

AN EDUCATIONAL PROGRAMME FOR NURSES TO FACILITATE CARDIAC
REHABILITATION OF PATIENTS WHO HAD HEART VALVE REPAIR OR
REPLACEMENT SURGERY IN NAMIBIA

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ABSTRACT

Heart valve disease is a critical global public health issue, contributing to cardiovascular morbidity and mortality worldwide. It serves as an indication for heart valve repair and replacement surgeries, which are invasive procedures that can potentially compromise patients' quality of life. Therefore, patients who have had heart valve surgery require cardiac rehabilitation to prevent potential complications and to improve patients' quality of life. Recognizing the need for enhanced post-surgery care, there is a compelling need for the development of an educational programme for nurses to facilitate cardiac rehabilitation of patients following heart valve surgery. This initiative not only would improve the patient's quality of life but also provide support to caregivers in their roles. The study was aimed at the development of an educational programme for nurses to facilitate the cardiac rehabilitation of patients who have had a heart valve repair or replacement surgery at the Windhoek Central Hospital's Cardiac Unit. The objectives of the study were to: describe the knowledge, attitudes, and practices of nurses regarding the cardiac rehabilitation of patients after heart valve surgery, explore and describe the challenges experienced by nurses when providing cardiac rehabilitation services to patients after heart valve surgery, explore and describe patient's experiences of recovery and coping after heart valve surgery, explore and describe caregivers' experiences in providing support and care to family members after heart valve surgery. The study followed a structured approach with four distinct Phases: Phase one was a situational analysis comprising four objectives, Phase two was about conceptual framework development based on Dickoff's theory of practice-oriented; Phase three, was about the educational programme development and Phase four was about the programme implementation, evaluation, and validation. A sequential explanatory mixed method design was employed, encompassing quantitative data collection and analysis in Phase One to determine nurse's knowledge, attitudes, and practices in cardiac rehabilitation. This was followed by qualitative data collection and analysis on the challenges experienced by nurses when providing cardiac rehabilitation services, patients' experience in recovery and coping, and caregivers' experiences in supporting and caring for family members after heart valve surgery.

Quantitative data were collected using self-administered questionnaires from a sample of twenty-three (23) nurses, out of the total study population of twenty-nine (29)

nurses. Data were analysed using the Statistical Software Program SPSS (version 27). The descriptive statistics analysis, Fisher's exact test, to describe the association between demographic characteristics and variables of knowledge, attitudes, and practices was performed. Qualitative data were collected through in-depth individual face-to-face semi-structured interviews using an interview guide for all three (3) objectives. A non-probability, purposive sampling method was used to select participants, resulting in a total of ten (10) nurses, twelve (12) patients, and eight (8) caregivers who consented to and participated in the study. Data collection continued until data saturation was achieved. Qualitative data were analysed using Tesch's eight steps of coding. The quantitative findings show that the majority of nurses, 20 (87%), had a high level of knowledge, with only 3 (13%) having average knowledge about CR. Similarly, the majority of nurses, 21 (91.3%), displayed positive attitudes while only 1 (4.3%) had a negative attitude. However, the findings on practices indicated that only half of the nurses, 13 (56.5%), showed good practice, while 8 (34.8%) had average practice, and 1 (4.3%) had poor practice in cardiac rehabilitation. Despite the high level of knowledge, respondents displayed a lack of knowledge specifically about the indications, benefits, phases, and core components of cardiac rehabilitation. **In the qualitative findings**, regarding *nurses' challenges*, two main themes and eleven (11) subthemes highlighted the challenges experienced by nurses in delivering cardiac rehabilitation interventions and their opinions on the importance of rehabilitation programmes after heart valve surgery. Regarding *patients' experiences*, two main themes and nine subthemes emerged indicating the challenges patients experienced (physical, emotional, psychological, and social factors) during recovery and coping after heart valve surgery as well as challenges regarding the support and care from nurses and family members after heart valve surgery. Regarding *caregivers' experiences*, two main themes and eight sub-themes emerged regarding the emotional disturbances and demand for care, along with varying experiences regarding the support and care provided by healthcare providers. Based on these findings, recommendations were put forth among others to the Ministry of Health and Social Services (MoHSS) for the development of a cardiac rehabilitation programme for nurses, improvement of nursing practice, as well as recommendations on future research in this area.

KEYWORDS: Heart valve surgery; Cardiac Rehabilitation; Educational Programme; nurses; patients; caregivers.

LIST OF PUBLICATION

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LIST OF ACRONYMS AND ABBREVIATIONS

AHA	American Heart Association
AACVPR	American Association of Cardiovascular and Pulmonary Rehabilitation
ACC	American College of Cardiology
ACRA	Australian Cardiovascular Health Rehabilitation Association
ARF	Acute Rheumatic Fever
BACPR:	British Association for Cardiovascular Prevention and Rehabilitation
C	Caregiver
CABG	Coronary Artery Bypass Grafting
CBCR:	Centre-based cardiac rehabilitation
CR	Cardiac rehabilitation
CPB	Cardiopulmonary Bypass
CVD	Cardiovascular disease
CRP	Cardiac Rehabilitation Programme
EAPC	European Association of Preventive Cardiology
ET	Exercise training
HBCR	Home-based cardiac rehabilitation
HVP	Heart valve patient
HVS	Heart valve surgery
HVR	Heart valve repair
INR	International Normalized ratio
KAP	Knowledge, Attitudes, Practice
LMICs	Low-Middle Income Countries
LV	Left ventricle
LVEF	Left ventricular ejection fraction
MDT	Multidisciplinary Team
MoHSS	Ministry of Health and Social Services
N	Nurse
OHS	Open Heart Surgery
PA	Physical activity
PHC	Primary Health Care

PMC	Percutaneous mitral commissurotomy
RF	Rheumatic fever
RHD	Rheumatic Heart Disease
SAVR	Surgical aortic valve replacement
TAVI	Transcatheter aortic valve Implantation
UNAM	University of Namibia
WCH	Windhoek Central Hospital
WHO	World Health Organisation

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DEDICATION

This dissertation is dedicated to my husband Emmanuel, and my children Mercedes, Xavier, and Malcolm.

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To my late parents Agnes Liseli and Michael Morrison Mulisa Mukendwa

DECLARATIONS

I, Lilian Sinte Masule, hereby declare that “The development of an educational programme for nurses to facilitate cardiac rehabilitation of patients after heart valve repair or replacement surgery”, is a true reflection of my research, and that this work or any part thereof has not been submitted for a degree at any other institution. No part of this thesis/dissertation may be reproduced, stored in any retrieval system, or transmitted in any form, or by any means whether electronic, mechanical, photocopying, recording or otherwise without the prior permission of the author, or The University of Namibia in that behalf.

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Name of Student



Signature

April 2025

Date

CHAPTER ONE

INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 INTRODUCTION AND RATIONALE

Heart valve repair or replacement surgery is a medical procedure for the treatment of moderate structural damage and scarring of the heart valves, which often occurs as a consequence of untreated rheumatic fever (RF) in patients (WHO, 2017; Choudhary, et al., 2016; Harris, et al., 2015). Rheumatic fever is a condition caused by an abnormal response of the connective tissues including the heart valves to infection with streptococcal bacteria, which usually begins as a sore throat and tonsillitis (WHO, 2017).

The surgical treatment for valvular heart disease can be either valve repair or valve replacement surgery (Urden, et al., 2018). Valve repair is undertaken when the valves become floppy and leaky. In this procedure, the diseased valve can be replaced with either a mechanical prosthesis (artificial), or a biological tissue valve (Urden, et al., 2018; Choudhary, et al., 2016; Harris, et al., 2015).

Mechanical prostheses and stented xenografts (bio prostheses) are the most common substitutes for aortic and mitral valves (Harris, et al., 2015). There is evidence to support that aortic valve replacement can enhance vitality, general health and overall quality of life, for patients with symptomatic severe aortic stenosis (Van Geldorp, et al., 2013). Although mechanical and biological valves may increase survival and improve a patient's quality of life, these substitutes carry their own health risks, particularly during recovery (Choudhary, et al., 2016; Harris, et al., 2015).

Studies conducted by Bourguignon, et al., (2014) and Harris, et al., (2015) revealed that complications such as thrombo-embolism and bleeding, infection, heart attack and

stroke are potential complications following mechanical valve replacement. Nevertheless, depending on the risks and potential complications associated with heart valve repair and replacement surgeries, patients can anticipate a return to normal life and health. Consequently, cardiac rehabilitation (CR) for patients following surgical interventions is crucial to prevent potential complications and enhance the overall quality of life (Ambrosetti, et al., Cowie et al., 2019; Piepoli, et al., 2014).

Furthermore, existing international guidelines, position papers, and policy statements from organisations such as the European Society for Cardiovascular Prevention and Rehabilitation (EACPR), the American Heart Association/American Association of Cardiovascular and Pulmonary Rehabilitation (AHA/AACPR), Australian Cardiovascular Health Rehabilitation Association (ACRA), the National Heart Foundation of Australia, the World Health Organisation, and consensus statements from low-resource countries, all advocate for the adoption of CR following cardiac surgery to support patients in their recovery from acute cardiac events (Ambrosetti, et al., 2021; Cowie, et al, 2019; Grace, et al., 2016; Piepoli, et.al., 2014; Woodruffe, et al., 2014; National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2004; American Association of Cardiovascular and Pulmonary Rehabilitation, 2013; WHO, 1993).

Additionally, in 1993, the Expert Committee on Rehabilitation after Cardiovascular Disease, convened by the WHO with a special focus on developing countries, recommended that cardiac rehabilitation should be an integral component of the long-term, comprehensive care provided to cardiac patients (WHO, 1993) and that such rehabilitation services should be accessible to all individuals with cardiovascular disease (WHO, 1993).

A cardiac rehabilitation programme is a medically supervised intervention designed to help patients cope with the challenges associated with recovery after heart surgeries to mitigate the risk of potential complications enhancing patients' physical functioning and improving their overall quality of life (Thomas, et al., 2019; American Heart Association, n.d.; Alosaimi, et al., 2017; Dalal et al., 2015). Cardiac rehabilitation services are comprehensive and long-term in nature, encompassing medical evaluation, prescribed exercise, cardiac risk factor modification, dietary guidance, and counselling (Dalal, et al., 2015).

Cardiac rehabilitation (CR) consists of three phases: Phase one (1) involves inpatient rehabilitation, assessment, and discharge; phase two (2) focuses on ambulatory outpatient rehabilitation and phase three (3) is dedicated to long-term maintenance (Alosaimi, et al., 2017; McMahon, et al., 2017; Varnfield & Karunanithi, 2015; Piepoli, et al., 2014). These phases and core components of CR are discussed in detail in Chapter 2.

The effective delivery of the core components of a cardiac rehabilitation programme (CRP) necessitates the involvement of a multi-disciplinary team, including cardiologists, physicians, nurse specialists, physiotherapists, dieticians, psychologists, exercise specialists, occupational therapists, and clerical administrators (Ambrosetti, et al., 2021; Cowie, et al., 2019; Dalal, et al., 2015; Piepoli, et al., 2014). According to the recommendations of the American Association of Cardiovascular and Pulmonary Rehabilitation, and American Heart Association and the European Society of Cardiology, CR should commence with patient assessment as early as possible after hospital admission, and this assessment should take place before the patient participates in the cardiac rehabilitation programme. The goal is to determine whether the patients are physically capable of adhering to the rehabilitation activities

(Ambrosetti, et al., 2021; Thomas, et al., 2019; Piepoli, et al., 2014; American Association of Cardiovascular and Pulmonary Rehabilitation, 2013).

Evidence indicates that implementation of CR may lead to improvements in patient vitality and functional capacity, a reduction in morbidity and mortality rates, a decrease in hospital re-admission and an improvement in overall quality of life (Dibben, et al., 2023; Taylor et al., 2021; Patel et al., 2019; Eichler, et al., 2017; Anderson et al., 2016; Goel, et al., 2015; Zanettini, et al., 2014).

1.2 BACKGROUND OF THE STUDY

Heart valve disease is a significant public health challenge contributing to cardiovascular morbidity and mortality worldwide. It serves as an indication for heart valve repair and replacement surgeries (Sibilitz, et al., 2016). According to WHO, (2020), rheumatic heart disease (RHD) alone claims the lives of 288 348 individuals each year with most of these cases occurring in low-and middle-income countries. The WHO reports that approximately 30 million people worldwide are currently affected by rheumatic heart disease (RHD) which results in the loss of 11.5 million disability-adjusted life years (WHO, 2018; Global Burden of Diseases Collaborative Network, 2016). Rheumatic heart disease induces inflammation in the cardiac valves, resulting in clinically silent valvular disease and severe permanent damage (Sika-Paotonu, et al., 2018). As a result on a global scale, rheumatic and congenital heart diseases are the predominant cause for cardiac surgery in low- and middle-income countries (Vervoort, et al., 2020).

According to the WHO, (2020), there is currently no cure for RHD, however, patients with severe RHD often require surgical intervention either to repair or replace the

damaged valve or valves. Globally, 75% of people lack access to heart surgery when it is needed, as a result of deficiencies in healthcare infrastructure, human resources and financial constraints (WHO, 2020). In Africa, approximately 15 million patients are living with rheumatic heart diseases, and an estimated 100,000 individuals require heart valve surgery each year at some point in their lives (Baumgartner, et al., 2017).

Nevertheless, Auchi, et al., (2020) report that approximately 300,000 heart valve surgeries are conducted worldwide annually. In the United States of America, between 1998 and 2005, approximately 340,000 surgical procedures were conducted for aortic and mitral valve heart pathology, accounting for 6, 342 and 287,989 heart valve repair and replacement respectively (Barnett, 2008).

In Africa in 2012, there were approximately 10,725 open heart surgeries conducted in 78 centres, accounting for 11.8 open heart operations per million people (Yankah, et al., 2014). During the same year, 22 centres in Sub-Saharan Africa, and 56 centres in North Africa performed approximately 1, 277 and 9,448 open heart operations respectively (Yankah, et al., 2014). This data indicates a rising trend in open-heart surgeries in Africa, along with potential complications associated with such procedures. Furthermore, a study conducted by Mirabel, et al., (2017) on cardiac surgery in Mozambique reported that between 2001 and 2011, about 56.67% and 33.33% of cardiac patients underwent mitral valve and aortic valve replacements.

In Namibia, according to records from outpatient and inpatient registers at Windhoek Central Hospital spanning from 2010 to 2020, there were 718 active patients diagnosed with RHD, resulting in a prevalence rate of 28 cases per 100 000 individuals in 2017 (Ministry of Health and Social Services, 2017). Additionally, during this period, 74

deaths were attributed to RHD according to the Windhoek Central Hospital, Cardiac Unit Information Registry, (Ministry of Health and Social Services, 2017).

Moreover, between January 2014 and September 2014, a significant number of 230 patients were diagnosed with RHD at the Windhoek Central Hospital Cardiac Clinic, and this number increased to 255 between January and August 2015 (MoHSS, 2015). Similarly, in 2017 between July and December 2017, approximately 216 patients were seen at the Cardiac Clinic and diagnosed with Rheumatic Heart Disease (MoHSS, 2017). These statistics indicate an increasing prevalence of valvular heart diseases which may require heart valve surgeries, and subsequently, may carry potential complications.

Furthermore, in Namibia heart surgery is conducted to address both heart valve repair and replacement procedures, using biological and mechanical prostheses. In 2019, 126 patients underwent cardiac surgery, while over 300 patients were awaiting heart surgery (Shindika, et al., 2019). According to the data from the Cardiac Unit Health Information Registry (2017), a total of 263 patients had valvular heart surgery from 2010 to December 2014. Additionally, 66 patients underwent cardiac surgery, between April 2017 and October 2017. Among these, a total of 87 patients underwent cardiac surgery for valvular repair and replacement (MoHSS, 2017).

While heart valve repair and replacement surgeries can significantly improve a patient's functional capacity and quality of life, the literature indicates that individuals who have undergone these procedures often encounter various mental and social challenges such as anxiety and depression (Siblitiz, et al., 2016). Additionally, they may face physical challenges such as fatigue, pain around the incision area, insomnia and difficulty in falling asleep as well as respiratory distress 10 to 30 days post-

discharge from the hospital after cardiac surgery (Yaman Aktas, et al., 2021). Furthermore, these patients may experience complications such as thrombo-embolism, endocarditis, arrhythmia, and a decline in the functioning of the repaired valve (Misawa, 2015; Samiei, et al., 2014; Sibilitz, et al., 2013).

Despite all the complications associated with heart surgery, research by Taghadosi, et al., (2014) has indicated that patients often lack the necessary support, as they do not receive adequate information from hospital staff regarding rehabilitation after heart valve replacement. Another study conducted in Belgaum, Karnataka by Degavi, and Bhupali, (2015) further emphasizes that the majority of nursing staff lacks the requisite knowledge about the rehabilitation of patients after heart valve repair or replacement surgery. These findings underscore the need for providing nurses with education and training in the field of cardiac rehabilitation to better support these patients.

A study conducted in China on CR among healthcare providers revealed a deficiency in awareness and understanding of CR among healthcare professionals, as well as a lack of time and staff to deliver cardiac rehabilitation services (Liu, et al., 2021). Conversely, a study conducted in Australia to explore the impact of home-based CR revealed that patients believed the programme significantly contributed to their recovery (Frohmader, et al., 2018). They expressed satisfaction with the information guidance and support provided by nurse mentors (Frohmader, et al., 2018).

Furthermore, it's important to emphasize the vital role of family support and care, both in terms of physical assistance and emotional support after heart surgery. A study by Berg, et al., (2013) reported that some patients express gratitude for the support they received from their relatives during their recovery process. These patients often state

that without the help of their family members, they would not have been able to return home early.

Considering the various challenges that patients often encounter following heart valve surgery (HVS), there is a need for the establishment of a CRP in Namibia. Such a programme can significantly reduce morbidity, and mortality rates and improves the quality of life for patients who have undergone heart valve repair or replacement surgery. The existing literature strongly recommends the implementation of medically supervised cardiac rehabilitation programmes for patients after heart valve surgeries. These programmes play a crucial role in helping patients cope with the challenges associated with heart surgery and prevent potential complications (Grace, et al., 2016; Anderson et al., 2016; Dalal, et al, 2015).

Cardiac rehabilitation is a comprehensive long-term medical program that encompasses a range of essential elements. These components include counselling for patients to address their emotional and physical well-being, wound care to prevent infection, guidance on compliance with post-operative medications, especially Digitalis and Warfarin; adjustments to physical activity levels, including the modulation of physical sexual activities, emotional support, and management, lifestyle changes such as the avoidance of risky behaviours and dietary modifications (Ambrosetti, et al., 2021; Cowie, et al., 2019; Thomas, et al., 2019; Dalal, et al, 2015; Piepoli, et al, 2014). It also includes monitoring of health parameters, such blood lipid profiles, and blood pressure (Taylor, et al., 2021; House, et al., 2018; Pollmann et al., 2017; Anderson, et al., 2016). These components collectively contribute to the comprehensive care and recovery of patients following heart valve surgery.

Despite the well-documented benefits of CR and clinical guidelines from developed countries recommending its use for cardiac patients, it remains significantly underutilized on a global scale. Globally, cardiac rehabilitation programs are available in just 38.8% of countries worldwide. Even more concerning is the fact that these services are accessible in only 23% of low-middle-income countries (LMICs), which bear the highest burden and experience the highest mortality rates from cardiovascular disease (Turk-Adawi, et al., 2014). Furthermore, in low-income countries, cardiac rehabilitation services are available in just 8.3% of cases, with specific examples including Afghanistan, Bangladesh, and Kenya (Turk-Adawi, et al., 2014). This underutilization represents a significant gap in care, particularly in regions where the need is most acute.

Numerous studies have been conducted to identify the reasons behind the underutilization of CR despite its benefits. Researchers such as Santos, et al., 2023; Martijn, et al., 2023; Ragupathi, et al., 2017; and Sérvio, et al., (2019) have reported various contributing factors. Physician-related factors, including a lack of a referral system, and inadequate training in cardiology for CR, have been identified as barriers. Patient-related factors, such as time constraints, financial affordability, motivation levels, transportation issues, geographical distance to CR centers, lack of awareness about CR, concerns about strenuous exercises and painful procedures, elevated anxiety levels, and a perceived lack of need for CR, also plays a significant role. System-related factors encompass a lack of resources, the financial unprofitability of CR programmes for patients, and the potential loss of income during CR participation, as highlighted by Varghese, et al., (2022). All of these factors combined contribute to the underutilization of CR, underscoring the need for targeted strategies to address these barriers and enhance CR accessibility. These findings underscore the need for targeted

interventions to address these specific obstacles and promote greater utilization of cardiac rehabilitation among patients in low-resource settings.

Indeed, adherence to the interventions offered by a CRP can lead to significant reductions in the risk of complications, as well as improvements in the patient's level of functioning and quality of life. Numerous studies have provided evidence that patients who participate in cardiac rehabilitation experience decreased morbidity and mortality rates.

1.3 STATEMENT OF THE PROBLEM

Coping with heart valve repair or replacement surgery without access to cardiac rehabilitation (CR) might be challenging for most patients recovering from heart surgery. Despite the well-established benefits of CR and its inclusion in international guidelines, a significant proportion of patients in developing countries do not have access to cardiac rehabilitation programmes (Grace, et, al., 2016; Turk-Adawi, et al., 2014; WHO, 1993).

There is limited information available regarding the availability of CR in most developing countries, including Namibia. The researcher has observed that after discharge from the Cardiac Unit, patients who had heart valve surgery receive inadequate nursing care. Typically, patients are seen by healthcare providers only when they are readmitted with valve-related complications or require reoperation of heart valve surgery. This highlights a critical gap in the continuity of care for these patients, particularly in the post-surgery phase where CR could offer significant benefits.

During the period from April 2017 to June 2017, a total of 15 patients underwent valvular replacement surgeries at the Cardiac Unit, Windhoek Central Hospital. Of

these patients, 7 (46.7%) had previously undergone heart valve surgery that had failed, necessitating another replacement procedure. In addition, at the Cardiac Unit between April and June 2015, among 11 patients who underwent open-heart surgery, 2 (18%) were for reoperation of mitral valve replacement, all due to valve-related complications after cardiac surgeries (Ministry of Health and Social Services, 2017). These statistics highlight the challenges and complexities associated with heart valve surgeries and underscore the importance of comprehensive post-operative care through cardiac rehabilitation to prevent and manage complications.

Furthermore, it's critical to acknowledge that some patients who have undergone heart surgery may present at the Cardiac Clinic with advanced complications, while others may, unfortunately, die at home and only be recognized as such when they repeatedly fail to return for follow-up appointments. The Cardiac Unit Health Information Registry (2016) reported 22 deaths among patients who had undergone heart valve surgeries between April 2015 and December 2015 (Ministry of Health and Social Services., 2016). Additionally, after HVS, patients are typically prescribed life-long post-surgical treatment regimens such as Aspirin for those with biological prosthesis and Warfarin for those with mechanical valve replacements (MVR) to prevent clotting and embolism. However, these medications require continuous monitoring of parameters like Prothrombin time index (PTI) and International Normalised Ratio (INR), to which patients are expected to comply (Shimanda, et al., 2022).

Furthermore, the researcher noted that most patients residing outside of Windhoek do not comply with the life-long post-surgical treatment, particularly the Warfarin regimen. Many of these patients discontinue taking the medication which can lead to serious complications including valve failure necessitating a repeat surgery. This lack of adherence is often attributed to a lack of knowledge and information on the

management of the Warfarin regimen after being discharged from the hospital. Addressing this gap in patient education and support is imperative to improve long-term outcomes for individuals who have undergone heart valve surgery.

The statistics regarding deaths and reoperations among patients who had undergone heart valve surgery in Namibia clearly highlight the presence of heart valve surgery-related complications. Many of these complications may have been preventable with the availability and implementation of a cardiac rehabilitation programme. In addition, the repeated hospitalisations, the need for reoperations, and the unfortunate deaths not only have significant implications for patient well-being but also contribute to a substantial economic burden on healthcare services in Namibia.

In Namibia, there is a dearth of knowledge regarding the attitudes, knowledge, and practices (KAP) of nurses as well as regarding challenges experienced by nurses in providing cardiac rehabilitation services to patients after heart valve replacement surgery. In support of this statement, a study conducted in Nigeria on the challenges of cardiac rehabilitation highlighted several issues, including the absence of dedicated personnel and limited access to the necessary equipment needed for cardiac rehabilitation (Auchi, et al., 2020). This underscores the challenges faced by healthcare professionals in delivering effective CR services due to a lack of essential resources.

Moreover, there is limited knowledge regarding the experiences of patients during their recovery and coping processes, as well as the experiences of caregivers who provide support and care to their family members following heart valve repair or replacement surgery. Given the gaps in knowledge and the complex nature of CR in Namibia, the researcher recognises the need for the development of a programme specifically aimed at equipping nurses with the knowledge and skills necessary to

facilitate CR of patients who have undergone heart valve repair or replacement surgery at Windhoek Central Hospital, Cardiac Unit.

Given the stated complexity of the problem, the researcher formulated the following research questions:

- What is the current level of knowledge, attitudes, and practices among nurses regarding cardiac rehabilitation of patients who have had heart valve repair or replacement surgery?
- What challenges do nurses experience when providing cardiac rehabilitation interventions to patients who have had heart valve surgery?
- What are the experiences of patients in recovery and coping after heart valve repair or replacement surgery?
- What are the experiences of caregivers who provide support and care for a family member recovering from heart valve repair or replacement surgery?
- In what ways do the qualitative data help to explain the quantitative results?
- How can a programme be developed to provide nurses with the necessary skills and knowledge to facilitate the cardiac rehabilitation of patients who have undergone heart valve surgery?
- What components should be included in a comprehensive programme aimed at facilitating cardiac rehabilitation of patients who have undergone a heart valve repair or replacement surgery?
- How could the educational programme for cardiac rehabilitation have been implemented and validated effectively?

1.4 AIM OF THE STUDY

The aim of the study was to develop, implement and evaluate/validate an educational programme for nurses to facilitate the cardiac rehabilitation of patients who had a heart valve repair or replacement surgery at the Cardiac Unit, Windhoek Central Hospital, Khomas region.

1.5 OBJECTIVES OF THE STUDY

The objectives of the study were to:

Phase 1: Situational Analysis

Objective 1.1: Describe the level of knowledge, attitudes, and practices of nurses regarding the cardiac rehabilitation of patients who have had heart valve repair or replacement surgery. [Phase 1]

Objective 1.2: Explore and describe the challenges experienced by nurses when providing cardiac rehabilitation services to patients who have undergone heart valve repair or replacement surgery. [Phase 1]

Objective 1.3: Explore and describe the experience of patients during their recovery and coping process following heart valve repair or replacement surgery. [Phase 1]

Objective 1.4: Explore and describe the experiences of caregivers who provide support and care to a family member who has undergone heart valve repair or replacement surgery. [Phase 1]

Objective 1.5: Explore and describe nurses' challenges in providing cardiac rehabilitation services to patients after HVS to explain the nurses' knowledge, attitudes, and practices regarding cardiac rehabilitation. [Phase 1]

Phase 2: Conceptual framework

Objective 2: Develop a conceptual framework for cardiac rehabilitation based on the findings from the situational analysis to provide a structured understanding of cardiac rehabilitation for this patient group. [Phase 2]

Phase 3: Educational Programme

Objective 3: Develop an educational programme designed for nurses to facilitate cardiac rehabilitation for patients who have had a heart valve repair or replacement surgery. [Phase 3]

Phase 4: Implementation and evaluation/validation

Objective 4: Implement, evaluate, and validate the effectiveness of the educational programme for nurses to facilitate cardiac rehabilitation of patients who have undergone heart valve repair or replacement surgery. [Phase 4]

1.6 RESEARCH DESIGN AND RESEARCH METHODS

Research Design

The study employed mixed Explanatory sequential design to describe the knowledge, attitudes, and practices of nurses regarding CR interventions for patients who underwent HVS as well as to discover the underlying meanings of reality about the challenges experienced by nurses in providing CR services to patients who underwent heart valve surgery, the experiences of patients on recovery and coping after HVS, and the experiences of caregivers as they provided support and care to their family members who had heart valve surgery. The explanatory sequential design is a two-phase mixed methods design in which the researcher begins with the collection and analysis of quantitative data, which is followed by the collection and analysis of qualitative data to help explain the initial quantitative results for the researcher to understand the complexity of CR from different methods, thus increasing the validity

or trustworthiness of the research (Creswell, and Clark, 2018). The study consisted of four (4) Phases as summarized in Table 1.1.

Table 1.1 Research Design

Design: Explanatory Sequential Mixed Method		
Phase 1: Situational analysis		
Study objectives	Approaches	Methodology
Objective 1.1: Describe the level of knowledge, attitudes, and practices (KAP) of nurses regarding cardiac rehabilitation	Quantitative, Descriptive Cross-sectional	Study site; Study population; sample and sampling methods; data collection instrument and procedures; data analysis-Fischer's Exact Test, validity and reliability; results, ethical considerations.
Objective 1.2: Explore and describe challenges experienced by nurses when providing CR services to patients who have undergone heart valve repair or replacement surgery.	Qualitative Exploratory, Contextual Descriptive	Study site; Study population; sample and sampling methods, sample size; data collection instrument and procedures; data analysis-Tesch's steps content analysis; trustworthiness; findings, ethical considerations (Objective 1.2-1.4).
Objective 1.3: Explore and describe the experience of patients during their recovery and coping process following heart valve repair or replacement surgery.	Qualitative Exploratory, Contextual Descriptive	Study site; Study population; sample and sampling methods, sample size; data collection instrument and procedures; data analysis-Tesch's steps content analysis; trustworthiness; findings, ethical considerations (Objective 1.2-1.4).
Objective 1.4: Explore and describe the experience of the caregivers who provide support and care to a family member who have undergone heart valve repair or replacement surgery	Qualitative Exploratory, contextual Descriptive	Study site; Study population; sample and sampling methods, sample size; data collection instrument and procedures; data analysis-Tesch's steps content analysis; trustworthiness; findings, ethical considerations (Objective 1.2-1.4).
Phase 2: Conceptualization		
Objective 2 Develop a conceptual framework for cardiac rehabilitation based on the findings from the situational analysis to provide a structured understanding of cardiac		Practical oriented theory of Dickoff, James, and Wiedenbach (1968). Six survey lists: (Agent, Recipient, context, dynamic, procedure, Terminus).

rehabilitation for this patients group. [Phase 2].

Phase 3: Development of an educational programme for nurses to facilitate cardiac rehabilitation

Objective 3:

Develop an educational programme for nurses to facilitate cardiac rehabilitation for patients who have had a heart valve repair or replacement surgery.
[Phase 3]

Programme content

Curriculum development Model: Nicholls and Nicholls Cyclical Model (1978)

Phase 4: Implementation, evaluation, and validation of an educational programme for nurses to facilitate cardiac rehabilitation

Objective 4:

Implement and validate the effectiveness of the educational programme for nurses in facilitating cardiac rehabilitation of patients who have undergone heart valve repair or replacement surgery.

Theories for implementation of the educational programme:

Nicholls and Nicholls Cyclical Model (1978)

Kolb's Experiential Learning,
Knowles adult learning theory (1984),
Gagne's theory of instruction

1.7 SIGNIFICANCE OF THE STUDY

The findings from this study are expected to inform health policy and guidelines related to CR for patients who have undergone heart valve repair or replacement surgeries. The findings served to inform the development of an educational programme (CRP) for nurses to facilitate CR of patients who had heart valve repair or replacement surgery. The development and implementation of the educational programme are expected to improve the knowledge gap and modify the attitudes and practices of the nurses involved in the CR of patients who have undergone heart valve repair or replacement surgery at Windhoek Central Hospital's Cardiac Unit and Cardiac Clinic. The implementation of the educational CRP by knowledgeable nurses with positive attitudes has the potential to improve patient's quality of life, reduce mortality, and reduce hospital readmission and hospital costs. This study has the potential to address

the deficiencies in the literature about cardiac rehabilitation within the areas of clinical nursing sciences in Namibia and therefore contribute to the body of knowledge in this area.

1.8 CONTEXT OF THE STUDY

The study was conducted at the Cardiac Unit and Cardiac Clinic of Windhoek Central Hospital in Namibia. The Republic of Namibia is located in South-West of Africa and covers a surface area of about 824,269 km². Namibia is characterized by its low population density, and as of the most recent census in 2016, the total population of Namibia was recorded at 2 324 388 (Namibia Statistics Agency, 2017). The country is bordered by the South Atlantic Ocean to the west, Angola to the north, Botswana to the east and South Africa to the South.



Figure 1.1: Map of Namibia with geographical location and regional administrations

Source: <https://www.nationsonline.org/maps/namibia-administrative-map.jpg>

Namibia is classified as a middle-upper-income country according to World Bank statistics (WHO, 2019). However, socio-economic inequality and the unavailability of healthcare services continue to persist. Overall, the unemployment rate stands at 29%, with youth unemployment as high as 43.4%. Literacy levels in Namibia are relatively high among the population aged 15 and above, standing at 89% (Namibia Statistics Agency, 2017).

The Ministry of Health and Social Services (MoHSS) adopts a primary health care (PHC) approach in the provision of healthcare services. The MoHSS plays a stewardship role in the formulation of policies, strategic plans, resource mobilisation, allocation, and external relations about the provision of health care services in Namibia. The PHC approach is grounded in four fundamental Pillars: health promotion, disease prevention, curative services, and rehabilitation services. Consequently, this study is based on the fourth pillar, aiming to develop an educational programme for nurses to facilitate CR of patients who have undergone heart valve repair or replacement surgery.

Windhoek Central Hospital is the only largest national referral and teaching hospital in Namibia, offering specialized health care services. These services include treatment of patients who have undergone cardiac surgery. The hospital boasts a substantial bed capacity of up to 855 patients. The uniqueness of the hospital lies in the diverse range of specialists, including those in the field of cardiac surgery (<https://www.electives.net/hospital/6851/preview>). The hospital was purposely selected for this study as it is the only national referral hospital in Namibia where Open-Heart Surgeries (OHS) are performed.

The study was conducted at the Cardiac Unit and Cardiac Clinic situated on the first-floor wing at Windhoek Central Hospital in the Khomas region. The Cardiac Unit

including the Cardiac Clinic has a nursing staff complement of twenty-nine (29) staff members responsible for delivering nursing care to patients with cardiac conditions.

The Cardiac Unit offers a comprehensive range of heart treatment services including:

- Open heart surgeries, for patients with rheumatic heart diseases.
- Cardiothoracic surgeries for patients with lung diseases.
- An outpatient cardiac clinic, providing services to patients from Monday to Friday.
- A cardiac paediatric unit, dedicated to screening children for congenital heart diseases.
- Catheter laboratory services, conducting cardiac diagnostic procedures and other interventions to determine the causes of heart conditions.
- An echocardiogram unit, specializing in investigations to assess the entire structure of the heart.
- Renal degeneration services, focusing on the treatment of patients with chronic high blood pressure.
- Referral of the most complicated cases especially paediatrics to the Republic of South Africa (Ministry of Health and Social Services, n.d).

1.9 PARADIGMATIC PERSPECTIVES

Laudan (1995), as cited in (Brink, et al., 2018) defines a paradigm as a set of assumptions regarding how entities in the world interact with each another and with themselves. It also encompasses approaches for generating and testing hypotheses.

The term paradigm gained popularity through the work of the American philosopher Thomas Kuhn (1922-1996) and was later endorsed by Guba and Lincoln (1994, as

cited by Kivunja & Kuyini, 2017). It is described as an accepted set of beliefs or values that guide the research process. A paradigm influences various aspects of research, including the selection of research subjects, the types of data to be collected, the methods employed for data analysis, and the interpretation of research findings (Kivunja & Kuyini, 2017).

This study employed a mixed-method approach, representing a paradigm that encompasses worldwide perspectives and their associated philosophical assumptions (Creswell & Creswell, 2018). According to Creswell and Clark (2018), mixed methods research draws from four worldviews: constructivism, post-positivism, transformative, and pragmatism. This study utilized the pragmatism worldview, which, as described by Creswell and Clark, (2018), encompasses a diverse body of ideas that focus on what works, incorporating various methods and valuing both objective and subjective knowledge from a range of sources. Pragmatism employs a variety of data collection techniques to address the research topic's core question while prioritizing the question asked above the methods (Creswell, & Clark, 2018). Furthermore, Gray & Grove, (2021) define pragmatism as a worldview suitable for researchers seeking solutions to problems.

Pragmatism provides a framework to assist researchers in selecting the most suitable methods. According to Creswell and Clark, (2018), pragmatists believe that individual researchers have the freedom to choose, the research methods, techniques, and procedures that best align with their needs and objectives. Moreover, Creswell and Clark, (2018) state that both quantitative and qualitative research methods can be used within a single study.

In this study, the research followed a mixed-method explanatory sequential approach for data collection and analysis. The explanatory sequential design is a mixed methods approach in which the researcher initially conducts quantitative data collection and analysis, followed by the collection and analysis of qualitative data to assist explain or explore the findings from the quantitative phase (Creswell, & Clark, 2018).

In this study, the research was conducted in two parts using the same participants from the quantitative research. First, quantitative data on the nurses' knowledge, attitudes, and practices regarding CR were collected and analysed. This was followed by the collection and analysis of qualitative data on nurses' challenges in providing CR, the experiences of patients, in recovery and coping as well as caregivers' experiences in providing care to a family member after heart valve surgery. The qualitative data were used to explain and clarify the results obtained from the quantitative data.

Therefore, the paradigm guided the researcher in organising the thoughts, observations, and interpretations of the results of this study. Furthermore, the paradigm helped structure the data collection process as well as establish the conceptual boundaries of the research project. It also enabled the researcher to effectively capture the knowledge, attitudes, and practices (KAP) of nurses regarding CR of patients who had heart valve surgeries, the challenges experienced by the nurses in providing CR services, as well as the experiences of patients in recovery and coping after HVS and experiences of caregivers in providing support and care to family members who had heart valve surgery.

This study was based on paradigmatic assumptions related to ontology, epistemology, axiology, and methodology, as described in the following sections.

Ontological assumptions

According to Creswell, and Clark, (2018), ontology is a philosophy that examines the nature of reality regarding the study's subject. Kivunja, and Kuyini, (2017) state that ontology enables the researcher to examine their underlying belief system and philosophical assumptions regarding the nature of being, existence, and reality. Gray, and Grove, (2021) note that ontology investigates questions such as "What does it mean to exist?" and "What is real?". When selecting qualitative methodologies, researchers often acknowledge the existence of multiple realities (Gray, & Grove 2021). In this study, a mixed methods approach was employed for quantitative research to explore and describe the nature of reality concerning the KAP of nurses regarding CR interventions for patients who underwent heart valve surgery. To achieve this, the researcher chose to use self-administered questionnaires as data collection tools.

In qualitative methods, the researcher aimed to discover the underlying meanings of reality about the challenges experienced by nurses when providing CR services to patients who underwent HVS, the experiences of patients during their recovery and coping after HVS, and the experiences of caregivers as they provided support and care to their family members who had heart valve surgery. Multiple realities were explored such as the critical appraisal of research articles (Grove, et al., 2015), conducting individual face-to-face interviews, prolonged engagement with participants, field notes, and inclusion of direct quotations from participants' interviews. Various themes and subthemes were identified that help capture the diverse aspects of reality about the challenges experienced by nurses in providing CR interventions, the experiences of patients during their recovery and coping, and the experiences of caregivers in providing support and care to family members who had heart valve surgery (Creswell and Clark, 2018; Grove, et al., 2015).

Epistemological assumptions

Epistemology is a philosophical branch concerned with the nature of knowledge and how individuals arrive at an understanding of the truth or reality related to a particular phenomenon (Kuvunya, and Kuyini, 2017). According to Gray and Grove (2021), it investigates questions such as "What constitutes knowledge?" "How is knowledge generated?" and "How can one know what is real?". Epistemology guides researchers in the acquisition of pertinent information for the studies. In this study, the researcher gathered knowledge through both quantitative and qualitative data obtained from the participants. Through quantitative methods, and epistemological perspectives, the researcher acquainted herself with the nurses' knowledge, attitudes, and practical skills concerning the CR for patients who underwent heart valve surgery. Moreover, this knowledge was acquired by designing a structured questionnaire based on the literature review and best practices regarding cardiac rehabilitation.

Similarly, in qualitative research, the data were gathered by reviewing research articles from relevant databases that focused on the core components of CR of patients who had undergone heart valve repair or replacement surgery. Further, data were collected through face-to-face in-depth interviews regarding the challenges experienced by nurses when providing CR; patients' experiences during recovery, and caregivers' experiences in supporting and caring for their family members who had undergone heart valve surgery.

Additionally, the interview questions were carefully designed to provide nurses, patients, and caregivers with a structured yet open platform to express themselves freely and share their experiences. This approach aimed to capture the truth and reality of the phenomenon being investigated. The researcher also dedicated ample time to

engage with the participants during face-to-face interviews, allowing for a deeper understanding of their experiences and the reality they faced. Through this extended interaction and in-depth interviews, the researcher gained valuable insights into the challenges experienced by nurses, patients, and caregivers regarding CR following heart valve surgery.

Therefore, the knowledge acquired served as the foundation for the development of an educational programme aimed at equipping nurses with the necessary knowledge and skills to facilitate CR for patients who have undergone heart valve surgery. The detailed results and findings of this study are presented in Chapters 4 and 5 and interpreted.

Axiological assumptions

Axiology refers to the ethical considerations essential in planning and implementing interventions. It involves defining, evaluating, and understanding concepts related to the right and wrong behaviour of the researcher (Kuvunya and Kuyini, 2017). Gray and Grove (2021), further describe axiology as founded in questions such as "What is right?" and "What is the value of a person?". In this study, the researcher was objective during the data collection, analysis, and interpretation of the results from quantitative data. Similarly, in the qualitative phase involving face-to-face interviews, objectivity was maintained as the researcher bracketed their own beliefs, opinions, values, assumptions, and knowledge about the phenomenon under study. Objectivity was consistently upheld throughout the data collection processes, data handling, analysis, and interpretation of the findings and results.

Furthermore, it is important to note the significance of values held by both parties in the study. Throughout this study, the participants' rights were respected as they were informed about the goal of the study before the data collection and of their freedom to

withdraw anytime if they felt uncomfortable or unwell without any penalties. Participation was entirely voluntary, and participants were informed that sharing their experiences of recovery after HVS and the support and care provided to patients by caregivers would not expose them to any risks or harm. Moreover, the ethical principles of beneficence, non-maleficence, and justice were consistently applied throughout the data collection and analysis process ensuring the well-being of the participants and preventing any harm or injustice.

Methodological assumptions

Methodological assumptions refer to the research approach, design, methods, and procedures meticulously planned to address the research problem and research questions (Kivunja & Kuyini, 2017). In this study, the researcher employed a pragmatic mixed-methods approach. Quantitative data were collected and analysed in the initial phase, followed by the collection and analysis of qualitative data to provide further insights into the quantitative results during the situational analysis in Phase 1. For the quantitative strand, a descriptive approach was utilized to describe the KAP of nurses regarding the CR of patients following heart valve surgery. The data were collected using self-administered questionnaires designed to assess the KAP of the nurses regarding cardiac rehabilitation.

In addition, the exploratory qualitative approach involved the collection of data through individual in-depth face-to-face interviews. This approach aimed to capture the real-life experiences of the nurses, patients, and caregivers regarding the challenges experienced in providing CR, patients' experiences related to recovery, and coping after heart valve repair or replacement surgery as well as caregivers' experience in providing support and care to a significant one who had heart valve surgery.

1.10 THEORETICAL BASIS OF THE STUDY

According to Gray, and Grove, (2021), a theory is a creative and rigorous framework of ideas used to describe, explain, predict, or control a particular phenomenon or a segment of the empirical world. Furthermore, Creswell and Clark, (2018) indicated that a theory plays a crucial role in providing a comprehensive rationale for research objectives.

This study applied the following theories and models which were deemed to be appropriate:

- Dorothea Orem's self-care deficit nursing theory (2001)
- Roy Adaptation Model (RAM)
- The Practice Theory of Dickoff, James and Wiedenbach (1968)
- Cardiac Rehabilitation Framework
- Nicholls and Nicholls Cyclical Model of Curriculum Development (1978).
- Knowles adult learning theory (1984)
- Kolb's experiential learning
- Gagne's theory of instruction

Orem's Theory on Nursing

Orem's theory on nursing (2001), as cited in George, (2014), was applied to the study during the situational analysis (**Phase 1**). This theory was used to describe the patient's need for care after HVS, and the caregivers' need for support to cope with the demands of caring for their family members who had heart valve repair or replacement surgery within the framework of Orem's construct of self-care deficit.

The four constructs of Orem's theory were applied as follows:

Human-being: Orem 2001 as cited in George (2014) believes that human beings are capable of independent thought and interaction with their environment and have the ability for development and learning. In this study, human beings encompassed patients, caregivers, and nurses. The study explored the challenges experienced by the nurses in providing CR services to patients following HVS, as well as the experiences of patients in their recovery and coping after heart valve surgery. This involved exploring patients' thoughts, feelings, and behaviours as they interact with health care providers and caregivers to reach a stage of self-care to meet their needs. Furthermore, for this study, nurses are considered human beings who have the abilities and professional expertise required to provide CR to patients after heart valve surgery. Similarly, caregivers' experiences in providing support and care to a family member who underwent heart valve surgery and their interactions with patients to meet the needs of their recovering family members were explored.

Health: Orem's definition of health, as cited in George, (2014), is in agreement with the World Health Organisation's (WHO) 1946 definition of health as a state of physical, mental and social well-being, not merely the absence of disease or infirmity. Orem believes that an individual's health changes as their physical and mental characteristics change. Orem further emphasised that health care includes health promotion and maintenance, treatment of disease or injury and prevention of complications. In this study, the focus was on the health of patients during recovery after HVS while the focus for nurses was aimed at providing CR to improve their physical, psychological, and social well-being, enabling them to return to their normal activities.

With regard to caregivers, health represents the support and care that they offer to their family members to help them regain their health and resume normal activities. Moreover, health for the nurses represents the care and health information they provide to patients before and after discharge to facilitate recovery from their surgery, prevent potential complications, improve quality of life, and support the resumption of normal activities.

Society: Orem (2001), as cited in George, (2014) states that society values both self-help and assistance to others. As a result, patients who have undergone heart valve repair or replacement surgery are expected to be self-reliant and take responsibility for their rehabilitation and maintenance of their health. However, society also acknowledges that individuals who are helpless should be assisted to fulfil their responsibilities to the best of their abilities. Based on this assumption, the researcher has developed an educational programme for nurses to facilitate CR for patients who have had heart valve repair or replacement surgery. This programme aims to promote patient's self-care efforts and, in doing so, improve their overall health.

Nursing: Orem defines nursing as a human service, which differs from other human services because it primarily focuses on individuals who are unable to maintain self-care. Nursing care is necessary to sustain life and health, facilitate recovery from disease or injury and help individuals cope with the effects of illness. Based on the application of Orem's theory in this study, the cardiac nurses would provide care to the patients immediately after HVS while also promoting patients' ability to engage in self-care independently. Cardiac rehabilitation and self-care would commence while patients are still in the hospital postoperatively, before discharge, and continue into the maintenance phase after discharge (Varnfield & Karunanithi, 2015).

Roy's Adaptation Model (RAM)

The RAM was used to describe the changes that take place in individuals after heart valve surgery. Its purpose was to describe challenges experienced by patients when recovering from HVS and to pinpoint suitable nursing interventions for the patients who underwent HVS to facilitate physiological adaptation and enhance self-concept. The study focused on four key constructs of RAM: the physiological model, self-concept, role function and interdependence (George, 2014).

The physiological or physical mode represents the physical responses and interactions of the human system with its environment. This mode is based on physiological integrity and encompasses fundamental individual needs such as oxygenation, nutrition, elimination, activity and rest, protection, sensory perception, fluid and electrolyte balance, as well as neurological and endocrine functions (George, 2014). In the context of this study, the physiological mode represents the basic needs of patients during their recovery and coping phases after heart valve surgery. Following HVS patients may experience deficits in these physiological functions including sternotomy wound healing, difficulty breathing, pain, sleep disturbances caused by mechanical valve sounds, increased risk of infection, reduced appetite, self-care limitations, and challenges in resuming normal activities.

Additionally, the physiological mode represents the nurses' knowledge and insight of potential discomfort and complications that patients may experience after heart valve surgery. It encompasses the nurses' ability to implement interventions that can alleviate discomfort and prevent potential complications.

The self-concept mode is defined as the individual's mixture of beliefs and feelings about themselves at a particular point in time (George, 2014; Ursavaş, et al., 2014). It consists of both physical self and personal identity (George (2014). The physical self

includes elements such as body image and body sensation, while the personal self includes aspects like self-ideal, moral values and spiritual beliefs. For this study, the self-concept mode represents the experiences and perceptions of patients who have undergone heart valve surgery. It includes their beliefs and emotions regarding their body image. Vis-à-vis: the presence of a permanent scar on their chest, and their physical self, sexual function, and overall quality of life. It also represents the patients' beliefs and thoughts regarding the life-long treatment regimen, medication adherence, potential side effects, treatment outcomes and any sleeping disturbances caused by mechanical valve sounds.

The self-concept mode includes patients' perceptions of loss of social roles, feeling of vulnerability and insecurity. Self-concept mode is limited to patients, nurses can acquire the knowledge and skills needed to develop interventions and provide counselling to patients regarding their perceptions, beliefs, and feelings related to their physical and personal self-perception. This knowledge can empower nurses to assist individual patients in adapting and coping with changes in their life, and body image ultimately improving their quality of life. Additionally, nurses can use this knowledge to provide support and guidance to caregivers on how to care for their family members after heart valve surgery.

The role function mode refers to an individual's societal role and ability to fulfil their responsibilities. This mode encompasses to all individuals and groups including an individual's capacity to care for themselves after heart valve surgery. In this study, the role function mode represents the responsibilities of the patients who have undergone HVS to carry out household and employment-related tasks. For example, it includes the patient's capacity to perform self-care tasks to promote and enhance recovery after HVS, performance of prescribed exercises, and making appropriate dietary choices.

Additionally, it signifies the nurses' capacity, encompassing their knowledge and skills to provide appropriate care to patients after HVS with the aim of improving their recovery, overall quality of health and quality of life.

Lastly, **the interdependence mode** refers to the relationships between an individual and others, emphasizing the dynamics of giving and receiving love, respecting others and the presence of support systems (Ursavas, et al., 2014). Within this mode, the concept of interdependence encompasses the role of family and social support in assisting their family member after HVS to improve their quality of life and facilitate their return to normal activities. It also involves the care provided by nurses to patients who have undergone HVS to enhance their recovery. Details of the application of the Roy Adaptation Model are described in Chapter 5 of the discussion of the findings.

The Practice-Oriented Theory of Dickoff, James and Wiedenbach (1968)

The practice theory developed by Dickoff, James, and Wiedenbach, (1968) guided the development of the conceptual framework in Phase 2. This framework formed the foundation for the creation of an educational programme for the nurses to facilitate cardiac rehabilitation of patients who had undergone heart valve surgery. The three key components identified by Dickoff, et al., (1968) that were applied to this study include the purposes of the activity, the prescription of activities to achieve the study's goals, and the incorporation of the six concepts of the survey list (Dickoff, James, & Wiedenbach., 1968). These six concepts, which served as the basis for reasoning maps, included the agent, recipient, context, dynamic, procedure, and terminus. Detailed applications of these concepts are provided in Chapter 6 of conceptualisation.

Nicholls and Nicholls cyclical model (Nicholls and Nicholls, 1978)

The Nicholls and Nicholls Cyclical model (1978) was adopted to guide the development of the educational programme designed for the nurses to facilitate CR of patients who underwent heart valve surgery. This model follows a five-step approach that guided the development of the educational programme. These five steps encompass situational analysis, the selection of objectives, the selection and organization of content, the selection and organization of methods and the evaluation of programme implementation.

Situational analysis: Situational analysis enables the researcher to better understand the context in which the curriculum is developed. In the context of this study, the researcher collected data from the participants and analysed it and identified the specific needs of the participants (de Melo, et al., 2023).

Selection of objectives: The objectives for the implementation of the educational programme were carefully selected and formulated based on the findings from the situational analysis conducted in Phase 1. This was done to ensure that the programme effectively addresses the needs of the participants involved in the delivery of CR interventions for patients who had heart valve surgery.

Selection and organization of content: The content was selected and organised based on the objectives of the educational programme.

Selection and organization of methods: Additionally, various teaching methods were carefully chosen for the educational workshop for nurses regarding cardiac rehabilitation. These methods included lectures, role play, group discussions, questions and answers, case scenarios, and debates to create an engaging and effective learning experience.

Evaluation of the implementation of the programme: The participants would be assessed at the end of each day of the two-day workshop to assess their progress, the effectiveness of the programme, and whether the workshop's objectives have been met. The developed programme content was also validated by academic experts and cardiac nurse specialists to ensure its appropriateness in meeting the needs of recipients regarding CR for patients who had heart valve surgery. Further details regarding the application of Nicholls and Nicholls Cyclical Model are highlighted in Chapter 7.

Knowles adult learning theory (Knowles, 1984)

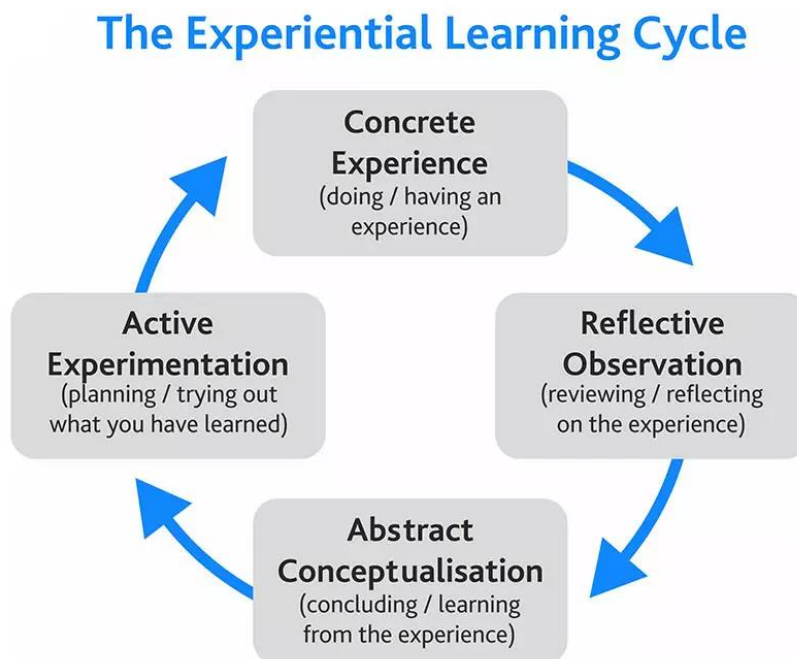
This theory was used to guide the researcher in the implementation of the educational programme. Knowles's Adult Learning theory is based on the key differences between adult and child learning and teaching (Bruce, & Klopper, 2017). Knowles' theory encompasses the art and science of adult learning. Knowles identified five assumptions regarding adult learners that the researcher considered during programme implementation namely: the learner's need to know, self-concept, the role of learner's experience, readiness to learn, orientation to learning, and students' motivation.

This theory was deemed to be appropriate for programme implementation because the nurse participants are also adult learners. According to Knowles, (1984), adults become increasingly self-directed as they age and take responsibility for their own learning needs. They learn more effectively in group settings and prefer to solve real-life situations and problems. The researcher will employ various teaching and learning strategies during programme implementation, including role-play, group discussion, case scenarios, and debates to ensure the active participation of all participants. Further details on the application of this theory are described in Chapter 7 of the study.

Kolb's Experiential Learning

Kolb's theory of experiential learning guides the procedures and techniques to be used during the implementation and evaluation of the educational programme for the nurses in Phases 3 and 4 as described in Chapters 7 and 8 respectively. According to Kolb, experiential learning is a process of learning by doing, rather than simply listening to others, or reading about it (Hughes & Quinn, 2013). Experiential learning is learning that results from experience. It involves active participation interaction, autonomy, flexibility, and a high degree of relevance in the learning process (Hughes & Quinn, 2013). Kolb's theory encompasses four cycles of experiential learning, which have been applied to the study.

Figure 1.2: The Kolb's four stages of learning cycle



Source: Adapted from Hughes & Quinn, (2013)

Concrete experience: In this stage, the participants would openly encounter new experiences related to cardiac rehabilitation (CR) or reflect on previous experiences they've had. This phase is facilitated through group discussion, debates, and role play.

Reflective observation: Following their active engagement in concrete experiences, participants would have an opportunity to think and reflect on what they have observed or learned during the training workshop about CR for patients who have undergone heart valve surgery.

Abstract Conceptualisation: In this stage, participants should transition from reflective observation to abstract conceptualization. They begin to categorize concepts and draw conclusions based on what they learnt about cardiac rehabilitation (Hughes, & Quinn, 2013).

Active experimentation: During this stage, participants have an opportunity to apply the new ideas they gained to the world around them. In the context of this study, the nurse participants would be encouraged to apply the new experiences and knowledge that they acquired during the training workshop to real-life situations involving the recovery of patients who have had heart valve surgery. They would be encouraged also to provide the caregivers with information on how to support and care for their family members after heart valve surgery. The application of Kolb's Experiential Learning theory is described in detail in Chapters 7 and 8.

Gagne's Theory of Instruction

Gagne's theory of instruction would be used during the implementation of the programme in Phase 4 and its detailed applications are discussed in Chapters 7 and 8. Gagne's instructional design model focuses on the learning outcomes and how to structure specific instructional events to attain those outcomes. It is based on the information processing model which explores the mental processes that occur when individuals are presented with different stimuli. According to Khadjooi, et al., (2011),

instructional events refer to the actions of both the teacher and the learner during the teaching session. Hughes and Quinn (2013) highlighted the conditions of learning such as internal conditions related to what the learner already knows prior to the instruction and external conditions involving the stimulus presented by the teacher.

Gagne's theory outlines nine events of instruction, all of which were applied to the study. These nine events are as follows: gaining the attention of the participants, informing students about the objectives, recalling prior learning, presenting the stimulus, providing student guidance, eliciting performance, providing feedback to the participants, assessing performance, and enhancing retention and transfer (Hughes, and Quinn, 2013). The application of Gagne's theory is discussed in detail in Chapter 7.

1.11 CONCEPTUAL FRAMEWORK FOR THE STUDY

The conceptual framework for cardiac rehabilitation was developed based on the findings of the situational analysis and is discussed in Chapter 2. This framework was adapted from the work of Dreyer, et al., (2021) and Grace, et al (2016) as well as the International cardiac rehabilitation guidelines association from the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR), European Association of Preventive Cardiology (EAPC), Australian Cardiovascular Health Rehabilitation Association (ACRA), and the British Association for Cardiovascular Prevention and Rehabilitation (BACPR) (Ambrosetti, et al., 2021; Cowie, et al., 2018; Woodruffe, et al., 2015; Pieopli, et al., 2014).

1.12 DEFINITION OF CONCEPTS

- **Rehabilitation** refers to a series of interventions designed to optimize functioning and reduce disability in individuals with health conditions in interaction with their

environment (Zagade & Chedake, 2022). In this study, rehabilitation encompasses a range of activities offered to patients after heart valve repair or replacement surgery to help them regain their normal life (<https://www.who.int/health-topics/rehabilitation>). The activities include health education, dietary counselling, exercise training, counselling, and psychosocial support.

- **Cardiac rehabilitation** is defined as the comprehensive set of activities aimed at positively impacting the underlying cause of the disease, while also creating the best possible physical, mental, and social conditions (WHO, 1993). These efforts enable patients to, through their own actions, either maintain or regain as normal a place as possible within the community (WHO, 1993). In the context of this study, cardiac rehabilitation refers to the range of interventions offered to patients following HVS including health education, advice on cardiovascular risk reduction, physical activity and exercise programmes, nutritional counselling, stress management, and support for returning to work.
- **Programme** a series of actions or events that are planned to be performed (<https://www.collinsdictionary.com/dictionary/english/programme>). In this study, programme refers to a wide range of interventions planned and implemented to aid patients who have undergone heart valve surgery. These interventions are intended to facilitate their recovery, minimize morbidity and mortality, reduce the likelihood of hospital readmission, and promote quality of life and well-being.
- **Educational programme:** Refers to a structured and coordinated series of educational activities and communications that are specifically designed to fulfil a defined set of educational objectives over an extended period (UNESCO, 2012). In this study, the educational programme was developed based on the findings from the situational analysis conducted in Phase 1. Its primary purpose is to

enhance the nurses with the knowledge to deliver quality nursing care to patients who have undergone heart surgery. Additionally, it aims to guide caregivers on how to support and care for their family members following heart valve surgery.

- **Patient** is an individual who is suffering from disease, injury, an abnormal state, or a mental disorder, and is engaged in related treatment (Farlex Partner, 2012). In this study, *patient* refers to a person suffering from heart valve disease and has subsequently undergone open heart valve surgery.
- **A nurse** is a person registered or enrolled as such in terms of Section 20 or regarded to be so registered in section 64; of the Namibian Act No 8 of 2004 (Republic of Namibia, 2004). In this study, a *nurse* refers to an individual who is registered by the Health Professions Council of Namibia (HPCNA) has undergone training in the intensive care unit and specialised in cardiothoracic nursing. These nurses are responsible for providing nursing care to patients with heart valve diseases and who have undergone heart valve repair or replacement surgery.
- **Registered nurse** refers to a person registered as such in Section 20, or regarded to be so registered in Section 64; of the Namibian Act No 8 Of 2004 (Republic of Namibia, 2004). In this study, is a nurse who holds either a diploma or a bachelor's degree in general nursing and midwifery science and who supervises the practice of an enrolled nurse in a setting.
- **Enrolled nurse** refers to a person enrolled as such in terms of Section 20, or who is regarded to be so enrolled in terms of Section 64 of the Namibian Act No 8 of 2004 (Republic of Namibia, 2004). In this study, is a nurse who holds a certificate in general nursing and midwifery and practices under a registered nurse's supervision.

- **Caregivers:** Informal caregivers are individuals who have close contact with others who suffer from a chronic or incapacitating ailment, such as heart failure and offer them unpaid support with daily activities of daily living (Grant & Graven, 2018). In this study, a caregiver is defined as a person who provides support and care to a family member who has undergone heart valve surgery, to assist in recovery from the operation and includes the mother, father, grandmother, sister, brother, uncle, or other relatives.
- **Family caregivers:** Family caregivers include individuals who provide care and support to both their biological or origin families as well as their chosen or non-biological families.
- **Knowledge:** Refers to awareness, understanding, or information that has been obtained by experience or study, and that is either in a person's mind or posted by people (Press, n.d). In this study, *knowledge* refers to the awareness and understanding of nurses regarding the questions related to cardiac rehabilitation for patients who have had heart valve repair or replacement surgery, as assessed through knowledge questionnaires.
- **Attitude** is the way that an individual thinks and feels about someone or something and the way that he or she behaves toward someone or something that shows how he or she thinks and feels (Oxford Advanced Learner's Dictionary, n.d). In this study, an *attitude* refers to the perception and beliefs held by the nurses who provide care to patients in the cardiac unit and cardiac clinic toward CR for patients who have undergone heart valve surgery.
- **Practice** refers to repeated exercise in or performance of an activity or skill so as to acquire or maintain proficiency in it (Lexico, n.d).

(<https://www.lexico.com/definition/practice>). In this study, *practice* refers to the nursing interventions provided by nurses to patients after heart valve surgery.

- **Surgery** is a medical treatment in which a patient's body part is incised with the purpose of the medical doctor /surgeon to repair or remove a diseased or damaged part (Collins Dictionary, n.d). In this study, *surgery* refers to open heart surgery performed by a cardiothoracic surgeon on patients diagnosed with heart valve diseases to repair or replace a diseased or damaged valve of the heart.
- **Valve replacement** is a surgical procedure that is performed to replace a valve of the heart that does not work properly or efficiently as a result of valvular heart disease. <https://www.heartandstroke.ca/heart-disease/treatments/surgery-and-other-procedures/heart-valve-surgery>. In this study, *valve replacement* refers to the replacement of a diseased or damaged valve of the heart.
- **Valve Repair** is a surgical procedure performed to repair a valve in the heart that is not functioning efficiently as a result of heart valve disease. (<https://www.heartandstroke.ca/heart-disease/treatments/surgery-and-other-procedures/heart-valve-surgery>). In this study, *valve repair* refers to repair of a diseased or damaged valve of the heart.
- **Challenges:** Refers to a new and difficult encounter that requires great effort and determination (Collins Dictionary, 2023). In this study, *challenges* refer to the challenges experienced by the nurses in delivering cardiac rehabilitation interventions to patients, the challenges faced by patients during recovery and coping after heart valve surgery and the experiences of caregivers in providing support and care to a family member after heart valve surgery.
- **Experience:** Is the state of being impacted by or learning something through direct participation or observation (Merriam Webster, 2023). In this study, it referred to

the experiences of nurses regarding cardiac rehabilitation services, patients' experience of recovery and coping as well as the caregivers' experiences of providing support and care to a family member who has had a heart valve surgery.

- **Cardiac unit:** Is a care unit which provides care for critically ill patients experiencing diseases of the heart for which medical care and intervention is needed (<https://www.uabmedicine.org/web/careers/nursing/browse-nursing-units/critical-care-services/cardiac-care-unit-ccu>). In this study, *cardiac unit* refers to one of the specialised departments which provides comprehensive treatment for heart diseases, thoracic problems as well as monitoring of the patients after open heart surgery from preoperative to postoperative and until discharged from the hospital. This unit admitted all patients with cardiovascular conditions for further management and interventions.
- **A cardiac clinic** is a department or unit of heart services where a ranges of comprehensive services related to cardiovascular diseases are offered (<https://www.mayoclinic.org/departments-centers/cardiovascular-health-clinic/overview/ovc-20442224>). In this study, *cardiac clinic* referred to one of the specialised units where all patients with cardiovascular and thoracic diseases were referred to for further interventions and follow-up.

1.13 STRUCTURE OF THE THESIS

This thesis is divided into the following chapters:

CHAPTER 1: Introduction and background. This chapter provides an overview of the study. It includes the background and problem statement and outlines the study's purpose and objectives. It described the research design, approaches, and methods used in the study. It further highlights the study's significance within its context. The chapter

also outlines the paradigmatic perspective and the theoretical basis that guided the study. Definitions of concepts used in the study are also highlighted.

CHAPTER 2: Literature Review: This chapter provides an extensive review of the literature-related studies on the treatment of valvular heart diseases, indications, types, procedures, and complications associated with heart valve surgery. The chapter also examines the core components of CRP, its benefits, barriers as well the role of a nurse in the core components of cardiac rehabilitation. It also discusses the KAP of nurses regarding CR, the challenges experienced by the nurses in providing CR, the experience of patients during recovery and coping as well as the caregiver's experiences in supporting and caring for family members following heart valve surgery. The chapter concludes with the effectiveness of the core components of CR and the conceptual framework for cardiac rehabilitation.

CHAPTER 3: Research design and methodology: This chapter is divided into strands focusing on quantitative and qualitative approaches. Each strand outlines the research designs, methods, study populations, sampling and sample sizes, data collection instruments and procedures, and data analysis. The reasoning strategies employed in the study are described, and measures to ensure the validity, reliability, and trustworthiness of the data are discussed. The chapter concludes with ethical considerations for the study.

CHAPTER 4: Results and findings: Presents the research findings from the situational analysis of both quantitative and qualitative strands.

CHAPTER 5: Discussion of the results and findings of the quantitative and qualitative research: This chapter presents the discussion of the study's findings, drawing on relevant literature to support and contextualize the results. It explores the integration

and interpretation of the quantitative results and qualitative findings within the broader research context.

CHAPTER 6: Conceptual framework: the conceptual framework derived from the study's findings that guided the development of the CRP for patients who underwent HVS was discussed.

CHAPTER 7: Development of the educational programme: This chapter describes the process undertaken in the development of an educational programme of CR for nurses based on the findings of the study. The discussion includes the goal, objectives, approaches, and content of the programme.

CHAPTER 8: Implementation and evaluation/validation of the educational programme: This chapter presents the implementation and evaluation/validation of the developed educational programme for nurses to facilitate CR for patients following cardiac surgery.

CHAPTER 9: Conclusion, limitation, and recommendations: This chapter presents the conclusions, limitations, justification, recommendations, and the way forward of the study.

1.14 SUMMARY

In this chapter, the introduction, background, problem statement, purpose, objectives, significance of the study, and context of the study were discussed. Furthermore, research designs and methods, paradigmatic perspectives, of the research and theoretical basis of the study that informed the development and implementation of the rehabilitation programme were described. Lastly, the definition of concepts was presented. The next chapter presents the literature review.

CHAPTER TWO

LITERATURE REVIEW [CONTEXTUALISATION]

2.1 INTRODUCTION

The previous chapter provided an overview of the study encompassing the introduction, background, problem statement, purpose, objectives, research design, paradigmatic perspectives as well as the theoretical basis of the study. This chapter presents the theoretical concept for the literature review and a comprehensive review of various related studies, published articles, and guidelines concerning CR for patients who have undergone heart valve repair or replacement surgery. The aim is to place the study in the context of existing literature.

This literature review focuses on several key areas including the treatment for valvular heart disease, indications for heart valve surgery, types of heart valve replacement surgery, the procedure involved in heart valve surgery, and potential complications arising from such surgeries. It also provides an overview of CR, including its different phases and core components, as well as the benefits and barriers associated with it and the role of the nurse in cardiac rehabilitation. Furthermore, the literature review explored the KAP of nurses regarding rehabilitation after heart valve surgery. It also examines the challenges nurses experience when providing CR for patients following heart valve repair or replacement surgery. The experiences of patients during their recovery and coping process after heart valve surgery as well as caregivers' experiences in supporting and caring for family members who have undergone heart valve repair or replacement surgery are also addressed in this chapter. Lastly, the conceptual framework for CR is described.

A literature review is the process of locating relevant research reports, critically evaluating these studies, and summarising their findings. According to Gray and Grove, (2021), a literature review is an interpretative, organised, and written presentation of the material the study's author has read. The purpose of the literature review is to establish what is already known regarding the topic, allowing the researcher to gain a comprehensive understanding of the current state of scientific knowledge (Brink et al., 2018; Polit, & Beck, 2012). The literature reviews answer the question, "What is known about this topic?" (Gray and Grove, 2021).

In the context of this study, the literature review enabled the researcher to become familiar with the latest developments concerning the KAP, as well as the challenges experienced by nurses in providing CR interventions for patients after heart valve surgery. It also sheds light on the experiences of patients during their recovery and coping processes following HVS, as well as the experiences of caregivers providing support and care to family members who underwent heart valve repair or replacement surgery.

The literature review was instrumental in identifying existing gaps in the knowledge regarding the phenomenon under investigation. It also included a review of relevant theories that would serve as the theoretical framework for this study. Lastly, the literature review was based on sources from the library, peer-reviewed articles and journals as well as grey literature.

2.2 THEORETICAL CONCEPT FOR THE LITERATURE REVIEW

The literature review for this study is grounded in Dorothea Orem's Self-Care theory, particularly focusing on the construct of supportive-educative compensatory as proposed by Orem in 2001 as cited in George (2014). Supportive-educative

compensatory is when the patient can perform self-care activities but requires assistance, guidance, education, and support from the nurse to improve their abilities to manage their own health (George, 2014). According to this theoretical framework, patients have the capacity to perform self-care activities or may require guidance to meet therapeutic self-care needs (George, 2014). Nurses play a crucial role in supporting and educating clients to develop self-care agencies. According to Mohammadpour, et al., (2015), supportive educational intervention based on Orem's self-care theory can assist nurses in identifying and addressing patient's self-care needs.

The literature review also included the core components of cardiac rehabilitation. These components are congruent with the concept of a supportive-educative system, which includes patient assessment, psychosocial counselling, physical activity counselling, exercise training (ET) and counselling, diet counselling, smoking cessation, return to work guidance, risk factors management (blood pressure control, lipids control, diabetes mellitus, and weight management) and psychosocial management (Ambrosetti, et al., 2021; Cowie, et al., 2019; Thomas, et al., 2019; Abreu, et al., 2018).

In the context of this study, the supportive-educative system guides the identification of the content of the CRP in Phase 3 of the study. This programme was developed within the framework of Nicholls and Nicholls' theory of curriculum development model. Furthermore, the European Society of Cardiology underscores that following an acute event, diagnosis of a chronic heart condition, or intervention, cardiac patients may require special attention to restore their quality of life and maintain or improve their functional capacity (Piepoli et al., 2010). The guidelines further emphasize the

importance of counselling in preventing recurrent events, promoting medication adherence, and encouraging the adoption of a healthy lifestyle (Piepoli, et al., 2010).

Figure 0.1 depicts the application of Orem's Supportive-educative Compensatory System to the cardiac rehabilitation programme.

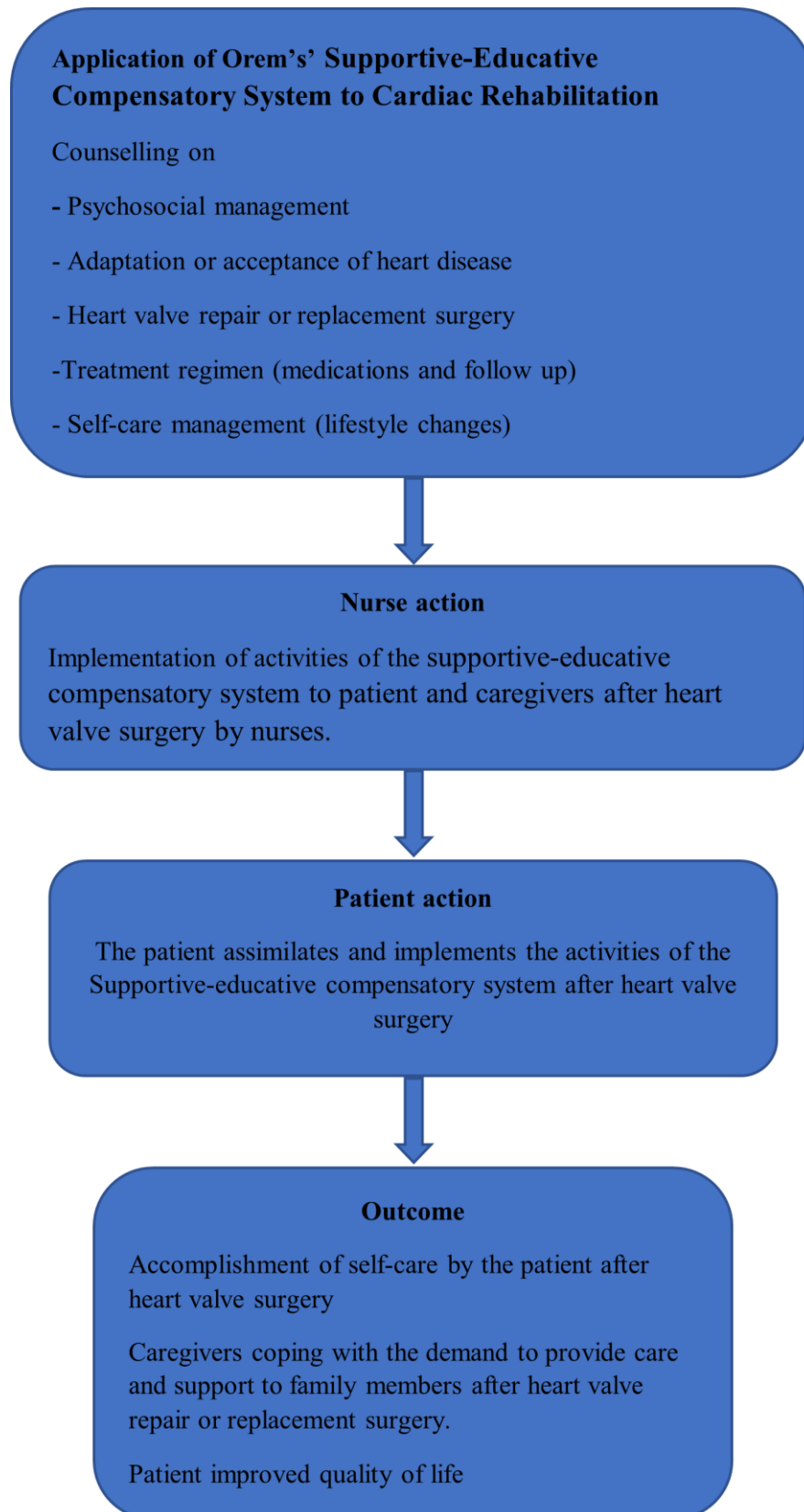


Figure 2.1: Application of Orem's Supportive-educative Compensatory System to the cardiac rehabilitation programme

Source: Adapted from Orem 2001 as cited in George, (2014), p. 133.

Figure 2.1 illustrates the use of Orem's Supportive-Educative Compensatory system to guide nurses in delivering care tailored to individual patient needs. After a Heart valve surgery (HVS), nurses counsel patients on psychosocial issues such as stress, anxiety, and depression, and help them cope with life after heart valve surgery. Nurses also provide reassurance about the recovery process and educate patients on medication regimens, lifelong anticoagulant therapy, and the importance of follow-up visits. Additionally, patients are advised on lifestyle changes, including light physical activity, proper sleep, wound care, healthy eating, and smoking cessation or moderation in alcohol consumption.

Patients and caregivers are expected to apply the guidance provided by the nurses. The goal is for patients to achieve self-care independence, while caregivers manage their role in supporting their loved ones. Further details about the Supportive-Educative Compensatory System and the challenges faced by nurses, patients, and caregivers are explored in the following sections of the literature review.

2.3 INDICATION FOR HEART VALVE REPLACEMENT

The literature indicates that aortic stenosis, mitral stenosis, tricuspid stenosis, and the resultant respective valvular regurgitations are the indications for valvular replacement cardiac surgery (Baumgartner, et al., 2017). The following sections provide details on each of the indications for heart valve replacement surgery.

Aortic stenosis: Aortic stenosis is characterized by the narrowing of the aortic valves which can result from ageing, rheumatic valvulitis, or the deterioration of a congenital bicuspid valve, often as a complication of rheumatic fever (Urden, et al., 2018; Baumgartner, et al., 2017). The replacement of stenosed aortic valves is recommended

in several scenarios including symptomatic patients with severe, high-gradient aortic stenosis, and symptomatic patients with low-flow, and low-gradient aortic stenosis with normal ejection fraction. Surgical aortic valve replacement (SAVR) is also recommended for patients with severe aortic stenosis and systolic left ventricle (LV) dysfunction not due to another cause, as well as symptomatic patients who exhibit symptoms related to aortic stenosis during an abnormal exercise test (Urden, et al., 2018; Baumgartner, et al., 2017). Asymptomatic patients with an abnormal exercise test showing a decrease in blood pressure below aortic stenosis levels should also consider valve replacement, as untreated aortic stenosis can progress to aortic regurgitation and subsequent insufficient cardiac output (Baumgartner, et al., 2017).

Aortic regurgitation: Aortic regurgitation also known as aortic insufficiency involves the reflux of arterial blood back into the left ventricle during ventricular diastole (Urden, et al., 2018; Baumgartner, et al., 2017). Aortic regurgitation can result from infective endocarditis and aortic dissections following conditions such as rheumatic fever, systemic hypertension, syphilis, or ageing valve diseases (Urden, et al., 2018; Baumgartner et al., 2017). Surgery is indicated for symptomatic patients with severe aortic regurgitation, as well as for asymptomatic patients with severe aortic regurgitation, impaired left ventricle function (ejection fraction of less than 50%) and left ventricle enlargement, accompanied by left ventricle end-diastolic diameter.

Mitral stenosis: Mitral stenosis refers to the progressive narrowing of the mitral valve orifice and is often a result of rheumatic heart disease (Urden, et al., 2018). Surgical replacement of the mitral valves is indicated for patients with moderate to severe mitral stenosis. Percutaneous mitral commissurotomy (PMC) may be considered in symptomatic patients without unfavourable characteristics such as old age, history of commissurotomy, permanent atrial fibrillation and severe pulmonary hypertension.

Percutaneous mitral commissurotomy is also indicated for any symptomatic patients with a contraction or a high risk for surgery (Urden, et al., 2018). Additionally, mitral valve replacement surgery is performed in symptomatic patients not suitable for percutaneous mitral commissurotomy. If not replaced, mitral stenosis can progress to mitral regurgitation and result in insufficient cardiac output (Urden, et al., 2018; Baumgartner et al., 2017).

Mitral regurgitation: Mitral regurgitation involves the reflux of arterial blood back into the left ventricle due to stenosed mitral valves (Urden, et al., 2018). Mitral stenosis can result from rheumatic disease, valve ageing, endocarditis, collagen vascular disease, or papillary muscle dysfunction. Mitral valve repair is the preferred technique when durable results are expected for symptomatic patients with a left ventricular ejection fraction (LVEF) of greater than 30% and for asymptomatic patients with LV dysfunction (Urden, et al., 2018; Baumgartner, et al., 2017).

Tricuspid stenosis: Tricuspid stenosis refers to the narrowing of the orifice of the tricuspid valves, most often as a complication of rheumatic heart disease or rheumatoid endocarditis (Urden, et al., 2018; Baumgartner, et al., 2017). Tricuspid stenosis causes the regurgitation of venous blood from the right ventricle into the right atrium, thus reducing pulmonary circulation. Replacement surgery is recommended for symptomatic patients with severe tricuspid stenosis and in patients with severe tricuspid stenosis who are undergoing left-sided valve intervention (Urden, et al., 2018; Baumgartner, et al., 2017).

Tricuspid regurgitation: Tricuspid regurgitation involves the reflux of venous blood back into the right atrium. Tricuspid regurgitation can result from tricuspid stenosis, infective endocarditis, rheumatic heart disease, carcinoid syndrome, and endomyocardial fibrosis (Urden, et al., 2018; Baumgartner, et al., 2017). Replacement

surgery is recommended for patients with severe primary and secondary tricuspid regurgitation (Urden, et al., 2018; Baumgartner, et al., 2017).

2.4 TYPES OF HEART VALVE REPLACEMENT SURGERY

There are four types of valve replacement surgery as described in the following sections: aortic, mitral, pulmonary, and double valve replacement surgery. Aortic and mitral valve replacement heart surgeries are the most common ones.

Aortic valve replacement: The aortic valve is located within the aorta at the left side of the heart and serves as an outflow valve for arterial blood into the aorta. Its function is to allow arterial blood to leave the left ventricle into the aorta, ensuring there is no backflow of blood into the left ventricle (Baumgartner, et al., 2017). Backflow of blood into the left ventricle can result in a higher afterload on the left ventricle, leading to enlargement and eventually failure of the left ventricle. Aortic stenosis and regurgitation are the indications for aortic valve replacement surgery. The survival rate after aortic valve replacement surgery is 94% (<https://www.healthline.com/health/heart/valve-disorders#types>).

Mitral valve replacement surgery: This is performed to replace either a congenital defect or a degenerative disease of the mitral valves. A defective mitral valve may be replaced by either an artificial metal valve or a biological valve (Baumgartner, et al., 2017). Although mechanical valves last longer, they require long-term use of anticoagulants to prevent clotting and embolism. Mechanical heart valves are made from materials such as carbon and titanium. Usually, they are made out of two leaflets and a knitted fabric ring encircling a metal ring that is sewn onto the heart in place of the original valve (Harris, et al., 2015). Mechanical heart valves offer advantages such as durability and long-term availability (Urden, et al., 2018). Patients with mechanical

heart valves are less likely to require reoperation for valvular replacement (Ahmed & Levy, 2021; Harris, et al., 2015). Therefore, mechanical valves are preferably used in young patients who are under the age of 40 years.

In contrast, a biological valve lasts between 15-20 years but incurs no risk of clotting and embolism, so no warfarin treatment regimen is required as a preventive measure. Bioprosthetic or biological valves are made of human or animal tissue. Animal tissue, such as pig, cow, or horse models, is used to create the valves. These valves are then cemented with a preserving solution and may be placed on a flexible frame to aid in their deployment during surgery (Harris, et al., 2015).

These artificial valves have the same purpose as natural heart valves and can last between 10 and 20 years (<https://www.healthline.com/health/heart-disease/valve-replacement-surgery#surgerytypes>). A bio-prosthesis is suitable for elderly patients over 60 years (Urden et al., 2018; Choudhary et al., 2016).

Double valve replacement surgery: This involves the replacement of both the mitral and aortic valves or the entire valves on the left side of the heart. As the name implies, the mortality rate is higher in double valve replacement surgery.

Pulmonary valve replacement surgery: This is indicated for the stenosis of the pulmonary semilunar valves, either as a congenital defect or as a result of infection or carcinoid syndrome (<https://www.healthline.com/health/heart-disease/valve-replacement-surgery#surgerytypes>).

The valves most commonly affected by stenosis, regurgitation, and in need of replacement surgery are the mitral and aortic valves, followed by the tricuspid valve, but the pulmonary valve is rarely affected (Sibilitz et al., (2016). This observation has also been noted at the Cardiac Unit's Health Information Registry in Namibia. The

majority of 15 patients who underwent heart valve surgery from April 2015 to November 2015 had mitral valve stenosis and regurgitation), followed by aortic valve disease (7 patients), and double valve disease (2 patients) (Cardiac Unit Health Information Registry, 2016). Additionally, between April 2017 and November 2017, out of 30 patients who underwent heart valve surgery, 17 (56.6%) patients were mitral valve replacement surgery followed by 8 patients (26.6%) with double valve replacement surgery and 5 patients (16.6%) of aortic valve replacement (Cardiac Health Information Registry, 2017).

2.5 TREATMENT FOR VALVULAR HEART DISEASE

Heart valve disease can be treated through either medical or surgical methods. Medical treatment includes the use of inotropic drugs and diuretics to improve heart performance and enhance fluid elimination to prevent fluid retention (Choudhary, et al., 2016; Ciubotaru, et al., 2013). Moreover, severely damaged heart valves may be surgically repaired or replaced by using artificial mechanical or bio-prosthetic heart valves.

However, mechanical valves are associated with the risk of abnormal blood clotting and the potential development of clots on the valve (Choudhary et al., 2016). Due to this risk, patients may require lifelong treatment with anticoagulants such as Warfarin. This treatment requires ongoing monitoring, dietary modifications, and frequent follow-up visits to the hospital for International Normalised Ratio (INR) checks to assess Warfarin levels (Choudhary, et al., 2015). Warfarin therapy can also increase the risk of bleeding. Therefore, patients are advised to avoid activities such as contact sports that may increase the risk of bleeding (Ahmed, et al., 2017). This underscores the importance of nurses possessing the necessary knowledge and skills to educate

patients during CR regarding the avoidance of sporting activities that may increase the risk of bleeding while on Warfarin.

The second type of artificial valve is a biological or prosthesis valve. The advantage of tissue valves is the low risk of clotting, a lower risk of bleeding, and that patients do not require lifelong treatment with anticoagulants (Choudhary et al., 2016; Korteland, et al., 2016). The drawback of bio-prosthetic heart valves is that they are less durable, have a risk of structural valve degeneration, and often require re-operation within 10 to 20 years of a person's lifetime (Choudhary, et al., 2016; Korteland, et al., 2016; Harris, et al., 2015; Ciubotaru, et. al., 2013; Harris, et al., 2015). Reoperation due to the degeneration of bioprosthetic heart valves for mitral valve repair was been observed and noted in the registry of the Cardiac Unit at Windhoek Central Hospital during data collection for this study.

Given the drawbacks of artificial and bioprosthetic heart valves, the patient's age, life expectancy, preferences, indications and contraindications for Warfarin therapy, socioeconomic status, comorbid conditions, contemplated pregnancy, and the cost and availability of the prosthesis are considered in the selection of replacement heart valves (Harris, et al., 2015). Therefore, a study conducted in the Netherlands to investigate the quality of life among patients who underwent aortic valve replacement with a prosthetic valve revealed that 19% were afraid of valve failure while 25% feared re-operation for valvular replacement because heart valve surgery is associated with complications, that can negatively affect patients' quality of life (Koerland, et al. 2016).

2.6 PROCEDURE FOR HEART VALVE SURGERY

A heart surgery is performed through an incision on the chest, under cardiopulmonary bypass (CPB) with aortic cross-clamping, using a bubble or membrane oxygenator, with partial or total haemodilution, and under moderate hypothermia (Udern, et al., 2018; Sarkar & Prabhu, 2017). Cardiopulmonary bypass (CPB) is a form of extracorporeal circulation in which the patient's blood is diverted from the heart and lungs and rerouted outside of the body by aortic cross-clamping to maintain circulation, ventilation, and oxygenation while the cardiac surgeon operates on a non-beating heart in a field largely devoid of blood, while other end organs remain adequately oxygenated and perfused (Cheng, et al., 2021; Urden, et al., 2018; Singha, et al., 2018; Sarkar, & Prabhu, 2017). In cardiac surgery, hypothermia allows for lower pump flow, less trauma, and better myocardial protection (Sarkar & Prabhu, 2017). The complications associated with CPB include intravascular fluid deficits, myocardial depression, coagulopathy, hyperglycaemia, electrolyte disturbances, haemolysis, hypertension (Urden, et al., 2018). Therefore, the patient's hemodynamic status should be monitored postoperatively.

During heart surgery, the diseased valves are removed and replaced with an artificial valve. For valve repair, the fused valve leaflets are repaired. Once the surgery is completed, and the heart is shocked to resume its functions, blood circulation through cardiopulmonary bypass re-enters the patient's normal circulation, and the wound is sutured. Post-operatively, patients would be monitored in the intensive care unit for three to five days before being transferred to a high-care ward until discharge (Urden, et al., 2018). According to the researcher's observations as previously worked in the Cardiac Unit, patients are observed for two to three days in the ICU if no complications occur, and then they are discharged into a high-care ward where mild exercises are

performed and health education on self-care management begins in preparation for discharge from the hospital.

2.7 COMPLICATIONS OF HEART VALVE SURGERY

Despite the fact that surgical treatment may improve the quality of life and decrease morbidity and mortality, it is however, associated with potential complications (Hansen et al., 2017; Berg et al., 2013; Bourguignon et al., 2011).

Several studies have identified potential complications associated with mechanical valve replacement. In this regard, a study conducted in Iran on surgical outcomes of heart valve replacement in a tertiary specialised cardiac centre reported that early postoperative complications occurred in 26.6% of the cases (Samiei, et al., 2013). Specifically, postoperative arrhythmia occurred in 7.5%, worsening function of the repaired valve occurred in 5%, general postoperative complications occurred in 11.9%, and mortality occurred in 7.8% of patients (Samiei, et al., 2013).

Additionally, elderly patients undergoing HVS experienced complications such as, arrhythmias, multiple organ failure, left ventricular rupture, low cardiac output syndrome, acute renal failure, respiratory failure, upper gastrointestinal bleeding, mechanical valve failure, and cerebrovascular accidents (Liu, et al., 2015).

Furthermore, thromboembolic events and bleeding are common complications following valve replacement surgery (Bourguignon et al., 2011).

Concurrently, a study conducted among 53 pregnant women who had mechanical mitral valve replacement and received Warfarin during pregnancy revealed that 34% resulted in abortions, 3.8% in stillbirths, while 1.9% resulted in maternal death during delivery (Samiei, et al., 2012). In contrast, a study conducted in Japan among patients following mechanical valve replacement revealed that valve-related complications

occurred at an acceptable rate such as thrombo-embolisms occurring at a rate of around 1 % per patient-year and bleeding problems at almost 0.5 % per patient-year (Misawa, 2015). These complications may suggest a lack of close monitoring and follow-up provided to patients for possible post-operative complications, which could be detected early and managed if CPR was available.

2.8 THE OVERVIEW OF CARDIAC REHABILITATION

According to Dalal et al., (2015) cardiac rehabilitation services are comprehensive, long-term programmes that involve various components such as medical evaluation, implementation of prescribed care interventions, modification of cardiac risk factors, education, counselling, and dietary and lifestyle modifications for patients with heart disease. Cardiac rehabilitation programmes are designed to achieve several goals, including minimisation of the physiological and psychological effects of cardiac illness or surgery, reducing the risk of sudden death or infarction, controlling symptoms, stabilizing, or reversing the atherosclerotic process, and enhancing the vocational status of patients (Dalal, et al., 2015). Ultimately, CR aims to increase the quality of life for patients (Alosaimi, et al., 2017).

Cardiac rehabilitation programmes typically consist of four phases with Phase one beginning while the patient is still in the hospital. Phase one is considered the acute phase and begins before the patient is discharged. As recommended by Mc Mahon, et al., (2017), and Piepoli, et al., (2014), the National Heart Foundation of Australia the Australian Cardiac Rehabilitation Association, (2004), and the WHO, (1993), several key aspects are emphasized during this inpatient early mobilization and education programme. Provision of basic information and reassurance, cover topics such as treatment, procedures, psychological aspects, social factors (family and personal

relationships, social support, and isolation), medication regimen, identification and modification of risk factors, wound care, and resumption of physical, sexual and daily living activities (E.g. driving and return to work). Supportive counselling involves providing individualised information reassurance and support for both the patient and their family as part of routine daily care. Mobilization and guidelines for appropriate physical activity and exercise. It also includes the development of a discharge plan that includes collaboration with general practitioners, primary healthcare providers, and follow-up care and referral to outpatient cardiac rehabilitation. The discharge plan should also include patient information on medications, management of symptoms, written materials to reinforce verbal information, and contact details for local community resources and patient support groups (WHO, 1993; National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2004).

In addition, Phase 2, which is the post-discharge period is also known as the sub-acute phase. This is conducted in both inpatient and outpatient settings once the patient is discharged from the hospital. This phase also places significant emphasis on health education, the resumption of physical activities, follow-up appointments, home visits, individual or group educational sessions, and screening for psychological problems that may arise as responses to cardiac surgery. Phase 2 typically spans about 4 to 6 weeks after cardiac surgery (McMahon, et al., 2017; Piepoli, et al., 2014). The benefits of this phase include a reduction in morbidity and mortality, improved function and quality of life, and the establishment of confidence for concerned patients (Thomas et al., 2019; McMahon, et al., 2017; Piepoli, et al., 2014).

Phase 3 is designed for the long-term rehabilitation of outpatients. It involves outpatient CR, where patients discharged from the hospital continue their rehabilitation as outpatients. According to the National Heart Foundation of Australia

and the Australian Cardiac Rehabilitation Association, (2004), outpatient CR can be provided in different settings, including hospitals, community health centres, general medical practices, or even in the patient's home through home-based cardiac rehabilitation (HBCR) methods such as home visits, telephone support, telemedicine, and the use of self-education materials. This phase encompasses a structured exercise program for rehabilitation and additional measures for risk reduction (Thomas et al., 2019; Alosaimi, et al., 2017; McMahon, et al., 2017).

During Phase 3 of the rehabilitation process, patients receive education on treatment regimens and medication management, counselling on exercise and physical activities, guidance on tobacco cessation, alcohol moderation, diet and nutrition tailored for cardiac patients, prevention of risk factors such as obesity, blood pressure, weight management, lifestyle changes and psychosocial management (Thomas et al., 2019; Mendes, et al., 2018; Alosaimi, et al., 2017; National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2004). Additionally, pharmacological aspects including the use of antiplatelets, ACE inhibitors, beta-blockers, statins, and anticoagulants are addressed together with psychological risk factors (Alosaimi, et al., 2017; Dalal, et al., 2015; Piepoli, et al., 2014).

Furthermore, studies by Anderson, (2016) and Dalal, et al., (2015) have highlighted the following heart conditions as the indications for cardiac rehabilitation:

- Ischaemic heart disease, myocardial infarction, post-coronary angioplasty, and coronary artery bypass surgery (CABG).
- Newly diagnosed chronic heart failure.
- Patients with heart transplants and ventricular assist devices.

- Patients who have undergone surgery for implantation of intra-cardiac defibrillators or cardiac resynchronization therapy for reasons other than acute coronary syndrome and heart failure.
- Patients with heart valve replacement for reasons other than acute coronary syndrome and heart failure.
- Patients with a confirmed diagnosis of exertional angina (British and American associations).

According to international association guidelines, position statements and consensus, the core components of the recommended CRP after cardiac surgery include patient assessment, diet/nutritional counselling, weight control management, blood pressure monitoring and management, lipid management, smoking cessation, psychosocial management, prescription for exercise training, physical activity counselling and vocational support. These components aim to enhance patients' recovery, prevent complications, and improve their quality of life (Ambrosetti et al., 2021; Cowie, et al., 2019; Piepoli, et al, 2014; Grace et al., 2016; Woodruffe, et al., 2014; National Heart Foundation of Australia & Australian Cardiac Rehabilitation Association, 2004; WHO, 1993).

The delivery of these components requires a multidisciplinary team which may include cardiologists, nurses, physiotherapists, dieticians, general practitioners, occupational therapists, pharmacists, psychologists, social workers, and clerical administrators. These professionals collaborate to provide CR activities at their respective phases (Ambrosetti, et al., 2021; Cowie et al., 2019; Abreu et al., 2018; Piepoli, et al., 2014; WHO, 1993).

Table 2.1: A multidisciplinary team required for the cardiac rehabilitation programme and the phases of their participation

Multidisciplinary team (MDT)	Phase 1	Phase 11	Phase 111
Cardiologists	Yes	Yes	Yes
Physical medical specialist	Yes	Yes	Yes
Psychiatrist/psychologist	Yes	Yes	-
Specialist in smoking cessation	Yes	Yes	-
Rehabilitation nurse	Yes	Yes	-
Physiotherapist	Yes	Yes	Yes
Exercise physiologist	-	Yes	Yes
Cardiopulmonary technician	-	Yes	-
Nutritionist	Yes	Yes	Yes
Social worker	Yes	Yes	-

Source: Abreu, et al., (2018) Multidisciplinary team responsible for cardiac rehabilitation programme.

Arena, et al., (2012) highlight the roles of the multidisciplinary team in delivering of cardiac rehabilitation services, as described in the following sections.

Cardiologists or Physicians: They facilitate patient intake, perform medical assessments, evaluate the patient's medical status, and plan the treatment regimen for individual patients. Cardiologists also reinforce the importance and benefits of outpatient CR, promoting recovery and referring all eligible patients while strongly encouraging their participation in the cardiac rehabilitation programme (Arena, et al., 2012).

Nurse: Nurses provide education and counselling to patients and caregivers about recovery, coping, treatment regime, diet and nutritional counselling and provide psychosocial support. Furthermore, nurses participate in discharge planning, facilitate referrals to outpatients' services, discuss CR and its activities, and explain the benefits to eligible patients and their caregivers. Therefore, nurses play an important role as members of a multidisciplinary team approach to CR and are involved in all three phases of the cardiac rehabilitation programme. As indicated in Table 2.1, the nurses are not involved in Phase 3 of the CR which is important for the rest of the patient's life. It is therefore essential that nurses be part of the multidisciplinary team in Phase

3 during the recovery process of the patient to monitor progress, patient education on self-care, and adherence to life-long medications.

Dieticians: Dieticians, provide information on cardiac diets, and plan and develop nutritional therapy plans for cardiac patients, ensuring they receive proper dietary guidance.

Psychologists and Social Workers: These professionals offer counselling services to help patients accept their condition and address any psychological or socio-economic challenges they may experience during their cardiac rehabilitation journey (National Foundation of Australia and Australian Cardiac Rehabilitation Association, 2004). Lastly, clerical provide administrative functions for record maintenance (WHO, 1993).

2.9 THE BENEFITS OF CARDIAC REHABILITATION

The benefits of cardiac rehabilitation are well documented in the literature and when available, CR can reduce morbidity, mortality, and readmissions and improve patients' quality of life (Ades, et al., 2017; Sibilitz, et al., 2016; Anderson, et al., 2016; Goel, et al., 2015). Therefore, according to Goel, et al., (2015), even patients who have undergone combined heart valve and coronary artery bypass graft surgery (CABG), often report a significant reduction in mortality when they participate in cardiac rehabilitation. Similarly, De Vries, et al., (2015) found that among patients who underwent HVS and coronary revascularisation, CR was associated with substantial survival benefits for up to 4 years regardless of age, type of diagnosis and type of intervention.

Additionally, a few studies have reported the impact of physical exercise training on patients following heart valve surgery. A Cochrane systematic review conducted in Denmark revealed that CR has a beneficial impact on the physical exercise capacity of

patients who had isolated valve surgery (Sibilitz, et al., 2016). Furthermore, the findings on the outcomes of CR among patients after HVS and those who had coronary artery bypass graft surgery indicated that patients who underwent HVS experienced improvements in aerobic fitness training (Sibilitz, et al., 2016). The Cochrane systematic review further concluded that both patient groups experienced improvements in strength, self-reported physical function, and depression scores (Sibilitz, et al., 2016).

Another study conducted by Pollmann et al., (2017) among 250 patients who underwent heart valve replacement between January 2009 and August 2013 concurs with the report by Anderson et al., (2016) that CR improves exercise capacity and is associated with decreased morbidity and mortality, reduces hospital admissions, and improves the quality of life for patients.

Similarly, Lund, et al., (2016) reported that moderate to high levels of physical exercise and participation in CR among patients who underwent heart valve surgery were highly associated with survival rates. Therefore, the guidelines on CR from the WHO recommend that developing countries and other high-income countries implement low-to-moderate intensity exercise for cardiac rehabilitation (Price, et al., 2016; WHO, 1993).

This means that low-to-moderate levels of physical exercise, while taking into consideration the sternotomy wound are safe for patients following heart valve surgery. However, the report of a randomized clinical trial of CopenHeart_{VR} suggests that upper body strength training should start when the patient is free from pain and at least 6 weeks post-operative to avoid complications of an unstable sternum (Sibilitz, et al., 2013).

2.10 BARRIERS TO CARDIAC REHABILITATION

Despite the well-documented benefits of CR for patients following cardiac surgeries, it is generally underutilised, even in most high-income countries where best practice guidelines are available. Globally, only 38.8% of countries have cardiac rehabilitation programs, of which 68% are in high-income countries, 23% in middle-income countries, and only 8.3% in low-income countries (Turk-Adawi, et al., 2014). The highest uptake rate for CR at 52% among patients after HVR was recorded in Denmark (Hansen et al., 2015).

Numerous studies have indicated the barriers to the use of CR by patients after cardiac surgery. These studies have reported that depression and anxiety, language barriers, lack of knowledge, low socioeconomic status, limited healthcare insurance, lack of transportation, distance, age, gender, poor health status, cultural/ethnic background and negative perceptions such as a lack of perceived need for CR are some of the factors associated with low referrals and enrolment in cardiac rehabilitation programmes (Santos, et al., 2023; Martijn, et al., 2023; Ragupathi, et al., 2017; and Sérvio, et al., 2019).

Similarly, a review of best practices in CR for women reported that patients' beliefs and perceptions such as the idea that exercise is painful and behaviours such as smoking, sedentary lifestyles, and obesity, create barriers to cardiac rehabilitation. Comorbidities such as depression and musculoskeletal limitations were identified as barriers preventing women from attending cardiac rehabilitation programmes (Alosaimi, et al., 2017). A similar study also highlighted negative attitudes among health professionals including physicians, nurses, and physiotherapists, as additional barriers to patients' access to cardiac rehabilitation (Alosaimi et al., (2017).

Despite the numerous barriers that hinder patients with heart disease from participating in CRP, the reports from the WHO, and other high, middle, and low-income countries recommend that CR should be offered to all patients with heart diseases (Abrosetti, et al., 2021; Grace et al., 2016; Piepoli et al., 2010; Woodruffe et al., 2015; WHO 1993). In this regard, the literature concludes that recognizing the extent to which each of these barriers influences access to CR and health behaviour may assist in improving the facilitation of rehabilitation by healthcare professionals and consequently, increasing the uptake of CR by patients with heart disease. Therefore, international guidelines, policy documents, and position statements available for best practices in CR should be adapted to help overcome the low uptake promote participation in CR and improve the quality of life of patients with heart valve surgeries and cardiovascular diseases.

2.11 KNOWLEDGE, ATTITUDES, AND PRACTICES OF NURSES REGARDING CARDIAC REHABILITATION

The second objective of this study was to describe the knowledge, attitudes, and practices (KAP) of nurses regarding the CR of patients after heart valve repair or replacement surgery. According to the researcher's knowledge, there is a lack of studies conducted on the KAP of nurses regarding the CR of the patients after surgery.

2.11.1 Knowledge, of nurses regarding cardiac rehabilitation

Knowledge is a vital element for every individual. It is the consciousness, identification, and application for the development of humankind. Knowledge is created in the human mind and increases when people are involved in its acquisition and dissemination. According to Mohajan, (2016), knowledge refers to a collection of experiences, appropriate information, and skilled insight that provides a structure for

evaluating and integrating new experiences and information. Although there have been limited studies conducted on the knowledge of nurses regarding the rehabilitation of patients after heart valve repair or replacement surgery, Degavi, and Bhupali (2015) study conducted in Belgaum, Karnataka claims that the majority of nursing staff lack knowledge about the rehabilitation of patients after heart valve repair or replacement surgery. Similarly, a study conducted in India on the knowledge of the nurses working at the cardiac unit regarding the rehabilitation of patients after heart surgery revealed that the majority have poor knowledge and only a small percentage of nurses had good knowledge about cardiac rehabilitation (Choure, et al, 2015).

It is therefore important for nurses who provide care at the Cardiac Unit and Cardiac Clinic to have the knowledge to teach patients and provide rehabilitation interventions within the framework of Orem's theory of the nursing system of the supportive-educative compensatory system as illustrated in Figure 2.2 of this chapter.

Providing rehabilitation interventions within the framework of the supportive-educative compensatory system empowers patients and families enhances patients' recovery and empowers the caregivers in the support and care of their family members after heart valve surgery. This could result in an improved quality of life for patients concerned, decreased readmission, morbidity and mortality among patients who underwent cardiac surgery (Sibilitz, et al., 2022; Anderson, et al., 2016; Goel, et al., 2015). Subsequently, Khademian, et al., (2020) concluded from their study on the effect of self-care based on Orem's Nursing theory that providing patient education on self-care can improve the quality of life of patients with hypertension. Therefore, this formula may be replicated in the cardiac rehabilitation program for teaching self-care to patients and their families.

In the Namibian context, according to the researcher's observations, patients in the Cardiac Unit and Cardiac Clinic are provided with information about cardiac diet, wound care, and infection control, lifestyle changes, adherence to medications, and are educated on Internationalised ratio (INR) for Warfarin and the importance of follow-ups. In addition, to pre- and post-operative counselling, patients are also offered a Warfarin booklet to read about the therapeutic and side effects of Warfarin at home. Nonetheless, the seemingly challenging experiences of a lack of competencies among patients, caregivers, and nurses regarding the rehabilitation of patients after HVR call for the development of a programme for nurses to facilitate the cardiac rehabilitation of patients who had a heart valve repair or replacement surgery.

2.11.2 Attitudes of nurses regarding cardiac rehabilitation of patients after heart valve repair or replacement surgery

The concept of attitude refers to a feeling or way of thinking that affects a person's behaviour, either positively or negatively. Therefore, an attitude is described as a psychological disposition that reflects itself as a degree of favouritism or disfavour (Eagly & Chaiken, 2007).

There are limited studies conducted about the attitudes of nurses regarding cardiac rehabilitation. However, a study conducted by Kumudah, et al., (2020) in a tertiary care teaching hospital in Malaysia revealed that the majority of the nurses had a positive attitude about referring the patients to CRP and believed that referring patients to CRP would prevent cardiovascular diseases, reduce hospital readmission of patients, and bring a positive impact on patient outcomes.

Another study conducted in 7 teaching hospitals in Zhejiang Province, China on the knowledge and attitude of the doctors and nurses concerning rehabilitation revealed

that staff with lower education levels, job titles and shorter speciality work experience were associated with a more negative attitude toward the implementation of cardiac rehabilitation (Zhu, et al., (2020). This shows that lower education levels and shorter work experience might have a negative attitude towards the implementation of cardiac rehabilitation. This revelation may apply to nurses who provide care to patients at the Cardiac Unit and Clinic in Namibia. Hence, the current study describes the nurses' attitudes towards cardiac rehabilitation at the Cardiac Unit and Clinic at the Windhoek Central Hospital.

2.11.3 Practices of nurses regarding cardiac rehabilitation of patients after heart valve repair or replacement surgery

There is a dearth of studies conducted on the practices of nurses regarding cardiac rehabilitation. Many studies focus on the knowledge and attitudes of nurses regarding cardiac rehabilitation. Therefore, the current study includes a description of nurse's practices regarding cardiac rehabilitation.

According to the Cambridge Dictionary, (n.d) practices is a working method or set of working methods that is officially accepted as being the best to use in a particular business or industry, usually described formally and in detail. In the context of this study according to Orem's framework of self-care in George, et al., (2014), these practices encompass the provision of information to patients and their caregivers about medication regimens, self-care management, sternotomy care and prevention of wound infection, early detection of complications, the importance of physical exercise, sexual activity counselling, advice to caregivers regarding support and care for their family members, and encouragement and counselling for caregivers to get involved in the care activities of their family members (Bjørnnes, et al., 2019; Khatiban, et al., 2018). Moreover, according to study findings conducted by Mohammadpour et al.

(2015) in two university hospitals in Khorasan, Iran, healthcare providers can recognise and meet patients' requirements for self-care by utilising Orem's self-care theory to inform their supportive educational intervention.

2.12 CHALLENGES EXPERIENCED BY NURSES REGARDING CARDIAC REHABILITATION OF PATIENTS AFTER HEART VALVE SURGERY

According to the researcher, there is a dearth of studies conducted on the challenges experienced by nurses regarding cardiac rehabilitation. However, numerous studies are concentrated on the role of the cardiac rehabilitation nurse and the impact of nurse-led cardiac rehabilitation on the quality of life (Arjunan & Trichur, 2021). A study conducted by Turner, et al., (2017) in Southwest England and East Midland, United Kingdom, on the views of patients and nurses regarding psychological support, reported that the programme benefited the patients despite time and resource constraints. However, nurses found it challenging to provide psychosocial care within their existing workloads.

A study conducted by Christiansen & Feiring, (2017) in Oslo, Norway on the challenges of the nurse's role in the rehabilitation context highlighted three themes. These themes include adjusting patients' and next of kin's expectations, tailoring support and information and recognising patients' knowledge. In addition, a study conducted in Nigeria on challenges in cardiac rehabilitation highlighted the lack of focal personnel and lack of access to the equipment needed for cardiac rehabilitation as some of the challenges experienced by nurses in providing rehabilitation to cardiac patients (Auchi, et al., 2020).

Given the challenges experienced by nurses in delivering CR interventions to patients after HVS, Orem's theory on self-care recommends that identifying patient's needs is a fundamental prerequisite to patient education. Moreover, regarding Figure 2.2 of

Orem's supportive-educative compensatory System, nurses are required to implement activities of supportive education care to patients and their caregivers after heart valve surgery. These activities would enable the patients and caregivers to assimilate and implement self-care. Furthermore, the caregivers would be able to cope with the demands of caring for and supporting their family members after heart valve surgery. According to Sheng & Meng, (2020)'s study conducted in China states that when applied to the treatment of individual patients, the Orem self-care theory-supporting education system may greatly enhance the patients' quality of life and overall well-being, as well as their ability to perform social responsibilities and adhere to their drug regimen.

2.13 EXPERIENCES OF PATIENTS IN RECOVERY AFTER HEART VALVE REPAIR OR REPLACEMENT SURGERY

Several studies have identified experiences of patients' recovery and coping after heart valve repair or replacement surgery. In this regard, the findings of studies conducted in Denmark and Iran about patients' experience of recovery after heart valve replacement revealed that patients had difficulty returning to their normal duties and taking over their responsibilities in the community (Berg et al., 2013). Both authors reported that patients experienced multiple problems such as poor adherence to treatment regimens and disregarding the correct cardiac diet, all of which have a negative effect on their recovery (Taghadosi, et al., 2014; Berg et al., 2013).

Additionally, Taghadosi et al., (2014) indicate that mechanical valve replacement is associated with sleepless nights as a result of the tick-tick sound of the valve. Similarly, a study conducted in the Netherlands reported that approximately 12% of patients with biological valves complained of being disturbed by valve sounds and worried about bleeding after valve replacement (Korteland, et al., 2016). The study further reported

that 19% of the patients who underwent mechanical valve replacement were frightened of valve failure while 25% were scared that they might need another valve operation (Korteland, et al., 2016).

Surprisingly, biological valves do not have any disturbing sounds. However, they have short-term durability and are prone to failure, which necessitates a reoperation in the future for the renewal of heart valves. Nonetheless, all these adverse experiences have negative effects on the patient's recovery process and quality of life.

Moreover, a study conducted in Iran by Taghadosi, et al., (2014) reports that patients expressed a lack of support and inadequate information from the hospital staff regarding rehabilitation and adjustment to their new life after heart valve replacement surgery. Therefore, Savage et al., (2015) and Sibilitz et al, (2013) concluded that due to a lack of health information and support on cardiac rehabilitation, a significant number of patients experience depressive symptoms such as anxiety and post-traumatic stress disorder, resulting in poor quality of life. According to the findings of Mohammadpour et al. (2015) study, patients' capacity for self-care can be enhanced by supportive educational interventions based on Orem's theory of self-care. Patients will be able to take care of themselves as a result, which will enhance their quality of life and ability to recover and cope after heart valve surgery.

A study by Turner et al., (2017) about patients' and nurses' views on providing psychological support within a CRP indicates that most patients reported experiencing a dramatic loss of self-confidence, panic attacks, sleeplessness, lack of energy, and motivation. Furthermore, the literature highlighted other major problems associated with life-long treatment with anti-coagulants, such as frequent blood drawings, drug-to-drug interactions, dietary restrictions, and the cost of medicine including expenses related to long-distances of travelling for anticoagulation monitoring (Choudhary, et

al., 2016). Concurrently with the claims above, in the context of the findings from this study, during data collection, most patients who underwent mechanical valve replacement complained of frequent doctor's visits for prescriptions, blood draws for INR check-ups, financial challenges for transportation to hospitals, diet restrictions and the avoidance of sports activities that may lead to bleeding as challenging experiences. These challenges encountered by these patients also have an impact on the caregivers of the respective patients. Therefore, Taghadosi et al., (2014) suggest that psychological management should be part of CR for patients to share their experiences and receive counselling to adjust to their life-long disease.

Given that, the international guidelines on the rehabilitation of patients with heart disease also recommend psychosocial interventions and counselling as part of the core components of a cardiac rehabilitation programme (Ambrosetti, et al., 2021; Grace et al., 2016; Piepoli et al., 2010; WHO 1993). However, the social implications of CR were not mentioned as an important aspect of patient recovery after heart valve surgery. After HVS, patients may require assistance from families and friends to assist with daily living activities until they are fully recovered and coping. A study conducted at the University of Copenhagen, in Denmark, states that after HVS the patients needed friends and family to be listened to and share their views regarding their experience of recovery (Berg, et al., 2013). Therefore, social support should be part of the cardiac rehabilitation programme.

In view of the challenges experienced by patients after HVS, the application of Orem's nursing system would assist the nurse in assessing the patient's needs for self-care and their abilities to perform self-care activities. The application of Orem's nursing system of a supportive-educative compensatory system by nurses before discharge from the

hospital would assist the patients in overcoming challenges experienced after heart valve surgery.

According to Mohammadpour et al., (2015), the supportive-educative system helps patients reduce their self-care deficit, improve their self-care ability and fulfil their universal, developmental, and health-related self-care needs. Within this system, although the patient would be capable of performing self-care interventions, he/she would still require assistance from the nurse in making decisions, controlling behaviour, and gaining knowledge and skills (George, 2014).

Importantly, the nurses in the Cardiac Unit and Cardiac Clinic would educate the patients on self-care agency, sternotomy care, prevention of wound infection, compliance with medications, the importance of exercise, counselling on sexual activities, and advice for caregivers regarding the support and care of their family members who had heart valve repair and replacement surgery. It is based on this assumption that Mohammadpour, et al., (2015) concluded that a supportive-educational approach based on Orem's theory of self-care can help healthcare providers identify and fulfill patients' self-care needs resulting in the prevention of readmissions, decreased morbidity and mortality, and an improvement in the quality of life for patients after heart surgery.

Care interventions according to the supportive-educative nursing system of Orem are feasible and the system is useful in acute settings therefore, valuable in improving the patient's knowledge, attitudes, and performance of any self-care behaviours (Khatiban, et al., 2018).

2.14 EXPERIENCES OF CAREGIVERS ON SUPPORT AND CARE TO RELATIVES WHO HAD HEART VALVE REPAIR OR REPLACEMENT SURGERY

This section provides an account of the experiences of caregivers when providing support and care to their loved ones in recovering from heart valve repair and replacement surgery. Caregivers play important roles in support to patients for recovery after heart valve surgery. These roles include monitoring patients' progress, providing care, supporting suggested lifestyle changes, and solving problems.

A study conducted in Denmark, revealed that caregivers have to take on new roles as physical and emotional helpers of patients after heart valve surgery (Berg, et al., 2013). Similarly, a study by the American Heart Association conducted by Kitko, et al., (2020) on family caregiving for individuals with heart failure, reported caregivers support patients with activities of daily living, namely: providing psychological support, helping improve and maintaining self-care, and navigating the healthcare system by coordinating appointments and follow-up visits.

In addition, a study conducted at the two governmental medical training centres in Isfahan, Iran by Bahrami, et al., (2014) on caregivers of patients with heart disease revealed that caregivers had problems related to obtaining information about the disease, being ignored by the healthcare system and caring for their family members with uncertainty. Concurrently, Etemadifar et al., (2015) found that caregivers reported uncertainty related to a lack of knowledge about heart disease and unreliable sources of information from the healthcare team. Additionally, Hamilton (2016) affirmed that caregivers experienced limited time to rest due to caregiving demands, which impacted their employment performance negatively.

Therefore, the literature reports that caregivers may develop depression and stress while caring for their loved ones recovering from cardiac surgery (Bjornnes, et al., 2019). These experiences are similar to those of caregivers of patients who underwent heart valve surgery in Namibia. In this study, the findings indicated that some caregivers felt they were not provided with enough support by the nurses on how to care for their family members upon discharge from the hospital.

However, the literature suggests that to overcome depression and emotional stress, caregivers should be empowered with health education and support through the application of Orem's Theory of Nursing System (Khatiban, et al., 2018). Caregivers should be included in the education programme for CR of their relatives because of the roles they play while the patient is still recovering from heart valve surgery. With the Supportive-educative Compensatory System, the caregivers will be coping with the demand to provide care support to the family members after heart valve surgery, this will also reduce their uncertainty and fear of taking care of their family members. In addition, Hu, et al., (2016)'s study showed that a multifunctional support program had beneficial effects on reducing caregiver demands, relieving depressive symptoms, and enhancing psychological well-being.

Given the complexity of these roles, caregivers should receive education on CR to have sufficient knowledge in tackling the challenges they may face while providing care to their family members recovering from heart surgery.

2.15 THE BEST PRACTICES ON THE CORE COMPONENT OF CARDIAC REHABILITATION

This section describes the best practices of the core components of cardiac rehabilitation. A literature review on best practices regarding the cardiac rehabilitation

of patients who underwent heart valve repair or replacement surgery, and cardiovascular diseases was undertaken.

The best practice of cardiac rehabilitation in this study was based on the international guidelines, framework, policy statements, and position papers from different experts of developed countries namely: the WHO, developing countries and experts from low-resource countries. The best practice guidelines used were from the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) and the American College of Cardiology (ACC); the European Association of Preventive Cardiology (EAPC); the British Association for Cardiovascular Prevention and Rehabilitation (BACPR); Australian Cardiovascular Health and Rehabilitation Association; Portuguese Society of Cardiology, and Low-income countries. The literature available in the English language was identified through a search of electronic databases.

The core components of the guidelines for CR of patients with cardiovascular conditions were extracted and compared in order to identify components which are feasible and affordable to be delivered for CR in the Namibian context. The American Heart Association and the American Association of Cardiovascular and Pulmonary Rehabilitation describe the fundamental elements of centre-based cardiac rehabilitation (CBCR), known to maximize cardiovascular risk reduction, improve healthy behaviours, and lower cardiovascular morbidity and mortality (Balady, et al., 2007).

Core cardiac rehabilitation components of the BACPR represent the coordinated set of actions necessary to favourably influence the underlying causes of cardiovascular disease and create the best physical, mental, and social environments possible so that

patients can, through their own efforts, maintain or regain optimal functioning in their communities and, through improved health behaviours, slow or reverse disease progression (Cowie et al., 2019). Cardiac rehabilitation is a Class 1 recommendation after heart surgery, myocardial infarction, coronary intervention, stable angina, or peripheral artery disease (Simon, et al., 2018).

Additionally, according to the European Society, comprehensive multidisciplinary therapies, including CR, may be referred to as preventive cardiology (PC), which aims to promote cardiovascular health in both primary prevention and secondary prevention settings (Ambrosetti et al., 2021).

The following core components have been established and recommended by major CR associations from high-income countries, namely American, Australian, British, Canadian, and European associations. These core components are patient assessment, exercise training, dietary counselling, risk factor management (smoking, lipids, blood pressure, weight, diabetes mellitus); and psychosocial interventions (Cowie et al., 2019; Piepoli et al., 2014; Woodruffe et al., 2015) as highlighted in the previous sections. These are described in detail in the following sections. The core components of cardiac rehabilitation provide insight into how they are being delivered in high and low-resource countries and how they can be applied to the Namibian context.

2.15.1 Patient assessment

Patient assessment is one of the important core components of the CR that must be conducted before the commencement of the CR programme. It is also recommended that the assessment should be patient-centered and goal-oriented. The Australian Cardiovascular Health and Rehabilitation Association (ACRA) states that the initial assessment's goal is to discover more about the patient's clinical, psychological, and

social status during a face-to-face meeting, video/web conference link, or telephone-based consult to establish an appropriate CR service (Woodruffe et al., 2015).

The consensus statement from low-income countries recommends that physical activity, diet, tobacco consumption, overweight and obesity, CHD knowledge, depression, return to work, lipids, BP, medications, and diabetes (Grace et al., 2016) should be considered during the assessment process.

Similarly, the European Association of Preventive Cardiology (EAPC) recommends patient assessment with medical conditions following cardiac valve surgery, namely: assessment for wound healing, comorbidities, complications and disabilities; with special focus on perioperative congestive heart failure, atrial fibrillation, blood glucose, renal and liver dysfunction, anaemia, venous thromboembolism, pleural and pericardial effusion, and diaphragmatic paralysis; evaluation and appropriate treatment of postoperative pain, echocardiography for pericardial effusion, prosthetic function and disease at other valve sites; exercise capacity to guide exercise prescription; symptoms limited exercise stress test as soon as possible; a maximal exercise test about four weeks after surgery; lastly, patient education on anticoagulants, drug interactions, self-management; and knowledge on endocarditis prophylaxis (Ambrosetti et al., 2021). The EAPC has covered most of the elements needed for patient assessment however, the component on the return to work was not mentioned as is the most important to prepare the patient for normal daily activities.

Similar to the EAPC, the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) and the American College of Cardiology (ACC) recommend patients be screened on medical history, physical examination, and testing on physical fitness and 12-lead ECG and resting heart rate (Thomas et al., 2019).

In Portugal, patient assessment was similar to other international guideline associations concerning the clinical history of cardiovascular disease, risk factors, and assessment of functional capacity including exercise testing in Phases 11 and 111 for all patients except in cases of patient capacity. The exercise training should involve individualized medical exercise prescription by a cardiologist or physical medicine specialist (Abreu, et al., 2018).

Moreover, in Australia, ACRA recommends that all eligible cardiac patients, according to Assessment and Short-Term Monitoring, should receive an individualized initial assessment that considers physical, psychological, and social parameters. Based on the patient's needs, the assessment should then be followed by an ongoing review, discharge assessment, and follow-up (Woodruffe, et al., 2015). In conclusion, it is therefore recommended that all patients should be assessed before the commencement of CR to verify the eligibility of the patient undergoing a cardiac rehabilitation programme.

2.15.2 Exercise training

The Australian Cardiovascular Health and Rehabilitation Association (ACRA) describes exercise training (ET) as a subcategory of physical activity in which planned, structured, and repetitive bodily motions are conducted to maintain or enhance physical fitness (Woodruffe, et al., 2015). It is a structured intervention that takes place over a specified period (Woodruffe, et al., 2015) and should be incorporated into interventions for physical activity. According to Squires et al., (2018), early outpatient cardiac rehabilitation (CR) heavily relies on exercise training, which has significant impacts on the patient's quality of life, cardiovascular health, and cardiorespiratory and metabolic indices disease control.

The benefits of regular exercise in patients following cardiac surgery have been well-established in both developing and low-resourced countries. Evidence suggests that exercise-based cardiac rehabilitation improves exercise capacity and vitality, and physical fitness, reduces disease-related factors, and improves patients' quality of life (Grace et al., 2016; Price et al., 2016, & Sibilitz et al., 2016).

Exercise training is an important aspect of CR for patients with cardiac diseases. Aerobic and resistance exercise are two types of exercise recommended by all the international guidelines and position statements for CR; however, the intensity, duration, and frequency of the training sessions may differ between the guidelines (Squires et al., 2018; Price et al., 2016). According to the international guidelines, position papers and other studies, aerobic and resistance exercise can improve the quality of life of patients after an event (Ambrosetti, et al., 2021; Squires et al., 2018). Squires et al., (2018) highlighted the primary components recommended for aerobic exercise, such as the combination of the frequency (sessions per week), and intensity (how hard). type (modality), and time (total duration). The types of aerobic exercise include swimming, jogging, brisk walking, aerobic dancing, elliptical training, rowing, stair climbing, treadmill, cycling, and arm/leg ergometry (Ambrosetti et al., 2021; Cowie et al., 2019; Squires et al., 2018; Abreu et al., 2018; Price et al., 2016).

In addition, the position paper further recommends resistance exercise training, the dose of which is determined by the frequency, resistance amount, number of repetitions per set, and the number of sets for each exercise (Squires et al., 2018). These components, as recommended, should be prescribed and followed when conducting an exercise programme for patients following heart surgery. Therefore, exercise training should be prescribed according to the principle as recommended by the international guidelines (Ambrosetti et al, 2018).

The modalities for resistance training include elastic bands, small weights, other objects or using the patient's own body weight (Squires, et al., 2018; Grace et al, 2016). Patients should be monitored for signs and symptoms of exercise intolerance, including an increase in blood pressure during exercise, symptomatic arrhythmia or ischaemia, feeling ill or febrile during exercise, failure of heart rate, musculoskeletal pain, and excessive fatigue before and after exercise to determine if it may be discontinued (Grace et al., 2016).

Exercise training is recommended for patients following HVS and other general conditions. The EAPC recommends that exercise training should begin as early as the patient is still in the hospital and continue immediately after discharge from the hospital, and upper body training should begin after six weeks when the chest is stable (Ambrosetti et al., 2021). This is supported by the CopenHeartVR randomized trial recommendations that upper body training should begin at least 6 weeks post-operatively to avoid complications with an unstable sternum (Sibilitz, et al., 2016). Similarly, a study by Savage et al., (2015) reported that upper body strength training which commences at three months after surgery was associated with less trauma to the sternotomy. Therefore, exercise training should commence within six weeks after heart valve surgery.

Moreover, the European Association of Preventive Cardiology recommends three exercise sessions a week for the duration of the eight-week programme or once a week for six weeks in an ambulatory setting, versus 4-6 days per week (2-3 sessions per day) for three weeks in a residential CR setting (Ambrosetti et al., 2021). In addition, the American College of Sports Medicine recommends exercise prescriptions for patients with cardiovascular diseases in outpatient cardiac rehabilitation programmes, with an aerobic exercise frequency of a minimum of three days per week, preferably five days

per week. The intensity should be at least 40-80% of exercise capacity using heart rate reserve, with a duration of 20-60 minutes per session, including warm-up and cool-down exercises (Squires, et al., 2018). Modalities include arm ergometers, walking, climbing stairs, rowing, treadmill, and upper and lower extremity ergometers (Squires et al., 2018). Resistance exercise is recommended 2-3 non-consecutive days per week, performing 10-15 repetitions of each exercise, with a duration of 1-3 sets of 10-15 reps for 8-10 exercises targeting major muscle groups (Squires et al., 2018). It is also advised to select equipment that is safe and comfortable for the patient to use (Squires et al., 2018).

Given the recommendations from high-resource countries, low-resource countries have also adapted and developed the delivery of core components for cardiac rehabilitation programmes that are affordable. The general recommendations for exercise in low-income countries include providing exercise to all patients following major cardiovascular heart diseases (CHD). According to Grace et al., (2016), the duration of aerobic exercise training depends on patients' functional capacity ranging from 10- 60 minutes per session at a rate of approximately 10%-20% per week, followed by warm-up and cool-down activities. Lower-risk patients should continue exercises at home, while high-risk patients are to perform exercises in supervised settings (Grace et al., 2016).

Moreover, walking and non-weight-bearing exercises are recommended for patients with musculoskeletal pain. If an exercise ECG is conducted before the exercise, the heart rate should be kept at the symptomatic threshold and without ECG monitoring, exercise training intensity should be within light to moderate ranges (Grace et al, 2016). The European Association of Preventive Cardiology guidelines recommend that during Phase 1, while the patient is in the hospital, exercise training programs

under supervision may be necessary especially among unstable and frailer patients, to confirm individual responses and tolerability and to quickly identify signs and symptoms signalling a need to alter or cancel the program (Piepoli et al., 2014). In addition, before, during, and after exercise training, there should be physical examinations as well as monitoring of heart rate, rhythm, and blood pressure, (Piepoli et al., 2014).

Symptom-limited exercise tests and monitoring of symptoms, heart rate, blood pressure, and ECG monitoring during the initial stages for new cases should be implemented before the commencement of the exercise. Symptom-limited maximal exercise stress including a six-minute walk test is recommended for high-risk patients and those for high-intensity programmes (Ambrosetti, et al., 2021; Grace et al., 2016).

International guidelines and position papers recommend the availability of equipment for cardiac rehabilitation programs, including stethoscopes and sphygmomanometers, weighing scales, chemistry analysis equipment, urine analysis equipment, ECG machines, echocardiography equipment, and equipment needed to assess functional capacities such as graded exercise testing (treadmill/cycle), cardiopulmonary exercise testing, and the six-minute walk test (Grace et al., 2016). Other exercise equipment needed includes buckets, bricks, boxes, baskets, cases or free weights, weight training machines, treadmills, elastic bands and cardiopulmonary resuscitation equipment including defibrillators and emergency carts (Ambrosetti et al., 2021; Cowie et al., 2019; Abreu et al., 2018; Grace et al., 2016; Piepoli et al., 2014).

Although CR may require equipment-based exercise training such as treadmills and ergometers, this might not be possible and available in low-resource countries due to financial constraints related to purchasing maintaining, and training personnel (Grace

et al., 2015). Therefore, Piepoli et al., (2014) affirm that exercise programs for CR can be carried out affordably and with minimal equipment while adhering to best practices. The choice regarding the intensity of exercise training begins before the choice regarding equipment. Similar equipment can be used for high-intensity training, although additional safety equipment may be needed. Nonetheless, the WHO guidelines recommend non-equipment-based exercise training for developing countries that are cost-effective and efficient (WHO, 1993).

Moreover, low-income countries propose minimal equipment for monitoring exercise, such as watches/stopwatches, sphygmomanometers, and charts for patients to rate dyspnoea, logbooks to record exercise attendance, exercise duration, and heart rate charts (Grace et al., 2016). This equipment may be provided by a nurse or a trained community health worker in hospital or community settings. This exercise programme is applicable and can be adapted to the Namibian context for the rehabilitation of patients after heart valve repair and replacement surgery.

The duration of CRP varies from country to country. In the United States of America, it lasts for less than 36 weeks (Menezes, 2014), while in Europe, the programme duration ranges from 2 to 16 weeks (Price et al., 2016). The consensus statement for low-resource settings recommends that low-risk individuals can safely exercise without medical supervision, while high-risk individuals may require medical supervision (Grace et al., 2015). The guidelines from the Portuguese Society of Cardiology recommend that exercise specialists should coordinate exercise training under medical supervision and be responsible for the direction and progression of the training (Abreu et al, 2018). The Australian Cardiovascular Health and Rehabilitation Association's guidelines recommend that resistance exercise should be supervised by trained practitioners (Woodruffe et al., 2015). The two types of exercises

recommended by international guidelines may be adopted in the Namibian context for patients after heart valve surgery for recovery.

2.15.3 Physical Activity Counselling

According to the European Association for Cardiovascular Prevention and Rehabilitation (EAPR), physical activity should be undertaken taking into consideration wound healing and exercise capacity. The EAPR further recommends a minimum of 2.4 hours per week of moderate aerobic activity, in multiple bouts each lasting 10 minutes, and can be performed on 4-5 days a week. Counselling should address a sedentary lifestyle as a risk factor and highlight the benefits of physical activity according to the patient's age, past habits, co-morbidities, preferences, and goals. Encouraging involvement in leisure activities and group exercise training programs is important because patients tend to revert to previous sedentary habits over time (Piepoli et al., 2015). In addition, Abreu et al, (2018) recommend providing medical advice regarding physical activity outside of formal programs, such as recreation, work, sexual activity, driving, and travel. Furthermore, patient education should emphasize how benefits can be achieved and the need for lifelong commitment while also educating patients about the possibility of relapses.

The EAPC recommends the CR team determine the type and intensity of physical activity (PA) for each patient. This includes how many days and minutes a patient typically spends doing physical activity at moderate or intense intensity each day. The team should explain the effects of inactivity, offer advice on appropriate types of activities and ways to progress, and encourage the patient to find activities that they enjoy and can be included in their daily routine. Patients should also be advised on coping with adverse effects, such as shortness of breath. Additionally, patients should be encouraged to reduce the time spent sitting, engage in active transportation (like

walking or cycling), take breaks from prolonged sitting, and limit screen time (Ambrosetti et al., 2018).

Furthermore, the European Association of Preventive Cardiology guidelines recommend that patients engage in at least 150 minutes of moderate-intensity aerobic physical activity per week, 75 minutes of vigorous-intensity aerobic physical activities per week, or an equivalent combination of the two (Ambrosetti et al., 2021). If patients are unable to participate in activities based on walking or cycling, CR programs should work with patients and caregivers to facilitate alternatives such as chair-based exercise, wheelchair ambulation, or other non-weight-bearing options like aqua aerobics or moderate intensity floor-based calisthenics (Ambrosetti et al., 2021).

2.15.4 Diet/nutritional counselling

The European Association of Preventive Cardiology recommends evaluating perioperative nutritional markers such as serum albumin, micronutrients (iron, folate, vitamin B12, and Vitamin A), and inflammatory markers. Additionally, a dietary program should be implemented after heart valve surgery. Consideration should also be given to the interaction between anticoagulation medication and vitamin K-rich food as well as other drugs such as amiodarone (Ambrosetti et al., 2021).

In addition, the Australian Cardiovascular Health and Rehabilitation Association recommends education and counselling that is targeted at adopting a healthy eating pattern aimed at reducing saturated fats, trans fatty acids, sugar, and salt intake while promoting increased intake of fresh fruits and vegetables except leafy vegetables (Woodruffe et al, 2015).

Furthermore, in low-income countries dietary recommendations should be affordable and contain fruits and vegetables, (at least 400g/day) one glass (150 ml) of fruit juice, whole grains and fibre, unsaturated fat (olive oil, sunflower oil, canola/rapeseed oil),

less than 5 g salt/2000 mg sodium per day, reduced processed products, protein sources (fish, poultry, nuts, and legumes), vitamins and mineral supplements and dairy products. Processed food should be avoided to reduce the risk of developing high blood pressure and heart disease (Grace et al., 2016).

2.15.5 Smoking cessation

The position paper by the European Association of Preventive Cardiology guidelines recommends that all cardiac patients who smoke should be encouraged to quit primary smoking and avoid exposure to secondary smoking (Ambrosetti, et al., 2021). Patients should be screened for their smoking status and offered nicotine replacement therapy such as Varenicline which blocks the rewarding and reinforcing effects of smoking and Bupropion (Zyban), which treats depression and assists people in quitting smoking. Structured approaches using the 5A_s namely: Ask, Advice, Assess, Assist, and Arrange, should be applied for screening patients for tobacco smoking (Piepoli et al, 2016; American Heart Association, 2013).

Similarly, low-resource countries recommend the psychosocial intervention of a 30-minute counselling session with a physician, nurse, or trained health personnel for smoking cessation. Information provided should include the risks and consequences of smoking and advice on methods to quit smoking (Grace et al, 2016).

In conclusion, the WHO recommends that abstinence from cigarette smoking has a significant impact on reducing morbidity and mortality for patients with cardiovascular diseases (WHO, 1993). This means that patients should be encouraged to quit smoking and avoid secondary smoke to improve their quality of life after heart valve repair and replacement surgery.

2.15.6 Mental health

There is evidence that patients with cardiovascular diseases are prone to mental health problems due to their conditions. A study conducted on CR of patients after HVS in comparison with coronary artery grafting bypass found that a higher number of participants had depressive symptoms (Savage et al., 2015).

The American Association of Cardiovascular and Pulmonary Rehabilitation (AACPR) and the European Association of Preventive Cardiology (EAPC) guidelines on cardiac rehabilitation both recommend interviews by a psychologist for screening and identification of psychological distress, which may be indicated by clinically significant levels of stress, depression, anxiety, anger, social isolation, marital or family distress, sexual dysfunction or adjustment difficulties, as well as substance and alcohol abuse (Piepoli et al., 2014; American Association of Cardiovascular and Pulmonary Rehabilitation, 2013). Therefore, a study conducted by Turner (2017) on patients' and nurses' views on providing psychological support within cardiac rehabilitation shows that nurses were committed to providing psychological support and believed it benefited patients. They advocated for the support to be delivered within cardiac rehabilitation programmes rather than through parallel healthcare services.

In addition, the European Association of Preventive Cardiology's position paper on the core components common to all conditions recommends the assessment of psychosocial risk factors, namely: low socio-economic status, lack of social support, stress at work and in family life, posttraumatic stress, hostility, social isolation, depression, anxiety and other mental disorders (Ambrosetti et al, 2021). If a patient exhibits clinically significant signs of hostility, anxiety, or depression, a referral to a

psychiatrist for psychotherapy, medication, or collaborative treatment should be considered.

Both guidelines recommend providing individual or group education and counselling on adjusting to heart disease, stress management, relaxation techniques, and health-related lifestyle (Piepoli et al., 2016; American Association of Cardiovascular and Pulmonary Rehabilitation, 2013). Family members, spouses, and potential caregivers should also be included in these discussion sessions. Furthermore, relevant studies recommend that teaching and support for self-help strategies and exploring effective social support should be part of the interventions to manage psychosocial distress among cardiac patients and their caregivers (Amakali & Small, 2014).

In low-income countries, based on the consensus, it was recommended that patients should be screened for depression by healthcare professionals who are capable of conducting diagnostic interviews for depression and providing collaborative, stepped depression treatment for those with a positive diagnosis (Grace, et al., 2016). The consensus further encourages patients who have received a positive depression diagnosis to adhere to cardiac rehabilitation to benefit from activities that promote mental health. Antidepressant drugs and pharmacotherapy should be given based on the patient's condition (Grace et al., 2016).

2.15.7 Medical Risk Factor Management

- **Serum lipids control**

The European Association of Preventive Cardiology recommends an assessment of the lipids profile and making modifications to diet and physical activity to achieve an expected outcome of total plasma cholesterol of less than 1.8mmol for patients at low or moderate risk (Piepoli et al 2014). Similarly, guidelines from low-income countries recommend a combination of lifestyle changes and pharmacotherapy to control serum

cholesterol. This includes the use of statin therapy, unless contraindicated for patients who are allergic to statins, have active liver disease, or are pregnant and lactating mothers. Statins block the action of liver enzymes that produce cholesterol, thereby reducing serum cholesterol levels and helping to prevent heart attacks and strokes (Grace et al., 2016).

- **Hypertension**

Coronary artery disease, acute aortic syndrome, congenital and valvular heart diseases, and arrhythmias are conditions associated with cardiac surgery that can lead to hypertension. Hypertension is common among cardiac patients, and complications such as severe cerebrovascular accidents can occur if blood pressure is not properly controlled. A study conducted by Burazor et al., (2015) showed that high blood pressure was detected in 24% of patients referred to the in-house cardiac rehabilitation program, with a maximum systolic pressure of 200 mmHg and a diastolic pressure of 110 mmHg. The study further reported that blood pressure can elevate due to multiple reasons among which are the pain of sternotomy, patient stress and anxiety about the future, and withdrawal of certain blood pressure medications, postoperatively, leading to spikes in blood pressure (Burazor et al., 2015).

Given this background, it is important to monitor patient's blood pressure because most of them may experience stress in adapting to normal life after artificial valve placement. It is recommended that the patient's blood pressure be monitored and controlled during follow-up visits to prevent complications associated with heart surgery such as heart attacks and strokes.

The European Association of Preventive Cardiology recommends that blood pressure should be assessed at rest and during exercise. If the resting systolic blood pressure is between 130-139 mmHg or diastolic blood pressure is between 85-89 mmHg, lifestyle modifications should be considered, and drug therapy should be initiated (Piepoli, et

al, 2016). In low-income countries, blood pressure should be assessed at the commencement of the CR sessions. Individuals with high readings should receive advice on lifestyle changes and antihypertensive medications should be prescribed in accordance with the patient's conditions or diseases (Grace et al, 2016). This approach may be applicable to the rehabilitation of patients who have undergone cardiac surgery in Namibia.

- **Weight control**

This component is about control of body weight. A position paper prepared by the EAPC recommends and encourages weight control through lifestyle changes that aim to balance physical activity and caloric intake, with monitoring of Body Mass Index (BMI) to maintain it within the range of 18.5 to 24.9kg/m² (Piepoli et al, 2016). Furthermore, the literature recommends that individuals with a BMI greater than 25 especially those with a BMI greater than 30 should focus on a combination of weight loss, dietary changes and increased physical activity (Grace et al. 2016). Consequently, low-income countries recommend monitoring BMI and waist circumference every six months (Grace et al., 2016). A similar recommendation may be implemented in Namibia for all patients with cardiac disease who are overweight or obese taking into consideration individual affordability and specific needs.

- **Cardio-protective therapies**

According to the European Association of Preventive Cardiology (2015), cardio-protective drugs are important for treating patients at risk for or with documented cardiovascular disease (CVD) and their use is applicable to the rehabilitation of patients after heart valve repair and replacement surgery.

Cardio-protective drugs include anti-platelets, lipid-lowering drugs, beta-blockers, ACE inhibitors/angiotensin receptor blockers/aldosterone antagonists, calcium channel blockers, digitalis, anticoagulants, statins, and diuretic therapies (Sizar et al.,

2023; McKeever and Hamilton 2022; Sutter, et al., 2015)). Rehabilitation provides the opportunity to assess patients' understanding of and adherence to medications and to titrate medication appropriately.

Beta-blockers can be used to treat a variety of cardiovascular problems and are highly effective for the symptomatic treatment of patients with effort angina or arrhythmias. They are also recommended for all patients after an ST elevation or non-ST elevation myocardial infarction. Most evidence for reducing cardiovascular events with beta-blockers is available for patients after acute coronary syndrome (ACS), especially in the presence of left ventricular (LV) dysfunction and patients with heart failure and reduced ejection fraction. Contraindications for beta-blockers include asthma and high-degree atrioventricular (AV) block (if no pacemaker is present). Treatment should be administered in low doses and titrated slowly in the elderly, in COPD, and in patients with heart failure. Side effects may include hypotension (bradycardia), bronchospasm (cold extremities), central effects (fatigue, headache, sleep disturbances, vivid dreams, etc.), and increased insulin resistance (De Sutter et al., 2015).

Antiplatelets play a role in the secondary prevention of thrombotic cardiovascular complications. Indications for antiplatelet therapy include acute coronary syndrome, post-percutaneous coronary intervention (PCI) with stenting, mechanical heart valves in combination with warfarin, acute ischemic stroke, stable angina, post-coronary artery bypass grafting surgery, primary prevention of coronary artery disease, acute rheumatic disease, post-patent ductus arteriosus (PDA) device closure for the first six months, and primary prevention of venous thromboembolism. Statins are

recommended for every patient with CHD. Patient education and counselling should be provided to optimise patient medication adherence (Grace, et al., 2016).

Low-income countries recommend that cardio-protective therapies such as anti-platelets, ACE inhibitors, beta-blockers, and statins be limited unless they are affordable and accessible (Grace et al, 2016). In Namibia, cardio-protective therapies such as anti-platelets, ACE inhibitors, and beta-blockers are accessible, commonly available, and used for all patients with cardiovascular diseases. This existing approach may be extended to the proposed rehabilitation programme for patients after cardiac surgery.

- **Return to work**

The WHO (1993) reports that the ability of patients with cardiovascular disease to return to work depends on the nature of the disease and the type of work an individual undertakes. In this regard, a position statement from the CR section of the EACPR recommends that before discharge, a return to work should be discussed with the patients and their partners before resuming activities (Piepoli et al., 2010). Therefore, the Australian Cardiovascular Health and Rehabilitation Association (ACRA) recommend providing education and support on the resumption of physical activity, return to work or voluntary roles, driving, sexual activity, and other daily living activities (Woodruffe et al., 2015).

Based on the consensus made in low-income countries, all CR patients should undergo an assessment of employment status, occupational type, and desired occupational status (Grace et al., 2016). Subsequently, and where available, treadmill exercise testing is recommendable, and where resources are not available, a 6-minute walk test may be used to assess the patient's ability to return to work. Low-risk individuals with

good functional capacity may return to work within 2 weeks after an event (Grace et al., 2016).

Although there are few follow-up studies available regarding the health status of patients who underwent cardiac surgery after returning to work, there is documented evidence that patients were able to regain muscular strength after completing a 6-week exercise programme and returned to work within 2 months of completing a 5-week training programme without any adverse effects following aortic valve replacement (Jenkins, et al., 2018). Therefore, replicating a similar approach in the Namibian context may yield similar results in the rehabilitation of patients after heart valve repair and replacement surgery.

- **Education and counselling**

Education and counselling of patients and caregivers are important for the recovery of patients and caregivers coping with the burden of supporting and caring for a family member after heart valve surgery. Grace et al., (2016) state that the purpose of education should be to alter people's perceptions of health, stimulate positive emotions, enhance optimism about the potential for change, and promote the importance of personal experience or alternative evidence of self-efficacy.

The Portuguese Society of Cardiology guidelines states that counselling on lifestyle modification should be conducted by physicians, nurses, nutritionists, psychologists and other members of the CR team (Abreu, et al., 2018). It should include information on physical activity, diet, return to work, sexual activity, driving, flight travel, adherence to pharmacological and non-pharmacological therapy, stress control, and anxiety through education programs, group therapy, and consultations with different specialists in the CR programs (Abreu et al., 2018).

In addition, in low-resource settings, it is recommended that personalized patient education should be provided, and staff members should frequently interact with patients (Grace et al., 2016). Education should be delivered in individual and/ or group settings, and if possible, family members and caregivers should be included (Grace et al., 2016). To enable informed healthy choices, instruction on physical activity, risk factor management, drug treatment, smoking cessation, and dietary advice should be provided in terms of food rather than nutrients at an appropriate level. Advice should be customized to the patient's unique requirements within the context of their family, considering factors such as age, culture, lifestyle, and socio-economic status (Grace et al., 2016).

The components of the educational programme for CR suggested by WHO, and high-income countries align with those highlighted by low-income countries which may be applicable to the Namibian context if delivered in more affordable and practical ways. The suggestions by the literature on the best practice for cardiac rehabilitation provided the basis for the development of a conceptual framework for cardiac rehabilitation in respect of this study. Figure 2.3 displays the conceptual framework for cardiac rehabilitation in respect of this study.

2.16 ROLE OF A NURSE REGARDING THE CORE COMPONENTS OF BEST PRACTICE FOR CARDIAC REHABILITATION

Given that this study serves as the foundation for the development of a programme for nurses to facilitate CR for patients after heart valve repair or replacement, it should be noted that some of the core components of best practices could be implemented by nurses who are specialised in cardiology. These components include psychological and mental health counselling, management of cardio-protective therapy and hypertension, diet, serum lipid, and body weight control; advice on smoking cessation, physical

activity counselling and adjustment, and advice about returning to work (Thomas, et al., 2019). The recommended approach may be feasibly adopted for the rehabilitation of cardiac patients in Namibia.

Additionally, the report of the CopenHeartVR randomised trial suggests that the psycho-educational component for CR should be provided by a cardiology-specialized nurse through a holistic patient approach for a period of 6 months after cardiac surgery is performed (Sibilitz, et al., 2013). Similarly, majority of higher-income countries (America, Europe), including the WHO, recommend that cardiologists, physical medicine specialists, rehabilitation nurses, physiotherapists, psychologists/social workers, dieticians, and pharmacists should deliver the core components of cardiac rehabilitation (Ambrosetti, et al., 2021; Cowie, et al., 2018; Thomas, et al., 2019; Abreu, et al., 2018; Woodruffe, et al., 2015; National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2004; Piepoli et al., 2010; American Association of Cardiovascular and Pulmonary Rehabilitation 2013; WHO 1993).

Likewise, in the Namibian context, the implementation of the components for CR may be facilitated by the nurses who specialize in cardiac and general adult intensive care unit and general nurses who provide care at the cardiac unit and cardiac clinic, because these are the resources that are available for CR services. Cardiology specialised nurses would be committed to providing psychosocial support to patients with depression and anxiety (Sibilitz, et al., 2013).

Furthermore, an Ishihara et al., (2023) study conducted in Japan highlighted the role of the nurse in cardiac rehabilitation namely: patient education on self-measurement of blood pressure, pulse and body weight, instruction on medications, diet, physical

activity, confirmation of symptoms and physical condition as well as instructions on sleep, stress condition and leisure times. Therefore, the literature concludes that a tailored, nurse-led CRP reduces the risk of a new cardiac event, enhances improvements in lifestyle and risk factor management, and as a result, improves patient health outcomes and quality of life (Michelsen, et al., 2018; Kadda, et al., 2015).

In summary, all the international guidelines, position statements, and frameworks for best practices recommend nurses as part of the multidisciplinary team who have the responsibilities to monitor, counsel, advise and provide information to patients with cardiovascular diseases, including patients who underwent heart valve repair or replacement surgery (Ambrosetti, et al., 2021; Cowie, et al., 2018; Abreu, et al., 2018; WHO, 1993). This means that nurses have special and a variety of roles to play in the recovery of patients after a cardiovascular event. Therefore, nurses are highly valued by patients for attending to their mental and physical health because patients view nurses as someone they can talk to (Turner et al., 2017). The same assumption is applicable to the implementation of CR by nurses for patients who underwent heart valve repair and replacement surgery in Namibia.

2.17 CONCEPTUAL FRAMEWORK FOR CARDIAC REHABILITATION

This section presents the conceptual framework that was adapted from international policies and guidelines Dreyer et al., (2021) and Grace, et al., (2016)’s model for the delivery of cardiac rehabilitation; Ambrosetti, et al., 2021; Cowie, et al., 2019; and Woodruffe, et al., 2015). This framework was based on the findings of the situational analysis in Phase 1. Similar to the findings of the study, Dreyer, et al., (2021) state that after a cardiac event, a patient feels like a “different person” characterized by a threatened sense of safety and security, fragility, social isolation, difficulty, and

uncertainty about the future. This feeling mostly manifests itself as losses that pose new challenges to everyday life. This adversity requires patients to take responsibility for their health. Equally, nurses would also equip the caregivers to support the patients in their journey to recovery after a cardiac event.

Therefore, a conceptual framework describing the challenging experiences by both patients and their caregivers after a heart event should be formulated, with corresponding nurse interventions to address identified challenges. Figure 2.3: Illustrates the conceptual framework for cardiac rehabilitation based on the findings of this study.

The figure illustrates the Phases, challenges experienced by patients and caregivers, and core components of CR for patients after HVS to address the identified challenges. The patient's recovery process begins when they are hospitalized in Phase 1 to undergo heart valve surgery (HVS) until their discharge from the hospital when they enter into Phase 2 and 3 as outpatients and the maintenance phase, respectively. The left part of the figure outlines the challenges experienced by the patients who had HVS, as well as the challenges experienced by the caregivers in supporting and caring for a family member who had heart valve surgery. After HVS, the patient experiences a shift in identity characterized by both losses and gains that need to be addressed to cope with recovery and sustain required lifestyle changes for a positive health outcome. Therefore, patients need to engage in CR from Phase 1 to Phase 3.

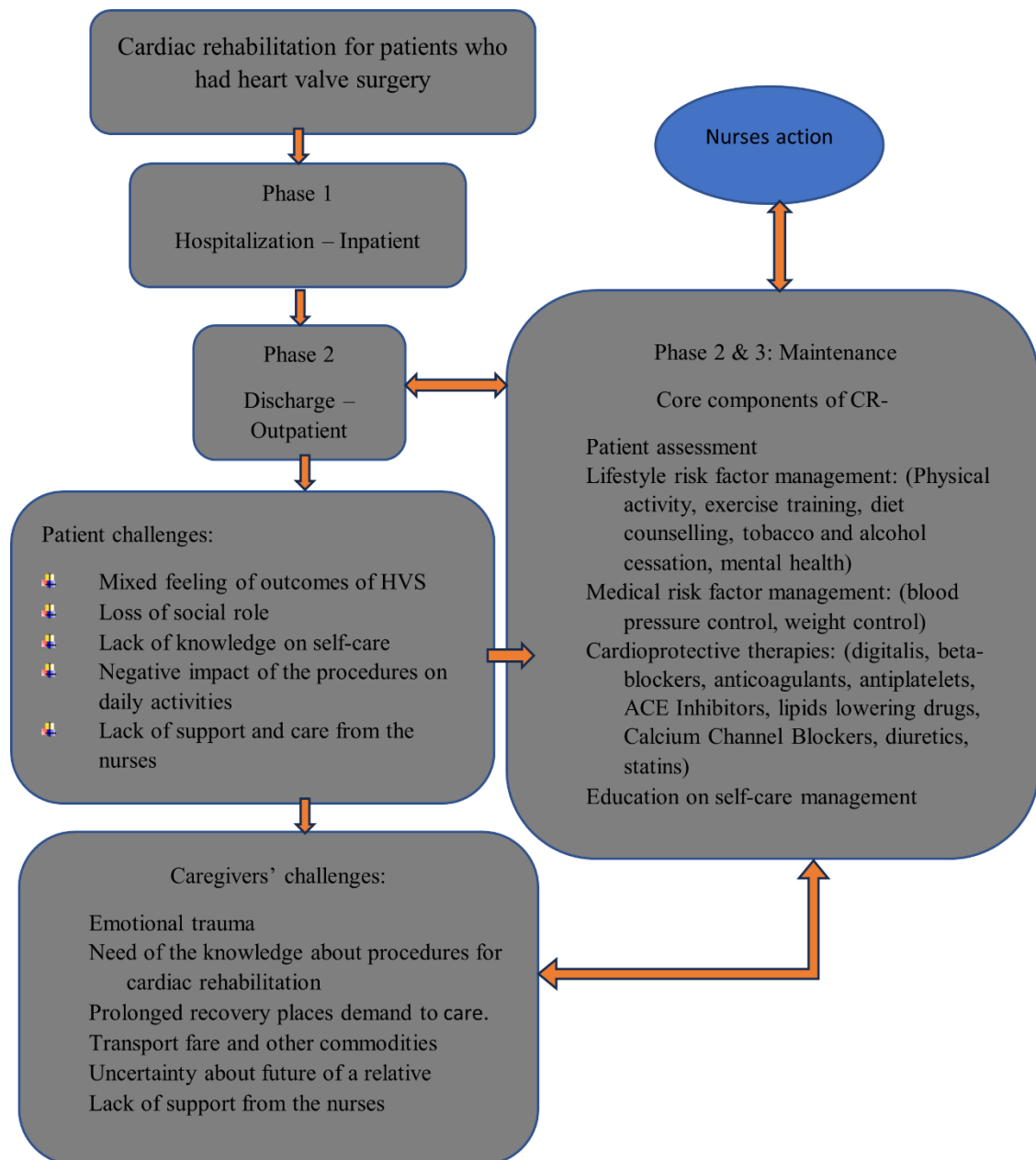


Figure 2.2: The conceptual framework for cardiac rehabilitation

Source: Adapted from Dreyer, et al, 2021; Grace et al., 2016; and International Association Guidelines.

In addition, the right part of the figure outlines the core concepts of cardiac rehabilitation for clinical recovery after cardiac surgery. During the post-heart valve surgery period (Phase 3), the patient needs to implement long-term lifestyle and behavioural changes and adhere to cardioprotective therapies for positive health outcomes. For the success of the implementation of the programme interventions,

patients will need guidance and support from healthcare professionals on self-care management and adherence to medication and lifestyle modifications to improve their quality of life. Furthermore, caregivers are also challenged with the burden of care due to new roles, the lack of knowledge and skills, and uncertainty about the future of a relative who had heart valve surgery. Therefore, caregivers need to be involved in the education and care of the family members who have had heart valve surgery.

2.18 SUMMARY

In this chapter, the literature review focused on the theoretical concept based on Dorothea Orem's Self-Care Theory of supportive-educational compensatory care. The literature discussed various aspects including types of heart valve replacement surgery, treatment of valvular heart diseases, indications for heart valve replacement and repair surgeries, heart valve surgery procedures, and complications associated with heart valve surgery. The review described the KAP of nurses regarding CR, the challenges experienced by nurses in CR, and the experiences of patients in their recovery after heart valve surgery. Additionally, the literature explored the experiences of caregivers on the support and care provided to family members after heart valve surgery. The overview of CR, its benefits, as well as the barriers were described.

Furthermore, the best practices on the core components of CR that are effective and adopted in the Namibian context, and the roles of the nurse on the core components of CRP were examined. The literature review concluded with the conceptual framework for CR adapted from Dreyer, et al., 2016; Grace et al., 2016 and International guidelines from America, Australia, Canada, Portugal, and European countries. The following chapter presents the research design and methods that were applied in the study.

CHAPTER THREE

RESEARCH DESIGN AND METHODS

3.1 INTRODUCTION

The previous chapter presented the literature review of studies relevant to the current research. This chapter introduces the mixed methods approach of explanatory sequential design, which is divided into: Quantitative and qualitative strand. Each strand addresses specific components, including research design, methods, study populations, sample size, sampling methods, data collection instruments, procedures, and data analysis and these are discussed separately for clarity.

The reasoning strategies, measures to maintain validity, and reliability of quantitative data and trustworthiness in qualitative data collection and analysis as well as ethical considerations are discussed. Lastly, the chapter describes Phase 2 of the study which focuses on the development of the conceptual framework, Phase 3 about the development of the educational programme and Phase 4 about the implementation and evaluation/validation of the educational programme are discussed.

3.2 SCIENTIFIC REASONING STRATEGIES

According to Grove et al., (2015), reasoning is the act of organizing and analysing the information that leads to conclusions. People can make sense of their thoughts, experiences, and scientific data through reasoning (Gray and Grove, 2021). The science of logic includes inductive and deductive reasoning. Therefore, the reasoning strategies used in this study included inductive, deductive, bracketing, analysis and synthesis, the applications of which are described in the following sections.

3.2.1 Inductive reasoning

According to Gray and Grove, (2021) inductive reasoning involves moving from the specific to the general, where particular instances are observed and then combined into larger general statements. In this study, inductive reasoning was used during Phase 1, objectives, 1.2, 1.3, and 1.4, of the nurses, patients and caregivers respectively for the collection of the qualitative data, when assessing the challenges nurses experienced in delivering CR to patients after HVS, the experiences of patients in recovery and coping after HVS, and the experiences of caregivers in providing support and care to their family members who had heart valve surgery. The researcher began with an interview and obtained responses from the participants, subsequently moving to general conclusions. Inductive reasoning was also applied in Chapter 4 for the development of themes and subthemes in data analysis. Moreover, inductive reasoning was also used in Phases 2 and 3 during the development of the conceptual framework and the educational programme respectively, as both were based on interpretations of the findings from the data.

3.2.2 Deductive reasoning

Deductive reasoning is the opposite of inductive reasoning, referring to moving from a general premise to a specific situation (Grove, & Gray, 2021). In this study, deductive reasoning was applied to the quantitative method to understand and describe the phenomena under study. Deductive reasoning was applied in Phase 1, for objective 1.2, which aimed to assess the knowledge, attitudes, and practices (KAP) of nurses regarding the provision of CR to patients who have had heart valve surgery.

Moreover, deductive reasoning was applied in Chapter 6, in the form of a survey list, consisting of the agent, recipient, context, dynamics, procedure and terminus. The researcher also employed deductive reasoning for the development of the educational

programme as well as its implementation and evaluation/validation of the developed education programme for nurses to facilitate CR for patients who have undergone heart valve surgery. The educational programme developed was validated by academic experts and cardiac specialist nurses, in consultation with the supervisors of this study to assess the feasibility of the study findings.

3.2.3 Synthesis

Synthesis is the process of clustering and interrelating ideas from multiple sources to form a new and comprehensive concept based on what emerged from the investigation (Grove & Gray, 2018). In this study, the concepts that emerged during data analysis were combined in the development of the conceptual framework. This framework serves as a guide for the development and implementation of an educational programme for nurses to facilitate CR for patients who underwent HVS in Namibia.

3.2.4 Inference

Inference involves the use of inductive reasoning to move from a specific case to a general truth. An inference refers to clues that lead to a conclusion or assumptions (Grove et al., 2015). In this study, conclusions were made based on the findings from both the quantitative and qualitative data collected during Phase 1 of the situational analysis. This was achieved through the collection of data from nurses, patients and caregivers using questionnaires and semi-structured interview guides followed by the interpretation of the findings. Inference played a crucial role in the development of the conceptual framework in Chapter 6 as it helped elucidate the meaning of nurses' challenges in providing CR interventions, patients' experiences of recovery and coping after HVS, caregivers' experiences in supporting and caring for their family members who have had heart valve surgery. Similarly, inference was applied in the development

of an educational rehabilitation programme, as the interventions for the programme were informed by the preceding conceptual framework.

3.2.5 Bracketing

Bracketing involves the researcher temporarily setting aside their existing knowledge about the phenomena under study (Grove, et al, 2015). Gray, and Grove (2021) assert that to truly understand the experiences of subjects, a researcher must be attentive to the worldview of the subject and put aside their personal viewpoints to enable meanings to emerge. In this study, the process of bracketing was employed during data collection, analysis and interpretation of both quantitative and qualitative data of the explanatory sequential methods. The researcher who is a nurse, with years of experience in the Cardiac Unit, consciously set aside her personal experiences related to that specific environment. This step was undertaken to minimise personal judgement, and assumptions during the interviews by accurately capturing the exact words and quotes of the participants. The researcher remained neutral throughout data collection to prevent her own feelings and ideas from influencing the study. During interviews, only the central question in the interview guide was asked to the participants, and probing was posed only for clarification when necessary and relevant to the research questions.

3.2.6 Reflection

Grove et al., (2015) describe reflection as the process of self-awareness and critical examination of the interaction between oneself and the data collection and analysis of qualitative data. Furthermore, according to Gray and Grove (2021), reflexivity involves the ongoing process of employing positional insights and continuously reflecting at each stage of the study to recognize how one's values and prejudices might

influence their thinking. Thus, reflexivity requires researchers to acknowledge and explain their viewpoints, beliefs, and implications for the research.

In this study, the researcher as a cardiac nurse who worked in the Cardiac Unit for many years with prior experiences was able to acknowledge her roles in the research during data collection, analysis, and interpretation of data not to influence the research process. During data collection, the researcher was careful with how the questions were asked and interpreted, and careful not to overemphasize certain aspects or overlook participants. Furthermore, during data collection, the researcher adhered to the ethical principles and respected the patients' rights and dignity. Peer debriefing was also conducted whereby the transcripts were shared with the study supervisors and peer colleagues to provide comments and suggestions on how the interpretations of the data were conducted. Moreover, the researcher employed reflection by revisiting significant statements made by the participants through member checking to obtain participants' consensus (Creswell, & Clark, 2018).

3.3 RESEARCH DESIGN AND METHODOLOGY

▪ Research design

Research design is a blueprint that provides the structure for the research methods and decisions that must be considered when planning the study to maximize control over factors that could interfere with the study's desired outcome (Grove, et al, 2015). The research design guides the researcher in selecting a study population, the sampling process, and methods of data collection and analysis. The choice of research design depends on the researcher's expertise, the problem being investigated, the study's purposes and the intended findings (Gray, & Grove, 2021). The study employed an explanatory sequential mixed-method design where a quantitative approach with

descriptive and cross-sectional design and a qualitative approach with descriptive, exploratory, and contextual design were followed to answer the research questions. The designs are described in the next sections.

- **Mixed method design**

A mixed method was employed. According to Creswell, (2014), mixed methods design involves the combination or integration of qualitative and quantitative data in a research study. Mixed methods research provides more comprehensive evidence for a research problem being studied because it can answer questions that cannot be addressed by either quantitative or qualitative research alone (Creswell & Creswell, 2018). Furthermore, the mixed methods approach encourages the use of multiple paradigms rather than being confined to a single paradigm associated with either quantitative or qualitative research (Creswell, & Clark, 2018).

- **Explanatory sequential mixed research design**

The mixed method of sequential explanatory design was used and applied in two Phases. According to Creswell, and Clark (2018), the explanatory sequential design is a mixed methods approach that involves a two-phase project. Othman, et al., (2020) state that conducting mixed methods in two phases is a powerful strategy for identifying and enhancing the study's strengths, providing rich data, and improving the validity and reliability of findings.

Subsequently, in this study, the two-phase project was addressed as the initial quantitative strand and the qualitative strand as a follow-up strand. In the initial phase of the quantitative strand, the researcher collected and analysed the data and applied a descriptive and cross-sectional method to describe the KAP of nurses regarding CR of patients who had heart valve surgery. Then, in response to quantitative results, a follow-up of qualitative, exploratory, descriptive, and contextual approaches was used

to aid in the explanation of the quantitative results (Creswell, and Creswell, 2018). In addition, the main central question followed the data collection research questions derived from the initial quantitative strand to gain a better understanding of the identified key results such as surprises, outliers, and significant and non-significant results (Creswell, & Creswell, 2018).

Furthermore, the challenges experienced by the nurses regarding CR interventions for patients who had undergone HVS, the experiences of patients regarding recovery and coping after HVS, as well as caregivers' experiences regarding the support and care provided to their family members who had HVS after discharge from the hospital were explored and described (Refer to figure 3.1).

Both the results from the quantitative and the findings from the qualitative strand were then integrated, and the interpretation of the results led to the development of the conceptual framework and educational programme for cardiac rehabilitation. Moreover, the qualitative approach enabled the researcher to gain insight and understanding of the challenges experienced by the nurses, patients' experiences of recovery and coping after HVS, as well as the caregiver's experiences in providing support and care, to a family member who had HVS respectively.

Figure 3.1 illustrates the application of the explanatory sequential mixed research design according to Creswell, and Clark, (2018).

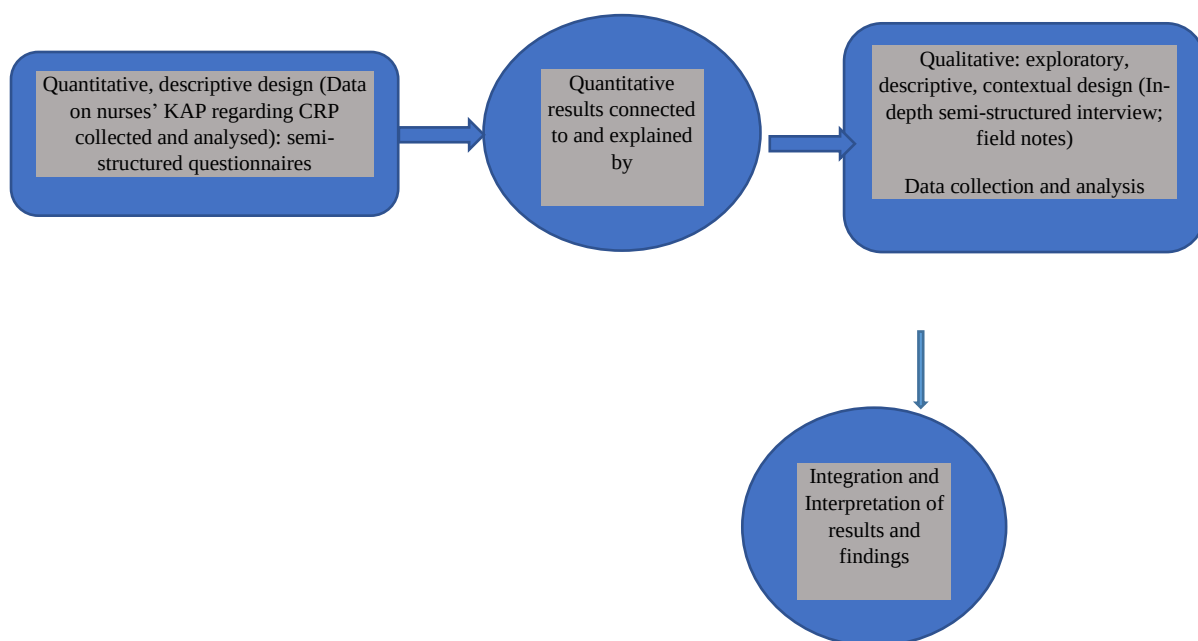


Figure 3.1: The explanatory sequential mixed research design

The following sections provide details on the application of the methodology used in the study.

3.4 RESEARCH METHODOLOGY

Methodology refers to the research design, methods, approaches, and procedures that are well-planned for use in an investigation to answer the research question (Kivynja & Kuyini, 2017). Data collection, instruments used, data analysis, and the participants, all form part of the methodology. This section describes the four Phases of the study, outlining how the study was conducted as summarised in Table 3.1.

Table 3.1: Research Phases and Methodology

Phases	Objectives	Methodology
Phase 1 Situational analysis	Objective 1.1: Describe the level of knowledge, attitudes, and practices of nurses regarding the CR of patients who	Design: Quantitative, descriptive cross-sectional Population: 29 Nurses working at the Cardiac Unit and Cardiac Clinic.

have had heart valve repair or replacement surgery.	Sample size: 23 Nurses Sampling: Total population sample Instrument: Questionnaires Procedure: Self-administered questionnaires Data analysis: SPSS Version 27 Descriptive statistics frequencies and percentages, Fischer's Exact Test to test the association between demographic and nurses' knowledge, attitudes and practices.

Objective 1.2: Explore and describe the challenges experienced by nurses in providing CR services to patients who have undergone heart valve repair or replacement surgery.	Design: Qualitative, Explanatory sequential mixed method Approach: Exploratory, Descriptive, Contextual Population: 29 Nurses working at Cardiac Unit/Clinic Sampling: Purposive sampling Sample size: 10 nurses; data saturation. Instrument: Interview guide Audio- tape recorder Procedure: In-depth semi-structured interviews, Field notes Data analysis: Content analysis Tesch's steps Findings: Themes & Sub-themes

Objective 1.3: Explore and describe the experience of patients during their recovery and coping process following heart valve repair or replacement surgery.	Design: Qualitative, Explanatory sequential mixed method Approach: Exploratory, Descriptive, Contextual Population: 352 patients Sampling: Purposive Sample size: 12 patients, data saturation. Instrument: Interview guide Audio- tape recorder Procedure: In-depth semi-structured interviews; Field notes Data analysis: Content analysis Tesch's steps Findings: Themes & Sub-themes

Objective 1.4: Explore and describe the experiences of caregivers about providing support and care to a relative who has undergone heart valve repair or replacement surgery.	Design: Qualitative, Explanatory sequential mixed method Approach: Exploratory, Descriptive, Contextual Population: 352 caregivers Sampling: Purposive sampling Sample size: 8 caregivers; data saturation Instrument: Interview guide Audio- tape recorder Procedure: In-depth semi-structured interviews, Field notes

Data analysis: Content analysis
 Tesch's steps
 Findings: Themes & Sub-themes

Phase 2 Conceptual framework	Objective 2: Develop a conceptual framework for CR based on the findings from the situational analysis to provide a structured understanding of cardiac rehabilitation for this patient group.	A conceptual framework was developed and operationalized within the constructs (Agent, recipients, context, dynamics, procedures, terminus) of a practical-oriented theory of Dickoff, and Wiedenbach (1968). Agent: Researcher, programme developer, facilitator. Recipient: registered nurses, enrolled nurse Context: Cardiac Unit and Cardiac Clinic. Dynamics: Nurses lack knowledge, negative attitudes, and poor practices. Challenges experienced by nurses, patients, and caregivers. Procedures: Activities of CR programme. Terminus: Outcomes
Phase 3 Educational programme	Objective 3: Develop an educational programme for nurses to facilitate CR for patients who have had heart valve repair or replacement surgery. [Phase 3]	Programme goals and objectives were described. Theories for curriculum development and teaching-learning were identified and applied. Programme learning content was developed. Guidelines for the implementation of the programme were developed.
Phase 4 Implementation and evaluation/validation of the programme	Objective 4: Implement and evaluate or validate the effectiveness of the educational programme for nurses to facilitate CR of patients who have undergone heart valve repair or replacement surgery.	The developed programme was validated by two academics and 1 nurse specialist in cardio-thoracic nursing care. The programme was found appropriate and practical because it addressed the challenges identified in the situational analysis.

3.5 PHASE 1: SITUATIONAL ANALYSIS

Phase 1 of the situational analysis consists of quantitative and qualitative research strands and consists of four (4) objectives, namely: Describe the level of KAP of nurses regarding CR of patients who have had heart valve repair or replacement surgery; Explore and describe the challenges experienced by nurses in providing CR services

to patients who had heart valve repair or replacement surgery; Explore and describe the experience of patients of recovery and coping after heart valve repair or replacement surgery; as well as explore and describe the experiences of caregivers about providing support and care to a relative who have undergone heart valve repair or replacement surgery.

The next section describes the situational analysis through quantitative and qualitative data (Explanatory sequential mixed-method approach) for the four (4) objectives.

3.5.1 Objective 1.1: Describe the knowledge, attitudes, and practices of nurses regarding cardiac rehabilitation

▪ Research approach- Quantitative Cross-sectional study

A cross-sectional study refers to a quantitative study approach in which data are collected at a single point in time (Brink et.al., 2018). For this study, a quantitative cross-sectional approach was adopted to obtain and describe the quantifiable data on the KAP of nurses regarding the CR of patients who had heart valve repair or replacement surgery at one point in time. In this regard, data was collected through a self-administered questionnaire with variables on nurses' KAP regarding CR of patients who had heart valve surgery. The identified results are outlined in Chapter 4 in the form of tables and discussed in Chapter 5.

▪ Descriptive research

According to Grove, et al., (2015) descriptive research involves the exploration and description of phenomena in actual settings. It provides a precise description of the traits of specific people, circumstances, or groups. Moreover, descriptive studies typically use large samples of subjects or study participants, in unaltered natural environments. Through descriptive research, researchers can categorize information in real-world contexts, find new meaning, characterize what already exists, and estimate

how frequently something occurs (Gray, and Grove, 2021). In this study, the researcher described the KAP of nurses regarding CR for patients after heart valve surgery.

- **Population**

A study population comprises a complete group of individuals or objects that share common characteristics who meet the criteria for inclusion in a study, and upon whom the study's findings can be applied (Gray, and Grove, 2021; Polit & Beck 2012). The population consisted of the nurses working at the Cardiac Unit and Cardiac Clinic of Windhoek Central Hospital. According to Grove et al., (2018), the target population is the entire set of individuals or elements who meet the sampling criteria. The target population encompassed all the twenty-nine (29) nurses responsible for providing nursing care to patients who had undergone heart valve repair and replacement surgery at these specific units within Windhoek Central Hospital.

- **Sample and sampling method**

A sample is a subset of a study population, chosen by the researcher to represent the population and draw inferences about it, while sampling is the process of selecting this subset from the sample frame to gather information regarding the phenomenon (Brink et al., 2018; Polit & Beck, 2013). Among the twenty-nine (29) nurses, two (2) participants declined to take part in the study, and one (1) participant had less than six months of experience in the Cardiac Unit. Three (3) were used for pilot testing and did not participate in the main study. The total sample size was comprised of the remaining twenty-three (23) nurses.

- **Inclusion and exclusion criteria**

According to Polit and Beck, (2012) and Grove, et al., (2015), inclusion criteria are the characteristics that individuals must have to be part of the target population, while

exclusion criteria refer to the characteristics that make prospective participants ineligible to participate in the study (Grove, et al, 2015).

The inclusion criteria for this study objective were: registered or enrolled nurses providing nursing care for patients who had HVS at the study setting; registered or enrolled nurses who consented to participate in the study; Intensive Care Unit or Cardiac trained nurses who provided nursing care to patients who had heart valve repair and replacement surgery at the study settings Unit of Windhoek Central Hospital and registered or enrolled nurses with more than six (6) months of experience in providing nursing care at the study setting, thus who were exposed to provide nursing to patients after heart valve surgery.

The exclusion criteria were registered or enrolled nurses who were not providing nursing care at the study settings at the time of data collection; registered or enrolled nurses who did not consent to participate in the study as well as nurses who had less than six months of working experience at the study settings.

Table 3.2: Table of the study population for objective 1.1

Nurse category	Number	Percentages
Cardiac specialist nurses	3	10.3%
Registered General nurses	23	79.3%
Enrolled nurses	3	10.3%
Total	29	99.9 (100)

▪ **Field preparation**

The researcher scheduled an appointment with the Control Registered Nurse (CRN) at the Cardiac Unit to introduce herself to the participants and inform them about the study to be conducted in the Study settings. During this meeting, the researcher explained the study's purposes, objectives, and the entire data collection process to the Control Registered Nurse. Subsequently, the researcher had the opportunity to meet

with the participants in the study settings. In the meeting, the informed consent leaflet was presented by the researcher and given to the participants to read on their own allowing them to familiarize themselves with its content. The principles of respect for persons, or autonomy regarding confidentiality, privacy, anonymity, and informed consent were explained to the participants. The ethical principles of beneficence, non-maleficence, and justice were also discussed with participants before the data collection commenced, and these principles were upheld throughout the data collection and analysis process. Detailed descriptions of these ethical principles are provided in the subsequent sections of this chapter.

- **Data collection**

According to Grove et al., (2015) data collection is the systematic and accurate gathering of information relevant to a study's specific aims, questions, or hypotheses. Gray and Grove (2021), emphasize that the data collection process begins before the collection of the first subject's data and continues until the last subject's data are collected. According to Du Plooy-Cilliera et al., (2014), researchers must exercise extra caution when collecting data because it is one of the most crucial components of any research study, and if done poorly, it could lead to erroneous conclusions and findings. In this study, the researcher was considerate in selecting the instruments and methods used for data collection and analysis and paid careful attention to the timing of data collection.

- **Data collection instrument**

The data were collected through a self-administered questionnaire comprising 92 items using the Likert Scale. The questionnaire consisted of four sections: Section A, focused on the demographic data. Section B asked questions about the knowledge of the

participants regarding CR, Section C, examined the attitudes of nurses towards CR, and Section D, evaluated the practices of nurses regarding cardiac rehabilitation.

Additionally, Section B consisted of 49 knowledge questions and was divided into six (6) subsections. Subsection 1, focused on the nurses' knowledge regarding cardiac rehabilitation and contained 11 questions; Subsection 2 focused on patient assessment and included 12 questions; Subsection 3 covered the knowledge about exercise education with 8 questions; Subsection 4 addressed the knowledge of dietary counselling with 4 questions; subsection 5 examined the knowledge of smoking cessation with 4 questions, and finally, subsection 6, pertained to the psychosocial management of the patient with 10 questions. The Four-Point Likert Scale (ranging from the highest point being 4 to the lowest being 1 score) definitely, probably, definitely not, and don't know was used to rate the knowledge of nurses. There were five negative questions on the instrument that were graded from Don't Know 4 to Definitely =1. The scores were reversed because of their importance. The negative questions from the nurses' knowledge about CR that were reversed are depicted in Table 3.3.

Table 3.3: Negative questions on nurses' knowledge about cardiac rehabilitation that were reversed:

Item	Negative questions
1.	Cardiac rehabilitation is designed only for those patients who have recently had heart valve surgery.
2.	Phase 1 of the cardiac rehabilitation program begins as soon as the patient is discharged from the hospital.
3.	Patients with bio-prosthesis of mitral valve repair should receive warfarin for 1 month after cardiac surgery.
4.	Low activity level reduces the risk of mortality in patients after heart valve surgery.
5.	Supervised exercise is recommended for low-risk patients.
6.	Food with high salt content and labeled food with added salt are healthy for patients after heart surgery.

Additionally, Section C focused on the attitude of nurses towards CR and consisted of 5 subsections. Subsection 1 addressed participants' attitudes toward CR; Subsection 2

was about patients' assessment, subsection 3 covered exercise training, subsection 4 was about diet/nutritional counselling, and Subsection 5 covered psycho-social management. The Five-Point Likert scale (ranging from "strongly agree" to "strongly disagree") was used for scoring, with 'strongly agree' scoring the highest point of 5 and 'strongly disagree' scoring the lowest point of 1. There were 13 negative questions and 10 positive questions in this section.

Lastly, Section D focused on the practices regarding CR and consisted of 20 questions. A 4-point Likert Scale was used, with response options including never (1), seldom (2), often (3), and always (4). Chapter 4 describes findings according to variables in the questionnaire.

The researcher adapted core components from international guidelines and relevant literature to formulate the questions. The selected core components included patient assessment, exercise training, diet counselling, smoking cessation, psycho-social management, and education as well as aspects related to the definition, phases, indications, and benefits of cardiac rehabilitation.

▪ **Data collection procedure**

Before collecting the data, permission was obtained from several ethical research committees including UNAM Health Ethical Research Committee (HREC), the Ministry of Health and Social Services Research Ethical Committee, and Windhoek Central Hospital through the Office of the Medical Superintendent (Refer to Annexure A, C & E). Additionally, permission was obtained from the participants at the Cardiac Unit and Cardiac Clinic. Various ethical considerations as mentioned earlier were addressed, including obtaining both verbal and written consent from participants, ensuring anonymity and confidentiality, emphasizing voluntary participation, and explaining the renegotiation of informed consent and the process for withdrawal. The

applications of these ethical aspects are discussed in more detail in the next sections of this chapter. Following the necessary ethical procedures, data collection commenced. The self-administered questionnaires were distributed to the participants by the researcher and completed questionnaires were collected from the office of the Chief Registered Nurse of the Cardiac Unit and Cardiac Clinic after a week. The data were collected from a sample of twenty-three (23) nurses and yielded a response rate of 100%.

- **Data analysis**

According to Grove et al., (2021), data analysis is conducted to condense, organize, and interpret the data to address the research aims, questions, and/or hypotheses. In this study, several steps were taken in the data analysis process. First, the raw data were checked for quality, and any missing data were identified and addressed before being entered into the electronic database and analysed using the statistical package for Statistical Social Science (SPSS) Version 27. The data were then coded, assigned alphanumerical values, and analysed. Descriptive statistics were performed to calculate the mean, median, and standard deviations of the data. Frequency distributions and percentages were also calculated. The level of knowledge was categorised as high (147-196 scores), average (99-146 scores) and low (49-98 scores). Attitudes scores: 23-68 (Negative; 69-115 (Positive).

Regarding the overall score of practice, the total score ranged from 19 to 76 and was divided into 3 categories as follows: 19-38 (poor practice score), 39-56 (average practice score), and 57-76 (good practice score). The results were presented in the form of tables for clarity and ease of interpretation. For the inferential analysis, multiple linear regression was conducted to determine the association between the knowledge, attitudes, and practice scores and the demographic characteristics of the nurses. Due

to the small sample size, data were analysed using Fischer's Exact Test to measure the association between variables and the demographic data of the nurse participants. A P-value of less than <0.05 was considered statistically significant. Detailed data analyses and findings are presented in Chapter 4.

- **Pilot testing**

A pilot study is typically a scaled-down version of the proposed study, often conducted by researchers to refine the sampling strategy, intervention, or variable measurement (Grove, et al., 2015). According to Creswell and Creswell, (2018), the purpose of pilot testing is to assess the validity of instrument scores in terms of content, provide an initial evaluation of the internal consistency of the items, improve questions, format, and instructions, and estimate the time required for the study.

The questionnaire underwent pilot testing before the main study to ensure its feasibility. The pilot testing included three (3) Cardiac nursing staff members who provided nursing care to patients who had HVS at the Cardiac Unit and who were not part of the main study.

- **Findings from the pilot testing**

As a result of the pilot testing, changes and adjustments were made to the instrument before the data collection for the main study. These changes were made in response to the feedback from the participants who found some of the questions unclear and difficult to understand. The questionnaire was subsequently modified to ensure that it was easy to read and understandable for all the participants. Modification of the questionnaire is described in Table 3.4. The participants in the pilot test were not part of the main study.

Table 3.4: **Questions on the questionnaires before and after adjustment were effected**

Section	Before pilot testing	After pilot testing
Section A: Demographic data	6. Indicate any training attended related to cardiac diseases and patient training.	6. Any training attended related to cardiac conditions: Yes /No 6.1 If “Yes” to question 6, indicate the type of education and training received.
Section B: Knowledge Psycho-social management	6.4 Problems encountered after heart valve surgery may delay the recovery process and influence self-care capacity in patients.	6.4 Problems encountered after heart valve surgery may delay the recovery process and influence the patient’s capacity for self-care.
Section C: Attitudes of nurses regarding cardiac rehabilitation of patients	1.8 I believe it is the duty and responsibility of the cardiothoracic doctors to give information to patients regarding rehabilitation after cardiac surgery.	1.8 I believe it is the duty and responsibility of cardiologists to give information to patients regarding rehabilitation after cardiac surgery.
Section C: Psycho-social management	5.5 I do not think that caregivers usually experience any difficulty in supporting and caring for their loved ones.	5.5 I do not think that the caregivers usually experience any difficulty in supporting and caring for their loved ones who had heart valve surgery.

3.5.1.1 Measures for validity and reliability

Measures to enhance validity and reliability were employed for this objective as described in the following sections.

▪ Validity

The validity of the quantitative data was ensured by verifying whether the instrument measured what was intended and an assessment of its consistency. Both Creswell and Clark (2018), and Du Plooy-Cilliera, et al. (2014) concur that validity refers to the truth value of measurements if the instrument accurately reflects the constructs being measured. The criteria for face, content, construct, internal and external validity were applied to ensure the validity of the questionnaire (Polit and Beck, 2012).

- **Face validity**

The instrument was reviewed by the two supervisors to ensure that it measured what it was supposed to measure. It was also sent to experts working at the Cardiac Unit and senior academic colleagues who are PhD holders for verification and confirmation that it was well designed to measure what it claims to measure (Polit & Beck, 2012).

- **Content validity**

According to Du Plooy-Cilliera (2014), content validity refers to whether the instrument reflects the accurate representation of the specific content. Gray, and Grove (2021) further explain that content validity examines the extent to which a measurement instrument includes all major elements relevant to the construct being measured.

To ensure content validity, the questionnaire's content covered the concepts relevant to the study objectives and included a variety of questions about the KAP of the nurses regarding CR, according to the core components of CR as proposed by international guidelines, position papers and statements, and the literature. Moreover, the instrument was evaluated by study supervisors, two statisticians, and experts in the field of Cardiac Unit from the Ministry of Health and Social Services for its content validity.

Lastly, pilot testing of the instrument was conducted on three (3) nurses from the Cardiac Unit and Cardiac Clinic before collecting data for the main study. This pilot testing aimed to identify errors and assess the feasibility of the study. The questionnaire was subsequently modified to ensure content validity as outlined in table 3.4.

- **Construct validity**

Construct validity assesses whether the instrument corresponds to other variables and effectively measures what it is meant to (Du Plooy-Cilliera et al., 2014). The instrument in this study was based on a review of the literature to link the items to the theoretical components of the research topic. The questionnaire contained all the necessary items and information for the instrument to fulfil its purpose (Bless, et al., 2013). The questionnaire was pilot-tested for content validity on 10% (n=3) of the study population. Three (3) nurse participants from the Cardiac Unit and Cardiac Clinic were not included in the main study.

- **Internal validity**

Internal validity refers to whether the research method or design will effectively answer the research question. According to Gray and Grove (2021), it is the degree to which correlations between variables occur due to their interaction and the extent to which other intrusive variables may have contributed to the measured value. In this study, the researcher was careful during data collection to minimize errors and incorrect results. The raw data was checked for any missing data.

- **External validity**

External validity refers to the ability to generalise the results from a small sample to a larger population (Du Plooy-Cilliera., et al., 2014). Moreover, as explained by Gray and Grove (2021), external validity is the degree to which research findings can be applied to populations other than the study's sample. In this study, given the small sample size, the results could not be generalized to a larger population. The researcher also included all the twenty-nine (29) nurses in the study. The researcher was also

aware of the environmental factors such as noise disruptions and this was enhanced as the nurses completed the questionnaire in the study settings to avoid disruptions.

▪ **Reliability**

Reliability describes the extent to which different study subjects, using the same instrument at various times, respond to the instrument in a consistent manner (Du Plooy-Cilliera, et al., 2014). Reliability also pertains to the generalization of the findings. To ensure the accuracy and internal consistency of the instrument, pilot testing using a sample of three (3) nurses working in the Cardiac Unit was conducted followed by the Cronbach Alpha (α) test using SPSS version 27. Moreover, to ensure the reliability of the data collection instrument, the internal consistency-reliability of all variables coded with a Likert scale in the questionnaire was assessed using Cronbach's alpha coefficient (Polit & Beck, 2012).

Cronbach's Alpha coefficient measure determines the internal consistency of an assessment tool (Taber, 2018). Cronbach's alpha values range between 0 and 1, with the highest score, representing a more reliable instrument (Gray, & Grove, 2021; Polit & Beck, 2012). Cronbach Alpha results reflected the following: Knowledge with a coefficient of 0.825 from 49 items which was high and acceptable; Attitudes with a coefficient of 0.734 from 23 items which was high, and Practices with a coefficient of 0.911 from 20 items which was strong and acceptable. The overall Cronbach Alpha coefficient was 0.909 from 92 questionnaire items which was high and within the acceptable standards (Taber, 2018). The questionnaire was also evaluated for consistency, completeness, and accuracy by experts in the field and supervisors. The next section describes the three objectives of the qualitative data of the study.

3.5.2 Objectives of the Qualitative Approach

Introduction

This section presents the three objectives of the qualitative approach as follows: The challenges experienced by the nurses in providing CR to patients after HVS, the experiences of patients in recovery and coping after HVS as well as the experiences of the caregivers on the support and care of a relative after heart valve surgery. The research methodology for each of the objectives about the nurses, patients, and caregivers for the qualitative approach are described separately because the population, sample size, sampling methods, and data collection instrument and procedure were different.

However, the data analysis process, including the explanation of Tesch's eight-step method, pilot testing, trustworthiness, and facilitation of communication techniques remained similar for the three objectives of the nurses, patients, and caregivers. These details are described in detail in the subsequent sections of this chapter.

The next section presents the research approaches: namely qualitative, exploratory, descriptive, and contextual for the three objectives of the nurse's challenges, patients' experiences, and the caregiver's experiences.

▪ Qualitative research

The qualitative research approach refers to a broad range of research designs and methods utilized to study social phenomena of which the researcher has little prior understanding (Brink, et al, 2018). The data on accounts of nurses' life experiences about CR of patients after HVS, patients' experiences of recovery and coping after heart valve repair and replacement surgery, and caregivers' experiences about the

support and care provided to their relative after HVS were systematically collected, analysed and interpreted (Grove, et.al, 2015).

According to Grove, et al., (2015), qualitative research is a systematic approach that involves collecting oral and written accounts of participants' life experiences and providing them with a new context. In qualitative research, the participant's remarks are analysed by the researcher, who interprets their meaning and provides a description of the experience, ultimately enhancing comprehension of it (Grove, et.al, 2015). According to Brink et al. (2018), qualitative research aims to provide an in-depth description and understanding of people's beliefs, actions, and events in all their complexity. Qualitative findings are expressed in words rather than numbers. Creswell and Creswell (2018) have outlined the characteristics of qualitative research as depicted in Table 3.5.

- **Exploratory research**

Exploratory research is applied in situations where limited information or knowledge exists about a particular subject, to gain a broad understanding of a situation or phenomenon (Creswell, 2014; Du Plooy-Cilliera, et al., 2014). Since little was known about the challenges nurses experience in providing CR interventions, the experiences of patients about recovery and coping after HVS, and the experience of the caregivers on the support and care of a relative after HVS, this study explored and provided insight about unknown challenges experienced by nurses regarding providing CR to patients who underwent HVS and the explored and provided insight about unknown experiences of patients who underwent heart valve surgery as well as caregivers on the support and care of a relative after heart valve surgery.

The researcher, therefore used exploratory research to explore, understand, and gain knowledge of the phenomenon under study. The following central open-ended

question was asked to the nurse participants: *“Tell me about your challenges experienced in providing cardiac rehabilitation intervention to patients who had heart valve surgery”*. The nurse participants described the challenges experienced in providing cardiac rehabilitation to patients who had heart valve surgery. The following central open-ended question was asked to the patients: *“Tell me about your experience on recovery and coping after heart valve surgery”*. The patient participants described their lived experiences on recovery and coping after HVS and the researcher gained an understanding and knowledge of the phenomenon under study. The following central open-ended question was asked to the caregivers: *“Tell me about your experience in providing care and support for a family member or relative who had heart valve surgery”*. The caregivers described their experiences regarding support and care provided to their relatives after heart valve surgery.

In addition, the central questions were followed by probing questions to ensure that sufficient information was obtained from the participants regarding the phenomena under study. Probing, as described by Gray and Grove (2021), involves asking follow-up questions or queries during a qualitative interview to elicit context-specific information, clarification, and additional data. Gaining insight and understanding of these phenomena assisted the researcher in developing an educational programme for nurses to facilitate the CR of patients who had heart valve surgery.

▪ **Descriptive approach**

Accurate descriptions of nurses’ experiences of challenges in providing CR interventions to patients who had HVS were provided; Patients’ experiences on recovery and coping after HVS as well as caregivers’ experiences in providing support and care to a family member who had HVS were accurately described (Du Plooy-Cilliera, et al. 2014). Grove et al., (2015), state that descriptive research is employed

to explore and describe phenomena in real-life situations, aiming to gain an in-depth understanding of the phenomenon, which can be useful to address a problem and for the development of an educational programme for nurses to facilitate CR for the patient who had heart valve surgery.

- **Contextual approach**

This study was contextual as the interviews with nurses, and patients were conducted at Cardiac Unit and Cardiac Clinic a natural setting familiar to the participants, where nurses offered CR services to patients who had HVS and where patients received follow-up treatment after heart valve surgery. Equally, interviews with caregivers were conducted at the Cardiac Clinic and the homes of caregivers, both contexts which are relevant to the care a support of their relatives who had heart valve surgery. Grove et al., (2015), define a natural setting as an unaltered, unrestricted environment. Accordingly, when a study is conducted in a natural context, the environment is not manipulated or altered in any way (Grove, et al, 2015).

Furthermore, services at the Cardiac Unit and Cardiac Clinic are an environment that influences the nurses' challenges experienced, patients' experiences of recovery and coping, and caregivers' experiences of the support and care and the ability to meet caring demands for their relatives who had HVS at home. The practice context helped nurse and patient participants to reflect during data collection and enabled them to recall and provide the necessary information. Conducting interviews in the caregivers' households created a comfortable environment that made it easier for them to talk freely, as it reduced their fear of disruptions as they explored their experiences in providing support and care to their family member who had heart valve surgery. Table 3.5 depicts the characteristics of qualitative research.

Table 3.5: Characteristics of qualitative research

Characteristics	Application to the study
Natural settings	The researcher collects data in settings that are familiar to the participants, where the problem under study occurs. Researchers do not take the participants to a laboratory or administer questionnaires for them to complete. Instead, the researcher is in direct contact with the participants observing how they behave and act in their own context. This was realized through face-to-face interviews, and the researcher spent more time interacting with the participants.
Researcher as key instrument	The researcher collected the data personally by conducting in-depth face-to-face interviews, observing participants' behaviour taking field notes, and audio recording the interviews. Audio recordings were used to gather information from the participants.
Multiple sources of data	The researcher collected data from multiple sources, including interviews, filed notes, and audio recordings rather than relying on a single data source. Open-ended questions were used to allow participants to express themselves freely. The researcher is responsible for viewing all the data, making sense of it, and organising it into codes and themes.
Inductive and deductive analysis	Researchers organized the data into increasingly abstract chunks of information as they emerged inductively. Then generate patterns, groupings, and themes from the bottom up, working back and forth between the themes until a set of themes and sub-themes were created.
Reflectivity	The researcher reflected on her roles in the study, including bracketing personal backgrounds, experiences, and prior knowledge of the phenomenon under study to avoid biases.
Holistic account	The researcher analysed the data and created a complex understanding of the nurse-participant's experiences regarding providing cardiac rehabilitation services, patients' experience of recovery and coping, and caregivers' experiences of support and care to a relative after heart valve surgery.

Source: Adopted from Creswell, and Creswell, (2018).

3.5.2.1 Objective 1.2: Explore and describe the challenges experienced by nurses in providing the cardiac rehabilitation of patients who had heart valve surgery

Research approach

A qualitative, exploratory, descriptive, and contextual approach was used to address the objective: challenges experienced by the nurses in providing CR services to the patients after heart valve repair or replacement surgery. The qualitative, exploratory, descriptive, and contextual approaches are described under section 3.5.2 of the objectives of qualitative data.

▪ Population

The target population consisted of all twenty-nine (29) nurses who provided nursing care to patients at the Cardiac Unit and Cardiac Clinic after heart valve repair and replacement surgery and who participated in the initial phase of quantitative data collection. These participants were well-suited for the qualitative data collection since they had contributed to the quantitative dataset (Creswell, & Clark, 2018).

▪ Sample and sampling method

A purposive, sampling method was employed in this study. Creswell and Clark, (2018); Grove et al. (2015), concurs that purposeful selection is an intentional choice of the study participants who can provide the most valuable insights into the research problem and question for qualitative research. The nurses were purposefully selected because they provide care to patients who had HVS and therefore, possessed relevant experience and knowledge to describe the challenges they may experience when providing cardiac rehabilitation. The data on their challenges regarding CR complement the quantitative data on the nurses' KAP regarding cardiac rehabilitation. Furthermore, the sampling criteria for this study included both inclusion and exclusion criteria which are defined and described under objective 1.1 of the nurse's KAP of the

quantitative data. The inclusion criteria comprised nurses who participated in the collection of quantitative data. In addition, the exclusion criteria included nurses who were not part of the initial quantitative strand because they did not meet the inclusion criteria. Creswell and Clark (2018), recommend that a subset of the participants in the quantitative data collection should be selected for the qualitative follow-up phase.

The sample size for this objective was determined by the saturation of information obtained during data collection. Saturation was achieved after ten (10) participants were interviewed, as no additional sampling provided new information but rather repeated previously collected data redundantly (Grove et al. (2015).

▪ **Data collection instrument**

Data collection instrument: An interview guide featuring semi-structured questions with central questions and probing questions was used to collect the data from the nurses regarding the challenges they experienced in providing CR services to patients who had heart valve repair and replacement surgery. The interview guide was in English, the official language as all nurse participants were fluent in English. The central open-ended question for the interview was: *“Tell me about the challenges you experience in providing cardiac rehabilitation interventions to patients who had a heart valve surgery”*. According to Creswell and Creswell (2018), the central question is a broad question that seeks an explanation of the central phenomenon or concept in a study. This was followed by probing questions such as: *“Could you tell me more”?; “I need more details”; “Could you explain more”; “How do you feel”; “I need more detail”....?*

Creswell and Creswell (2018), recommend posing one or two central research questions and advise against asking no more than five to seven sub-questions in addition to the central questions. The main central question was followed by data

collection research questions derived from the initial quantitative strand to gain a better understanding of the identified key results such as surprises, outliers, and significant and non-significant results (Cresswell, & Creswell., 2018). The data were collected through individual in-depth interviews, field notes, and audio recordings.

The following research pre-determined questions were asked to explain the quantitative results:

- What are your experiences in providing cardiac rehabilitation services to patients who had heart valve repair or replacement surgery?
- Could you elaborate more on the implementation of the warfarin booklet? What do you normally teach the patients regarding the implementation of the Warfarin booklet?
- Could you elaborate on your perception or experience regarding the sexual education of patients who had heart valve surgery?
- Could you elaborate on the type of information and support you normally provide to the caregivers on how to take care of their family members after discharge from the hospital?
- Could you tell me your opinion or views regarding the importance of cardiac rehabilitation after patients who had heart valve surgery?
- Is there anything you would like to add regarding your experience and challenges with cardiac rehabilitation interventions for patients after heart valve surgery?

- **Procedure for data collection**

After obtaining permission from the UNAM Decentralised Ethics Committee (DEC), MoHSS Research Ethical Committee, and Windhoek Central Hospital through the Office of the Senior Medical Superintendent, the researcher scheduled a meeting with the Control Registered Nurse (CRN) in charge of the Cardiac Unit and Cardiac Clinic (Phase 2 of the explanatory sequential method). During this meeting, the researcher introduced the purpose of the research and explained the main aim of the study to the CRNs from the two departments. Subsequently, the researcher visited the two departments and arranged appointments with the nurses, coordinating the date, venue, and appropriate time for the interviews while ensuring that it did not interfere with the nursing care of patients.

The researcher explained to the participants the purpose of the study and the data collection process. Participants were informed about the use of an audio recorder for data collection. To ensure informed consent, participants were provided with a consent information leaflet to read before signing the consent form. The applications of the ethical principles are described in objective 1.1 of the nurse's knowledge, attitudes, and practices. Moreover, detailed explanations for the application of the ethical principles are outlined in sections about ethical considerations in this chapter.

- **Field preparation**

A suitable conference room for conducting the interview was identified and prepared at the Cardiac Unit. This conference room is located within the unit and was familiar to all the participants. The room was free from noise disruptions, well-lit, air-conditioned, and equipped with a big round table, and various comfortable chairs for the participants. The staff at the Cardiac Unit and Cardiac Clinic were informed of the interview venue.

- **In-depth individual face-to-face interview**

Interviews are useful information-gathering tools that, when conducted effectively, enable the researcher to discern and understand the significance of participants' responses to specific topics (Du Plooy-Cilliers, 2014). In-depth interviews allow participants to clarify and elaborate on their points and provide more detailed explanations of the questions asked, allow field notes about participants' non-verbal responses, and give the researcher some influence over the course of the conversation (Creswell and Creswell, 2018).

After the field preparation, the interviews commenced in the study setting. Conference Room on the scheduled days with the participants. The participants were provided with chairs to seat and reminded to make themselves comfortable. To put participants at ease, icebreaker-type questions were asked to prepare them for the interview and encourage open discussion. The researcher introduced herself to the participants, explained the purpose of the study, and outlined the expected duration and the interview process.

Permission to audio-record the interviews was also obtained from the participants, and verbal and written informed consent was explained and obtained from them before the data collection began. An audio recorder was placed on the table within easy reach of both the researcher and the interviewee. An interview guide was used to direct the researcher. Face-to-face individual in-depth interviews were conducted with eight (8) nurses at the Cardiac Unit, while the remaining two (2) nurse participants were interviewed at the Cardiac Clinic.

Interview guide: During the interviews, a semi-structured interview guide was used to avoid asking irrelevant questions. The central and probing questions of the interview

are described in detail under the data collection instrument section of objective 1.2 focuses on the nurses.

Moreover, a closing remark was issued after each interview, with appreciation for the participants' time, assured them of maintaining confidentiality, and inquired if they would be willing to participate in follow-up interviews if further clarification is needed on some questions (Creswell and Creswell, 2018).

Observations and field notes: Brink et al. (2018), define observations as a technique for collecting descriptive data on behaviour, events, and situations, while field notes are the notes taken by the researcher about participants' non-verbal responses during the interviews (Grove et al., 2013). Moreover, Phillippi and Lauderdale (2018), add that field notes encourage the researcher to pay close attention to the participant's non-verbal responses. Therefore, field notes increase the accuracy and reliability of the data.

In this study, field notes were taken during the interview to complement the audio-recorded data. The researcher's field notes included observations of non-verbal communication that was not captured by the audio recorder such as gestures, hesitations, facial expressions, lack of interest, uncertainty, and uneasiness during the interview process. In addition, the field notes assisted the researcher in remembering, reflecting upon, and analysing the observations and experiences during the data collection process. The duration of the interviews for all the participants ranged between 20-60 minutes.

▪ **Audio recorder**

The audio recorder was used during the individual interviews for objectives 1.2, 1.3, and 1.4 of the nurses, patients, and caregivers of the study respectively after permission

was granted by each participant to be recorded. The audio recorder served as a backup to supplement in-depth interview information from the participants. The recorded audio was later used for verbatim transcriptions.

▪ **Data analysis for the nurses, patients, and caregivers**

The text analysis for objectives 1.2, 1.3, and 1.4 for the nurses, patients, and caregivers respectively was guided by Tesch's eight steps of the coding process as described by Creswell and Creswell (2018). The data analysis for objective 1.2 about the nurse's challenges resulted in 2 themes and 11 subthemes, objective 1.3 about the patient's experiences, resulted in 2 themes and 9 subthemes while objective 1.4 of the caregiver's experiences, resulted in 2 themes and 8 subthemes. These findings are described in detail in Chapter 4, which presents the study results and findings.

The goal of this analysis was to make sense of the textual data, by breaking it down into segments and then reconstructing it under codes that reflected its meanings. The researcher began by examining verbatim transcripts and field notes to familiarise with the data and gain a global understanding of the results. The data were then organised by bracketing chunks and writing a word or phrase representing a category in the margins (Creswell, & Clark, 2014). Code phrases were assigned to the data to describe the main ideas and opinions about the participants' experiences.

According to Creswell and Creswell (2018) and Grove et al., (2015), coding is a process of organizing data by placing text or chunks in brackets and assigning a term in the margins to represent a category. In this study, once the coding was completed, data from all transcripts with similar codes was grouped into categories. Redundant codes were eliminated, resulting in a reduced number of codes. Themes were then identified from these codes together with their corresponding sub-themes.

Creswell and Creswell (2018), suggest that qualitative data analysis should be seen as a process that follows sequential steps moving from the specific to the general, and it involves multiple levels of analysis as depicted in Figure 3.2.

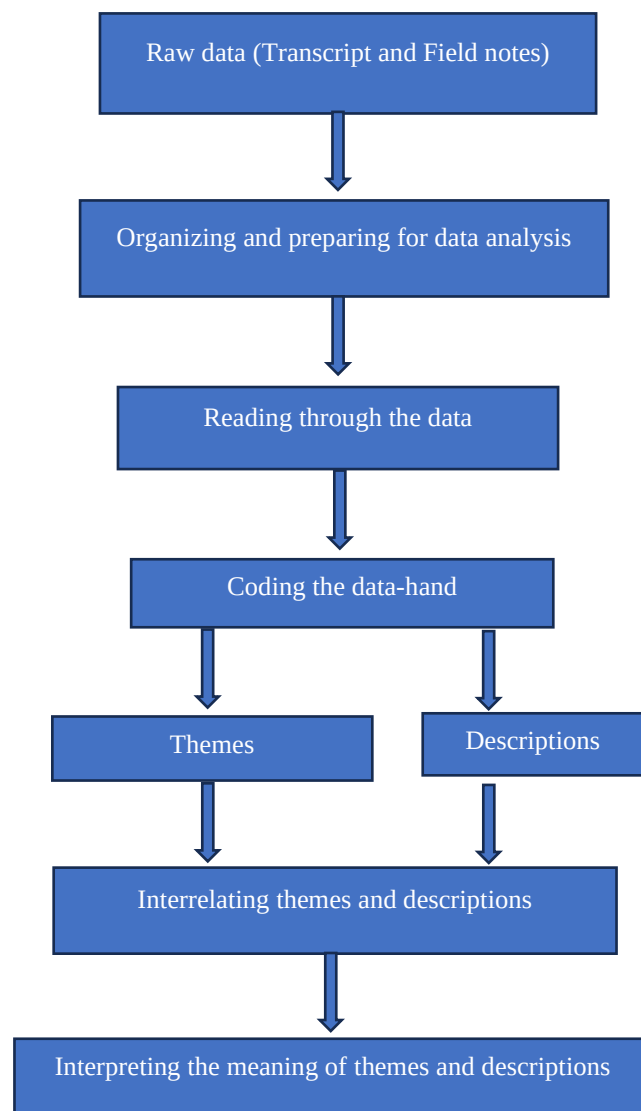


Figure 3.2: Qualitative research data analysis process: Adapted from Creswell and Creswell, (2018).

Figure 3.2 demonstrates a summary of the applications of Tesch's eight steps for data analysis methods as described by Creswell and Creswell (2018), for objectives, 1.2, 1.3, and 1.4 of the nurses, patients, and caregivers respectively. Tesch's eight (8) steps of qualitative data analysis were applied in the study as indicated in Table 3.6.

Table 3.6: Application of Tesch's method of qualitative data analysis

Tesch's Steps of Qualitative Data Analysis	Application for the study
Step 1: Get a sense of the information	The researcher examined and read through the verbatim transcripts from the interviews, the data from the observational field notes and familiarized herself with the data, and obtained a global understanding of the research results. The researcher wrote down some ideas as they came to mind.
Step 2: The transcripts were analyzed one by one until all the transcripts had been analyzed.	The researcher read through the transcripts, asking what this is all about, and writing the emerging thoughts in the margin.
Step 3: Make a list of all topics.	Code words or phrases that described the main ideas about the participants' experiences were assigned to the data segments. The main ideas or topics which were common across all the transcripts were coded.
Step 4: After coding, the data from all the transcripts that contained similar codes was grouped together into categories, and redundant codes were eliminated.	After coding, the codes were grouped together into categories or themes, and the list of codes was reduced to a smaller number of codes.
Step 5: The most descriptive wording was turned into categories.	The total list of categories was reduced by grouping related topics. The themes were then identified from each category of codes. The themes that participants frequently discussed and those that were unique or surprising or were supported by most evidence were identified from the codes.
Step 6: Choosing a final shorthand for each group and sorting these codes alphabetically.	Themes were then layered into sub-themes in a table format.
Step 7: Organize the information from each category in one location and do an initial analysis.	The themes and subthemes were tabulated for presentation as the findings.
Step 8: Recode the existing data	The researcher was assisted by her supervisors with the verification of data analysis. The researcher and the supervisors reached a consensus on the emerging themes and subthemes. The

recoding of data was applied where necessary.

Adopted from Creswell and Creswell, (2018)

3.5.2.2 Objective 1.3: Explore and describe patients' experience of recovery and coping after heart valve repair or replacement surgery

Research approach

A qualitative, exploratory, descriptive, and contextual approach was used to address this objective: patients' experience in recovery and coping after heart valve repair or replacement surgery. The approaches are described under 3.5.2 objectives of the qualitative research, pages 125-128.

▪ Population

The target population for the study included all 351 patients who underwent a heart valve repair or replacement surgery at Windhoek Central Hospital, Cardiac Unit.

▪ Sample and sampling method

Similar to objective 1.2 focuses on the nurses, a purposive sampling method was applied to select the participants. Purposive sampling allowed for the selection of eligible participants, who were able to provide the relevant information that was being sought from patients regarding their experiences of recovery and coping after heart valve repair or replacement surgery.

A total of twelve (12) patients were interviewed about their experiences of recovery and coping after HVS and data collection continued until data saturation was achieved when no new information emerged from the participants, signifying that a sense of closure had been attained because new data yielded redundant information (Polit & Beck, 2013).

- **Inclusion and exclusion criteria**

The inclusion criteria for the selection of participants were patients who underwent heart valve repair or replacement surgery between 2015 and 2021 and who were aged 18 and above, who attended follow-up appointments at the Cardiac Clinic and Cardiac Unit during the data collection period; patients who were able to speak English and Namibian languages and the patients who consented and were willing to participate in the study.

All twelve (12) participants towards data saturation met these criteria, comprising eight (8) females aged 24-48 years, and (4) four males aged 18-38 years old. In terms of employment, four (4) were employed as administrators and cleaners; two (2) were learners, one (1) was a student, one (1) was self-employed, and four (4) were unemployed. Eight (8) patients underwent mechanical valve replacement and were on Warfarin, while the remaining four (4) underwent tissue valve heart surgery. This information was obtained from the patients and in their health passport records during data collection.

The exclusion criteria were cardiac patients who did not undergo HVS, patients who were under the age of 18 years, patients who did not provide consent or were unwilling to participate in the study, and patients who did not attend follow-up appointments at the Cardiac Clinic during the data collection period.

- **Data collection instrument**

In this regard, an interview guide with semi-structured questions consisting of a central open-ended question and probing questions was used to collect the data on participants' experiences of recovering and coping after heart valve repair or replacement surgery. The central open-ended question used in the interviews was: *“Tell me about your experience of recovery and coping after you had a heart valve*

repair or replacement surgery”. The interview guide was prepared in English, the official language of Namibia. However, there was one (1) participant who could not understand English. To accommodate this participant, the interview questions were translated into the vernacular language by a nurse at the Cardiac Clinic, who was adequately trained in translating the questions into the vernacular language before the commencement of data collection. The nurses at the Cardiac Clinic are experienced in communicating with cardiac patients, as they provide regular care to these patients.

- **Procedure for the data collection**

The Research Ethical Clearance and permission to conduct the study are similar to objective 1.1 of the nurse's KAP regarding cardiac rehabilitation (Refer to Annexures A & C). The patient's details were gathered by the researcher from the Health Information Registry at the Cardiac Unit and Cardiac Clinic at Windhoek Central Hospital. Patients were contacted by phone, and interview appointments were scheduled based on their follow-up dates at the Cardiac Clinic to minimize any interference with their daily activities.

Furthermore, verbal and written informed consent was obtained from the participants and the translator before data collection. A semi-structured interview method was used to collect data from patients regarding their experiences of recovery and coping after heart valve repair and replacement surgery. In-depth individual face-to-face interviews were conducted to explore patients' experiences following heart valve repair or replacement surgery, with the researcher bracketing her preconceived beliefs about the phenomenon under study.

Face-to-face individual in-depth interviews were conducted with seven (7) patients at the Cardiac Clinic, while two (2) participants were interviewed at UNAM as one was

a registered student at UNAM and the other one preferred the university setting because there was no conducive, quiet space to interview at the workplace. Additionally, two (2) interviews were conducted at the participants' workplace, and one (1) interview occurred at the patient's home.

- **Field preparation**

Field preparations at the Cardiac Unit before the interviews are similar to objective 1.2. of the nurses. At the Cardiac Clinic, a small consulting room (not in current use) was identified and used for the interviews. At the University of Namibia (UNAM), the interview was conducted in an office that provided a conducive environment for the interview of two (2) participants. Moreover, at the workplaces of the two (2) participants, the interviews were conducted in their respective offices, ensuring a suitable environment with minimal noise. For the interview conducted at the patient's home, the interview was conducted in a quiet place, without distractions, and a chair and small table to place the recorder were provided.

- **Individual face-to-face interview during data collection**

The researcher introduced themselves to the participants and explained the purpose of the study, the interview duration, and the process. Permission to audio-record the interviews and informed consent was obtained from the participants, before the data collection. The participants were also reminded of their right to withdraw from the study at any time without penalties or to decline to answer questions if they don't feel comfortable doing so. The participants were also reminded of the audio recorder to minimise interruptions. The participants were further informed that if they showed signs of distress, arrangements could be made to schedule an appointment with a social worker for counselling. Anonymity was ensured as participants were identified with

codes. Confidentiality of the data was maintained because information would not be shared with anyone other than the researcher and supervisors.

An interview guide was used to direct the researcher during the interviews. The central question of the interview was: “*Tell me about your experiences of recovery and coping after you had a heart valve repair or replacement surgery*”. This was followed by probing questions and sub-questions to gain a better understanding of the participant’s experiences. The sub-questions and probing questions were as follows:

- Could you tell me more about your experiences regarding the operation process?
- Could you elaborate more on your recovery and coping.....?
- Could you tell me about your experience of adapting and coping physically and emotionally?
- Could you tell me more about how the heart surgery affected your roles and responsibilities?
- Could you elaborate more on the support and care you have received from the nurses?
- Can you describe your experiences regarding the support and care received by your family members during your recovery?
- How did you feel then.....?
- Is there anything you would like to add regarding your experience of recovery and coping after you had a heart valve repair or replacement surgery?

Audio recorder: is explained under objective 1.2 of the nurses.

Data collection continued until data saturation was achieved. The duration of the interviews with patient participants ranged between 30 to 60 minutes, taking into consideration the patient-participant's conditions and comfort.

- **Data analysis**

The data analysis followed Tesch's eight steps of qualitative data analysis as described under objective 1.2 focuses on the nurse's challenges.

3.5.2.3 Objective 1.4: Explore and describe the experiences of caregivers on the support and care for a family member who had a heart valve repair or replacement surgery

- **Research approach**

A qualitative, exploratory, descriptive, and contextual approach was used to address objectives on the experiences of caregivers on support and care for a family member who had a heart valve repair or replacement surgery. Similar to the nurses and patients, the research approaches are described under the 3.5.2 objectives of the qualitative research.

- **Population**

The target population consisted of caregivers of family members who had undergone heart valve repair or replacement surgery at Windhoek Central Hospital between 2015 and 2021. The caregivers' contact information was obtained from either their family members who had undergone HVS during their follow-up visits, or directly from the caregivers themselves when accompanying their family members to the Cardiac Clinic for follow-up treatment. Caregivers who were not present during the follow-up visits were contacted telephonically to arrange an appointment for their interview either at the Cardiac Clinic or at their households.

- **Sample and sampling methods**

A purposive sampling method was used. The sample size was determined by data saturation or when no new information emerged, after interviewing eight (8) participants on the support and care they provided to a family member who had undergone heart valve surgery. The caregivers in the sample included parents and adult siblings, initially appointed by the patients themselves. Among those, there were five (5) females, aged between 24-58 years old, and three (3) males aged 35-47 years old. The breakdown of the caregivers included four (4) sisters, two (2) parents and two (2) brothers. Their education levels varied from grade 10 to grade 12, with one caregiver currently pursuing a Master's degree.

The inclusion criteria were caregivers of a family member who underwent heart valve repair or replacement surgery at Windhoek Central Hospital, above 18 years of age, identified by the patient as significant family members, and who accompanied their family members on follow-up hospital appointments at the time of the study, who granted permission to be interviewed and able to speak English and other Namibian spoken language. These caregivers either provided verbal consent through telephone calls or were recommended by the patient to participate in the study after the purpose of the study and the procedure of the data collection were explained to them.

The exclusion criteria were caregivers under the age of 18 years, caregivers who did not grant permission, unwilling to participate, who were not recommended by the patient to participate in the study, or caregivers who did not accompany their family members for follow-up visits at the Cardiac Clinic at the time of data collection.

- **Data collection instrument**

An interview guide featuring semi-structured questions was used to collect the data from the caregivers regarding their experiences in providing care and support to their

family members who had undergone heart valve repair or replacement surgery. The interview guide was in English, the official language of Namibia. Most of the participants were proficient in English eliminating the need for a translator during the interviews. However, for one (1) caregiver who had limited English proficiency, the researcher translated the interview questions into the participant's vernacular language (Silozi) which was also the researcher's vernacular language. The central open-ended question posed during the interviews was: *"Tell me about your experiences in providing care and support to a family member who had heart valve repair and replacement surgery."* The audiotape was used to record the interviews, and field notes were taken on participants' non-verbal responses.

- **Procedure for data collection**

After permission was granted and informed consent signed, individual face-to-face in-depth interviews were conducted at the Cardiac Clinic and caregivers' households. A total of eight (8) interviews were conducted of which, five (5) were conducted at the Cardiac Clinic and two (2) were conducted in the researcher's office at the University of Namibia. This was due to a lack of a conducive environment and potential disruptions at the participant's workplace. The remaining one (1) interview was held at the caregiver's household. The rationale for conducting interviews in participants' households is explained in the section on the contextual research approach (P. 127-128).

- **Field preparation**

Field preparations of the caregivers at the Cardiac Clinic are similar to objectives 1.2 and 1.3 focused on the nurses and patients respectively.

Individual face-to-face interview: An in-depth, individual face-to-face interview was employed to gather the data about caregivers' experiences in providing support and care to their family members who had undergone heart valve repair or replacement surgery. A detailed description of the individual face-to-face interview is explained under objective 1.3 of the patients.

The central question for the interviews as described under the data collection instrument was asked. This was followed by additional sub-questions and probing questions such as:

- Could you tell me about your experience regarding your family member's operation process?
- Could you tell me more about how the heart surgery of your family member affected your roles and responsibilities at home?
- Could you explain more....?
- Could you elaborate more on the support you have received from the nurses?
- Could you say more.....?
- Is there anything you would like to share regarding your experiences in supporting and caring for your family member after their heart valve surgery?

Data collection continued until data saturation was achieved. The interviews with the caregivers lasted between 20 to 45 minutes considering their easiness.

Audio recorder and field notes: These are explained in detail under objective 1.2 of the nurses.

Table 3.7 presents the key aspects considered by the researcher when planning an interview.

Table 3.7: Key aspects the researcher considers when planning an interview.

Key aspects	Description and its applications to the study
The question should move from a broad to a narrow focus	The researcher should begin with general, broad questions regarding the topic. In this study, the participants were initially asked the central main question, followed by probing questions that arose from the answers given by the participants.
Never rely purely on pre-planned questions but allow the interview to progress and flow in a natural, and conversational manner	The researcher allowed the participants ample time to think about their answers without interrupting them.
Formulation of clear and simple questions	The researcher was careful with the formulation of the questions, ensuring that they were structured in a way that allowed the participants to communicate freely. The questions were asked in a language that was clearly understood by all participants.
Avoid asking leading questions	In the study, the questions were designed to encourage participants to freely express themselves. For example, questions like; “how did you feel?” “Could you tell me more?” was used to facilitate open and detailed responses.
Avoid asking double-barreled questions	In the study, one question was posed at a time to avoid confusing the participants.
Ask open-ended questions	To avoid leading participants, open-ended questions were asked to allow participants to express themselves and provide information asked by the researcher. These aspects of interview planning were also applied in objectives 1.3 and 1.4 of the patients and caregivers of the study.

Source: Adapted in du Plooy-Cilliers, et al., (2014)

- **Pilot testing of objectives 1.2, 1.3, 1.4 of the nurses, patients, and caregivers**

According to Brink et al., (2018), pilot testing is a small feasibility study undertaken with a limited number of participants from the target population who are not part of the main study, to verify or establish the feasibility of the actual study. It aims to identify flaws in the methodology, and data collection tool and propose corrections. The pilot testing of the interview guide for objective no. 1.2 of the nurses was conducted with two (2) nurses. For objective no. 1.3 of the patient's experiences, pilot testing was conducted with three (3) patients, and for objective 1.4 of the caregiver's experiences on the support and care, it was conducted with two (2) caregivers. These participants were not included in the main study.

- **Findings from the pilot testing**

The findings from the pilot testing for objective 1.2 on nurses' challenges in providing cardiac rehabilitation, objective 1.3, about patients' experience on recovery and coping after heart valve surgery, and objective 1.4, on caregivers' experiences about care and support to family members or a relative who underwent heart valve surgery indicated no challenges about the understanding of the respective interview questions by the respective participants. Therefore, there was no major adjustment for any of the interview guides. However, minor adjustments were made on the few probing questions for objectives 1.2, 1.3, and 1.4 of the nurses, patients, and caregivers respectively.

- **Facilitation of communication technique for objectives 1.2, 1.3, and 1.4 of qualitative research**

During the interview, the researcher applied various communication techniques including the use of appropriate language and terminology, probing, clarifications,

silence, patience, minimal probing response, active listening, summarising, and responsiveness, as detailed in the next sections.

Appropriate language and terminologies were used to ensure participants could freely express themselves. Simple language was used for all the participants to enable a better understanding of the interview questions.

Probing was used to elicit further details from the participants for them to provide abundant information regarding the phenomena under study (Grove et al., (2015). In this regard, unclear questions were clarified without necessarily alluding to the possible answers. Clarifications were also used to seek the intended meaning behind the participant's answer. Where necessary, silence was employed to give participants sufficient time to think about their answers without interruptions. The researcher exercised patience and allowed participants to give answers at their own pace, using minimal non-verbal responses and encouraging the participants to say more or to respond to the question that was asked.

Listening both to verbal and non-verbal communication was employed, to give the participants enough time to express themselves freely and provide an opportunity for the researcher to make field notes. To obtain the desired information, the researcher carefully listened to what the participants were saying as suggested by Du Plooy-Cilliera, (2014). This involved avoiding ascribing own meanings and perspectives to the participants' responses, listening for hidden subtext and underlying meanings, making sure the context of the participant's responses and the researcher's understanding are the same, and never presuming full understanding of participants' intentions but instead, asking for clarification when needed.

At the end of the interview, the researcher summarised the information to seek confirmation from the participants and identify any missing information. Finally, the researcher demonstrated responsiveness by acknowledging participant's responses as a sign of appreciation and understanding of the information provided.

Table 3.8 depicts the summary of qualitative research for situational analysis about objectives 1.2, 1.3, and 1.4, nurses, patients, and caregivers' experiences respectively.

Table 3.8: Summary of Qualitative research for objectives 1.2, 1.3, and 1.4 of the Explanatory Sequential mixed method design

Phase 1, qualitative strand: Situational Analysis Objectives	Population	Sampling methods and sample	Data collection/instrument	Data analysis
1.2: Explore and describe the challenges experienced by nurses in providing CR interventions to patients following heart valve surgery.	Nurses working at the Cardiac Unit and Cardiac Clinic	Purposive, Sample size: Ten (10) nurses were interviewed, and sample size was determined by data saturation. Interview guide (including central and probing questions)	Individual in-depth face-to-face interview Field notes and audiotape	Content analysis- Tesch's steps Method
1.3: Explore and describe patients' experience of recovery and coping after heart valve repair or replacement surgery.	Patients who were operated on and receiving care at the Cardiac Unit and Cardiac Clinic.	Purposive, sampling Sample size: Twelve (12) patients were interviewed, and sample size was determined by data saturation.	Individual face-to-face interview Field notes and audiotape	Content analysis- Tesch's steps Method

1.4: Explore and describe the experiences of caregivers in the support and care for a family member who has undergone heart valve repair or replacement surgery.	Caregivers providing support and care to a family member after heart valve surgery	Interview central Purposive sampling, Sample size: Eight (8) caregivers were interviewed as determined by data saturation. Interview guide	Individual face-to-face interview Field notes audiotape	Content analysis- Tesch's steps Method

3.6 INTEGRATION AND INTERPRETATION OF THE DATA

According to Gray and Grove (2021), integration of research findings involves comparing and combining the quantitative results and qualitative findings of a study. This process includes examining similarities and differences of the two data sets, merging one type of data into another, and connecting them within a theoretical framework (Gray, & Grove, 2021). This study is of an explanatory sequential design, therefore the integration and interpretation of the quantitative and qualitative data was applied. The theoretical framework of Creswell and Clark, (2018) was used to guide the integration of the quantitative results and qualitative findings. The researcher intended to integrate the results of quantitative data and the findings of qualitative data for a collective interpretation to answer the mixed method question and the objective. First, quantitative data was collected, and analysed and key findings (significant results, non-significant results, high-performing exemplars, outliers, or unexpected and perplexing results) were identified (Creswell, and Clark, 2018).

These results were used to formulate and refine the research questions for the qualitative data (Creswell, & Clark, 2018). Secondly, qualitative data were collected

and analysed and the findings (themes and subthemes) were identified. Thirdly, the results and findings from both two sets of data were connected and jointly displayed in the form of a table as displayed in Chapter 4, Table 4.53. Lastly, the qualitative findings, validated outliers, and unexpected and perplexing quantitative results were described.

3.7 PHASE 2: DEVELOPMENT OF A CONCEPTUAL FRAMEWORK

The findings from the situational analysis (Phase 1) of objectives 1.1, 1.2, 1.3, and 1.4 which focused on the nurses' KAP, nurses' challenges in providing CR interventions; patients' experiences of recovery and coping; and caregivers' experiences in supporting and caring for family members who had heart valve repair and replacement surgery respectively, served as the foundation for developing of a conceptual framework.

In addition, the conceptual framework guided the development of an educational programme for nurses to facilitate the CR of patients who had heart valve repair or replacement surgery. Constructs from the theory of Dickoff, James and Wiedenbach (1968) were adapted to create the conceptual framework for this phase including the agent (researcher, programme developer, and facilitator), recipient (nurses, patients and caregivers), context (environment), dynamics (challenges), procedures (educational programme), and terminus (outcomes). The conceptual framework is described in detail in Chapter 6 of the study.

3.8 PHASE 3 DEVELOPMENT OF AN EDUCATIONAL REHABILITATION PROGRAMME

The findings from the situational analysis in Phase 1 guided the researcher in developing an educational programme for nurses to facilitate CR of patients who have undergone heart valve repair or replacement surgery. The programme learning content was developed to address the nurses' lack of knowledge, negative attitudes and poor practices as well as address the challenges experienced by the nurses in delivering cardiac rehabilitation services, patients' challenges in recovery and coping, and caregivers' challenges on the support and care of a family member after heart valve surgery. The details of the programme development are described in Chapter 7.

3.9 PHASE 4: IMPLEMENTATION AND EVALUATION / VALIDATION OF THE PROGRAMME

The developed educational programme for nurses to facilitate CR for patients who underwent heart valve repair or replacement surgery would be implemented on a small scale. It was presented to stakeholders for validation of its feasibility for long-term implementation. Workshops on the implementation of programme activities are to be conducted and evaluated by the participants to evaluate their effectiveness in facilitating the CR of patients following heart valve repair or replacement surgery. The implementation of the programme was not conducted; however, the developed educational programme underwent a comprehensive validation process, including face and content validation by two (2) academic experts, a nurse specialised in the Cardiac Intensive Care Unit, and the research supervisors. The findings confirmed that the program is appropriate for its intended goals and applicable to other similar contexts within Namibia. Details on the implementation and evaluation/validation of the program are provided in Chapter 8.

3.10 TRUSTWORTHINESS FOR QUALITATIVE DATA

According to Grove et al., (2015), trustworthiness in a qualitative study refers to the extent to which it is dependable, confirmable, credible, and transferable. In this study, the trustworthiness of the qualitative data from objectives 1.2, 1.3, & 1.4 of the nurses, patients and caregivers respectively was enhanced based on the model of Lincoln and Guba (1985), as cited in Brink et al., (2018), through the application of criteria of credibility, transferability, dependability, and confirmability, as described in the following sections.

Credibility

Credibility refers to the confidence, truthfulness and accurate interpretation of the data (Grove et al., 2015; Du Plooy-Cilliera, et al., 2014; Polit and Beck, 2012). To enhance the credibility of the data in the study, criteria of prolonged engagement, persistent observation, triangulation, peer briefing, and member checking were employed. Table 3.9 summarises the measures applied to ensure the criterion of credibility for trustworthiness.

Table 3.9: Measures for application of credibility

Strategy	Criteria	Application to the study
Credibility	Prolonged engagement during fieldwork	Data were collected by the researcher for objective 1.2 of the nurses for two months from 08 December 2022- 10 February 2023. Objectives 1.3 and 1.4 of the patients and caregivers respectively, the data were collected for four months- from 16 December 2020 to 20 April 2021. The researcher spent more time with the participants in the field to gain a deeper understanding of their experiences and lives.
	Persistent observation	The researcher requested information from the nurse participants to describe the challenges they experienced in providing CR interventions. In addition, data on patient experiences regarding recovery and coping after heart valve surgery, as well as the caregivers' experiences in providing support and care to their family members who had undergone heart valve surgery were collected.

	Multiple methods of collecting qualitative data were used including in-depth interviews, observations, audio recordings, field notes, and literature review. The researcher was present at the Cardiac Unit and Cardiac Clinic during data collection while nurses provided information to the patients during their follow-up visits to verify data collected from the participants.
Triangulation	Interviews were conducted with different participants including: 10 nurses, 12 patients, and 8 caregivers. Multiple methods of collecting qualitative data were used (in-depth interviews, audio recordings, field notes, observational notes, and literature control). Triangulation was used to consolidate the findings from both qualitative and quantitative approaches.
Peer briefing	The research proposal was discussed at the School of Nursing's Post-Graduate Research seminars and reviewed by the University of Namibia Health Research Ethics Committee (HREC) and Decentralised Ethics Committee (DEC) for approval. Consultations were held with the study supervisors, experts, researchers, and senior colleagues with PhDs and knowledge and understanding of CR for patients who had heart valve surgery.
Member checking	Participants were debriefed at the end of each interview when necessary. Techniques such as clarification, summarizing, paraphrasing and providing examples were used to confirm the meaning of what the participants had said during the interview process. The voice recordings were played back to the participants for confirmation. The researcher and two supervisors conducted data analysis. Additionally, the researcher and two supervisors revised and discussed data interpretation to reach a consensus where necessary.

Dependability

Dependability refers to the provision of consistency and stable findings with the same evidence if the study were repeated with similar participants in the same context over time (Brink, et al, 2018). According to Lincoln and Guba (1985), as cited in du Plooy-Cilliers, et al., (2014), dependability is the degree to which the data-gathering strategy, data analysis, and the theory derived from the data are all integrated. Table 3.10

summarises the measures applied to ensure the criterion of dependability for trustworthiness.

Table 3.10: Measures for the application of dependability

Strategy	Criteria	Application to the study
Dependability	Enquiry audit	A peer examination was conducted. Experts in the field were consulted. Guidance was provided by the supervisors. A literature control of the findings was conducted.
	Triangulation	Two types of data (quantitative and qualitative data) were used to validate the findings from the two approaches.
	Peer examination	The supervisors who are experts in the field were consulted to review and provide comments on the developed educational programme for implementation. Two senior PhD holders and healthcare professionals from MoHSS at the Cardiac Unit assisted in reviewing and commenting on the developed programme.
	Dense description of the research methods	Details of research participants including population, sample size and sampling methods, data collection and analysis were clearly described. Criteria for data saturation were well outlined and applied.

Confirmability

Confirmability pertains to the accuracy, relevance, and meaning of the data ensuring that the interpretation of the findings aligns with the information provided by the participants and is not influenced by the researcher's imagination and how well the raw data supports the researcher's analysis and conclusions. Confirmability was enhanced through member checking whereby the researcher repeated the nurses', patients, and caregivers' responses to them during the interview to ensure that the interpretation was not missed out (Botma, et al., 2010; Creswell, 2014; Polit & Beck, 2013). Therefore, the findings reflect the voices of the participants and were not influenced by the researcher's perceptions. Table 3.11 summarises the criteria applied in this study to ensure confirmability. (Brink et al., 2018).

Table 3.11: Measures for application of confirmability

Strategy	Criteria	Application to the study
Confirmability	Triangulation	Various data collection methods were used to enrich the process including interviews, filed notes, observations, and audio recordings.
	Enquiry audit	All field notes, audio recordings, observation notes, themes, subthemes, and interpretations underwent review and were confirmed by both the supervisors and subject experts.
	Reflectivity	During interviews, the researcher acknowledged own feelings, beliefs, thoughts, and experiences to avoid influencing the research process.

Transferability

Transferability refers to the ability to apply the study's findings to other contexts or participants (Brink et al, 2018). Additionally, according to Du Plooy-Cilliera et al. (2014), transferability refers to the potential for the findings to be applicable in comparable circumstances and yield comparable outcomes. Table 3.12 summarises the measures applied to ensure the criterion of transferability for trustworthiness.

Table 3.12: Measures for application of transferability

Strategy	Criteria	Application for the study
Transferability	Thick description	The researcher provided a thorough description of the findings and their practical implications, which enhances the potential for transferability to other contexts. Recommendations for future research are provided in Chapter 9 of this study.
	Purposive sampling	All sources of data including nurses, patients, and caregivers, had experiences relevant to the goal and objective of the study, providing relevant data to guide the development of an appropriate educational programme for nurses to facilitate rehabilitation of patients who underwent heart valve repair and replacement surgery.
	Data saturation	Data collection continued until saturation was achieved.

3.11 ETHICAL CONSIDERATIONS

This section discusses the ethical principles that were applied to the study. Research ethics refers to a set of ethical guidelines that direct how scientific research should be conducted and disseminated (Grove et al., 2015). The Declaration of Helsinki, adopted in 1964 and revised by the World Medical Association, recommends the ethical principles with regard to (1) protection of the life, health, privacy, and dignity of human subjects by researchers; (2) exercise of utmost care by researchers to protect subjects from harm in nontherapeutic research; and that (3) research to be conducted only when the importance of the objective outweighs the inherent risks and burdens to the subjects (Grove et al., 2015).

Therefore, Du Plooy-Cilliera, et al., (2014) conclude that a researcher who upholds the moral standards and professional norms necessary for conducting research in an ethical manner is deemed to be acting with integrity. This entails conducting oneself in a trustworthy and respectful manner, notwithstanding difficulties (Du Plooy-Cilliera, et al., 2014). Throughout this study, applications of ethical principles were maintained consistently. The ethical principles applied were respect for persons, beneficence, non-maleficence, and justice, which are discussed in the following sections.

- **Permission to conduct the research**

Permission to conduct the study was obtained from the University of Namibia (UNAM), School of Nursing and Public Health (SoNPH) Post-Graduate Study Committee, UNAM Health Research Ethical Review Committee (HREC) and Decentralised Ethics Committee (DEC). Furthermore, approval to conduct the study at Windhoek Central Hospital, Cardiac Unit and Cardiac Clinic was granted by the Ethics and Research Committee of the Ministry of Health and Social Services as well as the Office of the Senior Medical Superintendent of Windhoek Central Hospital.

These approvals enabled the participation of nurses, patients, and caregivers from both departments in the study (Annexures A-D for Ethical clearance from UNAM, and permissions to conduct the research from MoHSS are attached).

▪ **Respect for persons**

The principles of respect for persons emphasize that individuals have the right to autonomy and the right to self-determination (Grove et al., 2013; Brink et al 2018). In this study, the purpose, objectives, benefits, and process of the study were fully explained to the participants before they were asked to sign the consent form. Voluntary participation was emphasized, and participants were assured that they had the right to withdraw from the study at any time without any penalties or coercion. In this study, the participants were fully informed about the purpose of the study and the benefits of the programme for nurses to facilitate the CR of patients who have undergone heart valve surgery.

Informed consent was also obtained before the commencement of each interview, after disclosure of essential study information to participants; participants' comprehension of this information; participants' competence to give consent and participants' voluntary consent to take part in the study were combined (Polit and Beck, 2012). Verbal and written consent were obtained from the nurse, patient, and caregiver participants for data collection and audio recording.

Anonymity, confidentiality, and privacy were maintained throughout the study. Anonymity means that no data or response could be linked to a participant's identity Gray, & Grove, (2021) as participants were identified by codes instead of their names. According to Grove et. al., (2015) confidentiality is the safe and secure management of information or data provided by a subject by the researcher to ensure that the data remains concealed from others. The questionnaires and audio tapes containing

collected data were kept in a lockable cupboard (Brink et al., 2018) with only the researcher having access. The audio tapes and questionnaires will be retained for a period of five years after the completion of the study to ensure confidentiality (Grove et. al., 2015; Brink et al., 2018).

Participants were informed that they had the right to choose if they wanted to share their personal information. Private information shared by participants was not disclosed to unauthorized individuals without their knowledge and was not used in the reporting process of the study.

- **Rights to beneficence**

Beneficence refers to minimising harm and maximising benefits (Polit and Beck, 2012). To prevent any participants' discomfort, the agreement made regarding the duration of the interview was respected (Brink et al., 2018), and the questions were carefully structured in a non-threatening manner. Participants were informed that although there was no direct benefit to them from the study, the findings would reveal the current status of nurses KAP regarding CR, raise awareness among MoHSS nurses about patients' experiences of recovery and coping, as well as caregivers' experiences in supporting and caring for a family member after heart valve repair or replacement surgery. Furthermore, participants were also informed that the obtained findings would inform the development of an educational programme for nurses to facilitate the CR of patients who had heart valve repair or replacement surgery. Moreover, the educational programme might contribute to improving patient's quality of life, reducing mortality, hospital readmission rates, and hospital costs.

- **Principle of non-maleficence**

The principle of non-maleficence implies that no harm or injury should be caused by research. Participants were informed that there were no risks or discomforts involved in sharing their challenges experienced in providing CR to patients who had HVS, patients' experiences of recovery and coping after HVS, as well as caregivers' experiences of providing support and care to their family members after heart valve surgery. They were also informed that they had the right to withdraw from the interview if they felt discomfort due to their health status, and the consent could be re-negotiated if necessary. Subsequently, the collection of data was scheduled at a time that was convenient for the participants, taking into consideration the health needs of patients and caregivers, as well as the nurses working schedules.

No invasive procedures were undertaken and no sensitive information that could harm the patient was discussed during the interviews, except for the questions that were part of the data collection process. Participants were informed that they were not obligated to answer any questions they were not comfortable with. Furthermore, the participants were observed and monitored for any signs of distress during the interview. They were also informed that in case they showed any signs of distress, they would be referred to social workers or psychologists for counselling. However, in this study, none of the participants displayed any signs of distress during the interview process.

- **Principle of justice**

Justice refers to the participants' right to fair selection and treatment by receiving what is due to them or is reasonable compared to other individuals in a similar circumstance. (Brink et al, 2018; Grove et al., 2015). In this study, justice was ensured by selecting participants for reasons directly related to the study not on their availability or ease of manipulation (Brink et al, 2018). All elements of the study population who met the

inclusion criteria were given an opportunity to participate. Furthermore, participants of all perspectives were selected and treated fairly without any biases. The researcher ensured punctuality and respected the agreements made regarding the scheduled time and interview duration.

3.12 SUMMARY

This chapter presented the explanatory sequential mixed methods, of the quantitative and qualitative strands which was applied to the study. The research designs and research methods of the two data were discussed separately. Descriptive cross-sectional design applications for quantitative data were described. Likewise, applications of exploratory, descriptive, and contextual approaches for collecting qualitative data were discussed. Applications of strategic reasoning, including inductive, deductive, inference, bracketing, and inference were described. Integration and interpretation of the data were also described. Phase 1 of situational analysis, Phase 2 of the conceptual framework, Phase 3 of the development of a programme, and Phase 4 of the implementation and evaluation/validation of an educational programme were also described. Applications for ensuring reliability and validity for quantitative data were described. Applications of measures and criteria of trustworthiness for qualitative data were discussed as well as applications of Ethical considerations. The next chapter, Chapter 4 presents the findings of quantitative and qualitative data.

CHAPTER FOUR

THE PRESENTATION OF THE QUANTITATIVE RESULTS AND QUALITATIVE FINDINGS

4.1 INTRODUCTION

The previous chapter presented the research design and research methods, which utilised an explanatory sequential mixed-methodology approach. This chapter focuses on presenting the results and findings, derived from analysis of data collected for both quantitative and qualitative objectives. The quantitative descriptive results are presented as frequencies, percentages, and statistically significant values (p-value of <0.05). The findings from the qualitative data are presented as themes and subthemes accompanied by verbatim quotations from the participants. Finally, this chapter integrates both quantitative results and qualitative findings.

4.2 THE RESULTS FROM OBJECTIVE 1.1: DESCRIBE THE KNOWLEDGE, ATTITUDES, AND PRACTICES OF NURSES REGARDING CARDIAC REHABILITATION OF PATIENTS AFTER HEART VALVE REPAIR OR REPLACEMENT SURGERY

4.2.1 Section A: Demographic Characteristics of the participants

This section presents the results regarding the demographic data of the participants.

Table 4.1: The demographic characteristics of the nurse respondents (n=23)

Variables	Frequency	Percentage (%)
Age of the participants		
20-29	8	34.8%
30-39	4	17.4%
40 and above	11	47.8%
Gender of the participants		
Male	2	8.7%
Female	21	91.3%
Rank in nursing profession		
Enrolled Nurse (E/N)	3	13%
Registered Nurse (R/N)	17	73.9%

Senior Registered Nurse (R/N)	3	13%
Nurses' educational level		
Certificate in nursing and midwifery science (Enrolled nurse)	3	13%
Diploma of nursing and midwifery science	3	13%
Bachelor of Nursing Science Clinical (Honours)	11	47.8%
PGD in nursing science	5	21.7%
Master's degree	1	4.3%
Years of experience in the Cardiac Unit and Cardiac Clinic		
1 Year and below	9	39.1%
2 Years and above	14	60.9%
Education related to cardiac conditions attended		
Yes	6	26.1%
No	17	73.9%
Type of cardiac training and education attended		
Cardiothoracic Nursing	3	13%
Cardiopulmonary Resuscitation	1	4.3%
Cardiovascular diseases	1	4.3%
INR education	1	4.3%

The results presented in Table 4.1, show that the majority 91.3% were females, 47.8% and 34.8% were of age 40 and 20-29 respectively. The majority 73.9% were registered nurses compared to 13% of enrolled nurses. The majority 14 (60.9%) had 3 or more years of experience and only 9 (39.1%) of the respondents had 2 years or less of experience in the Cardiac Unit and Cardiac Clinic. Furthermore, the majority 17 (73.9%) had not attended any education related to cardiac conditions while 6 (26%) had undergone some form of education in cardiothoracic training (n3= 13%) and cardiovascular diseases and education in INR were each attended by only 1(4.3%) of the participants.

4.2.2 Section B: The Nurse's Knowledge of Cardiac Rehabilitation of Patients After Heart Valve Repair or Replacement Surgery

▪ Section 1: Knowledge of the nurses on cardiac rehabilitation

The extent to which the respondents understood and interpreted the concept of cardiac rehabilitation was assessed by asking participants to rank four constructs associated with the concept. These four constructs were nutrition; medication regimen and side effects; physical activity counselling and exercise training; and cardiovascular disease risk factors management. Responses for these constructs were ranked on the Likert scale as Definitely (4), Probably (3), Definitely not (2), and Don't know (1). The results are presented in Table 4.2.

Table 4.2: Nurses knowledge on cardiac rehabilitation (n=23)

Statement	4 Definitely	3 Probably	2 Definitely not	1 I don't know
Cardiac rehabilitation is a supervised health program that provides education about:				
Nutrition	19(82.6%)	4(17.4%)	0(0%)	0(0%)
Medication regimen and side effects.	20(87%)	3(13%)	0(0%)	0(0%)
Physical activity counselling and exercise training.	14(60.9%)	8(34.8%)	0(0%)	1(4.3%)
Cardiovascular diseases (CVD) risk factor Management.	17(73.9%)	4(17.4%)	1(4.3%)	1(4.3%)
Cardiac rehabilitation is designed only for those patients who have had heart valve surgery recently.	5(21.7%)	9(39.1%)	6(26.1%)	3(13%)
Phase 1 of the cardiac rehabilitation program begins as soon as the patient is discharged from the hospital.	7(30.4%)	6(26.1%)	7(30.4%)	3(13%)
The benefits of cardiac rehabilitation are to:				
Reduce hospital readmissions.	22(95.7%)	1(4.3%)	0(0%)	0(0%)
Reduce the risk of death.	16(69.6%)	4(17.4%)	2(8.7%)	1(4.3%)

Reduce depression and anxiety.	17(73.9%)	4(17.4%)	0(0%)	2(8.7%)
Control the regulation of the normal body temperature.	1(4.3%)	8(34.8%)	6(26.1%)	8(34.8%)
Improve overall health and well-being.	20(87.0%)	2(8.7%)	0(0%)	1(4.3%)

Table 4.2, the results indicate good knowledge about CR among nurse respondents with regard to nutrition (82.6%), medication and side effect regimen (87%), physical activity counselling and exercise training (60.9%), cardiovascular disease risk factor management (73.9%), CR reduces hospital re-admission (95.7%), reduce risk of death (69.6%), reduce depression and anxiety (73.9%), and improve overall health and well-being (87.0%). However, only 21.7% knew that CR is not only for patients who had heart valve surgery recently, only (30.4%) knew that CR should begin as soon as the patient is discharged from the hospital.

Table 4.3: The overall findings of the knowledge regarding cardiac rehabilitation (n=23)

Knowledge of cardiac rehabilitation	Frequency =n	Percent %
High knowledge	21	91.3%
Average knowledge	1	4.3%
Low level of knowledge	1	4.3%
Total	23	100%

Table 4.3: The overall findings indicate that the majority of the respondents, n=21 (91.3%) had a high level of knowledge regarding CR, while 1 (4.3%) had an average and 1 (4.3%) had a low level of knowledge.

▪ **Section 2 Patient assessment**

Table 4.4: Nurse-respondents' Knowledge about patient assessment (n=23)

Statement	4 Definitely	3 Probably	2 Definitely not	1 Don't know
The following elements should be included in the patient's assessment before the cardiac rehabilitation program commences:				
Screening of cardiovascular risk factors	21(91.3%)	2(8.7%)	0(0.0%)	0(0.0%)
Physical activity counselling and exercise training	18(78.3%)	5(21.7%)	0 (0.0%)	0 (0.0%)
Physical examination of general health status	19(82.6%)	4(17.4%)	0 (0.0%)	0 (0.0%)
Wound healing and complications	19(82.6%)	3(13%)	1(4.3%)	0 (0.0%)
Assessment for psychosocial stress	21(91.3%)	1(4.3%)	0.0%)	1(4.3%)
Adherence to medication regime, anticoagulation and self-monitoring of weight, blood pressure and symptoms.	20(87%)	2(8.7%)	0(0%)	1(4.3%)
Return to work after heart valve surgery	15(65.2%)	6(26.1%)	0(0%)	2(8.7%)
The recovery after heart valve surgery takes about four to six weeks.	14(60.9%)	5(21.7%)	1(4.3%)	3(13%)
It takes about 3 to 8 weeks for the breastbone to heal completely after heart surgery	10(43.5%)	6(26.1%)	3(13%)	4(17%)
Warfarin is a life-long anticoagulation given to cardiac patients following mechanical valve replacement surgery.	20(87%)	2(8.7%)	0 (0.0%)	1(4.3%)
Anticoagulants prevent the development of blood clots that can result in embolism.	23(100%)	0(0.0%)	0 (0.0%)	0 (0.0%)
Patients with bio-prostheses or mitral repair should receive warfarin for 1 month after cardiac surgery.	5(21.7%)	7(30.4%)	8(34.8%)	3(13%)

Table 4.4, similarly, the majority of the nurse respondents displayed good knowledge about Screening for cardiovascular (91.3%), counselling for physical activity and exercise training (78.3%) physical examination of general health status (82.6%),

wound healing and complications, (82.6%), assessment for psychosocial stress (91.3%), adherence to medication regimen and self-monitoring (87%), when to return to work after heart surgery (65.2%), the duration for recovery after heart surgery in 4-6 week (60.9%), Warfarin treatment regimen (87%) and anticoagulant to prevent clotting and embolism (100%). On the contrary, only 43.5% of the respondents knew the correct time for the breastbone to heal after heart valve surgery and 21.7% had knowledge about the duration of warfarin treatment for patients with bio-prosthesis or mitral repair respectively.

Table 4.5: On overall knowledge of the nurse respondents about patient assessment (n=23)

Knowledge of patient assessment	Frequency =n23	Percent %
High knowledge	22	95.7%
Average knowledge	1	4.3%
Low level of knowledge	0	0%
Total	23	100%

In conclusion, the majority of the participants, 22 (95.7%), had a high level of knowledge. while only 1 (4.3%) had average knowledge about patient assessment.

▪ Section 3: Exercise training

Table 4.6: Nurse-respondents' knowledge of exercise training (n=23)

Statement	4 Definitely	3 Probably	2 Definitely not	1 Don't know
Exercise training can be started early in-hospital phase.	19(82.6%)	3(13%)	1(4.3%)	0 (0.0%)
Aerobic and resistance exercise training are two types of exercise recommended for cardiac rehabilitation.	6(26.1%)	6(26.1%)	4(17.4%)	7(30.4%)
Low activity reduces the risk of mortality in patients after heart valve surgery.	9(39.1%)	7(30.4%)	6(26.1%)	1(4.3%)
Supervised exercise is recommended for low-risk	12(52.2%)	4(17.4%)	6(26.1%)	1(4.3%)

patients.

Upper-body training can begin when the chest is stable, usually after 4 weeks of heart surgery.	9(39.1%)	5(21.7%)	7(30.4%)	2(8.7%)
Walking, swimming, jogging, stair climbing, and lightweight 6 weeks after heart surgery are safe for patients who underwent heart valve surgery.	8(34.8%)	7(30.4%)	5(21.7%)	3(13%)
Physical exercise reduces patient readmission, reduces cardiovascular mortality, and improves psychosocial well-being after cardiac events and heart surgery.	16(69.6%)	3(13%)	3(13%)	1(4.3%)
After heart valve surgery, patients may experience difficulties in returning to their normal activities.	13(56.5%)	10(43.5%)	0(0.0%)	0(0.0%)

Table 4.6, found that the majority of the nurse respondents had knowledge (82.6%) of when the exercise training should begin, 69.6% had knowledge about the benefit of physical exercises, and 56.5% had knowledge that after heart valve surgery patients may experience difficulties in returning to normal activities. However, only 26.1% had knowledge of the types of exercises recommended for cardiac rehabilitation, 26.1% knew that supervised exercise is recommended for low-risk patients, 39.1% knew that low activity reduces the risk of mortality and that upper-body activity should begin 4 weeks when the chest is stable respectively. Lastly, only 34.8% had knowledge about the types of aerobic exercises that are safe at 6 weeks after heart valve surgery.

Table 4.7: Overall nurse respondents' knowledge about exercise training (n=23)

Knowledge of exercise training	Frequency =n	Percent %
High knowledge	18	78.3%
Average knowledge	4	17.4%
Low level of knowledge	1	4.3%
Total	23	100%

In conclusion, the overall knowledge shows that the majority of the participants, 18 (78.3%), had a high level of knowledge, while 4 (17.4%) had an average level, and the

remaining 1 (4.3%) had a low level of knowledge on exercise training for cardiac rehabilitation.

▪ **Section 4: Diet/nutritional counselling**

Table 4.8: Nurse- respondents' knowledge on diet /nutritional counselling of patients (n=23)

Statement	4 Definitely	3 Probably	2 Definitely not	1 Don't know
It is necessary to educate and involve caregivers regarding dietary goals and healthy food choices.	22(95.7%)	1(4.3%)	0 (0.0%)	0 (0.0%)
Vitamin K interferes with anticoagulation.	19(82.6%)	1(4.3)	3(13%)	0 (0.0%)
Foods high in vitamin K, such as leafy green vegetables can reduce the effect of warfarin.	19(82.6%)	2(8.7%)	2(8.7%)	0 (0.0%)
Food with high salt content and labelled food with added salt are healthy for patients after heart surgery.	0 (0.0%)	3(13%)	16(69.6%)	4(17.4%)

Table 4.8 indicated that the majority of the nurse respondents (95.7%) had knowledge in educating and involving caregivers on diet, (82.6%) knew that vitamin K interferes with anticoagulants, and (82.6%) knew that foods high in Vitamin K reduce the effects of Warfarin. However, a significant 4 (17.4%) did not know that highly salty foods are healthy for patients after heart valve surgery.

Table 4.9: Overall nurse respondents' knowledge about diet/nutritional counselling (n=23)

Knowledge of exercise training	Frequency =n	Percent %
High knowledge	21	91.3%
Average knowledge	2	8.7%
Low level of knowledge	0	0.0%
Total	23	100%

The overall knowledge indicates that the majority, 21 (91.3%) had the highest knowledge, while 2 (8.7%) had average knowledge about diet/nutritional counselling for patients who had heart valve surgery.

▪ Section 5: Smoking cessation

Table 4.10: Nurse-respondents' knowledge of smoking cessation (n=23)

Statement	4 Definitely	3 Probably	2 Definitely not	1 Don't know
Not smoking by patients after heart surgery may reduce the risk of:				
Heart attack	22(95.7%)	1(4.3%)	0 (0.0%)	0(0.0%)
Stroke	21(91.3%)	2(8.7%)	0 (0.0%)	0(0.0%)
Acute renal failure	15(65.2%)	6(26.1%)	2(8.7%)	0(0.0%)
All smokers should be encouraged to stop smoking all forms of tobacco.	20(87%)	1(4.3%)	0(0.0%)	2(8.7%)

Table 4.10, indicated that the majority of the nurse respondents (95.7%), had the knowledge that avoidance of smoking by patients after heart valve surgery may reduce the risk of heart attack, (91.3%) may reduce the risk of stroke, and (65.2%) risk of acute renal failure.

Table 4.11: Overall Nurse respondents' knowledge of smoking cessation (n=23)

Knowledge of smoking cessation	Frequency =n	Percent %
High knowledge	21	91.3%
Average knowledge	2	8.7%
Low level of knowledge	0	0.0%
Total	23	100%

The participants' overall level of knowledge on smoking was high, with 21 (91.3%) having the knowledge, that avoidance of smoking by patients after cardiac surgery reduces the risks of a heart attack. Only the remaining 2 (8.7%) had no knowledge on this topic.

Section 6: Psychosocial management

The participants were asked to identify which aspects should be included when screening patients for psychosocial stress.

Table 4.12: Nurse-respondents' knowledge of Psycho-social management (n=23)

Statement	4 Definitely	3 Probably	2 Definitely not	1 Don't know
Which of the following aspects should be included when screening patients for psycho-social stress:				
Depression and anxiety	21(91.3%)	1(4.3%)	0(0.0%)	1(4.3%)
Social isolation	17(73.9%)	6(26.1%)	0(0.0%)	0(0.0%)
Diet and exercise training	16(69.6%)	4(17.4%)	3(13%)	0(0.0%)
Marital/family distress and sexual dysfunction	13(56.5%)	7(30.4%)	2(8.7%)	1(4.3%)
Alcohol abuse	20(87 %)	3(13%)	0(0.0%)	0(0.05)
Sleeping disturbances after heart valve surgery due to artificial heart valve sound.	8(34.8%)	10(43.5%)	3(13%)	2(8.7%)
Experience of anxiety and depression after six months of being discharged.	6(26.1%)	12(52.2%)	3(13%)	2(8.7%)
Problems encountered after heart valve surgery may delay the recovery process and influence the patient's capacity for self-care.	16(69.6%)	4(17.4%)	0(0.0%)	3(13%)
Problems to adapt psycho-socially after heart valve surgery which might negatively impact the health of the patient.	15(65.2%)	6(26.1%)	0(0.0%)	2(8.7%)
Caregivers, family members and other support people should be encouraged to participate in the cardiac rehabilitation process of the patient throughout	23(100%)	0(0.0%)	0(0.0%)	0(0.0%)

Table 4.12, indicated that the majority of the nurse respondents displayed knowledge of aspects that should be included when screening patients for psycho-social stress: (91.3%) depression and anxiety, (73.9%) social isolation, (69.6%) diet and exercise training, marital/family distress and sexual dysfunction, and (87%) abuse of alcohol as a coping strategy after cardiac surgery. However, only 34.8% knew that artificial heart

valves sound may disturb sleep for patients. All respondents (100%) knew that caregivers, family members, and other support people should be encouraged to participate in the CR process of the patient throughout.

Table 4.13: Overall nurse respondents' knowledge about psycho-social management (n=23)

Psycho-social management	Frequency =n	Percent %
High knowledge	22	95.7%
Average knowledge	1	4.3%
Low level of knowledge	0	0.0%
Total	23	100%

In conclusion, the overall findings on the level of nurses' knowledge regarding psychosocial management were high, with the majority of 22 (95.7%) of the participants demonstrating a high level of knowledge, while only 1 (4.3%) had a low level of knowledge. Table 4.14 presents the results on the overall level of knowledge of the nurses regarding aspects of CR for patients after heart valve repair or replacement surgery.

Table 4.14: Overall knowledge of cardiac rehabilitation among the nurse-respondents (n=23)

Components on the level of knowledge about cardiac rehabilitation	Low	Average	High
1. Cardiac rehabilitation	4.3%	4.3%	91.3%
2. Patient assessment	0%	4.3%	95.7%
3. Exercise training	4.3%	17.4%	78.3%
4. Diet/nutritional counselling	0%	8.7%	91.3%
5. Smoking cessation	0%	8.7%	91.3%
6. Psycho-social management	4.3%	0%	95.7%
Overall combined level of knowledge	0%	3 (13%)	20 (87%)

The overall level of knowledge regarding various aspects of cardiac rehabilitation indicates that the majority of respondents (95.7%) demonstrated a high level of knowledge about patient assessment and psychosocial management followed by 91.3% knowledge levels in areas such as diet and nutritional counselling, as well as smoking cessation for cardiac rehabilitation. The knowledge level for exercise training was slightly lower at 78.3%.

4.2.3 Section C: Nurses Attitudes Regarding Cardiac Rehabilitation

The respondents' attitudes towards CR for patients after heart valve surgery were assessed using a combination of positive and negative statements.

Nurses' Attitudes towards cardiac rehabilitation

Table 4.15: Nurse-respondents' attitudes towards cardiac rehabilitation (n=23)

Attitudes	5 Strongly agree	4 Agree	3 Neutral	2 Disagree	1 Strongly disagree
I believe rehabilitation should begin as soon as the patient is discharged from the hospital.	12(52.2%)	4(17.4)	2(8.7%)	3(13%)	2(8.7%)
I think after heart valve surgery; the patient will not require rehabilitation as long as there are no potential complications involved.	0(0.0%)	3(13%)	1(4.3%)	9(39.1)	10(43.5%)
I do not see cardiac rehabilitation as part of my responsibilities.	0(0.0%)	2(8.7%)	5(21.7%)	5(21.7%)	11(47.8%)
I think doing a cardiac rehabilitation program for patients after heart surgery is time-consuming.	1(4.3%)	1(4.3%)	4(17.4%)	6(26.1%)	10(43.5%)
I am sceptical about the benefits of cardiac rehabilitation programs.	3(13%)	2(8.7%)	5(21.7%)	8(34.8%)	5(21.7%)
I think am skilled enough and interested in giving health information to patients regarding cardiac rehabilitation programmes after heart surgery	11(47.8%)	2(8.7%)	7(30.4%)	2(8.7%)	1(4.3%)
I think patients and caregivers should be responsible for their own health behaviour changes, risk reduction, self-management, and post-hospitalization.	9(39.1%)	8(34.8%)	2(8.7%)	3(13%)	1(4.3%)
I believe it is the duty and responsibility of cardiologists to give information to patients regarding rehabilitation after cardiac surgery.	14(60.9%)	3(13%)	4(17.4%)	1(4.3%)	1(4.3%)

Table 4.15, shows that the majority of the nurse respondents had positive attitudes towards cardiac rehabilitation in the following variables: (52.2%) believed in the timing of rehabilitation starting immediately after a patient's hospital discharge, (43.5%) felt that patients require rehabilitation as long as no potential complications are involved,

(69.6%) felt cardiac rehabilitation as their responsibility, (69.6%) believed that doing cardiac rehabilitation program was not time-consuming, half of the respondents (52.2%) considered the benefit of CR, (73.9%) believed that they were competent to give health information to the patients after cardiac rehabilitation. However, despite positive attitudes, some nurses displayed negative attitudes, (73.9%) believed that patients and caregivers should be responsible for their own health and that it was the duty of the cardiologists to give information to the patients for recovery respectively.

▪ **Patient assessment**

Table 4.16: Nurse-respondents' attitudes towards patient assessment (n=23)

Patient assessment	5 Strongly agree	4 Agree	3 Neutral	2 Disagree	1 Strongly disagree
I think comprehensive patient assessment should be conducted before the commencement of the cardiac rehabilitation programme.	13(56.5)	8(34.8%)	2(8.7%)	0(0.0%)	0(0.0%)
I think the information given to patients on discharge regarding medications, wound care, infection control, and psychological stress is sufficient for their recovery process.	7(30.4%)	5(21.7%)	3(13%)	6(26.1%)	2(8.7%)

Table 4.16, the majority of the respondents, (91.3%) believed that patients should be screened, while half of the respondents (52.2%) believed that information given to the patients on discharge was sufficient for their recovery.

▪ **Exercise Education**

Table 4.17: Nurse-respondents' attitudes towards exercise education (n=23)

Patient assessment	5 Strongly agree	4 Agree	3 Neutral	2 Disagree	1 Strongly disagree
I think strenuous exercise that involves upper body parts should be avoided during the first two weeks after heart surgery as it may cause harm or damage to the sternal wound.	15(65.2%)	2(8.7%)	3(13%)	3(13%)	0(0%)
I think exercise training programme and supervision is the responsibility of the physiotherapist or a staff member trained in exercise prescription and not of a nurse.	7(30.4%)	8(34.8%)	5(21.7%)	2(8.7%)	1(4.3%)
I think high-risk patients should be supervised during low-intensity exercise by healthcare providers skilled in the management of emergency cardiac events.	14(60.9%)	6(26.1%)	2(8.7%)	1(4.3%)	0(0%)
I think low-moderate intensity exercise is safe for patients after 6 weeks of heart valve surgery.	7(30.4%)	11(47.8%)	5(21.7%)	0(0%)	0(0%)
I think it is the responsibility of the caregivers to get involved in encouraging their family members to participate in exercise training for their relatives who had heart valve surgery.	9(39.1%)	11(47.8%)	2(8.7%)	1(4.3%)	0(0%)

Table 4.17, indicates that the majority of the nurse respondents had positive attitudes (73.9%) believed that strenuous exercises should be avoided during the first two weeks after surgery, and 78.3%) believed that low-moderate intensity exercise is safe for patients. Furthermore, (87%) believed high-risk patients should be supervised during low-intensity exercises and believed that it was the responsibility of the caregivers to get involved in the exercise training of their family members after heart valve surgery respectively.

- **Diet/Nutritional counselling**

Table 4.18: Nurse-respondents' attitudes about diet/nutritional counselling (n=23)

Diet/nutritional counselling	5 Strongly agree	4 Agree	3 Neutral	2 Disagree	1 Strongly disagree
I think the Warfarin information booklet given to patients after discharge is sufficient in providing information about diet/nutrition counselling services.	9(39.1%)	5(21.7%)	2(8.7%)	5(21.7%)	2(8.7%)
I think food rich in Vitamin K may interfere with warfarin taken by patients after heart surgery.	12(52.2%)	7(30.4%)	1(4.3%)	1(4.3%)	2(8.7%)
It is the nurse's responsibility to explain diet/nutrition counselling to patients and caregivers after heart surgery.	11(47.8%)	6(26.1%)	4(17.4%)	1(4.3%)	1(4.3%)

Table 4.18 shows that the majority of the nurse respondents had negative attitudes, (60.8%) and believed the Warfarin information booklet given to the patients on discharge was sufficient for their recovery. However, (73.9%) believed it was the responsibility of the nurse to explain information to the patients and caregivers about diet. About (82.6%) believe that food rich in Vitamin K interferes with Warfarin.

- **Psycho-social management**

Table 4.19: Nurse-respondents' attitudes towards psycho-social management (n=23)

Psycho-social management	5 Strongly agree	4 Agree	3 Neutral	2 Disagree	1 Strongly agree
I find it difficult to provide emotional support to patients and their caregivers if they become upset.	6(26.1%)	3(13%)	10(43.5%)	4(17.4%)	0(0%)
I feel uncomfortable talking to patients and their caregivers about sexual life experiences.	1(4.3%)	8(34.8)	6(26.1%)	8(34.8%)	0(0%)
I feel the support and care given to patients by caregivers at home is sufficient for patient recovery and return to normal activities.	5(21.7%)	3(13%)	9(39.1%)	5(21.7%)	1(4.3%)

I believe that if patients are given an opportunity to share their worries and fears with others, it may help with their recovery process.	16(69.6%)	6(26.1%)	1(4.3%)	0(0%)	0(0%)
I do not think caregivers usually experience any difficulty in supporting and caring for their loved ones who had heart valve surgery.	3(13%)	3(13%)	7(30.4%)	4(17.4%)	6(26.1%)

Table 4.19 indicates some nurse-respondents displaying positive attitudes, the majority (95.7%) believed that patients should be given the opportunity to express their feelings. However, only (17.4%) believed in providing emotional support to patients and caregivers, only (34.8%) believed in talking about sexual life, and less than half of the respondents (43.5%) felt that caregivers usually experience difficulties in supporting and caring for their family member, (34.8%) felt support and care given to patients and caregivers were sufficient for patients' recovery. Lastly, only (26.1%) felt the support and care were sufficient for recovery and return to normal activities.

Table 4.20: Overall level of attitudes towards cardiac rehabilitation among the nurse-respondents (n=23)

Components on level of attitudes about cardiac rehabilitation	Negative	Positive
Attitudes towards cardiac rehabilitation	6 (26.1%)	16 (69.6%)
Patient assessment and exercise training	1 (4.3%)	22 (95.7%)
Diet/nutritional counselling and psycho-social management	4 (17.4%)	19 (82.6%)
Overall combined level of attitudes	1 (4.3%)	21 (91.3%)

Table 4.20 provides an overview of the nurses' overall attitudes towards cardiac rehabilitation. In conclusion, the combined level of attitudes towards CR shows that the majority, 21 (91.3%), had positive attitudes while only 1 (4.3%) had negative attitudes.

4.2.4 Section D: Nurses Practices regarding Cardiac Rehabilitation

Table 4.21 presents the practices of the nurse respondents regarding cardiac rehabilitation.

Table 4.21: Nurse-respondents' practices about cardiac rehabilitation (n=23)

Statement	4 Never	3 Seldom	2 Often	1 Always
Indicate which of the following rehabilitation activities you provide to patients before discharge from the hospital				
Medications and drug regimens	1(4.3%)	2(8.7%)	3(13%)	17(73.9%)
Self-care management	1(4.3%)	2(8.7%)	5(21.7%)	15(65.2%)
Sternotomy care and prevention of wound infection.	2(8.7%)	1(4.3%)	4(17.4%)	16(69.6%)
Early detection of complications	1(4.3%)	5(21.7%)	6(26.1%)	11(47.8%)
Importance of physical exercise	0 (0%)	6(26.1%)	9(39.1%)	8(34.8%)
Sexual activities counselling	6(26.1%)	6(26.1%)	7(30.4%)	4(17.4%)
Advise caregivers regarding support and care of their family members.	1(4.3%)	4(17.4%)	7(30.4%)	11(47.8%)
Working through the Warfarin information booklet with the patients before discharge from the hospital.	2(8.7%)	6(26.1%)	4(17.4%)	11(47.8%)
Giving training and teaching to the patients and caregivers to implement the content of the booklet regarding the following:				
Medication compliance and side effects	1(4.3%)	3(13%)	5(21.7%)	14(60.9%)
Sleep and rest	1(4.3%)	2(8.7%)	8(34.8%)	12(52.2%)
Diet/nutritional counselling and diet changes	0%	1(4.3%)	8(34.8%)	14(60.9%)
Changing bad habits of smoking and drinking alcohol.	0%)	1(4.3%)	8(34.8%)	14(60.9%)
Preparation of a work-up schedule for the activities of the patients regarding cycling, rowing, swimming, bicycling, jogging and rest.	14(60.9%)	4(17.4%)	2(8.7%)	3(13%)
Counselling of the patients to help them cope with heart valve surgery, stress, or anxiety.	1(4.3%)	8(34.8%)	9(39.1%)	5(21.7%)
Counselling of the caregivers to help them cope with stress and anxiety in caring for their family members after heart valve surgery.	3(13%)	6(26.1%)	11(47.8%)	3(13%)

Encouraging and counselling caregivers to get involved in the physical activities of their family members.	2(8.7%)	6(26.1%)	10(43.5%)	4(17.4%)
Encouraging patients in the involvement of leisure activities that they find comfortable and enjoyable.	2(8.7%)	6(26.1%)	10(43.5%)	5(21.7%)
Providing information to caregivers as to what to expect, and how to deal with patients' emotional responses such as depression and moodiness.	3(13%)	9(39.1%)	7(30.4%)	4(17.4%)
Listening to the patient's problems and responding accordingly.	1(4.3%)	1(4.3%)	5(21.7%)	16(69.6%)
Listening to the caregivers' problems and responding accordingly.	1(4.3%)	1(4.3%)	8(34.8%)	13(56.5%)

Table 4.21 indicates that the majority of the nurse-respondents provided the following activities to the patients on discharge, 73.9% on medication and drug regimen, 65.2% on self-care, and 69.6% on sternotomy wound care. However, less than half (47.8%) provided information on early detection of complications, (34.8%) on physical exercise, 47.8% on advice to caregivers, and only (17.4%) on sexual activity counselling. Moreover, less than half (47.8%) work through the Warfarin information booklet.

With regards to teaching the patients and caregivers, (60.9%) were able to teach about medication compliance and side effects, diet and changing bad habits on smoking and alcohol respectively, and half of the respondents (52.2%) on sleep and rest. In addition, (69.6%) listened to the patients and half (56.5%) listened to the caregivers.

However, the poor practice was evident among the respondents, (13%) on preparing work-up schedules for exercises and counselling caregivers to cope with stress respectively, (21.7%) counselling patients, (17.4%) encouraging and counselling caregivers to get involved and providing information to caregivers what to expect with emotional responses respectively, and (21.7%) encouraged patients to get involved.

Table 4.22: Overall level of nurse respondents' practices on cardiac rehabilitation (n=22)

Level of practice	Frequency=n	Percentages%
Poor practice	1	4.3%
Average practice	8	34.8%
Good practice	13	56.5%
Total	22	95.7%
Missing item	1	4.3%

More than half of the respondents, 13 (56.5%), had good practice. A notable 8 (34.8%) had average practice, and only 1 (4.3%) had poor practice, with the remaining 1 (4.3%) being a missing item.

4.2.5 Overall Association of nurse-respondents' knowledge about cardiac rehabilitation and Demographic Data

The association between age categories and nurses' knowledge of cardiac rehabilitation is shown in Table 4.23.

Table 4.23: Overall association between nurses' age categories and the knowledge of cardiac rehabilitation (n=23)

Nurses age	The overall levels of knowledge		P-value
	Average knowledge	High level of knowledge	
20-29	1 (12.5%)	7 (87.5%)	1.000
30-39	0 (0.0%)	4 (100.0%)	
40 and above	2 (18.2%)	9 (81.8%)	
N of Valid Cases	23		

Table 4.23 indicates overall that there is no association found between age categories and knowledge, as indicated by the *p*-value of more than 0.050.

Table 4.24: Overall association between gender and nurses' knowledge of cardiac rehabilitation (n=23)

Nurses gender	The overall levels of knowledge		P-value
	Average knowledge	High level of knowledge	
Male	0 (0.0%)	2 (100.0%)	1.000
Female	3 (14.3%)	18 (85.7%)	
N of Valid Cases	23		

Table 4.24 shows that the *p*-value is above 0.050, indicating that overall, there is no association between gender and knowledge of the nurses on cardiac rehabilitation.

Table 4.25: Association between rank and nurses' knowledge of cardiac rehabilitation (n=23)

Nurses rank	The overall levels of knowledge		P-value
	Average knowledge	High level of knowledge	
Enrolled nurse	0 (0.0%)	3 (100.0%)	.616
Registered nurse	2 (11.8%)	15 (88.2%)	
Senior registered nurse	1 (33.3%)	2 (66.7%)	
N of Valid Cases	23		

Table 4.25 shows that there is no association found between nurses' rank and the level of knowledge, as indicated by the *p*-value above 0.050.

Table 4.26: Overall association between nurses' educational level and their knowledge of cardiac rehabilitation (n=23)

Nurses educational level	The overall levels of knowledge		P-value
	Average knowledge	High level of knowledge	
Certificate in Nursing and Midwifery Science	0	3 (100.0%)	.845
Diploma of Nursing and Midwifery Science	1 (33.3%)	2 (66.7%)	
Bachelor of Nursing Science Clinical (Honours)	2 (18.2%)	9 (81.8%)	
PGD in Nursing Science	0 (0.0%)	5 (100.0%)	
Master's degree	0 (0.0%)	1 (100.0%)	
N of Valid Cases	23		

Table 4.26 shows that there is no association found between nurses' educational level and their knowledge towards cardiac rehabilitation, as indicated by a *p*-value above 0.050.

Table 4.27: Overall association between nurses' years of experience and level of knowledge (n=23)

Nurses' years of experience	Overall level of knowledge		<i>p</i> -value
	Average	High	
1 year	1 (14.3%)	6 (85.7%)	.941
2 years	0 (0.0%)	2 (80.0%)	
3 years	1 (20.0%)	4 (100.0%)	
5 years	0 (0.0%)	1 (100.0%)	
8 years	0 (0.0%)	1 (100.0%)	
10 years	0 (0.0%)	2 (100.0%)	
11 years	0 (0.0%)	1 (100.0%)	
12 years	0 (0.0%)	1 (100.0%)	
13 years	1 (50.0%)	1 (50.0%)	
14 years	0	1 (100.0%)	
Total	3 (13.0%)	20 (87.0%)	

Table 4.27 indicates that there is no association found between nurses' years of experience and the knowledge of the nurses towards cardiac rehabilitation, as indicated by a p-value above 0.050.

Table 4.28: Overall association between training related to cardiac conditions and level of knowledge about cardiac rehabilitation (n=23)

Training related to cardiac conditions	The overall level of knowledge		P-value
	Average knowledge	High level of knowledge	
Yes	1 (16.7%)	5 (83.3%)	1.000
No	2 (11.8%)	15 (88.2%)	
Total	3	20	
			23 (100.0%)

Table 4.28 indicates no association between training related to cardiac conditions and nurse's knowledge of cardiac rehabilitation as indicated by the p-value above 0.050.

Table 4.29: Association between type of training and level of knowledge on cardiac rehabilitation (n=23)

Type of training attended	The overall levels of knowledge		P-value
	Average knowledge	High level of knowledge	
Cardiothoracic Nursing	0 (0.0%)	3 (100.0%)	.500
Cardiopulmonary Resuscitation	0 (0.0%)	1 (100.0%)	
Cardiovascular diseases	0 (100.0%)	1 (100.0%)	
INR training	1 (100.0%)	0 (0.0%)	
N of Valid Cases	6		

Table 4.29 indicates no association between the type of training attended and the nurse's knowledge about cardiac rehabilitation as indicated by the p-value above 0.050.

4.2.6 Association Between Nurses' Attitudes towards cardiac rehabilitation and Demographic Data (n=23)

An independent cross-tabulation was performed, and it indicated some associations between nurses' attitudes regarding CR of patients after heart valve surgery and their demographic variables. Table 4.30 presents the findings regarding the relationship between age and nurses' attitudes towards cardiac rehabilitation.

Table 4.30: Association between nurses' age and attitudes towards cardiac rehabilitation (n=23)

Statement	Nurses Age	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Fishers Exact Test p-value
I think am skilled enough and interested in giving health information to patients regarding cardiac rehabilitation programmes after heart surgery.	20-29	2 (25.0%)	0 (0.0%)	5 (62.5%)	1 (12.5%)	0 (0.0%)	0.038*
	30-39	1 (25.0%)	1 (25.0%)	1 (25.0%)	1 (25.0%)	0 (0.0%)	
	40 and above	8 (72.7%)	1 (9.1%)	1 (9.1%)	0 (0.0%)	1 (9.1%)	
I think patients and caregivers should be responsible for their own health behaviour changes, risk reduction, self-management, and post-hospitalization.	20-29	4 (50.0%)	0 (0.0%)	2 (25.0%)	1 (12.5%)	1 (12.5%)	0.015*
	30-39	0 (0.0%)	4 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
	40 and above	5 (45.5%)	4 (36.4%)	0 (0.0%)	2 (18.2%)	0 (0.0%)	
I do not think caregivers usually experience any difficulty in supporting and caring for their loved ones who had heart valve surgery.	20-29	0 (0.0%)	1 (12.5%)	1 (12.5%)	1 (12.5%)	5 (62.5%)	0.025*
	30-39	0 (0.0%)	2 (50.0%)	1 (25.0%)	1 (25.0%)	0 (0.0%)	
	40 and above	3 (27.3%)	0 (0.0%)	5 (45.5%)	2 (18.2%)	1 (9.1%)	
N of Valid Cases	23						

P- value below 0.050 there is an association and -p-value above 0.050 no association.

Table 4.30, shows that there is an association between nurses' age and attitudes towards CR regarding some aspects of the core components of cardiac rehabilitation. About 72.7% of the respondents of 40 years old and above, had positive attitudes towards cardiac rehabilitation. Therefore, a statistically significant association of p-value of 0.038 was found between the age group above 40 years old and positive attitudes.

However, there is a negative attitude association between age and negative attitudes regarding the encouragement of self-care management for patients and caregivers in rehabilitation, as indicated by a p-value of 0.015 across all age categories. The study concluded that both groups above 40 (81.9%), 20-29 (50%), and 30-39 (100%) had

negative attitudes towards the encouragement of health behavioural changes, risk reduction, and self-care management of patients and caregivers.

Furthermore, there was a significant association between nurses' age categories of 20-29 years and positive attitudes toward CR as indicated by a P-value of 0.025. this was evident in nurse respondents who believed that caregivers usually experience difficulty in supporting and caring for their relatives after heart valve surgery.

Table 4.31: Overall association between nurses' age and overall level of attitudes (n=22)

Nurses' age	The overall levels of attitudes and age		P-value
	Negative	Positive attitudes	
20-29	0 (0.0%)	8 (100.0%)	.455
30-39	0 (0.0%)	4 (100.0%)	
40 and above	1 (10.0%)	9 (90.0%)	
Total no of valid cases	1	21	

Table 4.31 indicates no association between nurses' age and overall attitude levels with a p-value of more than 0.05.

Table 4.32: Overall association between nurses' gender and attitudes towards cardiac rehabilitation (n=23)

Statement	Nurses Rank	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Fishers Exact Test p-value
I believe rehabilitation should begin as soon as the patient is discharged from the hospital.	Male	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (100%)	0 (0.0%)	0.020*
	Female	12 (57.1%)	4(19.0%)	2(9.5%)	1 (4.8%)	2(9.5%)	
I think the information given to patients on discharge regarding medications, wound care, infection control and psychological stress is sufficient for their recovery process	Male	0 (0.0%)	0 (0.0%)	1 (50%)	0 (0.0%)	1 (50%)	0.040*
	Female	7 (33.3%)	5 (23.8%)	2 (9.5%)	6 (28.6%)	1 (4.8%)	
N of Valid Cases		23					

Regarding rehabilitation, 100% of males disagreed while the majority of females either strongly agreed or agreed when CR should begin. This shows a significant p-value of 0.020. Table 4.32 shows that there is an association between nurses' gender (female) and negative attitudes about the commencement of CR and the need for continuous provision of information to patients and caregivers as indicated by the p-value of 0.040 across all genders.

Table 4.33: Overall association of nurses' gender and level of attitudes towards cardiac rehabilitation (n=23)

Overall levels of attitudes versus gender	Nurses gender		
	Male	Female	
Negative	0 (0.0%)	1 (4.5%)	1.000
Positive	2 (100%)	19 (95.5%)	
N of Valid Cases	22	(100)	

Table 4.33, however, shows no association between nurses' gender and attitudes, as indicated by the p-value above 0.050, when compared to the independent crosstab in Table 4.38.

Table 4.34: Overall association between nurses' rank and attitudes towards cardiac rehabilitation (n=23)

Statement	Nurses Rank	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Fishers Exact Test p-value
I am sceptical about the benefits of cardiac rehabilitation.	Enrolled nurse	1 (33.3%)	1 (33.3%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	.040*
	Registered nurse	1 (5.9%)	0 (0.0%)	4 (23.5%)	7 (41.2%)	5 (29.4%)	
	Senior registered nurse	1 (33.3%)	1 (33.3%)	0 (0.0%)	1 (33.3%)	0 (0.0%)	
I do not think caregivers usually experience any difficulty in supporting and caring for their loved ones who had heart valve surgery.	Enrolled Nurse	1 (33.3%)	1 (33.3%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	.018*
	Registered nurse	0 (0.0%)	2 (11.8%)	6 (35.3%)	3 (17.6%)	6 (35.3%)	
	Senior registered nurse	2 (66.7%)	0 (0.0%)	0 (0.0%)	1 (33.3%)	0 (0.0%)	
N of Valid Cases	23						

Table 4.34 shows that there was a significant association between nurses' ranks and attitudes towards the benefit of cardiac rehabilitation among registered nurses (about 70.6%) of the respondents have positive attitudes towards the benefit of cardiac rehabilitation (p-value of 0.040. In relation to whether caregivers experience any difficulty in support and care of a relative after HVS, about half (52.9%) of the registered nurses have positive attitudes while senior registered nurses have negative attitudes (66.7%) in the realisation that caregivers experience difficulties in supporting and caring of their relative after heart valve surgery. Therefore, a negative attitude was observed among senior registered nurses and their ignorance of the need to support and care for caregivers, as indicated by the p-value of less than 0.018.

Table 4.35: Overall association of nurses' rank and level of attitudes on cardiac rehabilitation (n=22)

Nurses' rank	The overall levels of attitudes		P-value
	Negative	Positive attitudes	
Enrolled nurse	0	2 (100%)	.227
Registered nurse	0	17 (100%)	
Senior registered nurse	1 (33.3%)	2 (66.7%)	
N of Valid Cases	22		

Table 4.35 shows no overall association between nurses' rank and overall attitudes as indicated by the p-value above 0.050 across all ranks.

Table 4.36: Overall association between nurses' educational level and attitudes towards cardiac rehabilitation (n=23)

Nurses educational level	The overall levels of attitudes		p-value
	Negative	Positive	
Certificate in Nursing and Midwifery Science	0 (0.0%)	2 (100.0%)	.273
Diploma in Nursing and Midwifery Science	1 (33.3%)	2 (66.7%)	
Bachelor of Nursing Science Clinical (Honours)	0 (0.0%)	11 (100.0%)	
PGD in Nursing Science	0 (0.0%)	5 (100.0%)	
Master's degree	0 (0.0%)	1 (100.0%)	
N of Valid Cases	22		

Table 4.36 shows no association between nurses' educational level and overall attitudes towards CR as indicated by the p-value above 0.050 across all educational levels.

Table 4.37: Overall association between nurses' years of experience and level of attitudes (n=22)

Nurses' years of experience	Overall level of attitudes		p-value
	Negative	Positive	
1 year	0 (0.0%)	7 (100.0%)	.455
2 years	0 (0.0%)	2 (100.0%)	
3 years	0 (0.0%)	5 (100.0%)	
5 years	0 (0.0%)	1 (100.0%)	
8 years	0 (0.0%)	1 (100.0%)	
10 years	0 (0.0%)	1 (100.0%)	
11 years	0 (0.0%)	1 (100.0%)	
12 years	0 (0.0%)	1 (100.0%)	
13 years	1 (50.0%)	1 (50.0%)	
14 years	0	1 (100.0%)	
Total	1 (4.5%)	21 (95.5%)	

Table 4.37 shows no association between nurses' years of experience and overall attitudes towards CR as indicated by the p-value above 0.050 across all years of experience.

Table 4.38: Overall association between training related to cardiac conditions and attitudes towards cardiac rehabilitation (n=23)

Statement	Training related to cardiac conditions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Fishers Exact Test p-value
I do not see cardiac rehabilitation as part of my responsibilities.	Yes	0 (0.0%)	2 (33.3%)	2 (33.3%)	0 (0.0%)	2 (33.3%)	.054
	No	0 (0.0%)	0 (0.0%)	3 (17.6%)	5 (29.4%)	9 (52.9%)	
I am sceptical about the benefits of cardiac rehabilitation.	Yes	3 (50.0%)	1 (16.7%)	1 (16.7%)	0 (0.0%)	1 (16.7%)	.008*
	No	0 (0.0%)	1 (5.9%)	4 (23.5%)	8 (47.1%)	4 (23.5%)	
N of Valid Cases		23					

Table 4.38 shows no association between training related to cardiac conditions and attitudes towards CR as part of the responsibility of the nurse as indicated by the p-value above 0.050. However, the findings show an association between training related

to cardiac conditions and a positive attitude towards the benefit of CR as indicated by the *p*-value of 0.008.

Table 4.39: Overall association between training related to cardiac conditions and level of attitudes on cardiac rehabilitation (n=22)

Training related to cardiac conditions	The overall level of attitudes		P-value
	Negative	Positive	
Yes	1 (20.0%)	4 (80.0%)	.227
No	0 (0.0%)	17 (100.0%)	
N of Valid Cases	22		

Table 4.39 shows no association between training related to cardiac conditions and overall attitudes, as indicated by the *p*-value above 0.050.

Table 4.40: Association between type of training and overall level of attitudes on cardiac rehabilitation (n=5)

Type of training attended	The overall levels of attitudes		P-value
	Negative	Positive	
Cardiothoracic Nursing	0 (0.0%)	3 (100.0%)	.400
Cardiopulmonary Resuscitation	0 (0.0%)	1 (100.0%)	
Cardiovascular diseases	0 (100.0%)	1 (100.0%)	
INR training	1 (100.0%)	0 (0.0%)	
N of Valid Cases	5		

Table 4.40 shows no association between the types of training attended and overall attitudes as indicated by the *p*-value above 0.050.

4.2.7 Overall Association Between Nurses' Practice of Cardiac Rehabilitation and Demographic Data

Table 4.41: Association between nurses' age and practices towards cardiac rehabilitation (n=23)

Statements	Nurses Age	Always	Often	Seldom	Never	Fishers Exact Test p-value
Advice caregivers regarding support and care of their family members.	20-29	5 (62.5%)	2 (25.0%)	1 (12.5%)	0 (0.0%)	.041*
	30-39	0 (0.0%)	1 (25.0%)	3 (75.0%)	0 (0.0%)	
	40 and above	6 (54.5%)	4 (36.4%)	0 (0.0%)	1 (9.1%)	
N of Valid Cases	23					

Table 4.41 shows an association between nurses aged 20-29 and advising caregivers regarding the support and care of their family members, as indicated by the p-value of 0.041.

Table 4.42: Overall association between nurses age and level of practice (n=22)

Nurses' age	The overall levels of practice			P-value
	Poor	Average	Good	
20-29	1 (12.5%)	2 (25.0%)	5 (62.5%)	.364
30-39	0 (0.0%)	3 (75.0%)	1 (25.0%)	
40 and above	0 (0.0%)	3 (30.0%)	7 (70.0%)	
N Valid cases	22			

Table 4.42 indicates that there is no association found between nurses' age and the overall level of practice towards CR as evidenced by the p-value above 0.050 across all age groups.

Table 4.43: Association between nurses' gender and level of practice (n=22)

Nurses' gender	The overall levels of practice			P-value
	Poor	Average	Good	
Male	0 (0.0%)	1 (50.0%)	1 (50.0%)	1.000
Female	1 (5.0%)	7 (35.0%)	12 (60.0%)	
N Valid cases	22			

Table 4.43 shows that there is no association between nurses' gender and the overall practice towards CR as indicated by the p-value above 0.050.

Table 4.44: Overall association between nurses' rank and level of practice (n=22)

Nurses' rank	The overall levels of practice			P-value
	Poor	Average	Good	
Enrolled nurse	0 (0.0%)	0 (0.0%)	2 (100.0%)	.360
Registered nurse	1 (5.9%)	8 (47.1%)	8 (47.1%)	
Senior registered nurse	0 (0.0%)	0 (0.0%)	3 (100.0%)	
N Valid cases	22			

Table 4.44 shows that there is no association between nurses' rank and the overall practice toward CR, as indicated by the p-value above 0.050 across all ranks.

Table 4.45: Overall association between nurses' educational level and level of practice (n=22)

Nurses' educational level	The overall levels of practice			p-value
	Poor	Average	Good	
Certificate in Nursing and Midwifery Science	0 (0.0%)	0 (0.0%)	2 (100.0%)	.500
Diploma in Nursing and Midwifery Science	0 (0.0%)	0 (0.0%)	3 (100.0%)	
Bachelor of Nursing Science Clinical (Honours)	1 (9.1%)	6 (54.5%)	4 (36.4%)	
PGD in Nursing Science	0 (0.0%)	2 (40.0%)	3 (60%)	
Master's degree	0 (0.0%)	0 (0.0%)	1 (0.0%)	
N Valid cases	22			

Table 4.45 shows no association between nurses' age and the overall level of attitudes towards cardiac rehabilitation, as indicated by the p-value above 0.050 across all educational levels.

Table 4.46: Overall association between nurses' years of experience and level of practice (n=22)

Nurses' years of experience	Overall level of practice			p-value
	Poor	Average	Good	
1 year	1 (14.3%)	2 (28.6%)	4 (57.1%)	.689
2 years	0 (0.0%)	2 (100.0%)	0 (0.0%)	
3 years	0 (0.0%)	2 (40.0%)	3 (60.0%)	
5 years	0 (0.0%)	0 (0.0%)	1 (100.0%)	
8 years	0 (0.0%)	0 (0.0%)	1 (100.0%)	
10 years	0 (0.0%)	1 (100.0%)	0 (0.0%)	
11 years	0 (0.0%)	0 (0.0%)	1 (100.0%)	
12 years	0 (0.0%)	1 (100.0%)	0 (0.0%)	
13 years	0 (0.0%)	0 (0.0%)	2 (100.0%)	
14 years	0 (0.0%)	0 (0.0%)	1 (100.0%)	
N Valid cases	22			

Table 4.46 indicates no association between the nurses' years of experience and the overall level of practice, as indicated by the p-value above 0.050 for all years of experience.

Table 4.47: Overall association between training related to cardiac conditions and practices towards cardiac rehabilitation (n=23)

Statement		Always	Seldom	Often	Never	Fishers Exact Test p-value
Training related to cardiac conditions on Medication compliance and side effects.	Yes	2 (33.3%)	0 (0.0%)	3 (50.0%)	1 (16.7%)	.041*
	No	12 (70.6%)	3 (17.6%)	2 (11.8%)	0 (0.0%)	
N of Valid Cases		23				

Table 4.47 indicates that there is an association between training related to cardiac conditions and practice as shown by the p-value of less than 0.050. This demonstrates substantiates poor practice among the nurses regarding training, with a p-value of 0.041.

Table 4.48: Overall association of training related to cardiac conditions and level of practices (n=22)

Training related to cardiac conditions	The overall levels of practices		P-value
	Yes	No	
Poor	0 (0.0%)	1 (5.9%)	1.000
Average	2 (40.0%)	6 (35.3%)	
Good	3 (60.0%)	10 (58.8%)	
N of Valid Cases	22		

Table 4.48 shows that there is no overall association between training related to cardiac conditions and practice, as indicated by the p-value above 0.050.

Table 4.49: Overall association between the type of cardiac training attended and nurses' practices of cardiac rehabilitation (n=5)

Type of training attended	The overall levels of practices		P-value
	Average	Good	
Cardiothoracic Nursing	2 (66.7%)	1 (33.3%)	1.000
Cardiovascular diseases	0 (0.0%)	1 (100.0%)	
INR Training	0 (0.0%)	1 (100%)	
N of Valid Cases	5 (100.0%)		

Table 4.49 shows no association between the specific type of cardiac training attended by nurses and the overall practice, as indicated by the p-value above 0.050. The next section presents the qualitative findings of the explanatory sequential mixed methods.

4.3 THE FINDINGS FROM OBJECTIVE 1.2: EXPLORATION AND DESCRIPTION OF THE CHALLENGES EXPERIENCED BY NURSES IN PROVIDING CARDIAC REHABILITATION OF PATIENTS AFTER HEART VALVE SURGERY

4.3.1 Introduction

This section presents the findings related to the challenges experienced by nurses regarding cardiac rehabilitation of patients after heart valve repair or replacement surgery. The qualitative data collection questions were derived from the key findings identified in the initial quantitative data results to explain the quantitative results through qualitative data.

The data analysis followed the eight steps of Tesch's coding process as described by Creswell and Clark (2014) as detailed in Chapter 3: Methodology. The data were transcribed, and coded resulting in two (2) themes and ten (11) subthemes.

Table 4.50: Themes and subthemes on challenges experienced by nurses in providing cardiac rehabilitation to patients after heart valve surgery

Themes	Sub-themes
4.3.1 Theme 1: Different challenges regarding the delivery of cardiac rehabilitation interventions for patients who had heart valve surgery.	4.3.1.1 Nurses experience language barriers when communicating interventions of cardiac rehabilitation to patients. 4.3.1.2 The economic status of patients and caregivers influences the provision of health information to both patients and caregivers. 4.3.1.3 Nurses perceive sex education as a taboo topic. 4.3.1.4 Ignorance of health information on cardiac rehabilitation by patients 4.3.1.5 Nurses lack the knowledge and skills required to provide cardiac rehabilitation to patients after cardiac surgery. 4.3.1.6 Inadequate resources hinder the facilitation of cardiac rehabilitation for patients. 4.3.1.7 Lack of interpersonal relationships among the nurses. 4.3.1.8 Unavailability of a standardized cardiac rehabilitation program to guide the

	rehabilitation of patients after cardiac surgery.
	4.3.1.9 Lack of involvement of the caregivers in cardiac rehabilitation by nurses.
4.3.2 Theme 2: Nurses' opinions and views regarding the importance of cardiac rehabilitation programme after heart valve surgery.	4.3.2.1 Nurses perceive the cardiac rehabilitation programme as an important intervention for patients who have had cardiac surgery.
	4.3.2.2 Recommendations from the nurse participants regarding the involvement of a multidisciplinary team in the cardiac rehabilitation programme.

4.3.2 Theme 1: Different challenges regarding the delivery of cardiac rehabilitation interventions to patients after heart valve surgery

The first theme that emerged from the nurses' interviews was related to various challenges in the delivery of CR interventions to patients after heart valve surgery. Additionally, some subthemes emerged from the qualitative findings that were not initially identified in the quantitative results but were considered important (Refer to Annexure K, for the data collection instrument). These subthemes namely socio-economic status, and interpersonal relationships among the healthcare professionals, were included in the research findings and discussions to contribute to the development of the educational (CRP) in Namibia.

4.3.2.1 Sub-theme 1: Nurses experience language barrier in communicating interventions of cardiac rehabilitation to the patients

This subtheme emerged from the interviews with nurses when they were asked about the challenges, they experienced regarding the delivery of CR interventions to patients after heart valve surgery. Some participants expressed concern regarding the language barrier which hinders the facilitation of CR for patients after heart valve surgery.

As reflected by the quotes from the participants:

“Language barrier especially for me. You know some patients cannot speak the national language- English. Namibia is a country with many tribes and languages, some people are still not privileged to have formal education. They only speak their native language, it is hard to pass a message to them if you do not speak their language”. “There is no one to translate” [N1; N2].

Similarly, other participants shared:

“What I see is the language, there poor Namibian and Angola people at the border are seen during outreach, and when they are brought here, now talking to them sometimes is a challenge, but we try even with sign languages or look for interpreter to come talk to them.” [N7, N8].

The findings highlighted the cultural differences between nurses and patients as well as low-level education as a hindrance to effective communication between the nurses and patients.

4.3.2.2 Sub-theme 2: The economic status of patients and caregivers influences the provision of health information to both patients and caregivers

This subtheme was not identified in the quantitative results but emerged during the qualitative data analysis. Some participants reported that almost all patients could not afford transportation expenses to come to the hospital for follow-up appointments, which made it a challenge for nurses to deliver cardiac rehabilitation. Consequently, some patients defaulted on their follow-up appointments and medications due to financial constraints. Additionally, some participants mentioned the difficulty of providing information to patients who did not adhere to prescribed instructions, especially dietary and medication compliance.

The participants expressed:

“My challenge is patients' social economic status because some of those things are good but to the patients is a challenge... you tell them they have to make sure that they go to the clinic for follow-up, but they don't have the means on how to get to the clinic..... [Aaaauuu].. So, one has to know when you are rehabilitating the patients... not just make sure you do this, and you do that, avoid these things...., don't eat this food, which sometimes is the only food that they have in the villages. So, it is very difficult for them to avoid them, because it is the only one they can afford. So, we need to have time to get to know the patients very well, if they have ... and able to afford that food.” [N1; N7].

Other participants explained:

“We have to consider their source of income, if they can afford, like every week to come to the clinic for rehabilitation. Sometimes, like the kids, the parents are working, we have to ask them which time fits them and the kids so that they will attend the program”. The other thing which I see is that for some patients it is very difficult for them to go for follow-ups or to the nearest clinic due to financial constraints. Some of them are quite far from the clinic, yes. Others we don't even see them at all even if they are told to come back, they are difficult to trace, so difficult, only very few and their contacts can be traced.” [N8; N3].

The findings indicate that socioeconomic status is a challenge that negatively affects the delivery of CR and compliance with activities for CR by the patients and their caregivers. Patients' socioeconomic status influences their responses to health information for cardiac rehabilitation.

4.3.2.3 Sub-theme 3: Perception of sex education by nurses as a taboo

This sub-theme emerged from the quantitative results, which indicated that only 8 (34.8%) had a positive attitude and felt comfortable talking to the patients and caregivers about sexual life experiences. Regarding practice, only 4(17.4%) showed good practice in providing sexual activity counselling to the patients after heart valve surgery. Most of the participants perceived talking about sexual activities with patients as taboo influenced by religions and cultures in Namibia.

One participant said:

“[Aaaa].... [shaking the head], No sexual activities, most of the time we don't really go into detail, and you know most patients also don't ask.... about.... [pause]you know in our culture [Laugh], is a bit of a taboo but you will find out some of the patients are free to ask... so, we tell the patients to wait with sexual activities. And if they ask, we tell them to wait until 6 weeks and see how it goes because your chest was open. So, they don't have to put pressure on their chest and so on..... some are free and those who are, aaaah...not free, they will not even ask about their sexual activities.” [N3].

Similarly, other participants verbalised:

“Hardly, [high voice] ... I should call it a 'Taboo' in our African culture to talk about sexual activities; No, not really, not with a heart valve, I never talk about it, I don't mention it, I don't..... [eeehh].... It is a sensitive topic and sometimes you are not comfortable, so we hardly talk about it but some of the patients may ask, and we guide them... according to what they want. [Aaaaa], like 6 weeks after and they can start with.... I guess just depends on the heart. So.... some heart is very so... you are enjoying, we don't want them to get into..... Even though you have to engage in sexual activities, hey you

have to start slow, take it slow, start slow don't remember the past day..., it might affect your heart and your bone.” [N1; N5].

Another participant expressed:

“[Auuuuu!] [laugh] sexual activities, is an interesting one because it has a religious, culture in it, and the age gap. At my age talking to somebody who is more mature.... I have to come down and ask... but transitioning adolescence for me is much easier because I give them options, I tell them what is better with what. I remember someone was talking about sexual things and the patient was like “No no no...no”!.....” I don't do those things.” [N2; N5; N7].

The findings revealed that talking about sexual activities was a taboo in some cultures and religions.

Some nurse participants mentioned that they routinely talk to patients regarding sexual activities including when to safely resume sexual activity after heart surgery and offering family planning advice including the choice of methods to use.

One participant added:

“Yes, ... with adults we are usually telling them depending on the wound, how the wound is, if the wound is healed nice or not..... It depends, yes on patient to patient. also [laugh]. Usually, what I'm telling them [laugh] maybe after 3 months or after 6 months it depends also.” [N9].

Another participant expressed:

“Eeeee... sexual activities.... eee... we advise them, is not a contraindication, but the person has to wait until completely healed, but we also advise the patients like the young ones those of childbearing age like women that it is

good to stay healthy than to engage in some sexual activities that will result in pregnancy, will cause later a problem in lives” [N6].

The findings indicate that nurses generally have reservations about discussing sexual activities with their patients after heart surgery, except when providing family planning advice to transitioning adolescents. They regard talking about sexual activities as taboo according to some religions and cultures in Namibia.

4.3.2.4 Sub-theme 4: Ignorance of health information on cardiac rehabilitation by patients

The respondents expressed their concerns about the ignorance of patients who do not take the health information for cardiac rehabilitation provided by healthcare providers seriously, nor adhere to the treatment regimen.

One participant highlighted that: *“From the patient’s side, it can also be that they are not serious with their sicknesses. The patients do not put more effort and making sure that they take care of themselves as they are supposed to be. Some patients don’t follow what they are being told at the hospital. Sometimes once they are operated on, they think everything is fixed, they don’t need to take their medication anymore. Sometimes they default or don’t show up for follow-ups. Some of them may come with other problems or may be have developed high blood pressure or their Warfarin is low meaning they are out of range, so they are prone to getting clots. Sometimes we might find some of them already come with a valve that has clots. Then they are admitted, and they have to go for another surgery which is supposed to be avoided by giving correct information and making sure that patients understand what they are supposed to do.” [N3].*

Another participant shared: *“When it comes to the medications, you give medication, for example, this one is Lasix and this one is Warfarin, and you take them like this and this. And the next day you are still going to explain to them again. When the time comes that the doctor must discharge the patient, then the patient is not comfortable to be discharged and also about taking their medications.”* Some patients will go to the village or to the farm with Warfarin that they got after discharge and then after discharge, they feel like they are better, and then they stop their medications. They come back with clots then is another issue.” [N10].

One participant shared her experience regarding the patient’s non-adherence to the medications:

“Medications, you know, some of these patients just happen to have this illness, let’s say RHD which was just picked up maybe a few months ago... all of the sudden put on medications now they have to take medications for the rest of their lives. So, some adhere to take medications as they are supposed to... so here we are just to give more education on how they should take their medications and how important is the medication, and that without the medications, their conditions can get worse.” [3].

The findings indicate the patients’ lack of awareness regarding the health information provided to them after discharge, and non-adherence to treatment regimen, potentially resulting in complications that could have been avoided if the information had been followed.

4.3.2.5 Sub-theme 5: Some nurses lack the knowledge and skills in the delivery of cardiac rehabilitation

Some participants expressed concerns about nurses' lack of knowledge and education to deliver CR to patients after heart surgery.

One participant shared: *"It is of course that staff has a knowledge deficit, because some of them are newly graduates; they don't know what is Warfarin, they don't know how important the medicine is for the patients."* [N1]

Other participants shared: *"The nurses are not equipped, because nurse A may be 100%, nurse B might only know 50% and nurse C might only know 25% of the information. So, I think health care workers must know the information about cardiac rehabilitation so that they are able to give such information back to the patients. Sometimes, it can be that maybe the information given is probably not enough for patients. So, we need to learn more to be able to. So, more needs to be done, and we need to be trained; also more rehabilitation to take place so that patients are prepared fully because there are times when a patient comes to you crying after an operation and you do not know why the patient is crying."* [N3; N6].

Some nurses do not provide information on International Normalised Ratio (INR) levels and Warfarin due to a knowledge deficit but instead refer patients to the Cardiac Clinic where there are registered nurses trained on International normalised ratio.

In this regard, a participant shared: *"Not me, [aauu].... We have nurses that are trained on Warfarin education, and they are at the Cardiac Clinic, and sometimes they are in the wards.... so, when it comes to that booklet, I always send the patients to the Cardiac Clinic... where they are so taught, they are informed about the booklet and how to deal with that booklet."* [N1].

Other participants shared: *“I personally also know how to do it... [eeh]... and not because I have been taught but out of curiosity; so, then when they come to the ward, they still do not have clarity and so you have to explain to them to get to know everyone has to know about it. The patients are seen by the sisters at the clinic and advise them Ja, the patients must also know the normal values of the INR results, and in which ranges their results are failing.” [N8; N2; N1].*

In summary, poor knowledge among nurses regarding INR and Warfarin education across all units of cardiac care reflects the lack of education in CR, as indicated in the demographic data of this study in the section of the quantitative results, as well as owing to the absence of a standardised cardiac programme as mentioned by the nurses during the interviews.

4.3.2.6 Sub-theme 6: Inadequate health services resources to facilitate cardiac rehabilitation

Most of the participants expressed concerns about inadequate resources for facilitating CR services for patients. These concerns included a lack of time, and space, staff shortages, committed participation of nurses in CR, lack of multidisciplinary approach to CR, medication shortages, and medication adherence.

One nurse participant said:

“Yes, number 1 is time, because we don’t get much time to spend with the patients to talk about cardiac rehabilitation. It is more of nursing care, the medications, and taking care of the wounds because when it comes to some of those rehabilitations, it should be an ongoing process, but most of the time, we wait until the last day, to tell them all this information which is too much about CR and too much for the patients to handle. So, I have seen that training about

Warfarin starts when the patient is about to be discharged. So, it means this should be an ongoing thing.... Because Warfarin training should be engraved in their minds that this is a pink tablet that I have to take for the rest of my life, but if they are told the last minute, they may not take it that seriously.” [N1].

Another participant shared:

“Ja, you know there is a need for time, we only have 1 day for example, 1 day which is Wednesday and that is the only day when we have time to give information on INR training to the patients before the patient is discharged. So, some other days we have other activities unless on the day that the patient is seen by that particular doctor for preparation. Otherwise, we only meet them after discharge and only on Wednesday, and then we do counselling. So, time limit, the time is limited because they are not the only ones who are operated; there are other patients waiting for us to give information, so this is like an overall clinic for the patients who are taking Warfarin with other conditions.” [N6].

The findings indicated that the nurses had a lack of time to provide health information to patients regarding cardiac rehabilitation.

Some nurse participants were concerned about the challenges related to the lack of space to deliver cardiac rehabilitation at the Cardiac Clinic.

The participants shared:

“The challenge that I have is that here at Central Hospital we don’t have enough space. There are 3 clinics once, usually 3 clinics you cannot really see... you are doing your best to differentiate between the children and the adults, sick babies, patients from the Prem Unit, and what.... But one (1) department for 3 times of the clinic services.... [Aaauu] And then the doctor is

sitting this side and who? What are the challenges we have; we do not have space....enough space. And even for surgery our wards are too small. So, we only perform surgery on certain days because we have only two rooms, and we have ICU sides only.” Yes, the space is a problem and there is no privacy.”
[N9; N6].

The findings revealed a lack of infrastructure for delivering CR services to patients after heart surgery.

Another challenge expressed by one participant was the lack of staff to deliver CR services at the clinic:

“The number of staff at the clinic is also another challenge because you will find it is only one staff and there are other activities and procedures that need to be done.” **[N6].**

Some participants experienced challenges related to medications being out of stock which could result in patients facing potential complications and requiring reoperation because of the unavailability of Warfarin and other antihypertensive drugs.

The participants explained:

“They will tell you maybe 2 weeks or after 1 month when they come for follow-ups: sister, we don’t have Warfarin, the Warfarin was out of stock. Patients cannot afford to buy the medications. Sometimes patients give a reason, they did not take their medications for 2 weeks because they didn’t have transport money to go and collect medication. Usually, Oshakati, Walvis Bay and Keetmanshoop those small places, not Windhoek, they don’t have certain medications like PEN VK and Carvedilol are also no stock. Then patients did not take Warfarin and later the valve would clot, and then we must do another

surgery which is another problem again. So, it doesn't help we are giving patients prescriptions but some of the tablets are not there.”[N9; N6; N3].

Another participant explained:

“Sometimes it is not their fault, sometimes at the pharmacy, there are no medications. Sometimes they might even come to the unit and say sister: please I was at the pharmacy, asking for such medications, and they say there is nothing. We give if we have, then we give them the little we have for them to take to continue with their medications.” [N3].

The findings from the participants indicate limited facilities for CR and that some medications are always out of stock, which affects the provision of effective cardiac rehabilitation. In addition to inadequate resources, the lack of interpersonal relationships among nurses in delivering CR was also mentioned.

4.3.2.7 Sub-theme 7: Lack of interpersonal relationship among the nurses in the delivery of cardiac rehabilitation

This sub-theme was not identified in the quantitative results but emerged from the qualitative data and was found to be a critically important aspect that requires attention. Some participants expressed concern about certain nurses who do not actively participate in the CR of patients after heart valve surgery.

One participant has this to say:

“Some of the people don't do it. Even though we are supposed to rehabilitate our patients, they are not involved, they don't want to involve themselves to do so which is quite wrong. You will find there are 1 or 2 nurses who are outside and do not want to work as a team. None of us is trained, but I think we are just empathetic. If, all of us get involved, irrespectively of who we are, not just waiting for a social worker. Ja, teamwork is not there somehow.” [N8].

Another participant expressed:

“The challenge that I have at our clinic, not all the nurses are committed really in what we are actually doing. Some nurses don’t even care about the patients. So, nurses should really be committed to patient care and information, not only certain staff, but all the staff should get involved to patient care.” [N9].

Another participant said:

“I think is just the effort of the whole team, like no one is really pushing; no one is making sure that the patients are informed, that they got all the information they deserve to have. I think we are just reluctant, otherwise, we have all the resources. We don’t really put more effort as it is supposed to be.” [N4].

In addition to nurses’ reluctance to provide CR to patients, the lack of standardised CRP poses challenges for nurses in providing cardiac rehabilitation services.

4.3.2.8 Sub-theme 8: Unavailable standardized cardiac rehabilitation program to guide the rehabilitation of patients after cardiac surgery

Some participants expressed their concerns regarding the unavailability of a cardiac rehabilitation programme.

The participant remarked:

“Rehabilitation not..., unless, it has come yesterday, not really. There is no structure like that in place in which you are supposed to do or follow...so. There is not something that is stipulated that we have to do to every patient.” [N1].

Another participant said:

[“Mmmmhh!”] So, we don’t really have a program for Cardiac rehabilitation. I have been in Cardiac Unit for a few years now, more than 5 to 7 years, aa.... there is

no such a programme in a Cardiac Unit. We don't have a programme that is standing as a cardiac rehabilitation program whereby patients have to come back after an operation. What we do is just to give patients information regarding their valves and heart valve surgery.” [N3; N7].

In summary, the findings from the participant nurses indicate that CR is non-existent at the Cardiac Clinic and Cardiac Unit, which is important for the recovery of patients after heart valve surgery.

4.3.2.9 Sub-theme 9: Lack of involvement of the caregivers in cardiac rehabilitation by nurses

The lack of involvement of caregivers in the cardiac rehabilitation of their loved ones by nurses was also identified during the quantitative data results. Nurses were only focused on the patients, except when a patient was a minor or mentally disabled, in which case the caregivers would be involved in the cardiac rehabilitation programme.

One participant shared:

“The caregiver, that will depend on the patients. Uuuuh! about that we somehow fail them, we only include caregivers if patients are young and old and those who are not mentally wise, partly dependent, and cannot take care of themselves, they need a second person; but if this patient is independent and understanding, we just assume that they are fine. So, we call them if the patient is a minor when they are admitted and discharged. They are being spoken to, and they are being told this and that from now on, the child will have these medications. And you have to give this medication according to how it is prescribed. And if the child is not feeling well or whatever, bring her to the nearest hospital is being told. But if a person understands everything like me, normally there is no need for a caregiver unless we interview them or in our

interaction, we see this person will need a second person to be there for him or her. Then we ask if there is a caregiver to come and give information.”
[N1; N3; N4].

Other participants shared:

Hi, hi..... but we include caretakers be when you struggle with the language barrier or mental abilities then you can say you need relatives or we see the social workers; or when we see where this patient stays will he be able to take his medications? Is he/she able to do a follow-up? Is only when we include caregivers and we focus on how to take care of them.” **[N4; N1; N5].**

The findings revealed that the majority of the nurses do not involve caregivers in the rehabilitation of their loved ones, however, provide limited information.

Although some nurses do not involve caregivers in the patients’ information about CR, some nurses have the following to say regarding the involvement of caregivers:

Furthermore, one participant providing care at the Cardiac Clinic shared:

“Most of the time, the caregivers take part initially preoperatively; they are being counselled together; that part of counselling is done by the doctor just what are they expecting, what they are going to do about that operation, the patient expectations after operation and then [pause], for example, that information about Warfarin are included in the pre-op.... that’s why the family, the caretakers get involved...[eeee] but after discharge, most of the patients are adults. They usually come on their own, but it is only like for the small children they are accompanied by their mother/caregivers.” **[N6].**

One participant said:

“With the family members mostly when it comes to Warfarin, we always call in a second member, sometimes patient might not listen. They are there, but the patient is not listening to what you are saying, so there should be a family member that also listens to this so that when they go home when the patient misses e.g. diet, then the family member can come in e.g.: then remember the sister said, you cannot eat A B C and D.... And we also make sure when our patients are discharged from the High Care, we also call family members, we just do not let them go alone. anything about the wound if it is bleeding or oozing where can they go, the medications especially with the mothers how to give the baby medications, also family members how to give the patient medications or how to remind the patients”. “We tell them about the wound care if there is a wound, when can they go to the clinic.” [N10].

The findings reflected that there is less involvement of caregivers in CR by nurses. Nurses only involve caregivers in the CRP when patients are minors or mentally disabled. Furthermore, the findings revealed that only some nurse participants especially staff members at the Cardiac Clinic involve caregivers in the CR of their patients after surgery.

In summary, this theme presented the different challenges experienced by the nurses regarding CR, such as language barriers, economic constraints, perception of sexual activities as a taboo, ignorance of patients on health information, nurses' lack of knowledge, lack of interpersonal relationships among health care providers, inadequate resources, unavailability of CRP as well as lack of involvement of the caregivers in CR by the nurses.

4.3.3 Theme 2: Nurses' opinions or views regarding the importance of rehabilitation program after heart valve surgery

The second theme that emerged from the nurses' interview relates to the importance of CR interventions after cardiac surgery. This theme is supported by the subthemes pertaining to nurses regarding the CRP as an important intervention for patients after HVS and the recommendations from the nurse participants of the involvement of a multidisciplinary team in the cardiac rehabilitation programme.

4.3.3.1 Sub-theme 1: Nurses perceive the cardiac rehabilitation program as an important intervention for patients who had heart valve surgery

This sub-theme emerged as a response to the quantitative results where nurse respondents showed an average level of practice regarding CR for patients after heart valve surgery. Almost all the participants shared different views and opinions regarding the significance of CR services during the recovery of patients, including support for caregivers. Some participants indicated that a CRP should be available, with standard operational procedures in place for all cardiac patients, as most patients have suffered for a long time due to cardiac conditions.

Two participants said:

“Yes, I’ll say 100% it is important for the patients to have a CR whereby if patients are discharged, they can always come back for rehabilitation, or ask questions where they did not understand, or they can do some exercises. So, I think we need to have a program for CR. It will do good to our patients as well as their caretakers. It is also important because the patients have to go back to their normal lives as they used to live before.” [N3; N8].

Other participants emphasized:

“It is very important, very important, and it is very necessary, and I wish they could have like, standard operational procedures put in place which indicates what is supposed to be in place for every patient, and every patient should be told about this, so it is very important.... because most of the patients are lost. Most of the patients don’t really have the information after surgery. They tend to go home and do the activities which they used to do before, which can affect their recovery. Some of them usually came back with infection, or the chest has opened up” [N1; N2].

Another participant added:

“I think in my opinion it is very important, I know that we were not doing much, but I wish we could have a rehabilitation program set up apart specifically for these patients. Because these patients have gone through this heart problem for a long time. I hope the government can in the future set up rehabilitation centres not only for Mitral valve replacement but for cardiac patients at large. If we have the rehabilitation centre, it will speed up their recovery and they will cope and give back to society as productive citizens. [N7].

The findings indicate that almost all the participants expressed the importance of CR for the recovery of patients after heart surgery. Participants recommended that CR should be readily available, allowing both patients and their caregivers to attend rehabilitation sessions after discharge from the hospital.

4.3.3.2 Sub-theme 2: Recommendations from the nurse participants of the involvement of a multidisciplinary team in the cardiac rehabilitation programme

Some participants highlighted the need for a multidisciplinary team to deliver the cardiac rehabilitation programme. The participants shared their experiences of lack or the absence of other members of the multidisciplinary team, such as pharmacists, physiotherapists, and social workers, who could participate in facilitating the CR of patients after heart valve surgery.

One participant described:

“Cardiac rehabilitation is a multidisciplinary service whereby each and every HCW, like doctors, nurses, psychologists, social workers and pharmacists have to participate so that we can give holistic information, so it will be a holistic approach..... whereby no one will be left out so every part will be touched by the experts. It is not only me as a nurse; it is a joint, from the doctor to the social worker to the nurse. Because sometimes we even struggle to get physiotherapists to come to see patients; Maybe, now that UNAM is training the physiotherapists, hopefully it will be a benefit for us... to have our own physiotherapist dedicated to cardiac patients... hopefully. There will be also...., a Rehabilitation programme is needed... we really need physiotherapists.” [N3].

Another participant shared:

“I also want to say we also need a pharmacist only for cardiac. Just like the ARV clinic has own pharmacy, so we need a pharmacy for cardiac patients that issues treatment from Monday to Friday so that they can understand us. So that when we are saying no stock, or whatever, they can get their stock from

wherever. Because it doesn't help, we are giving prescription, but some tablets are not there.” [N9].

Another participant echoed the need for social worker services:

“Uuuuu! I think it is just about these patients, I think they all need social workers, someone to take care of them even before but here we only refer them when we see funny things. I think it needs to be made a routine for social workers counselling cardiac patients. It should be part of the pre-and post-operative care.” [N4].

The nurse participants recommended other specialists of a multidisciplinary team to get involved in the CR of the patients namely: Pharmacists, physiotherapists, and social workers, who seemed not actively involved in the cardiac rehabilitation programme.

In summary, the last theme presented the nurses' views and opinions regarding the importance of cardiac rehabilitation. Nurses perceived the CRP as an important intervention for patients after heart valve surgery. They also recommended a multidisciplinary approach to facilitate cardiac rehabilitation.

4.4 THE FINDINGS FROM OBJECTIVE 1.3: EXPLORATION AND DESCRIPTION OF PATIENTS' EXPERIENCE OF RECOVERY AND COPING AFTER HEART VALVE REPAIR OR REPLACEMENT SURGERY

This section presents the findings from patients regarding their experiences of recovery and coping after heart valve repair or replacement surgery. Two (2) themes and nine (9) subthemes emerged accounts of which are presented in Table 4.51.

Table 4.51: Themes and subthemes on the experience of patients in recovery and coping after heart valve surgery

Themes	Subthemes
4.4.1 Theme 1: Different experiences of patients regarding recovery and coping after heart valve surgery.	Emotionally and Psychologically: 4.4.1.1 Patients have mixed feelings about the operation/procedure and its outcome. Socially: 4.4.1.2 Patients experience a loss of social roles. 4.4.1.3 Patients lack the knowledge of self-care that is essential to enhance recovery. Physically: 4.4.1.4 The procedure negatively impacted on daily activities of living. 4.4.1.5 Patients experience contentment with the outcome of the procedure.
4.4.2 Theme 2: Different experiences of the patients regarding support and care from nurses and family members after heart valve surgery.	4.4.2.1 Patients appreciate good support from the nurses. 4.4.2.2 Patients expressed disappointment due to a lack of support from nurses. 4.4.2.3 Patients appreciate support from family members. 4.4.2.4 Overprotective family members due to a lack of knowledge regarding cardiac rehabilitation.

4.4.1 Theme 1: Different experiences of patients regarding the recovery and coping after heart valve surgery

The first theme that emerged was about the different experiences of patients regarding recovery and coping after heart valve surgery.

4.4.1.1 Sub-theme 1: Patients have mixed feelings about the operation/procedure and outcome

The participants displayed mixed feelings about the procedure and outcomes, characterised by their experiences of delays and cancellations of the operations, feelings of fear and worry about the outcome of the operation, disappointment after surgery, and embarrassment over the scar, as well as disturbances caused by the sound of the valve.

Some participants experienced disappointment due to delays and cancellations of surgery, as evident from the following quotes by the participants.

Some participants expressed the following:

When I was told that I was going for an operation in January 2016, I was scared, but what scared me was that I was cancelled three times; for the first time I started with nose bleeding, and the operation was cancelled. The second time, I had a swollen body then cancelled also; the third time electricity power went off, and I went for an operation the fourth time, I spent three days in ICU after the operation, I spent three (3) months in the hospital.” [HVP8; HVP3].

Another participant expressed the feeling of not being ready for surgery and hoped for the Almighty Lord to heal her. The participant had this to say:

“It wasn’t easy for me, so they called me to come in, I told them I wasn’t ready because these things caught me ‘God’ I was still hoping for a miracle somehow and the thing is my baby was 1 month old. The third time they called for surgery, I told them I was not ready and they told me again that there were other patients. Then the doctor said no, we understand that you are not ready

but there are patients also on the list. By the time you are ready, there might be no open space for you.” [HVP11].

The findings from the participants indicated concerns about the delays and cancellations of operations mainly due to a lack of resources, including non-functional electricity in the theatre to perform surgery, and patients who were not emotionally ready for the surgery.

The majority of the participants indicated that they feared and worried regarding the operation process and the outcome of the operation.

For instance, some participants expressed:

“When I was told I was going to be operated on, I was very scared, because I had never seen or been operated, and I never heard of such disease. I was so scared I couldn’t even smile at everyone [laughs, was so scared [laughing], I thought I wouldn’t [Aauuu].... live again, I thought I’d die. I was scared because it was for the first time that I was getting that stuff; I was very scared; I didn’t know what to do, or where to go; I was so scared; I was frustrated to get it because I hadn’t experienced that before.” [HVP7; HVP4].

Other participants have similar expressions:

“I almost quit, I [laughs], I always cry [laughs] I was afraid because like, I’ll go for good... because the time when I was still waiting to get to the theatre also there was this other patient I left who passed away, Ja, I was scared also. It affected me; I could not sleep; I was thinking about the wound; so are they going to cut with the panga or what are they going to use now I imagine I do not have a wound, I was trying to imagine the body with a wound.” [HVP8; HVP10].

The participants further expressed negative thoughts about the effects of the operation and life-long treatment on their future. In this regard, the participants expressed their disappointment as indicated below.

Two participants shared:

“It is difficult for me sometimes when I just used to think out, taking medications for the rest of my life and things sometimes don’t go well [pause]. Like for now, things are not okay, [shaking his head] like my friends, sometimes, the condition that I’m in let me say sometimes to stress because. I’m always at the hospital, now and then. I’m afraid of being paralysed because I heard I can be paralysed. I’m afraid, I’m stressed. Stress is the one that is killing me now [pausing]. My INR used to drop like 1 point something they always used to say is not normal because I used to take long and again then again is too high for me but still is very low, my INR is low very low.” [HVP10; HVP1].

Another participant expressed:

“I have those feelings like neeh.... [pause] anything can happen anytime. So, again, I was afraid to commit myself or even at church if they were having a braai, looking for people who could help. I’m afraid to commit myself even like you know, what if all a sudden I feel you know those things. I was just thinking anything could happen anytime; those things I was battling with really. I have a constant fear that anything can happen. I’m afraid because you never know what happens but I’m overcoming that fear even when I wake up and I see I have a headache, I just try to be alone not trying to call anyone. At the moment, that is what I’m facing and is what I’m working towards that.” [HVP11].

The findings indicated that patients who were on anticoagulants (Vitamin K antagonists) such as Warfarin were anxious about their International Normalised Ratio (INR), which was unstable. One participant feared and was worried about dying.

Some participants expressed disappointments after surgery related to: slow recovery and feeling sicker than before, experiencing symptoms such as vomiting, chest pains, and weight loss and having to take medications for the rest of their lives.

For example, one participant expressed:

“My experience with recovery was not really good, things were going very slow after surgery, I think after 3 weeks after surgery, I started feeling ill again like started vomiting while I was at home and started feeling pain in my chest and so on... So when I went to the hospital, I was admitted for 2 days, they kept me... They were observing me and they changed the doses of my medications... I was discharged, and again I think a month after that, I fell ill, all the pain, some pain like on my shoulders, on my back and again in my chest but the worst thing was the pain in my chest because it felt like I want to burst neeh....”
[HVP11].

Some participants expressed:

“From the hospital, I could not sleep on the side; I was having problems with eating. I could not eat anything, anything even if they brought me food, I don’t know what was wrong; sometimes when I force myself, I throw out.” When I went home, I started again. You know, the devil is a liar, I wasn’t born with a heart problem. Now I started getting weak and weak, then I changed from one side of the operation to another side, it is like a knife that’s between my neck and when I went to the clinic, I thought maybe the combination of the medicines

because they were a lot. I was very pale, my hands were pale, I did not have energy then they gave me antibiotics. [HVP3; HVP12].

The findings from the participants indicate their suffering after surgery, expressing that they don't feel better even after heart surgery.

Some participants expressed feelings of embarrassment because of the scar on their chest.

Some participants exemplified the intensity of their feelings by saying:

"Sometimes I'm not comfortable emotionally like I cannot put on any top I want because of the scar, pain and burning also. I don't feel okay because of the scar. I don't like people to see my chest, they are going to talk, aaa... talk many things." [HVP3; HVP5; HVP8].

Another participant expressed:

"Eeeee! The scar! The scar! [Shaking her head] I'm really uncomfortable about it; I don't want people to see it; I want to cover it all the time; Like now I even told my husband, you know I have to change my wardrobe; now I have to buy new clothes because I must go look for clothes that are covering the scar[pause]. Ja, so we were having something neeh and then I went to this tailor, I know her, and then I wanted her to make me a dress, but now when I told her about the design of the dress, she proposes one is like a book tube neeh!.. and I told my tailor I don't want the book tube, lift it up until it covers the scar; she told me no, but why are you covering the scar, you don't need to be ashamed of this medical condition. But I'm telling myself I'm not comfortable." [HVP11].

One participant expressed disappointment about losing weight and said the following:

“I have been like even lost my confidence level where I’m like just that dropped because I lost a lot of weight; I wasn’t looking good so even when people go to town or ask me to go or go somewhere, I just did not want to go because of how people will look at me. I didn’t feel I was looking good. I was also really emotional because why all those happen; I was wondering it really happen to me, why what happened, it really happened?” [HVP11].

The findings indicate that most of the participants expressed emotional disturbances and embarrassment due to the scar from the sternotomy, which was psychologically stressful for some patients.

Some participants expressed embarrassment and disturbances because of the sound of the mechanical replacement valve. The extent of disappointments after surgery was apparent in the different ways the participants shared in their narratives.

The following is a statement from one participant:

“That sound really sounds like a watch, I feel, I heard like I’m wearing a watch in my heart [laughing]; when maybe I’m quiet, and I’m alone for a time being, when it makes that sound it disturbs me.” [HVP 4].

Another participant added:

“My experience with the valve: it was making much sound at first, I couldn’t cope with it because it was too high [auuuuuuu]... because the sound is ever high, disturbing me, I feel like not sleeping well, because whenever I’m sleeping, I can just hear crickcrickrikkkkk, soo high and also when I’m laughing [pointing on the chest]. Ja, for the first time other patients were

complaining. They were like, whenever I enter the room, then when I keep quiet, they can now hear crickcrick and they will ask what is that? I say, ... I don't say anything... because I don't wanna be asked many questions."
[HVP7].

Another participant said:

"At the beginning yes, ja, it was disturbing me.... I even asked the nurses what they put on me that... why they put me that valve they didn't ask me and then they were like... they didn't tell me. I was just... hearing the sound, then I asked: so, you left something inside me and what it is? Ja, it is even irritating me, when I'm even sleeping just lying down, and thinking just irritating me. I don't want to hear that sound. And later they told me, don't worry you will be fine, you will get used to it." **[HVP9].**

The findings indicated that the participants experienced disturbances as a result of the sound of the mechanical valve. In addition to emotional disturbances, participants experienced a loss of social role following cardiac surgery.

4.4.1.2 Sub-theme 2: Participants experience loss of social role

The participants expressed dissatisfaction as they could not participate in any social activities or social contact like sports and athletics after cardiac surgery. The majority expressed disappointment over role changes.

In this regard, one participant verbalised the following:

"I have a complaint like why I got this first to be operated. I didn't want to be operated on, the effect is sometimes you want to do something, but you can't do it because of your condition." **[HVP9].**

Another participant expressed the same disappointment over the limitation on social activities after surgery.

In this regard, the participants stated that:

“After surgery, I was told not to do heavy weight, not to do sport because whenever I do sport, if I got injured because I was given that Warfarin, auu... apparently if I got injured or some cut on my body, I might bleed much. [pause]. And I was told not to carry heavy things because auu... of my chest because auu.. the wound was, ja was still fresh. I’m so disappointed because I loved athletics, I love playing netball but now I can’t do all these....” [HVP7; HVP1].

Echoing the above statement, one participant further expressed that:

“It affected me very much, I don’t do sports anymore, I don’t dance anymore, I don’t lift things anymore, it affected me so much. I was going gyming now I don’t gym anymore. I don’t do stuff like that; I don’t do funnies like other kids. I feel very bad because I was doing that stuff, now. I’m not doing the stuff; I don’t run around like my friends; I don’t even play soccer anymore.” [HVP4].

Another participant expressed her emotions on roles and responsibilities by saying:

“I’m a wife, I’m a mother.... I’m, ja, those roles were affected. When I started feeling ill, my daughter hadn’t even turned a month yet, it was like 3 days since she was supposed to turn a month. I was missing her; I couldn’t be there for her when I was in the hospital. I was in the hospital for a month and a week when I first went in for surgery... so we have to take her off from the breast... stop breastfeeding her, first I was losing weight, and I didn’t have strength.” [HVP11].

The findings from the participants indicated that they were disappointed with the limitations on social activities because of the potential for injuries and bleeding as a result of the anticoagulants they were taking. They were also concerned about limitations on social activities due to heart surgery.

4.4.1.3 Sub-theme 3: Patient lacks the knowledge for self-care that is essential to enhance recovery

The participants experienced a lack of knowledge regarding self-care, adapting, and coping after surgery.

One participant said:

“I did nothing, just staying at home but sometimes if I try to do some exercises, I’ll just feel pain.” [HVP2].

The participants shared:

“When I was done with the operation, I was lifting heavy stuff, and when I came to the clinic, they told me noonooo... [shaking the head], this is wrong, and this is wrong. For me to recover, I was just walking around even for an hour; I used to take a long distance.” [HVP10; HVP4].

Another participant expressed:

“I was telling myself how to breathe with one nose to get the oxygen. I google how can I keep my breath; I have to go outside of the house, sit there for 15 minutes whatever, also I have to do exercise every morning and afternoon. Like walking two (2) kilometres or to walk or the stairs, because you want your heart to keep pumping.” [HVP1].

The findings indicated a lack of knowledge on self-care among the participants, as they demonstrated little knowledge about what to avoid for recovery how the physical activities should be performed, and for how long.

4.4.1.4 Sub-themes 4: The procedure impacted negatively on daily activities of living

The participants stated that they experienced pain postoperatively. Some participants experienced pain within 24 hours of surgery, while for others, the pain continued after discharge from the hospital.

In this regard, participants had the following to say:

“I experienced a lot of pain because by that time when I was not yet operated on, I was having a serious problem, breathing was the problem. Also, after the operation it affected me, I feel like before.” [HVP10].

Some participants experienced pain after discharge from the hospital and said:

“When I got discharged [pause] from the hospital, I was not really recovered from the wound; The wound was very painful, because of some wires, the wires were paining. it was having some pain where I could not, walk even for a kilometre. I cannot bend down like that.... When I was trying to speak now, it was very hard because I only say a few words, and some of them I’m sticking with them and I was not able to laugh... for me, it was just to smile. “It was painful, because of some wires. Ja, I could not do some stuff on my own, I have to call in my cousin to help me with the work and with the cooking.” [HVP7; HVP3; HVP1].

Other participants expressed:

“What I was doing before, affected me, because whenever I want to do

something, I have to limit myself because of the operation...

like pounding or stamping Mahangu, fetching water. No heavy lifting, I must not be involved in sports.” I cannot clean the house, and also, I cannot walk long distances. To carry heavy things like 5kg or 10 kg, I cannot carry those things.” “I did not do anything, I was just at home, I had pain.” [HVP1;

HVP3; HVP2].

The majority of the participants expressed disappointment over role changes, owing to pain and restrictions after heart valve surgery. Most participants indicated that they were unable to perform their roles, suffering weakness, and were struggling to resume normal activities.

Some indicated that they suffered financially; they were breadwinners and could not take care of their family members due to the outcomes of the operation.

One participant expressed:

“After operation [pause], things which affect me is that you know I was working as a mine worker but now I’m just still at home. Ja, because that job I was doing I can’t do anymore, because it costs power. Ja, you know even in my family, I was the one who was getting bread on the table, so like now, the families are suffering, even my mother is old, I was the one who had responsibilities to help so and so.” [HVP2].

Similarly, another participant expressed that:

“The operation has affected my role, especially my job. Ja because I don’t have enough experience of work, I know only of...., I’m a driver and I was driving long distances like from Namibia to South Africa, but now I cannot, no longer able to drive such a long distance, I’m not happy about that.” [HVP8].

Another participant expressed her concern about role responsibilities by saying:

“I’m a wife, I couldn’t cook for my husband. He has to come from work and cook and he has to do his own laundry and iron his clothes. Those are roles which I could not do, and it makes me feel not useful. You feel you are a burden than anything. I lost my job because, at work, they couldn’t wait for me for such a long time. I’m not working, I’m just trying to do business here and there selling stuff.” [HVP11].

The findings highlighted the negative effect of cardiac surgery on participants’ roles, including the performance of household chores such as food preparation and laundry. In addition to the concerns about the loss of social roles, the participants echoed their hope for good health thanks to Cardiac surgery.

4.4.1.5 Sub-themes 5: Patient experiences contentment with the outcome of the procedure

Irrespective of submissions on the perceived negative impact of the surgery, some participants nevertheless displayed contentment with the outcomes of heart valve surgery as reflected by hopeful quotes from the participants.

The participants have this to share:

“I was not even scared because I was just saying thanks maybe I’ll be fine because I was like I’m tired of the sickness every time you are just paining, paining and bleeding, then at school every time you don’t enjoy your school anymore like before then, I just said I’m waiting for my operation, I’m ready for it. I just felt happy because, maybe after the operation, I’ll get better. Because everything is just coming from God, so I understand, then I have that hope that I’ll recover and then maybe after 3 years or after 4 years. But first thing I know I have to put God first... Because He is my protector, my strength.

I could not live without Him. Because everything is just coming from God, so I understand, then I have that hope that I'll recover and then maybe after 3 years or after 4 years." [HVP9; HVP2; HVP12].

The participants shared:

"But at first, I was told I'll not be able to do everything for myself, but later, I was surprised that I was still at the hospital I recovered, I was walking and like doing my own things, then I was- like... I can do everything. For example, I can wash my clothes, I can cook for myself. Ja, I can take care of my garden, everything in the house I can do, although not lifting heavy things. I'm through with all that, now I'm free, I don't faint, and stuff. Now I don't have the stuff to complain anymore. I don't have issues and it was like my experience was I thank the doctors for operating me." [HVP4; HVP10].

Other participants echoed:

"My thoughts about the future, I want to study, I want to go first to school [pause] to study especially for people with heart problems. I really want to help them because it is something that I have experience with, how it feels like to be operated.... I want to help the next people. I want to become a nurse also. "Ja, I really trust and hope that I'm going to have that full life again. Ja, I don't want to be limited for the rest of my life. I want to live my life to the fullest. I want to continue with my studies because before I fell ill, I actually applied for a Diploma in counselling; Ja, so I want to reapply and ja, let's see how the future holds." [HVP3; HVP5; HVP11].

In conclusion, participants optimistically said:

“My thoughts about the future, me, I [pause] I don’t wanna like to give up for my future because I’m suffering for this sickness. I really trust and hope that I’m going to have that full life again. I want auu... to complete all my studies and also my university things so that I become someone in future who is able to assist other people who do suffer from the disease like me. Also, to motivate them not to give up on their future, because this sickness is not really a sickness that can make you not do your future plans, and also to do things which you are able to do, you are able to go to school aa.... what is needed for you is to go for your follow-ups, you have much time to do your things. For me, my future is I want to be a pharmacist.” [HVP3; HVP7; HVP11].

The findings indicate that the majority of the participants have a positive attitude toward the outcomes of the surgery and are optimistic about their future. They demonstrated faith in the Lord to get better, recover from the operation, and continue with normal lives.

In summary, this theme presented the different experiences of patients regarding recovery and coping after heart valve surgery. The findings revealed patients' mixed feelings about the operation outcomes, loss of social role, lack of knowledge of self-care, contentment with the outcome of the procedure, and the negative impacts of the procedures on the daily activities of living.

4.4.2 Theme 2: Different experiences regarding support and care from nurses and family members after heart valve surgery

Most of the participants expressed their appreciation and gratitude for the support and care they received from healthcare providers in the form of spiritual advice, health information, and counselling. Participants shared different experiences regarding support and care from nurses and family members, as substantiated by the following subthemes.

4.4.2.1 Sub-theme 1: Patient appreciates good support from nurses

This sub-theme also emerged in the quantitative results, where both positive and negative responses were identified from the nurses' responses regarding support to patients. The extent of support and care received from the nurses is shared by the participants.

The participants have this to share:

“The nurses told me not to worry and that I would recover, and they told me to take responsibility of my tablets. They showed me the right ways; they showed me how to take care of myself; they told me not to drink other tablets, I should just drink the tablets that they had given me. They also told me if I experience any bleeding, I must go to the clinic as soon as possible. They told me I must control my diet and cut on salt. They also tell me some food that I cannot eat like, cabbage, spinach, aaa... the liver ... our traditional beers; they say those things if I eat them, they just give me a lot of ... they are just having powers, then my heart will not be pumping. They told me not to gym, not to play soccer, they told me not to play hands with either person, but to walk around. They told me not to get angry because if I get angry, I'll faint. They also helped me whenever I was coming for my... follow-up... ja.. they always

make sure that they call me to come for my follow-up. If I don't come for follow-up, they ask me the reason why I don't come for follow-ups. And they ask me how I feel if I'm fine or I have some sickness or having any other problem."

[HVP2; HVP3; HVP4; HVP7; HVP12].

Other participants expressed appreciation for the nurses through their form of faith and belief in God as follows:

"So, I'm happy with the nurses; the nurses have been advising me, giving me encouragement, to trust in God for my recovery and that I should not doubt, now I have started going to church. I just want to thank our doctors who helped me out with my disease of the heart; I thought I was going to die but I'm healed. Just want to say God Bless them." **[HVP8; HVP5].**

Another participant asserted:

"Ah! The nurses really at Windhoek Central Hospital Cardiac ward are the best nurses and best doctors. They are really kind, giving me hope, you should take things slow, things gonna be okay. Taking your medications, the food you should eat, and doing exercises, were really helpful. You must walk, you must exercise, you must not sleep a lot, you must not be lying down for so long, that is the way you will get better. I really appreciate the doctors, and the whole of the cardiac team that have been there for me before surgery, after surgery and during recovery. They gave me the telephone number of the ward I can call anytime." **[HVP11].**

The findings indicated the support patients received from healthcare providers in the form of health information about self-care, and having faith and belief in the Lord

while recovering at home. However, some patients expressed disappointment about the lack of support from nurses.

4.4.2.2 Sub-theme 2: Patients expressed disappointment due to lack of support from the nurses

Despite the appreciation of support and care from the nurses, some participants raised concerns about not receiving enough information and support from the nurses regarding the care after heart valve surgery. However, in the quantitative results, the nurses indicated that they support the patients after heart valve surgery.

One of the participants said:

“Nothing, oh! They just told me I should just exercising aa.... and eat a lot of vegetables and not oily things. I was eating broccoli, spinach, fruits, apples, oranges and all those.” [HVP10].

When probing the participant about whether they knew that spinach affects his health, the participant responded as follows:

I don't know but... I always see that my INR is not okay, not normal” [HVP10].

Another participant expressed: *“You know people are not the same, you find the rude ones and the nice ones, you just see the difference, whenever the person is coming to approach you. They only gave me medicine the rest you take care of yourself.” [HVP 12].*

From the information given by the participants, it seems conflicting or ambiguous information is provided to the patients regarding recovery from cardiac surgery. Even those participants who indicated that they have received support and care from the nurses, mentioned a lack of information on reasons for diet, on the support and care,

and a lack of information on counselling. The findings suggest that nurses lack correct information for cardiac rehabilitation.

4.4.2.3 Sub-themes 3: Patient appreciates supportive family

Most of the participants appreciated the support and care received from their family members during their recovery after heart valve surgery. In this regard the participants remarked on the support and care they received from their family members.

The participants shared:

“My family take good care of me; They gave me full support, take good care of me. They didn’t abandon me, they were always on my side. They understood my situation anyway. If I needed help, my family helped me with my child like buying her schoolbooks; my family always coming to visit me; sometimes when I didn’t have food in my house, they would buy for me, make sure that I have something- balance food to eat, and making sure there is taxi money for me to go to the hospital. My partner makes sure that I take my medications on time. They gave me word of hope, helping me with household chores; they washed my clothes and cleaned my room. My son would fetch water for me. They make sure that I don’t do that heavy work. When I went back home, they made sure that I stayed in a clean place, my medications were kept safe and always ate proper fresh food, not rotten”. [HVP2; HVP3; HVP7; HVP10].

Other participants shared:

“My mother was very happy to see me recovering; she didn’t expect me to recover. They always encourage me to be serious with my tablets, to go for my follow-ups and to ask for money if I don’t have. They were like scared to lose me. Every time they would repeatedly say take your medication, take your

medication. Every time they were showing love. So, I feel loved.” [HVP3; HVP4; HVP5; HVP7; HVP9; HVP10].

Another participant concluded:

“I’m really blessed to have a husband who is very understanding. The first few months after the hospital I went back home to my mom’s place. So, ja, they have been helping me and cook and bring food; they will ask what she is eating, what is the mood for eating; so, they were very supportive and very helpful. So, they are around you, they care for you, and they are supporting you really. Like one of my cousins is cooking while the other one is doing my laundry; so, they were supportive really in every way they could.” [HVP11].

Family support for their loved one who had HVS to some extent, results in overprotective toward the patients as reflected in the next sub-theme.

4.4.2.4 Sub-themes 4: Overprotective family due to lack of knowledge regarding cardiac rehabilitation

Some participants mentioned that family members tended to be overprotective because of the fear and anxiety about a loved one getting sick or losing them after heart surgery.

Some participants shared:

“They were scared about the wound that it was extensive. They used to tell me you must always drink your medications; we don’t want to lose you. They were scared to lose me; every time they were like you should take your medications well. Even now, they take care of me. Sometimes I want to do the..... no you cannot do it let us do it ... they understand how my condition was.” [HVP1; HVP4].

The participants expressed:

“I did not have strength, so one day when I was washing my baby, you know you first wash the baby’s head. While I was holding her and washing, I just lost strength in my arm, and she just fell out of my arms but luckily, she fell on the bed and not on the floor. So, from there my mother-in-law said you: cannot bath her again alone. You can’t take risks; so, my sister would come and help to bathe her or my mother-in-law would come to help and wash her.” [HVP11; HVP 4; HVP5].

The findings indicated that some caregivers were overprotective because of a lack of knowledge and uncertainty about how to care for and provide support to their family members.

In summary, the theme presented the different experiences of the patients regarding support and care from the nurses and family members. The patients appreciated good support from the nurses and family members. However, patients also expressed disappointment due to a lack of support from the nurses and overprotective families due to a lack of knowledge regarding cardiac rehabilitation. In addition to nurses and patients’ experiences, the experiences caregivers’ in providing care and support to their loved ones after HVS were also explored, and the findings of this are presented in the next section.

4.5 THE FINDINGS FROM OBJECTIVE 1.4: EXPLORATION AND DESCRIPTION OF CAREGIVERS' EXPERIENCES ON THE SUPPORT AND CARE PROVIDED TO FAMILY MEMBERS AFTER HEART VALVE SURGERY

This section presents the findings from caregivers regarding their experiences on providing care and support to their family members after heart valve repair or replacement surgery. The data analysis resulted in two (2) themes and eight (8) subthemes, which are presented in Table 4.52.

Table 4.52: Caregivers experiences on the support and care of the family members after heart valve surgery

Themes	Sub-themes
4.5.1 Theme 1: Experiences of emotional disturbances regarding heart surgery and challenges with the operation of a family member	4.5.1.1 Caregivers experience emotional trauma with regard to heart surgery for their family members.
	4.5.1.2 The caregivers expressed a need for knowledge of the procedures for cardiac rehabilitation.
	4.5.1.3 Prolonged recovery periods place demands on caregivers.
	4.5.1.4 Caregivers are concerned about expenses related to transport fares and other commodities.
	4.5.1.5 Uncertainty about the future of a relative after heart valve surgery.
	4.5.1.6 Reassurance and positive thoughts about the future of a relative after heart surgery.
4.5.2 Theme 2: Different experiences regarding healthcare providers' support and care of a relative who underwent cardiac rehabilitation.	4.5.2.1 Caregivers appreciate the support from the health care providers.
	4.5.2.2 Caregivers are concerned about the lack of support from nurses.

4.5.1 Theme 1: Experiences of emotional disturbances regarding heart surgery and challenges with the operation of a relative

The first theme that emerged was related to the different experiences of emotional disturbances regarding heart surgery and challenges with the operation of a family member as described in Table 4.52.

4.5.1.1 Sub-theme 1: Caregivers experience emotional trauma with regard to heart valve surgery for a family member.

The findings indicated that most participants shared about their emotions when they were informed about the operation process for their family members. Upon hearing about the need for heart valve surgery, the participants felt overwhelmed and scared about the process. Some lacked clear information about heart surgery as evident in the following excerpt:

One participant exemplified this when she said:

“I did not feel well, to tell the truth, when they told me he was going to theatre, I did not feel well. I thought of..... can a heart be operated or what? I could not feel well, I was scared, and my child’s life was in a hand [meaning short life]. Yes, but I was strong I got the strength because God is the one who knows. I’m not the one who created him. It is God, everything is done by God. I knelt down and talked to the Lord: My God: God, you are the one who gave me and you are the one who knows the life of my Child. I could not feel well..., immediately I got strength and stopped there.” [C8].

Another participant stated that:

“Ooh! That was the worst day I could not forget. I could not remember the time the first he was booked for surgery for the first time. It was 20 January but the moment they injected him, the electricity went off in the theatre, all the sudden but God say that... the next time, I came back he was still the same, no operation, maybe 3 times the operation was postponed, and that one affected me” [C4].

Other participants shared:

“Aaa for the theatre, I personally was scared but as time went on, I Google what and how to cope with the situation. Ja that’s how I ended up encouraging my mom because it was just me and mom that were with her, we were just the 2 of us. And that’s how, when I get the information from the internet that’s how I was giving her advice that noo... you don’t need to worry. Ja, this is not the first time that people have gone for an operation on the heart. There are people who went through the same process and then up to now they are still living. So, for me, I took it easy, but my mom was so worried and then I had to say noonoo... is not like a disease that does not have a cure. We have to leave everything in God’s hands. I was feeling very bad, but I did not have any other choice, only to be strong and give myself to God. But now I have to pray. I must not be weak because if I became weak then she will do the same.” [C3; C6].

The findings indicated that the majority of the caregivers were emotionally traumatised, feeling overwhelmed, scared, and worried about the operation process and the outcome of their relatives’ surgery. Moreover, some participants were hopeful for the best after heart surgery, believing that their family members would be free from the problems they experienced before heart surgery. They also placed their trust in the Almighty Lord who is the ultimate healer.

As caregivers grappled with emotional trauma, they expressed concerns about their lack of knowledge regarding procedures for CR, which hindered their ability to effectively support their relatives.

4.5.1.2 Sub-theme 2: The caregivers expressed need for the knowledge of the procedures for cardiac rehabilitation

Caregivers indicated the need for knowledge of the procedures for CR, as reflected in the following excerpts from the participants.

The participants expressed:

“From the medical point of view, I don’t really understand what they mean about this medical condition whatever the heart valve. We thought what happened? And what was the cause? I think the support system from the hospital should be more convincing. When I heard about a valve that needed replacement, it was not easy for me, but anyway, I took it, I accepted but my mother could not understand.” [C1; C4].

One participant said:

“When he arrived home, he could not sleep well. He had difficulties sleeping, and he could not sleep on his back and waking up was a problem. I brought in a chair for him, a sofa where he used to sit. So, if he wants to raise up, he could call me to come hold him on his head to help him rise up. Because the operation was still fresh, so it was a day-to-day routine. He was improving bit- -by bit.” [C8].

The findings highlighted that participants needed information on how to care for and support their family members during the recovery process after heart valve surgery. While lacking the necessary knowledge for them to provide appropriate care. The prolonged recovery period places demand for care on caregivers.

4.5.1.3 Sub-theme 3: Prolonged recovery period places demand for care on caregivers

The majority of the participants expressed being overwhelmed and burdened due to the prolonged period of caregiving. Their experiences are illustrated through the following excerpts.

One participant expressed that:

“We had a lot of responsibilities that we needed to take up. It affected me. I have to give up some of my responsibilities. I have to take leave from work to stay with her. It is really a burden; it was a burden because I cannot do things I used to do on my own time. I needed to focus on her now. I would do her laundry because she hardly could do anything of her own. Also preparing her food. She has a child you needed to prepare her for school and bathing her.”
[C1].

Some participants expressed:

“Ja, this was a bit tough, Oh! It was really affecting me so much, because I’m the only breadwinner in a family. I have to take care of his child and my 3 children. I had to divide myself; I was studying, and I had to put my studies on hold for a year to be able to send money for her to go to the hospital because she used to go twice or once a month. Also, a problem came that she had to eat different food. Sometimes if I’m coming from work, I have to go visit him. I have also worked at my house, and it is too much for me to take other responsibilities. It is not easy because we are not staying together. I’m spending a lot of money to go take care of my brother.” **[C3; C2; C4].**

Another participant said:

“The roles that I used to do, I came to realise that some of the work I could no longer do, because I was a person who could do work on my own, I was self-employed, I could no longer take orders and sale fish at the market. I had to withdraw to care for him, to take care and see how his life was, until such time that he was feeling better, able to walk and do some other chores. Then I used to tell him not to just sit and do nothing, you can do some exercises, at times, you have to do something to recover from an illness; you need to do some exercises. He fetches water in a small bucket to bathe because he cannot just sit and watch.” [C8].

The findings indicate that almost all the participants were overwhelmed by the responsibility of taking care of their family members to aid their recovery from the operation. Most of them experienced stress due to the new roles they had to take on. Financial expenses also placed a burden on the caregivers.

4.5.1.4 Sub-theme 4: Caregivers are concerned about the expenses related to transport fares and other commodities

One participant complained about the transport, which was always unavailable when they had to go for follow-ups to collect medications.

The participant said:

“There is one tablet which is finished, and she used to collect actually in Okahandja. When they get there, they suffer a lot because sometimes they are from the farm to come to the hospital for her follow-up to see the doctor and collect the tablets; sometimes they find the ambulance is gone already. They

have to take a private transport to go to Windhoek to collect the medication which they find to be a bit difficult.” [C6].

One caregiver expressed concern about medications, which were always out of stock, as she mentioned that:

“You will find that the medication he is supposed to get is out of stock at the hospital. It takes 2 to 3 months of no medications at our hospital. So, the only solution is to go and buy at the pharmacy, and at the pharmacy is very expensive. It is the one I feel it is a problem for me and again he cannot stay without his medication. That’s one of the problems that worries me much.” [C8].

The findings indicate that participants complained about the lack of medications at the hospital and the unavailability of transport to collect medications from the hospital.

4.5.1.5 Sub-theme 5: Uncertainty about the future of a relative after heart valve surgery

Most caregivers were uncertain about the future and the recovery of their family members. They felt stressed due to the slow recovery and deterioration of their family members after surgery.

One participant expressed as having negative thoughts about the recovery of her son:

“His future, I’m not happy with it. I’m saddened by his future, but the best thing about him is, that he does his exercises, he goes for his piece of work/job; but his future.... You will see at times when the valve beats, the person next to him can hear the sound of the valve. When you ask him, he would say he is not feeling well in the chest, so he cannot do the work he used to do before his illness.” [C8].

Some participants shared:

“Okay, my thoughts about her future, since she has that artificial valve, she cannot have babies in future, that’s what they said. I think she won’t be able to do any heavy work because even now, she doesn’t cook. So, she is just there. When it comes to do heavy work and house chores, she is excluded from it. “It was such a bad experience like you would also think will my sister ever get back to... like how she has been before?” [C1; C3].

Another participant expressed:

His future in general, he wants to work because now he is married, he has a wife and family to take care of, but some work is very hard for him to do work like lifting some heavy things.” [C4].

Another participant said:

“Now he has not worked for a year and 9 months. Then on 9 June, he collapsed while he was driving. Yes, 5 years after the operation, now he has problems fainting, it seems the heart stops sometimes, now this is his 4th episode from 9 June 2021 fainting. In the first episode he was driving, 2nd he was on the phone, 3rd he was alone standing he said he felt dizziness, blackouts then he fell. The last one he told me he was eating. After eating when he stood up, he felt dizzy, and it happened like that. Maybe that is the problem with the mechanical valve.” [C4].

The findings from the participants indicate that they were uncertain about the well-being of their family members, and their prognosis after surgery. Despite perceiving a poor prognosis, family members and caregivers continued to reassure their relatives to remain hopeful.

4.5.1.6 Sub-theme 6: Reassurance and positive thoughts about the future of a relative

Despite the adverse experiences, some participants expressed positive thoughts and words of encouragement about the future of their family members after heart valve repair and replacement surgery advising them never to lose hope and give up on life.

Two participants said:

“Now her future is good, [Aaaa!] because that time she was sick, she was not going to school, today school and tomorrow not going to school. Only 1 month, the other one month she did not go. In 2017, she failed grade 10 and repeated grade 10. She started school, now she is in grade 11, and now everything is better. She is good, she must go back to school. But she is not for normal school, she is not so good, she needs a special school like VTC [Vocational Training Centre].” [C6; C7].

Another participant expressed:

“My thoughts are like now there is hope in her future if she wants to study, she can still do it, although there are certain jobs she cannot apply for, like currently she is only allowed to do a certain type of work; she is cleaner, but she doesn’t do heavy work. When others are carrying heavy things, she is given light work like wiping a table or just sweeping.” [C1].

Three participants expressed:

“When she was in grade 12, then we used to encourage her that you don’t need to feel down, you can make it; you are a bright student, and you are smart.”
“We counselled him that this is not the end of life, he will change, things will be normal again and he will be fine again, he must just take it easy.” I told her

to take things easy, it is how life is, and she is wanna be good if she understands.” [C3; C4; C5].

One participant said:

“The first thing I told my son is that: it happens in life, my son. When God created you, he knew already that you would have this kind of illness. Don’t feel like you are not an important person among others, you are still a person among others. What is important is to take care of yourself in everything you do. God is the one who knows your life whether you were not operated or operated. You are still my son. The other thing I told him is that if you want your life to be good, stay away from smoking, stay away from alcohol and follow instructions that you were given at the hospital. You will see your life will be very good; if you stay away from these things everything will be good to you.” [C8].

The participants had positive thoughts about the future of their family members, believing that they could further their studies and find light jobs without facing significant challenges. The findings indicated that the participants reassured their family members never to give up on life, but to remain productive as they believed they could still achieve success in the future.

In summary, this theme presented caregivers' experiences of emotional trauma, the need for knowledge about the procedure, prolonged recovery that placed demand to care, uncertainty about the future of a relative, positive thoughts about the future, and reassurance of a family member who underwent heart valve surgery.

4.5.2 Theme 2: Different experiences regarding nurses' support and care of the relative who underwent cardiac rehabilitation.

The second theme that emerged from caregivers was about different experiences regarding nurses' support and care of the relatives who underwent cardiac rehabilitation.

4.5.2.1 Sub-theme 1: Caregivers appreciate the support from the healthcare providers

Some participants expressed appreciation for the support they received from the nurses regarding the cardiac rehabilitation of family members who had heart valve repair and replacement surgery after discharge from the hospital.

One participant said:

“After the operation, she received good support because even when she left to go to the North, they always called asking how she was doing and about, anything which she thinks is a problem. They also said she had now operated, they put artificial valve, my mom should sign for her to get support for her to receive that money so that she will be able to use that money when she is going to the hospital. They also said she cannot take any medication even when she has a headache, she should just call the doctor or the nurses so that they tell her what to do. About the food: They told her not to eat spicy food, no vegetables, no sweet things and no traditional spinach and if she eats just small, not even small sauce the spinach because if she eats the spinach, will stack on the valve, is what they said.” [C3].

Two participants said:

“Those nurses at the Cardiac Clinic were good nurses, sometimes they would call me to find out if he was fine. They also gave me a small lesson, that I must take care of my brother now he is discharged. I must make sure that he has some warm clothes, make sure he takes his medications. “A big support that they have given to my sisters; they must keep it up. Because they helped my sister; the operation was successful, and there was no problem to her.” [C4; C5].

The participants shared:

“I feel like they did a great job, God gave them the strength. I feel they did a very good job because that time when he was not operated, he suffered a lot. He could not walk, and got tired easily from a short walk, just a short distance he sat and said I’m tired. I’ll continue praying hard to the doctors and sisters that they are on top of her so they can do a proper job like now.” [C6; C8].

The findings indicated appreciation by caregivers of the support given by the nurses to the caregivers regarding patients’ self-care taking medications avoidance of leafy vegetables, and the importance of follow-up visits.

4.5.2.2 Subtheme 2: Caregivers are concerned about the lack of support from the nurses.

Some of the participants expressed a lack of care and support received from the nurses on how to care for these family members after discharge from the hospital. They mentioned a lack of clear information from the nurses.

The participants expressed:

“Uuh! [shaking her head], It is frustrating, I don’t think we really had a lot of support from the nurses, except when you come there..... you ask how she is doing, then she tells you I’m doing okay. But not really interacting with the nurses. I don’t think we really had a lot of discussion about what I should do..... “I did not receive any support from the nurses. They did not tell me anything.” [C1; C2].

Another participant said:

“Nothing, [shaking her head] the nurses did not help us.” Yes, that time when he was discharged, the work must be mine, yes, even if there is nothing from the nurses. Here at the hospital, I don’t know, the doctors seem like not be serious, especially for patients suffering from heart diseases, medications are not available here.... Only to buy at the pharmacy.” [C8].

One participant expressed a preference for the creation of a support system at the hospital for patients with heart valve surgery by saying:

“I think the support system from the hospital is needed and this should be more convincing. I think they shouldn’t discharge patients so early as soon as they feel the patient is ready to go. I think they should give more time after surgery. Yes, the support system where everyone who underwent surgery goes through and is needed emotionally, physically and patient to share their fears and experiences.” [C8].

The findings revealed that the participants had to accept the burden of supporting and caring for their family members in the absence of support or clear instructions from the nurses.

In summary, the theme presented different experiences of caregivers regarding healthcare providers' support and care of a relative after heart valve surgery. Some caregivers appreciated support from the healthcare provider, while some caregivers were concerned about the lack of support from the nurses.

4.6 INTEGRATION AND INTERPRETATION OF QUANTITATIVE AND QUALITATIVE DATA

This section presents the integration of the quantitative results and qualitative findings by reporting the main findings in a narrative form as illustrated in Table 4.53. The formula, or framework for integration and interpretation of the quantitative results and qualitative findings was adopted from Creswell and Clark, (2018) by using the constructs of convergent and discordant.

Table 4.53: Integration of Results and findings of quantitative and qualitative data

Quantitative	Qualitative			
Questions/findings - Nurses	Nurses	Patients	Caregivers	Interpretation
A. KNOWLEDGE: 4.6.1 High level of knowledge among nurses: High level of knowledge towards cardiac rehabilitation (n = 20, 87%)	Experience challenges in providing CR interventions to patients after heart valve surgery in Theme 1.	Negative findings: Some patients expressed disappointment due to the lack of support from the nurses as referred to subtheme 4.4.2.2. Positive findings: Other patients appreciated the support from the nurses as referred to in Subtheme 4.4.2.1	Negative findings: Not receiving support and information from the nurses on the procedure for cardiac rehabilitation- Subtheme 4.5.2.2 as quoted by the participants C1,2,6, & 8. Positive findings: Appreciating support from the nurses as they have received health information from the nurses regarding the importance of follow-up, diet, medications, and wound care [Sub-theme 4.5.2.1, caregivers quote C1,2,6, & 8].	Convergent & discordant
4.6.2 Lack of knowledge on some aspects of CR among nurses: 4.6.2.1 Cardiac rehabilitation is designed only for those patients who have had HVS recently (n = 5, 21.7%) had good knowledge.	Experience challenges regarding the delivery of CR interventions for patients who have had heart valve surgery (Theme 1). Subtheme 5: Nurses lack knowledge and skills in providing CR to patients after cardiac surgery. [As referred to Theme 1, subtheme 4.3.1.5; and the participant quotes N1, N3, & N6 in Chapter 4.) Unavailability of standardized CRP to guide the rehabilitation of patients after heart surgery. (Sub-theme 4.3.1.8 in Chapter 4.	Patients lack the knowledge of self-care that is essential to enhance recovery as referred to in Subtheme 4.4.1.3.	The caregivers expressed a need for knowledge of the procedures for cardiac rehabilitation as referred to in Sub-theme 4.5.1.2.	Convergent

4.6.2.2 Phase 1 of CRP begins as soon as the patient is discharged from the hospital only (n=7; 30.4% had good knowledge). The majority of the nurse participants lacked knowledge.	Unavailability of standardized CRP to guide the rehabilitation of patients after heart surgery. (Sub-theme 4.3.1.8 and as referred to participants quotes N1, N3, & N7) in Chapter 4. Sub-theme 5: Nurses lack knowledge and skills in providing CR services to patients after cardiac surgery (As referred to by the participant quotes, N1, N2, & N8) in Chapter 4.	Patients lack the knowledge of self-care which is essential to enhance recovery [Sub-theme 4.4.1.3].	The caregivers expressed a need for knowledge on the procedures for cardiac rehabilitation [as referred to in Sub-theme 4.5.1.2].	Convergent
4.6.2.3 It takes about 3 to 8 weeks for the breast to heal after heart valve surgery. Only (n=10; 43.5% had good knowledge).	Sub-theme 4.3.1.5: Nurses lack knowledge and skills in providing CR services to patients after cardiac surgery.	Patients lack the knowledge of self-care which is essential to enhance recovery (Sub-theme 4.4.1.3).	The caregivers expressed a need for knowledge of the procedures for cardiac rehabilitation [as referred to in Sub-theme 4.5.1.2].	Convergent
4.6.2.4 Patients with bio-prosthesis or mitral repair should receive Warfarin for 1 month after heart surgery only (n=8, 34.8%) had good knowledge).	Sub-theme 4.3.1.5: Nurses lack knowledge and skills in providing CR services to patients after cardiac surgery.	Patients lack the knowledge of self-care which is essential to enhance recovery (Sub-theme 4.4.1.3).	The caregivers expressed a need for knowledge of the procedures for cardiac rehabilitation [as referred to in Sub-theme 4.5.1.2]. .	Convergent

4.6.2.5 Aerobic and resistance exercise training are two types of exercise recommended for cardiac rehabilitation only (n= 6, 26.1% had good knowledge).	Sub-theme 4.3.1.5: Nurses lack knowledge and skills in providing CR services to patients after cardiac surgery (As quoted by the participants in Chapter 4: N1, N3, & N6). Unavailability of CRP to guide the rehabilitation of patients [sub-theme 4.3.1.8].	Patients lack the knowledge of self-care that is essential to enhance recovery (Sub-theme 4.4.1.3).	Qualitative data were not collected and analysed.	Convergent
4.6.2.6 Supervised exercise is recommended for low-risk patients (n = 12; 52.2% had good knowledge).	Sub-theme 4.3.1.5: Nurses lack knowledge and skills in providing CR services to patients after cardiac surgery (As quoted by the participants in Chapter 4: N1, N3, & N6). Unavailability of CRP to guide the rehabilitation of patients, Sub-theme 4.3.1.8: as referred to in participant quotes N1, N3, N7). Inadequate resources to facilitate CR to patients as referred to sub-theme 4.3.1.6.	Patients lack the knowledge of self-care that is essential to enhance recovery (Sub-theme 4.4.1.3).	The caregivers expressed a need for knowledge of the procedures for cardiac rehabilitation [Sub-theme 4.5.1.2].	Convergent /discordant
4.6.2.7 Upper body training can begin when the chest is stable usually after 4 weeks of heart surgery only (n=9, 39.1% had good knowledge).	Sub-theme 4.3.1.5: Nurses lack knowledge and skills in providing CR services to patients after cardiac surgery. Unavailability of CRP to guide the rehabilitation of patients [Sub-theme 4.3.1.8].	Patients lack the knowledge of self-care that is essential to enhance recovery (Sub-theme 4.4.1.3).	The caregivers expressed a need for knowledge of the procedures for cardiac rehabilitation [Sub-theme 4.5.1.2].	Convergent

4.6.2.8 Walking, swimming, jogging, stair climbing, and lightweight 6 weeks after HS is safe for patients after heart valve surgery (n= 8, 34.8% had good knowledge).	Sub-theme 4.3.1.5: Nurses lack knowledge and skills in providing CR services to patients after cardiac surgery (As quoted by the participants in Chapter 4: N1, N3, & N6). Unavailability of CRP to guide the rehabilitation of patients, Sub-theme 4.3.1.8 (as referred to in N1, N3, N7).	Patients lack the knowledge of self-care that is essential to enhance recovery (Sub-theme 4.4.1.3).	The caregivers expressed a need for knowledge of the procedures for cardiac rehabilitation [Sub-theme 4.5.1.2].	Convergent
4.6.2.9 Educating and involving caregivers regarding dietary goals and healthy food choices (n=22, 95.7% had good knowledge).	Sub-theme 4.3.1.9: Lack of involvement of caregivers in the CR by nurses [as quoted by the nurse participants N1, 3-7]. Positive findings: only one nurse participant involves the caregiver: as per quote N10].	No qualitative data were collected and analyzed regarding involving caregivers in dietary goals and healthy food choices.	Negative findings: Caregivers are concerned about the lack of support from nurses [as referred to in Sub-theme 4.5.2.2]. Positive findings: Caregivers appreciate the support from the health care providers [as referred to in Sub-theme 4.5.2.1].	Discordant
4.6.2.10 Caregivers, family members, and other support people should be encouraged to participate in the CR process of the patient throughout (n= 23, 100% had good knowledge) [Surprising or unexpected results]	Lack of involvement of caregivers in the CR by nurses [S-theme 4.3.1.9].	No qualitative data were collected and analyzed.	Negative findings: Caregivers are concerned about the lack of support from nurses [sub-theme 4.5.1.2]. Positive findings: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.2].	Discordant
B. Attitudes towards CR: 4.6.3 Positive attitudes (n = 21, 91.3%)	Lack of involvement of caregivers in the CR by nurses [Sub-theme 4.3.1.9].	Patients expressed disappointment due to the lack of support from nurses [Sub-theme 4.4.2.2].	Negative findings: Caregivers are concerned about the lack of support from nurses [Sub-theme 4.5.2.2].	Discordance

Some aspects of CR where nurses had negative attitudes: 4.6.3.1 I think I'm skilled enough and interested in giving health information to patients regarding CRP after heart surgery. (13, 56.5% had positive attitudes). There was also an association between nurses' age and attitudes toward CR among those aged 40 and above, as indicated by the P-value of 0.038. [Positive attitudes]	Language barriers to communicating cardiac rehabilitation interventions to patients [Sub-theme 4.3.1.1]. Ignorance of health information on cardiac rehabilitation by patients. Sub-theme 4.3.1.4, as referred to in participants quotes, [N3 & N1]. Unavailability of CRP to guide the rehabilitation of patients, sub-theme 4.3.1.8 (As referred to in participant quotes N1, N3, N7) in Chapter 4.	Negative findings: Patients expressed disappointment due to the lack of support from nurses. As referred to in patient quotes: HVP 10, & 12, [sub-theme 4.4.2.2]. Positive findings: Patients appreciate good support from nurses as quoted by participants: [HVP 1-5; 7-9; 11-12]	No qualitative data was collected and analysed.	Discordant/
4.6.3.2 I think patients and caregivers should be responsible for their own health behaviour changes, risk reduction, self-management and post-hospitalization (n = 17, 73.9%). [negative attitudes]	Lack of involvement of caregivers in the CR by nurses, sub-theme 4.3.1.9. (as quoted by the nurse participants (N1, N3, N4, N5, N6, & N7). Ignorance of health information on cardiac rehabilitation by patients. (as quoted by the participants [N1 & N3]	Negative findings: Patients expressed disappointment due to the lack of support from nurses [sub-theme 4.4.2.2]. Positive findings: Patients appreciate support from the nurses [Sub-theme 4.4.2.1].	Negative: Subtheme 8: Caregivers are concerned about the lack of support from nurses [sub-theme 4.5.2.2]. Positive: Subtheme 7: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.1].	Discordant

4.6.3.3 I believe it is the duty and responsibility of cardiologists to give information to patients regarding rehabilitation after cardiac surgery (n= 17, 73.9%) [Negative attitudes].	Inadequate resources to facilitate CR interventions to patients. [as referred to in Sub-theme 4.3.1.6].	No qualitative data were collected and analyzed on the responsibility of the cardiologists to provide information to the patients regarding cardiac rehabilitation.	No qualitative data were collected and analyzed regarding the responsibility of the cardiologists to give information to the patients regarding cardiac rehabilitation.	Convergent
4.6.3.4 I think the information given to the patients on discharge regarding medications, wound care, infection control, and psychological stress is sufficient for their recovery process (n= 8, 34.8%) [Positive attitudes].	Nurses lack knowledge and skills in providing CR services to patients after cardiac surgery (sub-theme 4.3.1.5, as quoted by the participants: N1, N3, & N6)). Unavailability of CRP to guide the rehabilitation of patients (sub-theme 4.3.1.8, as referred to in N1, N3, N7).	Patients lack the knowledge of self-care that is essential to enhance recovery [Sub-theme 4.4.1.3]. Negative findings: Lack of support from the nurses [sub-theme 4.4.2.2]. Positive findings: Patients appreciate good support from nurses [Sub-theme 4.4.2.1].	Negative findings: Caregivers are concerned about the lack of support from nurses [sub-theme 4.5.2.2]. Positive findings: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.1].	Convergent/discordant
4.6.3.5 I think it is the responsibility of the caregivers to get involved in encouraging their family members to participate in exercise training of their relative who had heart valve surgery (n=20, 87%) had negative attitudes.	Lack of involvement of caregivers in the CR by nurses. (sub-theme 4.3.1.9, as quoted by the nurse participants (N1, N3, N4, N5, N6, & N7).	No qualitative data were collected and analysed however, Negative findings: Overprotective family due to lack of knowledge regarding cardiac rehabilitation, as referred to in Sub-theme 4.4.2.4, [patient quotes HVP1, 4-5; 9,11,12].	Negative findings: Caregivers are concerned about the lack of support from nurses [sub-theme 4.5.2.2]. Negative findings: A prolonged recovery period places demand for care on caregivers as referred to in Subthemes 5.13.1.3 in chapter 5.	Convergent
4.6.3.6 I think the Warfarin information booklet given to patients after discharge is sufficient in providing information about diet/nutrition counselling services (n=14, 60.9%) had negative attitudes.	Nurses lack knowledge and skills in providing CR services to patients after cardiac surgery [sub-theme 4.3.1.5].	Patients lack the knowledge of self-care that is essential to enhance recovery [as referred to in Sub-theme 4.4.1.3]. Negative findings: Lack of support from the nurses [Sub-theme 4.4.2.2].	Need for knowledge that is essential [Sub-theme 4.5.1.2].	Convergent/Discordant

		Positive findings: Patients appreciate good support from nurses Sub-theme 4.4.2.1.		
4.6.3.7 I think exercise training programmes and supervision are the responsibility of the physiotherapist or a staff member trained in exercise prescription and not of a nurse (n= 15, 65.2%). Negative attitudes	Inadequate resources to facilitate CR interventions to patients [as referred to in Sub-theme 4.3.1.6].	No qualitative data were collected and analyzed.	No qualitative data were collected and analyzed.	Convergent
4.6.3.8 I think the Warfarin booklet given to the patients after discharge is sufficient in providing information about diet/nutrition counselling services (n= 14, 60.9%) [negative attitudes].	Unavailability of CRP to guide the rehabilitation of patients (sub-theme 4.3.1.8, as referred to in the participants quotes N1, N3, N7). Some nurses lack knowledge and skill in the delivery of cardiac rehabilitation (sub-theme 4.3.1.5, as quoted by participants N1, N3, & N6).	Patients lack the knowledge of self-care that is essential to enhance recovery [Sub-theme 4.4.1.3]. .	Need for knowledge that is essential [as referred to in Sub-theme 4.5.1.2].	Convergent
4.6.3.9 I find it difficult to provide emotional support to patients and their caregivers if they become upset (4, 17.4% had a positive attitude).	Some nurses lack knowledge and skill in the delivery of cardiac rehabilitation (Sub-theme 4.3.1.5).	Negative findings: Some patients expressed disappointment in the lack of support from the nurses as referred to in Sub-theme 5.12.2.2. Positive findings: Other patients appreciate the support from the nurses [as referred to in Sub-theme 4.4.2.1].	Caregivers experience emotional trauma regarding heart surgery for a family member as referred to in Sub-theme 4.5.1.1, and quotes C1,3-8]. Caregivers are concerned about the lack of support from nurses [Sub-theme 4.5.2.2]. Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.1].	Discordant

		Emotionally and psychologically: Patients have mixed feelings about the operation/procedure and outcome		
4.6.3.10 I feel uncomfortable talking to patients and their caregivers about sexual life experiences (only n = 8, 34.8% had positive attitudes).	Perception of sex education by nurses as a taboo. (sub-theme 4.3.1.3, as referred to in participants quotes N1, N3, N5, & N7). Unavailability of a standardised rehabilitation programme to guide the rehabilitation of patients after cardiac rehabilitation (sub-theme 4.3.1.8, as quoted by participants N1, N3, & N7).	No qualitative data were collected and analyzed.	No qualitative data were collected and analyzed.	Convergent
4.6.3.11 I feel the support and care given to patients by their caregivers at home is sufficient for patient recovery and return to normal activities (n = 6, 26.1%) [had positive attitudes]. [Surprising results].	Lack of involvement of caregivers in the CR by nurses [sub-theme 4.3.1.9]. Unavailability of a standardised rehabilitation programme to guide the rehabilitation of patients after cardiac rehabilitation (Sub-theme 4.3.1.8).	Negative findings: Some patients expressed disappointment about the lack of support from the nurses as referred to in sub-theme [sub-theme 4.4.2.2]. Positive findings: Other patients appreciated support from the nurses [as referred to in Sub-theme 4.4.2.1]. Overprotective family due to lack of knowledge regarding cardiac rehabilitation [Sub-theme 4.4.2.4].	Negative findings: Caregivers are concerned about the lack of support from nurses [sub-theme 4.5.2.2]. Positive findings: Caregivers appreciate the support from the health care providers [sub-theme 4.5.2.1]. The caregivers expressed a need for knowledge of the procedures for cardiac rehabilitation [Sub-theme 4.5.1.2].	Discordant Convergent
4.6.3.12 I believe that if patients are given an opportunity to share their	Ignorance of health information on cardiac rehabilitation by patients.	Patients have mixed feelings about the operation and outcome of the procedure as referred to in	Caregivers experience emotional trauma with regard to heart surgery for	Discordant/ Convergent

worries and fears with others, it may help with their recovery process (n=22. 95.7%) Positive attitudes	[Sub-theme 4.3.1.4, as referred to in participants quotes, [N3& N1.	sub-theme 4.4.1.1 and patients quote HVP1, 3-12] Negative findings: Some patients expressed disappointment about the lack of support from the nurses as referred to in sub-theme 4.4.2.2. Positive findings: Other patients appreciated support from the nurses as referred to in Subtheme 4.4.2.1].	a family member as referred to in Sub-theme 4.5.1.1, and quotes C1,3-8].	
4.6.3.13. I do not think caregivers usually experience any difficulty in the support and care of their loved ones who had heart valve surgery (n= 10, 43.5%) [Positive} attitudes]. [Surprising results]. There is also an association between nurses aged 20-29 who had positive attitudes towards the statement which is statistically significant with the p-value of 0.025.	Lack of involvement of caregivers in the CR by nurses [Sub-theme 4.3.1.9]. Unavailability of a standardised CRP to guide the rehabilitation of patients after cardiac surgery. [Sub-theme 4.3.1.8].	No qualitative data were collected and analyzed.	Caregivers experience emotional trauma with regard to heart surgery for a family member as referred to in Subtheme 4.5.1.1. Prolonged recovery placed demands on caregivers [sub-theme 4.5.1.3, as quoted C1-4,8]. Negative: Caregivers are concerned about the lack of support from nurses as referred to in sub-theme 4.5.2.2. Positive: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.1]. Subtheme 2: The caregivers expressed a need for knowledge on the procedures for cardiac rehabilitation [Sub-theme 4.5.1.2.	Discordant/ Convergent
C. Practices towards CR: 4.6.4 Average practices (n = 13, 56.5%)	Unavailability of a standardised CRP to guide the rehabilitation of patients	Negative findings: Patients expressed disappointment due to	Negative findings: Caregivers are concerned about the lack of support from nurses [Sub-theme 4.5.2.2].	Discordant /convergent

	after cardiac surgery [sub-theme 4.3.1.8].	the lack of support from nurses [Sub-theme 4.4.2.2]. Positive findings: Patients appreciate good support from nurses [4.4.2.1].	Positive findings: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.2]. .	
4.6.4.1 Providing information on medications and drug regimens (n=17, 73.9% had good practice).	Nurse experiences language barriers to communicate interventions of cardiac rehabilitation to the patients [sub-theme 4.3.1.1] Ignorance of patients on health information [Sub-theme 4.3.1.4].	Negative findings: Patients expressed disappointment due to the lack of support from nurses [Sub-theme 4.4.2.2]. Positive findings: Patients appreciate good support from nurses [sub-theme 4.4.2.1]. Patients lack the knowledge of self-care that is essential to enhance recovery [Sub-theme 4.4.1.3].	Negative findings: Caregivers are concerned about the lack of support from nurses [sub-theme 4.5.2.2]. Positive findings: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.2].	Convergent /discordant
4.6.4.2 Sexual activities counselling (n = 4, 17.4% had good practice)	Sub-theme 4.3.1.3: Perception of sex education by nurses as a taboo. (As referred to in participants quotes N1, N3, N5, & N7, in Chapter 4). Sub-theme 4.3.1.5: Some nurses lack knowledge and skill in the delivery of cardiac rehabilitation (as quoted by participants in Chapter 4	No qualitative data were collected and analyzed regarding sexual activities.	No qualitative data were collected and analyzed regarding sexual activities.	Convergent
4.6.4.3 Advising caregivers regarding support and care of their family members (n =11, 47.8%) [Surprising results].	Sub-theme 4.3.1.9: Lack of involvement of caregivers in the CR by nurses [N1, & N4]	No qualitative data were collected and analyzed.	Prolonged recovery placed demands on caregivers [Sub-theme 4.5.1.3, as quoted C1-4,8].	Discordant

			Negative findings: Caregivers are concerned about the lack of support from nurses [Sub-theme 4.5.2.2]. Positive findings: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.2].	
5.6.4.4 Working through the Warfarin information booklet with the patients before discharge from the hospital (n=47.8% had good practice)	Sub-theme 4.3.1.5: Nurses lack knowledge and skills in providing CR services to patients after cardiac surgery. Sub-theme 4.3.1.8: Unavailability of CRP to guide the rehabilitation of patients (As referred to N1, N3, N7). Nurse experiences language barriers to communicating interventions of cardiac rehabilitation to the patients [Sub-theme 4.3.1.1]. Ignorance of patients on health information [Sub-theme 4.3.1.4].	Patients lack the knowledge of self-care that is essential to enhance recovery [Sub-theme 4.4.1.3]. Negative findings: Patients expressed disappointment due to the lack of support from nurses [Sub-theme 4.4.2.2]. Positive findings: Patients appreciate good support from nurses [Sub-theme 4.4.2.1].	The caregivers expressed a need for knowledge of the procedures for cardiac rehabilitation [Sub-theme 4.5.1.2].	Convergent
4.6.4.5 Giving and teaching the patients and caregivers about the content of the booklet: Medication compliance and side effects: (n=14, 60.9% and 5, 21.7% often)	Sub-theme 4.3.1.5: Nurses lack knowledge and skills in providing CR services to patients after cardiac surgery. Sub-theme 4.3.1.8: Unavailability of CRP to guide the rehabilitation of patients (As referred to N1, N3, N7). Nurse experiences language barriers to communicating	Patients lack the knowledge of self-care that is essential to enhance recovery [Sub-theme 4.4.1.3]. Negative findings: Patients expressed disappointment due to the lack of support from nurses [Sub-theme 4.4.2.2].	Negative findings: Caregivers are concerned about the lack of support from nurses [Sub-theme 4.5.2.2]. Positive findings: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.2].	Convergent/discordant

	interventions of cardiac rehabilitation to the patients [Sub-theme 4.3.1.1]. Ignorance of patients on health information [sub-theme 4.3.1.4]. Lack of involvement of caregivers in the CR by nurses [Sub-theme 4.3.1.9].	Positive findings: Patients appreciate good support from nurses [Sub-theme 4.4.2.1].		
4.6.4.6 Changing bad habits of smoking and drinking alcohol. (n=14, 60.9%)	Nurse experiences language barriers to communicating interventions of cardiac rehabilitation to the patients [Sub-theme 4.3.1.1]. Ignorance of patients on health information [Sub-theme 4.3.1.4].	Patients lack the knowledge of self-care that is essential to enhance recovery [Sub-theme 4.4.1.3]. Negative findings: Patients expressed disappointment due to the lack of support from nurses [Sub-theme 4.4.2.2]. Positive findings: Patients appreciate good support from nurses [Sub-theme 4.4.2.1].	The caregivers expressed a need for knowledge of the procedures for cardiac rehabilitation [Sub-theme 4.5.1.2].	Convergent
4.6.4.7 Preparing a work-up schedule for the activities of the patients regarding cycling, rowing, swimming, bicycling, jogging and rest (n= 3, 13% had good practice).	Sub-theme 4.3.1.5: Nurses lack of knowledge and skills in providing CR services to patients after cardiac surgery (As quoted by the participants in Chapter 4: N1, N3, & N6). Sub-theme 4.3.1.8: Unavailability of CRP to guide the rehabilitation of patients (As referred to in N1, N3, N7).	Negative findings: Patients expressed disappointment due to the lack of support from nurses [Sub-theme 4.4.2.2]. Positive findings: Patients appreciate good support from nurses [sub-theme 4.4.2.1]. Patients lack the knowledge of self-care that is essential to enhance recovery [Sub-theme 4.4.1.3].	Negative findings: Caregivers are concerned about the lack of support from nurses [Sub-theme 4.5.2.2]. Positive findings: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.2].	Convergent/discordant

4.6.4.8 Counselling of the patients to help them cope with heart valve surgery, stress or anxiety (5= 21.7% had good practice).	Nurse experiences language barriers to communicating interventions of cardiac rehabilitation to the patients [sub-theme 4.3.1.1]. Ignorance of patients on health information [Sub-theme 4.3.1.4].	Patients have mixed feelings about the operation and outcome of the procedure as referred to in Sub-theme 4.4.1.1. Negative findings: Patients expressed disappointment due to the lack of support from nurses [Sub-theme 4.4.2.2]. Positive findings: Patients appreciate good support from nurses [sub-theme 4.4.2.1]. Patients lack the knowledge of self-care that is essential to enhance recovery [Sub-theme 4.4.1.3].	No data were collected and analyzed.	Convergent
4.6.4.9 Counselling of the caregivers to help them cope with stress and anxiety in caring for their family member after heart valve surgery (n=3, 13% always and 11 (43.5% often).	Sub-theme 4.3.1.9: Lack of involvement of caregivers in the CR by nurses. Nurse experiences language barriers to communicating interventions of cardiac rehabilitation to the patients [Sub-theme 4.3.1.1]. Ignorance of patients on health information [Sub-theme 4.3.1.4].	Negative findings: Patients expressed disappointment due to the lack of support from nurses [Sub-theme 4.4.2.2]. Positive findings: Patients appreciate good support from nurses [Sub-theme 4.4.2.1].	Caregivers experience emotional trauma with regard to heart surgery for a family member as referred to in Sub-theme 4.5.1.1. Prolonged recovery placed demands on caregivers [Sub-theme 4.5.1.3, as quoted C1-4,8]. Negative findings: Caregivers are concerned about the lack of support from nurses [Sub-theme 4.5.2.2]. Positive findings: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.2].	Discordant
4.6.4.10 Encouraging and counselling caregivers to get involved in the physical activities of their family members (n=4, 17.4% had good practice). [Surprising results]	Sub-theme 4.3.1.9: Lack of involvement of caregivers in the CR by nurses. Nurse experiences language barriers to communicating interventions of cardiac	Negative findings: Patients expressed disappointment due to the lack of support from nurses [Sub-theme 4.4.2.2]. Positive findings: Patients appreciate good support from nurses [Sub-theme 4.4.2.1].	Caregivers experience emotional trauma with regard to heart surgery for a family member as referred to in Sub-theme 4.5.1.1. Prolonged recovery placed demands on caregivers [Sub-theme 4.5.1.3, as quoted C1-4,8].	Discordant Convergent

	rehabilitation to the patients [Sub-theme 4.3.1.1]. Ignorance of patients on health information [Sub-theme 4.3.1.4].		Negative findings: Caregivers are concerned about the lack of support from nurses [Sub-theme 4.5.2.2]. Positive findings: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.2].	
4.6.4.11 Encouraging patients in the involvement of leisure activities that they find comfortable and enjoyable. (n=5, 21.7% always had good practice).	Nurse experiences language barriers to communicating interventions of cardiac rehabilitation to the patients [Sub-theme 4.3.1.1]. Ignorance of patients on health information [Sub-theme 4.3.1.4]. Sub-theme 4.3.1.8: Unavailability of CRP to guide the rehabilitation of patients (As referred to in N1, N3, N7).	Negative findings: Patients expressed disappointment due to the lack of support from nurses [Sub-theme 4.4.2.2]. Positive findings: Patients appreciate good support from nurses [Sub-theme 4.4.2.1].	The caregivers expressed a need for knowledge of the procedures for cardiac rehabilitation [Sub-theme 4.5.1.2].	Convergent
4.6.4.12 Providing information to caregivers as to what to expect, and how to deal with patients' emotional responses such as depression and moodiness (n = 4, 17.4%) had good practice.	Sub-theme 4.3.1.9: Lack of involvement of caregivers in the CR by nurses. Nurse experiences language barriers to communicating interventions of cardiac rehabilitation to the patients [Sub-theme 4.3.1.1].	Emotionally and psychologically: Patients have mixed feelings about the operation/procedure and outcome	Sub-theme 4.5.1.1: Caregivers experience emotional trauma with regard to heart surgery for a family member. Prolonged recovery placed demands on caregivers [sub-theme 4.5.1.3, as quoted C1-4, 8]. Negative findings: Caregivers are concerned about the lack of support from nurses [Sub-theme 4.5.2.2]. Positive findings: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.1]	Convergent

4.6.4.13 Listening to the patient's problems and respond accordingly (n=16, 69.6%) had good practice.	Sub-theme 4.3.1.9: Lack of involvement of caregivers in the CR by nurses. Nurse experiences language barriers to communicating interventions of cardiac rehabilitation to the patients [Sub-theme 4.3.1.1].	Emotionally and psychologically: Patients have mixed feelings about the operation/procedure and outcome [Sub-theme 4.4.1.1]. Negative findings: Patients expressed disappointment due to the lack of support from nurses [Sub-theme 4.4.2.2]. Positive findings: Patients appreciate good support from nurses [sub-theme 4.4.2.1]. Patients lack the knowledge of self-care that is essential to enhance recovery [Sub-theme 4.4.1.3].	The caregivers expressed a need for knowledge on the procedures for cardiac rehabilitation [Sub-theme 4.5.1.2].	Discordant
4.6.4.14 Listen to the caregivers' problems and respond accordingly (n= 13, 56.5%) had good practice [Insignificant results].	Sub-theme 4.3.1.9: Lack of involvement of caregivers in the CR by nurses. Nurse experiences language barriers to communicating interventions of cardiac rehabilitation to the patients [Sub-theme 4.3.1.1].	Negative findings: Patients expressed disappointment due to the lack of support from nurses [Sub-theme 4.4.2.2].	Sub-theme 4.5.1.1: Caregivers experience emotional trauma with regard to heart surgery for a family member. Prolonged recovery placed demands on caregivers [Sub-theme 4.5.1.3, as quoted C1-4, 8]. Negative findings: Caregivers are concerned about the lack of support from nurses [Sub-theme 4.5.2.2]. Positive findings: Caregivers appreciate the support from the health care providers [Sub-theme 4.5.2.2].	Discordant

New emerging sub-themes that were deduced from qualitative data analysis				
Economic status: No quantitative data were collected and analyzed related to economic status.	Sub-theme: 4.3.1.2: The economic status of patients and caregivers influences health information for both patients and caregivers	Physically: The procedure impacted negatively on daily activities of living [Sub-theme 4.5.1.3]. Social role	Sub-theme 4.5.1.4: Caregivers are concerned about expenses related to transport fares and other commodities.	Convergent
Uncertainty about the future of a relative: No quantitative data were collected and analyzed related to Uncertainty about the future of a relative after heart valve surgery. [Emotional/psychosocial]	No qualitative data were collected or analyzed.	Patients experience contentment with the outcome of the procedure [Sub-theme 4.4.1.4].	Subtheme 4.5.1.5: Uncertainty about the future of a relative after heart valve surgery. [emotional/psychosocial]. Subtheme 4.5.1.6: Reassurance and positive thoughts about the future of a relative after heart surgery. [psychosocial] [Sub-theme 4.5.1.6].	Discordant
No quantitative data were collected and analyzed	No qualitative data were collected or analyzed.	Patients appreciate supportive family [Sub-theme 4.4.2.3]	Sub-theme 4.5.1.6: Reassurance and positive thoughts about the future of a relative after heart surgery. [psychosocial].	Convergent explanation
No quantitative data were collected and analyzed	No qualitative data were collected or analyzed.	Patients appreciate supportive family [Sub-theme 4.4.2.3]	Sub-theme 4.5.1.3: A prolonged recovery period places demands on caregivers.	Discordant/explanation
No quantitative data were collected and analyzed	Theme 2: Sub-theme 1: Nurses perceive the cardiac rehabilitation programme as an important intervention for patients who had heart valve surgery (As referred by participants N1, N2, N3).	No quantitative data were collected and analyzed.	No quantitative data were collected and analyzed.	Explanation
Interpersonal relationships among healthcare professionals about CRP:	Sub-theme 4.3.1.7: Lack of interpersonal relationships	No quantitative data were collected and analyzed.	No quantitative data were collected and analyzed	Explanation

No quantitative data were collected and analyzed	among the nurses in delivering CR services.			
Loss of social roles: No quantitative data were collected and analyzed.	No qualitative data were collected and analyzed.	Socially: Patients experience a loss of a social role [Sub-theme 4.4.1.2].	Subtheme 4.5.1.3: Prolonged recovery period places demand on caregivers.	Convergent

4.7 SUMMARY

This chapter presents the results of quantitative data and qualitative data of the situational analysis (Phase 1) about the nurse's KAP regarding CR, challenges experienced by the nurses on CR services, challenges experienced by the patients on recovery and copies as well as the challenges experienced by the caregivers on the support and care of a family member after heart valve repair or replacement surgery. The next chapter presents a discussion of the results and findings from both quantitative and qualitative research.

CHAPTER FIVE

DISCUSSION OF THE RESULTS AND FINDINGS OF QUANTITATIVE AND QUALITATIVE RESEARCH

5.1 INTRODUCTION

The previous chapter presented the results and the findings of the quantitative and qualitative strands. This chapter presents a discussion of the findings of both the quantitative and qualitative strands according to the study objectives.

The first section discusses the results of quantitative data on the variables of KAP of nurses regarding cardiac rehabilitation. The second section of the discussion is about the findings from the qualitative data regarding challenges experienced by nurses regarding providing CR, patients' experiences of recovery and coping after heart valve surgery, and caregivers' experiences of the support and care provided to a family member who had heart valve surgery (based on Roy Adaptation Model). The discussions of quantitative results and qualitative findings are contrasted with the relevant literature from previous studies and highlight the knowledge gap in the existing relevant literature.

5.2 OBJECTIVE 1.1- KNOWLEDGE, ATTITUDES, AND PRACTICES OF THE NURSES REGARDING CARDIAC REHABILITATION

This section discusses the quantitative results of nurses on KAP regarding CR for patients who have had heart valve repair and replacement surgery.

Regarding the demographic characteristics of the participants, the study found that the majority, (91.3%), of the participants were female, while 8.7% were male. This is in concurrence with Kumudah et al., (2020)' study conducted in a tertiary care teaching

hospital in Malaysia who suggest that females are inclined to choose a nursing career as they are more comfortable in providing nursing care than males. This study showed that the majority 11 (47.8%) were of the age 40 years and above while 34.8% were of the age group of 20-29 years. The majority 17 (73.9%) were registered nurses and 1 (4.3%) had a Master's degree in Nursing Science. A higher representation of participants who are older than 40 years in this study suggests that the majority of the nurse respondents have experience in providing nursing care. As a result, they are potentially able to facilitate quality interventions of CR for cardiac patients after heart valve surgery. A higher proportion of registered nurses, some with advanced qualifications in nursing at the Cardiac Unit/Clinic suggests that they should be able to apply advanced knowledge and skills in nursing and provide quality care about cardiac rehabilitation to patients after heart valve repair and replacement surgery and their caregivers.

However, a notable 34.8% of the respondents who are aged 20-29 years indicate that they have less experience in nursing, potentially less knowledge about CR, and may not provide quality care about cardiac rehabilitation.

Similar to the findings of this study, an analogous study by Salim et. al., (2021) also indicates that only a limited number of the study participants hold Master's and PhDs in Nursing Science while the majority hold a baccalaureate degree and a diploma in nursing science.

Regarding the years of experience in the Cardiac Unit/Clinic, the findings indicate that the majority (60.9%) had experience of 3 years and more, similar to the findings of a study conducted in Tertiary Care Teaching Hospital in Malaysia by Kumudah et al., (2020) which also found that the majority of nurses who provide nursing care to cardiac patients had more experience of 4-7 years (38%) and 8 years of experience and

above (27.2%). Experience in cardiac care suggests that patients are provided with quality care.

In terms of training related to cardiac conditions, only 6 (26%) had attended training on cardiac thoracic surgery, cardiovascular diseases, and INR education. Cardiopulmonary resuscitation, cardiovascular diseases, and education in INR were each attended by a mere 1(4.3%) of the respondents. According to Kumudah et al., (2020), lack of education results in knowledge and skill gaps, which may lead to inappropriate delivery of health care, subsequent delayed recovery, and poor coping for patients after cardiac surgery. Correspondingly, a lack of knowledge and skills in CR interventions among some nurse respondents was also reported by the nurses in sub-theme 5, 4.3.1.5 of Chapter 4. This indicates that most of the nurses in the Cardiac Unit and Cardiac Clinic have not received any education related to cardiac nursing care. Education related to cardiac nursing would equip cardiac nurses with advanced, updated knowledge and skills, including interventions for CR for patients after cardiac surgery.

In addition, a Cardiac Unit is a specialised unit that deals with complex and major operations related to cardiac conditions; therefore, nurses should be trained or undergo short courses about cardiac care on a continuous basis. Degavi and Bhupali's (2015) study conducted in Belgaum, Karnataka suggested enhancing the knowledge of the nurses regarding cardiac rehabilitation by nurse educators to improve the quality of life of cardiac patients. Concurrently, Salim et al., (2020) recommend that knowledge and skill gaps among healthcare providers be identified, and training regarding CR be planned and implemented to upgrade the knowledge and skills of healthcare providers.

Updated and advanced knowledge and skills about CR would enable nurse practitioners to implement the interventions of CR effectively, promote patients' recovery and equally empower caregivers to cope with the demand for care and support for their family members who had HVS (Ambrosetti et al., 2021; Abreu et al., 2018; Balady, 2007).

Therefore, this study recommended that nursing staff at the Cardiac Unit and Cardiac Clinic attend education on CR to be equipped with the knowledge and skills to deal with the challenges they may encounter while attending to patients and their caregivers.

With regard to nurses' knowledge about CR, the results indicated that nurse respondents had a higher level of knowledge (87%) regarding the core components of cardiac rehabilitation. The overall level of knowledge regarding aspects of core components for CR indicated that the majority (95.7%) of the respondents have a high level of knowledge on patient assessment and psychosocial management, followed by 91.3% of knowledge on diet/nutritional counselling, and smoking cessation, respectively. Lastly, 78.3% had good knowledge of exercise education. This suggests that the nurses claim a high level of knowledge despite the lack of education received about cardiac rehabilitation.

In support of this study, different literature concurs that despite the absence of a comprehensive CRP in healthcare settings, medical and nursing staff have a good knowledge of the components of cardiac rehabilitation (Farah et al., 2021; Zhu et al., 2020; Kumudah et al., 2020). However, in contrast to this study, Salim & Hassoun, (2021) argue that half of the medical staff and paramedical staff, including nurses, have poor knowledge about the cardiac rehabilitation program.

However, although the results in this study have indicated a high level of knowledge on CR among the nurse respondents discordantly, there were some aspects of the core components of CR for which the nurse respondents lacked knowledge. The respondents lacked knowledge on the **indication of cardiac rehabilitation** as only 26.1% had good knowledge, while only 30.4% had good knowledge on the **phases of cardiac rehabilitation**. The lack of knowledge about the indications of CR might indicate the non-existence of the CRP, as well as a lack of education among the nurses. Similarly, the findings of qualitative data indicated that both patients and caregivers lacked the knowledge on self-care to enhance recovery and caregivers needed the knowledge on the procedures for cardiac rehabilitation. This indicates the convergence of quantitative and qualitative data.

In support of the study's results, a study conducted by Degavi et al., (2015) among the nurses found that the nurses had inadequate knowledge regarding the cardiac rehabilitation programme. The study further suggested enhancing the knowledge of the nurses regarding cardiac rehabilitation to improve the quality of life for cardiac patients (Degavi et al., 2015).

The results further indicated that nurses lacked knowledge of the different phases of the cardiac rehabilitation programme. According to the literature, Phase 1 of CR begins while the patient is in the hospital and includes early mobilization for the prevention of complications and patient assessment. Phase 2 starts after discharge from the hospital and includes the provision of health information to the patients and caregivers. Phase 3 is about exercise and education programs and lastly, phase four (4) is about long-term maintenance (Kumudah et.al., 2020; Alosaimi et al, 2017; McMahon et al., 2017).

With regards to the **healing period of the breastbone after heart surgery**, the results indicated that only 43.5% of the respondents had good knowledge. Convergence was also observed in qualitative data that some nurses lacked the knowledge and skills, especially junior nurses who did not have enough experience to provide nursing care to cardiac patients postoperatively. Similarly, in the qualitative data findings, the patients and caregivers also expressed concern about the lack and need for knowledge on self-care and the procedures for CR interventions respectively. This agrees with the study's results that the majority of the nurses did not receive education regarding cardiac conditions.

In support of this study, a study conducted by Abbas and Jasim, (2019) at Al-Nasinyah Health Centre in India recommends that nurses should receive continuing education sessions on CR to raise nurses' awareness of strategies to prevent complications and promote recovery from heart valve replacement surgery. This recommendation may be adopted in the Namibian context to conduct short courses or education among the nurses working at the Cardiac Unit and Cardiac Clinic to enhance their knowledge about cardiac rehabilitation.

Regarding the **Warfarin treatment for one (1) month following mitral valve repair**, the results from this study indicated that only (21.7%) of the respondents had good knowledge of that fact [Chapter 4]. Nonetheless, the American Heart Association (AHA) and American College of Cardiology guidelines recommend that following mitral valve repair surgery a patient should receive anticoagulants Warfarin for the first 3 months to achieve an INR of 2.5 (Members, et al., 2021). In this regard, Watt, et al., (2020), affirm that post-operative Warfarin administration was associated with improved long-term survival and an overall decrease in the composite of bleeding and

thromboembolic incidents. Therefore, the Warfarin given at three months is safe for the patients following mitral valve repair.

Moreover, evidence of nurses' lack of the knowledge on Warfarin treatment regimen is supported by the findings from the qualitative data in sub-theme 4.3.1.5 of Chapter 4, where some nurses at the Cardiac Unit lacked the knowledge and skills in adjusting Warfarin dosages based on the INR results. Instead, they referred patients to the nurses at the Cardiac Clinic for INR education training and information, as alluded to by the nurse respondents N1, N2, & N8 in Chapter 4. This indicates convergence in both quantitative and qualitative strands of the data that the nurses lacked the knowledge and skills to provide CR to patients after heart valve surgery.

With regard to the **two types of exercises for cardiac rehabilitation**, the results indicated that only (26.1%) of the respondents had good knowledge, and the majority had poor knowledge [chapter 4]. Similarly, only (34.8%) had good knowledge of the different types of aerobic exercises such as walking, swimming, jogging, climbing stairs, and lightweight exercises. Similarly, in the qualitative data of sub-theme 4.4.1.3 and sub-theme 4.4.2.2, the patients also mentioned they received limited information about exercises and were not informed about the types of exercises, intensity and durations for exercise as quoted by patient HVP 1; HVP 4; HVP 11, & HVP 12, in Chapter 4. This evidence indicates convergence in both qualitative and quantitative strands. Nurses' lack of assertiveness in providing information about exercise to patients for CR is presumably ascribed to the unavailability of a standardized CRP at the Cardiac Unit to guide the facilitation of the CR of patients after heart surgery by nurses.

Exercise education is a crucial component of secondary prevention in cardiac rehabilitation, and patients after heart surgery should receive it as recommended by

international guidelines on cardiac rehabilitation (Ambrosetti et al., 2021; Anderson, et al., 2016). Exercise education improves functional capacity, quality of life, disease-related symptoms, depression, and reduces mortality and hospital admissions costs (Ambrosetti et al., 2021; Völler, et al., 2015; Thomas, et al., 2019; Piepoli, et al., 2014). Therefore, nurses should educate and counsel patients to participate in exercise education as prescribed by the cardiologist or trained physiotherapists. International guidelines recommend that exercise instruction should be personalized after a thorough clinical assessment that considers risk stratification, behavioural traits, personal goals, and exercise choice, (Ambrosetti, et al., 2021). Therefore, nurses, educators, and counsellors should know these recommended policies.

Aerobic exercises for CR are recommended by international guidelines and their benefits include enhancement of cardiovascular health and recovery of the patients by lowering and controlling blood pressure, easing chronic pain, maintaining a healthy weight, boosting mood and strengthening the immune system (Ambrosetti, et al., 2021; Squires et al., 2018; Ribeiro et al., 2017; Price, et al., 2016; Grace et al., 2016).

Regarding when **upper-body training should begin**, it was reported that only (39.1%) of the respondents had good knowledge [Chapter 4- Table 4.6, Sec B]. The existing guidelines based on consensus, recommend that upper body training can begin when the chest is stable usually after 6 weeks following sternotomy (Ambrosetti et al., 2021; Grace et al., 2016). In contrast, the randomized clinical trial conducted by Ennis, et al., (2022) found that starting exercise training as early as 2 weeks was safe and effective as starting 6 weeks after sternotomy. Nonetheless, healthcare providers should be cautious and aware that exercise education and training after surgery involving upper body training can be started as early as 2 weeks given that it is safe and supervised by

a trained physiotherapy or exercise therapist (Abreu, et al., 2018). However, other recommendations advise individuals who have had surgery to refrain from vigorous upper extremity exercise until the work is stabilized.

Furthermore, with regard to **educating and involving caregivers on dietary goals and healthy food choices**, the findings indicated that the majority of the participants, (95.7%), had good knowledge. Similarly, surprising results emerged that all the nurses (100%) claimed that caregivers, family members, and other support people should be encouraged to participate in the cardiac rehabilitation process of the patient throughout [chapter 4]. However, in the qualitative data, this is contradictory as the nurses reported not involving the caregivers in the CR interventions of the patients but rather involving them in the case of a minor or disabled patient as quoted by N1, N3-6 in sub-theme 4.3.1.9 in Chapter 4.

Additionally, discordant results were also observed among the caregivers who reported a lack of support from the nurses regarding information on how to support and care for their family members as referred to in sub-theme 4.5.2.2. However, there were some limited positive findings from the caregivers of receiving information from the nurses on how to care for their family member after heart valve surgery as quoted [Sub-theme 4.5.2.1] in Chapter 4. By the implications, nurses do not involve the caregivers in the care of their family members after heart surgery. Caregivers perform their caregiving roles with uncertainty, and heightened care burden which results in poor quality of care at home, and delayed recovery of the patients. Caregivers should, therefore, be included in the care of their family members since they are performing different caring tasks with uncertainty. In support of this study, several studies also reported that caregivers lack support from the healthcare system to provide care and support to their significant others (Grant & Graven, 2018; Gusdal, et al., 2016; Bahrami, et al., 2014).

In addition to the nurses' lack of knowledge of cardiac rehabilitation, a de Melo Ghisi et al., (2018) study conducted in India added that cardiologists too had poor knowledge about cardiac rehabilitation despite their awareness of the importance and its core components for secondary prevention. Therefore, de Melo Ghisi et al., (2018) recommend that cardiologists should equally receive education to improve their knowledge and skills for the implementation of CR, which will in turn encourage more patient referrals and ultimately utilization of cardiac rehabilitation programmes. This strategy might also be adopted in a Namibian context for the nurses at the Cardiac Unit and Cardiac Clinic to establish a cardiac rehabilitation programme with core components to improve patient quality of care and empower the caregivers with the knowledge and skills for them to provide appropriate home care for their family members after heart valve surgery.

In addition, the findings indicated the **overall level of nurses' attitudes towards cardiac rehabilitation** that the majority, (91.3%), was positive with only 1 (4.3%) having an overall negative attitude. Convergently, in the findings for qualitative data nurses perceived CRP as an important intervention for patients who underwent heart valve surgery as quoted by nurse participants [Chapter 4, sub-theme 4.3.2.1; N1-3; 7 & 8]. Supporting the study, Salim, et al, (2021) also showed that most participants had fair to good attitudes toward the cardiac rehabilitation program. However, there is a contradiction as nurses displayed negative attitudes towards patients and caregivers in terms of support and involvement in CRP interventions as referred to in subthemes 4.3.1.9 (nurses); 4.4.1.3; 4.4.2.2 (patients), and 4.5.1.2 & 4.5.2.2 (caregivers). Patients reported a lack of support from nurses as well as caregivers expressing a need for knowledge of procedures. This indicates the discordance of quantitative and qualitative results.

Despite the results indicating nurses' positive attitudes toward CR, nurses displayed negative attitudes towards some aspects about their attitudes regarding the components of cardiac rehabilitation. These aspects include negative attitudes towards phases, indications for CR, the role of the multidisciplinary team in CR, the use of a Warfarin information booklet, sexual counselling for patients, caregiver involvement and support, and patient support.

Therefore, the results revealed that less than half 11 (47.8%) of the nurse respondents, had a fair attitude, of **being skilled enough and interested in providing health information** to patients regarding the cardiac rehabilitation programme after heart surgery [Chapter 4, Table 4.15]. A statistically significant association was also observed among participants aged 40 and above, and positive attitudes in providing health information to patients ($p=0.038$). Positive attitudes toward cardiac rehabilitation among older nurses may be due to their many years of experience in nursing cardiac patients after heart valve surgery.

However, nurses' claim to be skilled enough and interested in providing health information to patients is contrary to the findings of the qualitative data, which revealed that nurses experienced language barriers when communicating CR interventions to patients, as referred to in sub-theme 4.3.1.1. Difficulties in conveying information to patients from diverse cultural backgrounds who could not express themselves in English were quoted by [N1, 2, 7, & 8: Chapter 4]. Similarly, patients and caregivers expressed that language barriers were one of the reasons why nurses could not provide appropriate and adequate health information about cardiac rehabilitation to patients as quoted by [Patients: HVP10 & 12], and [Caregivers: C1, 2, 6, & 8] respectively.

In support of this study, Zhu et al., (2020) asserted that nurses displayed negative attitudes which hindered the application of cardiac rehabilitation. Therefore, this indicates both convergence and discordance in both quantitative and qualitative data.

In support of the current findings, Al Shamsi (2020) found that language limitations in the healthcare sector led to miscommunication between medical professionals and patients, decreasing satisfaction for both parties and affecting the standard of healthcare delivery and patient safety. The implications and strategies to overcome language barriers are discussed in Chapter 5, under objective 1.2, nurses' challenges.

Another indicator of nurses' negative attitudes towards cardiac rehabilitation is the **idea that patients and caregivers should be responsible for their own health behaviour**. The results indicated that a notable portion, (39.1%) of the nurses had negative attitudes towards their professional responsibility to support patients and caregivers for patients' rehabilitation. They asserted that patients and caregivers should be responsible for their health behaviour, risk reduction, and post-hospitalisation care, and the majority 87% had negative attitudes towards the idea that caregivers should assist with exercises, and 17 (73.9%), had negative attitudes towards the **role of the multidisciplinary** team in providing information to patients after heart valve surgery. Additionally, the nurses believed that it was the responsibility of cardiologists to provide information to patients regarding rehabilitation after cardiac surgery.

Cardiac rehabilitation involves a multidisciplinary team, and nurses are a crucial part of that team; they are expected to participate in the recovery process and provide information to patients about CR after heart valve surgery. Nurses spend 24 hours with the patients, and patients feel comfortable in their presence compared to other

healthcare providers. Nurses need to provide holistic care to patients while they are in their care.

Therefore, guidelines from the International Association and literature recommend that the delivery of the core components of CR requires expertise from a range of different professionals including cardiologists, general practitioners, nurses, nurse specialists, physiotherapists, dieticians, psychologists, exercise specialists, occupational therapists and clerical administrators (Ambrossetti et al., 2021; Cowie et al., 2018; Abreu et al., 2018; Piepoli et al., 2014; Dalal et al., 2015; WHO, 1993).

Similarly in this study, 65.2% of the nurse respondents, **believed that exercise training and supervision are the responsibility of physiotherapists** and that it is solely the responsibility of the cardiologist to provide CR services to patients after heart surgery. Convergently, in support of the study findings, Kumudah, et al., (2020) reported that more than 60% of the nurses were not aware of their roles and responsibilities in cardiac rehabilitation programmes. An association of negative attitudes among the participants aged 30-39 years was also observed with a p-value of 0.015. This revelation is supported by the nurses in the qualitative results as they reported of not involving the caregivers in the care of their family members after heart valve surgery as previously discussed in this session. Similarly, a study conducted by Etemadifar et al., (2015) in three educational hospitals in Isfahan, Iran reported caregivers' uncertainty, lack of familial support, and lack of support from the healthcare team. As a result, they lacked basic knowledge related to the diseases and medications.

Therefore, nurses should have positive attitudes towards patients and caregivers to reduce uncertainty among the caregivers regarding the care and support of family members who underwent heart valve surgery. Moreover, in the absence of nurses,

caregivers are the ones who provide home care to the patients after discharge from the hospitals, therefore, they need to be equipped with the knowledge and skills to perform their caring role of complex tasks safely and effectively (Grant, et al., 2016; Burke, et al., 2014).

The findings further revealed that half of the nurses, 52,2%, had negative attitudes as they asserted that the **information given to patients on discharge was sufficient for their recovery process** [Chapter 4-Sec C: Table 4.16]. This is in agreement with findings from the qualitative data which showed the nurses lacked the knowledge and skills coupled with the unavailability of the CRP to facilitate interventions for patients after heart valve surgery, as referred to in sub-theme 4.3.1.5 and 4.3.1.8 respectively. In contrast, according to Berg et al., (2013), the information given to patients should be provided continuously, both while in the hospital, after discharge, and during follow-up appointments. This is because patients tend to forget what they were told while in the hospital and upon discharge. According to Kumudah et al., (2020), healthcare professionals, including nurses, cardiologists, and other doctors, play a crucial role in assisting patients by offering pre-and post-operative education and counselling, which can assist in alleviating worries and discomfort. Therefore, nurses have an important role in ensuring that patients are well cared for, enabling them to recover from their illness and return to their normal daily activities.

In addition, approximately 61% of the nurses had negative attitudes towards **information given to patients regarding the Warfarin booklet**. The Warfarin information booklet contains information about Warfarin doses, INR levels, other medications, diet, contraindications, and when to come for follow-up and is given to all cardiac patients who undergo mechanical valve procedures. The booklet should be carried by the patient when visiting a health facility for follow-up visits.

However, the information in the booklet might not be sufficient to equip patients with the necessary knowledge, as most patients may be reluctant to read the information and instead prefer verbal communication from nurses upon discharge and during follow-up visits. In support of the quantitative results, findings from qualitative data indicated that some nurses at the Cardiac Unit do not provide information about Warfarin to patients but rather refer them to the clinic for training in INR as referred to in sub-theme 4.3.1.5. This shows a convergence of quantitative results and qualitative findings. Orienting the patients about the Warfarin information booklet before discharge from the hospital is important so that patients can recognise or identify any potential complications, seek an INR test, adjust medication doses, and follow dietary guidelines.

Providing health education to patients about sexual life activities was another result which signalled nurses' negative attitude in this study. Only 34.8% of the respondents felt comfortable talking to the patients and their caregivers about sexual life. The majority of the nurses were uncomfortable and unsure about discussing patients' sexual activities because they regarded providing sexual health information to patients as taboo. The nurses perceived sexual-related health education as a taboo in some cultures and religions in Namibia. This indicates convergence in both quantitative and qualitative data.

This view is in concurrence with Saunamäki, and Engström (2014) who concluded that nurses consider sexual-related health education a taboo, and as a result, they are inclined to dismiss their responsibility to provide sexual information to patients. However, proponents of health promotion advocate for sexual health education for a person's physical, mental, emotional, and social well-being, therefore, patients need to be provided with sexual health information. In this regard, Azar, et al., (2022) and

Saunamäki and Engström, (2014) recommend sexual education for nurses to empower them to overcome the barriers related to sexual health education for clients of health services.

With regard to practice in this study, the overall results revealed that only over half of the nurses, 13 (56.5%) had good practices regarding cardiac rehabilitation. Nevertheless, a lack of education among the nurses regarding CRP was observed in the demographic data of the nurse respondents, and the unavailability of a standardised CRP to guide the rehabilitation of patients after heart valve surgery, as referred to in sub-theme 4.3.1.8, in chapter 4. Conversely, the patients and caregivers reported a lack of support from the nurses. This shows discordance and convergence of results.

Nonetheless, it was observed that the majority (87%) of the **nurses educate patients about the medication regimens**. However, this is contradictory, as the nurses claim to face challenges due to a language barrier in communicating health information to the patients, as well as patient's ignorance of health information as referred to in sub-theme 4.3.1.1, and sub-theme 4.3.1.4 respectively. This indicates the discordance of quantitative results and qualitative findings.

Although the nurses demonstrated average practices about the implementation of CR, the findings revealed poor to lack of practice in some variables of cardiac rehabilitation: namely early detection of complications, sexual activities counselling, advising, encouraging, and counselling of caregivers, teaching patients on changing habits of smoking and alcohol, working through the Warfarin information booklet, counselling and listening to patients and caregivers' problems and responding accordingly. The study reported poor to average practices among the nurses regarding the implementation of cardiac rehabilitation activities before patients are discharged from the hospital as discussed in the next section.

Less than half (47.8%) of the respondents always practised **giving health information to patients about the early detection of complications and worked through the Warfarin information booklet** with the patients before discharge. This means that patients are not adequately provided with sufficient information on the early detection of complications, which is important in seeking medical assistance. The low score of practice about these variables indicates incomplete care to patients by nurses after heart valve surgery, which in turn places patients at risk of developing complications.

According to Shahmoradi et al., (2022), patients who engage in educational strategies before and after heart surgery can significantly obtain necessary information and respond to treatment more effectively. Therefore, the educational programme for nurses to facilitate CR may equip nurses with sufficient knowledge and skills for the sufficient practice of CR to patients who had HVS and to support their caregivers.

Equally, and as with the attitudes, only 17.4% of the respondents always provide **sexual counselling to the patients**. The nurses' poor practice of sexual health information was also confirmed by a study by Azar, et al., (2022), which found that nurses feel uncomfortable with the subject as it is culturally regarded as taboo and sensitive. Therefore, Azar et al., (2022), recommend a nursing education curriculum that includes theoretical and clinical foundations about sexuality and sexual health to improve prospective nurses' competencies in providing sexual health education. The proposed curriculum would assist nurses in gaining the necessary knowledge and modifying their attitudes, and confidence to discuss sexual health education with patients after heart surgery.

Similarly, only 47.8% always **advised caregivers regarding the support and care** of their family members. In addition, a statistically significant association was observed between the age group of 20-29 years and a positive attitude about providing

regular advice to caregivers regarding the support and care of their family members with a p-value of 0.041. Convergently, caregivers also expressed disappointment about the lack of support from the nurses, as described in the previous sections of this chapter.

Moreover, poor practice was also noted among the **nurses regarding the preparation of a workup schedule** for the patients' aerobic exercises such as swimming, cycling, rowing, bicycling, and jogging, and only 13% demonstrated good practice. The poor practice of the nurses in exercise training validates nurses' perception that providing training exercises for patients is rather the responsibility of trained exercise therapists as pointed out in the discussion of nurses' attitude towards cardiac rehabilitation.

It is therefore equally important for the healthcare system to provide in-service training and education to the nurses at the Cardiac Unit/Clinic about cardiac rehabilitation. In return, nurses would provide caregivers with necessary information regarding the rehabilitation of their family members after heart surgery (Sandy, et al., 2013).

With regard to the association between the nurse's demographic characteristics and attitudes towards cardiac rehabilitation, significant associations were found between the nurses' age, gender, ranks, and some core components of cardiac rehabilitation. Approximately 72.7% of the respondents who were 40 years old and above had a positive attitude toward cardiac rehabilitation, with a statistically significant association of p-value <0.050. This study established that older nurses demonstrate a positive attitude toward cardiac rehabilitation.

Negative attitudes among the respondents below the age of 40 may be related to a lack of experience in different aspects of cardiac rehabilitation as they have fewer years of experience in the Cardiac Unit. In contrast to this study's findings, Kumudah, et al.,

2020) found no significant differences between age, sex, education, years of working experience, and attitudes toward the cardiac rehabilitation programme.

Furthermore, a negative association between attitude and age regarding the encouragement of health behaviour changes, risk reduction, and self-care management of patients and caregivers for CR was found across all age categories as indicated by the p-value of less than 0.050. The study concluded that both groups, 30-39 years (100%), 20-29 (50%), and above 40 (81.9%) had negative attitudes towards the encouragement of health behaviour changes, risk reduction, and self-care management of patients and caregivers.

Similarly, there is an association of p-value of less than 0.050 between the younger age category of 20-29 years and positive attitudes as respondents of this age category believed that caregivers usually experience difficulty in supporting and caring for their relatives after heart valve surgery. The positive attitude of the age category between 20-29 may be because they have recently graduated from their training and may still be influenced by the knowledge about the need to support caregivers. This revelation is supported by Kumudah et al., (2020) who state that nurses should act as a role as good listeners, and counsellors of patients and their family members. Therefore, the nurses should provide support to the caregivers to help them overcome uncertainty while attending to the needs of their family members after heart surgery.

Regarding the association between nurses' gender and attitudes towards cardiac rehabilitation, female respondents displayed or had negative attitudes regarding the commencement of CR and the need for continuous provision of information to patients and caregivers. This was indicated by a p-value of less than 0.050. The reason for the

majority of females having a negative attitude was because male respondents were the minority (only 2 males).

Nevertheless, the findings about nurses' negative attitudes towards cardiac rehabilitation imply, as also anchored by Kumudah, et al., (2020), that nurses are not well informed about cardiac rehabilitation and its activities to promote patient recovery and coping after heart valve surgery. This is mainly due to the non-existence of the cardiac rehabilitation programme and lack of training related to cardiac conditions. However, it is important that the nurses at the Cardiac Unit are well-informed about cardiac rehabilitation programmes so that they can provide appropriate information to the patients to enhance recovery. Therefore, it is necessary to develop a contextualised cardiac rehabilitation programme for use by nurses to facilitate the rehabilitation of patients after cardiac surgery.

Regarding the overall association between nurses' rank and attitude towards cardiac rehabilitation, the findings show that about 70.6% of the registered nurses have positive attitudes toward the benefit of cardiac rehabilitation. A positive attitude towards CR among registered nurses might be ascribed to their level of education. Basic aspects of cardiac care are part of the undergraduate curriculum for the qualification of a bachelor's degree in nursing science. Therefore, registered nurses can reflect on that. Furthermore, participants alluded under qualitative data that CR is important and beneficial for the patients and should be in place. Nevertheless, the difference in the current study might be that only specific aspects of the core components were analysed for the association, and as a result of the small sample size. However, no overall association was found with all the variables of demographic data and attitudes regarding cardiac rehabilitation.

In support of this study's findings, a study by Zhu et., al., (2020) found significant differences in the attitudes of the medical staff toward the application of cardiac rehabilitation. The author reported that the lower the educational level, lower job title, and short specialty work experiences, the more negative attitudes toward rehabilitation.

The study findings revealed no association between education related to cardiac conditions and attitudes toward CR because even participants who were trained in some aspects of CR demonstrated negative attitudes towards the benefit of CR as indicated by the *p*-value less than 0.050. The study concludes that the negative attitudes might be because the majority of the nurses were not educated in CR, and therefore, are not aware of the benefits of CR for patients after heart valve surgery. Zhu, et al., (2020) study further concluded that the perception of no benefit of cardiac rehabilitation by medical staff including nurses is the main obstructive factor of cardiac rehabilitation.

This indicates that despite the overall high level of knowledge of CR demonstrated by nurses, their attitudes towards some aspects of the core components of CR were negative, which may restrict the implementation of CR activities. Therefore, the establishment and implementation of a CRP would improve the attitudes of nurses, especially newly graduated nurses towards cardiac rehabilitation.

The findings also indicated a significant association between practice, age and training related to cardiac conditions. The participants of age groups of 20-29 and 40 years and above had a positive practice in advising the caregivers regarding support and care of their family members which is indicated by the *p*-value of less than 0.050. The support that the nurses provided is related to information given on medications, diet, and follow-up visits. In support of this study, Becqué, et al., (2021)'s study affirms that

nurses provided information to caregivers about identified needs, practical training on various tasks like bathing, wound care, medication administration, emotional support, decision-making support, and organized respite for the family members who underwent cardiac surgery.

The results established a significant association between training related to cardiac conditions and practices, as indicated by the p-value of less than 0.050 on education related to cardiac conditions, medication, compliance, and side effects. Those who underwent training related to cardiac conditions had a better practice towards cardiac rehabilitation. However, the findings reveal poor practices on medication and its side effects. Lack of education about medication causes non-adherence of patients to medications, complications and subsequent poor health outcomes for patients.

5.2.1 Summary

This section presented a discussion of the results about the knowledge, attitudes, and practices of nurses, which indicated a higher level of knowledge and attitude and average practice about cardiac rehabilitation. Despite the overall high level of knowledge, positive attitudes, and average practices from the quantitative data, nurses lacked knowledge, negative attitudes, and poor practices regarding some aspects of the core components, indications, and phases of cardiac rehabilitation.

The next section presents the discussion of the findings of objective 1.2 on the challenges experienced by nurses in providing cardiac rehabilitation to patients after heart valve surgery.

5.3 OBJECTIVE 1.2: CHALLENGES EXPERIENCED BY NURSES IN PROVIDING CARDIAC REHABILITATION OF PATIENTS AFTER HEART VALVE SURGERY

Introduction

This section presents the discussion of the findings of objective 1.2 of the nurses, which aimed to explore and describe the challenges experienced by nurses in providing CR to patients after heart valve surgery. Different challenges regarding the delivery of CR interventions for patients who had heart surgery and nurses' opinions and views regarding the importance of cardiac rehabilitation programs after heart valve surgery emerged as themes. These themes are supported by sub-themes described in Chapter 4 of the study findings.

The nurse respondents indicated that they experienced a **language barrier** in communicating interventions of cardiac rehabilitation to the patients. Language is central to communication; it helps the speaker and listeners understand each other's needs. Therefore, AL Shamsi, et al., (2020) argue that language barriers may hinder effective communication between patients and nurses, lead to miscommunication, reduce parties' satisfaction, and decrease the quality of healthcare delivery at healthcare facilities. Watson (2018) adds that communicating health information to patients through an interpreter contributes indirectly to increased costs and the length of treatment visits because patients have to wait for the interpreter before they can be attended to or receive health information.

In this study, some nurse participants expressed concern regarding the language as an impediment for nurses to communicate health information about CR after heart valve surgery to patients who are of diverse cultures, and some of whom could not express themselves in English. In this regard, a similar study conducted in South Africa by

Maddocks, and Cobbing (2017) emphasized that communication barriers between healthcare workers and patients, result in the provision of inadequate information to patients.

Previous studies have described measures to overcome language barriers in healthcare settings. Al Shamsi et al., (2020)'s study suggested that the implementation of online translation tools such as Google Translate and MediBabble may improve the quality of healthcare and the level of satisfaction among both healthcare providers and patients. Even though the tool may improve patients' quality of health care, these tools might not be feasible in the Namibian context as most of the cardiac patients are from a low-income group and cannot afford smartphones and internet services.

However, a study conducted by Ali and Watson (2019) concluded that the use of bilingual nurses or other healthcare professionals who can speak the language of the patient can be useful, especially when the patient is under stress, experiencing pain, and under the influence of medications or anaesthesia. Therefore, the use of bilingual nurses enables patients to open up and express the information they need. Moreover, the MoHSS in Namibia may also adopt this intervention to train nurses who would serve as interpreters to patients with language barriers. This may alleviate anxiety and medication errors and may also improve accessibility to health care.

Economic status among the patients and caregivers was another finding revealed from the study. Socioeconomic status (SES) is often measured as a combination of education, income, and occupation Baker, (2014), and possessions, which tends to be positively associated with better health. Socioeconomic factors influence cardiac patients' attendance at follow-up visits and adherence to medications after heart surgery.

The findings of this study indicated that poor socioeconomic status is a challenge that negatively affects the delivery of CR, regarding responses to health information for rehabilitation and compliance with activities for CR by the patients and their caregivers. Some of the nurse participants reported that almost all of the patients could not afford transport-related expenses to go to the hospital for follow-up, because some of the cardiac patients were unemployed, residing in rural areas and facing far distances to travel to Windhoek for follow-up treatment.

Most of the patients left work as a result of ill health and employers could not retain their positions. Subsequently, the nurse participants indicated that some patients were receiving hospital-based grants which were not sufficient to sustain their livelihood and attend follow-up visits. These resulted in some patients defaulting on their follow-up and medications due to financial constraints. By the implications, these barriers may hinder patients from attending cardiac rehabilitation services, even if it is available.

In support of the findings from this study, according to previous research, rural residents and patients with low socio-economic status (SES) have more obstacles to utilizing cardiac rehabilitation services than their urban counterparts because of distance, cost, and transportation issues (Bakhshayeh, et al., 2019; Shanmugasegaram, et al., 2013).

Other studies conducted on the barriers to CR delivery and utilization in low-resource settings among healthcare administrators, rehabilitation providers, and cardiac patients found a low level of patient education, lack of patient motivation to change habits, patients' belief that they could handle their problems, lack of time, and lack of knowledge about CR by nurses and dieticians as other socio-economic factors that

cause ineffective delivery of CR to clients (Sérvio, et al., 2019). Graversen et al., (2017) and Laustsen et al., (2013) therefore conclude that patients with low socioeconomic status received less information and were less willing to participate in CR and as a result, they are at risk of developing complications. Subsequently, the findings from this study revealed that most of the patients who did not turn up for follow-up treatments were readmitted for postoperative complications such as valve clots and infections resulting from medication non-compliance.

To overcome these socioeconomic barriers, Chindhy, et al., (2020) and Bakhshayeh, et al., (2019) suggest that home-based cardiac rehabilitation (HBCR) alone or in combination with Centre-based Cardiac Rehabilitation (CBCR) can assist patient participation, for example, through scheduling flexibility, time commitment, travel distance, cost arrangement, and consideration of patient preferences. This model might be adopted for the CR of patients after heart valve surgery in Namibia.

Perception of sex education by nurses as taboo was another concern of the participants from this study. According to the WHO, (2006), sexuality is a central aspect of a human being throughout life and encompasses, among other aspects: gender identities, sexual roles, intimacy, sex, and reproduction. Sexuality is experienced and expressed in beliefs, values, roles, relationships desires, fantasies, attitudes and practices, (WHO, 2006). Therefore, sexual education for CR is essential to prevent complications and improve the quality of life and well-being of cardiac patients. Furthermore, individual patients with cardiac disease have the right to information, and education about sexuality (WHO, 2006).

The quantitative results indicated that only 34.8% of the nurse respondents felt comfortable talking to the patients about sexual activities and that the nurses have

reservations about talking to cardiac patients regarding sexual activities such as when to commence sexual activity after heart surgery except for family planning advice for transitioning adolescents. Other than that, some nurse participants have never attempted to talk about sexuality to the patients after heart valve surgery. They regard talking about sexual activities as taboo according to some cultures and religions in Namibia.

In addition, even those nurses who claimed to have given information on sexual education to patients, could not provide detailed information but only provided information on the resumption of sexual activities after 6 weeks postoperatively or when the sternotomy wound has completely healed, and information on the use of Implanton as a method of contraception for family planning.

The findings from this study are parallel with those of previous studies. A study by Yılmaz and Karataş, (2018) reported that sexuality is regarded as a taboo, intimate, shameful, and sinful subject. Therefore, sexuality is forbidden in society and cannot be talked about, even with one's parents. Similarly, according to Kelder et al., (2020), who agree with Dyer & Das Nair's (2013) study, most healthcare professionals avoid discussing sexuality with patients or use assumptive talks, general advice, deploy patients' talk, depersonalize, and choose patient-initiated advice out of fear of offending them, personal discomfort, and owing to a lack of knowledge about sexual issues. The regard of sexual health education as a taboo by healthcare professionals according to culture and religion also applies to the nurses in Namibia with regard to providing sexual health education to patients after heart valve repair and replacement surgery.

In addition to the health care provider's perception of sexual health education as a taboo, institutional barriers such as lack of education, guidelines, material resources, and the regard of sexual health counselling and education as a private matter and the least priority create barriers for nurses to provide sexual education to cardiac patients (Karani & McLuskey, 2020).

The impact of not receiving sexual health-related information or ambiguity of the information about when to start sexual activities following heart surgery may confuse the patients while their spouses are concerned about the resumption of sexual intercourse after surgery (Pourebrahimi et al., 2021).

To overcome the barriers to the provision of sexual health education to patients by nurses, Fennell and Grant, (2019) suggested that the leaders in professional and community-based organizations should be at the forefront of making recommendations for nurses and practitioners, so they could improve their ability to provide sexual healthcare information to patients, including cardiac patients. Therefore, healthcare professionals should break the taboo around sexual health education and routinely address sexuality and sexual intimacy with cardiac patients to accommodate patients' needs (Traumer, et al., 2019). Subsequently, the findings from this study justify the recommendations of sexual health education for a cardiac rehabilitation programme by nurses for patients who have had heart valve repair and replacement surgery. Communication about sexuality is essential for the prevention of complications, fast recovery, and the improvement of patient's quality of life.

Ignorance of health information by patients was another finding from the study. Ignorance in this study is when the patients do not follow instructions given to them by healthcare providers on self-care after discharge from the hospitals regarding

medication compliance, side effects, wound care, diet, and lifestyle changes which may result in serious complications and premature death or hospital readmissions respectively (Kumar et al., 2021; Rehman et al., 2019).

In this regard, Kumar et al., (2021) and Rehman et al., (2019) suggest that patients should be counselled about the importance of respect for health information and adherence to treatment regimens to mitigate potential complications and minimize re-hospitalizations. Therefore, the ignorance of health information among patients who had heart valve repair and replacement surgery and their families revealed by the study could be better addressed by a CRP for nurses to facilitate the rehabilitation of patients after heart valve repair and replacement surgery in Namibia.

Nurses' lack of knowledge and skills to deliver cardiac rehabilitation was another finding that was a concern for the nurse participants. Lack of knowledge among nurses may compromise the recovery of patients after heart valve surgery. The findings revealed that some nurse participants at the Cardiac Unit do not provide education about INR and Warfarin to patients and their caregivers but rather refer the patients to the Cardiac Clinic for INR education, a facility that is already challenged by space and staff shortages. In addition, most of these nurses at the Cardiac Unit and local hospitals lack sufficient experience in adjusting Warfarin dosages based on the INR results. Poor knowledge among nurses regarding INR and Warfarin education across all units of cardiac care reflects a lack of standardized cardiac rehabilitation programmes.

It was also reported by nurse participants that the nurses in the local hospital did not know the blood specimen for prothrombin time (PI) and Partial Thromboplastin time (PTT). As a result, they could be drawn and placed in the wrong tube. This results in a delay in the patient's treatment and potential complications. Partial Thromboplastin

time is the amount of time in seconds that a patient's blood takes to clot, and the test is employed to evaluate the clotting cascade's intrinsic pathway's activity (Rountree, et al., 2023). In coagulation studies, prothrombin time (PT) and the international normalizing ratio (INR) are typically measured as part of the panel, the results of which guide the adjustment of the Warfarin dosage. Therefore, the nurses at the Cardiac Unit and Cardiac Clinic should know the blood specimen bottle to draw the blood.

The delay in providing information to patients may result in some patients being discharged with insufficient information regarding INR and Warfarin and they may use their medications inappropriately resulting in severe postoperative complications. Moreover, patients who underwent mechanical valve replacement surgery are supposed to be on lifelong anticoagulants to prevent clotting on the artificial valve and their INR levels should be monitored to adjust the dose of the anticoagulant drugs (Zhu et al., 2019). Correct Warfarin dosage can prevent patient potential complications such as bleeding and thrombosis, and as a result improves the long-term survival rate (Zhu et al., 2019). In addition, a cardiac nurse should be knowledgeable about the normal ranges of INR levels, Warfarin, and other health information instead of referring the patients to the clinic for INR education after discharge from the hospital.

After discharge, the INR levels must be monitored every 3-5 days for a month. From one to three months after discharge, the INR should be monitored every 10 to 14 days if the results stabilized. From 3 to 6 months after discharge, INR should be monitored once a month, and from 6 to 12 months after discharge, INR should be monitored once every 2 months. According to the standard of Sub-Saharan Africa, adopted in Namibia, the target INR ranges for the following heart valve surgery are Double Valve Replacement (2.5-3.5; Mitral Valve Replacement (2.5-3.5); Aortic Valve Replacement

(2.0-3.0) (Ministry of Health and Social Services, 2017). These INR ranges require a cardiac nurse to be familiar with.

Therefore, the nurses must explain to the patients before discharge from the hospitals about the normal values in languages that the patients understand better so that they may be able to report to the nurses or the hospital in case the INR results are not normal.

Inadequate resources to facilitate cardiac rehabilitation was another concern highlighted by the nurse participants. Inadequate resources in this study refer to a lack of time, a multidisciplinary team, and infrastructure to deliver CR to patients after HVS, which compromises the quality of patient care and also affects the work efficiency of healthcare providers.

The findings from the nurse participants indicated that nurses were concerned about a **lack of infrastructure to deliver cardiac rehabilitation services to patients** after heart surgery namely: insufficient time, limited space, a shortage of human resources, nurses' commitment to cardiac rehabilitation, a lack of multidisciplinary approach to cardiac rehabilitation, as well as the shortage of medications. These findings are supported by similar studies from Nigeria on the challenges of cardiac rehabilitation, which highlighted inadequate resources such as a lack of focal personnel, insufficient access to the equipment needed for CR, and a lack of referrals of patients by doctors to cardiac rehabilitation programmes. All these factors may hinder the effective provision of cardiac rehabilitation (Auchi, et al., 2020; Sérvio, et al., 2019; de Melo Ghisi, et al., 2019).

Moreover, the findings of this study indicated that other categories of the multidisciplinary team such as pharmacists, physiotherapists and social workers,

whose participation would enhance the provision of comprehensive cardiac rehabilitation services, are not actively involved in the rehabilitation programme for cardiac patients. In support of this study, a previous study reported a lack of interprofessional communication to deliver cardiac rehabilitation. Likewise, the study by Fernandez et al., (2011) reports that some of the challenges for the coordinators of CR services are inadequate communication between healthcare providers and shortages of dedicated CR personnel to deliver the program. Therefore, the literature concludes that without the necessary resources, there would be no efficient and effective facilitation of the cardiac rehabilitation program (Britto, et al., 2020).

The last aspect of inadequate resources to facilitate cardiac rehabilitation for patients is the **shortage of medications** such as Warfarin and antihypertensive drugs. These shortages result in patients having potential complications and subsequent reoperation. Some patients rely on hospital social grants for their daily living and cannot afford to buy their medications in private pharmacies if they are not available in public hospital pharmacies. However, the hospital grants given to the patients are insufficient to cover other basic needs, including medications.

Drug shortages, especially for cardiac medications are seen as challenges in most health care facilities in Namibia. These medications include Warfarin, Penicillin VK, and Carvedilol. Shortages of these drugs negatively impact patient recovery, prolong hospital length of stay, and cause readmissions.

Warfarin is an anticoagulant given to cardiac patients post-mechanical valve replacement as a lifelong medication. If not taken patients, may develop valve complications and the subsequent need for reoperation of the valve (Zhu et al., 2019). Penicillin VK or Penicillin V Potassium is an antibiotic in the form of tablets used to

treat mild to moderate-severe infections due to penicillin G-sensitive microorganisms. Penicillin VK is used as prophylaxis for cardiac patients and reduces the recurrence of rheumatic fever and streptococcal throat infections after valvular heart surgery (Fønhus & Dalsbø, 2020). Non-adherence to this medication decreases the treatment's effectiveness, infection recurrence and bacterial resistance. Having these antibiotics in stock will reduce the need for complications and reoperation of heart valves.

Carvedilol is a non-selective adrenergic blocker used for patients with chronic heart failure with reduced ejection fraction (HFrEF), hypertension, and left ventricular dysfunction following myocardial infarction (MI) and for those who had heart surgery. Carvedilol enable patient's clinical stability and reduces mortality and hospitalization (Singh & Preuss, 2018).

Therefore, Reed, et al., (2016) suggest educating key stakeholders on the underlying causes and consequences of drug shortages and making efforts to prevent and mitigate them by raising awareness of the issues at the organizational level. The study further recommends advocating for changes in laws and regulations to address the underlying causes of drug shortages (Reed, et al., 2016). In this regard, the WHO as reported by Shukar, et al., (2021) established global mitigation strategies at four levels to overcome drug shortages globally. Alternatives to address the current shortage, operational upgrades to lower the likelihood of drug shortages and obtain early warnings, adjustments to legislative legislation, and education and training of all healthcare professionals on managing shortages are some of the techniques to overcome drug shortages (Shukar et al., 2021).

The nurse participants' viewpoints in this study recommend having their own Cardiac Pharmacy where patients and health care providers can obtain patients' medications.

Having a cardiac pharmacy, the pharmacists would maintain sufficient stock, and this will help alleviate the shortages of, or out of stock for cardiac medications.

Given the scale of the inadequacy of resources to facilitate cardiac rehabilitation for patients, as indicated by the nurse participants in this study, this study advocates for CRP for patients after heart valve repair and replacement surgery to enhance and promote patients' recovery and quality of life.

An unavailable standardised cardiac rehabilitation program to guide the rehabilitation of patients after cardiac surgery was highlighted by the nurse participants. Cardiac rehabilitation (CR) is a multifaceted and comprehensive outpatient intervention designed to improve the physical and psycho-social health of patients with cardiovascular disease (CVD) (Chindhy, et al., 2020). Previous studies have described the benefits of CR which, if available may reduce morbidity, mortality, and readmissions and improve patients' quality of life (Pollmann, et al., 2017; Sibilitz, et al., 2016; Anderson et al., 2016; Goel et al., 2015).

Consequently, some of the participants in this study expressed their concerns with regard to the unavailability of the CRP which is important for the recovery of patients after heart valve surgery. The nurses indicated that there was a lack of availability of standard procedure manuals that one could follow to provide health information to the patients before and after discharge from the hospital following heart valve surgery. Equally, caregivers indicated that there is a need for support system within the hospital, for emotional and physical support of patients after heart valve surgery. Therefore, the findings revealed that the nurses could only give health information available to assist patients with their recovery, without being guided by a standardized cardiac rehabilitation programme.

In support of the findings from this study, different literatures add that lack of medical insurance coverage, lack of cardiac centres, cardiologists' inadequate general knowledge and negative attitudes towards cardiac programmes were some of the factors that contribute to a lack of a cardiac rehabilitation programme in the community (Moradi et al., 2011).

Moreover, the lack of a standardised procedure manual for patients postoperatively after heart surgery may compromise patient safety and the recovery of patients because not all the nurses in the Cardiac Unit have the knowledge about what to provide to patients after surgery. Despite the benefits, the CR program is not readily available in Namibia. Notwithstanding the lack of standardized procedures and the unavailability of cardiac rehabilitation in Namibia, the reports from WHO publications, and other high-income, middle-and low-income countries recommend that cardiac rehabilitation should be provided to all patients with heart diseases (Woodruffe et al., 2015; Piepoli et al., 2014; WHO, 1993). If patients were aware of the impact of cardiac rehabilitation, they would appreciate the information given to them and adhere to the treatment regimen. Therefore, this study aimed to develop a CRP for nurses to support cardiac patients after cardiac surgery.

The second theme was about the nurses' opinions regarding the importance of a cardiac rehabilitation program after heart valve surgery that is supported by the two sub-themes: Nurses regard the CRP as an important intervention for patients who have had cardiac surgery and recommendations from the nurse participants of the involvement of the multidisciplinary team in the cardiac rehabilitation programme.

Rehabilitation is a process in which a person with a disability or a condition that limits their function, whether temporarily or permanently, takes part in reclaiming their full

potential for function, independence, and restoration (Mauk, 2011). In the context of this study, rehabilitation is the restoration of life after heart valve surgery to retain patients' normal function.

Almost all the nurse participants shared various opinions regarding the importance of CR services during the recovery of the patients, including support for the caregivers. Some participants indicated that a CRP with standard operational procedures should be in place for all cardiac patients to rehabilitate after cardiac surgery efficiently and effectively. Participants recommended that CR should be available so that patients and their caregivers could attend rehabilitation sessions after discharge. These expressions are supported by Kumudah, et., al. (2020) and Farah, et al., (2021) who state that most nurses consider CRP as important and adds value and benefits to the patients, therefore nurses refer patients for CRP believing that it will prevent complications, reduce hospital admissions of cardiac patients, and bring a positive impact on patient outcomes.

Therefore, based on the need for a standardized CRP as notably expressed by the nurse participants, this study recommends and develops a CRP for patients after heart surgery by nurses to enhance patients' recovery and quality of life. The developed CRP includes all core components, as suggested by the WHO guidelines on CR for developing countries (Bellmann, et al., 2020; WHO, 1993).

5.4 OBJECTIVE 1.3: PATIENT'S EXPERIENCES OF RECOVERY AND COPING AFTER HEART VALVE REPAIR OR REPLACEMENT SURGERY

This section presents the findings for objective 1.3, which focuses on the patient's experiences of recovery and coping after heart valve repair or replacement surgery. Two (2) themes and nine (9) subthemes emerged from the data, as discussed in the following sections. This objective is guided by Roy Adaptation Theory (RAM) based on the constructs of physiological mode, role function, self-concept, and interdependence mode for the discussion of the findings.

The first theme that emerged was about the various experiences of patients regarding recovery and coping after heart valve surgery. This theme is supported by the following subthemes: patients having mixed feelings about the operation/procedure and its outcome; experiences of loss of their social roles; a lack of knowledge necessary for self-care, which is essential to enhance recovery; and experiences of contentment with the outcome of the procedure, along with the negative impacts of the procedures on daily activities of living.

The findings revealed that patients have **mixed feelings about the operation and outcomes** such as regarding the delays and cancellations of operations, fear and worries about the outcome of the operation; disappointment after surgery, and feelings of embarrassment over the scar as well as embarrassment and disturbances related to the sound of the valve.

Delay and cancellation of operations mainly due to the lack of resources, including non-functional electricity in the theatre to perform surgery, and patients who were not emotionally ready for the surgery were the concerns that the participants indicated. Al Talalwah, et al., (2019) describe cancellations as occurring when planned surgery does

not take place as scheduled. In this study, cancellation means that the operation did not happen on the date as scheduled. The delays and cancellations of operations may lead to the deterioration of the patient's condition, a poor quality of life, family financial insecurity, and financial impact on the healthcare system.

The cancellation of surgery may be either avoidable or unavoidable. An avoidable delay or cancellation is a circumstance that existed before the scheduled cardiac surgery and that might have been prevented with proper planning and clear communication between patients and personnel. Unavoidable delays or cancellations are circumstances that, despite appropriate planning or patient-staff communication, could not have been prevented (Sukwana, et al., 2023).

These challenges of surgery cancellations are not only observed in Namibia but in other countries as well. The findings from this study align with other studies on the reasons for delay and avoidable cancellation of heart surgery. As patients alluded to in this study, previous studies found that the avoidable cancellations of surgery were mainly due to patients-related issues, such as changes in patient's medical conditions, incidences of infection, refusals and patients not being prepared for surgery, as well as patients not showing up for surgery. Surgeon-related issues include patients requiring further evaluation, while administrative and hospital-related issues include incomplete medication evaluation, equipment unavailability, and a lack of necessary facilities such as a bed in an Intensive Care Unit (ICU), blood products, and electricity in the laboratory. Wrong patient bookings were also identified as a factor (Kaddoum et al., 2016; Sultan, et al., 2012).

Furthermore, Al Talalwah, et al., (2019) concluded that the cancellation of scheduled surgeries has a significant impact on hospital costs, patients' health, and quality of life.

To avoid delays and cancellations of heart surgery, Desta et al., (2018) recommend that cancellations of surgery can be prevented by early detection of medical problems. Therefore, to prevent surgery cancellation, the study recommends proper preoperative assessment, proper scheduling, the fulfilment of necessary operating room equipment and cross-matching by the hospital and other stakeholders, early clear communication with operating room team members such as ensuring that surgeons are available according to their schedules, providing adequate information to the scheduled patient, and improving operating theatre efficiency (Desta, et al., 2018).

Fear and worries were other findings that were alluded to by the patients and which can have a negative impact on the patient's recovery process. Almost all the participants expressed fear and anxiety regarding the outcomes of the operation and the healing process. Most of the patients expressed fear of the unknown related to the possible outcome of the operation due to a lack of information during preoperative care. Therefore, some patients were not ready for surgery due to fear. Most of the participants lacked information about pre-operative care for heart valve surgery.

In support of this study's findings, a study conducted in Spain to assess preoperative anxiety in cardiac surgery concluded that among patients awaiting surgery, fear of the unknown and a lack of information related to surgery were the crucial factors that contributed to a high level of preoperative anxiety (Hernandez-Palazon et al., 2018). Similarly, a study conducted by Ramesh et al., (2017) among patients undergoing Coronary artery bypass surgery (CABG) showed that patients experienced a high level of preoperative anxiety, with females showing higher anxiety compared to males. This indicates that patients need to be prepared psychologically before the surgery to alleviate fear and anxiety.

Pourghane et al., (2014) emphasized the importance of holistic care and supportive intervention programs to be considered before surgery to facilitate recovery and enhance the quality of life after cardiac surgery. This would alleviate the fear of the unknown that patients experience before and after the operation. To alleviate the fear and uncertainty of patients Pourghane, et al., (2014) recommended the establishment of a supportive environment that promotes a better quality of life for cardiac patients. In conclusion, Shahmoradi et al., (2022) recommend that healthcare professionals use educational approaches to provide information to patients both preoperative and postoperatively which have an effect on increasing patients' level of knowledge, reducing stress, and improving the quality of life for patients (Heran et al., 2011; Sedaghat et al., 2019).

Disappointment after surgery was experienced by the patients. According to RAM, the physiological mode of the patients was not met. The physiological mode entails the human system's responses and interactions with the environment (George, 2014). This means that the basic needs of these patients were not met as a result of the heart valve surgery. The findings indicated that the patients expressed disappointment related to slow recovery, feeling sicker than before, and taking medications for the rest of their lives after surgery. Similar to the findings of this study, a study conducted by Berg, et al., (2013) revealed that patients felt physically weak before and after the surgery. Slow recovery and feeling unwell post-cardiac surgery might be attributed to the lack of standard procedures for CRP in Namibia, guidelines which nurses could follow for the provision of CR to promote patient recovery and coping after cardiac surgery.

The patients further expressed negative thoughts about the effects of the operation and life-long treatment on their future. One participant feared and was worried about dying,

while most of the respondents were concerned about their unstable International Normalised Ratio (INR), and Warfarin treatment.

Therefore, clinical guidelines developed by the American College of Chest Physicians recommend education and the involvement of patients who are on INR testing regarding the results and adjustment of the Warfarin dosage. Patients' knowledge would increase clinical benefit and cost-effectiveness (Ansell, et al., 2008). Disappointment after surgery includes embarrassment over the scar from surgery.

Feelings of embarrassment over the scar on the operation site were also a concern among the patients. According to Roy's adaptation model, these patients lacked self-concept as a result of chest scar. Self-concept refers to an individual's mixture of beliefs and feelings about her or himself at a certain time. These patients had self-respect impairment and insufficiency in individual coping risks (Ursavas, et al, 2014). The findings indicate that most of the patients expressed disturbances and embarrassment over the body image related to the sternotomy wound, which was psychologically stressful for some patients. Some patients were anxious and traumatized because of the scar on their chest. The change in appearance and body image can negatively affect one's self-confidence and body image. Both Ngaage and Agius, (2018) and Berg, et al., (2013) stress that patients with scars live with trauma, feelings of being devalued by society, loss of self-confidence, and are more prone to developing shame, depression, anxiety, and aggression. To prevent patients' embarrassment over the scar, Parikh, et al., (2021) urge the surgeons, when possible, to perform shorter skin incisions to reduce patients' levels of depression and anxiety symptoms to promote a better perception of body image and thus improve patients' quality of life.

Another cause of **embarrassment among patients after heart valve surgery relates to the sound of the artificial valves**. Moreover, the feeling of embarrassment and disturbances about the sound of the valve were experienced by the patients in the study. The findings of this study indicated that the majority of the participants experienced disturbances by the sound of the mechanical valves. In support of this study's findings, several studies have described the effects of valve noise on patients who underwent mechanical valve replacement.

A study conducted in a Chinese population indicated that patients under 60 years of age and females of childbearing age were at high-risk factors for experiencing disturbances by the noise of artificial heart valves compared to men and individuals between 18 to 35 years (Huang, et al., 2020; Hong, et al., 2019). However, according to the findings of this study, patients who were affected by the sound of the valve were younger than 35 years old. Nonetheless, the study conducted by Huang, et al., (2020) contended over time, that the effect of mechanical mitral valve sounds on the quality of life would be reduced and there was an improvement in the quality of life for concerned patients.

Chen, et al., (2020) concluded that patients with mechanical mitral valve replacement (MVR) should receive continuous health consultations to alleviate anxiety and depression related to the noise of the valve, ultimately improving their quality of life. According to the self-concept model of Roy Adaptation Theory (RAM), it is the responsibility of the nurses to support patients in expressing their emotions and assist them in coming to terms with the changes in their body image. Nurses must explain the causes of disordered body image, and they must also examine coping mechanisms and suggest social support systems. During follow-up appointments, patients should have the opportunity to meet other patients who have experienced similar

circumstances in the past. Patients are also urged to participate in support groups and group therapy (George, 2014; Ursavas, et al., 2014).

In addition, Oterhals, et al., (2013)'s study affirms that patients with mechanical aortic heart valves may become more competent and self-assured in their ability to control their health with timely patient counselling and proper follow-up through a cardiac rehabilitation program. Therefore, these practices may also be adopted in the Namibian context regarding the provision of health information and counselling to cardiac patients during the pre and postoperative periods about the sensation of mechanical valve sounds after heart valve surgery.

Furthermore, **the patients experience a loss of their social role owing to heart valve disease and surgery.** Loss of social roles in this study refers to patients' limited ability to perform certain roles they used to do before their illness. These roles include basic daily activities such as cooking, laundry, shopping, sports, driving cars, and finding work suitable for their physical condition after heart valve surgery. Restrictions on social roles may result in frustration, anxiety, and stress among patients. The negative impact of heart surgery on the daily activities of living for the patients caused a burden to care for the caregivers as caregivers take on new roles.

According to the Roy Adaptation Model, the impact of illness causes patients to experience insufficiency in fulfilling roles (George, 2014; Ursavas, et al., 2014). Providing health information and education to patients about these social role limitations may help alleviate anxiety. This information can be provided to patients both preoperatively and postoperatively for them to be aware of the limitations before they resume their normal daily activities, often after four to six weeks after surgery.

For example, patients who are on anticoagulants such as Warfarin are advised not to participate in contact sports with a high risk of injury to avoid the risk of bleeding. This restriction regimen is in line with a suggestion by Gati, et al., (2019) that individuals on anticoagulants for mechanical bioprosthetic valves should avoid contact or collision sports to minimize the risk of bleeding. Moreover, patients should not discontinue Warfarin therapy, as discontinuing places them at an increased risk of stroke, thromboembolic complications, and cardiovascular complications (Mérie, et al., 2012).

Moreover, the majority of the participants expressed disappointment over role changes, resulting from cardiac surgery. Most participants indicated that they were unable to perform their roles or struggled to resume normal activities. Some of the participants experienced pain as a result of sternotomy wires. Some participants indicated a loss of their employment and income due to the operation and their subsequent conditions. The negative impact of cardiac surgery on daily activities of living caused a burden for caregivers who had to take on new roles.

Role changes, suffering from weakness, and struggling to resume normal duties and postoperative pain resulting from sternotomy wires have been studied before. A study by Tan and Amoako, (2013) concluded that postoperative physical dysfunction after cardiac surgery is a serious complication associated with significant long-term morbidity, resulting in adverse social and economic consequences.

Previous studies have also reported that patients were concerned about not being able to fulfil their previous roles and responsibilities in the family and society. Some participants indicated loss of their employment and incomes due to the operation and their subsequent conditions. They struggled to return to their previous jobs and provide

for their families financially (Sedaghat, et al., 2019). Similarly, a study by Berg, et al., (2013) substantiates that after heart surgery, patients struggle to regain physical strength to resume normal living and to re-establish balanced overall living. Therefore, the literature concludes that although heart valve repair and replacement surgeries improve a patient's functional capacity and quality of life, patients often experience mental and social problems related to heart valve replacement (Siblit, et al., 2016).

According to RAM's role function model, nurses have a responsibility to support patients in sharing recently experienced concerns and overcoming obstacles in their jobs. Patients are also urged to discuss the current situation with their employers (Ursavas, et al., 2014; George, 2014) and where necessary remedial actions may be put in place.

The findings from this study further indicated that the majority of the patients experienced postoperative pain syndrome after surgery because of the sternotomy, which is the discomfort experienced after thoracic surgery and is often persistent for at least 2 months without an apparent cause (Bordoni, et al., 2017).

Post-operative pain syndrome is a subjective sensation, that every surgical patient may feel differently, despite of the type of surgical intervention and if it persists, it may lead to the development of many complications for some patients (Zubrzycki et al., (2018). In addition, Costa, et al., (2015) describe chronic postoperative pain (CPOP) as pain that occurs after surgery and lasts for more than two months without any other apparent causes, such as an infection or the underlying condition that contributed to the surgery.

Furthermore, patients expressed concern about lack of the knowledge of self-care which is essential to enhancing recovery. Patients' lack of knowledge in this study

refers to patients not having sufficient knowledge about their medical condition, medications, diet, and how to provide self-care after discharge from the hospital. Lack of knowledge about medication can have negative implications that may result in patient non-adherence to medication, which later leads to arrhythmias related to improper use of adrenergic blockers (Carvedilol), valve clotting related to improper use of Warfarin and risk for infection related to improper use of Antibiotic Penicillin (PVK).

In addition, a lack of knowledge may also have an impact on the patient's recovery process because they will not be able to take control of their own health and deal with symptoms in case of potential complications. Therefore, the nurse must educate patients before discharge and provide continuous education during follow-up visits about medication regimens, diet, and self-care.

The findings further indicated a **lack of knowledge about self-care** among participants with regard to correct diet and appropriate physical activities based on their conditions or surgery as well as the duration of recovery. People who engage in self-care maintenance adhere to those behaviours needed to maintain physical and emotional stability. Self-care monitoring involves a process of observing oneself for changes in signs and symptoms. Self-care management is applied as an individual concerned responds to signs and symptoms accordingly when they occur.

Previous studies have highlighted the lack of knowledge among patients after heart surgery. A study conducted by Alex, et al., (2014) on the efficacy of an information booklet on the knowledge regarding CR among clients with coronary artery disease found a lack of knowledge regarding medication and its complications, dietary management, exercises, and resumption of sexual activity. Moreover, Pourghane et al.,

(2014) found that patients experienced the feelings of being caught between knowing and not knowing as a result of a lack of education about self-care, which leads to uncertainty. As a result of a lack of knowledge about self-care, patients do not adapt easily to daily activities and reported that a cardiac procedure had a negative impact on their daily activities of living.

The second theme that emerged from the patient participants is about different experiences regarding support and care from nurses and family members after heart valve surgery. This theme is supported by the sub-themes of patient appreciation of good support from nurses, versus patients' disappointment due to a lack of support from the nurses, patients' appreciation of supportive family and caregivers, and overprotective family due to a lack of knowledge regarding cardiac rehabilitation.

The findings indicated the **good support that the patients received from the health care providers** in the form of health information about self-care while at home for recovery. Most of the participants expressed their appreciation and gratitude for the support and care they received from the health care providers, characterized by spiritual advice, health information and counselling. Some participants indicated that they received words of encouragement and health information from the nurses. In addition, patients also appreciated the support they received from the caregivers. The participants were grateful that their family members were their primary source of support, helping them during hospital consultations, before and after surgery. Family members offered words of hope and encouragement, urging the patients not to give up on life. The family provided them with physical, psychological, and financial support during their illness and treatment process. This support included assistance with roles and responsibilities at home. The family appeared to be the main support system for most of the patient participants.

Similarly, Berg, et al., (2013), stated that some patients expressed gratitude for the support they received from their relatives during the process of their recovery, stating that without their help, they could not have recovered and returned home early. Similar to the assertions by the participants of this study, previous studies have highlighted the importance of the presence of family members, especially the spouse, as a highly helpful tool in fulfilling patients' physical and emotional needs to overcome anxiety and care shortcomings (Kamali, et al., 2020; Shafi, et al., 2013). Likewise, Mohammadi, et al., (2015) concurs that family members were the source of support and sympathy that assisted patients during hospitalization and after surgery.

Despite the appreciation of support and care from the nurses and caregivers, some patient participants raised concerns about not receiving enough information and support from the nurses regarding care after heart valve surgery. From the information given by the participants, it seems that conflicting or ambiguous information is provided to the patients regarding their recovery from cardiac surgery. Even those participants who indicated that they have received support and care from the nurses, reported a lack of information on some components of CR, for example, lifestyle changes regarding smoking, medications, and the information on Warfarin. This illustrates discordance with reported nurses' higher knowledge and attitudes about CR, while convergent with nurse respondents' self-report of experiencing challenges regarding providing effective health information to patients, owing to patients' socio-economic factors.

Moreover, some of the information provided by nurses was not accurate and had the potential to incite stress among patients because of the limited information provided without substantial reasons. Moreover, no explanation of the physiological effect of

certain foods, and exercises was provided to the patients. The findings concluded that nurses lack correct information for cardiac rehabilitation.

In support of the findings from this study, numerous previous studies have described patients' lack of support from healthcare providers about self-care at home during recovery after discharge from the hospital. A study conducted by Taghadosi et al., (2014) maintains that after heart surgery, patients lack support and do not receive adequate information from hospital staff regarding rehabilitation after heart valve surgery.

In addition, some patients were not satisfied with their communication with healthcare providers regarding medications (Helder, et al., 2019). Similarly, Singer, et al., (2019) found that the increased length of hospitalisation was associated with worse patient satisfaction communicating with doctors and nurses in the hospital.

Furthermore, a study conducted by Degavi and Bhupali (2015) claims that the majority of nursing staff lacks knowledge about the rehabilitation of patients after heart valve repair and replacement surgery, suggesting a need for exposing the nurses to the areas of cardiac rehabilitation. On the other hand, a study conducted in China on cardiac rehabilitation among healthcare providers revealed that patients and their families lacked clarity regarding the roles of various healthcare providers in cardiac rehabilitation (Liu, et al., 2021). The study further revealed a lack of CR awareness and understanding among healthcare professionals as well as, a lack of time and staff to deliver cardiac rehabilitation (Liu, et al., 2021).

Moreover, the availability of a CRP with standardized procedures, developed in this study, would enable all nurses to access appropriate health information on CR to

provide to patients before and after cardiac surgery. A readily available rehabilitation programme would mitigate nurses' reluctance to promote CR for cardiac patients.

Moreover, despite the lack of support from the nurses, **overprotective families** due to a lack of knowledge regarding cardiac rehabilitation were a concern among the participants. Overprotection may cause frustration and anxiety for the patients because they are limited from performing tasks they used to do.

Some of the patient participants expressed that family members tend to be overprotective towards them because of fear and anxiety about their loved one getting sick or concerns about losing them after heart surgery. The findings indicated that family members and caregivers were overprotective of their family members during the recovery process due to a lack of knowledge about caring for and providing support to a person after heart valve surgery. In support of the findings from this study, Island Health (2023) has highlighted strategies that patients and caregivers can use to assist patients in recovering after heart surgery namely: appreciate the worry and care that the family members are providing; and patient to inform their loved ones and close friends that they will let them know in case experiencing any physical or psychological issues that are disturbing that need assistance.

The availability of a CRP developed through this study would enable nurses to provide appropriate health information to the caregivers of cardiac patients before and after cardiac surgery. Caregivers would then apply the correct information at home to support the rehabilitation of their loved ones who underwent cardiac surgery.

5.5 OBJECTIVE 1.4: CAREGIVER'S EXPERIENCES ON THE SUPPORT AND CARE PROVIDED TO FAMILY MEMBERS AFTER HEART VALVE SURGERY

This section presents the discussion of the findings of Objective 1.4 about caregivers' experiences of providing care to a family member who underwent heart valve surgery. The first theme that emerged was about different experiences of emotional disturbances of caregivers regarding heart surgery, challenges with the operation of a relative and the future of a relative after heart valve surgery, the need for knowledge on the procedures for cardiac rehabilitation, prolonged recovery period that places a demand on caregivers, concerns about expenses related to transport fares and other commodities, uncertainty about the future of the relative after heart surgery and reassurance and positive thoughts about the future of a relative after heart surgery.

Grant & Graven (2018) and Cesta (2017) define a caregiver as an individual with a personal relationship who provides care and assistance to other individuals family members or friends with chronic conditions or disabilities without being paid. Caregivers may include a partner, adult child, other relative, in-laws, neighbours, or friends from other social circles. Caregiving is the practice of offering comprehensive, physical, mental, and emotional support to someone else who is unable to take care of themselves (Hermanns & Mastel-Smith, 2012).

For the context of this study, the caregivers were family members providing caregiving tasks to their family members after heart valve surgery such as bathing, preparing meals, performing wound care and dressing, and providing emotional and psychological support. Similarly, Schulz et al., (2016) highlight the roles of caregivers such as assistance with household tasks, self-care tasks, provision of emotional and social support, and advocacy and care coordination.

Emotional trauma was one of the findings that the caregivers experienced regarding the surgery and the future of their family members after heart valve surgery. Emotional trauma is characterized by a sense of hopelessness, helplessness, and unsafe. In this study, emotional trauma is the experience of anxiety, uncertainty, hopelessness, and helplessness felt by caregivers about the outcomes of operations for their family members after heart surgery. The findings indicated that most of the caregivers felt overwhelmed, scared, and worried about the operation process and the outcome of the surgery of their relatives. Although some caregivers indicated that they put everything in God's hands, they nevertheless felt overwhelmed and scared about the process of heart valve surgery for their family members.

These findings concur with the literature by Lahoz, et al., (2021) and Stratmann, et al., (2021), both of whom indicate that caregiving responsibilities are associated with psychological problems such as stress and anxiety for the caregivers. As a result, caregivers may manifest physical symptoms such as depression, feelings of despair, hopelessness, panic attacks, a sense of being out of control, irritability, and anger (Lahoz, 2021).

Furthermore, in support of this study's findings, Amakali, and Small, (2013) in their study revealed that caregivers of children with heart disease experienced emotional challenges manifested in shock at the children's diagnosis, social dysfunction due to the demands of providing care for the patients at home and subsequent inadequate home care for children with heart disease. To mitigate the emotional challenges experienced by caregivers, the author suggests that caregivers should be empowered through the implementation of rehabilitation interventions to facilitate coping (Amakali & Small, 2014). As implied by Etemadifar, et al., (2015), knowledge plays

an important role for caregivers as it enables them to perform caregiving tasks for the recovery of their family members after surgery without fear and uncertainty.

A lack of knowledge about caring procedures for a loved one after heart valve surgery may prolong the patient's recovery process. Caregivers may fear and hesitate to carry out caregiving tasks, such as wound care, medication administration, and assisting with exercises, due to a lack of necessary knowledge and skills about providing home care to a patient after heart surgery (Piamjariyaku et al, 2012).

In this study, caregivers expressed the need for knowledge about the recovery of their family members after heart valve surgery in terms of comfort, mobility, and information on the procedure performed. This knowledge is necessary for them to care for and support their family members during the recovery process. In concurrence with this study's findings, previous studies also found that many parents/caregivers of patients with heart disease lacked knowledge about the disease, drug management and information about potential treatment outcomes, leading to uncertainty in providing home care for the children with heart disease (Etemadiatra, et al., 2015; Bahrami, et al., 2014; Amakali & Small, 2013). Moreover, Doherty, et al, (2016), argue that caregivers had unmet information needs related to medications, symptoms and treatment options, physical care, pain control, and support for daily activities.

Similar to the findings of this study, a study by Bjornnes, et al., (2019) showed that informal caregivers wanted to assist in the care of their loved ones after hospital discharge post-cardiac surgery. However, caregivers felt insecure and overwhelmed because they lacked concise discharge information and follow-up support during the early recovery at home period.

These revelations further concur with those of previous studies by Halm (2016) and Piamjariyakul et al, (2012) who indicate that caregivers are often unprepared for their roles and lack the knowledge in caring for their family members after heart surgery. The authors further indicate that caregivers identify many needs related to their caregiving role, such as the need for a dedicated caregiver program to prepare them for their roles and how to access needed resources. Hence, healthcare providers are the source of information for caregivers to enable them to provide efficient and effective home care for their relatives (Halm, 2016; Piamjariyaku et al., 2012).

Caring for patients after cardiac surgery can have negative effects on the physical, psychological, emotional, and social health of family caregivers. Therefore, different authors concur that to reduce the negative effects and burden on the caregivers, caregivers should be empowered for their caring role by nurses through an educational support program that enhances the caregiver's ability to care. This would help mitigate the caring burden on the caregiver (Dalirirad, al.,2021; Amakali & Small, 2013; Sandy et al., 2013).

A prolonged recovery period places demand for care on caregivers [burden] was another finding experienced by the caregivers. In this study, the majority of the participants expressed that the healing process for their relatives took long, and they feel overwhelmed and burdened by providing extended care for their family members after heart valve repair and replacement surgery. Most of them were stressed about shouldering new responsibilities, such as mobilizing the patient, assisting with household chores (preparation of food and laundry and taking care of their children) since the patients had no strength to contribute, helping the patient with exercises, providing financial assistance, accompanying them to hospital follow-ups and ensuring they took their medications daily. Taking on these new roles and performing

all these tasks were problematic for the caregivers because they added to their existing responsibilities.

In support of this study, previous research has highlighted that caregivers find complex new roles and responsibilities to be demanding and inconvenient. These include providing emotional encouragement and spiritual support, providing transportation to work/hospital/follow-ups, reminding patients to take their medications, monitoring signs and symptoms, helping patients with physical exercises, helping with running errands, and additional household tasks (Lahoz et al., 2021; Grant et al., 2018; O'Sullivan, et al., 2021; Sullivan et.al 2016; Burke et.al, 2014; Park, et al., 2013).

A study by Ae-Ngibise, et al., (2015) further states that caregivers reported financial and social exclusion, emotional burden, depression, and inadequate time for social responsibilities. Therefore, Malik, et al., (2013), cautions that without support and guidance from healthcare professionals, the complex caregiving responsibilities that caregivers undertake may lead to burnout and depression.

Similarly, in this study, some of the caregiver participants have made adjustments to their employment or taken leave from work to focus more of their personal time to concentrate on the new roles and responsibilities required to support their family members after heart surgery. This is because the patients are unable to care for themselves as a result of the sternotomy wound and a lack of strength for normal daily activities (Lahoz, et al., 2021). This, in turn, results in insufficient rest, worries, and stress for the caregivers (Bangerter, et al., 2018; Grant et al., 2018). Concurrently, a study by Hamilton (2016) agreed with those of Doherty, et al., (2016) that caregivers sacrifice their social lives, and neglect themselves due to the demands of providing home care for their loved ones.

To overcome the burden and poor coping experienced by the caregivers, the literature proposes the development and implementation of a rehabilitation programme with interventions for home-based healthcare to support caregivers in coping with the demands of home care (Dalirirad, et al., 2021). A rehabilitation programme should involve a multidisciplinary healthcare team that assesses the demands on the caregivers and refers burdened caregivers to appropriate resources for emotional and spiritual support such as counselling services, and social, physical, and financial support. Therefore, healthcare professionals should provide caregivers with information to connect them with supportive resources (Grant et al, 2018; Ae-Ngibise, et al., 2015; Amakali, & Small, 2014; Sautter, et., al, 2014; Buck, et al, 2013; Metzger et al., 2013). The development of a home-based rehabilitation might also assist and reduce the transport constraints that the patients and caregivers are experiencing.

Another finding was about the **caregivers' concern about expenses related to transport fares and other commodities**. In addition to the multifaceted roles and responsibilities that the caregivers have to undertake, caregivers also bear expenses related to transportation for patients' follow-up treatment or medication collection. Caregivers stated that they could not afford the transportation fares for their family members to go to the hospital for follow-ups because they relied on public transport. Therefore, caregivers suggested that the health services provide an ambulance service for the transportation of their family members for follow-up care. Failing to get transport for follow-up appointments may compromise the patient's treatment and prolong their recovery. Financial challenges related to providing home care for a relative were also reported in a Tanzanian study, which found that caregivers of relatives with mental illness experienced financial strain due to increased patient care costs (Iseselo, et al., 2016).

Another concern was **financial constraints related to the ability to afford prescribed medications from private pharmacies**. One caregiver expressed concern about medications that were always out of stock at state health facility pharmacies. When prescribed medications were unavailable at local hospitals, patients had to go without treatment, which could compromise their recovery. Alternatively, travelling to a private pharmacy would incur extra expenses. As a result, caregivers pleaded for the establishment of pharmaceutical facilities at hospitals for cardiac medications only, staffed by pharmacists exclusively responsible for procuring and dispensing cardiac medications.

The plea for a pharmacy of cardiac medication by caregivers of this study is supported by Atif, et al., (2021) who suggest the active involvement of pharmacists in the healthcare delivery system, and for line ministries to address and resolve these issues as a priority to improve access to medicines. After mechanical valve replacement surgery, the patients need to take prescribed medications for the rest of their lives (anticoagulants, adrenergic blockers, and digitalis); failure to do so could lead to complications and treatment failures (Atif, et al., 2021; Iseselo et al., 2016).

Some participants expressed appreciation for the support they received from the nurses regarding the CR of the family members who had heart valve repair and replacement surgery after discharge from the hospital. The support given by nurses encompassed self-care, guidance on medication intake, adherence to prescribed medications, medication restocking, dietary guidance (avoidance of leafy vegetables and salty foods), and the importance of follow-up visits. They also received words of encouragement for them not to give up but to assist their family members to follow the doctor's prescriptions so that they can recover and return to their normal lives.

In support of this study, Becqué, et al., (2021) reported that nurses provided caregivers with assistance in identifying and instructing various tasks such as bathing, wound care, medication administration, support for decision-making, respite care planning, and emotional support. Moreover, Irfan, et al., (2017) highlighted the need for healthcare providers to address the psychological and social health problems of caregivers.

Despite the support from the nurses, **the caregivers were also concerned about the lack of support from the nurses.** In this regard, the same caregivers indicated that they did not receive any information from healthcare professionals on how to care for their family members at home, or that they were not given clear information by the nurses. Lack of support may lead to uncertainty in caring for the relative because of fear of making mistakes.

This revelation concurs with Gusdal et al., (2016) who reported that caregivers experienced challenges when healthcare professionals did not acknowledge or meet caregivers' needs for information about treatment and the availability of support. Therefore, Reinhard, et al., (2019) highlighted that caregivers often perform medical and nursing tasks such as administering medications and wound care at home with little or no instructions from healthcare professionals.

In conclusion, a study by Subih, et al., (2020) concluded that caregivers should receive more support and training from healthcare providers to develop their coping and resilience skills in a way that decreases their care burden and improves their self-confidence and quality of care. Moreover, Sandy et al (2013) study has highlighted that different forms of support should be provided to caregivers, including financial, emotional, practical, and training needs to fulfill their roles as caregivers.

Concurrently, some of the caregivers in this study highlighted the need for a social system to be established for patients after heart surgery to share their challenges and learn from each other. Through a social system, patients and caregivers' network and help each other with emotional and practical support. Such a system may reduce stress, depression, and anxiety among patients who have had cardiac surgery, and in return minimised the demand to care for the caregivers.

Given that the nurses had a lack of knowledge, negative attitudes, and average practices towards some aspects of the core components and phases of CR, while patients and caregivers experience challenges in recovery, coping, and providing care to a family member after HVS, cardiac rehabilitation programme for nurses was developed to deliver quality care and improve patient quality of life as well as assisting caregivers in support and care of their family members after heart valve surgery.

Table 5.1: Summary of discussion of quantitative results and qualitative findings of Explanatory Sequential Design for situational analysis Phase 1

Objectives	Findings	Conclusion
Determine the knowledge, attitudes, and practices of nurses regarding the rehabilitation of patients after heart valve repair or replacement surgery.	High level of knowledge regarding the core components of cardiac rehabilitation. Positive attitude regarding: Giving health information to patients Benefits of cardiac rehabilitation. Low level of knowledge: some aspects of the core components, phases and indications of cardiac rehabilitation. Negative attitude regarding: Phase 1 of cardiac rehabilitation. Indications for cardiac rehabilitation. Encouragement of the caregivers on behaviour changes, self-care management and risk reduction. That information is given to patients about cardiac rehabilitation. Positive practice regarding advice caregivers on support and care. Poor practice: Lack of training on cardiac-related conditions.	Convergent and discordant findings of good and poor knowledge.

Explore and describe challenges experienced by nurses regarding providing cardiac rehabilitation for patients after heart valve surgery.	- Language barriers. - Economic status. - Perceptions of sex education by nurses as a taboo. - Ignorance of health information on cardiac rehabilitation by patients. - Nurses' lack of knowledge and skills in providing CR to patients after cardiac surgery. - Inadequate resources to facilitate CR to patients. - Lack of interpersonal relationships among the nurses. - Unavailability of standardised cardiac rehabilitation program. - Lack of involvement of caregivers. Nurses' opinions and views regarding the importance of cardiac rehabilitation programs after heart surgery: - Nurses perceive the CRP as an important intervention for patients who had cardiac surgery.	Poor communications and financial implications. Lack of health system support. Inadequate human resources and infrastructure and poor interpersonal relationships to facilitate cardiac rehabilitation.
Objective: Explore and describe patients' experiences regarding recovery and coping after heart valve repair or replacement surgery.	- Mixed feelings about the operation/procedure and its outcomes. - Patients experience a loss of their social role - Patients lack the knowledge of self-care that is essential for enhancing recovery. - Procedure impacted negatively on daily activities. - Patients experience contentment with the outcomes of the procedure. Different experiences of the patients regarding support and care from nurses and family members after heart valve surgery: Patients appreciate the support from the nurses. Patients expressed disappointment due to a lack of support from the nurses. Patients appreciate the support from family members. Overprotective family members due to a lack of knowledge regarding cardiac rehabilitation.	Need for emotional and psychological support. Social support Physical effects/support
Explore and describe the experiences of caregivers in providing support and care for a	Caregivers experience emotional trauma with regard to heart surgery for a family member.	Need for emotional support

patient after heart valve repair or replacement surgery.	▪ The caregivers expressed a need for knowledge about the procedures for cardiac rehabilitation. ▪ A prolonged recovery period places a demand on caregivers. ▪ Caregivers are concerned about expenses related to transportation and other commodities. ▪ Uncertainty about the future of a relative. ▪ Reassurance and positive thoughts about the future of a relative after heart valve surgery.	Need for educational support Need for Physical support Need for Financial support Need for Psychosocial support
	Different experiences regarding health care providers' support and care of the relative who underwent cardiac rehabilitation: ▪ Caregivers appreciate support from health care providers. ▪ Caregivers are concerned about the lack of support from nurses.	

5.6 SUMMARY OF THE CHAPTER

Chapter 5 presented a discussion of the results of the quantitative data on the knowledge, attitudes, and practices of the nurses regarding the CR of patients after heart valve repair or replacement surgery and the findings of qualitative data on the challenges experienced by nurses in providing CR, patients' experiences on recovery and coping after heart valve surgery, and caregivers experiences of providing support and care to their family members after heart valve surgery. The association between nurses' age, educational levels and gender and the knowledge, attitudes and practices regarding CR association were also discussed. Given that the nurses had a lack of knowledge, negative attitudes, and average practices towards some aspects of the core components and phases of CR, there is a need for the development of a CRP for the nurses to deliver quality care and improve patient quality of life as well as assisting caregivers in the support and care of their family members after heart valve surgery. The next chapter presents the conceptual framework of the study (Phase 2).

CHAPTER SIX

CONCEPTUAL FRAMEWORK (PHASE 2)

6.1 INTRODUCTION

The previous chapter discussed the quantitative results and qualitative findings of Phase 1 of the study (situational analysis). This chapter presents the conceptual framework for Phase 2 of the study which reflects nurses' lack of knowledge on some aspects of CR, negative attitudes, poor practice, and the challenges experienced by nurses, patients, and caregivers regarding cardiac rehabilitation, which indicated a need for an educational cardiac rehabilitation programme.

6.2 DEVELOPMENT OF A CONCEPTUAL FRAMEWORK

This section presents the development of a conceptual framework guided by the theory of practice by Dickoff, James, and Wiedenbach (1968). The conceptual framework guided the development of an educational programme for nurses to facilitate the cardiac rehabilitation of patients who underwent heart valve repair or replacement surgery. The educational programme addresses the gaps and challenges identified during the situational analysis.

6.2.1 Practice-Oriented Theory of Dickoff et al., (1968)

The survey list, as proposed by Dickoff et al., (1968) was used as the basis for the development of an educational programme for nurses to facilitate the cardiac rehabilitation of patients who had heart valve surgery. The practice theory consists of six survey lists, including an agent (who performs the activity?), recipient (the receiver of the activity), context (the setting in which the activity will take place), procedure (the procedure of the activity), dynamics (the energy source of the activity), and

terminus (an outcome of the activity). Dickoff et al. (1968) survey list was applied for the development of the conceptual framework as explained in the following section.

The agent: The agent is the researcher, programme developer, and facilitator who developed the activities of a CR programme for nurses to acquire the knowledge and skills essential to facilitate CR of patients after heart valve surgery. In the context of this study, the agent is the researcher who developed an educational programme for nurses to facilitate CR of patients who had heart valve surgery.

The recipient: The recipients are the individuals who would benefit from the educational rehabilitation programme. In the context of this study, recipients are the nurses who would acquire the correct knowledge and skills for the facilitation of CR of patients after heart valve surgery. Patients and caregivers are also the recipients as they would benefit from the quality care and information provided by the nurses who are knowledgeable and skillful about CR for patients after heart valve surgery.

Context: The context in this study is the settings: The Cardiac Unit and Cardiac Clinic at Windhoek Central Hospital in the Khomas region are the contexts where the activities for educational cardiac rehabilitation are to be implemented.

Dynamics: Dynamics are the challenges identified during the situational analysis such as lack of knowledge, negative attitudes, and poor practices of the nurses as well as the challenges or problems identified by the nurses, patients, and caregivers. The challenges experienced by nurses in the delivery of CR, challenges experienced by patients on recovery and coping after HVS, and the caregivers' experiences in supporting and caring for a family member after HVS are the dynamics to be addressed by the interventions of the educational cardiac rehabilitation programme.

Procedure: Procedures are the activities of the educational cardiac rehabilitation program that will be carried out during the implementation of the educational programme for the nurses to facilitate the rehabilitation of patients after heart valve surgery.

Terminus: Terminus are the outcomes of the activities or the endpoint of the programme. For this study, the terminus refers to nurses who would be equipped with the knowledge and competence to provide rehabilitation care and support to the patients who had HVS and their caregivers. The outcomes of the implementation of the proposed educational programme will be changes in the recipients namely: knowledgeable and skilfully nurses who would facilitate CR, patients' recovery and coping, and empowerment of caregivers to support their family members after heart valve surgery.

Figure 6.1 represents the reasoning map for the applications of Dickoff et al, (1968) practice theory to this study.

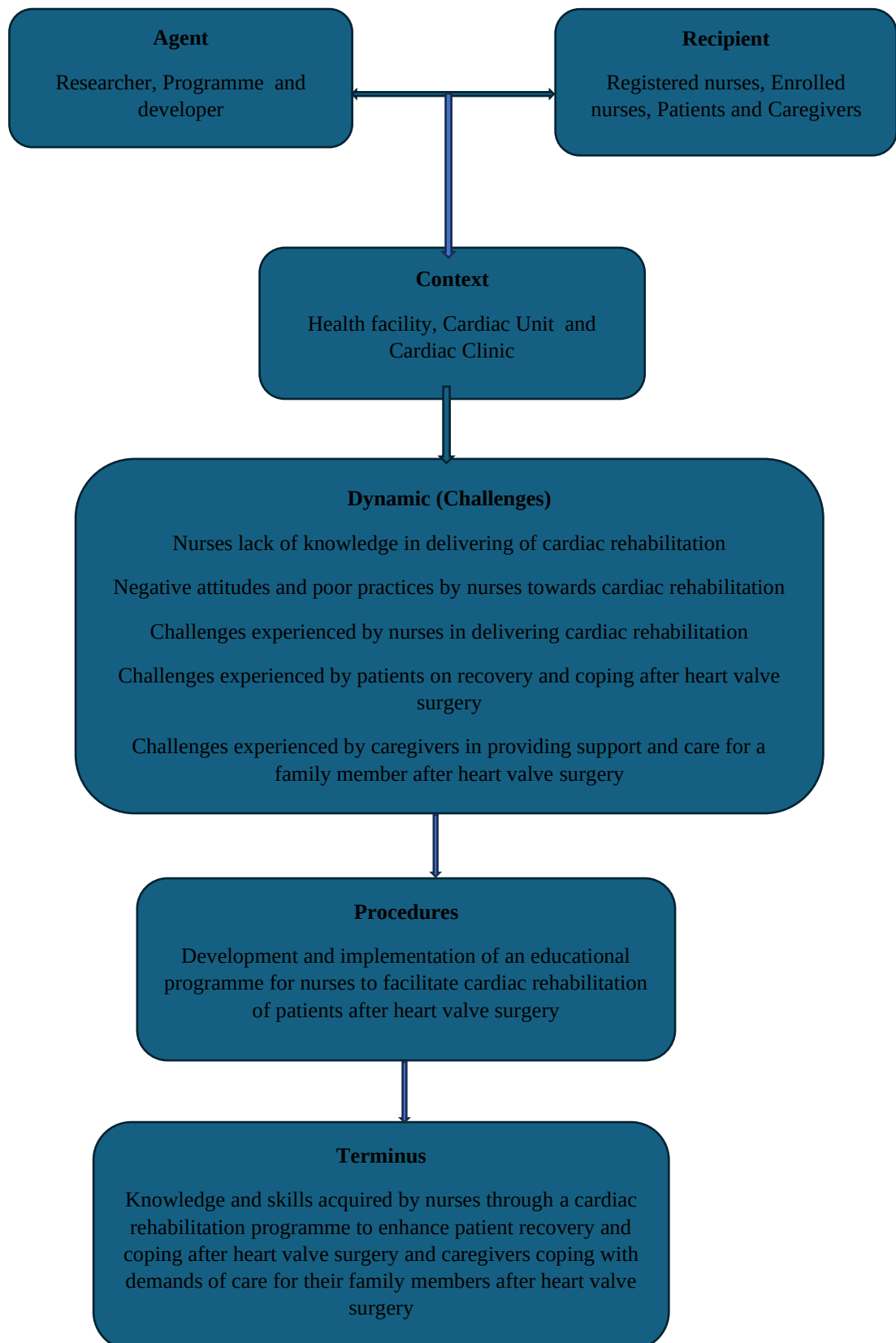


Figure 6.1: Reasoning Map for the development and Implementation of an educational programme for cardiac rehabilitation

The following sections provide detailed descriptions of the applications of each of Dickoff et al., (1968)'s survey list in this study.

6.2.1.1 Agent

According to Towel et al., (2015), the agent is the person who performs activities to address the challenges and achieve the desired terminus. In the context of this study, the agent is a researcher, nurse educator and developer of the educational programme for the rehabilitation of patients after heart valve surgery. The agent should possess the knowledge and skills to develop and implement an educational rehabilitation programme for nurses to facilitate the CR of patients after heart valve surgery. As the focal person, the agent should be resourceful, resilient, and possess relevant knowledge, skills and experiences related to the facilitation of the cardiac rehabilitation programme.

Moreover, an agent should possess personal qualities such as commitment, role modelling, self-awareness, and enthusiasm. He or she should also have effective communication skills including active listening, questioning, paraphrasing, giving feedback, and summarizing, to address the challenges experienced by nurses in delivering cardiac rehabilitation. The agent should also uphold personal values such as trust and respect, integrity, preparedness, and strong interpersonal skills. These qualities will enable nurses to implement CR interventions for patients recovering from heart surgery and for caregivers to provide support and care to family members after heart valve surgery. Figure 6.2 displays the essential qualities of the agent.

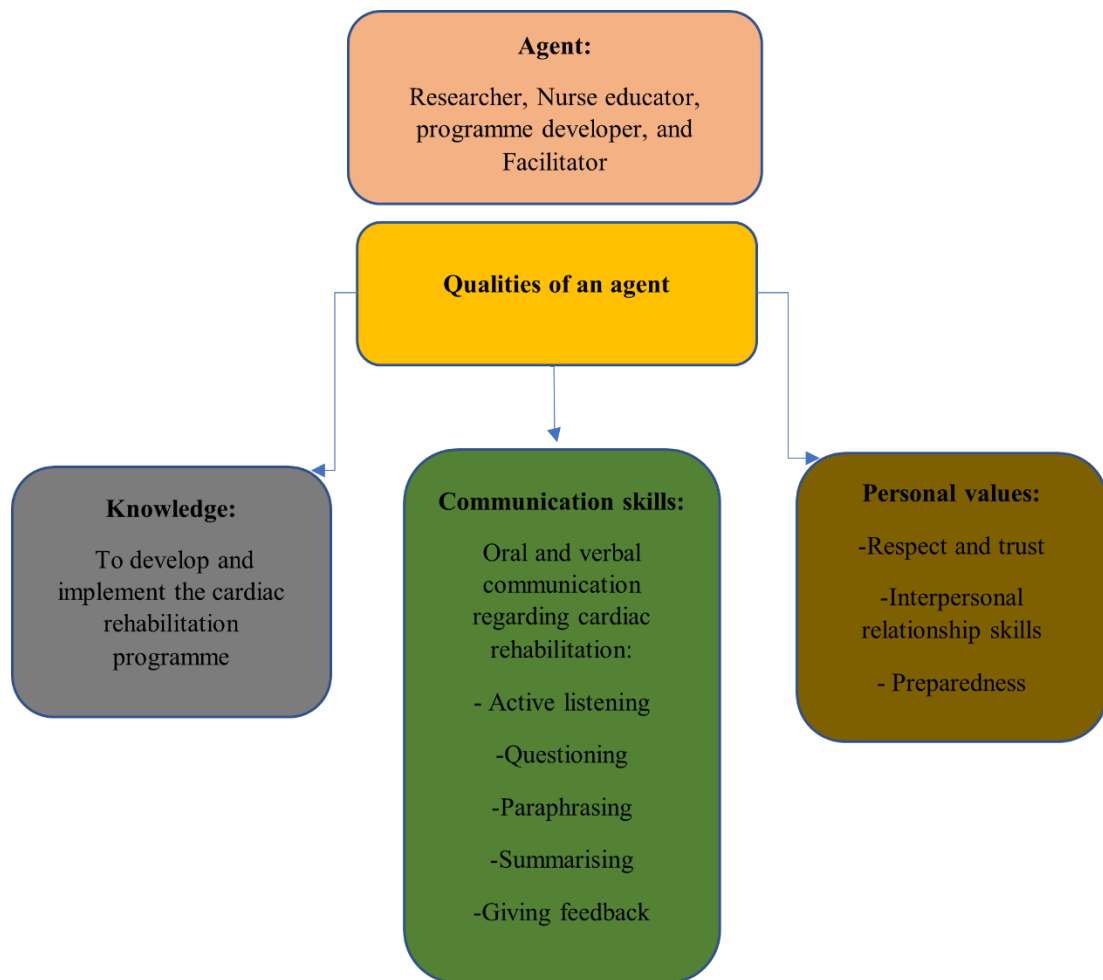


Figure 6.2: Essential qualities of the Agent

The next sections describe the applications of the characteristics of the agent to the study.

▪ **Knowledge of the agent**

With regard to knowledge, the agent, as a researcher, developer, and facilitator, should have in-depth knowledge and skills for the implementation of the cardiac rehabilitation programme. An agent should be a resourceful person, well-prepared to teach, demonstrate, and share knowledge with the nurses, enabling them to provide quality care for patients who have undergone heart valve surgery.

An agent or facilitator should be knowledgeable about the content of the training manual created based on the findings of the situational analysis in Phase 1 for the

implementation of the programme. The content that the facilitator should be knowledgeable about includes the CR core components, phases, benefits, and barriers. An agent should also be knowledgeable about the nurse's challenges, the experiences of the patients during recovery and coping, and the caregiver's experiences in supporting and caring for a family member who had heart valve surgery. Therefore, the researcher, acting as an agent, should possess the knowledge to equip the nurses and improve their knowledge, attitudes, and practices in the delivery of cardiac rehabilitation.

- **Personal values**

The agent should possess personal values. The recipients (nurses) would benefit from the role modelling and guidance of a mature, well-balanced facilitator who is confident, honest and secure. An agent should respect the nurses in general and be a trustworthy person during the implementation of a programme. The agent should be well prepared and stimulate the nurse's interest so that they can provide proper health information to the patients and caregivers about cardiac rehabilitation.

According to Nangombe, et al., (2020), effective interpersonal relationships promote the successful implementation of the programme. Therefore, the researcher, acting as an agent, needs to establish effective interpersonal relationships with the nurses and the nursing management team at the study site (Windhoek Central Hospital) for the successful implementation of the educational cardiac rehabilitation programme. This means that the agent or facilitator should be approachable and non-judgmental so that the recipients feel free to ask questions, voice uncertainties, or seek clarification. The agent as a facilitator should also demonstrate an interest and enthusiasm for teaching,

possess tolerance, be considerate and appreciate diversity, as she will be working with nurses from different cultures.

- **Communication skills**

An agent should also have good communication skills for the implementation of the programme. Geyer, et al., (2013) define communication as an interactive behaviour between people, involving the transmission of a message from one or more persons to another person or persons. Communication is central to person-person relationships and is key to customer satisfaction. Therefore, the researcher, acting as an agent, should possess good communication skills to facilitate the implementation of the cardiac rehabilitation programme.

In addition, an agent should also be aware of the barriers to effective communication and be able to address those barriers, such as language, culture, and religion during the implementation of the program. Other barriers such as physical and environmental factors including a stressful and noisy environment, can influence the formulation and reception of messages as well as the implementation of the programme. The agent should ensure that there are no disruptions in the physical environment for the success of the implementation of the programme.

Additionally, the facilitator should possess both verbal and non-verbal communication skills. These include maintaining an inviting voice tone and gestures. An agent should also have different communication skills as described in the following sections.

Active listening: Geyer (2013) defines listening as a dynamic, active process in which the receiver processes the message being received. The agent or facilitator should be attentive, ignore all distractions and show gestures indicating engagement with the conversation. Ground rules should be set during the session to minimize disruptions

while facilitating the session, as described in Chapter 8 of the implementation and evaluation/validation of the programme. In the context of this study, the agent should be well-versed in the concepts regarding cardiac rehabilitation.

Speaking: The facilitator should be clear when conveying messages or teaching the participants, ensuring that every participant understands and follows the topic being discussed. The facilitator should use simple language at the participants' level, pronounce words clearly, be active, express appreciation and use humour (Mardhiyah, 2019) during the implementation of the programme.

Questioning: The agent should possess effective questioning techniques. These techniques make it easier for the facilitator to obtain feedback from the audience to gauge their understanding of the subject matter (Shanmugavelu et al., 2020). Questioning also stimulates participants' interest and keeps them focused in the classroom. Interaction in the classroom promotes active thinking about drawing conclusions, promotes discussions from multiple points of view, and allows participants to discuss concepts from their own experiences (Bruce, & Klopper, 2017).

Questioning should occur at the beginning of the session to explore participants' prior knowledge about the CRP and throughout the session. The facilitator should allow sufficient time for participants to think about the questions and formulate their answers. Frequent questioning can inform the facilitator whether participants have gained the knowledge and skills related to CR interventions. Frequent questioning also assists the facilitator in assessing participants' levels of understanding, knowledge, and skills so that facilitation can be adjusted accordingly (Klopper, & Bruce, 2017).

Paraphrasing: Paraphrasing is important during facilitation, as it allows the facilitator to restate what a participant is conveying to demonstrate an understanding of the topic.

The facilitator needs to acknowledge the participants' expressions to ensure an understanding of their answers.

Summarising: The facilitator should summarise the main or key points discussed during the session or presentation so that participants can recap what was covered. A facilitator may ask any volunteer to summarize the key points discussed during the session to enhance the understanding of the entire audience.

Giving feedback: Feedback is important to participants' learning. According to Hughes and Quinn (2013), feedback creates opportunities for clarification and discussion, encouraging effective dialogue between facilitator and recipients. In the context of this study, the researcher provides feedback to the participants during sessions and at the end of the session regarding their performance and how they can improve. In addition, as adult learners, the agent should be careful and respectful when giving feedback to the participants. During the implementation of the programme, the agent should be aware that adult learners choose what they want to learn and should be treated with respect.

6.2.1.2 The Recipient

The recipients, as proposed in this study, are the nurses working at the Cardiac Unit and Cardiac Clinic who provide care to patients who have had heart valve surgery. These nurses educate and counsel the patients on self-care at home and offer support and information to caregivers on how to care for their family members who have undergone heart valve surgery. Nurses are the primary beneficiaries of the educational cardiac rehabilitation programme aimed at equipping them with the necessary knowledge, skills, and correct attitudes toward the provision of cardiac rehabilitation, and imparting caregivers with the knowledge needed for supporting and caring for

their relative after heart valve surgery. This, in turn, enhances their ability to improve patient care and quality of life.

Based on the findings from the situational analysis in Phase 1, it was identified that nurses lacked knowledge about some core components of CR, portrayed negative attitudes, and had average practices regarding some core components of cardiac rehabilitation. Furthermore, nurses experienced challenges in delivering CR, due to the absence of policies and guidelines for CR at the Cardiac Unit. Patients experienced challenges in recovery and coping after surgery, while caregivers experienced challenges with the support and care of a relative who had heart valve surgery.

Participating in the CR educational programme would equip the nurses with the correct knowledge, correct their attitudes, and improve their practices, enabling them to provide appropriate information to patients for their recovery from HVS and involve caregivers in the care of their family members who have had heart valve surgery.

In addition, these nurses, as the recipients, should possess certain characteristics to benefit from the programme including knowledge, a sense of responsibility and accountability, enthusiasm, trust and respect, interpersonal relationships, and communication skills. As the recipients, nurses should be knowledgeable about the procedures and interventions of the cardiac rehabilitation programme (CRP), acquired through their current experiences when providing care to patients after heart valve surgery, as well as through the proposed educational cardiac rehabilitation programme. Furthermore, nurses, as programme recipients, should be responsible and accountable when providing care to patients who have had heart valve surgery.

Moreover, the nurse recipients should have confidence and enthusiasm for successful programme implementation. They should respect their colleagues and embrace a

multidisciplinary team approach respecting each other's opinions and views during the implementation of the programme.

6.2.1.3 Context –Cardiac Unit and Cardiac Clinic at Windhoek Central

Hospital

The context for the implementation of the proposed educational cardiac rehabilitation programme is the Cardiac Unit and Cardiac Clinic at Windhoek Central Hospital (WCH), where patients scheduled for HVS are admitted and receive postoperative care until their discharge. Patients also return for follow-up appointments after discharge at the Cardiac Clinic for counselling and INR education. Windhoek Central Hospital is a National Referral Hospital that offers specialized services, including cardiology specialized units as described in Chapter 1 under study settings. The implementation of the programme will occur at WCH, in the Cardiac Unit.

The findings also revealed that the Cardiac Unit and Cardiac Clinic face challenges with limited space, the absence of guidelines and policies for cardiac rehabilitation services, the unavailability of a standardized CRP, and inadequate human resources. Therefore, the physical environment of the context should be conducive to the implementation of the programme, free from noise and any disruptions that may hinder its success.

Based on the findings, it was identified that there was a lack of multidisciplinary team involvement in the delivery of cardiac rehabilitation. Therefore, there must be good interrelationships, trust, and social support among the multidisciplinary team to improve the quality of life for patients after heart valve surgery.

In addition, the findings also showed a lack of support for patients who have had HVS and a lack of involvement of caregivers in the CR interventions of their family members who had heart valve surgery. Thus, fostering good interpersonal

relationships between nurses, patients, and caregivers is essential to improve the delivery of CR interventions. The implementation of the programme would help overcome the challenges that nurses experience in the delivery of CR interventions. In return, knowledgeable, and competent nurses would be able to provide CR interventions to patients and their caregivers, enabling the latter to cope with recovery and the care demands at home, respectively.

6.2.1.4 Dynamics

The dynamics are the energy source of the activity. This dynamic describes the desired outcomes from the implementation of the CR activities that address challenges experienced by nurses, patients, and caregivers. The dynamics concerned the enhancement of nurses' knowledge, and improvement of their attitudes and practices to deliver quality nursing care to patients who had HVS and provide support for their caregivers. These needs are addressed through the application of Knowles adult learning, Kolb's experiential learning, and Gagne's theory of Instruction, employing teaching strategies such as group discussions, role-play, case scenarios, problem-solving, and debates.

The dynamics would improve the quality of life of patients, reduce hospital readmission and mortality, as well as improve the provision of information to the involvement of caregivers in the support and care of their family members who had heart valve surgery. Imparting the knowledge, skills, and appropriate attitudes for nurses would be achieved through group discussions, role-play, problem-solving, and debates. Detailed discussions of challenges experienced by nurses, patients and caregivers are presented in Chapters 4 and 5 of the study.

Figure 6.3 displays the dynamics in the conceptual framework of this study.

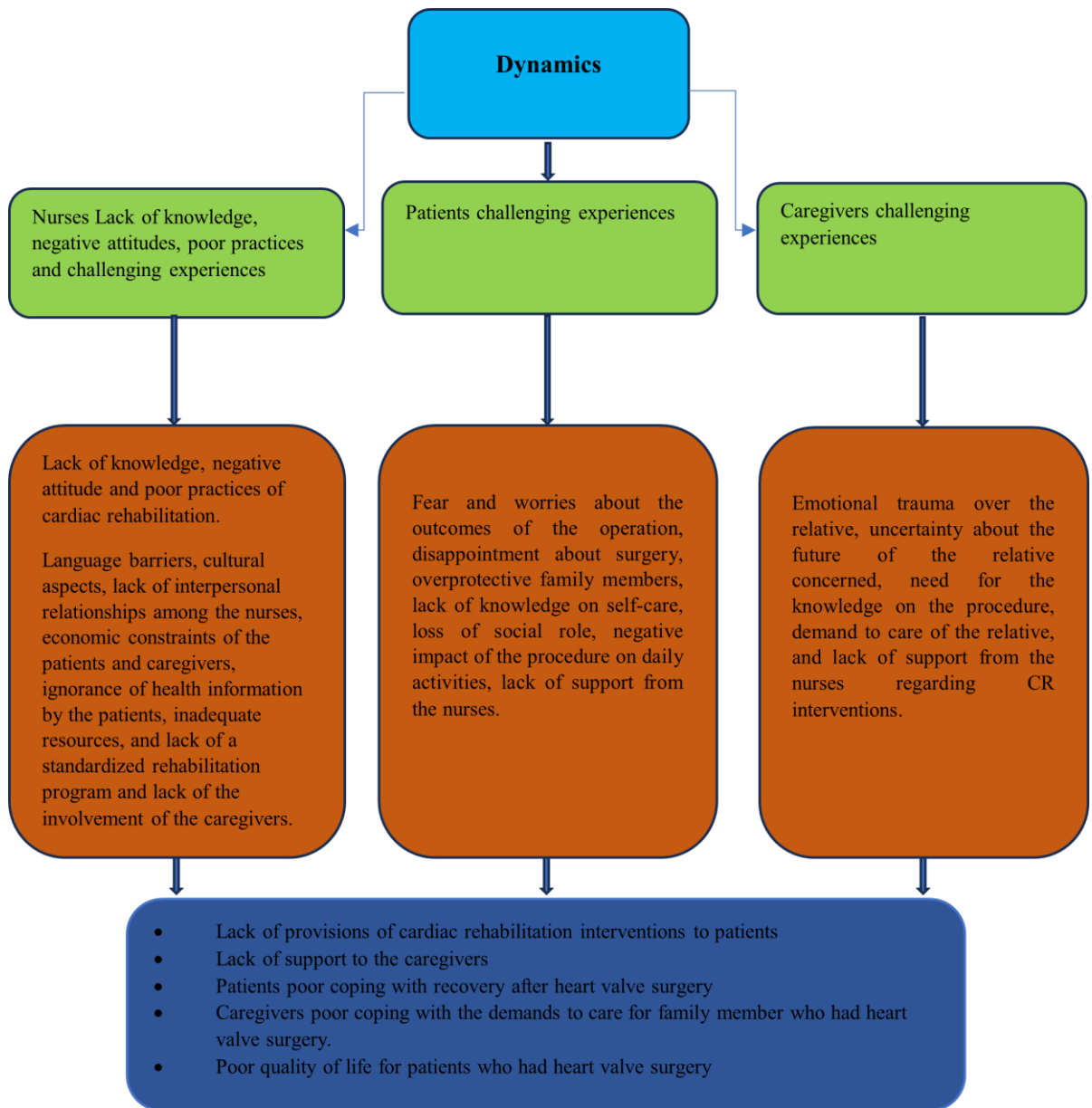


Figure 6.3: Dynamics

6.2.1.5 Procedures

Procedures are the protocols to be followed or interventions to be implemented to address the nurses' lack of knowledge, negative attitude, poor practice, challenges experienced by the nurses in the delivery of CR services, patients' challenges with recovery and coping, and caregivers' challenges with care and support for a family

member who had heart surgery. Procedures refer to the interventions/activities and the process for the implementation of the CRP and involve the interaction between the agent and the recipients.

In the context of this study, the procedure is the educational rehabilitation programme that was developed to be implemented at the Cardiac Unit and Cardiac Clinic to equip the nurses with the knowledge and skills necessary to address the identified challenges and improve the quality of care for patients after heart surgery, as well as support caregivers for the later to provide support and care to their relative after heart valve surgery.

For the success of the implementation of the educational programme, there must be good interpersonal relationships between the facilitator and the recipients so that they can plan the implementation of the programme together. Therefore, the nurses need to be trained on the areas or challenges identified during the situational analysis in Phase 1, enabling them to attend to the needs of the patients and caregivers. They should be trained on how to provide proper information to the patients for recovery and coping and to the caregivers on how to support and care for a family member who had heart valve surgery. The programme was developed to be implemented through the application of the Nicholls and Nicholls Cyclic Model, Knowles adult learning, Kolb's experiential learning, and Gagne's theory of Instruction. The programme is discussed in detail in Chapter 7.

6.2.1.6 Terminus

Terminus refers to the end products or outcomes of an intervention. In the context of this study, terminus refers to the outcomes of interventions of the CRA educational programme after its implementation for nurses. This refers to whether the set

objectives were achieved or not. The goal was to develop an educational rehabilitation programme for the nurses to facilitate CR of the patients who had heart valve surgery.

The changes expected from the nurses after the implementation of the developed programme interventions include increased knowledge, skills, and positive attitudes, improved practices of nurses in the delivery of CR interventions, improved patients' recovery and coping as well as the ability of caregivers to provide care and support to their family members who underwent heart valve surgery. Moreover, it is also expected that there will be increased involvement of the multidisciplinary team, patients getting involved in their care, and nurses involving caregivers in the care of their family members, as well as the development of Standard Operation Procedures (SOPs) for cardiac rehabilitation. Furthermore, the establishment of a CRP in Namibia would be a long-term outcome.

6.3 SUMMARY

This chapter presented the conceptual framework of the study based on the six-survey list as proposed by Dickoff, James, and Wiedenback, (1968), which includes the constructs of agents, recipients, context, dynamics, procedures, and terminus. The conceptual framework formed a foundation for the development of an educational programme for nurses to facilitate the cardiac rehabilitation of patients after heart valve surgery. The next chapter presents the description of the programme and its content based on the findings from the study.

CHAPTER SEVEN

DEVELOPMENT OF AN EDUCATIONAL PROGRAMME FOR NURSES TO FACILITATE CARDIAC REHABILITATION OF PATIENTS AFTER HEART VALVE REPAIR OR REPLACEMENT SURGERY

7.1 INTRODUCTION

The previous chapter described the conceptual framework based on the Practice theory of Dickoff (Dickoff, et al, 1968). This chapter presents the development of a programme for nurses to facilitate the CR of patients after heart valve repair or replacement surgery. The development of the programme was based on the results and findings from the four (4) objectives of Phase 1 of the situational analysis of the study.

7.2 DEVELOPMENT OF A PROGRAMME

The knowledge gap, poor attitudes, and poor practices among nurses, as well as the challenges experienced by nurses, patients, and caregivers, necessitate the development of an educational programme for nurses to provide CR to patients after HVS including support and care to their caregivers. The developed educational programme consists of programme components discussed in the following sections.

7.3 COMPONENTS OF THE PROGRAMME

The components of the programme include the title, purposes and objectives, program approaches, program content, and theoretical foundations for the development and implementation of an educational programme. Nicholls and Nicholls Cyclical Model (1978) was used to guide the development of the educational programme of the nurses to facilitate CR of patients who had heart valve surgery.

7.3.1 Title of the programme

The title of the programme is: *An educational programme for nurses to facilitate cardiac rehabilitation of patients after heart valve surgery at the Cardiac Unit in Namibia.*

7.3.2 Purpose of the programme

The aim of the educational programme is to empower nurses to facilitate the cardiac rehabilitation of patients after heart valve repair or replacement surgery at the Cardiac Unit, Windhoek Central Hospital, Khomas region. After completing data collection and analysis in Phase 1, several areas requiring attention were identified in Chapter 4 of the results and findings (Objectives 1.1 to 1.4) of the nurses, patients, and caregivers respectively. The educational program aims to equip nurses with the knowledge and skills to improve their attitudes toward cardiac rehabilitation (CR) and patients and support their caregivers. Implementing the CR program may enhance nurses' KAP, leading to better patient outcomes, reduced hospital readmissions and costs, and lower mortality rates for heart surgery patients.

7.3.3 Objectives of the programme

The specific objectives of the program are intended to address the gaps identified in Chapter 4 of the study results and findings. The programme aims to equip nurses with the appropriate knowledge, skills, and positive attitudes about CR to provide quality nursing care to the patients and assist caregivers in the care and support of their family members after heart valve surgery.

The specific objectives of the programme are:

- **To provide nurses with the knowledge and skills and modify their attitudes and practices on the CR to deliver cardiac rehabilitation interventions to patients after heart valve surgery.**

This objective is intended to address the knowledge gap, negative attitudes and average to poor practices identified among nurses regarding the provision of CR to patients after HVS as described in Chapter 4, objective 1.1 of the nurses.

- **To describe the challenges experienced by the nurses regarding the delivery of CRP interventions for the patients after heart valve surgery to improve the patient's quality of life.**

This objective addresses the challenges experienced by the nurses as described in Chapter 4, objective 1.2 (Nurses), and Table 4.50.

- **To describe the essential knowledge and skills for nurses to address the challenges experienced by the patients in recovery and coping after heart valve surgery to improve the patient's quality of life, reduce readmission, and hospital costs, and reduce mortality.**

This objective describes the necessary knowledge and skills of the nurses to address the challenges experienced by the patients in recovery and poor coping after heart valve surgery as identified in Chapter 4 of the findings, objective 1.3 (patients), (Table 4.51).

- **To equip the nurses with the knowledge and skills necessary for them to address the challenges experienced by the caregivers about the support and care of their family members after heart valve surgery.**

This objective is intended to provide nurses with the knowledge and skills to address the themes and subthemes identified during data analysis as identified in Chapter 4, objective 1.4, (Caregivers) (Table 4.52).

These challenges as identified would be addressed during the implementation of the programme to equip the nurses with the knowledge and skills and enable them to deliver quality nursing care to the patients after HVS, as well as provide patients and caregivers with appropriate information regarding the recovery and coping as well as the support and care of their family members after heart valve surgery.

7.4 PROGRAMME APPROACHES

This section covers the programme approach as informed by theoretical foundations for the development of a programme and programme content. The approach for the development of a CR educational programme was based on the educational theories of Nicholls and Nicholls Model. Knowles's theory of adult learning, Kolb's experiential learning theory, and Gagne's theory of instruction were applied during implementation. These educational theories were sequentially applied from the conception of the CRP until implementation.

7.4.1 Nicholls and Nicholls Cyclic Model for Curriculum Development

The Nicholls and Nicholls Cyclical model was an appropriate choice for the development of the programme for nurses to facilitate CR of patients after heart valve surgery. Figure 7.1 depicts the Nicholls and Nicholls Cyclical Model of Curriculum Development.

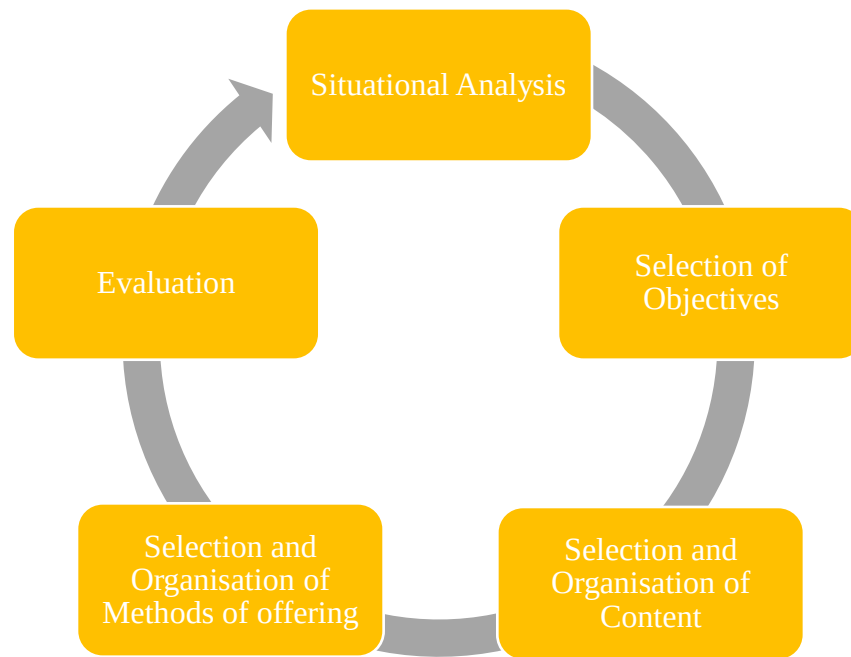


Figure 7.1: Nicholls and Nicholls Cyclical Model

<https://www.scribd.com/document/443158649/Nicholls-and-Nicholls>

The next section describes the application of the Nicholls and Nicholls Cyclical Model to the development of the cardiac rehabilitation educational programme. The Nicholls model consists of the following five-step approach.

- **Situational analysis:** Situational analysis enables the researcher to better understand the context in which the curriculum is to be developed and implemented. In the context of this study, the researcher collected and analysed the data from the participants and the needs of the participants were identified. The findings were used to formulate the objectives for the programme, programme development and implementation.
- **Selection of objectives:** The objectives for the programme were formulated based on the findings during the situational analysis in Phase 1 to meet the needs of the participants for the delivery of CR interventions for the patients after heart valve surgery. These objectives are outlined in this chapter under the section on objectives of the programme in 7.3.3.

- **Selection and organization of content:** The content was selected based on the objectives of the programme. The content to be presented to the participants is valid and reliable. The content can be easily understood by the participants because lessons are inductively composed from simple to complex. For example, starting with definitions and descriptions with examples for better understanding.
- **Selection and organization of methods:** Lectures, role play, group discussions, questions and answers, case scenarios, and debates are methods of teaching or learning to be used or applied during the workshop.
- **Evaluation:** The participants are assessed at the end of each day of the two-day workshop about CR to assess the effectiveness of training, participants' understanding and progress, and whether the objectives of the workshop were achieved. Pre and post-tests of the programme are implemented to determine the effectiveness of the programme content after the training workshop.

7.4.2 Knowles's theory of adult learning

Knowles's Adult learning theory is based on the key differences between the learning and teaching of adults and children, and it was found to be appropriate for programme implementation as the nurse participants are adult learners. According to Knowles (1984), adults, as they grow, become more self-directed and take ownership of their own learning needs. They learn more effectively in groups and prefer to solve real-life situations and problems. In addition, Knowles identified self-concept, experiences, readiness to learn and orientation to learning as the essential characteristics of adult learners that are to be applied to the implementation of an educational programme about cardiac rehabilitation for nurses.

In the context of this study, participants are grouped and given topics to prepare and present to the rest of the participants during the programme implementation.

Self-concept: Knowles (1980) believes that it is normal for an individual's self-concept to change from dependence to increased self-direction during the process of maturing. Knowles further states that adults are self-directed individuals who want to take control of their learning and are independent human beings who want to feel in control. In the context of this study, during the implementation of the programme activities, the researcher should be aware of and respect the participants' learning needs and autonomy. Hence, guidance and support are provided to the participants for the facilitation of learning during the implementation of the programme activities.

Experience: As people develop and grow, they have a wide range of experiences that they can use as a source of learning. Since the participants provide nursing care to patients in the Cardiac Unit after heart valve surgery, during the workshop they would be able to relate the subject matter to their experience working with patients with valvular heart disease or who had heart valve repair and replacement surgery.

Readiness to learn: According to Knowles (1980), adults show learning readiness when they experience a need to learn something to be able to apply it to real-life tasks or problems. Similarly, Bruce and Klopper (2017) substantiated that adults are eager to learn when achieving a particular goal becomes important for them or when they recognize the need to learn to fill a knowledge or skills gap in the workplace. Wentzel (2008) cited in Bruce and Klopper (2017) emphasizes that an adult decides to study further for personal events in case of promotion, personal reasons for self-development and educational enrichment, or to engage in life-long learning.

In the context of this study, during situational analysis, the findings revealed that the participants lacked knowledge and portrayed poor practice in the delivery of CR

interventions to patients after heart valve surgery. Therefore, the nurses as participants in the training workshop on CR have reasons to learn and attend the training workshop for them to be knowledgeable and competent about CRP so that they can provide quality care to the patients and assist caregivers in the support and care of a relative after heart valve surgery.

Orientation to learn: According to Knowles and Associates (1984) as cited in Bruce and Klopper (2017) adults are problem-solving and task-oriented and involve the immediate application of what they have learnt. Knowles, (1980) suggested that facilitators should establish a physical and psychological environment conducive to learning. In the context of this study, the facilitator should ensure that the environment for the training workshop is conducive and that participants are made comfortable and addressed by their names. Furthermore, during the training session, the seating arrangements will be in a circle to facilitate learning and for the participants to take control of their own learning.

Additionally, during the implementation of the programme activities, the facilitator ensures that, as adult learners, the participants are respected. The start and the end of the training session and the scheduled breaks are respected during the two-day workshop.

7.4.3 Kolb's Experiential Learning Theory

According to Hughes and Quinn (2013), over the past 25 years, experiential learning has become firmly established in nursing, midwifery, community, and public health nursing curricula. Experiential learning is learning by doing, rather than by listening to others or reading about it. It involves the active participation of students in the learning process, fostering interaction, autonomy, flexibility, and a high degree of relevance (Hughes & Quinn, 2013). Experiential learning is essentially learning that

results from experience. In this study, Kolb's four cycles of experiential learning are applied.

Concrete Experience (CE): During this stage, participants openly encounter new experiences or previous experiences that have already happened. In the context of this study, during the education workshop, participants actively engage in these experiences. They undergo the learning process through lectures, group discussions, case scenarios, debates, and role-play. This would develop personal learning experiences and share their experiences about the training session. Participants will also acquire knowledge by observing, listening, and reading about CR for patients who have had heart valve surgery.

Reflective observation (RO): After actively engaging in an experience, participants will have the opportunity to reflect on what they have observed or learned during the education workshop regarding CR for patients who have had heart valve surgery. Furthermore, the participants will be allowed to ask questions and discuss their experiences with CR interventions. Communication is very important during this process because it allows participants to identify any discrepancies between their understanding and the new experience acquired. Discussing experiences with others will help facilitate the reflection process by introducing different points of view regarding cardiac rehabilitation.

Abstract Conceptualisation (AC): During this stage, participants will progress from reflective observation to abstract conceptualization as they begin to classify concepts and draw conclusions about the events that will have occurred. They will be able to reflect on how they will apply the new knowledge or experience gained during the education workshop to patients after heart valve surgery. Moreover, the nurses have to

reflect on how they provided CR interventions previously before the education workshop.

Active Experimentation (AE): This is the final stage of the learning cycle. During this stage, participants would be encouraged to apply the new ideas and experiences to the real world around them. In the context of this study, participants will be urged to apply the new experiences acquired during the education workshop to real-life situations at the Cardiac Unit and Cardiac Clinic.

7.4.4 Gagne's Theory of Instruction

The focus of Gagne's instructional design model is on learning outcomes and how to establish specific instructional events to attain those outcomes. It is based on the information processing model, which focuses on the mental events that occur when individuals encounter various stimuli. According to Khadjooi et al., (2011), instructional events refer to the actions of both the teacher and learner during a teaching session. Hughes and Quinn (2013) highlighted the conditions of learning including internal conditions of learning (what the learner knows prior to the instructions) and external conditions of learning (the stimulus presented by the teacher). The researcher found this theory of instruction appropriate for the implementation of the current programme because it addresses the conditions of learning. Gagne's theory identifies nine events of instructions, which were applied in this study as described in the following sections.

Gaining attention: Refers to gaining attention from the participants. This happens when the participants arrive at the venue, and their attention can be diverted. During the facilitation of the educational workshop, the facilitator gains the participant's attention by using greetings, gesturing, and speaking loudly. This is done to capture

their attention and interest in the workshop. The facilitator should ask provocative questions to the participants regarding cardiac rehabilitation.

Informing audience/ participants about objectives: During the education workshops, for each topic that is discussed for the day, the learning objectives are stated to the participants to set their expectations and motivate them to follow and complete the training sessions. For example, on the first day of the workshop, the learning objectives are stated to the participants. For example: at the end of this session, you should be able to define cardiac rehabilitation, describe the phases of CR, debate the core components of CR, and display an inviting attitude towards the patients for cardiac rehabilitation.

Recalling prior learning: Before the start of the presentations during the workshop, the participants' prior knowledge is recalled. Participants are asked about what they already know about CR for patients after heart valve surgery, the phases of CR, and its core components they are familiar with, or they are asked about any topic that will be discussed. They are also asked to state the health information they normally provide to the patients and caregivers regarding CR interventions. This would give the facilitator a picture of what the participants already know and do not know about cardiac rehabilitation.

Presenting the stimulus: During this event, the presentation of the content to address areas of concern in the findings of data analyses is prepared in the form of a booklet, covering all the areas of concern regarding the findings of the situational analysis in Phase 1 of the study. PowerPoint presentations should be available for each topic of the day. Each participant receives a booklet of information, and each topic has learning objectives and detailed contents.

Providing student guidance: This refers to conveying the meaningfulness of the stimulus by devices that relate new information to existing knowledge and give concrete examples of abstract concepts. During the workshop, the content is presented through a PowerPoint presentation, and the participants are given the chance to reflect on their experiences of what they learnt in the workshop regarding CR for patients after heart valve surgery. This would allow them to adjust and modify their attitudes regarding the delivery of cardiac rehabilitation. The facilitator should ask the participants what happens if proper information is not given to the patients regarding their recovery after heart valve surgery.

Eliciting performance: The participants are asked to demonstrate the application of learning to a novel problem to ensure that learning has taken place. The participants are asked questions about what they learnt during the educational workshop and to provide examples of what they learnt about CR for patients after HVS for better understanding.

Provide feedback to students: During the educational workshop, feedback is given to the participants about their progress in achieving the educational objectives. After group discussions and role-plays, the facilitator gives constructive feedback to the participants on how well the activity was presented as well as areas of further improvement. The feedback is given utilising the sandwich method, taking into consideration that the participants are adult learners.

Assessing performance: Pre-and-post-training tests are administered to the participants to evaluate the knowledge acquired from the workshop and determine the level of proficiency of each participant. Similar tests are used in the pre-and post-training tests to compare the knowledge score before and after the workshop.

Enhancing retention and transfer: This will be achieved by giving practice in relevant capabilities and increasing the variety of performance. The facilitator should repeat the content during the workshop that the participants did not understand. According to Khadjooi et al., (2011) transferring knowledge and skills to new problems and situations is a goal of most instruction, although classroom time constraints make it more difficult to achieve. Nevertheless, during the educational workshop, time for interactive discussion is allocated so that participants are free to ask questions at their own pace. The facilitator should also be flexible with time scheduling to meet the needs of the participants. The session is closed by summarising the key points discussed, answering questions, and asking for feedback from the participants. The next section presents the programme content.

7.5 PROGRAMME CONTENT

This section describes the content of the CR educational programme. The content of the developed programme is related to the findings from the situational analysis in Phase 1 of the study, the cardiac rehabilitation framework, and the relevant information obtained from the literature. The results and findings from the situational analysis are identified in Chapter 4, objectives 1.1 to 1.4 focused on the nurses, patients and caregivers respectively. The content to be included in the educational programme is presented in Table 7.1.

Table 7.1: Content of the educational programme for nurses to facilitate rehabilitation of patients after heart valve repair or replacement surgery in Namibia

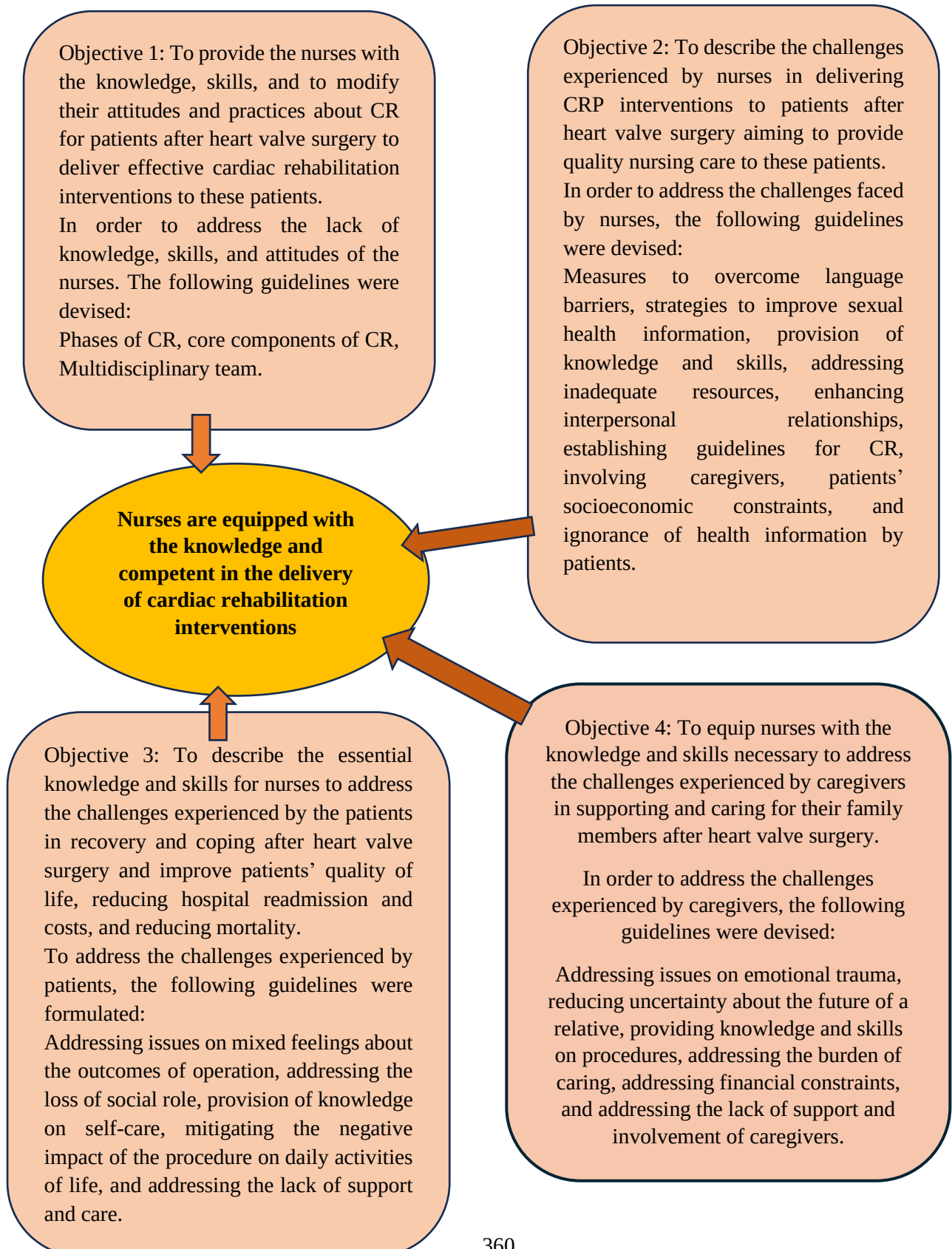
Programme	Description
Programme title:	An educational programme for nurses to facilitate cardiac rehabilitation for patients after heart valve repair or replacement surgery
Programme goal	▪ To empower nurses with the knowledge and skills for providing cardiac rehabilitation to patients who have had heart valve repair and replacement surgery.
Programme objectives	▪ To provide the nurses with the knowledge, skills, and modify their attitudes and practices about CR for patients after heart valve surgery enabling them to deliver cardiac rehabilitation interventions to patients after heart valve surgery. ▪ To describe the challenges experienced by nurses in delivering CRP interventions to patients after heart valve surgery to ensure the delivery of quality nursing care to these patients. ▪ To describe the essential knowledge and skills for nurses to address the challenges experienced by patients in their recovery and coping after heart valve surgery and improve the patient's quality of life while reducing mortality, and lowering hospital readmission and costs. ▪ To equip nurses with the knowledge and skills necessary to address the challenges experienced by caregivers in supporting and caring for their family members after heart valve surgery.
Programme structures	▪ The developed programme is to be implemented in the form of an educational workshop.
Target population	▪ The nurses who are providing nursing care to patients who have had heart valve surgery at the Cardiac Unit and Cardiac Clinic.
Teaching strategies	▪ Lectures, group discussions, case scenarios, problem-solving, debates and role-play.
Programme approaches	▪ Applications of Nicholls and Nicholls Cyclic model for curriculum development, Knowles theory of adult learning, Kolb's Experiential Learning, and Gagne's Theory of Instruction for implementation of the programme.
Programme phases	▪ Orientation, working and termination phases.
Evaluation	▪ Pre- and post-training tests will be administered during the educational workshop.

7.5.1 Description of the content of the educational rehabilitation programme

Figure 7.2 presents the content and activities of the programme to be covered during the two-day workshop. The content is based on the areas of concern identified during the situational analysis in Phase 1. This content is delivered in the form of a two-day workshop at Windhoek Central Hospital, Cardiac Unit's Conference Room.

Figure 7.2: Depicts the description of the content of the educational rehabilitation programme.

Figure 7.2: The content of the educational rehabilitation programme



Objective 1: To provide the nurses with the knowledge and skills and modify their attitudes and practices about cardiac rehabilitation of patients after heart valve surgery to deliver quality nursing care to the patients after heart valve surgery.

This objective presents the content that addresses the nurses' knowledge, attitudes and practices about cardiac rehabilitation of patients after heart valve surgery.

Table 7.2: The content for Objective 1, to address the knowledge, skills, attitudes, and practices of the nurses about cardiac rehabilitation

Content	Teaching/Learning Strategies	Learning Theory/Approaches
1. Cardiac rehabilitation 2. Definition of cardiac rehabilitation 3. Indications for CRP 4. Phases of cardiac rehabilitation ▪ Phase 1: Inpatient ▪ Phase 2: Outpatient ▪ Phase 3: Maintenance 5. Core components of cardiac rehabilitation: ▪ Patient assessment ▪ Exercise training ▪ Diet/nutritional counselling ▪ Smoking cessation ▪ Cardioprotective therapies ▪ Medical risk factor management ▪ Lifestyle risk factor management ▪ Psychosocial counselling 6. The benefits of cardiac rehabilitation 7. Barriers to cardiac rehabilitation 8. The role and responsibilities of the nurses in cardiac rehabilitation 9. Nurses' knowledge of patients' cardiac rehabilitation - Lack of knowledge and skills on patients' cardiac medications ▪ Anticoagulants- Warfarin, Heparin & Clexane. ▪ INR normal ranges/levels ▪ Role of the nurses in INR and Warfarin training ▪ Cardio-protective therapies ○ Beta-blockers ○ Antiplatelets ○ Angiotensin-converting enzyme inhibitors (ACEIs) ○ Calcium channel blockers ○ Digitalis ○ Diuretics ○ Statins	PowerPoint Presentation Case scenarios Group discussion	Kolb's Experiential learning (concrete, reflection, abstract and active) Knowles' Theory of Andragogy Gagne's Theory of Instruction

Table 7.2: The content of Objective 1, which addresses the nurses' knowledge, attitudes, and practices about CR, is derived from Phase 1 of the results from Objective 1.1 on the nurses' KAP about CR of patients who have had heart repair or replacement surgery.

Objective 2: To describe the challenges experienced by the nurses regarding the delivery of CRP interventions for the patients after heart valve surgery to provide quality nursing care to the patients after heart valve surgery

This objective presents the content that addresses barriers to the provision of CR by nurses to empower nurses with the knowledge and skills to deliver quality nursing care to patients after heart valve surgery.

Table 7.3: The content for objective 2, to describe the challenges experienced by nurses in the delivery of cardiac rehabilitation to patients after heart valve surgery

Content	Teaching/ Learning Strategies	Learning Theory/ Approaches
- Language barriers - Strategies to overcome the language barrier in a health care setting. - Economic constraints on the patients and caregivers - Definition of socioeconomic status - Barriers to CRP in low-income countries. - Factors associated with non-attendance to cardiac rehabilitation by cardiac patients. - Strategies to promote home-based cardiac rehabilitation - How to overcome socioeconomic barriers. - Home-based cardiac rehabilitation - Perception of sex education as a taboo - Definition of sexuality - Definition of sexual education - Sexual health care - Barriers for nurses in providing sexual education to patients after heart surgery. - Impact on patients for not receiving sexual-related health information. - Strategies to improve discussion of sexual-related health information to patients by health care providers.	PowerPoint Presentations Case scenarios Debating Role play	Kolb's Experiential Learning Knowles' Theory of Andragogy Gagne' Theory of instruction

4. Ignorance of health information by patients ▪ Definition of ignorance and non-compliance ▪ Reasons for ignorance of health information by patients/clients ▪ Factors influencing patients' non-compliance with medication regimens. ▪ Factors associated with lack of patient attendance to the cardiac rehabilitation programme. ▪ How to overcome patients' ignorance of health information and non-compliance with medications. 5. Inadequate resources to facilitate CR of patients ▪ Multidisciplinary team for a cardiac rehabilitation programme. ▪ Roles and responsibilities of the multidisciplinary team in cardiac rehabilitation. ▪ Strategies to improve limited resources, multidisciplinary- teams and drug shortages. 6. Interpersonal relationships among the nurses working in the Cardiac Unit ▪ Definition of interpersonal relationships. ▪ Importance of interpersonal relationships. ▪ Strategies to promote interpersonal relationships. 7. Unavailability of a standardized cardiac rehabilitation programme ▪ Policies and guidelines of CRP (Refer to topic 1 on the core components) 8. Involvement of the caregivers ▪ Definition of caregivers and caregiving. ▪ The role and responsibilities of caregivers. ▪ The role of caregivers in the support and care of a relative after heart valve surgery ▪ Challenges experienced by caregivers. ▪ Strategies to involve caregivers in the care of a relative.		

The data provided in Table 7.3 is based on the findings of objective 1.2, which explored the challenges that nurses experience when providing CR services to patients who have had heart valve replacement or repair surgery.

Objective 3: To describe the essential knowledge and skills for nurses to address the challenges experienced by the patients in recovery and coping after heart valve surgery to improve the patient's quality of life and reduce hospital readmission, hospital costs and mortality.

The objective presents the content that addresses the challenges experienced by the patients during recovery and coping after heart valve surgery.

Table 7.4: Content for Objective 3, to address the challenges experienced by the patient in recovery and coping after heart valve surgery

Content	Teaching/ Learning Strategies	Learning Theory/ Approaches
Mixed feelings about the outcome of the operation:	PowerPoint	Kolb's
▪ Delays and cancellations of the operations. ▪ Factors associated with delays and cancellation of surgery ▪ Avoidable cancellation of surgery. ▪ How to overcome experiences of the cancellation of surgery ▪ Pre and postoperative care, reassurance, and counselling of patients on the following aspects: ○ Fear and worry about the outcome of the operation. ○ Disappointment after surgery ○ Embarrassment over the scar-sternotomy wound ○ Disturbances about the sound of the artificial valve. ▪ How to alleviate the fear and uncertainty of patients. ▪ Emotional support ▪ Psychological support	- Presentations - Case scenarios - Debating - Roleplay	- Experiential Learning - Knowles' Theory of Andragogy - Gagne' theory of Instruction
Loss of social role ○ Pre- and post-operative patient education ○ Social support		
Provision of knowledge on self-care- educational support: ○ Medication regimen ○ Diet ○ Self-care ○ Physical activities/exercises ○ Sexual health activities ○ Lifestyle changes- alcohol and smoking.		
The negative impact on daily activities of living after heart valve surgery: ○ Pre- and post-operative patient education ○ Define post-operative pain syndrome ○ Pain medication for post-operative pain syndrome		
Support and care from nurses ○ Training, education and mentoring by the nurses: ○ Health system support ○ Medications ○ Cardiac diet ○ Physical exercises ○ Lifestyle changes- smoking, alcohol		
Overprotective family member ▪ Training and health education on self-care		

The content depicted in Table 7.4 of objective 3, to address the challenges experienced by patients in recovery and coping after heart valve repair or replacement surgery is derived from the findings of objective 1.3 of the challenges experienced by patients in recovery and coping after heart valve repair or replacement surgery.

Objective 4: To equip the nurses with the knowledge and skills that are necessary for them to address the challenges experienced by the caregivers regarding the support and care provided to their family members after heart valve surgery, for the nurses to equip the caregivers on the support and care of a relative after heart valve surgery.

The objective presents the content that addresses the challenges experienced by the caregivers on the support and care of a family member after heart valve surgery.

Table 7.5: Content for objective 4, to equip the nurses with knowledge and skills that are necessary for them to address the challenges experienced by the caregivers regarding the support and care

Content	Teaching/ Learning Strategies	Learning Theory/ Approaches
Addressing emotional trauma: ▪ Definition of Emotional trauma ▪ Emotional support	PowerPoint Presentation Case scenarios	Kolb's Learning Theory of
Addressing the need and provision for knowledge about the procedure ○ Medication and treatment regimes ○ Wound care ○ Diet ○ Physical activity ○ Monitoring of symptoms ○ Physical, psychological, emotional, and social support for the patients.	Debating Roleplay	Andragogy Gagne' theory of Instruction
A prolonged recovery period placed a burden on caregivers: ○ Addressing the burden and poor coping experienced by caregivers on caring ○ Explanation of prolonged recovery ▪ Addressing expenses related to transport fares and other commodities. ○ Drug shortages		
Addressing uncertainty about the future of a relative ○ Define uncertainty ○ Fear and anxiety ○ Factors associated with uncertainty ○ Pre- and post-operative caregiver education on uncertainty ○ Strategies to overcome uncertainty ○ Reassurance		
Addressing the issue of support and care of the caregivers		

The content of Table 7.5 of Objective 4, which addresses the difficulties faced by caregivers when providing support and care to a family member following heart valve repair or replacement surgery, is based on the findings of Objective 1.4, on the challenges experienced by caregivers when providing support and care to a family member after heart valve repair or replacement surgery.

7.6 SUMMARY

This chapter presented the process of developing the cardiac rehabilitation programme for nurses to facilitate the cardiac rehabilitation of patients who had heart valve repair or replacement surgery based on the findings of the situational analysis in Phase 1 of the study. It also described the applications of educational theory that guided the programme development, implementation and evaluation. The chapter covered programme components including the title, purpose, objectives, and content. The next chapter discusses the implementation and evaluation/validation of the programme.

CHAPTER EIGHT

IMPLEMENTATION AND EVALUATION / VALIDATION OF THE EDUCATIONAL PROGRAMME

8.1 INTRODUCTION

This chapter presents the implementation and evaluation/validation of the developed programme for nurses to facilitate the CR of patients who had heart valve repair or replacement surgery. This chapter has two (2) sections: section 1 is about the implementation of the programme, and section 2 is about an evaluation/validation of the programme. It should be noted that the developed programme was not implemented during the study. However, it was validated by experts, as discussed in the following sections.

8.2 SECTION 1: IMPLEMENTATION OF THE PROGRAMME

This section describes the implementation of the developed programme as outlined in Chapter 7 of the study. The target population, goals, and procedures are described. The theories/educational approaches to be used during the implementation of the programme activities, as well as the facilitation methods to be employed for the success of the programme, are explained. The Phases of the implementation of the programme are also discussed.

8.2.1 Target Population

The target population for the programme's implementation/pilot testing are the nurses who provide nursing care to the patients who had heart valve surgery at the Cardiac Unit and Cardiac Clinic at Windhoek Central Hospital. A purposive sampling method will be used to select the participants.

8.2.2 Goal of the educational programme implementation

The goal for the implementation of the educational programme is to evaluate and validate the feasibility of the developed educational programme for the nurses to facilitate CR for patients who had heart valve surgery. The purpose of the educational programme is to equip nurses with the knowledge and skills, to change their attitudes, behaviour, and practices toward cardiac rehabilitation

8.3 PROCEDURES FOR IMPLEMENTATION OF THE EDUCATION PROGRAMME

For the successful implementation of the programme towards the achievement of the goals and objectives, the following arrangements should be in place before the implementation of the programme activities.

8.3.1 Permission to conduct the educational workshop

Permission to conduct the educational workshop at the Cardiac Unit and Cardiac Clinic will be sought through the Office of the Senior Medical Superintendent at Windhoek Central Hospital. Additionally, permission will be obtained from the Control Registered Nurse and Quality Assurance Officer for preparation and planning purposes. The nurses at Cardiac Unit and Cardiac Clinic are invited to attend a two-day educational workshop.

8.3.2 Programme schedule

For the success of the proposed educational workshop, a training schedule is drafted for a two-day workshop to allow participants to assimilate the content. The proposed schedule is divided into two sessions. Day one (1) covers topics for objectives 1 and 2, and day two (2) covers topics for objectives 3 and 4. Registration of the participants takes place every day from 08h00-08h15. All two days' workshops start from 08h15-17h00, with a tea break at 10h30-11h00, lunch at 13h00-14h00, and an afternoon tea

break at 15h00-15h15. The facilitator ensures that all the activities are covered. However, flexibility is allowed to make any changes to the programme schedule considering the learning needs and different learning styles of the participants.

8.3.3 Venue

The venue for the educational workshop is Cardiac Unit's Conference Room at Windhoek Central Hospital. The room should be fully equipped with chairs and one big round table for the training. The participants are seated in a circle to promote a sense of belonging, and eye contact. The seating arrangement promotes attentiveness and engagement in the activities of the workshop. The facilitator ensures that the environment is conducive with adequate lighting, and spacious with air-conditioning.

8.3.4 Resources for the educational workshop

Teaching materials for example, handouts, notebooks, pens, marker pens, a laptop, a head projector, and flip charts are available at the workshop to facilitate educational training. A bottle of water and some snacks are also provided to increase vitality, reduce boredom, and increase concentration.

8.3.5 Ground rules/housekeeping rules

After the welcoming remarks and introduction of the workshop, ground rules and workshop expectations are discussed at the beginning of the first day of the workshop. These rules should be adhered to throughout the two-day educational workshop. The participants are allowed to list their ground rules which are written on the flip charts and serve as a reminder throughout the workshop. The participants will use name tags to be addressed by their names, or as they wish to be called during the workshop. Confidentiality and privacy are maintained throughout the educational workshop.

8.4 FACILITATION TECHNIQUES

This section presents the teaching techniques that were proposed for the success of the programme's implementation. Facilitation is a technique mostly used by the facilitator in training to help participants acquire, retain, and apply the knowledge and skills learned from the workshop. Through facilitation, participants are introduced to the content or activities of the workshop. They are free to ask questions, share their knowledge with each other, and encourage others to participate, while the facilitator has to respond to questions and give suggestions during the educational workshop. The lecture method (interactive lecturing), group discussion, questions and answers methods, case scenarios, role-play, debating, feedback, plenary discussion, and icebreakers are among the methods of facilitation to be used during the educational workshop.

8.4.1 The Interactive lecturing method

A lecture is a teaching encounter in which a teacher transmits information to the audience whose main role is to listen. A lecture is a teacher-centred approach, featuring the teacher's direct instruction, and does not promote interactive problem-solving and discussion (Hughes, & Quinn, 2013).

Given that the participants are adult learners whose aim is self-directive, who want to take control of their learning, and who prefer discussion and a problem-solving approach (Knowles, 1984), the facilitator opts for interactive lecturing that encourages active engagement and accountability. Interactive lecturing promotes learners' retention, critical thinking skills, and participants' perceptions of their learning. Therefore, interactive lecturing should be conducted throughout the four sessions, and participants would be actively involved through group discussions, case scenarios, and group presentations.

8.4.2 Group discussion

According to Bruce, and Klopper, (2017), discussion is an orderly process of face-to-face interaction between group members. The aim of group discussion is to solve a problem, enhance members' knowledge of an issue at hand, address a question, or make a decision on an issue. Group discussion helps the participants to think for themselves and gain confidence in their abilities to generate ideas and express their viewpoints. Group discussion will be used throughout the sessions since the participants are adult learners and want to take ownership of their own learning needs. Moreover, group discussion helps the students to develop skills in teamwork and cooperation.

During the implementation of the activities, participants are put in small groups of 3 to 4 participants to discuss any topic given to them. Group leaders are nominated and ground rules for the group are set to control dominant and non-dominant quiet members. After discussion in groups, members have to present their discussions to the rest of the participants. This will be followed by questions and comments from the audience, who will be observers.

8.4.3 Questions and Answer Methods

Questioning is the integral most commonly used teaching/learning strategy because it stimulates thinking and facilitates learning (Hughes, & Quinn, 2013). Questioning is also important for the facilitator to explain and encourage active learning. Participants are encouraged to ask questions and give comments for clarification purposes at the beginning, during, and at the end of the session. During questioning time, participants are encouraged to ask provoking questions such as "*Why? How? What if?*" questions that promote critical thinking and problem-solving skills. Answers and clarifications are given by the facilitator and participants.

8.4.4 Case scenario

According to Seshan, et al., (2021), a case scenario or case study is a preferred active, problem-based, student-centered, teacher-facilitated teaching technique for effective learning because it aids in the development of critical thinking abilities in the students. This strategy allows the participants to integrate theory into real-life situations. Additionally, case scenario-based instruction encourages participants to reflect on their learning as they work collaboratively to solve cases and exchange ideas during case scenario analysis and presentation. In this study, case scenarios are used to give participants opportunities to solve problems in real-life situations.

8.4.5 Role-play

According to Bruce, and Klopper (2017), role play is a teaching/learning strategy that requires two or more students to act out a situation under the facilitator's direction. Role-play requires students to use their imagination to act out a particular situation by taking on the identity of another person. Role play is useful in improving communication and problem-solving skills, and attitudes, and provides insight into how to work in an interdisciplinary group in a real-life situation.

During the implementation of activities, participants are given role-play scenarios to act upon as indicated.

One example of a case scenario:

A 23-year-old male patient who underwent mechanical valve surgery four days ago is worried and fearful about the outcome of the operation after discharge from the hospital. You are required to enact the role-play. This role-play requires three people to role play such as two (2) nurses and one (1) patient.

Clarification on the rules of the role-play is provided, and the role players are briefed before they enact the play.

Furthermore, the role players have to set their objectives and prepare the scenarios. While the role players play their roles, other participants act as the audience and make

notes to provide feedback. In addition, at the end of a role-play, a general discussion follows. Debriefing would also commence, and the facilitator asks the role players to describe their experience and share their insights, and feelings about the act. The observers are given an opportunity to share what they saw, felt, and perceived about the role play.

8.4.6 Debating

According to Hughes and Quinn (2013), a debate is a formal way of examining issues that can be very exciting to the participants as well as the audience. Debates give the participants the opportunity to formulate an argument and present it to the audience. Debates are easy to compile. The facilitator can choose several issues; for example, four (4) participants are required to present their views, two speaking for the motion and two against it (Hughes, & Quinn, 2013). During the implementation of the activities, debates are performed through the four sessions and the participants, as adult learners, are free to present their views about the issues under discussion. After the presentation, the audience or observers are given the chance to contribute and vote for the motion or against it.

8.4.7 Feedback and plenary discussion

Hughes and Quinn (2013) define feedback as any data, procedure, or endeavour that facilitates or quickens a student's learning through remarks made in relation to formative or summative assessment tasks. During the implementation of the programme, plenary discussions are conducted for the participants to share their views and the outcomes of the educational workshop.

8.5 PROCESS / PHASES OF PROGRAMME IMPLEMENTATION

This section presents the process of implementing the programme activities, which includes the orientation phase, working phase and termination phase, as displayed in Figure 8.1. The researcher, as the programme developer, will be the facilitator for the implementation of the programme.

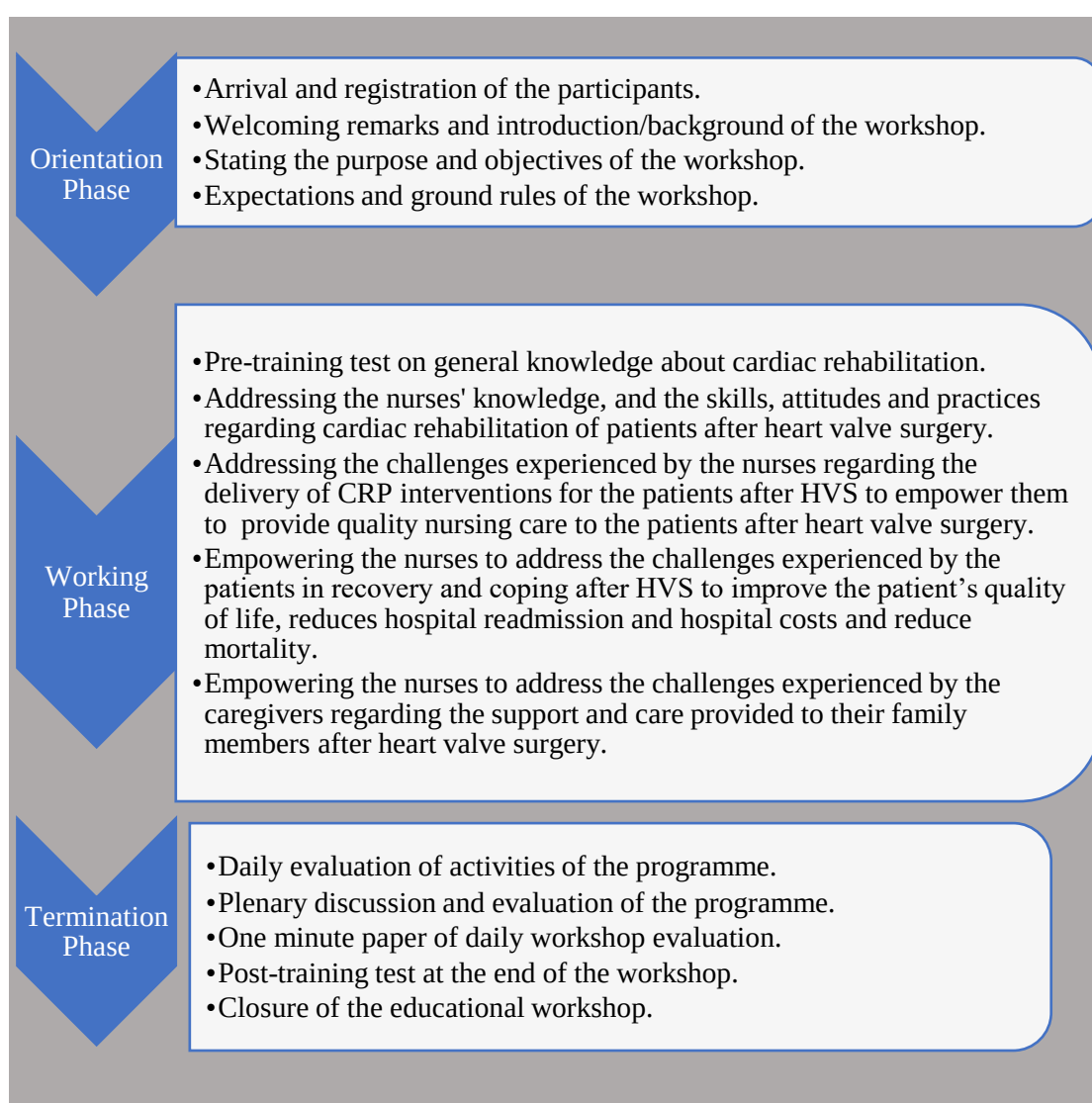


Figure 8.1: Phases of the programme implementation to facilitate cardiac rehabilitation of patients after heart valve surgery

8.4.8 Orientation phase

During the orientation phase, the researcher invites the participants before the commencement of the educational workshop through the Office of the Senior Medical Officer of Windhoek Central Hospital. A notification is also sent to the Quality Assurance Office of WCH which is responsible for education, and the Senior Control Registered Nurse at the Cardiac Department to convey the message to the staff members about the educational workshop. Participation in the workshop is voluntary, and all members of the target study population who are available are encouraged to participate. Upon arrival at 08h00-08h15, participants register and take their seats in the Cardiac Unit boardroom.

After registration, all participants are made comfortable in their chairs, welcoming remarks and an introduction and background of the educational workshop are shared. The aims and objectives of the workshop are stated for the participants to understand why they were invited. The expectations from the workshop are highlighted and participants are given an opportunity to express their expectations. Expectations are noted on the flip charts and included in the workshop. Ground rules are established by the participants and remain on the flip chart as a reminder throughout the training programme.

Table 8.1: The proposed schedule for the educational workshop about cardiac rehabilitation

Date	Time	Day	Session/objectives
To be announced	08h15-08h30	Day 1	✚ Arrival & registration ✚ Welcoming remarks and introduction ✚ Ground rule setting ✚ Aims & objectives of the workshop ✚ Pre-training test on general knowledge regarding cardiac rehabilitation.
	09h00-13h00	Topic 1	Session 1: Objective 1- To provide the nurses with knowledge and skills and modify their attitudes and practices on the CR of patients after heart valve surgery to deliver cardiac rehabilitation interventions to patients after heart valve surgery.
	13-14h00	Lunch	
	14-16h30	Topic 2	Session 2: Objective 2- To describe the challenges experienced by the nurses regarding the delivery of CRP interventions to patients after heart valve surgery to improve the patient's quality of life.
	16h30-17h00		Evaluation of the activities for the day
	08h00-08h15	Day 2	Arrival & registration
	08h30-1300	Topic 3	Recap day 1 Session 3: Objective 3- To describe the essential knowledge and skills for nurses to address the challenges experienced by the patients during recovery and coping after heart valve surgery to improve the patient's quality of life, reduce re-admission, and hospital costs, and reduce mortality
	13h00-14h00		Lunch break
	14h00-16h00	Topic 4	Session 4: Objective 4- To equip the nurses with the knowledge and skills that are necessary for them to address the challenges experienced by the caregivers regarding the support and care provided to their family members after heart valve surgery
	16h30-17h00		Wrapping up and evaluation of the activities of the day.
	17h00		Post-training test evaluation Closure of the educational workshop

8.4.9 Working phase

This phase addresses the challenges identified during the situational analysis in Phase 1. The programme is presented in four sessions as depicted in Table 8.1 of the workshop schedule. The working phase is aimed at implementing the programme activities for the four (4) objectives of the programme. Additionally, the implementation of the programme activities is based on Knowles' Theory of Andragogy, Kolb's Experiential Learning, and Gagne's Theory of Instruction. The programme is presented in four sessions, as described in the following sections.

DAY 1

Day 1 covers session 1 and session 2 as indicated in Table 8.1 the proposed schedule of the educational workshop about cardiac rehabilitation.

Session 1: Objective 1- To provide the nurses with the knowledge and skills to modify their attitudes and practices on the CR of patients after heart valve surgery to deliver cardiac rehabilitation interventions to patients after heart valve surgery.

This session is aimed at addressing the knowledge, and skills, and modifying the attitudes and practices of the nurses regarding cardiac rehabilitation of patients after heart valve surgery.

The findings identified during data analysis are shared with the participants through PowerPoint presentations, case scenarios, and group discussions. Before the presentation, the facilitator asks the participants to state what they know about CR, and what they think about cardiac rehabilitation. This is done to assess the participants' existing knowledge about cardiac rehabilitation. The areas of concern covered for session 1 are depicted in Chapter 7, Table 7.2.

The following are the activities that the participants perform during the educational workshop.

Case Scenario

A 20-year-old female patient underwent mechanical valve replacement surgery a year ago and came for follow-up and would want to start a family.
Summarise how you would address the patient's problem.

Group discussion

Case scenario 1:

A 19-year-old male patient underwent mechanical valve replacement a year ago and came for a follow-up with a septic sternotomy wound. He informs you he stays far (about 25 kilometers) from a nearby clinic and hospital.

Explain how you would handle this situation.

Debating

Debating on the benefit of cardiac rehabilitation:

You are all working in the Cardiac Unit, and you have to debate on the benefit of cardiac rehabilitation for patients who had heart valve surgery.

What do you think about it? One group supports and the other is against it.

Participants have 5 to 10 minutes of debating.

Session 2: Objective 2- To address the challenges experienced by the nurses regarding the delivery of CRP interventions for the patients after heart valve surgery to improve the patient's quality of life.

This session, focusing on objective 1.2 is aimed at addressing the challenges experienced by the nurses in delivering CR interventions to improve the quality of life for patients after heart valve surgery. The aspects that are covered during session 2 on day 1 are presented in Chapter 7, Table 7.3.

The following are the activities that the participants perform during the educational workshop.

Case scenario

Care scenario: Sexual activity:

A 25-year-old male patient, a university student, underwent Mitral Valve Replacement; he is about to be discharged from the hospital. He is involved in a serious relationship and would like to receive more health information about sexual activities, such as when he may start with sexual activity.

Debate the information you would provide to the patient for him to have a healthy sexual life.

Group discussion

Group discussion:

In your groups, discuss why patients tend to ignore health information provided to them about recovery after being discharged from the hospital.

Debating

Debating on caregivers' involvement

Caregivers are individuals who assume the role of the nurses for a family member after discharge from the hospital.

Debate whether caregivers should be involved in the care of their family members after heart valve surgery.

- Each group consists of 4 members.
- Other members will act as observers and facilitators.

Debating

Debate on this scenario: Is it the role and responsibility of the nurse or the doctor to provide cardiac rehabilitation information to the patient after discharge from the hospital for recovery?

Each group should have 3 to 4 members to debate.

One group supports the nurses' role, and another group opposes it.

Group discussion

Group discussion

Language barriers are considered a challenge for patients at the Cardiac Unit and Cardiac Clinic.

Discuss how you would overcome this barrier so that patients are fully informed about self-care upon discharge from the hospital.

Roleplay

Session 2: Role-play scenario

You are a registered nurse working at the Cardiac Clinic. A 20-year-old male patient who underwent Mechanical valve replacement surgery three months ago has come for a follow-up visit. He informs you that he has not taken his Anticoagulant-Warfarin medication for the past three weeks because it ran out of stock, and he had no transport money to travel to the hospital for the prescription. The patient is accompanied by his grandmother.

You are required to role-play this scenario.

Three role players are needed to take on the roles of:

- 1 Registered nurse.
- 1 Patient
- Caregiver

DAY 2

Session 3: Objective 3 - To describe the essential knowledge and skills for nurses to address the challenges experienced by the patients in recovery and coping after heart valve surgery to improve the patient's quality of life, reduce readmission, and hospital costs, and reduce mortality

This session aims to empower the nurses with the knowledge and skills needed to address the challenges experienced by patients during their recovery and coping after heart valve surgery. The content for this session is presented in Chapter 7, Table 7.4. The following are the activities that the participants perform during the educational workshop.

Case scenario 2

Case Scenario:

A 30-year-old female works at the City of Windhoek and deals with customers every day about water bills. She underwent mitral valve replacement a year ago and has a sternotomy wound on her chest. She is shy to expose her chest and feels so uncomfortable in front of the customers.

Discuss how you would handle this situation.

Group discussion

Group discussion:

A young man, 20 years old, complained of not participating in sports since he underwent mechanical valve replacement.

Discuss the advice you would provide him for better understanding.

Role play

Role play:

A young man underwent heart valve surgery two days ago and is worried and fearful about the outcome of the operation after discharge from the hospital.

You are required to role-play the scenario.

Three role-players are needed to play the roles of:

- 2 nurses
- 1 patient

DAY 2

Session 4: Objective 4- To equip the nurses with the knowledge and skills that are necessary for them to address the challenges experienced by the caregivers regarding the support and care provided to their family members after heart valve surgery.

This session aims to empower the nurses to address the challenges experienced by the caregivers regarding the support and care provided to their family members after heart valve surgery. The content is presented in Table 7.5, Chapter 7. The following are the activities that the participants perform during the educational workshop.

Case scenario

Case scenario:

A caregiver visits the Cardiac Clinic with her grandchild for follow-up and tells you that they have no food, and his grandchild is eating 'Ekaka'- traditional green cabbage because it is the only food she can afford. She is a pensioner and cannot afford to buy special food for him alone, as she is also raising seven (7) other children from her three (3) daughters who are not supportive.

Discuss how you would handle this situation.

Role play

Role play:

A caregiver visits the Cardiac Clinic and is worried and uncertain about the future of her sister, fearing she won't be productive and have children in the future due to heart valve surgery.

Role players needed to play the roles of:

- 1 Nurse
- 1 Caregiver
- 1 Patient

Group discussion

A caregiver complains to you that her child has not been taking his cardiac medications since they ran out and she has no money to go to the hospital for a prescription. In your groups, discuss how you would handle this situation.

Application of the programme's educational approaches

The educational theories of Knowles's Theory of Andragogy, Kolb's Experiential Learning, and Gagne's theory of instruction are applied during the implementation of the programme activities, as described in Chapter 7, sections 7.4.2, 7.4.3 and 7.4.4 respectively.

8.4.10 Termination Phase

This is the final phase or the closure of the implementation of the programme activities. During this phase, an evaluation of the educational programme is conducted at the end of each session. The one-minute paper is administered to the participants at the end of each day to evaluate whether the participants have learned during a particular session and whether the content of the session is well understood. Five to ten minutes are set aside to complete the session evaluation. The participants are requested to volunteer to take part in the evaluation of the implementation of the programme to assess its effectiveness. Lastly, the facilitator thanked everyone who participated in the implementation of the programme for their time and contributions throughout the educational workshop.

8.6 SECTION TWO: EVALUATION/VALIDATION OF THE PROGRAMME

This session focuses on the evaluation of the implementation of the educational programme for the participants to describe their experiences with the training activities. Program evaluation is a systematic process for organizing, capturing, and analysing the performance and outcomes of a program (Stewart et al., 2021). The evaluation should address the following questions as recommended by Stewart et al., (2021): Is the program effective? Can the programme be improved?

8.6.1 Evaluation of the Programme

It should be noted that the implementation of the programme for this study was not conducted. However, the developed and the educational manual guidelines for its implementation were validated by academic experts, and cardiac ICU nurse specialists, as referred to in Annexure R, S & T reports from the academic validators. Educational manual guidelines were developed for the facilitator to follow during the implementation and evaluation of the programme. Furthermore, a comprehensive evaluation of the programme is conducted at the end of the two-day workshop covering the daily workshop activities, discussions, and the workshop in general. The scores of the pre-training test and post-training test are compared to identify the differences in the participants' knowledge before and after the training.

A multi-method approach will be used to evaluate the programme implementation. Firstly, in the daily workshop evaluation, a qualitative approach is conducted for the participants to describe their experiences regarding the programme activities (Refer to Table 8.2). Secondly, a quantitative approach is conducted where participants have to complete the questions regarding the educational workshop attended to evaluate the effectiveness of the educational programme (Table 8.3). The programme evaluation

tool consists of both closed and open-ended questions. Lastly, for the evaluation of the effectiveness of the programme, a pre-training and post-training test is administered to determine whether the objectives were achieved (Refer to table 8.4).

A pre-test and post-test, using a quasi-experimental evaluation will be conducted among nurses who will participate in the programme implementation to assess their knowledge about cardiac rehabilitation before and after the implementation of the educational programme.

The outline of this session is as follows:

-  Daily workshop evaluation on the general views or opinions of the participants regarding the programme's implementation.
-  The effectiveness of the programme, which includes pre-training and post-training testing.

8.6.1.1 Daily workshop evaluation

This is the proposed daily workshop evaluation at the end of each day. The daily workshop evaluation is conducted each day to determine if the programme was implemented according to the intended aims and objectives. The daily workshop evaluation will consist of open-ended questions to allow the participants to express themselves freely regarding the implementation of the programme (refer to Table 8.2). The completed evaluation forms are collected by the facilitator and analysed for the questions and answers. The discussion of the evaluation of the programme's implementation covers what the participants learnt, what was the most important topic, what they still need to learn, and lastly, providing general comments on the presentation and content of the programme.

Table 8.2: A one-minute paper for the evaluation of each session covered during the day session.

Dear Participants, Take a moment to share your views or opinions regarding the session you have just attended and answer the following questions: 1. What did you learn in today's session? 2. What was the most important topic you learned in today's session? 3. What would you still like to know more about the session? 4. What general comments do you have about the programme itself?
THANK YOU FOR YOUR PARTICIPATION!

8.6.1.2 The effectiveness of the programme implementation

This section presents the items for the evaluation of the implementation of the programme, assessing whether the participants have acquired the knowledge and skills and are able to apply them to patients who have had heart valve surgery to improve

their quality of life, reduce hospital readmissions and costs and reduce mortality. From the responses given, the researcher determines whether the programme was effective and useful to the participants and whether there are positive changes in the knowledge and skills of the nurse participants.

Table 8.3 depicts the evaluation of the implementation of the programme.

Table 8.3: The evaluation of the implementation of the programme

Dear participants Kindly complete and share your views regarding the educational workshop you have attended by answering the following questions. Indicate your choice with the [X].			
	Yes	No	Not sure
Topic 1: Cardiac Rehabilitation 1. I acquired knowledge and skills in cardiac rehabilitation training.			
Topic 2: Nurses' challenges 2. I gained knowledge and skills on the challenges that the nurses experience regarding the delivery of CRP interventions.			
Topic 3: Patients recovery and coping after heart valve surgery 3. I understand the challenges experienced by the patients and I'll apply the knowledge and skills gained in the workshop.			
Topic 4: Caregiver challenges 4. I understand the challenges experienced by caregivers, and I'll apply the knowledge acquired to assist them to support and care for their family members after heart valve surgery.			
5. Was the educational workshop helpful?			
6. Were the educational workshop objectives achieved?			
7. Was the content well-organised and easy to follow?			
8. Did the workshop content meet your expectations?			
9. Did you learn anything new?			
10. Was the topic covered relevant to you?			
11. What challenges did you experience during the workshop?			
12. What are your general comments regarding the workshop?			

Pre and post-test for an educational workshop

The participants are given a pre-test at the beginning of the educational workshop to assess their general level of knowledge and proficiency in cardiac rehabilitation. After the programme was implemented, a post-test was also administered at the end of the

educational workshop to determine the participants' achievements. Pre- and post-training test scores are compared to determine the effect of educational workshop on the participants. The pre-and post-training tests are common forms of evaluating educational programmes in terms of knowledge and the improvement of the participants. Table 8.4 depicts the sample of the pre-and post-training test and refers to Annexure Q.

Table 8.4: **Pre and post-test on cardiac rehabilitation**

PRE AND POST-TEST ON CARDIAC REHABILITATION Dear participants, Answer all the questions provided: 1.1 This phase of cardiac rehabilitation begins when the patient is discharged from the hospital: - Phase 1 - Phase 2 - Phase 3 - Phase 4 1.2 Swimming, climbing stairs, and walking are examples of which exercise: - Resistance exercise - Borg exercise - Aerobic exercise - Kinetic exercise 1.3 The most common complication of cardiac surgery is: - Infection - Stroke - Clotting of the valve - bleeding Answer all the questions provided: 1.4 This phase of cardiac rehabilitation begins when the patient is discharged from the hospital: - Phase 1 - Phase 2 - Phase 3 - Phase 4 1.5 Mechanical valve replacement surgery is best suited to: - Female of childbearing age - Elderly patients - Young males - Tricuspid valve

Kindly cycle the correct answer:

1.6 Cardiac rehabilitation is only meant for patients who had heart valve surgery.

Yes No I don't know

1.7 A patient who underwent a mitral valve repair does not require Warfarin after heart valve surgery.

Yes No I don't know

1.8 Supervision exercises are recommended for low-risk patients after heart valve surgery.

Yes No I don't know

1.9 Sugary foods are healthy for patients after heart surgery.

Yes No I don't know

1.10 It is safe for patients to drive a car 2 weeks after surgery.

Yes No I don't know

1.11 Patients can start carrying heavy stuff 2 weeks after heart valve surgery.

Yes No I don't know

1.12 It is safe for patients to skip Warfarin Medications for two days without complications.

Yes No I don't know

1.13 Identify any four (4) core components of cardiac rehabilitation.

1.14 Outline the benefits of cardiac rehabilitation.

1.15 Write short notes on the information you normally provide to the caregivers on the support and care for their family members after heart valve surgery.

Table 8.5: Pre- and post-test scores of the participants

Participants	Pre-test %	Post-test %
1		
2		
3		
4		

8.6.2 Validation of the developed programme and educational manual

The developed programme, together with the educational manual (Refer to Annexure U) was based on the findings from the situational analysis in Phase 1, for objectives 1.1 to 1.4 of the nurses, patients and caregivers respectively.

Validation criteria: Six (6) experts were selected to validate the educational programme, including four (4) internal and external academics and clinical specialists (a cardiologist and an ICU Cardiac nurse specialist), who were invited to validate the educational programme. Purposive sampling was used due to the expert's relevant experience in cardiovascular care and educational programme development. Two (2) external academic experts could not participate, and one (1) cardiac specialist did not respond. With a 50% response rate, participants recommended the programme's development, finding it appropriate and practical. Suggestions for improvement included refining goals, adding home-based cardiac rehabilitation content, and improving the structure with a table of contents, abbreviations, and an executive summary. Adjustments were made based on the feedback (Refer to Annexures R, S, & T). Table 8.6 illustrates the validation form that was completed by the experts.

Table 8.6: Validation tool of the educational programme for nurses to facilitate cardiac rehabilitation of patients after heart valve repair or replacement surgery

AN EDUCATIONAL PROGRAMME FOR NURSES TO FACILITATE CARDIAC REHABILITATION OF PATIENTS AFTER HEART VALVE REPAIR OR REPLACEMENT SURGERY AT CARDIAC UNIT, WINDHOEK CENTRAL HOSPITAL, KHOMAS REGION, NAMIBIA
Validation of the Proposed Educational Programme for Nurses to Facilitate Cardiac Rehabilitation of Patients after Heart Valve Repair or Replacement Surgery at the Cardiac Unit, Windhoek Central Hospital, Khomas Region.
<u>Identification</u> Expert field: Expert Name (optional):

Institution Name:

Department:

Highest Qualification:: Date completed.....

INSTRUCTIONS:

*This information is required to validate the proposed programme for the study.
Kindly provide comments on your validation of the programme development and
programme implementation activities in chapters 7 & 8 (development and implementation
of the programme.*

Provide validation, according to the below components.

Programme development

1. Is the title of the programme clearly stated indicating the subject, the facilitator and the beneficiaries?

.....
.....

2. Is the program goal clearly stated?

.....
.....

3. Are the programme objectives SMART?

.....
.....

3.1 Are programme objectives specific?

.....
.....

3.2 Are programme objectives measurable?

.....
.....

3.3 Are programme objectives attainable/achievable?

.....
.....

3.4 Are programme objectives realistic?

.....
.....

4. Are the programme objectives practical?

.....
.....

5. Can the programme objectives be applied in other context, other than the current study setting?

.....
.....

6. How best can the programme content be made accessible to the target group?

.....
.....

7. Is the program clinically significant and useful?

.....

.....

.....

8. Is the program significant and useful for home-based care by the caregivers?

.....

.....

.....

9. Do you think the program is important and significant for rehabilitation of the cardiac patients?

.....

.....

10. Is the programme content appropriate?

.....

.....

Programme implementation

11. Are activities of the programme implementation appropriate?

.....

.....

12. Are activities of the programme implementation sufficient/comprehensive?

.....

.....

Additional Suggestions:

13. Provide any suggestions for improvement of the programme content and implementation activities:

.....

.....

Thank you for taking the time to participate in this evaluation and provide input to the document.

Signature of programme validator: Date:

8.7 SUMMARY

This chapter was presented in two sections. Section 1 presented the proposed implementation of the educational programme. The programme's goals, objectives, target population, procedures, facilitation techniques and the phases of programme implementation were discussed. Section two describes the proposed evaluation and validation of the implementation of the educational programme. The next chapter describes the conclusion, recommendations, contributions, and limitations of the study.

CHAPTER NINE

CONCLUSIONS, RECOMMENDATIONS, CONTRIBUTIONS AND LIMITATIONS OF THE STUDY

9.1 INTRODUCTION

This is the final chapter of the study, which presents the conclusion, recommendations, contributions, and limitations of the research. The conclusion summarizes the key findings in relation to the research aim and objectives, discusses the value and contribution of the study, outlines the study's limitations, and provides recommendations for nursing education and future research. It also highlights the study's contributions to the body of knowledge regarding cardiac rehabilitation of patients after heart valve surgery as well as the way forward of the study.

9.2 AIM OF THE STUDY

The aim of the study was to develop an educational programme for nurses to facilitate the cardiac rehabilitation of patients who underwent heart valve repair or replacement surgery at the Cardiac Unit, Windhoek Central Hospital, Khomas region. To achieve the aims of the study, four objectives were formulated during situational analysis [Phase1] in addition to three additional objectives as follows:

Objective 1.1: Determine the knowledge, attitudes, and practices of nurses regarding the rehabilitation of patients after heart valve repair or replacement surgery.

Objective 1.2: Explore and describe the challenges experienced by nurses in providing cardiac rehabilitation interventions for patients after heart valve surgery.

Objective 1.3: Explore and describe patients' experiences of recovery and coping after heart valve repair or replacement surgery.

Objective 1.4: Explore and describe the experiences of caregivers in the support and care of a family member who has undergone heart valve repair or replacement surgery.

Phase 2: Conceptual framework

Objective 2: Develop a conceptual framework for CR based on the findings from the situational analysis to provide a structured understanding of CR of this patient group.

Phase 3: Educational programme

Objective 3: Develop an educational programme designed for nurses to facilitate the cardiac rehabilitation of patients after heart valve repair or replacement surgery.

Phase 4: Implementation and evaluation/validation

Objective 4: Implement and evaluate/validate the effectiveness of the educational programme for nurses to facilitate the cardiac rehabilitation of patients who underwent heart valve repair or replacement surgery.

9.3 CONCLUSION OF THE STUDY

This section presents the conclusions derived from the findings during the situational analysis in Phase 1, Phase 2 of Conceptualisation, Phase 3 development of a programme, and lastly, Phase 4 of the implementation and evaluation/validation of the educational programme.

Phase 1: Situational analysis

9.3.1 Objective 1.1 - Describe the knowledge, attitudes, and practices of nurses regarding the rehabilitation of patients after heart valve repair or replacement surgery.

The findings indicated that nurses have a high level of knowledge about cardiac rehabilitation. However, there were some aspects of the phases and the core components of CR where nurses displayed a lack of knowledge as highlighted below:

- Nurses lacked the knowledge about when cardiac rehabilitation for patients after heart surgery should start, only 30.4% had good knowledge.
- Nurses lacked knowledge of the indications of cardiac rehabilitation. In response to whether CR was designed only for patients who had heart valve surgery, only 6 (26.1%) had good knowledge.
- Nurses lacked knowledge about how long it takes for the breast (sternotomy wound) to heal after heart valve surgery, as only 10(43.5%) had good knowledge.
- Nurses lacked the knowledge that patients with bio-prosthesis or mitral valves should receive Warfarin treatment for 1 month after heart valve surgery, only 8 (34.8%) had good knowledge.
- Nurses also lacked knowledge about the two types of exercises (aerobic and resistance) for cardiac rehabilitation. Only 6(26.1%) had good knowledge.
- Uncertainty regarding whether supervised exercises are for low-risk patients after heart valve surgery, as only over half (12 (52.2%) had good knowledge.

The findings concluded that nurses lacked knowledge about certain aspects of CR, including the phases of CR, indications for CR, and some core components of cardiac rehabilitation.

Regarding the nurses' attitudes towards CR, the findings revealed that they hold negative attitudes as they: Believe or are convinced that the CRP should only begin after the patient is discharged from the hospital; Believe that they were skilled enough and interested in giving health information to patients regarding the CRP after heart surgery; Believed that patients and caregivers should be responsible for their health behaviour, risk reduction, self-management, and post-hospitalisation. An association was also observed among the 30–39-year-old participants who showed a statistically

significant negative attitude with a p-value of 0.015 towards patients and caregivers being responsible for their health behaviour, risk reduction, and post-hospitalisation.

Moreover, nurses believe that only cardiologists can provide information to patients regarding CR after HVS and that the information provided to patients on discharge regarding self-care at home, including the Warfarin information booklet, is sufficient for the patient's recovery process. Furthermore, only half of the nurses believe that the information given to the patients on discharge regarding medications, wound care, infection control, and psychological stress is sufficient for their recovery process. In addition, 65.2% of the nurse participants had a negative attitude that exercise training and supervision are the responsibility of physiotherapists and staff members trained in exercise prescription and not nurses. Only 17.4% had positive attitudes and were able to provide emotional support to patients and their caregivers if they became upset.

In addition, nurses also felt uncomfortable talking to patients and caregivers about sex education perceiving sex as a taboo. Lastly, nurses felt that the support and care given to patients by the caregivers was sufficient for patients' recovery to return to normal activities. Nurses believe that caregivers do not usually experience any difficulty in supporting and caring for their loved ones who had heart valve surgery. This concludes that nurses have negative attitudes towards aspects of the core components of cardiac rehabilitation.

Lastly, despite having good knowledge, the findings indicate that nurses have poor to average practice in cardiac rehabilitation. Some examples of areas where nurses showed poor practice include: Providing information on the early detection of complications, nurses believe that it is the responsibility of physiotherapists to provide information about the types of exercises that are safe. Furthermore, the nurses also

were hesitant to provide health information on sexual activities. They were unable to work through the Warfarin information booklet with the patients. Moreover, the nurses also failed to counsel patients and caregivers to help them cope with heart valve surgery, stress, or anxiety, as well as encourage caregivers' involvement in the physical activities of their relatives after heart valve surgery. Lastly, nurses failed to encourage patients to get involved in leisure activities they find comfortable and enjoyable.

9.3.2 Objective 1.2- Explore and describe the challenges experienced by nurses in providing cardiac rehabilitation for patients after heart valve surgery

The findings indicated the challenges experienced by nurses in delivering cardiac rehabilitation to the patients. These challenges included: language barriers, cultural aspects such as the perception of sex education as a taboo, lack of knowledge and skills for CR, lack of interpersonal relationships among the nurses, economic constraints of the patients and caregivers, ignorance of health information by the patients, lack of involvement of the caregivers by the nurses, inadequate resources to facilitate cardiac rehabilitation, as well as unavailable standardized rehabilitation program to guide the rehabilitation of patients after cardiac surgery. These findings need to be addressed through a cardiac rehabilitation programme. The nurses acknowledged that CR is important for patients to facilitate their recovery from heart valve surgery.

9.3.3 Objective 1.3 - Explore and describe patients' experiences of recovery and coping after heart valve repair or replacement surgery

The findings indicated that patients experienced substantial challenges regarding recovery and coping after heart valve surgery. These experiences included mixed feelings such as fear and worries about the outcomes of the operation, disappointment about surgery (embarrassment about the scar and the sound of a mechanical valve), the

negative impact of the procedure on daily activities, overprotective family members, lack of knowledge on self-care, loss of social role, and lack of support from the nurses.

9.3.4 Objective 1.4 - Explore and describe the experiences of caregivers on the support and care for a patient after heart valve repair or replacement surgery

The findings regarding the challenges experienced by caregivers in supporting and caring for a family member after HVS included: experiences of emotional disturbances such as emotional trauma, uncertainty about the future of the relative, concerns about expenses related to transport fares and other commodities, the need for the knowledge about the procedure, increased demand to care for the relative on caregivers, and lack of support from the nurses regarding cardiac rehabilitation.

In conclusion, the findings of the situational analysis in Phase 1 necessitated the implementation of a cardiac rehabilitation programme for the nurses to provide CRP to the patients and their caregivers.

Phase 2: Conceptual framework

9.3.5 Objective 2- Develop a conceptual framework based on the findings from the situational analysis.

The results and findings identified from the situational analysis in Phase 1 led to the development of a conceptual framework. The conceptual framework was guided by the Dickoff theory of practice as the basis for the development of a programme for nurses to facilitate cardiac rehabilitation of patients after heart valve surgery.

Dickoff's six survey lists of agent, recipient, context, procedure, dynamic, and terminus were applied as described in Chapter 6 of this study.

Phase 3: Educational programme

9.3.6 Objective 3- Develop an educational programme for nurses to facilitate the cardiac rehabilitation of patients after heart valve repair or replacement surgery.

The programme for nurses to facilitate the cardiac rehabilitation of patients after HVS was developed based on the findings from the situational analysis of the study.

The programme consisted of four objectives:

Objective 1: Providing the nurses with the knowledge and skills and modifying their negative attitudes to improve nurses' practices regarding CR for patients after heart valve surgery.

Objective 2: Describe the challenges experienced by the nurses regarding the delivery of CRP interventions for the patients after HVS, to provide quality nursing care to the patients after heart valve surgery.

Objective 3: Describe the essential knowledge and skills for nurses to address the challenges experienced by the patients in recovery and coping after HVS to improve the patient's quality of life, and reduce hospital readmission and costs, and mortality.

Objective 4: Equip the nurses with the necessary knowledge and skills to address the challenges experienced by the caregivers regarding the support and care provided to their family members after heart valve surgery.

Phase 4: Implementation and evaluation/validation

9.3.7 Objective 4 - Implement and evaluate/validate the programme for nurses to facilitate the cardiac rehabilitation of a patient who had a heart valve repair or replacement surgery

The last objective in Phase 4 was to implement and evaluate/validate the programme for the nurses to facilitate cardiac rehabilitation for patients after heart valve surgery.

A two-day workshop would be conducted at the Windhoek Central Hospital (WCH) - Cardiac Unit Boardroom with the participants being the nurses providing nursing care at Cardiac Unit and Cardiac Clinic. The evaluation of the workshop will be completed on each day of the workshop. A summative programme evaluation will be completed at the end of the two-day workshop to assess the effectiveness and impact of the implementation of the educational workshop.

A pre-training test would be completed before programme implementation to establish the nurse's knowledge, attitudes, and practices. Furthermore, a post-training test would be completed at the end of the programme implementation to determine the effectiveness of the implementation of the educational workshop.

However, the programme was validated by two (2) academic experts, and one (1) cardiac specialist nurse on the sufficiency of content, and appropriateness of facilitation methods (Refer to Annexure R, S & T).

9.4 RECOMMENDATIONS OF THE STUDY

Based on the findings of the study, recommendations were made with regard to the Ministry of Health and Social Services, Nursing services, nursing education, and further research.

9.4.1 Recommendations to the Ministry of Health and Social Services

- Develop standardized national procedures for nurses in collaboration with the researcher to facilitate the cardiac rehabilitation of patients after heart valve surgery.
- Conduct training and workshops regarding the planned/developed cardiac rehabilitation programme, to upgrade the knowledge and skills of nurses and to identify educational deficiencies among the nursing staff members.

- The MoHSS to endorse the developed Standardised Operational Procedures (SOPs) to guide nurses in the implementation of the cardiac rehabilitation programme.
- Establish a multidisciplinary team for CR of patients after heart valve surgery including cardiologists, cardiothoracic doctors, specialists cardiac nurses, pharmacists, social workers, physiotherapists, and dieticians.
- Primary health care nurses should also be part of the educational programme as they are the first in contact with the patients for rehabilitation.
- Involvement of the cardiac theatre nurses and other members of the multidisciplinary team such as pharmacists, physiotherapists, and cardiologists in cardiac rehabilitation.
- Introduce a home-based cardiac rehabilitation programme run by registered nurses trained in cardiac rehabilitation.
- Introduce cardiac rehabilitation-linked incentives to patients who underwent cardiac surgery to encourage participation in cardiac rehabilitation.

9.4.2 Recommendation for Nursing Services

- Conduct educational workshops and in-service training for nurses about CR to upgrade their knowledge and skills to render quality care to the patients and caregivers.
- Conduct teaching sessions for the patients and their caregivers before discharge and during their follow-up visits at the Cardiac Clinic to upgrade their knowledge regarding cardiac rehabilitation and improve their quality of life.
- Conduct wellness sessions at the Cardiac Clinic during follow-up visits for the patients and caregivers about CR to alleviate fear and worries about the

outcomes of the operation and uncertainty about the future of the patient concerned.

- Identify and train bilingual nurses in cardiac rehabilitation programme who would serve as hospital interpreters for patients and their caregivers about the information on cardiac rehabilitation.

9.4.3 Recommendations for Nursing Education

Based on the findings, the following were recommended for the training institutions:

- Offering specialized short courses in cardiac rehabilitation by educational institutions to nurses providing care at the Cardiac Unit and Cardiac Clinic.
- Arrange with the MoHSS to conduct workshops and seminars for nurses involving cardiac theatre nurses, and other multidisciplinary teams such as pharmacists, physiotherapists, and cardiologists.
- Include a cardiac rehabilitation component in the undergraduate and postgraduate curriculum.
- Encourage postgraduate nursing students to attend specialized courses, in-service training, and seminars regarding cardiac rehabilitation.

9.4.4 Recommendation for further research

Based on the findings of the study, the researcher recommended the following:

- Conduct a quantitative descriptive study among patients and caregivers about their knowledge of cardiac rehabilitation.
- Conduct a qualitative study about teamwork among the nurses at the Cardiac Unit and Cardiac Clinic regarding cardiac rehabilitation.
- Investigating patient outcomes (morbidity and mortality) after heart valve surgery.

9.5 CONTRIBUTION OF THE STUDY

- This study contributed to the body of knowledge by identifying knowledge gaps, attitudes, and practices of nurses toward cardiac rehabilitation, challenges experienced by nurses on the delivery of CR, patients' experiences about recovery and coping with heart valve surgery, and caregivers' experiences on the support and care of a family member after heart valve surgery.
- An educational programme for nurses to facilitate CR of patients after heart valve surgery was developed. This would address the challenges experienced by nurses, nurses' gaps in knowledge, negative attitudes, and poor practices towards cardiac rehabilitation, and challenges experienced by patients and caregivers.
- A conceptual framework for cardiac rehabilitation was developed.
- An educational manual was developed for the implementation of the programme to equip the nurses with the knowledge and skills to facilitate cardiac rehabilitation to improve patients' quality of life.
- Dissemination of evidence-based information about nurses' knowledge, attitudes, and practices regarding cardiac rehabilitation of patients after heart valve replacement surgery at Windhoek Central Hospital Namibia.
- A manuscript about nurses' knowledge, attitudes, and practices regarding cardiac rehabilitation of patients after heart valve replacement surgery was published in a Journal of *Health SA Gesondheid*, (2024), Volume 29.
- Dissemination of evidence-based information about nurses' challenges regarding providing cardiac rehabilitation; patients' experiences of recovery

and coping and caregivers' experiences of support and care for family members after heart valve surgery through staff meetings and educational workshops.

9.6 LIMITATIONS

- The quantitative data of the study were obtained from a small sample size, involving only nurses providing care at the state/public Cardiac Unit and Cardiac Clinic. Therefore, the findings cannot be generalized to nurses in the Cardiac Units and Clinics of private hospitals who operate in a different context.
- This study was limited to nurses working at the Cardiac Unit and Clinic and not the Primary health care nurses who are the first in contact with the patients and involved in the rehabilitation of patients after heart valve surgery.
- Although data saturation was achieved, qualitative data from patients and caregivers is based on the patient and caregiver's views who participated in this study which may not reflect the views of other patients and caregivers from other contexts. Subsequently, the generalizability of the findings depends on the discretion of the user.
- There was limited literature on cardiac rehabilitation of patients after heart valve surgery in Africa, SADC including Namibia. Therefore, challenges with the validation of the developed programme were encountered as most of the information was derived from International Guidelines. Therefore, the researcher used international guidelines to develop a cardiac rehabilitation programme for this study.
- Prolonged time for completion of the study, as a result of the COVID-19 Pandemic: the researcher could not collect the data timely due to COVID-19

restrictions and the data were only collected in 2021 and 2022. Nevertheless, the research project was accomplished.

9.7 WAY FORWARD

After this study, the researcher will disseminate the results and findings through the following manuscripts from the dissertation:

- Knowledge, attitudes, and practices of the nurses regarding rehabilitation of patients after heart valve replacement surgery at Windhoek Central Hospital, Namibia. *Journal of Health SA Gesondheid*. (The manuscript was accepted and published).
- Challenges experienced by nurses in providing CR of patients after heart valve repair or replacement surgery.
- Experiences of the patients regarding recovery and coping after heart valve repair or replacement surgery.
- Experiences of the caregivers on the support and care provided to the family members after heart valve repair or replacement surgery.
- Standard operational procedures for cardiac rehabilitation for the nurses at the Cardiac Unit/Clinic.
- Educational manual for nurses to facilitate CR of patients after heart valve surgery (developed, validated, and to be implemented by nurses at the Cardiac Unit/Clinic at Windhoek Central Hospital, Namibia).
- Collaboration with other developing countries to implement and evaluate the programme.

9.7.1 Paper for presentation

The following papers are proposed for presentation at national and international academic conferences:

- Challenges experienced by nurses in providing cardiac rehabilitation interventions to patients after heart valve repair or replacement surgery.
- Experiences of the patients on recovery and coping after heart valve surgery.
- Experiences of the caregivers on support and care of a family member after heart valve repair or placement surgery.
- Educational programme for nurses to facilitate CR of patients after heart valve surgery.

9.8 SUMMARY

This chapter presented the conclusions, recommendations, contributions, and limitations of the study. Although the nurses demonstrated good knowledge, they nevertheless displayed negative attitudes and poor practice in some aspects of cardiac rehabilitation. Furthermore, nurses, patients, and caregivers experience substantive challenges regarding coping during recovery as well as cardiac rehabilitation of patients who underwent heart valve repair and replacement surgery. Limitations that were encountered during the study are highlighted. Contributions to the existing body of knowledge in nursing practice were described. Lastly, based on the findings, recommendations were made regarding the facilitation of a cardiac rehabilitation programme by the Ministry of Health and Social Services nursing care services, education, and training with regard to future research and publications.

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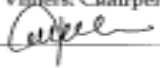
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ANNEXURE A: Ethical clearance certificate from UNAM (Phase 1)

	UNAM UNIVERSITY OF NAMIBIA
ETHICAL CLEARANCE CERTIFICATE	
Ethical Clearance Reference Number: SON /486/2019	Date: 22 August, 2019
This Ethical Clearance Certificate is issued by the University of Namibia Research Ethics Committee (UREC) in accordance with the University of Namibia's Research Ethics Policy and Guidelines. Ethical approval is given in respect of undertakings contained in the Research Project outlined below. This Certificate is issued on the recommendations of the ethical evaluation done by the Faculty/Centre/Campus Research & Publications Committee sitting with the Postgraduate Studies Committee.	
Title of Project: <u>The Development Of A Programme For Nurses To Facilitate Rehabilitation Of Patients Who Had Heart Valve Repair Or Replacement Surgery In Namibia</u>	
Researcher: LILIAN SENTE MASULE	
Student Number: 8901358	
Supervisors: <i>Dr K. Amukali (Mnu) Dr W. Wilkinson; Prof. L. Swall (Co)</i>	
Faculty: School of Nursing	
Take note of the following:	
(a) Any significant changes in the conditions or undertakings outlined in the approved Proposal must be communicated to the UREC. An application to make amendments may be necessary. (b) Any breaches of ethical undertakings or practices that have an impact on ethical conduct of the research must be reported to the UREC. (c) The Principal Researcher must report issues of ethical compliance to the UREC (through the Chairperson of the Faculty/Centre/Campus Research & Publications Committee) at the end of the Project or as may be requested by UREC. (d) The UREC retains the right to: (i) Withdraw or amend this Ethical Clearance if any unethical practices (as outlined in the Research Ethics Policy) have been detected or suspected, (ii) Request for an ethical compliance report at any point during the course of the research.	
UREC wishes you the best in your research.	
Dr. J.E. de Villiers: Chairperson 	Ms. P. Claassen: Secretary 

ANNEXURE B: Ethical Clearance certificate from UNAM (Phase 2)



ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: SON 0003 Date: 09 June 2022

This Ethical Clearance Certificate is issued by the University of Namibia Ethics Committee (REC) in accordance with the University of Namibia's Research Ethics Policy and Guidelines. Ethical approval is given in respect of undertakings contained in the Research Project outlined below. This Certificate is issued on the recommendations of the ethical evaluation done by the ethics committee.

TITLE OF PROJECT: THE DEVELOPMENT OF A PROGRAMME FOR NURSES TO FACILITATE THE REHABILITATION OF PATIENTS WHO HAD HEART VALVE OR REPLACEMENT SURGERY IN NAMIBIA.

Student: LILIAN MASULE

Student Number: 8901368

Supervisor(s): Dr K Amakali (Main supervisor) and Dr. W Wilkinson ,Co -supervisor

Centre for Research Services

Take note of the following:

1. Any significant changes in the conditions or undertakings outlined in the approved Proposal must be communicated to the ethics committee. An application to make amendments may be necessary.
2. Any breaches of ethical undertakings or practices that have an impact on ethical conduct of the research must be reported to the ethics committee
3. The Principal Researcher must report issues of ethical compliance to the ethics committee (through the Chairperson) at the end of the Project or as may be requested by the ethics committee
4. The ethics committee retains the right to:
 - i) Withdraw or amend this Ethical Clearance if any unethical practices (as outlined in the Research Ethics Policy) have been detected or suspected,
 - ii) Request for an ethical compliance report at any point during the course of the research.

The ethics committee wishes you the best in your research.

Dr. Emma M. Nghitanwa

A handwritten signature in blue ink, appearing to read 'Emma M. Nghitanwa', is written over a horizontal line.

Name (Chairperson Ethics Committee)

A handwritten signature in blue ink, appearing to read 'Davis Mumbengegwi', is written over a horizontal line.

Prof. Davis Mumbengegwi (Head, Multidisciplinary Research)

ANNEXURE C: Permission letter to conduct a study from Ministry of Health and Social Services (Phase 1)



REPUBLIC OF NAMIBIA

Ministry of Health and Social Services

Private Bag 13198
Windhoek
Namibia

Ministerial Building
Harvey Street
Windhoek

Tel: 061 – 203 2507
Fax: 061 – 222558
E-mail: ltashipou87@gmail.com

OFFICE OF THE EXECUTIVE DIRECTOR

Ref: 17/3/3 LSM

Enquiries: Mr. A. Shipanga

Date: 17 December 2019

Ms. Lilian Sinte Masule
PO Box 98726
Pelican Square
Windhoek

Dear Ms. Masule

Re: The Development of a programme for nurses to facilitate Rehabilitation of patients who had Heart valve repair or replacement surgery in Namibia.

1. Reference is made to your application to conduct the above-mentioned study.
2. The proposal has been evaluated and found to have merit.
3. **Kindly be informed that permission to conduct the study has been granted under the following conditions:**
 - 3.1 The data to be collected must only be used for academic purpose;
 - 3.2 No other data should be collected other than the data stated in the proposal;
 - 3.3 Stipulated ethical considerations in the protocol related to the protection of Human Subjects should be observed and adhered to, any violation thereof will lead to termination of the study at any stage;

- 3.4 A quarterly report to be submitted to the Ministry's Research Unit;
 - 3.5 Preliminary findings to be submitted upon completion of the study;
 - 3.6 Final report to be submitted upon completion of the study;
 - 3.7 Separate permission should be sought from the Ministry for the publication of the findings.
-
4. All the cost implications that will result from this study will be the responsibility of the applicant and not of the MoHSS.

Yours sincerely,


BEN NANGOMBE
EXECUTIVE DIRECTOR

"Health for All"

ANNEXURE D: Permission letter to conduct a study from Ministry of Health and Social Services (Phase 2)



REPUBLIC OF NAMIBIA

MINISTRY OF HEALTH AND SOCIAL SERVICES

Ministerial Building
Harvey Street
Private Bag 13198, Windhoek

OFFICE OF THE EXECUTIVE DIRECTOR

Tel: No: 061 -203 2507
Fax No: 061-222 558
Andreas.Shipanga@mhss.gov.na

Ref: 22/4/2/3

Enquiries: Mr. A. Shipanga

Date: 24 August 2022

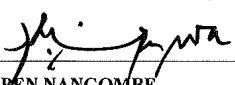
Ms. Lilian Masule
PO Box 98726
Pelican Square
Windhoek

Dear Ms. Masule

Re: The development of a programme for nurses to facilitate rehabilitation of patients who had heart valve repair or replacement surgery in Namibia.

1. Reference is made to your application to conduct the above-mentioned study.
2. The proposal has been evaluated and found to have merit.
3. **Kindly be informed that permission to conduct the study has been granted under the following conditions:**
 - 3.1 The data to be collected must only be used for academic purpose;
 - 3.2 No other data should be collected other than the data stated in the proposal;
 - 3.3 Stipulated ethical considerations in the protocol related to the protection of Human Subjects should be observed and adhered to, any violation thereof will lead to termination of the study at any stage;
 - 3.4 A quarterly report to be submitted to the Ministry's Research Unit;
 - 3.5 Preliminary findings to be submitted upon completion of the study;
 - 3.6 Final report to be submitted upon completion of the study;
 - 3.7 Separate permission should be sought from the Ministry for the publication of the findings.
4. All the cost implications that will result from this study will be the responsibility of the applicant and not of the MoHSS.

Yours sincerely,


BEN NANGOMBE
EXECUTIVE DIRECTOR



All official correspondence must be addressed to the Executive Director.



20066

ANNEXURE E: Permission letter from the Senior Medical Superintendent at
Windhoek Central Hospital (Phase 1)



Private Bag 13215 Windhoek Namibia	Harvey Street Windhoek Central Hospital	Tel. No: (061) 203 3024 Fax No: (061) 222886
Enquiries: Ms. S. Ilpinge	Ref. 17/3 / 3	Date: 22 January 2020

OFFICE OF THE MEDICAL SUPERINTENDENT

Ms.Lilian Sinte Masule
P.O.BOX 98726
Pelican Square
Windhoek
0812787342

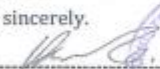
Dear Ms.Masule

SUBJECT: PERMISSION TO CONDUCT A RESEARCH STUDY ON THE DEVELOPMENT OF A PROGRAMME FOR NURSES TO FACILITATE REHABILITATION OF PATIENTS WHO HAD HEART VALVE REPAIR OR REPLACEMENT SURGERY AT WINDHOEK CENTRAL HOSPITAL, NAMIBIA.

1. Reference is made to your application to conduct the above-mentioned study.
2. This letter serves to inform you that permission has been granted for you to conduct a study at Windhoek Central Hospital, on the above mentioned subject as you have requested and does not include any remuneration.
3. Patient/Client's information should be kept confidential at all times.
4. Preliminary findings copy to be submitted to Customer care office, Windhoek Central Hospital upon completion of the study.

Thank you.

Yours sincerely,


DR.K.H.NAKANGOMBE
ACTING CHIEF MEDICAL SUPERINTENDENT



ANNEXURE F: Permission letter from the Senior Medical Superintendent at
Windhoek Central Hospital (Phase 2)



MINISTRY OF HEALTH AND SOCIAL SERVICES

Private Bag 13215 Windhoek Namibia	Harvey Street Windhoek Central Hospital	Tel. No: (061) 203 3024 Fax No: (061) 222886
Enquiries: Ms. A.U.Mootu	Ref.	Date : 07 December 2022

OFFICE OF THE MEDICAL SUPERINTENDENT

Ms.Lilian Masule
P.O.Box 98726
Pelican Square
0812787342

Dear Ms. Masule

**RE: PERMISSION TO CONDUCT A RESEARCH STUDY ON THE DEVELOPMENT OF A
PROGRAMME OF NURSES TO FACILITATE REHABILITATION OF PATIENTS WHO HAD
HEART VALVE REPAIR OR REPLACEMENT SURGERY IN NAMIBIA.**

Reference is made to the above mentioned subject:

Kindly be informed that permission has been granted to conduct the study on the above
mentioned subject under the following conditions:

1. Patient client information should be kept confidential at all times
2. The purpose for study is only for your study purposes as you have requested and it does not include any remuneration.
3. Permission to be obtained from each individual patient going to be studied.
4. **Preliminary findings to be submitted to Customer care office, Windhoek Central Hospital upon completion of the study.**

Thank you for your kind gesture.

Yours sincerely,

DR. S.SHALONGO
CHIEF MEDICAL SUPERINTENDENT



ANNEXURE G: Participant information leaflet and consent form for nurses



TITLE OF THE RESEARCH PROJECT: The development of a programme for nurses to facilitate rehabilitation of patients who had heart valve repair or replacement surgery in Namibia

REFERENCE NUMBER: 8901368

PRINCIPAL INVESTIGATOR: Lilian Sinte Masule

ADDRESS: P.O. Box 98726, Pelican Square, Windhoek

CONTACT NUMBER: 081 278 7342

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary**, and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the Research Ethics Committee at The University of Namibia and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and Namibian National Research Ethics Guidelines.

1. What is this research study all about?

a) Where will the study be conducted; are there other sites; total number of participants to be recruited at your site and altogether.

I Lilian Sinte Masule, am a registered student at the University of Namibia (UNAM), studying for a Doctoral Degree in Nursing Science. I am conducting a research study entitled, “The development of a programme for nurses to facilitate rehabilitation of patients who had heart valve repair or replacement surgery” at Windhoek Central Hospital, Khomas Region, Namibia for the fulfilment of the degree I am registered for. Given the small number of the population, all twenty-two (22) nurses providing care to patients in Cardiac Unit and Cardiac Clinic will be included in the study.

b) Explain in participant’s friendly language what your project aims to do and why you are doing it?

The purpose of this study is to explore and determine the nurses’ knowledge, attitudes, and practices regarding the rehabilitation of these patients in order to develop a rehabilitation programme for patients who had heart valve repair or replacement surgery.

c) Explain all procedures.

A face-to-face individual interview will be conducted at Windhoek Central Hospital, Cardiac Unit, Boardroom on your family member’s date of follow-up by me. The tape recorder will be used to ensure trustworthiness of the information. The data collection will take place for a period of two to three (2-3) months.

d) Explain any randomization process that may occur. N/A

e) Explain the use of any medication, if applicable. N/A

2. Why have you been invited to participate?

a) Explain this question clearly.

You are asked to participate in this study to determine your knowledge, attitudes and practices regarding the rehabilitation of patients after heart valve repair or replacement surgery at Windhoek Central Hospital, Khomas Region, Namibia. You are invited to

participate because you have been working in the Cardiac Unit and Cardiac Clinic, therefore you meet the inclusion criteria.

3. What will your responsibilities be?

a) Explain this question clearly.

Your participation in this study is voluntary, you are under no obligation to participate. You have the right to withdraw at any time if you care to even in the middle of an interview without any penalty imposed. With your permission, the questionnaire will take up to twenty to twenty-five (20-25) minutes of your time to complete. The questionnaire will consist of four (4) sections: section A includes your demographic data, section B focuses on your knowledge, Section C focuses on attitudes and lastly, section D focuses on practices regarding rehabilitation of patients after heart valve replacement surgery. You will receive a self-reporting questionnaire to be completed at own convenient time. The completed questionnaires will be collected by the researcher.

b) Explain the duration the participant is expected to participate in the study (i.e. 2 hours, 4 days, etc.)

Your participation in this study will require 20-25 minutes of your time.

4. Will you benefit from taking part in this research?

a) Explain all benefits objectively. If there are no personal benefits, then indicate who is likely to benefit from this research e.g. future patients.

Although there is no benefit from this study, the findings will make the nurses aware about the patient's experience of recovery after heart valve repair or replacement

surgery. Furthermore, the findings obtained may inform the development of a rehabilitation programme for patients who underwent heart valve repair or replacement surgery. This programme might also improve patients' quality of life, reduce mortality, hospital readmission and hospital costs. Moreover, it will inform policy and guideline regarding rehabilitation of patients after heart valve repair or replacement surgeries.

10 Are there in risks involved in your taking part in this research?

a) Identify any risks objectively.

There are no risks or discomforts to you in sharing your knowledge and experiences regarding the rehabilitation of patients after heart valve repair or replacement surgery.

If you do not agree to take part, what alternatives do you have?

b) *Clearly indicate in broad terms what alternative treatment is available and where it can be accessed, if applicable.*

If you do not agree to take part, you may indicate so that you are excused as participation in this study is voluntary.

Who will have access to your medical records? (Where applicable)

a) *Explain that the information collected will be treated as confidential and protected. If it is used in a publication or thesis, the identity of the participant will remain anonymous. Clearly indicate who will have access to the information.*

Your name will not be written on the questionnaire form, which means no data will be linked to your name. Codes will be used instead. All completed questionnaires will be collected by the researcher and kept in a lockable facility, and none, except the researcher and the supervisor will have access to your data. Moreover, your identity will not be shared with anyone when the study is being reported or published.

What will happen in the unlikely event of some form of injury occurring as a direct result of your taking part in this research study?

- a) *Clarify issues related to insurance cover if applicable. If any pharmaceutical agents are involved will compensation be according to ABPI guidelines? (Association of British Pharmaceutical Industry compensation guidelines for research related injury which is regarded as the international gold standard). If yes, please include the details here. If no, then explain what compensation will be available and under what conditions.*

There will be no pharmaceutical agents involved. However, to prevent any discomfort, the agreement that we made regarding the duration of completion the questionnaires will be respected. No injury or risk associated with this study since it is only completed through questionnaires and questions would not be intrusive to your professionalism. The data collections will also be scheduled at times that is convenient for you.

Will you be paid to take part in this study and are there any costs involved?

There are no monetary or material gain from this study. However, the findings may help to improve your knowledge on providing rehabilitation care for patients who had heart valve surgeries.

Is there anything else that you should know or do?

- a) *You should inform your family practitioner or usual doctor that you are taking part in a research study. (Include if applicable)*
- b) *You should also inform your medical insurance company that you are participating in a research study. (Include if applicable)*
- c) *You can contact study Supervisor Dr K. Amakali...at the University of Namibia. at tel 061-206-3297; email: kamakali@unam.na if you have any further queries about the study..*
- d) *You can contact the Centre for Research and Publications at +264 061 2063061; pclaassen@unam.na if you have any concerns or complaints that have not been adequately addressed by the investigator.*
- e) *You will receive a copy of this information and consent form for your own records.*

Declaration by participant

By signing below, I agree to take part in a research study entitled **The development of a programme for nurses to facilitate rehabilitation of patients who had heart valve repair or replacement surgery in Namibia.**

I declare that:

- a) I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- b) I have had a chance to ask questions and all my questions have been adequately answered.
- c) I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- d) I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- e) I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) on (*date*) 2020.

.....
Signature of participant

.....
Signature of witness

Declaration by investigator

I(*name*) declare that:

- I explained the information in this document to
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use a interpreter. (*If a interpreter is used then the interpreter must sign the declaration below.*)

Signed at (*place*) on (*date*) 2020.

.....
Signature of investigator

.....
Signature of witness

Declaration by interpreter

I
.....(*name*)dec
lare that:

- a) I assisted the investigator (*name*) to
explain the information in this document to (*name of participant*)
..... using the language medium of
(Oshiwambo, Oshiherero, Afrikaans, etc.)

ANNEXURE H: Participant information leaflet and consent form for patients



TITLE OF THE RESEARCH PROJECT: The development of a programme for nurses to facilitate rehabilitation of patients who had heart valve repair or replacement surgery in Namibia

REFERENCE NUMBER: 8901368

PRINCIPAL INVESTIGATOR: Lilian Sinte Masule

ADDRESS: P.O. Box 98726, Pelican Square, Windhoek

CONTACT NUMBER: 081 278 7342

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary**, and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the Research Ethics Committee at The University of Namibia and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and Namibian National Research Ethics Guidelines.

1. What is this research study all about?

- f) Where will the study be conducted; are there other sites; total number of participants to be recruited at your site and altogether.*

I Lilian Sinte Masule, am a registered student at the University of Namibia (UNAM), studying for a Doctoral Degree in Nursing Science. I am conducting a research study titled, “The development of a programme for nurses to facilitate rehabilitation of patients who had heart valve repair or replacement surgery” at Windhoek Central Hospital, Khomas Region, Namibia for the fulfilment of the degree I am registered for. The number of participants to be recruited in the study will depend on the responses given whether the information required are sufficient or to continue with the interview.

- g) Explain in participants’ friendly language what your project aims to do and why you are doing it?*

The purpose of this research study is to explore and describe your experiences of recovery after you had heart valve repair or replacement surgery in order to develop a rehabilitation programme for patients who had heart valve repair or replacement surgery.

- h) Explain all procedures.*

A face-to-face individual interview will be conducted at Windhoek Central Hospital, Cardiac Unit, Boardroom on your family member’s date of follow-up by me. The tape recorder will be used to ensure trustworthiness of the information. The data collection will take place for a period of two to three (2-3) months.

- i) Explain any randomization process that may occur.*

N/A

- j) Explain the use of any medication, if applicable.*

N/A

5. Why have you been invited to participate?

c) *Explain this question clearly.*

You are being asked to participate in a research study to share your experiences of recovery after you had heart valve repair or replacement surgery and your experiences on the support and care you are receiving from your caretakers. You are also invited to participate because you were operated for the first time for open heart valve repair or replacement surgery between the period of 2015 to 2019, and you have consented to participate in this study; therefore, you meet the inclusion criteria.

6. What will your responsibilities be?

c) *Explain this question clearly.*

Your participation in this study is voluntary, you are under no obligation to participate. You have the right to withdraw at any time if you care to even in the middle of an interview without any penalty imposed. If you are willing to participate, you will share your experiences of recovery after heart valve surgery and your experiences of support and care provided by your family members. You can stop the interview at any time you feel uncomfortable or unwell. You can share the information which you feel comfortable with.

d) *Explain the duration the participant is expected to participate in the study (i.e. 2 hours, 4 days, etc.)*

Your participation in this study will require 30-45 minutes of your time.

1. Will you benefit from taking part in this research?

b) Explain all benefits objectively. If there are no personal benefits, then indicate who is likely to benefit from this research e.g. future patients.

Although there is no benefit from this study, the findings will make the nurses aware about your experiences of recovery after you had heart valve repair or replacement surgery. Furthermore, the findings obtained may inform the development of a rehabilitation programme for patients who underwent heart valve repair or replacement surgery. This programme might also improve patient's quality of life, reduce mortality, hospital readmission and hospital costs. Moreover, it will inform policy and guideline regarding rehabilitation of patients after heart valve repair or replacement surgeries.

2. Are there any risks involved in your taking part in this research?

b) Identify any risks objectively.

There are no risks or discomforts involved for you in sharing your experiences of recovery after heart valve surgery and the support and care provided by your caretakers after surgery. However, if you feel discomfort due to health status, the consent may be re-negotiated, and you may withdraw from the interview.

3. If you do not agree to take part, what alternatives do you have?

d) *Clearly indicate in broad terms what alternative treatment is available and where it can be accessed, if applicable.*

If you do not agree to take part, you may indicate so that you are excused as participation in this study is voluntary.

4. Who will have access to your medical records? (Where applicable)

b) *Explain that the information collected will be treated as confidential and protected. If it is used in a publication or thesis, the identity of the participant will remain anonymous. Clearly indicate who will have access to the information.*

The audio recordings together with transcription will be kept by the researcher. Your name will not be written on the recording or on the transcriptions, which means no information will be linked to your name. Codes will be used instead. All data,

recordings, field notes and transcription will be kept in a lockable facility, and none except the researcher and the supervisor will have access to your interview. Moreover, your identity will not be shared with anyone when the study is being reported or published. The interview will be conducted in a quiet room where there is no disruptions.

5. What will happen in the unlikely event of some form of injury occurring as a direct result of your taking part in this research study?

b) Clarify issues related to insurance cover if applicable. If any pharmaceutical agents are involved will compensation be according to ABPI guidelines? (Association of British Pharmaceutical Industry compensation guidelines for research related injury which is regarded as the international gold standard). If yes, please include the details here. If no, then explain what compensation will be available and under what conditions.

There will be no pharmaceutical agents involved, however, to prevent any discomfort, the agreement made regarding the duration of the interview will be respected and you have the right to share just the information that you feel comfortable with. No injury or risks is associated with this study as the data collection will be conducted through an interview. The interview will also be scheduled at times that is convenient for you and your health needs taken into considerations. No invasive procedures will form part of data collection process. The researcher will also observe and check on you for any form of distress at which point consent may be re-negotiated and the interview will be terminated. Appropriate actions will be taken to alleviate your distress.

6. Will you be paid to take part in this study and are there any costs involved?

No monetary benefit are associated with this study. However, findings may help to improve nurses' knowledge, on providing rehabilitation care for patients who had heart valve surgeries.

9 Is there anything else that you should know or do?

- f) *You should inform your family practitioner or usual doctor that you are taking part in a research study. (Include if applicable)*
- g) *You should also inform your medical insurance company that you are participating in a research study. (Include if applicable)*
- h) *You can contact **Dr K. Amakali...at the University of Namibia**, at tel **061-206-3297**; kamakali@unam.na if you have any further queries about the study.*
- i) *You can contact the Centre for Research and Publications at **+264 061 2063061**; pclaassen@unam.na if you have any concerns or complaints that have not been adequately addressed by the investigator.*
- j) *You will receive a copy of this information and consent form for your own records.*

Declaration by participant

By signing below, I agree to take part in a research study entitled The development of a programme for nurses to facilitate rehabilitation of patients who had heart valve repair or replacement surgery in Namibia.

I declare that:

- f) I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- g) I have had a chance to ask questions and all my questions have been adequately answered.
- h) I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- i) I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- j) I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (place) on (date) 2021.

.....
Signature of participant

.....
Signature of witness

Declaration by investigator

I (*name*) declare that:

- I explained the information in this document to
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use a interpreter. (*If a interpreter is used then the interpreter must sign the declaration below.*)

Signed at (*place*) on (*date*) 2021.

.....
Signature of investigator

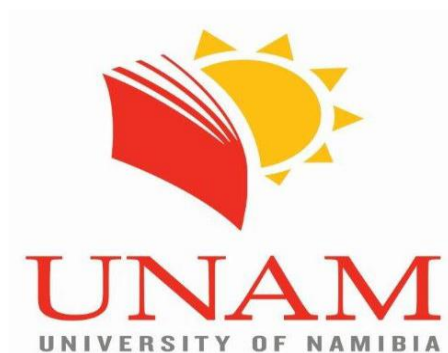
.....
Signature of witness

Declaration by interpreter

I(*name*) declare that:

- b) I assisted the investigator (*name*) to explain
the information in this document to (*name of participant*)
.....using the language medium of
(Oshiwambo, Oshihherero, Afrikaans, etc.)

ANNEXURE I: Participant information leaflet and consent form for caregiver



TITLE OF THE RESEARCH PROJECT: The development of a programme for nurses to facilitate rehabilitation of patients who had heart valve repair or replacement surgery in Namibia

REFERENCE NUMBER: 8901368

PRINCIPAL INVESTIGATOR: Lilian Sinte Masule

ADDRESS: P.O. Box 98726, Pelican Square, Windhoek

CONTACT NUMBER: 081 278 7342

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary**, and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the Research Ethics Committee at The University of Namibia and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and Namibian National Research Ethics Guidelines.

1. What is this research study all about?

k) Where will the study be conducted; are there other sites; total number of participants to be recruited at your site and altogether.

I Lilian Sinte Masule, am a registered student at the University of Namibia (UNAM), studying for a Doctoral Degree in Nursing Science. I am conducting a research study entitled, “The development of a programme for nurses to facilitate rehabilitation of patients who had heart valve repair or replacement surgery” at Windhoek Central Hospital, Khomas Region, Namibia for the fulfilment of the degree I am registered for. The number of participants to be recruited in the study will depend on the responses given whether the information required are sufficient or to continue with the interview.

l) Explain to the participant in friendly language what your project aims to do and why you are doing it?

The purpose of this research study is to explore and describe your family members experiences of recovery after heart valve repair or replacement surgery, your experiences on the support and care you are providing to your family member after heart valve repair or replacement surgery in order to develop a rehabilitation programme for patients who had heart valve repair or replacement surgery.

m) Explain all procedures.

A face-to-face individual interview will be conducted at Windhoek Central Hospital, Cardiac Unit, Boardroom on your family member’s date of follow-up by me. The tape recorder will be used to ensure trustworthiness of the information. The data collection will take place for a period of two to three (2-3) months.

n) Explain any randomization process that may occur.

N/A

o) Explain the use of any medication, if applicable.

N/A

2. Why have you been invited to participate?

e) Explain this question clearly.

You are being asked to participate in a research study because you have a family member who was operated for the first time for open heart valve repair or replacement surgery between the period of 2015 to 2019 to share your experiences on the support and care you are providing to your family member after heart valve repair or replacement surgery. You have also consented to participate in this study, therefore you meet the inclusion criteria.

3. What will your responsibilities be?

e) Explain this question clearly.

Your participation in this study is voluntary, you are under no obligation to participate. You have the right to withdraw at any time if you care to even in the middle of an interview without any penalty imposed. If you are willing to participate, your participations in this study will take 30-45 minutes of your time for interview in which you will share your experiences on the support and care you are providing to your family member after heart valve repair or replacement surgery. You can stop the interview at any time you feel uncomfortable or unwell and you can share just information you feel comfortable with.

f) Explain the duration the participant is expected to participate in the study (i.e. 2 hours, 4 days, etc.)

Your participation in this study will require 30-45 minutes of your time.

Will you benefit from taking part in this research?

c) Explain all benefits objectively. If there are no personal benefits, then indicate who is likely to benefit from this research e.g. future patients.

Although there is no benefit from this study, the findings will make the nurses aware about your family member experiences of recovery after heart valve repair or

replacement surgery. Furthermore, the findings obtained may inform the development of a rehabilitation programme for patients who underwent heart valve repair or replacement surgery. Moreover, it will inform policy and guideline regarding rehabilitation of patients after heart valve repair or replacement surgeries. This programme might also improve patient's quality of life, reduce mortality, hospital readmission and hospital costs.

5. Are there in risks involved in your taking part in this research?

c) Identify any risks objectively.

There are no risks or discomforts involved for you in sharing your experiences on the support and care provided to your family member after heart valve repair or replacement surgery.

If you do not agree to take part, what alternatives do you have?

f) *Clearly indicate in broad terms what alternative treatment is available and where it can be accessed, if applicable.*

If you do not agree to take part, you may indicate so that you are excused as participation in this study is voluntary.

Who will have access to your medical records? (Where applicable)

c) *Explain that the information collected will be treated as confidential and protected. If it is used in a publication or thesis, the identity of the participant will remain anonymous. Clearly indicate who will have access to the information.*

The audio recordings, together with transcription will be kept by the researcher. Your name will not be written on the recording or on the transcriptions, which means no information will be linked to your name. Codes will be used instead. All data, recordings, field notes and transcription will be kept in a lockable cupboard, and none,

except the researcher and the supervisor will have access to your interview. Moreover, your identity will not be shared with anyone when the study is being reported or published. The interview will be conducted in a quiet room where there is no disruptions.

What will happen in the unlikely event of some form of injury occurring as a direct result of your taking part in this research study?

- c) *Clarify issues related to insurance cover if applicable. If any pharmaceutical agents are involved will compensation be according to ABPI guidelines? (Association of British Pharmaceutical Industry compensation guidelines for research related injury which is regarded as the international gold standard). If yes, please include the details here. If no, then explain what compensation will be available and under what conditions.*

There will be no pharmaceutical agents involved. No injury or risks associated with this study as the data collection will be conducted through an interview. However, to prevent any discomfort, the agreement made regarding the duration of the interview will be respected and you have the right to share just the information you feel comfortable with. The interview will also be scheduled at times that is convenient for you and your health needs taken into considerations. No invasive procedures will form part during the data collection process. The researcher will also observe and check on you for any form of distress at which point the interview may be terminated. Appropriate actions will be taken to alleviate your distress.

Will you be paid to take part in this study and are there any costs involved?

No monetary benefit are associated with this study. However, findings may help to improve nurses' knowledge on providing rehabilitation care for patients who had heart valve surgeries.

10 Is there anything else that you should know or do?

- k) *You should inform your family practitioner or usual doctor that you are taking part in a research study. (Include if applicable)*
- l) *You should also inform your medical insurance company that you are participating in a research study. (Include if applicable)*
- m) *You can contact the study Supervisor Dr K. Amakali...at the University of Namibia.....at tel 061-206-3297; kamakali@unam.na if you have any further queries about the study.*
- n) *You can contact the UNAM Centre for Research and Publications at +264 061 2063061; pclaassen@unam.na if you have any concerns or complaints that have not been adequately addressed by the investigator.*
- o) *You will receive a copy of this information and consent form for your own records.*

12. Declaration by participant

By signing below, I agree to take part in a research study entitled **The development of a programme for nurses to facilitate rehabilitation of patients post heart valve repair or replacement surgery in Namibia.**

I declare that:

- k) I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- l) I have had a chance to ask questions and all my questions have been adequately answered.
- m) I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- n) I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- o) I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (place) on (date) 2021.

.....
Signature of participant

.....
Signature of witness

12. Declaration by investigator

I(name)
declare that:

- I explained the information in this document to
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use a interpreter. (*If a interpreter is used then the interpreter must sign the declaration below.*)

Signed at (place) on (date) 2021.

.....
Signature of investigator

.....
Signature of witness

12. Declaration by interpreter

I(name) declare
that:

- c) I assisted the investigator (name) to
explain the information in this document to (name of participant)
..... using the language medium of
(Oshiwambo, Oshihherero, Afrikaans, etc.)

ANNEXURE J: Questionnaire for the Nurses working at the Cardiac Unit and
Cardiac Clinic at Windhoek Central Hospital

**QUESTIONNAIRES FOR NURSES WORKING IN THE CARDIAC UNIT AND
CARDIAC CLINIC AT WINDHOEK CENTRAL HOSPITAL, KHOMAS REGION**

Name of Investigator: Lilian S. Masule

Course: Doctor of Nursing Science

Title: The development of a programme for nurses to facilitate rehabilitation of patients post heart valve repair or replacement surgery in Namibia

Dear participant

This questionnaire aims at determining your knowledge, attitudes and practices regarding the rehabilitation of patients after heart valve repair or replacement surgery. The aim of the study is to develop a rehabilitation programme for the patients after heart valve surgery.

Instruction: The self-administered questionnaire is completed anonymously under direct supervision of the researcher to avoid biases. Completion of a questionnaire will take approximately fifteen to twenty minutes of your time.

Kindly indicate your responses by marking a cross (X) in the space provided. Section B consists of definitely (4), probably (3), definitely not (2) or don't know (1); Section C as Strongly Agree (5), Agree (4), Neutral (3), Disagree (2) and Strongly disagree (1); Section D as Never (1), Seldom (2), Often (3) and Always (4).

SECTION A: DEMOGRAPHIC DATA

1. Age (years):

Kindly indicate your age in the space provided:

2. Gender:

Male	1
Female	2

3. Rank in nursing profession:

Enrolled Nurse (E/N)	1
Registered Nurse (R/N)	2
Senior Registered Nurse (R/N)	3
Control Registered Nurse	4

4. Educational level:

Certificate in Nursing and Midwifery Science	1
Diploma in General Nursing and Midwifery Science	2
Bachelor of Nursing Science (Clinical) (Honours)	3

Postgraduate in Nursing Science (Education, Critical care, Theatre, Health promotion, Health Service Management)	4
Master's Degree	5
PhD	6

5. Kindly indicate your years of clinical experience in Cardiac Unit/Clinic:

6. Any training attended related to cardiac conditions:

Yes	1
No	2

6.1 if yes to question 6, indicate the type of training attended:

SECTION B: NURSES' KNOWLEDGE REGARDING CARDIAC REHABILITATION OF PATIENTS

Kindly indicate your knowledge of cardiac rehabilitation of patients in relation to the following scale. Indicate whether you definitely (4), probably (3) definitely not (2) or don't know (1) with regard to the following statements.

Please mark a cross [X] on the correct answer.

	4	3	2	1
1. What is cardiac rehabilitation				
1.1. Cardiac rehabilitation is a supervised health program that provides education about:				
1.1.1. Nutrition				
1.1.2. Medication regimen and side effects				
1.1.3. Physical activity counselling and exercise training				
1.1.4. Cardiovascular diseases (CVD) risk factor management				
1.2. Cardiac rehabilitation is designed only for those patients who have recently had heart surgery				
1.3. Phase 1 of cardiac rehabilitation program begins as soon as the patient is discharged from hospital				
1.4. The benefit of cardiac rehabilitation are:				
1.4.1. Reduces hospital re-admissions				
1.4.2. Reduces the risk of death				
1.4.3. Reduces depression and anxiety				
1.4.4. Controls the regulation of the normal body temperature				
1.4.5. Improve overall health and well-being				
2. Patient assessment:				
2.1. The following elements should be included in the patient assessment before cardiac rehabilitation program commences:				
2.1.1. Screening of cardiovascular risk factors				
2.1.2. Physical activity counselling and exercise training				

2.1.3. Physical examination of general health status				
2.1.4. Wound healing and complications				
2.1.5. Psychosocial stress management				
2.1.6. Adherence to medication regime, anticoagulation and self-monitoring of weight, blood pressure and symptoms.				
2.1.7. Return to work				
2.2. The recovery after heart surgery takes about four to six weeks.				
2.3. It takes about 3 to 8 weeks for the breastbone to heal completely after surgery.				
2.4. Warfarin is a life-long anticoagulation given to cardiac patients following mechanical valve replacement surgery.				
2.5. Anticoagulants prevents the development of blood clots that can result in embolism.				
2.6. Patients with bio-prostheses or mitral repair should receive warfarin for 1 month after cardiac surgery.				
3. Exercise training:				
3.1. Exercise training can be started early in-hospital phase.				
3.2. Aerobic and resistance exercise training are two types of exercise recommended for cardiac rehabilitation.				
3.3. Low-activity level reduces the risk of mortality in patients after heart valve surgery.				
3.4. Supervised exercise is recommended for low-risk patients.				
3.5. Upper-body training can begin when the chest is stable usually after 4 weeks of surgery.				
3.6. Walking, swimming, jogging, stair climbing, and light weight is safe for patient who underwent heart surgery.				
3.7. Physical exercise reduces patient readmission, reduce cardiovascular mortality and improves psychosocial well-being after cardiac event and heart surgery.				
3.8. After heart valve surgery, patients may experience difficulties in returning to their normal activities.				
4. Diet/nutritional counselling:				
4.1. It is necessary to educate and involve caregivers regarding dietary goals and healthy food choices.				
4.2. Vitamin K interferes with anticoagulation.				
4.3. Foods high in vitamin K, such as leafy green vegetables can reduce the effect of warfarin.				
4.4. Food with high salt content and labelled food with added salt are healthy for patient after heart surgery.				
5. Smoking cessation:				
5.1. Not smoking by patients after heart surgery may reduce the risk of:				
5.1.1. Heart attack				
5.1.2. Stroke				
5.1.3. Chronic renal failure				
5.2. All smokers should be encouraged professionally to stop smoking all forms of tobacco permanently.				
6. Psycho-social management				
6.1. Which of the following aspects should be included when screening patients for psycho-social stress:				
6.1.1. Depression and anxiety				
6.1.2. Social isolation				
6.1.3. Diet and exercise training				
6.1.4. Marital/family distress and sexual dysfunction				
6.1.5. Substance abuse of alcohol				
6.2. Sleeping disturbances may be experienced after heart valve surgery due to artificial heart valve sound.				
6.3. After surgery, the patient may experience anxiety and depression within six months of being discharged.				

6.4. Problems encountered after heart valve surgery may delay the process and influence the patient's capacity for self-care.				
6.5. Problems to adapt psycho-socially after heart valve surgery might negatively impact the health of the patient.				
6.6. Caregivers, family members and other support people should be encouraged to participate in the cardiac rehabilitation process of the patient throughout.				

SECTION C: ATTITUDES OF NURSES REGARDING CARDIAC REHABILITATION OF PATIENTS

Kindly indicate your opinions regarding the rehabilitation of the patients after heart valve repair or replacement surgery. State whether you strongly agree (5), Agree (A) (4), Neutral (N) (3), Disagree (D) (2) and strongly disagree (SD) (1) against the following statements.

Please indicate the selected response with a cross [X] in the appropriate box.

	5	4	3	2	1
1. Attitudes regarding rehabilitation					
1.1. I believe rehabilitation should begin as soon as the patient is discharged from hospital.					
1.2. I think after heart valve surgery the patient will not require rehabilitation as long as there are no potential complications involved.					
1.3. I do not see cardiac rehabilitation as part of my responsibilities.					
1.4. I think doing a cardiac rehabilitation program to patients after heart surgery is time consuming.					
1.5. I am sceptical about the benefits of cardiac rehabilitation programs.					
1.6. I think am skilled enough and interested to give health information to patients regarding cardiac rehabilitation programme after heart surgery.					
1.7. I think patients and caregivers should be responsible for their own health behaviour changes, risk reduction self-management and post-hospitalisation.					
1.8. I believe it is the duty and responsibility of the cardiothoracic doctors to give information to patients regarding rehabilitation after cardiac surgery.					
2. Patient assessment:					
2.1. I think comprehensive patient assessment should be conducted before commencement of cardiac rehabilitation programme.					
2.2. I think the information given to patients on discharge regarding medications, wound care and infection control, psychological stress is sufficient for their recovery process.					
3. Exercise training					
3.1. I think strenuous exercise that involves upper body part should be avoided during the first two weeks after heart surgery as it may cause harm or damage to the sternal wound.					
3.2. I think exercise training programme and supervision is the responsibility of the physiotherapist or a staff member trained in exercise prescription and not of a nurse.					
3.3. I think high-risk patients should be supervised during low-intensity exercise by health care providers skilled in management of emergency cardiac events.					
3.4. I think low-moderate intensity exercise is safe for patient after 6 weeks of heart valve surgery.					
3.5. I think it is the responsibility of the caregivers to get involved in encouraging their family member to participate in exercise training.					
4. Diet/nutritional counselling					
4.1. I think the warfarin information booklet given to patients after discharge is sufficient in providing information about diet/nutrition counselling services.					
4.2. I think food rich in Vitamin K may inference with warfarin taken by patients after heart surgery.					
4.3. It is the nurse's responsibilities to explain diet/nutrition counselling to patients and caregivers after heart surgery.					

5. Psycho-social management					
5.1. I find it difficult to provide emotional support to patients and their caregivers if they became upset.					
5.2. I feel uncomfortable to talk to patients and their caregivers about sexual life experiences.					
5.3. I feel the support and care given to patients by caregivers at home is sufficient for patient recovery and return to normal activities.					
5.4. I believe that if patients are given an opportunity to share their worries and fears with others, it may help with their recovery process.					
5.5. I do not think the caregivers usually experience any difficulty in support and care of their loved ones who had heart valve surgery.					

SECTION D: PRACTICE OF NURSES REGARDING CARDIAC REHABILITATION

Indicate the practices/care you provide to patients with regard to cardiac rehabilitation. Kindly state whether you Never (1), Seldom (2), Often (3) and Always (4) against the following statements. Please indicate the selected response with a cross [X] in the appropriate box.

1. Rehabilitation:	1	2	3	4
1.1. Indicate which of the following rehabilitation activities you provide to patients before discharge from the hospital:				
1.1.1. Medications and drug regimens				
1.1.2. Self-care management				
1.1.3. Sternotomy care and prevention of wound infection				
1.1.4. Early detection of complications				
1.1.5. Importance of physical exercise				
1.1.6. Sexual activities counselling				
1.1.7. Advice caregivers regarding support and care of their family members.				
1.2. Did you work through the Warfarin information booklet with the patients before discharge from the hospital?				
1.3. Did you give training and teaching to the patients and caregivers to implement the content of the booklet regarding the following:				
1.3.1. Medication compliance and side effects				
1.3.2. Sleep and rest				
1.3.3. Diet /nutritional counselling and diet changes				
1.3.4. Changing bad habits of smoking and drinking alcohol.				
1.4. Did you prepare a workup schedule for the activities of the patients regarding cycling, rowing, swimming, bicycling, jogging and rest?				
1.5. Did you counsel the patients in helping them to cope with heart valve surgery, stress and anxiety?				
1.6. Did you counsel the caregivers to help them cope with stress and anxiety in caring for their family member after heart valve surgery?				
1.7. I normally encourage and counsel caregivers to get involved in the physical activities of their family member.				
1.8. I normally encourage patient in the involvement of leisure activities which they find comfortable and enjoyable.				
1.9. I normally provide information to caregivers what to expect, how to deal with patients' emotional responses such as depression and moodiness.				
1.10. I normally listen to the patient's problems and respond accordingly.				
1.11. I normally listen to the caregivers' problems and respond accordingly.				

THANK YOU FOR YOUR PARTICIPATION AND TIME

ANNEXURE K: Individual Interview Guide for the nurses regarding their challenges experienced in providing cardiac rehabilitation to patients after heart valve repair or replacement surgery

INDIVIDUAL INTERVIEW GUIDE

For nurses on the challenges experienced in providing cardiac rehabilitation services to the patient's heart valve repair or replacement surgery

Title: The development of a programme for nurses to facilitate cardiac rehabilitation of patients who had a heart valve repair or replacement surgery in Namibia

The objective of the study is to explore and describe the challenges experienced by nurses in providing cardiac rehabilitation for patients who had a heart valve repair or replacement surgery in order to develop a rehabilitation program for these patients.

The researcher introduces herself and explains the purpose and the process of the interview, addresses ethical aspects of research in terms of privacy, confidentiality, an anonymity. The researcher to indicate how long the interview will take.

Main question

Could you please tell me about your challenges experienced in providing cardiac rehabilitation services to patients after heart valve surgery?

Possible probing questions:

- Could you elaborate more on the implementation of the warfarin booklet?
What do you normally teach the patients regarding the implementation of the booklet?
- Could you elaborate on your perception or experience regarding the sexual education of patients who had heart valve surgery?
- Could you elaborate on the type of information and support you normally provide to the caregivers on how to take care of their family members after discharge from the hospital?
- Could you tell me about your opinion regarding cardiac rehabilitation of patients after heart valve surgery?
- Tell me more...?
- Is there anything you would like to add regarding your experience with the cardiac rehabilitation of patients after surgery?

THANK YOU FOR YOUR PARTICIPATION AND TIME!

ANNEXURE L: Transcription of the individual interview guide for the nurses on the challenges experienced in providing cardiac rehabilitation interventions to patients after heart valve surgery

Participant No: 3

Age: 50 years

Department: Cardiac Unit

Years of experience in Cardiac Unit: 12 years

Qualification: ICU trained

Researcher: Thank you for talking to me today. My name is Lilian Sinte Masule, am a registered student at the University of Namibia (UNAM), studying for a Doctoral Degree in Nursing Science. I am conducting a research study titled, “The development of a programme for nurses to facilitate rehabilitation of patients who had heart valve repair or replacement surgery” at Windhoek Central Hospital, Khomas Region, Namibia for the fulfilment of the degree I am registered for. The purpose of the study is to explore and describe your experiences your recovery and coping after you had heart valve repair or replacement surgery in order to develop a rehabilitation programme for patients who had heart valve repair or replacement surgery. This study was approved by University of Namibia Health Ethical Committee, Ministry of Health and Social Services and the Office of the Medical Officer at Windhoek Central Hospital.

We are going to talk about 30-45 minutes about your experiences regarding cardiac rehabilitation of patients after heart valve surgery, this includes the information you provide to them before and after discharge to recover and coping from their operation. There is no right or wrong answers, please it is very important to say what you think or feel not what you think I want to hear. The discussion is confidential, this means that your name or specific answer will not be used publicly, so please do not hesitate to speak your mind. We well be running through a few questions, so I would like you to speak out loud and tell me about everything you are thinking, feeling, and so on. You will be recorded, but this information will not be distributed to anyone except me and my supervisors. The consent will be given to you before we start. The researcher read the consent to participate in research and interview with audiotape to the participate.

Your participation in this study is voluntary, you are under no obligation to participate. You have the right to withdraw at any time if you care to even in the middle of an interview without any penalty imposed. If you are willing to participate, you will share your challenges experienced in providing cardiac rehabilitation interventions to the patients after heart valve surgery. You can stop the interview at any time you feel uncomfortable or unwell. You can share the information which you feel comfortable with. Therefore, do you agree to participate in this study?

Respondents: Yes, Madam I do agree.

Interviewer: Thank you so much, now we can start. Could you please tell me about your challenges experienced in providing cardiac rehabilitation services to patients after heart valve surgery?

Respondent: *[Mmmhhh!]* My challenges you know is that we don't have a program that is standing as a cardiac program whereby patients have to come back after operation. What we do is to just to give the patients information regarding their valves, their heart valve surgery. Another issue is that I see there is lack of information to patients, the patients are not getting fully information. Sometimes some patients are given but once they are home, they struggle to cope after surgery. For example, a patient is informed about Warfarin, taking Warfarin but [Eeeee.] once they are at home.... some of them cannot remember anymore how? Some patients cannot remember how many tablets they are supposed to take.

Interviewer: You mean is lack of information which is why patients come back for reoperation or default their medications?

Respondent: I will say lack of information "From the patient's side, it can also be that they are not serious with their sicknesses. The patients do not put more efforts and make sure that they take care of themselves as they supposed to be. Or it can be they do not have enough support system whereby somebody should also encourage them to take care of themselves. so... those are some of the issues that I have picked up. Some patients don't follow what they are being told at the hospital. Sometimes once they are operated, they think everything is fixed, they don't need to take their medication any more. Sometimes they default, or don't show up for follow ups. *Sometimes it is not their faults, sometimes at the pharmacy there is no medications there. Sometimes they might even be coming to the unit and said sister: please I was at the pharmacy, asking*

such medications, they say there is nothing. We give if we have, then we give them the little we have for them to take to continue with their medications.

Researcher: Could you elaborate the medication which is out of stock you are referring to?

Participant: The medication like PEN VK, there are times when there are no stock, so if we had some medications, we give to our patients.”

Interviewer: What happens to those patients who came being seriously sick the defaulters?

Respondent: Ok, sometimes like the defaulter, some of them they may come with other problems or come maybe have developed high blood pressure or their warfarin are low meaning they are out of range, so they are prone to get clots, so we admit them and get treatment accordingly. Sometimes we find some might already have clots, such patients are admitted, and they have to go for another surgery which supposed to be avoided by the correct information and making sure that the patient understood what they are supposed to do.

Interview: Just a follow-up question, you mentioned a lack of information to patients, can you elaborate more on that.....?

Respondent: Ok, there is lack of information giving to patients, the patients are not getting fully information, the nurses are not equipped, because nurse A knows maybe 100%, nurse B might only know 50% and nurse C might only know 25% of the information. So, I think healthcare workers must know how to give information about cardiac rehabilitation so that they are able to give such information back to the patients. The other thing is... I think maybe we need CR but also not only in Windhoek, like Oshakati, has Cardiac Clinic... because most patients are coming from the North especially heart valve surgery they are coming from the north... they will also benefit also from CR from that information at that hospital what else I think that is that's all.

Interviewer: Could you elaborate more on other challenges experienced that you did not mention?

Respondents: Sometimes patients don't understand the official language and sometimes it's difficult to get a healthcare worker who speaks the indigenous

language of the patient. Such patient doesn't get full information, this can hinder the fast recovery of the patients.

Interviewer: What else?

Respondents: We have to consider their source of income, sometimes they won't be able to afford to come, like every week to the clinic for rehabilitation. Sometimes, like the kids, the parents are working, we have to ask them which time fits them and the kids so that they will attend the program.

Interviewer: Thank you it is clear. Okay, we can move on to the next question.

Respondents: Can you elaborate more on the information you give regarding sexual activities after heart valve surgery?

“[Aaaa] *[shaking her head]* No sexual activities, most of the time we don't really go into detail, and you know most patients also don't ask.... about.... *[pause]* you know in our culture *[Laugh]*, is a bit of a taboo but you will find out some of the patients are free to ask... so, we tell the patients to wait with sexual activities. And if they ask, we tell them to wait until 6 weeks, and see how it goes because of your chest was open. So, they don't have to put pressure on their chest and so on. There are those hwo are free and those who are not *[aaahh]*, not free, they will not even ask about their sexual activities.

Interviewer: What else?

Respondents: There are those patients who are free and those who are..... aaaah...not free, they will not even ask about their sexual activities.” Well, we tell them no you have to wait...ask and we tell them to wait until 6 weeks, and see how it goes because of your chest was open so they don't have to put pressure on their chest and so on, *[pause]*.....There are those who are free and those who are aaaah...not free, they will not even ask about their sexual activities.

Interviewer: Thank you it is clear.

Researcher: Tell me about warfarin booklet, what do you normally teach patients regarding the implementation of the warfarin booklet before discharge from the hospital?

Respondent: Ok, Warfarin booklet we tell them like is like is your health passport, because where ever you are going you need to carry it so that the next Healthcare provider to be able to know that you are on this medication....to know if you are sick which kind of medication are you supposed to get and which one you are not supposed to get and part from that warfarin booklet is where we have to write the INR values so meaning that the ranges how thin or thick is your blood is,,, and this will give a picture to the next person to know if it was like this and this warfarin you are supposed to take it like this the dosage will guide the patient also know how to take the warfarin. It has also the information in itsel what is written there regarding the diet and how they should take care of themselves whereby the patient can always read regarding diet.

Researcher: You touched on the diet; what information are you always telling them of taking healthy diet?

Participant: most of our patients we tell them not to eat food which in fats, they should take low salt and low-fat diet. They should not take things like spinach, vegetables because spinach it has Vit K which can make your blood to became thick while the person is on warfarin which making your blood to clot. We also encourage them, you know most of them they have the traditional spinach, not to tell them but also to be careful with it to eat. If they eat may be once [high voice] and little. Instead of saying don't eat at all and some of them will say but I have no other thing to eat. I do not have other thing to eat other than spinach. We encourage them to follow the correct diet that they are supposed to eat.

Researcher: What else?

Participant: We also encourage them to control their weight because when they are overweight you are so putting more pressure on the heart so your heart will work harder. We also tell them to drink alcohol occasionally, because if you drink alcohol and you have mechanical valve you know you are putting yourself at risk, and you get stroke because your bold is thinner because of warfarin.

Interviewer: Could you elaborate more on your involvement of the caregivers in cardiac rehabilitation?

Respondents: "The caregiver, that will depend on the patients because some patients are young and some of them are old and those who are not mentally wise and cannot

take care of themselves, they need a second person. So, we call them if the patient is a minor when they are admitted and discharged. They are being spoken to, they are being told this and what from now on, child will have these medications. And you have to give this medication according to how it is prescribed. And the signs may be the child is not feeling well or whatever is being told bring her to the nearest hospital. But if a person who understands like everything like me, normally there is no need for a caregiver so they do it or unless we interview them or in our interaction, we see this person will need a second person to be there for him or her. Then we ask if there is a caregiver to come and give information.

Interviewer: Apart from medication if the child is sick what else you normally tell them?

Respondent: They must have to take those medications that any prescribed when sick or not they have if the child is sick, they have to bring the child for follow ups... they should stick to the follow-ups like they are being given the warfarin booklet.... The sisters at the clinic will write the numbers of the clinic, whereby if anything happens the caregivers can call the clinic or us at or they can call at the unit there is something that is bothering them.

Interviewer: Just a follow up question, could you elaborate more? Is the caregivers only needed for minors or not?

Respondent: No no....., not only for minors because we have also patients who are mentally disturbed or not well, so they also have caregivers, but if a person who understands like everything like me, normally there is no a caregiver so they do it or unless we interview them or in our interaction we see this person will need a second person to be there for him or her.... Then we ask if there is a caregiver to come and give information.

Interviewer: With others no need for a caregiver involvement?

Respondent: No need for caregivers even at home only if there is a problem. If a person does not understand or the other thing is when a person is illiterate, cannot read, then we ask for a second person to come so they can be informed. Everything regarding wound care regarding patient's operation and rehabilitation we tell them, everything that regarding patient surgery and rehabilitation we tell the caregivers.

Interviewer: Thank you, we can move on.

Researcher: Could you tell me your opinion or views regarding the importance of cardiac rehabilitation after patients who had heart valve surgery?

Respondent: Yes, I'll say it is 100% important for the patients to have CR, whereby even a patient is discharged they can always come back for rehabilitation or they can also do this for exercises or they can also ask questions where they didn't understand, so it is so it is very important and I think we need to have a program for CR it... it will really do good to our patients as well as their caretakers.

Researcher: Do you think providing all these activities you have mentioned is part of your responsibilities as a nurse?

Participant: Yes, it is part of my responsibilities because CR is a multidisciplinary service whereby each and every HCW like doctors, nurses, psychologists, social workers and pharmacists have to participate so that we can give holistic information, so it will be a holistic approach [pause]..... whereby no one will be left out so every part will be touched by the experts....

Researcher: Thank you so much in summary you mentioned that there is no cardiac rehabilitation programme at Cardiac Unit, and also lack of information giving to some nurses.

Researcher: Anything you would like to add about the challenges you are experiencing?

Respondent: May be ok, now that as UNAM is training the physiotherapists. because even after patient sometimes we struggle to get physiotherapists to come see the patient, so hopefully that UNAM has started training the physiotherapist, it will be a benefit to us... to have own physiotherapist dedicated to cardiac patients... hopefully the rehabilitation there will be also. It is needed.... that is something we really need physiotherapists.

Researcher: Thank you, could you tell me more on the medication?

Respondent: Medications, u know some of these patients they have just happen you know to have this illness. Let's say Rheumatic Heart Disease [RHD] which was just picked up may be few months ago... all of the sudden put on medications now they have to take medications for the rest of their lives. So Some adhere to take medications

as they are supposed to... so here we just to give those more education how they should take their medications and how important is the medication, and without the medications their conditions can get worse than e as they are at the.... Sometimes it is not their faults, sometimes at the pharmacy there is no medications not there, sometimes you might be even coming to the unit and said sister please I was at the pharmacy [*pause*].....asking for such medications, they say there is no medication sister, I was at the pharmacy they do not medication, we give if we have then we will give them if we have, we give them the little we have for them to make that they continue with their medications.

Researcher: Can you give me an example of the meds you are talking about these medications?

Participant: So, medication like Pen-VK there was at times when they were no stock so here, we had some we give to our patients such medications.

Researcher: Thank you very much for that!

Participant: I hope this will bring out something good

ANNEXURE M: Individual interview guide for patient who had heart valve repair or replacement surgery

INTERVIEW GUIDE

For patients who underwent heart valve repair or replacement surgery

Name of Investigator: Lilian S. Masule

Course: Doctor of Nursing Science

TITLE: THE DEVELOPMENT OF A PROGRAMME FOR NURSES TO FACILITATE REHABILITATION FOR PATIENTS WHO HAD HEART VALVE REPAIR OR REPLACEMENT SURGERY IN NAMIBIA

The objective of the study is to explore and describe the patients' experience of recovery and coping after heart valve repair or replacement surgery in order to develop a rehabilitation programme for these patients.

Main Question: "Could you please tell me your experience of recovery and coping after you had heart valve repair or replacement surgery"?

POSSIBLE PROBING QUESTIONS:

- Could you elaborate more on your recovery and coping?
- Could you tell me more about your experiences regarding the operation process?
- Could you tell me about your experience of adapting and coping physically and emotionally?
- Could you tell me how the surgery affected your roles and responsibility?

- Can you describe your experiences regarding the involvement and reaction of the family members on your recovery?
- How did you feel then.....?
- Can you describe your experiences regarding the preparations and support you receive from the caregivers?
- Tell me more about.... ?
- What are your thoughts about the future?
- Is there anything you would like to add regarding your experience of recovery after heart valve repair or replacement surgery?

THANK YOU FOR YOUR PARTICPATION AND TIME

ANNEXURE N: Transcription for patients who had heart valve repair or replacement surgery

Participant No. 7

Age: 20 years Gender: Female

Type of heart valve surgery: Mechanical valve replacement

Medication taking: On Warfarin anticoagulants

Surgery performed: 2019

Clinical History: Rheumatic Heart Disease

Language: English

Education level: University student

Researcher: Good afternoon, madam

Participant: Good afternoon

Researcher: My name is Lilian Sinte Masule, am a registered student at the University of Namibia (UNAM), studying for a Doctoral Degree in Nursing Science. I am conducting a research study titled, “The development of a programme for nurses to facilitate rehabilitation of patients who had heart valve repair or replacement surgery” at Windhoek Central Hospital, Khomas Region, Namibia for the fulfilment of the degree I am registered for. The purpose of the study is to explore and describe your experiences your recovery and coping after you had heart valve repair or replacement surgery in order to develop a rehabilitation programme for patients who had heart valve repair or replacement surgery. This study was approved by University of Namibia Health Ethical Committee, Ministry of Health and Social Services and the Office of the Medical Officer at Windhoek Central Hospital.

Your participation in this study is voluntary, you are under no obligation to participate. You have the right to withdraw at any time if you care to even in the middle of an interview without any penalty imposed. If you are willing to participate, you will share your experiences of recovery and coping after heart valve surgery and your experiences of support and care provided by your family members. You can stop the interview at any time you feel uncomfortable or unwell. You can share the information which you feel comfortable with. Your participation in this study will require 30-60 minutes of your time.

This session will be recorded, and confidentiality and privacy will be maintained as no name will be used but instead only codes will be used. Although there is no benefit from this study, the findings will make the nurses aware about your experiences of recovery after you had heart valve repair or replacement surgery. Furthermore, the findings obtained may inform the development of a rehabilitation programme for patients who underwent heart valve repair or replacement surgery. This programme might also improve patient's quality of life, reduce mortality, hospital readmission and hospital costs. The audio recordings together with transcription will be kept by the researcher.

Your name will not be written on the recording or on the transcriptions, which means no information will be linked to your name. Codes will be used instead. All data, recordings, field notes and transcription will be kept in a lockable facility, and none except the researcher and the supervisor will have access to your interview. Moreover, your identity will not be shared with anyone when the study is being reported or published. The interview will be conducted in a quiet room where there is no disruptions. Given the information I explained to you, do you agree to participate in the interview?

Participant: Respondent: Yes, I agree madam.

Researcher: Could you tell me your experience of recovery and coping after you had heart valve repair or replacement surgery?

Participant: [Hmmm] [Huuuu- pause] After I was operated, [pause], I'm a patient who got replaced with a mechanical [pause] valve. So.... My experience with the valve, it was making much sound at the first time, so I could not cope with it because it was too high..... And also [aauu uuuu] [pause] when I got discharged [pause] from the hospital, I was not really really recovered from the wound. I was having some pain where I could not [pause], like walk even for a kilometre, or I cannot bend down like that [pointing on the chest]. And when I'm trying to speak, it was very hard, I could only say some few words and some of the words could stack on my throat, so I was not able to laugh. For me it was just to smile to my friends.

Researcher: How did you feel about the valve sound?

Participant: *[aauuh], after [pause]..... because* the sound was ever high, disturbing me, I feel like not sleeping well. Because whenever I'm sleeping, I can just hear

crickcrikie crikkkkk [The sound of the valve]. Soo high, and also when I'm laughing neeh! it was hard for me, I can't just laugh even though someone makes something funny. I can't laugh like that, even though I wanted to laugh, I couldn't even smile, I could hide my.....[pause].

Researcher: Could you tell me about your experience regarding the operation process?

Participant: My reaction, [Aauu] that time I was very young. I never knew people got operated because I was at the village when they called me to come to the hospital for operation. I was told I'll be operated. I was very very scared, soo scared because I have never been operated before and I never heard of such [pause] of such [auuu] disease [looking down].

Researcher: I just want to hear more about your operation when you were operated.

Participant: It all started in 2016, it is that same year that I was told I'm suffering from the Rheumatic heart disease [RHD] for those years I have been like experiencing joint pains, swelling of the feet and I can't like walk even or can't run even for a kilometre that I'm already tired, I couldn't walk even for 2 kilometre like for footing. Then I was told I'm going to be operated. I was so scared, but they told me [pause], when you are going to be operated you won't feel anything, oh, you will be given medicine that will ...make you sleep [pause]. Aauu... you won't be able to sense, sensible like that [referring to pain]. So, I was so scared on the day of the operation [pause] [looking down]. I was so scared; I can't even smile to everyone [laugh]. I was so scared [laugh] I thought I won't, [auuu] leave again, I thought I'll die.

Researcher: Thank you for that.

Participant: Could you tell me your experience of adapting and coping physically and emotionally?

Participant: Physically, after my operation [pause] I'm no more like I getting tired like easily. I can at least work a one kilometre without [auua] [pause] without ever getting tired. I can at least run a bit, but not really for a longer distance, and about the sound of the valve is now lower, I can like hear it but is low, so but some days I'm no longer hear tis like low low because I'm like getting used to it.

Researcher: What about person next to you, can they hear the valve sound?

Participant: Jaa, only for sometimes.

Researcher: Could you elaborate more, are they not complaining?

Participant: Jaa, for the first time they were complaining they were like, whenever I enter the room, I then keep quiet, then can now said crickkie....crikkie.....and they will ask what is that? [pause]. I'll say [pause], I don't say anything [pause] because I don't wanna be asked many questions.

Researcher: Could you elaborate, how did surgery affect your roles and responsibilities after operation?

Researcher: Surgery auuu! [pause].... like I said, after my surgery I was told not to do heavy weight, not to do sport because whenever [pause], if I do sport, if I got injured because I was given Warfarin tablets, [Aaaau], apparently if I got injured or some cut on my body, it might bleed much....[pause], and I was told not to hold like or carry heavy things because [auuu] of my chest because [Auuuu], the bones were, Jaa! was still fresh and [pause].

Researcher: How do you feel about that?

Participant: I'm so disappointed [pause- change of tone of voice], because I loved athletics, I love playing netball but now I can't do all these sports.

Researcher: Could you tell me the support you have received from the nurses?

Participant: [Huummm!- laughs], the support [pause], after my operation they told me that like [iiii- auuu], my parents moes!. My aunt that brought me here at the hospital was complaining about poverty. Then the nurses said I no no noo!, you I can get money from the government. If I applied for that money, I'll be able to receive the money per month.

Researcher: Are you referring to the social grant that the government is giving to people with disability?

Participant: Jaa, and now, they are also like [pause], helping me whenever I'm coming to for my follow-up [pause], Jaa, the nurses they always make sure that they call me to come for my follow-up. If I don't come for follow up they will ask me the reason why I didn't come for follow-up. They always make sure that I'm always coming each

and every month to the follow- up. And they ask me how I feel, if I'm fine or I have some sickness or having other problems.

Researcher: What else from the nurses, the support and care, can you elaborate more?

Participant: [Pause], They make sure that each and every year, I always have to be seen to check how my valve was, to check my valve is working, or how it is functioning and what condition the valve is in?.

Researcher: Could you tell me the support you have received from your family members?

Participant: My family did take a good care of me and also supported. They made [pause] sure that always there is money for me even though I got sick and even though I got injured, just at a certain point. There is money for me to go to the hospital. They make sure that I eat also balanced diet food because, [auuu], I drink my medication. They make sure that each and every day I have enough medicine for me to drink like.

Researcher: could you tell me the reaction and involvement of your family members after your operation?

P: They are very good, and very responsible, because they make sure that [auu am!] I'm in good condition, I'm not doing those heavy work, and they make sure that I have enough medication. They always make sure that I always go for my follow-ups [Pause]. I also make sure they are aware how I'm feeling each and every day after my follow-up. I always tell them that what the nurses have told me about how is my health condition. My family also make sure that everything is enough for me, and I'm provided with everything I need. And they make sure that I eat all those balanced diets and also those food that I was told to eat each and every day.

Researcher: How do you feel about that?

Participant: I feel good... Ja, ... Ja.... Because they are treating me very well, and I'm proud of it.

Researcher: Could you tell me the preparation and support you have received you're your family after discharge from the hospital?

Participant: [Pause], when I got home? They make sure that I have [pause], [Auuu], I stay at the clean place like the room that I sleep and also where I stay for my day, and

also where my medications will be kept neat and clean space... plates and [pause]. They make sure that I always eat those fresh food without those rotten ones.

Researcher: Could you tell me your thought about the future?

Participant: My thoughts about future? for me I I.... [pause] I don't wanna like to give up for my future because I'm suffering from this sickness. I want [auuu] to complete with my education. Like when I was operation, when I was doing my grade 10, so from the whole year I never went to school after my recovery. I want like to complete with all my studies and also my university things, so that I became someone in future who can also be able to assist other people who do suffer from the disease like me. And also, to motivate them, about for them not to give up on their future because this sickness is not really a sickness that can make you not to plan for your future. And things like I can able, I can, you are able, you can, you are able to go to school for you is just to go to follow ups. You have much time to do your things and my future I want, ... I want like to be a pharmacist... [pause], and jaa [pause].

Researcher: Thank you so much for that information!

Researcher: What else you would like to add about your recovery and coping after heart valve surgery?

Participant: Nothing [aauuu], I'm now happy because I'm still strong, Ja, I can still like [pause] help with alles! [meaning help with everything]. I'm still continue with my education and with my future plans, I can do anything.

Researcher: Thank you very much for your time, we have come to the end of our interview.

Participant: Thank you so much madam!

ANNEXURE O: Individual interview guide for the caregivers of a family member who had heart valve repair or replacement surgery

Name of Investigator: **Lilian S. Masule**

Course: **Doctor of Nursing Science**

TITLE: THE DEVELOPMENT OF A PROGRAMME FOR NURSES TO FACILITATE REHABILITATION OF PATIENTS WHO HAD HEART VALVE REPAIR OR REPLACEMENT SURGERY IN NAMIBIA

The objective of the study is to explore and describe the patients' experience of recovery after heart valve replacement surgery in order to develop a rehabilitation programme for these patients.

MAIN QUESTION:

Could you please "Tell me about your experiences on the support and care of your family member after heart valve repair or replacement surgery"?

POSSIBLE PROBING QUESTIONS:

- Could you tell me more how the heart surgery of your family member affected your roles and responsibilities at home?
- Could you tell me how was your experience when you heard that your family member is diagnosed with heart valve disease?
- Could you tell me about your experience regarding your family member's operation process?
- In your opinion, tell me more what you think can make this process easier for you and your family to cope with the heart valve surgery?
- Could you elaborate more what kind of support did you receive from the nurses?
- What are your thoughts about the future?
- Is there anything you would like to add regarding your experiences on support and care of your family member after heart valve surgery?

THANK YOU FOR YOUR PARTICIPATION AND TIME

ANNEXURE P: Transcription with the caregivers of a family member who underwent heart valve replacement surgery.

Participant number: C8
Language: Silozi (Translated in English)
Place: Katima Mulilo (Zambezi Region)
Relationship: Mother of the patient
Age: 58 years

Researcher: Good morning mom, how are you?

Participant: Good morning, madam, I'm fine and thank you!

Researcher: My name is Lilian Sinte Masule, am a registered student at the University of Namibia (UNAM), studying for a Doctoral Degree in Nursing Science. I am conducting a research study titled, "The development of a programme for nurses to facilitate rehabilitation of patients who had heart valve repair or replacement surgery" at Windhoek Central Hospital, Khomas Region, Namibia for the fulfilment of the degree I am registered for. The purpose of the study is to explore and describe your experiences on support and care of a family member after who had a heart valve repair or replacement surgery in order to develop a rehabilitation programme for patients who had heart valve repair or replacement surgery. This study was approved by University of Namibia Health Ethical Committee, Ministry of Health and Social Services and the Office of the Medical Officer at Windhoek Central Hospital.

Your participation in this study is voluntary, you are under no obligation to participate. You have the right to withdraw at any time if you care to even in the middle of an interview without any penalty imposed. If you are willing to participate, you will share your experiences of on the support and care you provided to your family member after heart valve surgery. You can stop the interview at any time you feel uncomfortable or unwell. You can share the information which you feel comfortable with. Your participation in this study will require 30-60 minutes of your time.

This session will be recorded, and confidentiality and privacy will be maintained as no name will be used but instead only codes will be used. Although there is no benefit from this study, the findings will make the nurses aware about your experiences of recovery after you had heart valve repair or replacement surgery. Furthermore, the findings obtained may inform the development of a rehabilitation programme for

patients who underwent heart valve repair or replacement surgery. This programme might also improve patient's quality of life, reduce mortality, hospital readmission and hospital costs. The audio recordings together with transcription will be kept by the researcher.

Your name will not be written on the recording or on the transcriptions, which means no information will be linked to your name. Codes will be used instead. All data, recordings, field notes and transcription will be kept in a lockable facility, and none except the researcher and the supervisor will have access to your interview. Moreover, your identity will not be shared with anyone when the study is being reported or published. The interview will be conducted in a quiet room where there is no disruptions. Given the information I explained to you, do you agree to participate in the interview?

Participant: Respondent: Yes, I agree madam.

Researcher: Tell me about your experiences on the support and care you provided to your family member after heart valve repair or replacement surgery”?

Participant: The support I gave to my son after discharge from the hospital, the first things I told my son is that it happens in life my son. When God created you, he knew it already that you will have this kind of illness. Don't feel like you are not important person among others, you are still a person among others. What is important is to take care of yourself in everything you do. God is the one who knows your life whether you were not operated or operated. You are still my son. This is the kind of support I encouraged him after operation.

Researcher: Thank you!

Researcher: Could you elaborate more on the support and care?

Participant: The other thing I told him is that if you want your life to be good, stay away from smoking, stay away from alcohol, and follow instructions that you were given at the hospital. You will see your life will be very good; if you stay away from these things everything will be good to you.

Researcher: What else did you assist or supported him?

Participant: I also told him not just sit and do nothing; he can do some exercises. At times, he fetches water in a small bucket to bath because he cannot just sit and watch, he has to do something to recover from an illness; you need to do some exercises”.

Researcher: Could you tell me more how the heart surgery of your family member affected your roles and responsibilities at home?

Participant: “The roles that I used to do, I came to realise that some of the work I could no longer do, because I was a person who would do work on my own. I was self-employed, I could no longer take orders and sale fish at the local market. I have to withdraw to care for him, to take care and see how his life was, until such time that he was feeling better, able to walk and do some other chores.

Researcher: How did you feel leaving all what you have been doing and take care of your son?

Participant: [Uuuh!], at first, I felt like weak, but I realise that I don’t need to be weak because we are in the world full of sins and temptations. If I’m weak my child if looks at me and see that I have problems or distressed he will also feel the same since he is suffering from heart disease. I was always happy in front of him even if I have a problem, I could not show in front of him. Even if I don’t have something to eat, I could not show it to him [pause]. I’ll try my level best not to show that there is nothing to eat. I would put efforts that there is always food in the house.

Researcher: Thank you.

Researcher: Could you tell me your experience when you heard that your family member is diagnosed with heart valve disease?

Participant: When the doctor told me that my son was is suffering from heart disease. I did not feel well, to tell the truth, [pause] [nodding her head]. I was weak, and scared. When I think of about the heart, the heart [Aaaa] [shaking her head]. I could see how he suffered before the operation. When he started sick, he could not walk, getting tired easily, walk a bit and sit down again. He would cough and then vomit, vomiting blood.

Researcher: Did the doctor explain to you what your son was suffering from?

Participant: He was suffering from... [pause-holding her head], I cannot explain because we are people who are not educated.

Researcher: Thank you so much.

Researcher: Could you tell me about your experience regarding your family member operation process?

Participant: I did not feel well, to tell the truth, when they told me he was going to theatre, I did not feel well. I thought of.... can a heart be operated or what? I could not feel well, I was scared, my child's life is in a hand [*meaning short life*]. Yes, but I was strong I got the strength because God is the one who knows. I'm not the one who created him. It is God, everything is done by God. I knelt down and talk to the Lord: My God: God, you are the one who gave me, and you are the one who knows the life of my Child. I could not feel well..., immediately I got the strength and stopped there".

Researcher: Did they tell you what they will do in theatre?

Participant: They did not explain because I was here at home, he was in Windhoek hospital.

Researcher: Could you explain the time he spends in theatre? Was it long or short?

Participant: The time he spends in theatre was long. The day when he told me tomorrow, he was going for operation I was travelling to come. The day he was operated, the next day I arrived at the hospital. I was so happy [Smiling] he did not take long on oxygen, and he did not take long on the pipes he was having.

Researcher: In your opinion, tell me more what you think can make this process easier for you and your family to cope with the heart valve surgery?

Participant: I think they did a great job. God gave them the strength and I feel they did a very good job because the time when he was not operated, he suffered a lot.

Researcher: So, you mentioned before operation he could not walk, tired easily, vomiting blood, and had weakness in the bones.

Participant: Yes, he could not walk, tired easily from a short walk distance, he will sit and says he is tired and weakness in the bones.

Researcher: Could you elaborate more on the support you have received from the nurses?

Participant: "Nothing, [shaking her head] the nurses did not help us." Yes, I felt like there is nothing, I could not do for my son, but I can do...., that time when he was discharged, the work must be mine, yes, even if there is nothing from the nurses. Here

at the hospital, I don't know, the doctors seem like not be serious, especially for patients suffering from heart diseases, medications are not available here.... Only to buy at the pharmacy nothing, the nurses did not help us.

Researcher: What about when you accompany him for follow-up visits, did they say anything about the support and what he should do and not do for his recovery and coping?

Participant: Nothing madam.

Researcher: You feel it was a burden?

Participant: Yes, I felt there is nothing I could do, the work is mine even if there is nothing help from the nurses.

Researcher: thank you.

Researcher: When he was discharge from the hospital and arrived home, how did you help him to recover and coping?

Participant: "When he arrived home, he could not sleep well. He had difficulties in sleeping, yes sleeping on the back could not do because to wake up was a problem. I brought in a chair for him, a sofa where he used to sit. So, if he wants to raise up, he could call me to came hold him on his head to help him raise up. Because the operation was still fresh, so it was a day-to-day routine. He was improving bit by bit and started going to the hospital for follow-ups.

Researcher: Thank you.

Researcher: So, you felt like you have to do it?

Participant: yes, is how I used to assist him.

Researcher: What are your thoughts about the future of your son?

Participant: His future, I'm not happy with it [very emotional- change in tone of the voice, Bending her head down]. I'm saddened by his future, but the best thing about him is, he does his exercises, he goes for his piece of work, but his future...[Pause], You will see at times when the valve beats, the person next to him could hear the sound of the valve. When you ask him, he would say he is not feeling well in the chest, so he cannot do the work he used to do before his illness".

Researcher: Could you tell me more about the work he used to do before the illness?

Participant: the work he used to do before operation was always doing heavy duties like piece work jobs wherever he will hear whether heavy or light he could go for it,

chopping woods, could clean his own house. He was also working in the road constructions, pushing and pulling wheelbarrows with cements, now he cannot do it anymore.

Researcher: Is there anything you would like to add regarding your experiences on support and care of your family member after heart valve surgery?

Participants: Haa! I don't know I wanted to ask, isn't possible for him to get a support because I feel he is disabled. He is no more a person like the way he was born.

Another problem is you will find that his medication he supposed to get is out of stock at the hospital. It takes 2 to 3 months of no medications at our hospital.

Researcher: In that case what do you normally do when his medication is out of stock?

Participant: So, the only solution is to go and buy at the pharmacy, and at the pharmacy is very expensive. It is the one I feel it is a problem for me and again he cannot stay without his medication. That's one of the problems that worries me much. Because here at the hospital, I don't know the doctors seems like they are not serious especially for people suffering from heart diseases. Medications are not available and only at the private pharmacy.

Researcher: Thank you very much for your time we have come to the end of our interview. Is only if you have anything else to say or add.

Participant: Thank you, madam, nothing to say.

ANNEXURE Q: Pre and post-test on cardiac rehabilitation

PRE AND POST TEST ON CARDIAC REHABILITATION

Dear participants,

Answer all the questions provided:

1.16 This phase of cardiac rehabilitation begins when the patients is discharged from the hospital:

- e. Phase 1
- f. phase 2
- g. phase 3
- h. phase 4

1.17 Swimming, climbing stairs, walking are examples of which exercise:

- e. Resistance exercise
- f. Borg exercise
- g. Aerobic exercise
- h. Kinetic exercise

1.18 The most common complication of cardiac surgery:

- e. Infection
- f. Stroke
- g. Clotting of the valve
- h. bleeding

Answer all the questions provided:

1.19 This phase of cardiac rehabilitation begins when the patients is discharged from the hospital:

- a. Phase 1
- e. Phase 2
- f. Phase 3
- g. Phase 4

1.20 Mechanical valve replacement surgery is best suited to:

- a. Female of childbearing age
- b. Elderly patients
- c. Young males
- d. Tricuspid valve

Kindly cycle the correct answer:

1.21 Cardiac rehabilitation is only meant for patients who had heart valve surgery?

Yes No I don't know

1.22 A patient who underwent a mitral valve repair does not require Warfarin after heart valve surgery.

Yes No I don't know

1.23 Supervision exercises is recommended for low-risk patients after heart valve surgery.

Yes No I don't know

1.24 Sugary foods are healthy for patients after heart surgery.

Yes No I don't know

1.25	It is safe for patients to drive a car 2 weeks after surgery.	Yes	No	I don't know
1.26	Patients can start carrying heavy stuff 2 weeks after heart valve surgery.	Yes	No	I don't know
1.27	It is safe for patients to skip Warfarin Medications for two days without complications.	Yes	No	I don't know
1.28	Identify any 4 core components of cardiac rehabilitation.			
1.29	Outline the benefit of cardiac rehabilitation			
1.30	Write short notes on the information you normally provide to the caregivers on the support and care for their family members after heart valve surgery.			

ANNEXURE R: Report on the validation of the developed cardiac rehabilitation from an Academic expert

AN EDUCATIONAL PROGRAMME FOR NURSES TO FACILITATE CARDIAC REHABILITATION OF PATIENTS AFTER HEART VALVE REPAIR OR REPLACEMENT SURGERY AT CARDIAC UNIT, WINDHOEK CENTRAL HOSPITAL, KHOMAS REGION, NAMIBIA

Evaluation of the Proposed Educational programme for Nurses to Facilitate Cardiac Rehabilitation of Patients after Heart Valve Repair or Replacement Surgery at Cardiac Unit, Windhoek Central Hospital, Khomas Region.

Identification

Expert field: Public Health
Expert Name (optional): Ester Mulenga
Institution Name: University of Namibia
Department: Faculty of Health Sciences and Veterinary Medicine Faculty, School of Nursing and Public Health

Highest Qualification: Doctor of Philosophy in Public Health Date completed: April 2018

INSTRUCTIONS: This information is required to validate the proposed programme for the study.

Kindly provide comments on your validation on the programme development and programme implementation activities in chapter 7 & 8 (development and implementation of the programme. Provide validation, according to the below components.

Programme development

1. Do you think the title of the programme is clearly stated indicating the subject, the facilitator- and the beneficiaries?

The title of the programme is appropriate, it is clearly indicating the subject, the facilitator and beneficiaries.

2. Is the program goal clearly stated?

The goal/ purpose of the programme is also appropriate; however, it need to stand on it is own, without starting with the purpose of the study as it will confuse the reader.

3. Are the programme objective SMART?

3.1 Are programme objectives specific?

Yes, they are specific since they are going to address specific challenges identified during the study.

3.2 Are programme objectives measurable?

In terms of smart, the verbs used may be difficult to measure such as address, empower, impart, one cannot really measure some of those verbs, the candidate can use other verbs which can be measured.

3.3 Are programme objectives attainable/achievable?

Yes, they are achievable, just need to revise the verbs to be able to measure if such objective is achieved.

3.4 Are programme objectives realistic?

The objectives are realistic, because they are addressing challenges identified during situational analysis.

4. Are the programme objectives practical?

The objectives are practical, because they are trying to address the challenges identified by the study.

5. Can the programme objectives be applied in other context, other than the current study setting?

Yes, they can be applied in another setting related to rehabilitation of patients after heart surgery.

6. How best can the programme content be made accessible to the target group?

It can be made accessible through workshop and also via short course, so a short course can be developed out of this programme to be attended by nurses who work with patients who have undergone cardiac surgery.

7. Is the program clinically significant and useful?

... Yes, the programme is clinically important, because nurses need to know how to rehabilitate those patients and how to support caregivers of those patients.

8. Is the program significant and useful for home-based care by the caregivers?

Yes, it is significant, but there is not much information on home-based care in the content.

9. Do you think the program is important and significant for rehabilitation of the cardiac patients?

Yes, the programme is important for rehabilitation of cardiac patients, because looking at the problem they encounter after surgery, there is a need for program.

10. Is the programme content appropriate?

Yes, the content is appropriate since the content is derived from the problems identified during the study.

Programme implementation

11. Are activities of the programme implementation appropriate?

Activities are appropriate, since different activities are used for programme implementation.

12. Are activities of the programme implementation sufficient/comprehensive?

Yes, they are sufficient since, there are different activities that will be used to cover this programme.

Additional suggestions

13. Provide any suggestion for improvement of the programme content and implementation activities:

In the training manual the candidate needs to add: list of abbreviations, table of content, executive summary and also to include problem statement in the background of the training manual as well as the findings of the study.

Thank you for taking time to participate in this Evaluation and input to the document.

Signature of programme validator:



Date 24/08/2023

Annexure S: AN EDUCATIONAL PROGRAMME FOR NURSES TO FACILITATE CARDIAC REHABILITATION OF PATIENTS AFTER HEART VALVE REPAIR OR REPLACEMENT SURGERY AT CARDIAC UNIT, WINDHOEK CENTRAL HOSPITAL, KHOMAS REGION, NAMIBIA.

Validation of the proposed educational programme for nurse to facilitate cardiac rehabilitation of patients after Heart Valve Repair or Replacement Surgery at Cardiac Unit, Windhoek Central Hospital, Khomas region, Namibia.

Identification:

Expert field:	Nursing Science
Expert name:	Dr Epafra Anyolo
Name of Institution:	University of Namibia
Department:	Faculty of Health Sciences and Veterinary Medicine, School of Nursing and Public Health: General Nursing Sciences
Highest Qualification:	Doctor of Philosophy in Nursing Science: Completed: April 2023
INSTRUCTIONS:	<i>This information is required to validate the proposed programme for the study.</i>

Kindly provide comments on your validation on the programme development and programme implementation activities in chapter 7 & 8 (development and implementation of the programme). Provide validation according to the below components/sections.

Programme development

- 1. Do you think the title of the programme is clearly stated indicating the subject, the facilitator, and the beneficiaries?**

The title is clearly stated, indicating the subject matter, the facilitator and beneficiaries.

- 2. Is the programme goal clearly stated?**

The goal/aim of the programme is appropriate. However, it needs to be revised to be clear for the reader/beneficiaries.

- 3. Are the programme objectives SMART?**

3.1 Are programme objectives specific?

Yes, they are specific, designed to address specific problems identified in the study.

3.2 Are programme objectives measurable?

The verbs used in the formulation of the objectives are difficult to measure e.g. empower, thus the candidate may use other measurable verbs for this purpose.

3.3 Are programme objectives attainable?

Yes, they are attainable if the current verbs are changed to measurable verbs, one can measure whether they are attainable.

3.4 Are programme objectives realistic?

Yes, they are realistic as they aim to address realistic problems identified in the study.

4. Are programme objectives practical?

Yes, they are very practical because they intend to address practical issues in the hospital setting

5. Can the programme objective be applied in other context, other than the current study setting?

Yes, they can be applied in similar setting elsewhere.

6. How best can the programme content be made accessible to the target group?

By means of seminars and workshops and in-service trainings sessions by dedicated cadres. It can also be included in the treatment manuals for rehabilitation program activities in the Ministry of Health and Social Services.

7. Is the programme clinically significant and useful?

Yes, is significant and useful to the nurses and caregivers of such patients outside the hospital setting.

8. Is the programme significant and useful for home-based care by caregivers?

Yes, but the content is more limited to nurses only.

9. Do you think the program is important and significant for rehabilitation of the cardiac patients?

Yes, because the patients are faced with numerous challenges after discharged from the hospital. Thus, such a programme is important and significant to assist the cardiac patients to cope after surgery

10. Is the program content appropriate?

Yes, the content is formulated to address the challenges/problems identified during situational analysis of the study.

Programme implementation

11. Are activities of the programme implementation appropriate?

Yes, they are appropriate to the identified problems.

12. Are activities of the programme implementation sufficient/comprehensive?

Yes, they are sufficient. There are various activities, both aimed to address issues/challenges identified in the study.

Additional suggestions

13. Provide any suggestion for improvement of the programme content and implementation activities:

Items to be added: expand on the background and add problem statement for the reader. Also, table of content and explanation of abbreviations used in the manual.

Thank you for taking time to participate in this Evaluation and input to the document.

Signature of programme:

A handwritten signature in blue ink, appearing to read 'Alfred'.

Date: 12 December 2023

ANNEXURE T: Report on validation of the developed cardiac rehabilitation programme from the health care professionals from cardiac unit (Cardiac ICU Nurse)

AN EDUCATIONAL PROGRAMME FOR NURSES TO FACILITATE CARDIAC REHABILITATION OF PATIENTS AFTER HEART VALVE REPAIR OR REPLACEMENT SURGERY AT CARDIAC UNIT, WINDHOEK CENTRAL HOSPITAL, KHOMAS REGION, NAMIBIA

Evaluation of the Proposed Educational Programme for Nurses to Facilitate Cardiac Rehabilitation of Patients after Heart Valve Repair or Replacement Surgery at Cardiac Unit, Windhoek Central Hospital, Khomas Region.

Identification

Expert field: Critical Care Nursing- Cardio-thoracic & Cardiology Adult

Expert Name (optional): Annely Iiyambo

Institution Name: Windhoek Central Hospital

Department: Cardiac Unit

Highest Qualification: Master of Public Health Date completed: 2022

INSTRUCTIONS: *This information is required to validate the proposed programme for the study.*

Kindly provide comments on your validation of the programme development and programme implementation activities in chapters 7 & 8 (development and implementation of the programme. Provide validation, according to the below components.

Programme development

1. Do you think the title of the programme is clearly stated indicating the subject, the facilitator- and the beneficiaries?

Yes, it is clearly stated.

2. Is the program goal clearly stated?

Yes, the goal is to equip the nurses at the Cardiac Unit and Cardiac Clinic with the knowledge and skills to improve their attitudes regarding the cardiac rehabilitation of patients and support their caregivers.

3. Are the programme objective SMART?

Yes.

3.1 Are programme objectives specific?

Yes, four specific objectives are outlined.

3.2 Are programme objectives measurable?

3.3 Are programme objectives attainable/achievable?

Yes, they are achievable.

3.4 Are programme objectives realistic?

Yes, they are realistic, they are based on the outcomes of the study results which was conducted.

4. Are the programme objectives practical?

Yes, the programme objectives are practical.

5. Can the programme objectives be applied in other context, other than the current study setting?

The programme objectives can only be applied in the current study settings.

6. How best can the programme content be made accessible to the target group?

The programme content can be made available at the Cardiac Unit and Cardiac Clinic.

7. Is the program clinically significant and useful?

Yes, they are clinically significant and useful.

8. Is the program significant and useful for home-based care by the caregivers?

Yes, but the programme targets the nurses, it equips the nurses in order to give the needed support to patients and their caregivers.

9. Do you think the program is important and significant for rehabilitation of the cardiac patients?

Yes, it is helpful to both nurses and patients, nurses will be able to give appropriate information to patients regarding cardiac rehabilitation.

10. Is the programme content appropriate?

Yes, because it is based on the research outcomes.

Programme implementation

11. Are activities of the programme implementation appropriate?

I foresee the problem when it comes to attendance it is difficult to get a large number at once to attend the workshop, due to the nature of the work.

12. Are activities of the programme implementation sufficient/comprehensive?

Yes, it is comprehensive.

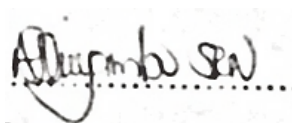
Additional Suggestions

13. Provide any suggestions for improvement of the programme content and implementation activities:

The implementation of the programme I suggest it can be done in January 2024 when the Unit is a bit less busy and quiet.

Thank you for taking time to participate in this Evaluation and input to the document.

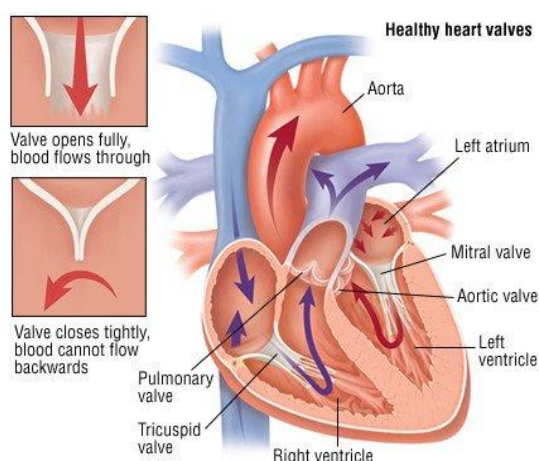
Signature of programme validator:

A handwritten signature in black ink, appearing to read 'Aliyamba SN', written over a dotted line.

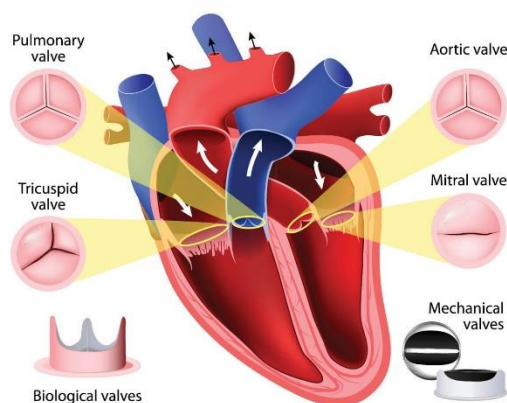
Date: 2023/09/30

ANNEXURE U: Educational manual for the implementation of the developed educational programme

AN EDUCATIONAL PROGRAMME FOR NURSES TO FACILITATE THE REHABILITATION OF PATIENTS AFTER HEART VALVE REPAIR OR REPLACEMENT SURGERY



Valves of the heart (<https://images.app.goo.gl/ifcoyogCe7pD1RbeA>)



The valve of the heart and the artificial valves
(<https://images.app.goo.gl/ifcoyogCe7pD1RbeA>)

COMPILED BY LILIAN S MASULE

lsmasule@unam.na

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LIST OF ABBREVIATIONS

ACE	Angiotensin-converting enzyme inhibitors
ASCVD	Atherosclerotic cardiovascular disease
CR	Cardiac rehabilitation
CRP	Cardiac rehabilitation programme
CABG	Coronary artery bypass surgery
CBCR	Centre-based cardiac rehabilitation
CHD	Coronary heart disease
CVD	Cardiovascular disease
DVR	Double valve replacement
ECG	Electrocardiogram
HBCR	Home-based cardiac rehabilitation
INR	Internationalized Normalised ratio
LCD	Low density lipoprotein
MVR	Mitral valve replacement
MoHSS	Ministry of Health and Social Services
WHO	World Health Organization

EXECUTIVE SUMMARY

This educational manual is designed to equip the nurses with the knowledge and skills and to modify their attitudes and practices regarding cardiac rehabilitation (CR) of patients after heart valve surgery. The educational guide consists of 4 topics formulated from the results and findings identified during data collection and data analysis of the situational analysis in Phase 1.

- Topic 1: addresses the knowledge and skills, attitudes, and practices towards cardiac rehabilitation.
- Topic 2: addresses the challenges experienced by the nurses in the delivery of CR interventions to patients after heart valve surgery.
- Topic 3: addresses the challenges experienced by the patients in recovery and coping after heart valve surgery.
- Topic 4: addresses the experience of the caregivers on the support and care of a family member after heart valve surgery.

Objectives of the educational manual are:

- To provide nurses with knowledge, and skills, and modify their attitudes and practices about CR for patients after HVS enabling them to deliver CR interventions to patients after heart valve surgery.
- Equip the nurses with the knowledge and skills to mitigate challenges that they experience in providing CR for patients after heart valve repair or replacement surgery.
- To describe the essential knowledge and skills for nurses to address the challenges experienced by the patients in recovery and coping after HVS to improve the patient's quality of life, reduce readmission, and hospital costs, and reduce mortality.
- To equip the nurses with the knowledge and skills necessary to address the challenges experienced by caregivers in supporting and caring for their family members after heart valve surgery.

Facilitation techniques: The educational programme will be delivered through a two-day workshop to meet the needs of the nurse participants. The lecture method (interactive lecturing), group discussion, questions and answers methods, case scenarios, role-play, debating, feedback, plenary discussion, and icebreakers are among the methods of facilitation to be used during the educational workshop.

Evaluation: Pre and post-testing using a quasi-experimental evaluation will be conducted among nurses who will participate in the programme implementation to assess their knowledge about CR before and after the implementation of the educational programme.

Conclusion: Equipping the nurses with the knowledge, skills and modifying their attitudes and practices will aim at enhancing patient quality of life, and reducing

hospital admissions, and costs, and mortality as well as empowering caregivers to cope with the demands of caring for their family members after heart valve surgery.

1.1 Introduction and Background

Heart valve disease is a critical global public health issue, contributing to cardiovascular morbidity and mortality worldwide. It serves as an indication for heart valve repair and replacement surgeries, which are invasive procedures that can potentially compromise patients' quality of life. Structurally damaged heart valves often occur as a consequence of untreated rheumatic fever more in Low-income countries (WHO, 2017; Choudhary, et al., 2016; Harris, et al. , 2015).

Moreover, between January 2014 and September 2014, a significant number of 230 patients were diagnosed with rheumatic heart diseases at the Windhoek Central Hospital Cardiac Clinic, and this number increased to 255 between January and August 2015 (Cardiac Unit Health Information Management System, 2015). Similarly, in 2017 between July and December 2017, approximately 216 patients were seen at the cardiac clinic and diagnosed with Rheumatic Heart Disease (Cardiac Unit Health information management system, 2017). These statistics indicate an increasing prevalence of valvular heart diseases which may require heart valve surgeries, and subsequently, may carry potential complications.

While heart valve repair and replacement surgeries can significantly improve a patient's functional capacity and quality of life, the literature indicates that individuals who have undergone these procedures often encounter various mental and social challenges (Sibilitz, et al., 2016). Additionally, they may face physical challenges such as fatigue, weakness, and gum bleeding as side effects of medications like Warfarin (Yaman Aktas, et al., 2021). Furthermore, these patients may experience complications such as thrombo-embolism, endocarditis, arrhythmia, and a decline in the functioning of the repaired valve (Misawa, 2015; Berg, et al., 2013; Samiei, et al., 2014). Therefore, patients who have had heart valve surgery (HVS) require cardiac rehabilitation interventions to prevent potential complications, reduce morbidity and mortality, minimise hospital readmissions, lower healthcare costs, and promote overall health.

Considering the various challenges that patients often encounter following heart valve surgery, there is a need for the establishment of a cardiac rehabilitation programme

(CRP) in Namibia. Such a program can significantly contribute to improving the quality of life for patients who have undergone heart valve repair or replacement surgery while also reduces mortality rates. Cardiac rehabilitation is a comprehensive long-term program that encompasses: patient assessment, physical activity, exercise training, lifestyle risk factor management (physical activity, exercise training, diet, tobacco), medical risk factor management (lipids, blood pressure, weight, diabetes mellitus); cardioprotective therapies, psychosocial management, education and return to work. Therefore, there is a need to provide nurses with education and training in the field of CR to better support these patients.

1.2 Problem statement

Coping with heart valve repair or replacement surgery without access to cardiac rehabilitation (CR) might be challenging for most patients recovering from heart surgery. Despite the well-established benefits of CR and its inclusion in international guidelines, a significant proportion of patients in developing countries do not have access to cardiac rehabilitation programmes (Grace, et al., 2016; Turk-Adawi, et al., 2014; WHO, 1993; Turk-Adawi, et al., 2014; WHO, 1993).

The researcher has observed that patients who undergo heart valve surgery at Windhoek Central Hospital (WCH) Namibia, have limited contact with nurses at the Cardiac Unit. Typically, patients are seen by healthcare providers only when they are readmitted with valve-related complications, which may require reoperation of heart valve surgery. This highlights a critical gap in the continuity of care for these patients, particularly in the post-surgery phase where cardiac rehabilitation could offer significant benefits.

During the period from April 2017 to June 2017, a total of 15 patients who underwent valvular replacement surgeries at Windhoek Central Hospital. Of these cases, 7 cases (46.7%) were patients who had previously undergone valve surgery that had failed, necessitating another replacement procedure. In addition, between April and June 2015, among 11 cases of open-heart surgery, 2 cases (18%) were for reoperation of mitral valve replacement, all due to valve-related complications after cardiac surgeries (Cardiac Unit Health Information Registry, 2017).

These statistics underscore the importance of comprehensive post-operative care and cardiac rehabilitation programme (CRP) to prevent and manage complications. To address the challenges experienced by the nurses, patients, and caregivers of patients who had heart valve surgery, the researcher of the current study developed an educational programme and educational manual to empower the nurses with the knowledge and skills regarding CR, for patients who had a heart valve repair or replacement surgery.

1.3 Methodology

A mixed methods approach of explanatory sequential design, was used to assess the level of nurses' knowledge, attitudes, and practices regarding cardiac rehabilitation, in addition to assessing the experiences of the nurses in providing CR services to the patients after heart valve surgery, patients experience on recovery and coping after heart valve surgery as well as the experiences of the caregivers on the support and care provided to their family members after heart valve surgery.

1.4 Findings of the study

The findings from the study indicated that the nurses have a high level of knowledge, positive attitudes, and poor to moderate practices regarding cardiac rehabilitation. However, some aspects were identified such as the phases, indications, and core components of cardiac rehabilitation where nurses lack appropriate knowledge.

However, nurses experience diverse challenges with regard to providing CR for patients after heart valve surgery: These include: language barriers, cultural aspects such as the perception of sex education as a taboo; lack of knowledge and skills for CR; economic constraints of the patients and caregivers; ignorance of health information by the patients; inadequate resources to facilitate CR; lack of interpersonal relationships among the nurses; unavailability of a standardised rehabilitation programme to guide the rehabilitation of patients after heart valve surgery as well as lack of involvement of caregivers.

Furthermore, patients experience challenges, which include: mixed feelings such as fear and worries about the outcomes of the operation; disappointments about surgery (embarrassment about the scar and the sound of a mechanical valve); negative impact of the procedure on daily activities; overprotective family members; lack of knowledge on self-care; loss of social role; and lack of support from the nurses.

Equally, caregivers experience emotional trauma with regard to heart surgery for a family member; expressed a need for knowledge about the procedures for cardiac rehabilitation; demand to care for their family member owing to a prolonged recovery period; concerned about expenses related to transportation and other commodities; uncertainty about the future of a relative after heart valve surgery; lack of support from the nurses in exemption to experiences of reassurance and positive thoughts about the future of a relative after heart surgery. Both the results from quantitative and qualitative were then integrated, and the interpretation of the results led to the development of the conceptual framework and educational programme.

1.5 Recommendations

To address these challenges, an educational programme for cardiac rehabilitation was developed using an educational manual to empower the nurses with knowledge and skills regarding the cardiac rehabilitation of patients after heart valve surgery.

AN EDUCATIONAL PROGRAMME FOR NURSES TO FACILITATE CARDIAC REHABILITATION OF PATIENTS AFTER HEART VALVE REPAIR OR REPLACEMENT SURGERY

Name of the educational manual

An educational programme for nurses to facilitate cardiac rehabilitation for patients after heart valve repair or replacement surgery.

The goal of the educational programme

The aim of the developed educational programme is to empower nurses to facilitate the rehabilitation of patients who had a heart valve repair or replacement surgery at the Cardiac Unit and Cardiac Clinic at Windhoek Central Hospital, Khomas region.

The objectives of the educational programme for cardiac rehabilitation

The specific objectives are described in the executive summary of the educational manual.

Overview of the educational manual for cardiac rehabilitation

This educational manual has been written to assist in guiding the participants to acquire the knowledge and skills regarding cardiac rehabilitation (CR) of patients after heart valve surgery.

Target population

The nurses who are providing nursing care to patients who have had heart valve surgery at the Cardiac Unit and Cardiac Clinic.

Facilitation techniques

The lectures, group discussions case scenarios, problem-solving, debates and role play will be used during the implementation of the programme of the two-day workshop.

Programme approaches

Applications of Nicholls and Nicholls Cyclic model for curriculum development was applied for educational program development, Knowles theory of adult learning, Kolb's Experiential Learning, and Gagne's Theory of Instruction will be used for implementation of the programme.

Content of the educational manual

This educational guide consists of 4 topics formulated from the findings identified during data collection and data analysis of the situational analysis in Phase 1 as described under the Executive summary.

Topic 1: Knowledge, attitudes, and practice of the nurses towards cardiac rehabilitation of patients who had heart valve surgery

1.1 Overview

This topic covers the definition, aims, indications, multidisciplinary team, phases, and core components of cardiac rehabilitation. This topic also highlights the benefits, barriers, and role and responsibilities of the nurses in the delivery of cardiac rehabilitation of patients who had heart valve surgery. This topic will empower you with the knowledge and skills and modify your attitudes and practices on the cardiac rehabilitation (CR) of patients who had heart valve surgery to deliver cardiac rehabilitation interventions to patients who had heart valve surgery.

1.2 Learning outcomes

On completion of this session, you should be able to:

- Define Cardiac rehabilitation.
- Outline the aim of cardiac rehabilitation.
- Outline the indications for cardiac rehabilitation.
- Identify the multidisciplinary team for cardiac rehabilitation.
- Understand the phases of cardiac rehabilitation.
- Analyse the core components of cardiac rehabilitation.
- Describe the benefits of cardiac rehabilitation.
- Understand the barriers to cardiac rehabilitation.
- Debate on the role and responsibilities of the nurses in cardiac rehabilitation.

1.2.1 Definition of Cardiac Rehabilitation

Cardiac rehabilitation is defined by World Health Organization (WHO), (1993) as “The sum of activity and interventions required to ensure the best possible physical, mental, and social conditions so that patients with chronic or post-acute cardiovascular disease may, by their own efforts, pressure or resume their proper place in society and lead an active life.”

- Dalal, et al, (2015) describes cardiac rehabilitation as a (Secondary prevention) services that are comprehensive, long-term programmes involving medical evaluation, prescribed exercise, cardiac risk factor modification, education, and counselling.
- Cardiac rehabilitation has been classified as a Class 1a recommendation after heart valve surgery, myocardial infarction or coronary interventions, and established by the American Heart Association and American College of Cardiology (Simon, et al., 2018).
- Cardiac rehabilitation (CR) is a multidisciplinary intervention, and its core elements includes patient assessment, management and control of cardiovascular risk factors, physical activity counseling, prescription of exercise training, dietary guidance, psychosocial management, and vocational support are widely accepted.
- These core components of CR have been established by the major CR association from high-income countries, and low income-countries namely: American, Australian, British, Canadian and European associations (Ambrosetti, et al., 2021; Balady, 2007; Cowie, et al., 2019; Woodruffe, et al., 2015; Grace, et al., 2016; Simon, et al., 2018)5.

1.2.2 Aim of Cardiac Rehabilitation

Designed to limit the physiological, and psychological impact of cardiovascular disease, reduce risk factors for sudden death, control cardiac symptoms, stabilize or

reverse the atherosclerotic process and enhance the psychological and vocational status of selected patients (Balady, 2007; Dalal; 2015). Helps make lifestyle changes to reduce risk of future heart problems.

1.2.3 Indications for Cardiac Rehabilitation

Indications of cardiac rehabilitation as highlighted by (Anderson, et al, 2016 and Dalal, et al., 2015):

- Ischaemic heart disease, myocardial infarction, after coronary angioplasty, coronary artery bypass surgery (CABG)
- Newly diagnosed chronic heart failure
- Patients with heart transplants and ventricular assist device
- Patients who have undergone surgery for implantation of intra-cardiac defibrillator or cardiac resynchronization therapy for reasons other than acute coronary syndrome and heart failure.
- Patient with heart valve replacement for reasons other than Acute Coronary Syndrome and heart failure.
- Patients with a confirmed diagnosis of exertional angina.

1.2.4 Multidisciplinary team for Cardiac Rehabilitation

A multidisciplinary approach is needed to practice effective cardiac rehabilitation. Delivery of the core components requires expertise from a range of different professionals (Ambrosetti, et al., 2021; Piepoli, et al., 2014; British Heart Association, 2012; Dalal, et al, 2015).

The team includes:

- Cardiologists, community cardiologists, physicians, or general practitioners with a special interest.
- Cardio-thoracic surgeon
- Cardiac Nurse
- Nurse specialist
- Dietician
- Psychologist
- Exercise specialist (physiotherapist)
- Occupational therapist
- Clerical administrator

1.2.5 Phases of Cardiac Rehabilitation

Figure 1.1: Depicts the phases of cardiac rehabilitation

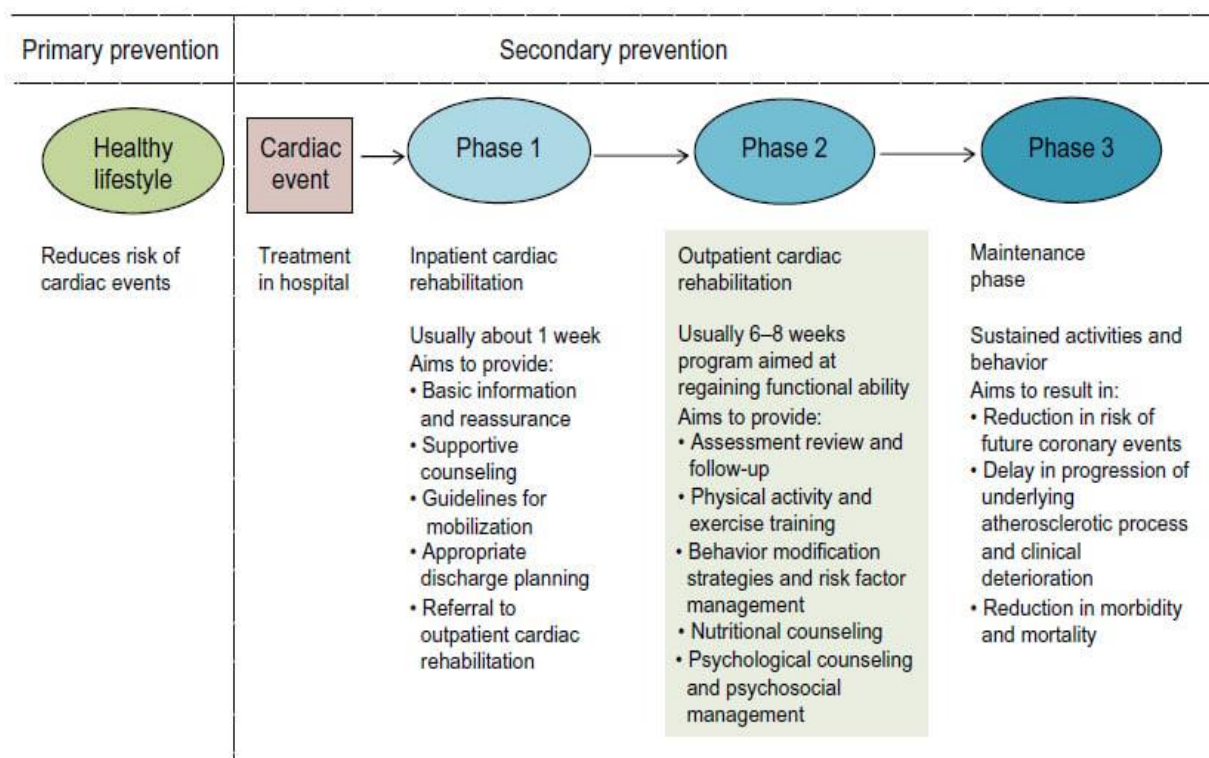


Figure 1.1: Phases of cardiac rehabilitation: Adapted from Varnfield & Karunanithi, (2015)

Varnfield, and Karunanithi, (2015) highlighted the phases of cardiac rehabilitation

Phase 1: In- Hospital patient period

- Aims at patient cardiovascular system adaptation to physical activity.
- Crucial in preparation for discharge
- Education of patients about risk factors and initiation of their lifestyle changes.
- Long-term secondary prevention plan is set up.

Phase 11: Post-discharge period/ Outpatient cardiac rehabilitation

- Begins when the patient is discharged from the hospital.
- This phase lasts till week 36 after cardiovascular diseases (CVD) event, lasts for 3 to 6 weeks. Outpatient department
- Supervised physical exercise up to 36 training sessions, patient centred, exercise stress testing, walking tests.
- Patients encouraged to exercise as much as they can tolerate
- lifestyle changes and adherence to secondary prevention principles.
- Continuous support to the family and promotion of continuous adherence to lifestyle recommendations.

- Support and education can be done through home visits, phone calls, outpatient follow-ups, and educational classes.
- This phase is also critical from the participation aspect, which is then mirrored in the maintenance phase.

Phase 111- Maintenance phase

- Ongoing maintenance phase beyond inpatient and outpatient rehabilitation.
- Involves exercises, flexibility, strengthening and aerobic exercises, life style change to reduce CVD risk factors through self-management (Varnfield & Karunanithi, 2015).

1.2.6 Core components of cardiac rehabilitation

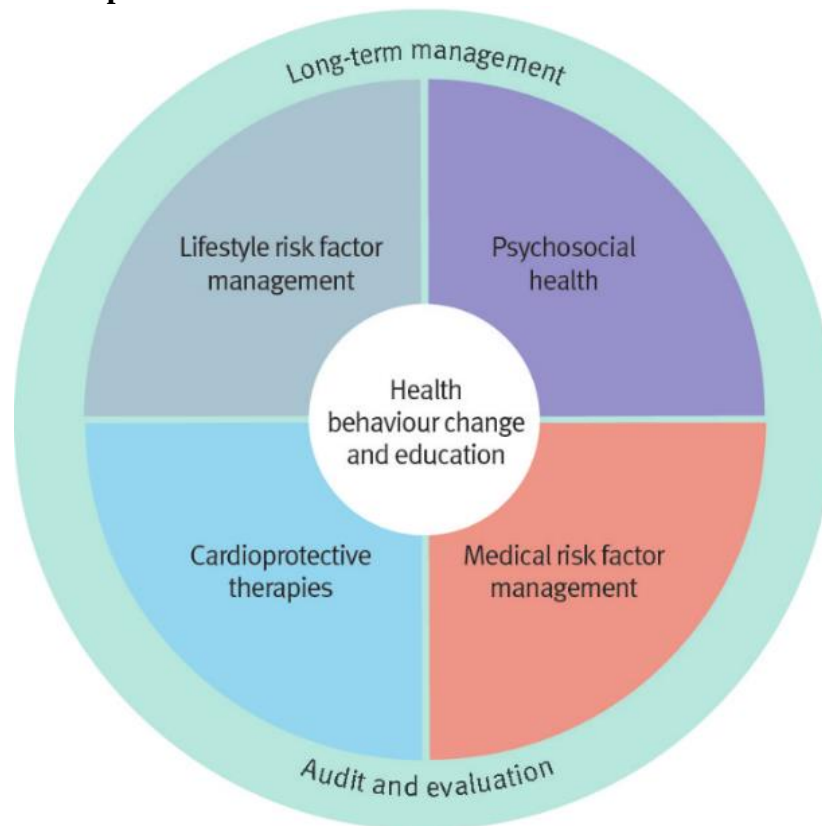
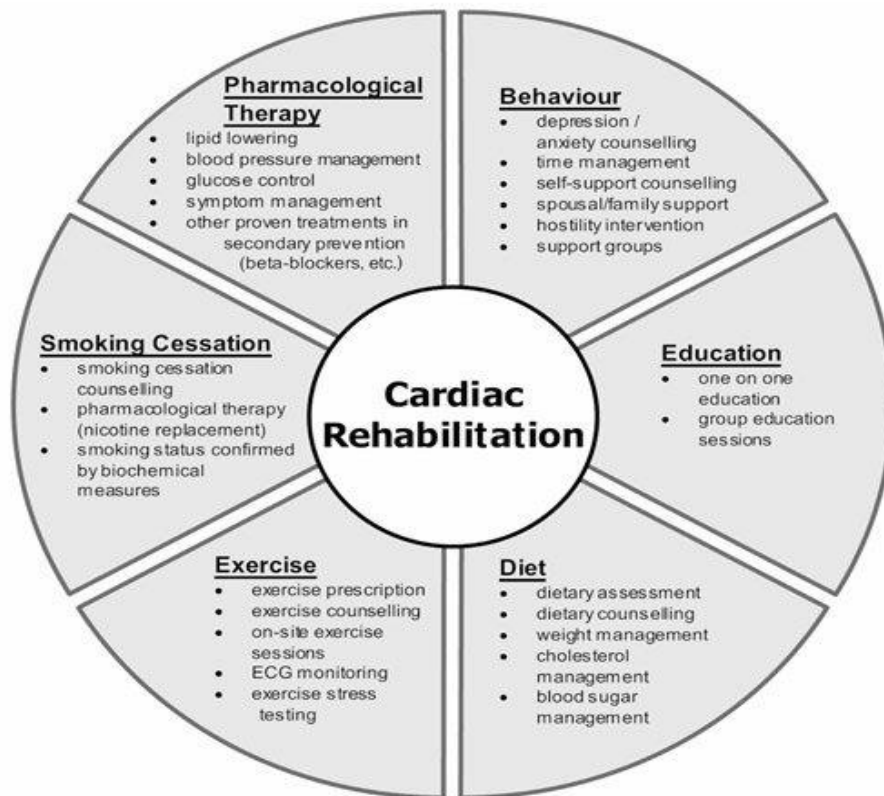


Figure 1.2: Core components of cardiac rehabilitation adapted from British Association for Cardiovascular Prevention and Rehabilitation (BACPR) Standard 2 Winnige, et al., (2021)



Current Controlled Trials in Cardiovascular Medicine

Figure 1.3: Core components of cardiac rehabilitation:

<https://images.app.goo.gl/3rZTe4xTLyLE4tmAA>

1.2.6.1 Patient assessment

The patient assessment should be conducted before the commencement of the cardiac rehabilitation. According to Grace, et al., (2016) the evaluation should be patient centered and goal oriented.

- Nurse/doctor to assess the medical history before recruitment to cardiac rehabilitation.
- Review current and prior cardiovascular medical and surgical diagnosis and procedures.
- Assess comorbidities: peripheral arterial disease, pulmonary disease, kidney, diabetes mellitus, depression and other pertinent diseases.
- Assess medication regimen: dose, frequency and compliance.
- Cardiovascular risk profile
- Educational barriers and preferences
- Physical examination: Assess cardiopulmonary systems (including pulse rate and regularity, blood pressure, auscultation of heart and lungs, palpation and inspection of lower extremities for edema and presence of arterial pulses);
- post-cardiovascular procedure wound sites;
- Orthopedic and neuromuscular status; and cognitive function.

1.2.6.2 Exercise training

- Exercise training can improve health and reduce a number of risk factors for chronic disease
- Exercise should begin during phase 2 depending on patients' ability and medical conditions.
- Improves exercise capacity and vitality, physical fitness, reduces disease-related factors, and improve patients' quality of life (Grace, et al., 2016; Price, et al., 2016; Sibilitz et al, 2016).
- Participation in an exercise-based cardiac rehabilitation program is recommended.
- According to American Heart Association (AHA) (2007) symptom-limited exercise testing before participation in exercise-based cardiac rehabilitation is recommended.
- Electrogram (ECG) exercise should be performed before exercise, and heart rate kept below the symptomatic threshold (Grace et al., 2016).
- If no exercise ECG is performed, recommended exercise training intensity should be light and moderate ranges (Grace, et al, 2016).
- Parameter: assessment of heart rate and rhythm, signs and symptoms, ST-segment changes, hemodynamics, perceived exertion, and exercise capacity.
- **Monitoring of exercise training:**
Monitor signs and symptoms such as: patient feeling ill or febrile before exercise, musculoskeletal pain, excessive fatigue, or any symptoms of exercise intolerance, failure of heart rate and blood pressure (BP) increase during exercise, symptomatic arrhythmia or ischemia.
- Develop individual exercise program prescriptions for aerobic and resistance training.

Two types of exercise training:

- Aerobic and resistance exercise training are two types of exercise recommended by all international guidelines and position statements for cardiac rehabilitation although the intensity, duration and frequency of the training sessions differs between different guidelines (Squires, et al., 2018; Price et al, 2016; Grace et al., 2016).
- Aerobic endurance exercise is the foundation of the exercise component of the cardiac rehabilitation programme.
- Aerobic exercise is any type of cardiovascular conditioning or “cardio.”
- During cardiovascular conditioning, patients, breathing and heart rate increase for a sustained period of time.

Types of aerobic exercise:

- Swimming, jogging, brisk walking, aerobic dancing, elliptical training, rowing, stair climbing, cross-country skiing, and rowing (Grace et al., 2016).
- F=3-5 days/wk; I = 50-80% of exercise capacity; D= 20-60 min; M= walking, treadmill, cycling, rowing, stair climbing, arm/leg ergometry (Squires, et al., 2018).

The benefit of aerobic exercises:

- Improves cardiovascular health, because it lowers and control blood pressure, reduces chronic pains, regulates weight, strengthen the immune system, and boosts the moods (Squires, et al., 2018).

(https://www.healthline.com/health/fitness-exercise/difference-between-aerobic-and-anaerobic#TOC_TITLE_HDR_1).



Figure 1.4: Examples of aerobic exercises.

<https://images.app.goo.gl/fPeLnFTY9LJ87byR7>

Resistance exercise:

Squires, et al., 2018; American Heart Association (2007) recommends the following:

- F=2-3 days/wk, I = 10-15 repetitions per set to moderate fatigue; D =1-3 sets of 8-10 different upper and lower body exercises; M=Calisthenics. Elastic bands, cuff/hand weights, dumbbells, free weights, wall pulleys, or weight machines.
- Warm-up, cool-down, and flexibility exercises in each exercise session.
- Provide progress updates to the exercise prescription and modify further if clinical status changes.

Take note: supervised exercise setting for high-risk patients is recommended (Grace, et al., 2016).

[Refer to hand outs on exercise training]



Figure 1.5: Types of resistance exercises

<https://images.app.goo.gl/Z52vTtPbqkz53DFe6>

Participants to Watch a Video on Resistance exercise:

<https://youtu.be/YUbvqEZIYfM>

1.2.6.3 Physical activity

Activities of cardiac rehabilitation as highlighted by Auchi, et al., (2020)

Physical activity:

- Low-impact activities that have a lower risk of injuries such as walking, cycling, rowing, jogging, and other activities.
 - Exercise at least three times a week.
 - Team to teach patients proper exercise techniques such as warming up and cooling down.
 - Resistance training exercise: 2 or 3 times a week to increase your muscular fitness.
- The term ‘**cardiovascular**’ refers to processes that relate to and promote greater heart rate, **Aerobic** refers to exercises that promote a greater oxygen intake.

Anaerobic exercise: This is when an exercise doesn't use oxygen (for instance, when performing short sprints).

American Heart Association (2007) recommends the following on physical activity:

- ✚ Assess current physical activity level and determine domestic, occupational and recreational needs.
- ✚ Evaluate activities relevant to age, gender, daily life e.g. driving, sexual activity, sports, gardening, and household chores.
- ✚ Assess for readiness to change behaviour, self-confidence, barriers to increased physical activity, and social support in making positive changes.
- ✚ Provide advice, support, and counselling about physical activity needs on initial evaluation and follow up.
- ✚ Caution patients to avoid vigorous physical activity.
- ✚ Advise low-impact aerobic activity to minimize risk of musculoskeletal injury.
- ✚ According to Grace, et., al., (2016) minimal equipment is needed such as sphygmomanometer with stethoscope, a watch to measure heart rate, charts and simple recording equipment.
- ✚ Personnel should have basic support/saving training.

1.2.6.4 Diet/nutritional counselling

A position paper prepared by the European Heart Association (2023); Grace et al., (2016) recommends the following diet:

- Healthy food choices such as low salt foods, fruits and vegetables, wholegrain cereals and bread, fish, lean meat, low dairy products, replacement of saturated fat with monosaturated and polysaturated fats from vegetable
- Avoidance of beverages and foods with added sugars. This diet may reduce low density lipoprotein (LDL) cholesterol levels, decreases the risks for cardiovascular disease and slows the progression of cardiovascular diseases.
- The whole grain is a source of fibre and other nutrients and are important in regulating blood pressure, weight control and lowers cholesterol levels.
- Eating too much salt can lead to high blood pressure as a risk of heart diseases.
- Low fat intake may reduce blood cholesterol level, and lowers the risk of development of cardiovascular disease.
- Salt intake: less than 5 g salt/2000mg sodium per day.
- The processed food should be avoided as it contains too much salt which can be a risk for development of high blood pressure and heart diseases. [Refer to the hand-outs for diet formula].

1.2.6.5 Smoking cessation

According to American Heart Association (2007) initial encounter:

- ✚ Ask the patient about smoking status and use of tobacco products.
- ✚ Document: as never smoked, former smoker, current smoker.
- ✚ Specify amount of smoking cigarette per day.

- ✚ Ask about exposure to secondhand smoking at home and at work.
- ✚ When readiness to change is not expressed, provide a brief motivational message: use 5 Rs; Relevance, Risks, Rewards, Roadblocks, and Repetition.
- ✚ When readiness to change is confirmed, continue with the 5As”: Ask, Advise, Assist, and Arrange [refer to the handouts for core components of cardiac rehabilitation].

1.2.6.6 Hypertension control

Grace et al., (2016) have highlighted the following on hypertension control:

- Patients with CHD and heart failure should be assessed for BP at initial CR sessions.
- BP readings should be performed regularly e.g. community settings, pharmacies, home.
- People with High BP ranging >140/90mmHg should be assessed in a quiet, comfortable environment.
- Advise on lifestyle behavior change for people with hypertension.
- Antihypertensive medications e.g. ACE inhibitors in heart failure
- Diuretics can be prescribed
- In people with CHD, hypotension and reducing diastolic pressure below 60mmHg should be avoided.

1.2.6.7 Psychosocial management

Identify any signs of depression, anxiety, anger, hostility, social isolation, marital/family distress, sexual dysfunction/adjustment, substance abuse using interview tool

- ✚ Identify use of psychotropic medications.
- ✚ Offer individual or small group education and counselling.
- ✚ Teach and support self-help strategies.
- ✚ Refer patients experiencing psychological distress for further evaluation and treatment.

1.2.6.8 Return to work

- ✚ Patient on CR programme should undergo assessment of occupational type, employment status and desired occupational status.
- ✚ Patients with demanding work should undergo risk evaluation before returning to work.
- ✚ Treadmill testing recommended,
- ✚ The 6 min walk test is alternative in case treadmill was not available.
- ✚ Low risk patients are those with no angina symptoms and with good functional capacity

- ✚ Patients to return to work 2 weeks after depending on interventions done (Grace et al., 2016).

1.2.6.9 Patient Education for self-management

Grace et al., (2016), have highlighted recommendations for the core component of cardiac rehabilitation in low-resource settings as follows:

- ✚ The education should be personalized and led by trained staff.
- ✚ Individuals, and family members or caregivers should be included in the discussions.
- ✚ Aim of education is to influence health beliefs.
- ✚ Education on physical activity, risk factor control, smoking cessation, drug treatment, dietary education on food
- ✚ Advice adapted to meet the needs of the patients, taking into consideration age, culture, and lifestyle.

1.2.7 Benefits of cardiac rehabilitation

Several studies have highlighted the benefits of cardiac rehabilitation

- Reduce morbidity, mortality, readmissions and improve patients' quality of life (Sibilitz, et al., 2016; Goel, et al., 2015).
- Improvements in strength, self-reported physical function and depression scores (Sibilitz, et al., 2016; Menzies & Ades, 2015).
- Cardiac rehabilitation improves exercise capacity and was associated with decreased morbidity and mortality, reduces hospital admissions and improves quality of life for patients (Pollmann, et al., (2017); Anderson, et al., 2016).
- Moderate to high levels of physical exercise and participation in cardiac rehabilitation among patients who underwent heart valve surgery were highly associated with survival rates (Sibilitz, et al., 2016).
- CR attendance was associated with more outpatient visits (Hansen, et al., (2015).

1.2.8 Barriers to cardiac rehabilitation

The following studies have highlighted the barriers to cardiac rehabilitation (Santos, et al., 2023; Martijn et al., 2023; Servio, et al., 2019; Dalal, et al, 2015;

- Poor referral rates, especially for certain groups of women, people with ethnic minority groups, people living in rural areas, and people with low socioeconomic status/class.
- Poor patient adherence. [leading to low enrolment and high dropout rates].
- Lack of endorsement by a doctor.
- Obesity
- Cigarette smoking.

- Depression
- Multiple morbidities, leading to poor functional capacity
- Poor exercise habits
- Problem with transport
- Poor social support
- Language problems and cultural beliefs.
- Lack of leave from work to attend center-based sessions.

1.2.8.1 Strategies to improve cardiac rehabilitation

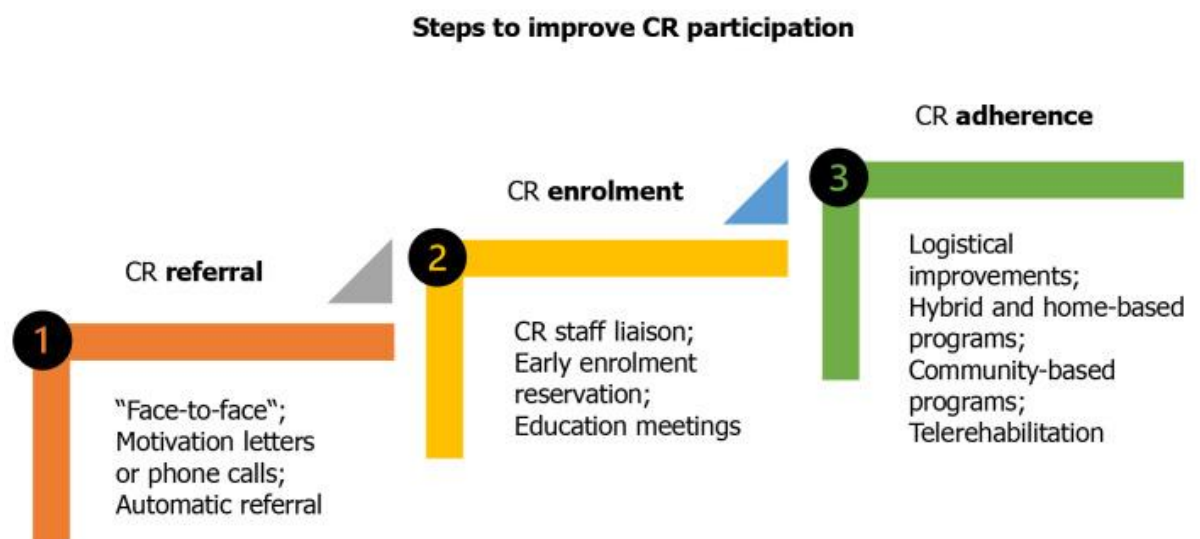


Figure 1.6 Steps to improve CR participation. Adapted from Winnige et al., (2021)

1.2.9 Lifestyle education

- Education of healthy lifestyle changes, such as eating a healthy diet, exercising regularly, maintaining a healthy weight, quitting smoking, and psychological, and behavioral changes.

Support:

- Patients may feel depressed or anxious, lose their social support system, and not want to work for several weeks.
- Address depression and anxiety even before symptoms manifest.
- Antidepressants may be prescribed.

1.2.10 The role of the nurse in cardiac rehabilitation

Vaughn et al, (2016) has identified four domains of rehabilitation nursing in acute care:

- Nurse-led interventions
- Promotion of health

- Successful living
- Interpersonal care

According to Fridlund (2002) nurses acts as container, coach, counselor, and educator focuses on information and physical mobilization.

Counsellor for patients and their families.

Nurses focus on education and supporting on lifestyle changes

Educating on the importance of follow-up visits in order to maintain a healthy lifestyle.

Aziz, et al., (2017) has highlighted some of the role of the nurse in cardiac rehabilitation:

- ✚ To provide health education to patients about OHS and recovery.
- ✚ Instruct patients to avoid certain activities such as lifting more than 5kilos, pushing and pulling heavy objects, and standing in one place for 15 minutes until medically cleared to do so.
- ✚ Avoid driving a car, can be a passenger in a vehicle.
- ✚ Climbing stairs and walking allowed unless doctors order restrict the patient
- ✚ Eating healthy diet
- ✚ Cutting foods high in salt, fat and sugar
- ✚ Not smoking
 - ✚ Controlling high blood pressure and high cholesterol



Figure 1.7: High blood pressure. Adapted from Warkus, (2016)

Group activities

Case scenario:

A 19-year-old, underwent mechanical valve replacement a year ago and came for a follow-up with a septic sternotomy wound. He informs you he stays far (about 25 kilometers) from a nearby clinic and hospital.

Explain how you would handle this situation?

Debating

Debate on the benefit of cardiac rehabilitation:

You are all working in the Cardiac Unit and you have to debate the benefit of cardiac rehabilitation of patients who had heart valve surgery.

What do you think about it? One group have to be in support and the other team against it. Participants will have 5 to 10 minutes of debating.

Case Scenario

A 20-year-old female patient underwent mechanical valve replacement surgery a year ago and came for follow-up and would want to start a family.
Summarise how you would address the patient's problem.

Topic 2: Challenges experienced by the nurses in the delivery of cardiac rehabilitation interventions

2.1 Overview

This section addresses the challenges experienced by the nurses regarding the delivery of CRP interventions for the patients who had heart valve surgery in order to provide quality nursing care to the patients. These challenges were identified during data collection and data analysis from the nurse participants. Therefore, the topic to be covered during this training includes: the language barriers, economic constraints, perceptions of sex education as a taboo, ignorance of health information by the patients, lack of knowledge and skills, inadequate resources, lack of involvement of caregivers, and nurses' opinions regarding cardiac rehabilitation.

2.2 Learning outcomes

On completion of this topic you should be able to:

- Understand the role of the nurses in the interpretation of patients.
- Discuss the strategies to overcome the language barrier in a health setting.
- Understand the economic constraints of the patients and caregivers.
- Discuss home-based cardiac rehabilitation
- Explore the ignorance of health information by patients.
- Lack of knowledge and skills.
- Inadequate resources to facilitate CR to patients.
- Interpersonal relationships.
- Explore the involvement of the caregivers.

2.2.1 Language barriers

Language is central to communication, it helps the speaker and listeners to understand each other's needs. The language barrier may hinder effective communication between patients and nurses at health care facilities.

2.2.1.1 Impact of language barriers on patients:

- Negatively affect patient safety
- Patient denied healthcare services.
- Reduces patient satisfaction and decreased the quality of healthcare delivery (Al Shamsi, et al., 2018).

2.2.1.2 Strategies to overcome the language barrier in a health setting

Squires, (2018) has highlighted strategies to overcome language barriers in healthcare setting:

- Get your professional staff members who speak other languages fluently certified for their skills and help them obtain medical interpreter training.
- Use care when other staff members provide interpretation.
- Document the use of medical interpreter services: type of interpretation. For example, on medication, admission, discharge, interpreter name, interpreter via telephone, computer, etc. documenting will protect the nurse. Showing that the nurse has made effort and to adhere to the organizational policy.
- Prioritize patient understanding of medication management: medication instructions should be in the patient's preferred language.
- Prioritizing hiring professional staff members who speak the language of your patients: if you have staff members who speak the patient language, then you have an excellent chance of improving patient outcomes and satisfaction.
- Al Shamsi, et al., (2020)'s suggested the implementation of online translation tools such as Google Translate and Medi Babble may improve the quality of healthcare and the level of satisfaction among both healthcare providers and patients

2.2.2 Economic constraints of the patients and caregivers

At the end of this session, the participants should be able to:

- Definition of socioeconomic status
- Barriers to CRP in low-income countries. **[Refer to Topic 1]**
- Factors associated with non-attendance of cardiac patients to cardiac rehabilitation.
- How to overcome socioeconomic barriers.

Definition of socioeconomic status

Socioeconomic status is the social standing or class of an individual or group (American Psychological Association, 2022).

Socioeconomic status is often measured as a combination of education, income, and occupation (Barker, 2014) and tends to be positively associated with better health.

Barriers to CRP in low-income countries

Other barriers (Refer to topic 1 on barriers to cardiac rehabilitation).

Factors associated with non-attendance of cardiac patients to cardiac rehabilitation

The following factors were identified during the situational analysis in Phase 1:

- Transport problems
- Unemployment due to ill health
- Reside in rural areas.
- Far distance to travel to Windhoek for follow-up visits.
- MoHSS social grants were not sufficient to sustain their livelihood.

Other barriers to cardiac rehabilitation as highlighted by Chindhy, et al., 2020)

- Schedule flexibility
- Travel distance
- Socioeconomic factor
- Time commitment
- Psychological factor
- Language barriers
- Poor physical health

How to overcome socioeconomic barriers for patients with repaired and replaced heart valve and their caregivers

- Home-based cardiac rehabilitation alone or in combination with Centre-based Cardiac Rehabilitation (CBCR) can assist patient participation, for example, through scheduling of flexibility time commitment, travel distance, cost arrangement, and consideration of patient preferences (Bakhshayek, et al., 2019; Shanmugasagaram, et al., 2013).
- MoHSS to increase the patient social grants.
- Gaalema, et al., (2019) suggested giving financial incentives for low socioeconomic status people to participate in CR.
- Provide transport to CR facilities
- Educating patients and healthcare providers on CR

2.2.3 Home-based care cardiac rehabilitation

Definition

Home-based Cardiac rehabilitation (HBCR) is a term used to describe a set of systematic, comprehensive, and individualized services that are primarily or exclusively provided outside of the typical Centre-based cardiac rehabilitation (CBCR) setting. These services include medical evaluation, prescribed exercise, cardiovascular risk factor modification, patient education, and behavioral activation/counseling.

Potential advantages and disadvantages of HBCR compared with CBCR as highlighted by a Scientific Statement From the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR), the American Heart Association (AHA), and the American College of Cardiology (ACC) (Thomas et al., 2019).

Advantages	Disadvantages
Reduced enrolment delay	Lack of reimbursement
Expanded capacity/access	Less intensive exercise training
Individually tailored programs	Less social support
Flexible, convenient scheduling	Less patient accountability
Minimal travel/transportation barriers	Lack of published standards for HBCR
Greater privacy while receiving CR services	Less face-to-face monitoring and communication
Integration with a regular home routine	Safety concerns for patients at higher risk

Strategies to promote Home-based cardiac rehabilitation Increased Referral to, Enrollment in, and Long-Term Participation in CR Programs as highlighted by Thomas et al., (2019)

- ✚ Integrate outpatient CR into the hospital discharge plan to get the support of hospital administration and referral doctors.
- ✚ At the time of hospital discharge, automatically send all eligible patients to outpatient CR.
- ✚ Before discharge, use hospital-based liaisons to educate and inform inpatients about CR.
- ✚ Design a short (5–10 min) advertisement highlighting the benefits of outpatient CR that can be viewed by all inpatients as they recover in the hospital.
- ✚ Inform patients the number of any nearby outpatient CR programs that they can get in contact with.
- ✚ Arrange appointments for CR enrollment utilizing the patient's preferred method of communication (phone call, text message, email, or normal mail).
- ✚ Offer low- to moderate-risk patients the option to choose of an HBCR program at the time of hospital discharge.

- ✚ Take into consideration financial incentives at the system, provider, and patient levels for referring patients to, enrolling in, and completing early outpatient exercise-based mental health rehabilitation sessions.
- ✚ Through a community of diversity liaisons, target certain patient categories that are less likely to enroll in and complete CR, such as women, older persons, racial/ethnic minorities, rural residents, and those with low incomes.
- ✚ Make medication dose and adherence in CR a priority for quality assurance.
- ✚ Provide regular assessments to monitor ongoing efforts to lower cardiovascular risk, including fitness and physical activity.

2.2.4 Perception of sex education as a taboo

Definition of concepts:

- **Sexuality**

According to the (WHO, 2006), sexuality is a central aspect of a human being throughout life and encompasses among others: sex, gender identities sexual roles, intimacy, and reproduction. Sexuality is experienced and expressed in thoughts, fantasies, desires, beliefs, attitudes, values, behaviors, practices, roles, and relationships WHO, 2006).

- **Sexual education** is essential to prevent complications and improve the quality of life and well-being of cardiac patients. Individual patients with cardiac disease have the right to information, and education as well as freedom of opinions and expression (WHO, 2006).
- **Sexual education:** According to National Guidelines Task Force (2004), sexual education is a lifetime process that involves developing attitudes, ideas, and values around vital issues like identity, relationships, and intimacy.
- **Sexual health:** The WHO (2006) defined sexual health as a state of physical, emotional, mental and social well-being in relation to sexuality, it is not merely the absence of disease, dysfunction or infirmity.”

According to the Sexuality Information and Education Council of the United States (SIECUS), every individual has the right to comprehensive sexuality education that addresses the sociocultural, biological, psychological, and spiritual aspects of sexuality by disseminating knowledge, examining attitudes and feelings, and fostering critical thinking and decision-making abilities (siecus.org/wp-content/uploads/2018/07/Guidelines-CSE.pdf).

Barriers for nurses in providing sexual education to patients after heart surgery.

Karani & McLuskey, (2020) identified the following barriers for nurses in providing sex education to patients:

- Institutional barriers such as lack of education, guidelines, material resources and the regard of sexual health counselling and education as a private matter

and the least priority, creates barrier for nurses to provide sexual education to cardiac patients. (Karani & McLuskey, 2020).

- Bdair & ConsTantino, (2017, P. 483) have highlighted other barriers to sexual health as depicted in Table 2.1:

Table 2.1: Barriers to sexual health

Main findings	Barriers
1. Nurses-related barriers	▪ Lack of enough time to address patients' sexual health. ▪ Lack of knowledge about sexual health. ▪ Lack of training about sexual health. ▪ Nursing shortage and heavy workload* ▪ Lack of educational materials about sexual health* ▪ Sexual health assessment is not nurses' responsibility (physician)* ▪ The patient is too ill and not ready for sexual health assessment* ▪ Nurses feel uncomfortable with sexual health assessment ▪ Presence of a third party with patient during hospital stay* ▪ Afraid to offend the patient or afraid from offend response ▪ Focus on physical illness rather than sexual health ▪ Sex is a private matter Patients do not ask about sexual health* ▪ Misunderstanding of nurses who ask about sexual health matters (Social interpretation)* ▪ Nurses own beliefs, values and attitudes about sexual health.
2. Patient related barriers	▪ Sexuality is not an issue for some patients (not interested). [current study] ▪ The patient is too ill and not ready to receive sexual health assessment* ▪ Presence of a third party with patient during hospital stay Patients do not ask about sexual health Old age of the patient ▪ Sexual health assessment is not nurses' responsibility (physician)* ▪ Gender difference (male-female) between nurses and patients ▪ Misunderstanding of patient who ask about sexual health matters (Social interpretation). [current study]
3. Organizational and academic related barriers	▪ Lack of privacy rooms for sexual health assessment ▪ Lack of educational materials about sexual health ▪ Lack of motivation from health care institutions (low priority) ▪ Lack of sexual health assessment section from nursing assessment sheet ▪ Lack of organizational policies about sexual health assessment. ▪ Nursing shortage and heavy workload. ▪ Lack of sexual health education in undergraduate studies.

4. Value related barrier	▪ Cultural or religious reasons ▪ Social restrains prevent talks about sexual topics ▪ Language or ethnicity reasons ▪ Sex is a private matter ▪ Age difference between nurse and patient (old patient and young nurse) ▪ Gender difference (male-female) between nurses and patients ▪ Social interpretation of sex (means pleasure and enjoyment) ▪ Nurses own beliefs, values and attitudes about sexual health. [current study].

NB: Items highlighted in red were identified during data collection

Strategies to improve sexual-related health information among healthcare providers

Bdair, and Constantino, (2017:483-485) have highlighted ten strategies for sexual health assessment for patients:

- Integrate sexual health assessment topics in the nursing curriculum during undergraduate studies.
- Conduct training sessions and workshops on sexual health assessment for nurses in clinical setting (sexual health competency: workshop, simulation, role play.
- Teach effective communication skills to nurses and build rapport and therapeutic relationship between nurse and patients to make nurses more able to translate their acquired sexual knowledge into practice.
- Use written educational material such as brochures and leaflets that are developed by experts about sexual health.
- Select appropriate time is an important factor for effective assessment and teaching of patients' sexual health.
- Invite partners during sexual health assessment and counselling. Resuming sexual activities.
- Break down external barriers, Media can play a vital role in discussing the sexual health and related concerns publicly.
- Nurses need to understand patients and partners' sexual health experiences and needs for sexual health information, nurses' knowledge, attitudes, beliefs, barriers and best teaching methods.
- Create an appropriate work environment through establishing specialized rooms in health institutions to help both nurses and patients to address sexual health-related issues in a more comfortable manner.

Other strategies for sexual activities:

- Fennell & Grant, (2019) suggested that the leaders in professional and community-based organizations should be at the forefront of making recommendations for nurses and practitioners, so they could improve their ability to provide sexual healthcare information to cardiac patients.
- Health care professionals should break the taboo around sexual health education and routinely address sexuality and sexual intimacy with cardiac patients in order to accommodate patients' needs (Traumer, et al., 2019).

Impact of patients not receiving sexual-related health information

- Patients tend to be confused while their spouses are concerned about the resumption of sexual intercourse after surgery.

Care scenario: Sexual activity:

A 25-year-old patient, a university student, underwent Mitral Valve Replacement; he is about to be discharged from the hospital. He is involved in a serious relationship and would like to receive more health information about sexual activities, such as, when he may start with sexual activity. Debate the information you would provide to the patient in order for him to have a healthy sexual life.

Group discussion

Group discussion:

In your groups, discuss why patients tend to ignore health information provided to them about recovery after being discharged from the hospital.

Debating

Debating on caregivers' involvement

Caregivers are individuals who assume the role of the nurse for a family member after discharge from the hospital.

Debate whether caregivers should be involved in the care of their family members after heart valve surgery.

- Each group consists of 4 members.
- Other members will act as observers and facilitators.

Debating

Debate on this scenario: Is it the role and responsibility of the nurse or the doctor to provide cardiac rehabilitation information to the patient after discharge from the hospital for recovery?

Each group should have 3 to 4 members to debate.

One group supports the nurses' role, and another group oppose it.

Group discussion

Language barriers are considered a challenge for patients at the Cardiac Unit and Cardiac Clinic. Discuss how you would overcome this barrier so that patients are fully informed about self-care upon discharge from the hospital.

2.2.5 Ignorance of health information by patients

Definition of ignorance and non-compliance

- **Ignorance** of health information by patients is when the patients do not follow instructions given to them by health care providers on self-care after discharge from the hospitals regarding medication compliance, side effects, wound care and diet, and lifestyle change
- **Non-compliance** Is when the patient does not take his/her medications as prescribed by doctors or follow the prescribed course of treatment. Non-compliance of medication may result in patients worsening cardiac disease and premature deaths.

Reasons for ignorance of health information [Refer to topic 2]

Factors Associated with non-compliance of medications in cardiac patients

Kumar, et al., (2021) highlighted factors associated with non-compliance of medications in cardiac patients:

- Scarcity of knowledge
- Negative attitudes
- Poor family support
- Financial constraints
- Forgetfulness
- Irregular clinic attendance
- Heavy alcohol use
- Alternative treatment vs pharmaceutical medication.
- Factors associated with lack of patient attendance to CRP (**Refer to topic 1**)

How to overcome ignorance of health information and non-compliance with medications

Kumar et al, 2021; De Vos, et al., 2013; Balady, 2007 recommended the following on how to overcome ignorance of health information and non-compliance of medications:

- Patients should be counseled about the importance of medication adherence to minimize re-hospitalization and mitigate potential complications as it would greatly help in increasing compliance with medication.
- Formulation of a multidisciplinary cardiac rehabilitation programme for both in- and outpatients to assess patients at risk for complications and functional decline,
- Raise patients' awareness about the benefits of CR,
- Address potential barriers to attending services of a cardiac rehabilitation program.

Group discussion

Patient ignorance of information:

In your groups, discuss why the patients tend to ignore the health information given to them for recovery after discharged from the hospital.

2.2.6 Lack of knowledge and skills

A lack of knowledge was identified among the nurses regarding cardiac medications.

- Anticoagulants- Warfarin
- INR normal ranges/levels
- Role of the nurses in INR and Warfarin training
- **Cardio-protective therapies**
 - Beta-blockers
 - Antiplatelets
 - Angiotensin-converting enzyme inhibitors (ACEIs)
 - Calcium channel blockers
 - Digitalis
 - Diuretics
 - Statins

2.2.6.1 INR Normal ranges/levels

According to Zhu, et al., (2019), warfarin is an oral anticoagulant available for patients with mechanical heart valves. The prothrombin time (PT) and the associated international normalized ratio (INR) are routinely tested to monitor the response of anticoagulation therapy in patients. Therefore, patients who underwent mechanical heart valve replacement need lifelong anticoagulants and their INR is regularly monitored to adjust the strength and the dose of the anticoagulation drugs. The appropriate warfarin management can reduce patients' potential complications such as bleeding, thrombosis and improve the patient long-term survival rate.

Therefore, it is the responsibilities of the nurses to be familiar with the levels of INR and about to give proper information to the patients for recovery prove.

Anticoagulation treatment strategies as highlighted by Zhu, et al., (2019)

- The INR will be measured every 3-5 days for 1 month after discharge. (After the patient's examination results stabilize),
- INR will be measured every 10-14 days from 1 to 3 months after discharge.
- Once a month from 3 to 6 months after discharge and once every 2 months.
- Once every 2 months from 6 to 12 months after discharge.

The target INR window is That is being practiced at the cardiac clinic, in Namibia:

- For aortic valve replacement: 2.0-3.0
- Mitral valve replacement: 2.5-3.5
- Double valve replacement: 2.5-3.5

2.2.6.2 The role of the nurse in INR and warfarin training

- Anticoagulation drugs can be life-saving.
- Nurses assess, closely monitor and educate the patients on anticoagulation drugs to ensure the full benefit of anticoagulation therapy and minimize potential harm.
- Medication adherence.
- INR target.
- Importance of laboratory monitoring.
- Ensure that the patient communicates with the nurse about the medication regime.
- Careful with food that contains Vitamin K.
- Not necessarily to avoid food that contains vit K but is consistent with the consumption.

2.2.6.3 Nurses role in Cardioprotective therapies

Cardio-protective therapies

Medications of cardiac patients after heart surgery

1. Beta Blockers

Beta-Blockers

According to Urden, et al., (2018) and De Sutter, et al., (2015;) beta-blockers can be used in a variety of cardiovascular problems and are very effective for the symptomatic treatment of patients with effort angina or arrhythmias. Most evidence for the reduction of cardiovascular events by beta-blockers is available for patients after acute coronary syndrome (ACS), especially in the presence of left ventricular (LV) dysfunction and patients with heart failure and reduced ejection fraction. Commonly prescribed medications according to American Heart Association.

- Amlodipine (Norvasc)
- Diltiazem (Cardizem, Tiazac)
- Felodipine (pledndil)
- Nifedipine (Adalat, Procardia)
- Nisoldipine (sular)
- Nimodipine (Nimotop)
- Verapamil (Cala, Verelan)

<https://www.heart.org/en/health-topics/heart-attack/treatment-of-a-heart-attack/cardiac-medications>

Indication for Beta-blockers:

- Lower blood pressure
- Used for cardiac arrhythmias (abnormal heart rhythms)
- Used to treat chest pains (angina)
- Used to help prevent future heart attacks in patients who have had a heart attack.

Contra-indication of beta-blockers

- Asthma and high-degree atrial-ventricular (AV) block (if no pacemaker).
- The treatment should be administered in low dose and go slow in the elderly, in COPD, and in patients with heart failure.

The side effects include:

- Hypotension (bradycardia);
- Bronchospasm (cold extremities);
- Central effects (fatigue, headache, sleep disturbances, dizziness, vivid dreams, etc.),
- Increased insulin resistance.

2. Antiplatelets

Antiplatelet plays a role in secondary prevention of thrombotic cardiovascular complications (Urden, et al., 2018).

Commonly prescribed medications include:

- Aspirin
- Clopidogrel (Plavix)
- Dipyridamole (Persantine)
- Prasugrel (effient)
- Ticagrelor (Brilinta)

The indications for antiplatelet include:

- ✚ Acute coronary syndrome,
- ✚ post-percutaneous coronary intervention (PCI) with stenting,
- ✚ mechanical heart valves in combination with warfarin,
- ✚ acute ischemic stroke,
- ✚ stable angina,
- ✚ post-coronary artery bypass grafting surgery,
- ✚ primary prevention of coronary artery disease, acute rheumatic disease,

- ✚ post patent ductus arteriosus (PDA) device closure for the first six months, and
- ✚ primary prevention of venous thromboembolism.

Side effects:

- ✚ **bleeding from stomach**

3. Angiotensin-converting enzyme inhibitors (ACEIs)

According to Urden, et al., (2018), ACEIs produce vasodilation by blocking the conversion of angiotensin 1 to angiotensin 11.

Indication:

- High blood pressure
- Coronary artery disease
- Heart failure
- Heart attack

Side effects

- ✚ Dry cough
- ✚ Dizziness
- ✚ Headache
- ✚ Hypotension
- ✚ Loss of taste
- ✚ Rare but serious side effects are swelling of the lips, tongue and throat.

4. Calcium channel blockers

Calcium channel blockers are commonly most frequently prescribed drugs for the treatment of cardiovascular disease (McKeever & Hamilton, 2018; Urden, et al., 2018).

McKeever, and Hamilton, (2022) and Urden, et al., (2018) have highlighted two types of calcium channel antagonists based on their primary physiologic effects:

- Non-dihydropyridines have inhibitory effects on the sinoatrial (SA), and atrioventricular (AV) nodes are resulting in a slowing of cardiac conduction and contractility.
 - Treatment of hypertension,
 - Reduces oxygen demand, and
 - Helps to control the rate in tachydysrhythmias.
- Dihydropyridines, in therapeutic dosing, have a little direct effect on the myocardium, and instead, are more often peripheral vasodilators, which is why they are useful for hypertension, post-intracranial hemorrhage associated vasospasm, and migraines.

Indications

Cardiovascular indications include hypertension, coronary spasm, angina pectoris, supraventricular dysrhythmias, hypertrophic cardiomyopathy, and pulmonary hypertension. In addition to these, they are also prescribed for Raynaud phenomenon, subarachnoid hemorrhage, and migraine headaches.

Side effects

- Non-dihydropyridines: may cause constipation, worsening cardiac output, and bradycardia.
- Dihydropyridines: may lead to light-headedness, flushing, headaches, and peripheral oedema. The peripheral oedema is likely related to the redistribution of fluid from the intravascular space to the interstitial.

Contraindication

- Non-dihydropyridines are contraindicated in those with heart failure with reduced ejection fraction, second or third-degree AV blockade, and sick sinus syndrome because of the possibility of causing bradycardia and worsening cardiac output.
- Calcium channel antagonists are also contraindicated in patients with known hypersensitivity to the drug or its components. Other contraindications include sick sinus syndrome (except in patients with an artificial pacemaker), severe hypotension, acute myocardial infarction, and pulmonary congestion (Moke, et al., 2023).

5. Digitalis

Commonly used medication:

- **Digoxin**

Indications:

- Increases the force of the heart contractions.
- Heart failure and irregular heartbeats

Side effects: according to Medline plus (2023)

<https://medlineplus.gov/druginfo/meds/a682301.html>

- Dizziness or lightheadedness
- Drowsiness
- vision changes z9blurred or yellow
- Rash
- Irregular heartbeat

Other serious side effects:

- Upset stomach
- Vomiting
- Diarrhea

- Loss of appetite
- Welling of the feet or hands
- Unusual weight gain
- Difficulty in breathing

6. Diuretics

Commonly prescribed medications used:

- Acetazolamide (Diamox)
- Amiloride (Midamor)
- Bumetanide (Bumex)
- Chlorothiazide (Diuril)
- Chlorthalidone (Hygroton)
- Furosemide (lasix)
- Hydro-chlorothiazide (Esidrix, Hydrodiuril)
- Indapamide (Lozol)
- Metalozone (Zaroxolyn)
- Spironolactone (Aldoctone)
- Torsemide (Demadex)

Therapeutic effects

- Causes the body to rid itself of excess fluids and sodium through urination.
- Reduces heart workload.
- Decreases the buildup fluids in the lungs and other parts of the body.

Indications

- Lower blood pressure
- Help reduce swelling from excess buildup of fluid in the body.

Side effects of diuretics

Common side effects	Serious side effects
▪ Low sodium level ▪ Low/high potassium in the blood ▪ Headache ▪ Dizziness ▪ Thirst ▪ Increased blood sugar ▪ Muscle cramps ▪ Increased cholesterol ▪ Skin rash ▪ Gout	In rare cases, may cause serious side effects: ▪ Allergic reaction ▪ Kidney failure ▪ Irregular heartbeat

7. Statins

Statin medications are used in the management and treatment of hypercholesteremia.

Sizar, et al., (2023) highlighted the types, indications, and adverse effects of statins medications.

FDA-approved statins include:

- Atorvastatin,
- Rosuvastatin,
- Simvastatin,
- Pravastatin,
- Lluvastatin,
- Lovastatin,
- Pitavastatin

The FDA-approved indications for statins are:

- Hyperlipidemia and mixed dyslipidemia
- Primary dysbetalipoproteinemia (Type III hyperlipoproteinemia)
- Hypertriglyceridemia
- Atherosclerosis
- Primary prevention of ASCVD (atherosclerotic cardiovascular disease)
- Secondary prevention in patients with clinical ASCVD
- Pediatric patients with familial hypercholesterolemia
- Adult patients with homozygous familial hypercholesterolemia

Adverse effects:

- Myopathy- unexplained muscle tenderness or weakness.
- Rhabdomyolysis- serious complications of statin use, but rare.
- Hepatotoxicity.
- Increased risk of developing diabetes mellitus.

Role play

Role-play scenario:

You are a registered nurse working at the cardiac clinic. A 20-year-old male patient who underwent mechanical valve replacement. Three months ago, has come for a follow-up visits. He informs you that he has not taken anticoagulant- warfarin medication for the past three weeks because it ran out of stock and he no transport money to travel to the hospital for the prescription. The patient is accompanied by his grandmother.

You are required to role-play this scenario.

Three role players needed to take on the roles of:

- 1 registered nurse
- 1 patient
- Caregiver

2.2.7 Inadequate resources to facilitate CR to patients

The (Ambrosetti, et al., 2021; Abreu, et al., 2018; Dalal, et al, 2015; Piepoli et al, 2014; WHO, 1993) have highlighted multidisciplinary teams for the delivery of the core components of cardiac rehabilitation:

- Cardiologists,
- Physician cardiologists,
- Nurse specialists,
- Physiotherapists,
- Dieticians,
- Psychologists,
- Exercise specialists,
- Occupational therapists,
- Clerical administrators

Roles and responsibilities of the multidisciplinary team

King, et al., (2013) highlighted the functions of the multidisciplinary team in the delivery of cardiac rehabilitation services, as follows:

Cardiologists/physicians:

- facilitate patient intakes,
- perform medical assessments,
- evaluate medical status for the patient and plan the treatment regimen for the individual patient.
- Reinforce the importance and benefits of the outpatient cardiac rehabilitation as that of to promote recovery and referral of all eligible patients and therefore they strongly encourage patients' participation in cardiac rehabilitation programme.

Nurses:

- Involved in discharge planning,
- Facilitate the referrals to outpatients,
- Discuss cardiac rehabilitation and its activities, and benefits to eligible patients and their caretakers.
- Nurses play an important role in educating patients about outpatient cardiac rehabilitation after cardiac surgery.

Dieticians:



Figure 2.1: Illustrates type of health fruits and vegetables

<https://images.app.goo.gl/t5EdKfbeQ4yQznoc9>

- Provide information on cardiac diet
- Plan nutritional therapy for cardiac patients.

Class activity

Any other functions that a dietician perform for patients after heart surgery?

Psychologists and social workers:

- Provides counselling for acceptance of the condition as well as to address psychological and socio-economic challenges that a patient may experience (National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2004)

Clerical Administrator: provide administrative functions for record maintenance (WHO, 1993).

Strategies to improve limited resources- multidisciplinary, drug shortages.

The following recommendations were highlighted by Reed, (2016) how to address drug shortages:

- Educating key stakeholders on the underlying causes and consequences of drug shortages and efforts to prevent and mitigate them by raising awareness of the issues at the organizational level.
- Advocating laws and regulation changes in order to address the underlying causes of drug shortages.

According to Shukar, et al. (2021), the WHO has established global mitigation strategies from four levels to overcome drug shortages globally:

- ❖ Workaround to tackle the current shortage,
- ❖ Operational improvements to reduce the risk of drug shortages and achieve early warning,
- ❖ Changes in governmental policies,
- ❖ Education and training of all healthcare professionals about managing shortages.

2.2.8 Interpersonal relationships

Interpersonal relationships: is when two or more individuals communicate with one another and agree on common expectations for behavior, interpersonal connections are established (Jooster, 2018).

Every individual in the relationship possesses unique rights, customs, principles, and values.

Interpersonal relationship are concerned with understanding the self and others, relating to people, adapting and coping with the environment.

Jooste, (2018) highlighted the interpersonal factors that influence interpersonal relationships

- Self-regard: the ability to be aware of, understand, accept and respect.
- Emotional self-awareness: the ability recognize and understand one's feelings.
- Assertiveness: to express feeling, beliefs and thoughts and defend one's rights in a non-destructive manner.
- Self-actualization: the ability to realize one's potential capabilities and to strive to do what one wants to do and enjoys doing.
- Independence: the ability to be self-directed in one's thinking, decisions and actions and to be free of emotional dependence.
- Empathy: the ability to be aware of, understand and appreciate the feelings of others.

Characteristics of positive interpersonal relationships according to Jooste, (2018):

-  Loyalty
-  Positive attitude
-  Supportive attitude
-  Understanding
-  Mutual trust
-  Caring
-  Open communication
-  Listening skills

2.2.9 Involvement of the Caregivers

- Definition of caregivers and caregiving.
- The role and responsibilities of the caregivers.
- Challenges experienced by the caregivers.
- Strategies to involve caregivers in the care of a relative.

Definition of caregivers and caregiving

Caregivers: Informal caregivers are individuals who have close contact with others who suffer from a chronic or incapacitating ailment, such as heart failure, and offer them unpaid support- with daily activities of daily living (Grant & Graven, 2018).

Informal caregivers are frequently family members, close friends, partners or neighbors. The people could or might not reside with the person receiving care (Grant, and Graven, 2018).

Cesta (2017) defines a caregiver as someone who is not paid for the services they perform, they care for the ill or frail family members or friends. The caregivers can be a spouse, adult child, other relative, in-laws, neighbors or friends with different relationships.

Caregiving: is the process of helping another person who is unable to do for themselves in a holistic (physically, mentally, economically, and socially) manner (Hermanns & Mastel-Smith, 2012; Family Caregiver Alliance®, 2014)

2.2.9.1 The roles and responsibilities of the Caregivers

Different studies Lahoz, et al., 2021; Grant, and Graven, 2018; Sullivan, et.al., 2016; Chung, et al., 2016; Schulz, & Eden, 2016; Burke, et.al, 2014; Park, et al., 2013 have highlighted multifaceted roles that caregivers are undertaken in providing assistance to their family members as follows:

- Provision of emotional, social and encouragement, and spiritual support,
- Providing transportation to work/hospital/follow-ups,
- Reminding the patients to take their medications,
- Monitoring and managing signs and symptoms,
- Helping the patient with physical exercises,
- Helping with running errands and additional household tasks.
- Assistance with household tasks,
- Preparing diet plans
- Monitoring fluid intakes
- Caregivers assuming multifaceted roles that require assistance from family, friends, and health providers.
- Self-care tasks, provision and advocacy, and care coordination.
- Caregivers play a role in providing direct nursing, supportive care, facilitating communication and identifying the needs and helping the patients to make decisions (Khoshkesht, et al., 2021).

Class Activity

Group discussion

Discuss other activities that caregivers and performing that are not on the list provided.

2.2.9.2 Challenges experienced by the caregivers

The following studies highlighted the challenges that caregivers are experienced in providing care and support to their family members (Khoshkesht, et al., 2021; Ae-Ngibise, et al., 2015; Grant et al, 2017):

- Caregivers reported financial and social exclusion,
- Emotional burden,
- Depression, and
- Inadequate time for social responsibilities.
- Overwhelmed workload with inadequate time.
- Identifying appropriate low-salt good in the grocery store.
- Uncertainty in managing and interpreting these symptoms.
- Inadequate support from other relatives.

Debate

Debating on caregivers' involvement

Caregivers are individual who assume the role of the nurse for a family member after discharge from the hospital.

Debate whether caregivers should be involved in the care of their family members after heart valve surgery.

- Each group consists of 4 members.
- Other members will act as observers and facilitators.

Debate on this scenario:

Is it the role and responsibility of the nurse to give cardiac rehabilitation information to the patient after discharge from the hospital for recovery or of a doctor?

- 3 to 4 members in each group to debate.
- One group supports the nurse and another group not in support the responsibility.

2.2.9.3 Strategies to involve caregivers in the care of a relative

The following strategies to involve the caregivers in the of a relative after heart valve surgery were highlighted by different authors (Dalirirad, et al., 2021; Grant et al, 2019; Ae-Ngibise, et al., 2015; Amakali, & Small, 2014; Sautter, et., al, 2014; Buck, et al, 2013; Metzger et al., 2013; Ross, & Austin, 2013; Sandy, et al., 2013).

- The development and implementation of a rehabilitation programme with interventions for home-based health care in support of caregivers to facilitate the caregivers coping with the demands of home care.

- Healthcare professionals can provide caregivers with practical support in addressing feelings of hopelessness, fear, and distress from role challenges and role conflicts.
- Emotional support in addressing social isolation and feeling of exclusion by health care professionals.
- Interventions for the caregivers to take care of themselves is important.
- A rehabilitation programme should be of multidisciplinary healthcare teams and focus on assessing the demand to care for the caregiver and
- To refer burdened caregivers to appropriate resources for emotional and spiritual support through counselling, social, physical, financial support and information from health care professionals to supportive resources.
- Caregivers should be equipped with the necessary guidance, resources, and training in order to fulfill their caregiving roles given the challenges and unmet needs they are experiencing (Mabetha, et al., 2021).
- Wangler, and Jansky, (2021) emphasizes that healthcare professionals should adopt a pre-emptive strategy on how to approach family members on potential issues and inform them about the existing assistance and support services.
- A need to train staff in order to identify and support caregivers, and also to raise awareness of caregiver needs on long term care (Wangler, & Jansky, 2021).
- Regular training and support to caregivers in order to improve their understanding of learning disability.

Topic 3: The challenges experienced by the patients in recovery and coping after heart valve surgery

3.1 Introduction

Patients who have undergone mechanical valve replacement have challenges with recovery and coping after heart valve surgery. Patients are affected by factors such as the clicking sound of the mechanical valve, patients' mental state, patients' knowledge of post-surgical treatment anticoagulation-related bleeding events, and mechanical valve-related complications (Hong, Huang, Huang, et al, 2019). Patients after surgery will also need support from the nurses and caregivers on medications, diet, physical activity, and exercises, emotional, psychological support.

3.2 Learning outcomes

On completion of this session, you should be able to:

- Discuss the patient's mixed feelings about the outcomes of the operation:
 - Delays and cancellations of the operation
 - Factors associated with cancellation of surgery
 - How to overcome cancellation of surgery.

- Pre and postoperative education on the following aspects:
 - Fear and worries about the outcome of the operation.
 - Disappointment after surgery
 - Embarrassment over the scar-sternotomy wound
 - Disturbances about the sound of the valve
- How to alleviate fear and uncertainty of patients
- Explain loss of social role
- Debate on the knowledge of self-care -educational support:
 - Medication regimen
 - Diet for patients with replaced and repaired heart valves.
 - Self-care
 - Physical activities/exercises
 - Sexual health activities
- Debate on the procedure that impacted negatively on daily activities.
 - Define post-operative pain syndrome
 - Explain pain medication for post-operative pain syndrome.
- Explain the support and care from the nurses
 - Lifestyle changes- alcohol and smoking
- Describe the overprotective of a family member after heart valve surgery.

Content description

3.2.1 Mixed feelings about the outcome of the operation

▪ Cancellation

According to Talalwah, and McIltrout, (2019) cancellation happens when the planned surgery did not take place as proposed. The study further stated that the cancellation of scheduled surgeries has a significant impact on patients' health, resources, cost and quality of life (Talalwah, & McIltrout, 2019).

Cancellation of surgery can be avoidable or unavoidable causes.

According to Sukwana, et al., (2023), avoidable is defined as cancellations or delays that occurred because of situations that existed before the day of surgery and could have been avoided with careful review and communication between patients and staff.

Unavoidable is defined as delays or cancellations that could not have been avoided even with adequate review or communication between patient and staff (Sukwana, et al., 2023).

Factors associated with delays and cancellation of surgery

Different studies have highlighted the factors associated with delays and cancellations of surgery as depicted in the table: Scheenstra, et al., 2022; Koushan, et al., 2021; Okeke, et al., 2020); Kaddoum, et al., 2016; Sultanet al., 2012).

Table 3.1: Factors associated with delays and cancellation of heart surgery

Factors	Description
Patients-related issues or occupation of the operating room for a more urgent operation.	 Changes in patients' medical conditions and incidence of infection,  refused surgery,  not being prepared for surgery,  patients not showing up for surgery
Surgeon-related issues	 Patients requiring further evaluation.  Unanticipated long preceding case.
Administrative and hospital-related issues	 Incomplete medication evaluation equipment not available,  Unavailability of necessary facilities such as a bed in the ICU, blood products  Lack of theatre space  Electricity in the laboratory and wrong booking of patients.  Lack of drapes, gowns, and boots.  Unavailability of oxygen and water.

How to overcome cancellation of surgery

To overcome avoidable cancellation, Desta, et al., (2018; Lankoande, et al., (2016) studies recommend the following:

- Cancellation can be prevented by early detection of medical problems or treatment.
- Proper preoperative and comprehensive assessment of patients prior to booking.
- Making patients more aware of the planned surgical procedure.
- Proper scheduling.
- Fulfilling necessary operating room equipment and cross-matched blood by the hospital and other stakeholders.
- Early clear communication with the operating room team for example surgeons to be available on their schedule.
- Making sure that all surgical patients have been examined and their cases discussed with the surgeon.
- Providing adequate information for the scheduled patient.
- Improving operating theatre efficiency.

3.2.2 Pre and postoperative care

Fear and worries about the outcome of an operation

Fear can have a negative impact on the patient's recovery and healing process. According to Island Health, (2020), surgery can affect patients physically and emotionally. Fear, sadness, anxiety, anger, mood swings, depression, or frustration can happen before or during, or after surgery, and is regarded as normal. Feelings can last a few days or a few weeks. They go away when patients feel more confident and secure in their daily lives.

Recovery is better when feelings are identified and corrected early. The patient can help her/himself by:

- Talking about their feelings with the caregivers or family.
- Talking with the cardiac social worker or spiritual care worker.
- Eating well, exercising within their limits and getting enough rest.
- Inform the nurse if the patient and the caregivers would like to talk to someone about the patients' concerns.
- Talking to someone who had similar heart surgery.
- Patient to see the primary care doctor if a patient has "blues" or has disturbed feelings for more than two weeks.

Ramesh, (2017) have highlighted preoperative psychological interventions in order to alleviate fears, anxiety or worries in patients before and after surgery:

- To provide patients with preoperative information or education with relevant information through discussion, booklets, video, or audiotape about the operation and postoperative time frame.
- To assist patients to gain a better understanding of the operation procedure in order to minimize their worries, anxiety, and uncertainty.
- Content of training should involve information about expected experiences e.g anxiety, pain or outcomes in individualised or group sessions.

Moreover, (Chen, et al., 2020) highlighted the following information that the nurses should do to the patients before surgery in order to alleviate anxiety and worries about surgery:

- Explain the duration of the surgery
- Postoperative pain management
- Postoperative environment in ICU
- Knowledge about endotracheal intubation.
- Potential postoperative complications e.g bleeding, pain
- Postoperative long-term pain management.
- Lung care, and nutritional needs.
- Anticoagulants and rehabilitation.

Salzmann, et al., 2020) have highlighted elements of interventions for psychological preparation before cardiac surgery as depicted in Table 3.

Table 3.2: Psychological support and preparation before surgery

Elements	Aim/examples
Assess what the patient already knows.	To ensure that doctors modify the necessary information for each patient.
- Providing the patient with procedural information, e.g. what will happen, - Sensory information, e.g. what will it feel like, behavioral instruction, e.g. what the patient should do.	Providing information on the ICU stay and first steps after surgery can help to reduce the patient's worry and uncertainty.
Psychosocial support Encouraging the patient to use available resources.	For example, spouse, family, or friends and preferred coping strategies.
Asking the patient about his or her thoughts and feelings regarding the procedure, any problems or anxieties he may have, or any topics he may like to discuss.	To improve the patient's mental state and determine the patient's chosen coping mechanism, e.g. information seeking vs. avoidance.
Listening, validating, and normalizing patient's feelings and thoughts	Should demonstrate and express that the patient's thoughts and feelings are appropriate and a reasonable response given the circumstances.
Helping the patient to express (negative) emotions or feelings.	Fostering emotional expression to reduce patient's emotional burden.
Respect the patients if they do not want to talk about a specific topic.	Respect the patient's autonomy and individual coping style.
Creating an "action plan" of when, how, and what activities the patient will be able to return to.	To help the patient to concretely plan when s/he will be able to return to important activities (s/he might not be able to perform shortly before surgery due to the cardiac disease)
Increasing personal control expectations and coping strategies.	- Identifying coping mechanisms with the patient for the effects of the procedure to minimize the patient's anxiety in the intensive care unit; - demonstrating that the patient can influence his future health by thinking about health behaviors and, - talking about (changeable) risk factors like smoking, diet, and exercise to avoid having another surgery in the future.

Imagination exercise using a positive image for the time after surgery.	To help the patient relax, experience positive emotions when thinking about his individualized positive, but realistic, future.

Shahmoradi, et al., 2022; Sedaghat,et al., 2019; Heran, et al., 2011, recommends the use of educational approaches by the health care professionals to the patient's preoperative and postoperatively that can have an effect on increasing the level of knowledge in patients, and hence reduces stress and improving the quality of life for the patients.

Group discussion

A young man 20 years old complained of not participating in sports since he underwent mechanical valve replacement.

Discuss the advice you would provide to him for better understanding.

Role play:

A young man underwent heart valve surgery two days ago and is worried and fearful about the outcome of the operation after discharge from the hospital.

You are required to role-play the scenario.

Three role-players are needed to play the roles of:

- 2 nurses
- 1 patient

3.2.2.1 Disappointment after surgery

Embarrassment over the scar:

The change in appearance and body image can negatively affect the body image and self-confidence in a person. According to Ciuffo, (2018), scars following open heart surgery serve as an unpleasant reminder of the drawn-out healing process that accompanied the trauma of the procedure. The scar from a sternotomy is typically large and may be uncomfortable for some time following the procedure. By its very nature, surgery causes invasive bodily harm. The body's attempts to repair the damage result in scars.

Both Ngaage and Agius, 2018) and Berg, et al., (2013) highlight the impact of the scar on patients:

- Patients with scars live with the trauma
- Feeling of being devalued by society
- Loss of self-confidence
- More prone to shame, depression, anxiety and aggression

Strategies to overcome scar embarrassment on patients

Parikh, et al., (2021) urges surgeon when possible, to perform shorter skin incisions in order to reduce the patient levels of depression and anxiety symptoms, promote a better perception of body image and therefore improve the quality of life.

Commander, et al., (2016) highlighted preoperative considerations:

- Patient education and management of any underlying comorbidities- that impedes wound healing.
- Evaluate the patient's nutritional status.
- Check for any systematic diseases such as diabetes mellitus which can decrease the inflammatory response to injury.
- Check for medications such as corticosteroids that can increase or decrease the body's ability to heal and increase the risk of infection.
- Drugs and toxins can negatively impact healing.
- Cigarette smoke contains multiple toxins such as nicotine, carbon monoxide, and hydrogen cyanide can negatively affect wound healing.
- Counseling patients on smoking cessation 1 month before surgery and 1 month postoperatively can lead to more favorable results.

Postoperative interventions for wound healing as recommended by Commander, et al., (2016):

- Prevention and control of infection remain the key
- Petroleum jelly ointment such as Vaseline can be applied three times daily – 1-3 weeks duration
- Petroleum jelly ointment reduces scar erythema.
- Educate the patients on sun protection as they begin returning to normal activity.
- Minimizing sun exposure to the scar by covering with clothing or dressing is recommended.
- Scar massage leads to a more supple and soft scar through the degradation of excessive and non-pliable collagen.
- Recommend scar massage 2 to 3 weeks postoperatively, performing twice daily, and a total duration of at least 6 weeks.
- Silicone gel sheeting is a moisture-protective dressing, they soften and reduce scars quicker than pressure dressings.
- Silicone sheets are used also in the treatment of hypertrophic scars.

Case scenario

A 30-year-old female works at the City of Windhoek and deals with customers every day about water bills. She underwent mitral valve replacement a year ago, and has a sternotomy wound on her chest. She is shy to expose her chest, feels so uncomfortable in front of the customers.

Discuss how you would handle the situation?

3.2.2.2 Disturbances of the sound of artificial valve:

Even though, mechanical valve replacement has been proven to be a safe and effective procedure for heart valve disease.

According to Hong, et al., 2019) for patients who underwent mechanical valve replacement, the quality of life may be affected by the following factors:

- ✚ Mechanical valve noise
- ✚ Patients' mental state
- ✚ Patients' knowledge of anticoagulation
- ✚ Mechanical valve-related complications.

Most patients who underwent mechanical valve surgery experience noise disturbances due to mechanical valves. According to Chen, et al., (2020) mechanical valve noise may lead to postoperative anxiety and psychological stress and may affect the patient's quality of life.

Strategy to overcome mechanical valve sounds:

Hong, et al (2019); Chen, et al., (2020) have highlighted strategies to overcome mechanical valve sound:

- Patients should be prepared before valve replacement surgery for the potential valve noise.
- If possible, the patients should meet with a person who underwent mechanical valve replacement and the influence of valve noise should be communicated.
- Cardiac surgeons should inform the patients of the potential noise disturbances caused by mechanical valves.
- Preoperative teaching, hearing examination, and stimulation of valve noise should be undertaken as a routine in preparation for mechanical valve replacement.
- Continuous nursing care and regular medical advice can help patients with mechanical MVR reduce their anxiety and depression caused by valve noise and enhance their quality of life (Kottmaier, et al., 2017).

3.2.3 Loss of social role

Loss of social roles means that the patients after heart surgery are limited from performing certain roles that they used to do before their illness and surgery. For example, daily basic activities such as cooking, laundry, shopping, sports, driving cars and finding work that is suitable for their physical conditions after heart valve surgery. Restrictions on social role may result in frustrations, anxiety and stress among patients.

Definition of social role

American Psychological Association, (2023) defines a social role as a collection of attitudes and behaviours required of a person who holds a certain position or does a specific task in a social environment, such as being a spouse or providing care for elderly parents.

3.2.4 Provision of knowledge on self-care educational support

It is the duty and responsibility of the nurse to educate the patients and the caregivers on self-care management such as diet, medication regimen, self-care, physical activity, exercises, and sexual health activities.

Patients should be educated on the following after heart valve surgery: [**Refer to Topic 2**]

- Medication regimen
- Diet for patients with replacement and repaired heart valve
- Self-care
- Physical activities/exercises
- Sexual health activities

3.2.4.1 Patient Education

Medication regimen

For some patients after heart surgery, there are certain medications that they are required to take. It is the duty of the nurse to discuss the medication information with the patients before discharge from the hospital. Where to get the prescription before it runs out. Some of these drugs that the patients are receiving after heart surgery include anticoagulants, beta-blockers, calcium channel blockers, angiotensin, digitalis, diuretics, and statins which the guidelines should take note as explained in Table 3.4.

Table 3.4: Medication guidelines

Take the medications only as prescribed. ✚ Some medications may differ from what the patient was taking before surgery. ✚ Do not take other people's medications. ✚ Learn the names of your medications, the amount to take, their purpose, and when to take them. ✚ In case you forget to drink the medication do not take 2 tablets the next time. ✚ Do not change or stop taking your medication unless advised by the doctor. ✚ Always carry a health passport of your medications	✚ Keep the medication in its own container and out of reach of children. ✚ The pharmacists can help you maintain an up-to-date record. ✚ Refill the prescription before run out. ✚ Ask your pharmacist before taking any new prescription, non-prescription medications or herbal/complementary agents to help prevent any potential interactions with your current medications. ✚ The patient to use of a dosette box or blister packing to help keep your medications organized and help you remember to take your medication every day. ✚ Ask your regular pharmacy about this service.

Anticoagulants- Warfarin

Warfarin is an anticoagulant, a lifelong medication that the patient after heart valve surgery may take to prevent blood clotting of the valve.

Warfarin has a brand name such as Coumadin or Jantoven.

Patients should be careful not to take these drugs in addition to warfarin. Warfarin has many potential drug and food interactions.



Figure 3.1: Warfarin tablets. <https://images.app.goo.gl/VU8YNbcBM2KnkDff9>

According to The Johns Hopkins Guide, (2009) Warfarin may also be used in people who have the following conditions:

- ✚ Atrial fibrillation (irregular heart rhythm)
- ✚ Deep vein thrombosis
- ✚ Heart attacks
- ✚ Heart valve replacements
- ✚ Peripheral vascular disease
- ✚ Pulmonary embolism
- ✚ Stroke
- ✚ Valvular heart disease
- ✚ Pulmonary hypertension

Aspects that the patients and caregivers should take note of:

- Importance of monitoring laboratory results e.g. INR blood tests once a week.
- Every week immediately after mechanical valve replacement (**Refer to Topic 2, subsection 2.10. on the knowledge and skills- INR Levels**).
- Communicate with health care providers for any changes in their medication regimen.
- Warfarin medicines are color-coded by strength.
- Avoid taking other medications that can cause bleeding such as aspirin, Motrin, Ibuprofen, Aleve or Naproxen.
- At every visit patient to ask INR number and should know the target range what it is supposed to be.
- Ranges should be 2.0-3.0 [Aortic valve replacement (AVR); 2.5-3.5 [Double valve replacement [DVR & MVR]
- An INR which is high shows risk of bleeding.

- An INR that is low indicates more risk of valve clots.
- Patients to read all new medicine labels and should ensure that they do not contain aspirin.
- If misses a dose of warfarin do not take an extra pill to “catch up”.
- Stopping and changing the number of their medicines can affect the warfarin levels of the patients.
- Avoid alcohol and street drugs such as cocaine, heroin, and other street drug can increase the risk of bleeding.
- Patient to inform health care provider that he/she is on warfarin.
- Avoid contact sports, because warfarin makes you bruise easily.
- Diet education is crucial, E.g. food that contains vitamin K.
- Take note, the patient does not need to avoid food rich in vitamin K, but the patient must be consistent with consumption habits.
- Vitamin K interacts with warfarin
- Foods with high amounts of vitamin K include dark leafy vegetables such as spinach, broccoli, cabbage, kale, Brussels sprouts, and collards.
- Avoid meat products such as beef and pork liver containing high amount of vitamin K.
- Keep your exercise level regular
- For more information (refer to the handouts given on Warfarin: Guide for patients and families.

Other material to read:

<https://magazine.nursing.jhu.edu/2011/07/anticoagulation-drugs-what-nurses-need-to-know/>

Figure 3.2: Food rich in vitamin K:



<https://images.app.goo.gl/2oSPWKmjFQF6eZGS6>

Patient Warfarin Record

I am taking Warfarin for:

☒ Atrial fibrillation ☒ Blood clot in the lungs or legs ☒ Prosthetic heart valve

☒ Other: _____

I need to take this anticoagulant for (duration): _____

My heart surgeon recommends that my target INR range be between: "

☒ 2.0 and 3.0 (AVR) ☐ 2.5 and 3.5 (DVR & MVR)

Other recommendations: Take once a day. Do not double dose for a missed pill.

Date of INR	INR Result	Dose of Warfarin	Date of INR	INR Result	Dose of Warfarin

3.2.4.2 Diet for patients after heart valve replacement

According to Satyavedam, (2021), the following diet can be followed after mitral valve replacement:

- Heart valve replacement patients should have a diet comparable to individuals who suffer from those illnesses and should follow the following:
 - Cut on saturated fat and cholesterol intake
 - Reduce salt and other products that contribute to high blood pressure
 - Avoid processed foods, dairy, red meat, and saturated fats
 - Cut down food rich in cholesterol.
 - Avoid high in hydrogenated fats such as margarine, shortening, bacon, gravy, and cream sauces.
 - Protein: lean meat, poultry, fish, and low-fat dairy items.
 - Avoid dairy products such as cheese, yogurt, cold cuts, hot dogs, sausages, egg yolk, and organ meats such as the liver.
 - Frying is always preferred to baking, broiling, grilling or pan-frying.
 - Salmon, trout, and herring are a rich source of omega-3 fatty acids and contribute to heart health when ingested 2 or 3 times a week.
 - Energy: Eat whole grains high in fiber such as cereals, and carbohydrates.

- ✚ Read labels and choose foods with less than 2 grams of saturated fat in a serving
- ✚ Limit high-fat snacks and sugary desserts.

Other resources to read about Dietary advice for people taking warfarin tablets:
[https://www.uhcw.nhs.uk/download/clientfiles/files/Patient%20Information%20Leaflets/Clinical%20Support%20Services/Dietetics/118085 Dietary advice for people taking warfarin tablets %282320%29.pdf](https://www.uhcw.nhs.uk/download/clientfiles/files/Patient%20Information%20Leaflets/Clinical%20Support%20Services/Dietetics/118085_Dietary_advice_for_people_taking_warfarin_tablets_%282320%29.pdf).

3.2.4.3 Self-care

According to WHO, (2023), self-care is a person's capability to promote health, prevent disease, maintain health, and deal with illness and disability with or without the assistance of a health professional.

▪ Wound care

Care of the incision area

- ✚ Patient should avoid touching, rubbing or scratching the incision area. Itchiness is a normal part of the healing process.
- ✚ Patient/caregiver should not apply oils, creams or lotions to the incision unless prescribed by the doctor.
- ✚ Bruising and pain around the incisions will get better over the next few weeks.
- ✚ Protect the incision from the sun for one year. Sunlight may cause the scar to become darker and more visible.
- ✚ Patient should wear clothing that will allow the incision to “breathe”.
- ✚ It is okay for the incisions to get wet.
- ✚ Let the water run over the areas rather than washing them directly.
- ✚ It is not necessary to use anti-bacterial soap.
- ✚ A clear yellow or slightly bloody drainage from the incision or chest tubes sites is normal. It can continue for the first 2 weeks at home.
- ✚ Apply a new dressing only if the incision is draining or if want to protect the wound from rubbing on the clothing.
- ✚ Avoid soaking the incision in a bath or hot tub for 6 weeks or until it is completely healed.
- ✚ Avoid aiming the showerhead at the incision (i.e., shower with the back to the shower head).
- ✚ Gently pat the incision with a clean towel. Patient should not rub the area.

Physical activities and exercises

Exercise training is an important aspect during CR in patients with cardiac diseases. Exercise training can begin during phase 2 after heart surgery depending on patients' ability and medical conditions. According to Auchincloss, et al., (2020) during phase 2, patients are encouraged to exercise as much as they can tolerate.

Two types of aerobic and resistance exercise are recommended by all international guidelines and position statements for CR (Price, et al., 2016). ***[Refer to the core components of CR in topic 1 about physical exercises].***

According to Island Health (2020), the following are the general timelines for resuming patients' usual activities after heart surgery.

Weeks 1-6	After 6 weeks (consider these activities if can do more:	After 3 months
▪ Walking ▪ Doing light housekeeping (dusting, setting a table, washing dishes, folding clothes. ▪ Doing light gardening (pot plants, trim flowers ▪ Attending sports events, church, movies, ▪ Climbing stairs ▪ Cooking meals ▪ Doing needlework. ▪ Being a passenger in a car. ▪ Playing games, cards ▪ Reading ▪ Going to a restaurant. ▪ Having sexual activity ▪ Riding a stationary bike ▪ Walking on a treadmill	▪ Return to work if: ▪ The patient's job does not require lifting and the doctor gives approval ▪ Doing heavier housework (vacuuming, sweeping, laundry, ironing) ▪ Going boating or fishing ▪ Travelling ▪ Driving a car or small truck. ▪ Doing light aerobics with no weights. ▪ Walking the dog on a leash ▪ Doing small mechanical jobs ▪ Begin to lift over ▪ Golf (do not carry golf bags)	▪ Return to work full-time with the specialist's approval. ▪ Doing heavy housework ▪ Doing heavy gardening ▪ Riding a bike or jog ▪ Bowl ▪ Hunting ▪ Ride a bike motorcycle ▪ Playing softball/baseball ▪ Swimming ▪ Playing tennis ▪ Water ski ▪ Weightlift in moderation ▪ Playing hockey ▪ Use a hot tub.

Sexual health activities

Patient education regarding sexual activities

Patient education on sexual activities:

- Inform the patient that fewer sex drives in the early recovery period as a result of pain, medications, fear, or depression,
- This may improve when the patient feels stronger.
- The same amount of energy for sexual intercourse is used when climbing 20 steps in 10 seconds or walking briskly at 5-6 km per hour.
- Patient to protect the chest during sexual activity,
- Found a comfortable position that does not put pressure on the chest.
- Safe positions like side-lying, patient on the bottom, and seated upright.
- Avoid sexual activity after a large meal or after exercising, wait until you are more rested.
- Consult your doctor or nurse for any questions about resuming sexual activity.

3.2.5 Procedure impacted negatively on daily activities of living

3.2.5.1 Post-operative pain syndrome

Definition: Post-operative pain syndrome is a subjective sensation, that every surgical patient may feel in a different way, despite the type of surgical intervention and if it persists, may lead to the development of many complications for some patients (Zubrzycki, et al., 2018).

Postoperative pain is the most inadequately managed symptom of cardiac surgery (Micah, et al., 2019).

According to Micah, et al., (2019) pain is the subjective feeling of an individual, which affects the overall recovery of patients after cardiac surgery.

- It is the duty of the nurse to ensure that patients after heart valve surgery are free from postoperative pain and administer pain medications as prescribed.
- Moreover, nurses play an important role in assessing, evaluating and managing patient pain.
- Tan and Amoako, (2013) concluded that postoperative physical dysfunction after cardiac surgery is a serious complication of cardiac surgery associated with significant long-term morbidity, which further results in adverse social and economic consequences.

Micah, et al., (2019), have identified factors associated with postoperative pain such as:

- Type of surgery
- Patient's belief regarding drug dependency
- Cultural values
- Hospital policies
- Fear of adverse effects
- Postoperative physical activities.
- Nurses' education level and unwillingness to administer medication for fear of adverse effects.

3.2.5.2 Pre and postoperative patient education on pain management

Nurses plays an important role in pre and post-operative care for patients undergoing heart surgery. Therefore, nurses should have knowledge and skills on patient education.

- Khalid, et al., (2022), Khalid draws the conclusion that providing pre-operative pain-related education to cardiac patients receiving care in a hospital improves patient satisfaction, lowers anxiety about taking painkillers, and motivates patients to talk to medical professionals when they are in pain.
- Micah, et al., (2019), study proposes the need for the enhancement of patients' education about drug dependency, side effects, and physical activity, before cardiac surgery.
- The nurses should receive in-service training on pain management taking into consideration the patients' culture and other perceptions of pain in mind.

3.2.5.3 Pain management for postoperative pain syndrome

The following pain management pharmacological and non-pharmacological methods can be used to relieve postoperative pain:

- Pharmacological methods such as opioids and nonopioids
- Nonpharmacological such as deep breathing
 - Massaging
 - Relaxing
 - Music therapy

3.2.6 Support and care from the nurses

- **Lifestyle changes**

Alcohol

- Avoid alcohol for 2 weeks after surgery
- Consume alcohol in moderation- alcohol may be consumed in moderation- maximum 3 drinks a day a week for men & 2 drinks a day a week for women.

- Medication reacts to alcohol.
- Patients should talk to pharmacists about medications that interact with alcohol.
- Patients with history of depression should avoid alcohol
- Alcohol is a depressant and may worsen your symptoms.

3.2.7 Overprotective family member

- All family members who care for someone find heart valve surgery stressful.
- This may result in family caregivers becoming overprotective. Caregivers do out of fear and concern that might not be doing and might take control in their efforts to assist.
- Caregivers do this out of fear and concern that they might not be doing enough for you.
- A caregiver could unintentionally undermine the patient's confidence and take away your independence.
- Even if attempting to assist with rehabilitation, caregivers need to manage their own emotions.

3.2.7.1 *Strategies that the Patients Can use for them to recover*

Island Health (June, 2020) have highlighted strategies that patients and caregivers can use to help patients recover after heart surgery:

- Appreciate the worry and care that others are providing.
- Patients are to inform their loved ones and close friends that she/he will let him/he know if experiencing any physical or psychological issues that are disturbing.
- Accept help from others
- Restrict visitors and limit calls.
- At home, the patient should establish their own home visiting hours.
- Starting a meeting by promising the clients that you will let them know when rest is needed when exhausted.
- Patients should be confident in their abilities to reject people's requests to pass by your office.
- To keep people or family members informed about your progress, use emails or a phone answering machine.

3.2.7.2 *Strategies that caregivers can use to assist a relative to recover from assist*

- Caregivers should be patient when caring for their loved ones as it is not unusual for their loved ones to have good and bad days.
- Share their feelings with a close friend.
- Talk to their primary care provider if they have feelings that concern them.
- Caregivers should take care of themselves, and their health: eat well, exercise, and get plenty of rest, they can rest when you rest.
- Do something they enjoy and find relaxing. They can be left alone.

Topic 4: The challenges experienced by the caregivers in the support and care of a relative after heart valve surgery

Objective 4: Empowering the nurses with knowledge and skills in order to address the challenges experienced by the caregivers regarding the support and care of the family member who had heart valve surgery.

4.1 Learning objectives

At the end of the session, the participants should be able to:

- Discuss the emotional trauma
- Describe the emotional and behavioral responses to emotional trauma
- Debate in the uncertainly about the future of a relative after heart surgery.
- Discuss the issues of support and care of the caregivers.

4.1.1 Definition of emotional trauma

Definition: Is the end result of an event or experience that leaves an individual feeling deeply unsafe and often helpless.

Emotional trauma is recognized by a persistent sense of unsafe and other challenging emotions such as fear or uncertainty.

Common emotional and behavioral responses to trauma as highlighted by Jet Foundation, (n.d):

- | |
|--|
| <ul style="list-style-type: none">▪ Denial▪ Depression▪ Anger▪ Fear▪ Guilt▪ Anxiety▪ Flashback to events▪ Difficult to concentrate▪ Withdrawal from friends and family |
|--|

Diet for patient with replacement and repaired heart valve [**Refer to topic 3**]

Physical activity [**Refer to topic 3**].

4.1.2 Prolonged recovery places demand to care on caregivers

What is prolonged recovery

Prolonged recovery is when the healing process of the patient takes longer after heart valve surgery and places demands on the caregivers. In the current study, the majority

of the participants expressed feeling overwhelmed and burdened by providing extended care for their family members after heart valve repair and replacement surgery.

Addressing the burden and poor coping experienced by the caregivers in caring.

- Different literature have highlighted strategies to overcome the burden and poor coping experienced by caregivers (Grant et al, 2018; Ae-Ngibise, et al.,2015; Amakali & Small, 2014; Sautter, et al., (2014); Buck, et al, 2013; Metzger et al., 2013; Ross, & Austin, 2013):
- Recommended creating and executing a rehabilitation program that includes home-based healthcare interventions to assist caregivers in managing the responsibilities of in-home care (Dalirirad, et al., 2021).
- Multidisciplinary healthcare teams should be involved in a rehabilitation program to evaluate the demands placed on caregivers and direct overworked caregivers to suitable resources for financial, social, emotional, and spiritual support through counseling, as well as information from medical professionals to link them to supportive resources (Grant et al, 2018; Ae-Ngibise, et al., 2015; Amakali & Small, 2014; Sautter, et al., (2014); Buck, et al, 2013; Metzger et al., 2013; Ross, & Austin, 2013).
- The development of a home-based rehabilitation might also assist and reduce the transport constraints that the patients and caregivers are experiencing.

4.1.3 Addressing uncertainty about the future of a relative

Definition: Uncertainty by the family caregivers is the perception of the inability to process information regarding the patient's illness trajectory when caring for significant others or a state of not being sure about the future (Haji et al., 2022).

- ✚ Uncertainty is a natural part of the experience of being ill at all the stages of disease including diagnosis, treatment, prognosis, recovery and potential recurrence.
- ✚ If caregivers are not provided with support or health information regarding the outcome of their loved one's recovery process, uncertainty about their relative's future can cause worry, stress, and sadness in them. (Haji Assa & Umberger, A concept analysis of family caregivers' uncertainty of patient's illness, 2022).
- ✚ At all stages of disease, including diagnosis, treatment, prognosis, recovery, and potential recurrence, uncertainty is a normal part of the experience of being ill.

4.1.3.1 The impact of uncertainty on the caregivers

Goodwin, et al., (2022) highlighted the impact of uncertainty on caregivers:

- Unable to relax because of spending in preparing and managing the reactions to uncertainty.
- Tiredness
- Sadness for the child's distress.
- Wanting a magic wand.
- Frustration or irritation related to a relative with uncertainty.
- Fear of the future.

4.1.3.2 Factors associated with uncertainty

Brown, et al., (2020), have highlighted three factors that can lead to uncertainty:

- 🧩 **Biological factors:** illness severity, symptom pattern and symptom familiarity.
- 🧩 **Psychological factors** such as learned helplessness, and emotional state cause uncertainty.
- 🧩 **Social factors** such as support systems and education level also influence experiences of uncertainty.

4.1.3.3 Pre and post-operative caregiver education on uncertainty

Strategies to overcome uncertainty

Liu, et al., (2020) have highlighted interventions that stakeholders can implement to reduce disease uncertainty:

- To advocate for public health education for the community to acquire more knowledge.
- Hospitals to set-up health education platforms through What's App messages when patients are admitted or discharged.
- Healthcare professionals should provide health education for the family caregivers in order to improve their knowledge.
- Caregivers should be encouraged to evaluate their own social support and seek assistance from others.
- Support caregivers with efficacious psychological therapies to sustain positive attitudes toward caregiving and boost their self-assurance in providing care for their family member following an intervention.

4.1.4 Addressing the issue of support and care of the caregivers

Nurses should play an important role in supporting family caregivers on how to care for their relatives after heart surgery.

Becqué, et al., (2021), have highlighted activities that the nurses attend to the needs of the caregivers:

- Identification of the needs of the caregivers- on admission and during patient care and when leaving: E.g. how are you? How are you doing?
 - Practical education: teach and instruct family how to perform practical care tasks such as bathing, giving medications, discuss symptoms patient may have and how to support the relative practically.
 - Emotional support: by sympathizing and listening to family problems e.g. coping problems, hopes, and family relationships
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