THE EFFECT OF PHARMACIST-PROVIDED DISCHARGE COUNSELLING ON MEDICATION KNOWLEDGE AND ADHERENCE AMONG PATIENTS WITH CARDIOVASCULAR DISEASES AT WINDHOEK CENTRAL HOSPITAL, NAMIBIA

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ABSTRACT

Background: Pharmacists are ideally placed to provide medication counselling to patients during the discharge stage of the patient care journey due to their extensive knowledge of medications. The provision of tailored educational counselling and adequate information about medications may improve patients' adherence, level of confidence, self-efficacy, and understanding of how to take their medications.

Objectives: To pilot the implementation of a pharmacist-provided discharge counselling service and to measure patients' level of medication knowledge and adherence before and after implementation of the service.

Methods: A prospective quasi-experimental study was completed among adult patients with cardiovascular diseases admitted to Windhoek Central Hospital during between November 2020 and May 2021. Patients taking at least one chronic medicine prior to admission and at discharge were included in the study. The study comprised of a control phase prior to implementation of the pharmacist-provided discharge counselling service and an intervention phase following implementation. Each phase was 3 months long with a one-month period between the two phases that was devoted to educational programmes. Patients in the intervention group received discharge counselling by trained pharmacists while patients in the control group received usual care. Patients' level of medication adherence and medication knowledge were assessed through interviews within a day of admission and on days 7 and 14 post-discharge. Repeated measures analysis of covariance was used to compare the level of medication knowledge and adherence among patients in the control and intervention groups. A $p < 0.05$ was considered statistically significant.

Results: A total of 84 patients comprising 42 patients in each group were evaluated. Female patients accounted for 59.5% (25/42) and 69.0% (29/42) of the patients in the control and intervention group, respectively. The mean age of patients in the control group was 45.5 years (range: 18-80 years) compared to 39.3 years (range: 18-69 years) in the intervention group. After controlling for the level of adherence at admission, there was a statistically significant difference in the levels of patient adherence to medication on days 7 and 14 post discharge as a consequence of pharmacist-provided counselling, ($F (1, 81) = 110.626$, $p < 0.001$, $\eta p2 = 0.577$). Estimated marginal means of adherence levels were different in the control ($M = 80.273$, $SE = 0.46$) and intervention ($M = 87.14$, $SE = 0.46$) groups. The level of adherence at admission was significantly related to the levels of adherence on days 7 and 14 post-discharge, $F (1, 81) = 126.35$, $p < 0.001$, $\eta p^2 = 0.609$). In addition, there was no significant difference in the levels of adherence measured on days 7 and 14 after discharge from hospital, $F (1, 81) = 0.030$, $p = 0.862$, $\eta p^2 = 0.001$). After controlling for patient's level of medication knowledge at admission, there was a significant effect of pharmacist-provided counselling on the levels of patients' medication knowledge measured on days 7 and 14 post-discharge, ($F (1, 81) = 41.49$, $p < 0.001$, $\eta p^2 = 0.339$). Estimated marginal means of levels of knowledge were different in the control ($M = 62.20$, $SE = 0.72$) and intervention ($M = 68.76$, $SE = 0.72$) groups. The level of medication knowledge at admission was significantly related to the levels of medication knowledge on days 7 and 14 post-discharge, $F (1, 81) = 273.79$, $p < 0.001$, $\eta p^2 = 0.772$). Furthermore, there was a significant difference in the levels of medication knowledge measured on days 7 and 14 after discharge from hospital, $F (1, 81) = 9.03$, $p = 0.004$, $\eta p^2 = 0.1$).

Conclusions: Implementation of a pharmacist-provided discharge counselling service resulted in improvements in the level of medication knowledge and adherence among patients.
Keywords: pharmacist, discharge counselling, medication knowledge, medication adherence

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LIST OF ABBREVIATIONS AND/OR ACRONYMS

ADEs- Adverse drug events

ADMIS- on admission

ANCOVA- Analysis of covariance

ARMS- Adherence to Refills and Medications Scale

BMQ - Brief Medication Questionnaire

CI –Confidence Interval

COPD- Chronic obstructive pulmonary disease

CVDs- Cardiovascular diseases

FU1 -7 days' post discharge

FU2 – 14 days' post discharge

HB-MAS- Hill Bone Medicines Adherence Scale

HF- Heart Failure

HTN- Hypertension

HREC- Human Research Ethics Committee

M –Mean

Mdiff – Mean difference

MMAS-8 - Morisky Medication Adherence Scale

MoHSS- Ministry of Health and Social Services

PILL-CVD -Pharmacist Intervention for Low Literacy in Cardiovascular Disease

PMC- Pubmed central

SD –Standard Deviation

SE –Standard error

SPSS - Statistical Package for the Social Sciences

UNAM- University of Namibia

US – United States

WCH- Windhoek Central hospital

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DEDICATION

I dedicate this thesis to my beloved son Mason Shilongo, my greatest motivation to working hard.

DECLARATIONS

I, Liisa Ndapewa Anguuo, hereby declare that this study is my own work and 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.

I, Liisa Ndapewa Anguuo, grant The University of Namibia the right to reproduce this thesis in whole or in part, in any manner or format, which The University of Namibia may deem fit.

Liisa Ndapewa Anguuo		**10th August 2022**
Name of Student	Signature	Date

1.0 INTRODUCTION

1.1 Background of the study

Cardiovascular diseases (CVDs) are the leading cause of death globally and are a major contributor to reduced quality of life(1) . According to the World Health Organization (WHO), an estimated 17.9 million people died from CVDs in 2019, representing 32% of all global deaths. Of these deaths, 85% were due to heart attack and stroke. Over three quarters of CVD deaths take place in low- and middle-income countries. Sub-Saharan Africa is ravaged by a growing burden of CVDs (2). Hypertension (HTN) is one of the most important modifiable risk factors for cardiovascular disease. HTN, as well as, heart failure (HF) are common causes of premature morbidity and mortality. They account for about 7.5 million deaths worldwide every year, with 82% occurring in low- and middle-income countries (3). HTN is defined as persistently elevated arterial blood pressure with a systolic blood pressure more than 140 mmHg and diastolic blood pressure more than 90 mmHg (3). HTN is known as the "silent killer", as uncontrolled HTN is often asymptomatic. Left untreated, HTN can lead to myocardial infarction, left ventricular hypertrophy, congestive HF, aneurysm, stroke, chronic kidney disease (HTN nephropathy), and HTN retinopathy (4). HF is a chronic, progressive condition in which the heart muscle is unable to pump enough blood to meet the body's needs for blood and oxygen (4). Both HTN and HF require lifelong use of medications to prolong life, prevent complications, and reduce hospitalizations (3). Health care workers should accompany lifelong therapy with counselling, education, and adherence support. As medication experts, pharmacist are best placed to provide this support.

Counselling can be valuable at any point of the patient care journey but the current study focuses on the discharge stage. During inpatient hospital stay, a patient's medications are administered by nurses and adherence is usually maintained. However, upon discharge, the patient (or a family member) must take responsibility for medication adherence in order to achieve and maintain their health status. The safety and efficacy of medication therapy depends on the correct information being shared with and understood by patients about their medication and patient understanding of that information (5). Therefore, the pharmacist undertaking discharge counselling should possess adequate knowledge and should be an effective communicator, making use of verbal and non-verbal communication skills (5). During medication counselling patients are provided with advice and information on their medicines. Patient counselling may be verbal or written, performed on an individual basis or in groups, and provided directly to the patient or caregiver (6). One of the pharmacist's responsibilities is to optimize the patient's medication therapy by promoting adherence through good medication counseling. Pharmacists are ideally placed to provide useful medication counselling to patients at the time of discharge due to their extensive knowledge of medications (7). Providing tailored educational counselling and adequate information about medications, such as medication indications and clear instructions on medication use, improves adherence and increases patient confidence, self-efficacy and understanding on how to take their medications (8). Previous studies suggest that direct pharmacist interaction with patients through medication reconciliation, discharge counselling, and post discharge phone calls decreases the number of adverse drug events (ADEs) and plays a positive role in transitional care (9). For example, a study done by Fernandez and colleagues on the effect of pharmacist interventions on antidepressant medication adherence in outpatients concluded that patients who received a pharmacist intervention were over 60% more likely to adhere to their medication than those who did not (OR=1.6, [95% Cl 1.2 to 2.2]) (10). Furthermore, some studies(11,12) have demonstrated the benefits of interventions provided by pharmacists in improving adherence and other patient outcomes. In addition to improved adherence, pharmacists can play an important role in the prevention of readmissions by counselling patients and providing relevant medication information. A study by Jackevicius *et al.*, showed that after acute myocardial infarction, nearly 24% of patients did not fill their medications within seven days of discharge, and one third of patients decided to stop at least one medication in the first month (13).

The relationship between medication knowledge and medication adherence is complicated. Some studies suggest that improved medication knowledge improves adherence (14), although, other reports show that counselling has little or no effect on adherence (15).

Providing counselling to in-patients is one of the important tasks of hospital pharmacists. This study evaluated the impact of pharmacist-provided discharge counselling on patients' medication knowledge and adherence.

1.2 Problem statement

Currently, patients do not receive pharmacist-provided discharge counselling at Windhoek Central Hospital. However, to achieve positive medication outcomes, patients discharged out of the hospital into their own care or those of their families need to be counselled into understanding their own therapy. This includes proper use and expected adverse effects of the medication. Pharmacists play a key role in the health care team by ensuring that patients are confident and comfortable with taking their medicines following hospital discharge. Consequences of poor medication counselling and sub-optimal adherence to medication include increased re-admission rates, longer time to primary care follow-up, increased adverse drug events, medication discrepancies, and lack of continuity of care (15). A few studies (16) done in Namibia have assessed medication adherence but none have specifically assessed the impact of pharmacists' discharge counselling on patients' medication knowledge and adherence. Within Windhoek Central Hospital (WCH), there is wide variability in the delivery of discharge counselling. Patients' medication knowledge and adherence levels are unknown. A study to evaluate the impact of pharmacist-provided discharge counselling service at WCH was therefore necessary.

1.3 Objectives of the study

1.3.1 Overall aim

To evaluate the impact of the implementation of a pilot pharmacist-provided counselling service on patients' medication knowledge and adherence at WCH.

1.3.2 Specific objectives

1. To measure and compare patients' level of medication knowledge before and after implementation of pharmacist-provided discharge counselling service
2. To measure and compare patients' level of medication adherence before and after implementation of pharmacist-provided discharge-counselling service

1.4 Significance of the study

The current study was envisaged to help implement pharmacist-provided discharge counselling at Windhoek Central Hospital. This research aimed to improve pharmacist-provided counselling to help improve patients' level of medication knowledge, adherence, and other clinical outcomes, such as hospital readmissions. Furthermore, as there are no published studies conducted in Namibia with a specific focus on the impact of pharmacist-provided discharge counselling on patients' level of medication knowledge and adherence this research aimed to fill an important gap.

1.5 Limitation of the study

The study was a single centre study at a public referral hospital; therefore, the findings may not be generalizable across other settings. The sample size may have been limited by loss to follow-up of the enrolled patients but this was addressed by increasing the determined sample size by 10%. This study did not focus on patient clinical outcomes such as readmission and mortality rates primarily because such data is not readily available. The lack of randomisation was a potential limitation of the proposed study though general practice is unlikely to have substantially changed in other ways during the entire study period. Given the relatively smaller number of subjects and taking into consideration potential readmission of subjects associated with longer follow-up i.e., more than 2 weeks, which could confound findings, a shorter follow-up period was adopted. Nonetheless, the need for longer follow-up in future larger studies is among the recommendations of the present study

1.6 Delimitation of the study

The study was confined to patients with a confirmed diagnosis of HTN and/or HF, who are prescribed medication therapy for those conditions.

2.0 LITERATURE REVIEW

2.1 Literature search strategy

A literature search was conducted using PubMed Central (PMC) and Google Scholar with search terms such as ‘pharmacist’, ‘discharge counselling’, and ‘medication knowledge ’and‘ medication adherence. The year of publication was not limited. Only relevant articles, with content relating to the current study were chosen for review.

2.2 Patients’ level of medication adherence associated with pharmacist-provided discharge counselling

Redesigning the hospital discharge process to incorporate clinical pharmacy duties could possibly reduce the incidence of post-discharge adverse events by improving medication adherence (17). In a pre-post study conducted in a hospital based in France by Leguelinel-Blache *et al*, patients’ adherence (measured by percent of discharge medications filled at a pharmacy) increased from 51% at baseline to 66% after a pharmacist conducted initial counselling on admission (17). When the pharmacist also provided discharge counselling, this rate rose to 79%. Furthermore, this study highlighted the importance of pharmacist-discharge counselling sessions to improve outpatients’ primary medication adherence.

A randomized controlled trial conducted by Pontarolo & Fernandez-llimo found that pharmacist-provided discharge medication counselling significantly contributed to better medication adherence ($p < 0.05$) (15). This study revealed that medication counselling at discharge decreased early readmission rates, especially related to heart disease, and improved medication adherence. Medication adherence was measured with the (Brief Medication Questionnaire (BMQ) and the Adherence to Refills and Medications Scale (ARMS). Abdusalim *et al.* conducted an open-labelled randomized controlled study with two groups, intervention and control (8). Abdusalim *et al.* evaluated the effectiveness of clinical pharmacist-led intervention on medication adherence among patients with chronic obstructive pulmonary disease (COPD) in a teaching hospital. This pharmacist-led intervention placed an emphasis on (1) compliance, (2) smoking cessation, (3) exercise, (4) inhaler use, and (5) need for timely follow up. Abdusalim *et al.,* found that carelessness with respect to taking medicines among the patients was one of the main drivers for non-adherence in COPD. Medication adherence was significantly improved from 49% at the baseline to 80% after 24 months after pharmacist-provided counselling.

Bisharat *et al.* conducted an observational study among patients with cardiac disease using an intervention strategy at discharge from two hospitals in Israel: Nazareth and Haemek hospitals (12). Patients were stratified into an intervention and control group. Patients in the intervention group received nurse counselling before discharge and 20-30 minutes counselling by pharmacists at discharge while patients in the control group only received usual discharge counselling by nurses. Patients' adherence to medication was higher in the intervention group (77.83 ± 22.85) compared to the control group (62.46 ± 24.5).

Vinluan *et al*., undertook a randomized prospective pilot study to evaluate the effect of pharmacist discharge counselling on patient adherence to HF therapy among elderly patients in the United States (US) (18). Vinluan *et al*., found that pharmacist-provided counselling could possibly improve medication adherence by recording and reporting showing 100% patient adherence level in intervention group versus 86% of control group, in the first month after discharge using prescription-filling rates as a tool. Vinluan *et al.*, further concluded that more frequent communication that involve more than one follow-up phone call in a month might be needed to re-emphasize important counselling points. Not all studies have found 100% adherence. For example, a secondary analysis of data from the Pharmacist Intervention for Low Literacy in Cardiovascular Disease (PILL-CVD) study was conducted by Wooldridge *et al*., to evaluate the prevalence and predictors of refractory primary non-adherence post discharge in order to guide future adherence interventions (19). In the original study, the interventions included pharmacist-assisted medication reconciliation, discharge counselling, low-literacy adherence aids, and follow-up phone calls in adults hospitalized for acute coronary syndromes or acute decompensated HF. The prevalence of refractory primary non-adherence was 9.4%, which equates to almost 1 in 10 patients hospitalized with cardiovascular disease demonstrating primary non-adherence refractory to comprehensive intervention including pharmacist discharge medication counselling (19). Despite that, non-adherence to medication persisted, suggesting a need for consistent study, discharge, and post-counselling interventions to be implemented for better adherence level outcomes. (19)

A prospective, non-randomized, quasi-experimental study was conducted in medical rehabilitation wards in a local public hospital, Tuen Mun Hospital in Hong Kong (20). The rehabilitation wards involved were for patients hospitalized for acute coronary syndrome (ACS) and/or HF and/or stroke; and were discharged with five or more routine oral medications (defined as chronic medications which need to be taken for at least one year), whom were transferred from acute care to the rehabilitation unit for longer term physical, occupational, or speech therapy. The objectives of this study were to investigate the impact of pharmacist-delivered discharge services; medication reconciliation and discharge counselling, on 30-day post-discharge unplanned health care utilization and to evaluate the impact of discharge counselling on patient medication adherence for these patients. For the intervention group, post-counselling medication adherence was assessed using the 8-item Morisky medication adherence scale (MMAS-8) and compared with the pre-counselling value (20). The majority of patients (76.5%) had low medication adherence before medication counselling was provided while only 11.8% of patients had high medication adherence. It was concluded that pharmacist medication reconciliation and discharge counselling reduced unplanned health care utilization in the next 30 days after discharge and improved short-term patient medication adherence, with the percentage of patients with high medication adherence significantly increased by over 30% while patients with low adherence significantly decreased by over 60%, benefits which persisted one month after counselling (20).

A cross-sectional study that involved 120 patients with HTN was conducted on hospital level in Matero in Lusaka, Zambia (21). This study aimed to assess the effects of medication knowledge on medication adherence. Adherence was assessed using the MMAS-8 and concluded that the patients' level of medication adherence was low (37.5%). Furthermore, uncontrolled blood pressure was associated with non-adherence. Health education and counselling were suggested as interventions to improve medication adherence in patients with uncontrolled HTN (21).

2.3 Patients' level of medication knowledge associated with pharmacist-provided discharge counselling

A study conducted by Elson *et al.,* compared the effects of targeted hospital pharmacist discharge counselling and usual discharge counselling by nurses on patients' knowledge of newly started medication. Outcomes were measured using a structured telephone survey conducted at two and four weeks post-discharge (22). Elson *et al.,* found that patients who received hospital pharmacist counselling as an intervention were significantly more likely to remember being counselled on the purpose of their new medicine and how to take it compared to those who received usual care (22). After hospital pharmacist, counselling only 3 out of 43 patients reportedly stated they had not received sufficient education compared with 12 out of 41 patients in standard discharge counselling group. Elson *et al*., concluded that targeted counselling by hospital pharmacists' increased patient knowledge of medicines newly prescribed in the hospital, however, they did not report on level of knowledge (22).

A study by Cooper & Garret, in which a questionnaire was administered to hospital patients at discharge to elicit responses relating to information and education received about medications during their hospital stay found that patients reported the need for more time to be allotted to medication counselling during the discharge process (23). Another study done by Kampamba *et al.,* in Lusaka, Zambia to assess the effects of medication knowledge on medication adherence among hypertensive patients found that only 8% of the participants had adequate medication knowledge (21). The medication knowledge score of participants in the study by Kampamba *et* *al.*, was generally very poor when compared to medication knowledge reported by studies undertaken in Jordan (62.3%) and Turkey (64.5%) (21,24).

3.0 RESEARCH METHODS

3.1 Research design

A prospective quasi-experimental study was undertaken at WCH from November 2020 to May 2021 and included patients discharged from 4-west ward with a diagnosis of HF and/or HTN. The study measured and compared medication knowledge and adherence of patients before and after the implementation of pharmacist-provided discharge counselling. A quasi-experimental design was selected to estimate the causal impact of an intervention on a target population, while acknowledging that sampling was not randomized but intentional. During the pre-intervention phase, the control group included patients discharged from 4-West with heart failure or hypertension who received usual care. During the intervention phase, the intervention group received pharmacist-provided discharge counselling. Between the pre-intervention and intervention phase, a 4-week training period for pharmacists was commenced to review and practice the process of discharge counselling. All patients in both groups received a follow-up phone call 7 and 14-days after discharge to evaluate retained knowledge and post-discharge adherence. This time-period for follow-up was selected to reduce the likelihood of readmission during the follow-up period.

3.2 Study population

The study population comprised of patients aged 18 years and older admitted to the 4-west ward between November 2020 and May 2021 with a diagnosis of HTN and/or HF who were prescribed medication therapy for those conditions. To estimate the sample size and study duration, a review of hospital records showed that 4-west admits approximately 20 patients with heart failure and/or hypertension in a 4-week periods. The estimated population size over 8 weeks is therefore about 40 patients per group/phase.

3.3 Sample size

Sample size was determined using Statulator, an online sample size calculator for comparing two independent means. Assuming a pooled standard deviation of 23.7 (13), the study required a sample size of 38 patients for each group (i.e., a total sample size of 76 patients, assuming equal group sizes), to achieve a power of 80% and a level of significance of 5% (two sided), for detecting a true difference in means (level of medication adherence) between the control and the intervention group of 15.37 (i.e., 77.83 – 62.46) (18). To account for attrition because of challenges with follow-up, 10% was added, thus, the sample size was 42 patients in each group. . Based on prior assessment, a sample of 42 participants should be achieved in 8 weeks; however, each phase was permitted to continue until the full sample size was reached.

3.4 Sampling

Study participants meeting the eligibility criteria were enrolled in the study using convenience sampling. Eligible consenting participants were selected and recruited from the 4-west ward at WCH.

3.4.1 Inclusion criteria

Patients aged 18 years and older with a diagnosis of HTN and/or HF admitted to the 4-west ward on at least one chronic medicine prior to admission and at discharge were included in the study. Only patients who provided their telephone/mobile number for follow-up were enrolled on the study. All participants provided written, informed consent to participate in the research.

3.4.2 Exclusion criteria

Patients were excluded from the study if they lacked a clear or definitive diagnosis of hypertension or heart failure or were readmitted to hospital before days 7 and 14-days post-discharge. Patients who did not provide informed consent or were unwilling/unable to provide their mobile/telephone number were excluded in the study. Patients lost to follow-up (including mortality during admission) were excluded from the study.

3.5 Research instruments

A 9-item Hill-Bone Medication Adherence Scale (HB-MAS) (appendix A) was used to assess medication adherence of patients before and after the implementation of pharmacist-provided discharge counselling. The HB-MAS is a widely used tool that has been validated for assessing adherence in patients with cardiovascular diseases. It is a 9-item scale with a known broad application across various diseases and conditions, for assessing patients' adherence to medication and each item is scored on a four-point scale (1=All the time, 2=some of the time, 3=most of the time and 4=none of the time). Final score is a quotient of the summed score over 36 (range: 9-36), multiplied by a 100 to get the percentage. Higher score indicates good medication adherence. The patients' level of medication knowledge was determined using the Medication Knowledge Assessment Form (appendix B) developed by Lelly Oboh and colleagues as part of the "The in-depth Medication Assessment". It is a six-structured questions tool, with a total sum of 21 points and the higher scores signify a good medication knowledge.

3.6 Procedure

3.6.1 Implementation of pharmacist-provided discharge counselling service

This prospective quasi-experimental study consisted of two phases namely control and intervention**.** The control phase was the period prior to implementation of pharmacist-provided discharge counselling service. The control phase began in November 2020 until February 2021. During the control phase, the patients received usual care. There was then a four-week period between the two phases that was devoted to educational programmes to train pharmacists on a standard process to provide discharge counselling. Items discussed and included in the pharmacist-provided discharge counselling tool were; the indication for each medication, dose, duration, what to do for missed doses, possible side effects and how to manage them, storage instructions, and lifestyle educational modifications (Appendix E). Counselling was structured according to the three Prime Question Model (25). Moreover, educational programmes involved presentations to pharmacists on a number of topics including medication history taking, assessment of patient medication knowledge and adherence, and discharge medication counselling. These topics were covered with the support of Clinical Pharmacists from the University of Namibia and Ministry of Health and Social Services. After the 4-week intervention rollout, pharmacists began to provide discharge medication counselling across the specified wards. At that point, the intervention phase began. During the intervention phase, all patients received discharge counselling provided by a pharmacist according to the training described above.

3.6.2 Data collection technique

Eligible patients in both the control and intervention groups with a diagnosis of HTN and/or HF were identified by reviewing the prescription cards.

Patients' clinical records (health passports, medical notes) were reviewed to identify whether they were on any medicines prior to admission. If medication history was undocumented in the medical notes, a medication history interview was undertaken in English or their preferred language. Consent for participation in the research was conducted and demographic and contact (telephone/mobile) details of consenting patients were noted and recorded.

A face-to-face interview with consenting patients was arranged within 24 hours following the patient's admission to evaluate the patients' level of medication adherence (appendix A) and medication knowledge (appendix B) prior to admission. Participants were followed up on days 7 and 14 post-discharge to reassess their medication adherence and medication knowledge using the same tools. Phone interviews by pharmacists were arranged on the proposed follow-up days at times convenient for each patient.

3.6.3 Research flow chart

Pre-intervention Phase: Control group data collection (8 weeks)

On admission			*On discharge*	*On follow-up: Days 7 and 14 post-discharge*
Identify Eligible Participants	Consent Eligible Participants	Conduct Knowledge & adherence Interview	Conduct medication Knowledge & adherence interview Confirm contact details	Repeat adherence & medication knowledge interview.

Intervention Implementation (4 weeks)

Intervention Phase: Intervention group data collection (8 weeks)

On admission			*On discharge*	*On follow-up: Days 7 and 14 post-discharge*
Identify Eligible Participants	Consent eligible participants	Conduct Adherence & adherence Interview	Conduct medication knowledge interview Offer tailored medication education and counselling Confirm contact details	Repeat adherence & medication knowledge Interview

Figure 1: Flow chart showing how the study was conducted

3.7 Data analysis

Data was documented on paper to assist with matching the data at each of the three time points (admission, 7-day follow-up, and 14-day follow-up). Data was then entered into SPSS. Quantitative data were analysed using the Statistical Package for Social Sciences (SPSS) version 27.0 (SPSS Inc., Chicago, IL, USA). Categorical variables were presented as proportions while continuous variables were expressed as mean, range and standard deviation. The outcome measures of the study were medication adherence (continuous variable) and medication knowledge (continuous variable).

The difference in continuous data between the intervention and control groups while controlling for a relevant covariate was detected using repeated measures analysis of covariance (ANCOVA). Shapiro-Wilk normality test was used to determine normality of the distribution of data. A p value < 0.05 was considered statistically significant.

3.8 Reliability and validity of the study

The research instruments were pre-tested by the principal investigator to ensure content validity, reliability, clarity, omissions, and errors. Pharmacists involved in data collection were trained on the use of the research instruments.

4.0 RESEARCH ETHICS

4.1 Ethical considerations

This study was conducted in compliance with standards of good clinical practice according to the principles of the Declaration of Helsinki (26).

4.2 Permissions and approvals

Formal ethical clearance was sought from the Human Research Ethics Committee (HREC) at the University of Namibia and the ethics committee at the Ministry of Health and Social Services (MoHSS). Permission to undertake the study was obtained from the management of Windhoek Central Hospital through the Customer Care Department.

4.3 Informed consent

The investigators obtained written informed consent from all eligible participants who were willing to participate in the study.

4.4 Voluntary participation (Autonomy)

Patients who consented to participate in the study were free to withdraw from the study at any point without giving any explanation. Patients who refused to participate in the study were not affected in any way.

4.5 Beneficence and non-maleficence

There was immediate benefit to patients who participated in the intervention phase and no benefit to those in the control group in the study. However, the information obtained from the study was envisaged to help improve medication-counselling service at Windhoek Central Hospital. There was no harm or risks involved for either group.

4.6 Confidentiality (Integrity)

Every effort was made to maintain the privacy of participants' information within the limits of Namibian Laws. Confidentiality of collected data was maintained through storage of data in files with encrypted codes on a password-protected personal computer and back up flash that was password-protected and secured in a lockable cabinet within the researcher's work premises, which are guarded throughout the day and locked overnight. No personal identifiable information was recorded on the data collection tools to maintain patient anonymity; instead, each participant was assigned a unique subject code. A list of participant codes with corresponding telephone/mobile numbers necessary for follow-up post-discharge was stored in a locked cabinet with restricted access to only the principal investigator.

4.7 Dissemination of the study findings

The findings of the study will be presented at scientific meetings/conferences/symposia at the University of Namibia and Windhoek Central Hospital. The findings will also be published in a peer-reviewed journal subject to obtaining all necessary approvals (UNAM/WCH/MoHSS).

5.0 RESULTS

A total of 84 patients comprising 42 patients in each group were enrolled and included in the analysis. Female patients accounted for 59.5% (25/42) and 69.0% (29/42) of the patients in the control and intervention groups, respectively. The mean age of patients in the control group was 45.5 years (range: 18-80 years) compared to 39.3 years (range: 18-69 years) in the intervention group. In the control group, 71.4% (30/42) of the patients had HTN, 21.4% (9/42) had HF while only 7.2% (3/42) had HTN with HF. In contrast, 66.7% (28/42) of the patients were hypertensive, 19.0% (8/42) had HF whist only 14.3% (6/42) had HTN with HF in the intervention group. The demographics of participants in the control and intervention groups are shown in table 1.

Table 1: Patient's age, gender and diagnosis for both study groups

Variable	Control group	Intervention group
Age		
Mean (SD)	45.52 (16.53)	39.29 (12.19)
Range	18 - 80	18 – 69
Gender		
Male, n (%)	17 (40.5)	25 (31.0)
Female, n (%)	25 (59.5)	29 (69.0)
Diagnosis		
HTN only, n (%)	30 (71.4)	28 (66.7)
HF only, n (%)	9 (21.4)	8 (19.0)
HTN and HF, n (%)	3 (7.2)	6 (14.3)

Table 2 below presents unadjusted means for both control and intervention groups for the primary outcomes: medication knowledge and medication adherence. Adherence on admission is 79% ± 5.65 and 78.57% ± 4.036 respectively in the control and intervention groups, and the unadjusted means for 7-day and 14-day post–discharge follow up was 80.47% ± 6.62 and 80.82% ± 2.08 respectively in the control group, and 88.67% ± 2.08 and 84.86% ± 3.47 respectively for the intervention group. In addition, the unadjusted means for medication knowledge in both study groups are also recorded and presented in table 2.

Table 2: Levels of medication knowledge and adherence among patients in both study groups

Variable	Control group	Intervention group
Level of patient medication knowledge		
On admission, mean (%)	62.70	62.59
Day 7 post-discharge, mean (%)	62.02	68.82
Day 14 post- discharge, mean (%)	62.47	68.59
Level of patient medication adherence		
On admission, mean (%)	79.00	78.57
Day 7 post-discharge, mean (%)	80.47	88.67
Day 14 post- discharge, mean (%)	80.82	84.86

Table 3 shows the trend in the participants' medication knowledge on admission, 7-days post discharge and 14-days post discharge within the intervention group. At admission, 50% participants did not know the name of their medication although 21.42% were fairly confident and their pronunciation would be understood. The confidence in pronunciation had slightly improved 7-and 14-days post discharge and only 42.86% did not know their medication by name. There is a noted increment in confidence of knowing the strength, how many/how much and when to take medication, from 2.38% at admission and 4.76% at both follow-up points. On admission, 26.19% could not describe what the medication was used for. This improved after the intervention to only 11.90% 7-dayspost discharge and 16.67% 14-days post discharge. In a situation where participants forgot to take their medication on time, 92.86% would take appropriate action at admission, which increased to 100%, was noted at both follow-up points. About 83.33% participants at admission could not describe (or were incorrect) the possible side effects of medication they take. However, this improved to 45.24% and 47.62% at 7-days and 14-days post discharge, respectively.

Table 3: Patient's medication knowledge in the intervention phase

Questions	Medication knowledge at admission (%)	Medication knowledge 7-days post discharge (%)	Medication knowledge 14-days post discharge (%)
What is the name of your medication (Describe the box)	1. 21 (50) 2. 6 (14.28) 3. 9 (21.42) 4. 6 (14.28)	1. 18 (42.86) 2. 8 (19.05) 3. 10 (23.81) 4. 6 (14.28)	1. 18 (42.86) 2. 7 (16.67) 3. 11 (26.19) 4. 6 (14.28)
What dose do you take, including prn medication?	1. 41 (97.62) 2. 1 (2.38)	1. 40 (95.24) 2. 2 (4.76)	1. 40 (95.24) 2. 2 (4.76)
What is this medication used for?	1. 11 (26.19) 2. 26 (61.90) 3. 5 (11.90) 4. 0	1. 5 (11.90) 2. 25 (59.52) 3. 10 (23.81) 4. 2 (4.76)	1. 7 (16.67) 2. 23 (54.76) 3. 10 (23.81) 4. 2 (4.76)
How long do you have to take this medication for?	1. 7 (16.67) 2. 19 (45.24) 3. 16 (38.09))	1. 3 (7.14) 2. 17 (40.48) 3. 22 (52.38)	1. 4 (9.52) 2. 16 (38.10) 3. 22 (52.38)
What would you do if you forgot to take a dose of this medication?	1. 3 (7.14) 2. 39 (92.86)	1. 0 2. 42 (100)	1. 0 2. 42 (100)
Do you know about any	1. 35 (83.33)	1. 19 (45.24)	1. 20 (47.62)

possible side effects of this medication?	2. 6 (14.29) 3. 1 (2.38)	2. 18 (42.86) 3. 5 (11.90)	2. 18 (42.86) 3. 4 (9.52)

Refer to appendix B for answer codes' meaning.

Table 4 reports estimated marginal means for both medication knowledge and adherence at 7-and 14-days post discharge, using admission data as covariates. There is a slight reduction in the level of medication knowledge from 68.87% at 7-days post discharge to 68.65% 14-days post discharge. Similarly, a reduction is also noted in the level of medication adherence from 89.04% 7-days post discharge to 85.23% 14-days post discharge.

Table 4: Covariate post-discharge levels of patient medication knowledge and adherence

Variable	**Control group**	**Intervention group**	**F**	***p***	**ηp^2**
Level of patient medication knowledge					
Day 7 post-discharge, estimated marginal mean (%)	61.97	68.87	110.63	< 0.001	0.577
Day 14 post-discharge estimated marginal mean (%)	62.42	68.65			
Level of patient medication adherence					
Day 7 post-discharge estimated marginal mean (%)	80.10	89.04	41.493	<0.001	0.339
Day 14 post-discharge estimated marginal mean (%)	80.45	85.23			

5.1 Medication knowledge

A repeated measure ANCOVA was conducted to determine whether the implementation of pharmacist-provided discharge counselling had an impact on the level of medication knowledge between control and intervention groups while controlling for medication knowledge at admission as a covariate.

Preliminary checks to assess the assumptions of normality, linearity, homogeneity of regression slopes, and homogeneity of variance were undertaken to ensure that paramedic tests could be used.

A Shapiro-Wilk test indicated that patients' levels of medication knowledge were normally distributed on both days 7 (W (42) = 0.969, p =0.294) and 14 (W (42) = 0.958, p = 0.126) post discharge in the control group. A Shapiro-Wilk test indicated that the patients' medication knowledge levels were also normally distributed on both days 7 (W (42) = 0.962, p = 0.174) and 14 (W (42) = 0.968, p = 0.274) post discharge in the intervention group. A scatterplot (appendix f) indicated that the relationship between levels of patients' medication knowledge on days 7 and 14 post-discharge, and level of patients' medication knowledge at admission were linear in both the control and intervention groups. Additionally, the scatterplot indicated that the regression slopes were similar and the F test indicated that there was no interaction between level of patients' medication knowledge at admission and control (without pharmacist-provided discharge counselling) or intervention (with pharmacist-provided discharge counselling), (F (1, 80) = 1.331, p= 0.252).

Box's test of equality of covariance matrices confirmed that there was no statistically significant difference in the observed covariance matrices of the dependent variables across groups (p=0.125), thus, homogeneity of variances was not violated.

After controlling for baseline medication knowledge at admission as a covariate, there was a statistically significant effect of pharmacist-provided discharge counselling on the level of medication knowledge measured on day 7- and 14 post discharge, F (1, 81) = 41.493, p <0.001, ηp^2= 0.339.

All pairwise comparisons were run for statistically significant simple main effects with reported 95% confidence intervals (CI) and Bonferroni adjusted *p*-values. The estimated marginal mean as a covariate for medication knowledge was 62.64%, with that of control group being 62.20%, (95%CI [60.76, 63.63], SE=0.72) and 68.76%, 95%CI [67.32, 7.019], (SE=0.72) for the intervention group (M= 68.76, 95% CI [67.32, 7.019], SE=0.72).

There was a statistically significant difference in the level of medication knowledge between control and intervention groups at baseline Mdiff=6.563, 95%CI [4.536-8.590], SD=1.019, p<0.001.

The level of medication knowledge at admission was significantly related to the levels of medication knowledge on days 7 and 14 post-discharge, F (1, 81) = 273.79, p < 0.001, ηp^2 = 0.772). However, there was a significant difference in the patient's levels of medication knowledge measured on days 7 and 14 after discharge within each group (control and intervention), F (1, 81) = 9.03, p = 0.004, ηp^2=0.100 (difference between measures of the two point-times was statistically significant). Moreover, the difference in the levels of medication knowledge measured on days 7 and 14 after discharge was not significantly related to the patients' group, F (1,81) = 2.45, p < 0.122, ηp^2 = 0.029.

5.2 Medication adherence

A repeated measures ANCOVA was conducted to examine whether the level of patients' medication adherence differed between the intervention and control groups while controlling for adherence at admission.

Preliminary checks were completed to assess the assumptions of normality, linearity, homogeneity of regression slopes, and homogeneity of variance.

A Shapiro-Wilk test indicated that levels of patients' adherence to medication were normally distributed on both days 7 (W (42) = 0.974, p =0.442) and 14 (W (42) = 0.948, p = 0.055) post discharge in the control group, as well as in the intervention group (day 7 (W (42) = 0.970, p = 0.337) and day 14 (W (42) = 0.966, p = 0.245).

A scatterplot (appendix F) indicated that the relationship between levels of patients' adherence on days 7 and 14 post-discharge, and adherence at admission were linear in both the control and intervention groups. Additionally, the scatterplot indicated that the regression slopes were similar and the F-test indicated that there was no interaction between level of patients' adherence to medication at admission and group F (1, 80) = 0.034, p= 0.854.

Levene's test indicated that the assumption of homogeneity of variance on days 7 (F (1, 82) = 3.563, p = 0.063) and 14 (F (1, 82) = 1.039, p = 0.311) post-discharge was not violated.

After controlling for the level of patients' adherence to medication at admission, there was a statistically significant difference in the levels of adherence to medication on days 7 and 14 post-discharge because of pharmacist-provided counselling, F (1, 81) = 110.63, p < 0.001, ηp^2 = 0.577. Estimated marginal means of adherence levels were different in the control (80.27%, (95%CI [79.36, 81.19], SE

= 0.46) and intervention (87.14%, (95%CI [86.22, 88.05], SE = 0.46) groups. The level of adherence at admission was significantly related to the levels of adherence on days 7 and 14 post-discharge, $F (1, 81) = 126.35$, $p < 0.001$, $\eta p^2 = 0.609$. In addition, there was no significant difference in the patient's levels of adherence measured on days 7 and 14 after discharge from hospital within each group (control and intervention), $F (1, 81) = 0.03$, $p = 0.862$, $\eta p^2=0.001$ (difference between measures of the two point-times was not statistically significant). The difference in the levels of adherence measured on days 7 and 14 after discharge from hospital was significantly related to the patients' group, $F (1,81) = 31.248$, $p < 0.001$, $\eta p^2 = 0.278$. There is a statistically significant reduction of 3.81 $p<0.001$ in the level of adherence from 7-days post discharge and 14-days post discharge. There was a statistically significant difference in adherence level between control and intervention phase; 6.86, 95% CI [5.56-8.161], SE= 0.370, $p<0.001$.

6.0 DISCUSSION

6.1 Patients' level of medication knowledge before and after implementation of pharmacist-provided discharge counselling service

The current study found a statistically significant increase in the level of medication knowledge between control and intervention group because of pharmacist-provided discharge medication education and counselling. Similarly, a study done by Elson *et al.,* found that patients who received hospital pharmacist counselling as an intervention were significantly more likely to remember being counselled on the purpose of their new medicine and how to take the medicine compared to those who received usual care (22). Further, Elson *et al.,* reported that relatively fewer patients who had received counselling stated they had not received as much information as they wanted compared with patients who received standard discharge counselling.

Medication knowledge has been found to be a determinant of medication adherence in patients with HTN (21). The ability to remember the names of drugs, their timing, the correct dose and indications have been shown to be associated with non-adherence. A recent study undertaken by Kampamba *et al.* reported that knowledge about HTN and its treatment influence adherence (21). The improvement in patients' levels of medication knowledge and adherence noted in the current study are similar to findings of a study conducted by Morisky. who examined the relationship between medication knowledge and adherence of patients on long-term therapy for one or more chronic illnesses in Jordan. Morisky reported a significant correlation between patients' medication knowledge and their adherence to medications (24). Although the study done by Morisky was a cross sectional survey and used a different tool to collect data, the data was collected with a questionnaire through a 5 to 10-minute face-to-face interview, which was similar to this current study. Further, participants were on chronic medication with a minimum of one chronic diagnosis and questions, though not identical, were similar to ones in the questionnaire used in this study. However, the study by Elson *et al.,* the aim of the current study was not to report the proportion of patients' who remembered if they received pharmacist-provided discharge counselling. Notwithstanding the difference in the objectives, Elson *et al.,* concluded that targeted counselling by hospital pharmacists increased patients' knowledge of medicines newly prescribed in the hospital. However, Elson *et al.,* did not specifically report on patients' level of medication knowledge (22).

Patients' confidence, self-efficacy, adherence and understanding on how to take their medications can be improved and boosted by providing tailored educational counselling and adequate information about medications such as indication of medication, clear instructions on medication use to patients (8). Defining and incorporating a practical education methods in patients' medication counselling will help increase the knowledge of each patient regarding the medication he or she takes, and thus improves their medication adherence (22). There is a clear relationship between medication knowledge and the level of adherence If a person knows what medication they take, possible side effects, how and why they take them; such knowledge may help to boost their adherence level (24). This current study also found a relationship between medication adherence and medication knowledge.

A recent study conducted by Kampamba *et al.,* in Matero hospital, a level one hospital in Lusaka city, found that the hypertensive patients' adherence to medication was generally poor (21). This finding by Kampamba *et al.,* is similar with the findings of the current study with respect to patients' level of medication adherence on admission to hospital. Kampamba *et al.,* recommended health education and counselling to patients with uncontrolled HTN in order to improve patients' medication knowledge and adherence. Devkota *et al.,* conducted a pre-post interventional counselling study at Manipal Teaching Hospital in Nepal to assess the knowledge, attitude and practice (KAP) of pregnant women before and after counselling (27). Devkota *et al.,* noted a significant improvement in the KAP-scores of the respondents from baseline (on admission) data to post-counselling (27). A higher number of patients after the intervention could tell the name of medicine prescribed, had knowledge of the use of prescribed medicines, knew that medicines could cause adverse effects, had a knowledge that unnecessary medicines could harm mother and foetus, and knew that not all medicines might be safe during pregnancy. They found that very few participants had knowledge about the medicines prescribed and their uses (27). However, Devkota *et al.,* concluded that counselling had a better impact on knowledge, attitude and practice of the pregnant women regarding medication use in pregnancy. They further recommended that hospitals and other health care facilities should allocate sufficient resources to counsel pregnant women, as this would not only improve patient compliance and medication adherence, but could also be a milestone to prevent medication misadventures during pregnancy (27). The current study has demonstrated that education offered through pharmacist-provided discharge counselling to patients regarding their medication; have significantly improved patients' medication knowledge compared with usual care.

6.2 Patients' level of medication adherence before and after implementation of pharmacist-provided discharge counselling service

The current study noted a statistically significant difference in the levels of patient adherence to medication on days 7 and 14 post discharge because of pharmacist-provided counselling. The findings of the current study are consistent with those of a similar study a hospital, based in France, by Leguelinel-Blache *et al*, in which patients' adherence (measured by percent of discharge medications filled at a pharmacy) increased from 51% at baseline to 66% after a pharmacist conducted initial counselling on admission (17). In contrast, the current study focused on counselling at discharge, which may be an even more critical transition of care point. The only noted difference in these two studies could be because the studies were conducted in different settings and adherence to medication was defined and measured differently, at different points of patient care. Leguelinel-Blache *et al.*, also highlighted the importance of pharmacist-discharge counselling sessions to improve outpatients' primary medication adherence (17). The level of medication adherence in the current study is moderate. In a meta-analysis study, adherence to antihypertensive medication among a hypertensive population in Ethiopia was also reported to be moderate (28). In addition, a randomized controlled trial done by Pontarolo &Fernandez-llimo (15) found that pharmacist-provided discharge medication counselling significantly contributed to better medication adherence (p <0.05). In the current study's medication adherence questionnaire, one of the questions focused on how often patients missed taking their medication due to carelessness. Abdusalim *et al.*, found that carelessness with respect to taking medicines among the patients was one of the main drivers for non-adherence in COPD (8). This was the case in the current study as most patients tended to forget to take their medication and/or decided not to take their medication on days when they have their doctors' visit/follow-up. Abdusalim *et al*., found that medication adherence was significantly improved from 49% at the baseline to 80% after 24 months due to pharmacist-provided counselling (8). This was a significant impact, with 31% improvement in the level of adherence on admission, compared to the current study's 8% increment. Adherence was a higher baseline in the current study compared to the Abdusalim study. The difference in the findings of the two studies may be due to different study designs and tools used in assessing patients' adherence level. In addition, patients in the Abdusalim study, were assessed four times over longer time intervals (6, 12, 18 and 24 months) post-discharge and were supplied with patient information leaflets (PILs) for reinforcing the content delivered through counselling (8). The current intervention was less intensive as participants were only followed-up twice post-discharge over shorter intervals and were not provided with any PILs which could have affected the findings. In another observational study conducted by Bisharat *et al.,* (12) at Nazareth and Haemek hospitals in Israel, patients' adherence to medication was higher in the intervention group (77.83 ± 22.85) compared to the control group (62.46 ± 24.5). Pharmacist-provided counselling had statistically significant effect on patients' level of medication adherence, resulting in 11.6% improvement in medication adherence, [$F(1, 73) = 9.43$, $p < 0.003$]. This finding is consistent with that of the current study ($F(1, 81) = 110.626$, $p < 0.\ 001$). Even though physicians and nurses contribute to improving adherence, pharmacists have demonstrated the ability to inform, problem-solve and provide performance support directly to patients (12). In comparison, Bisharat *et al.* conducted a study that examined the role of pharmacists as healthcare professionals in improving adherence enhancement (12), while a few studies cited, including the current study, focused on assessing the contribution of pharmacists' medication counselling to patients discharged from hospitals. Bisharat *et al.,* found that pharmacists could play an essential role in initiating education to patients and in monitoring their adherence in order to improve their treatment outcomes.

Education and counselling regarding medication therapy given to patients at discharge has been shown to affect demand and utilization of health services (12). This can be evidenced to aid and guide implementation of pharmacist-provided discharge counselling in the hospital to improve patients' health and reduce the burden on the health system by improving medication adherence and subsequent readmissions. The impact of discharge counselling on adherence may wear off over time. Arecent single-centred, prospective, non-randomized comparative study done in Canada by Neville *et al.,* enrolled patients with a primary diagnosis of acute coronary syndrome (ACS) over a year. The main objective was to determine whether a standardized counselling intervention by a clinical pharmacist at hospital discharge significantly improved patients' adherence to cardiovascular medications (29). The authors found that; there were no statistically significant differences between patients who did and did not receive counselling in terms of rates of non-adherence a year after discharge. Neville *et al.,* suggested the need for higher-quality evidence to determine the most effective and practical interventions to ensure that patients adhere to their medication regimens and achieve positive outcomes after ACS (29).

7.0 CONCLUSION

This pilot study of the impact of pharmacist-provided medication discharge counselling was successfully implemented. Participants' level of both medication knowledge and adherence was improved between the control and intervention group. Based on the findings of the current study, pharmacist-provided discharge counselling has a statistically significant and positive effect on both patient's medication adherence and knowledge. Pharmacist-provided discharge counseling service can likely contribute to better patient chronic health outcomes in CV disease through improved adherence and medication understanding. Hospital pharmacists should continuously and actively participate in counselling patients about their medications prior to hospital discharge. Further investigation into the most effective methods of counselling in Namibia can further augment this work.

8.0 RECOMMENDATIONS

Windhoek Central Hospital (and other state hospitals) should consider implementing a pharmacist-provided discharge counselling service to improve adherence and medication knowledge. Patients receiving the pharmacist-provided discharge counselling service should have continuous counselling at regular intervals to avoid a decline in both adherence and medication knowledge. Further studies should be conducted over longer periods with an increased sample size to measure the impact of pharmacist-discharge counselling on long-term outcomes in various chronic conditions at different facilities.

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APPENDICES

APPENDIX I: ETHICAL CLEARANCE

UNAM

UNIVERSITY OF NAMIBIA

ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: H-G CAMPUS /566/2020 Date: 7 July, 2020

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: The Impact Of Pharmacist-Provided Discharge Counseling On Medication Knowledge And Adherence Among Patients With Hypertension And Heart Failure At Rhinopark Private Hospital, Windhoek

Researcher: LIISA NDAPEWA ANGUUO

Student Number: 201120003

Supervisor(s): *Prof. T. Rennie (Main) Mr. Mwangana Mubita (Co)*

Campus: Hage Geingob Campus

Take note of the following:

(a) Any significant changes in the conditions or undertakings outlined in the approved Proposal must be communicated to the HREC. 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 HREC.

(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 HREC.

(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;

(iii) Cognizance and the observation of Namibia's Research Science and Technology Act, 2004 which makes it compulsory for Non-Namibian based researchers to obtain the compulsory Research Permit from the National Commission on Research Science and Technology (NCRST), FIRST, BEFORE the research can commence.

HREC wishes you the best in your research.

Dr. J.E. de Villiers : UREC Chairperson

pp.

Ms. P. Claassen: HREC Secretary

APPENDIX II: MINISTRY OF HEALTH AND SOCIAL SERVICES RESEARCH PERMISSION

REPUBLIC OF NAMIBIA

Ministry of Health and Social Services

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OFFICE OF THE EXECUTIVE DIRECTOR

Ref: 17/3/3/LNA
Enquiries: Mr. Andreas Shipanga

Date: 15 October 2020

Ms. Liisa Ndapewa Anguuo
PO Box 8039
Bachbrecht
Windhoek

Dear Ms. Anguuo

Re: Request for amendment for "The impact of pharmacist-provided discharge counselling on medication knowledge and adherence among patients with Hypertension and heart failure at Rhino Park Private Hospital, Windhoek" study.

1. Reference is made to your application of the above-mentioned study that was approved on the **10 August 2020**.

2. Kindly be informed that the request for amendments of the study has been approved. **Permission is therefore granted to change the study setting from Rhino Park Private Hospital to Windhoek Central Hospital cardiac unit.**

3. Any other amendments on the study protocol must be submitted to the Ministry for approval

Yours sincerely,

EXECUTIVE DIRECTOR
MINISTRY OF HEALTH AND SOCIAL SERVICES

BEN NANGOMBE
EXECUTIVE DIRECTOR

"Your Health Our Concern"

APPENDIX III: WINDHOEK CENTRAL HOSPITAL RESEARCH PERMISSION

Private Bag 13215 Windhoek Namibia	Harvey Street Windhoek Central Hospital	Tel. No: (061) 203 3024 Fax No: (061) 222886
Enquiries: Mrs. S.Iipinge	Ref.	Date: 05 November 2020

OFFICE OF THE MEDICAL SUPERINTENDENT

Ms. Liisa Anguuo
P.O.BOX 8039
0812208008

Dear Ms. Anguuo

SUBJECT: PERMISSION TO CONDUCT A RESEARCH STUDY ON THE IMPACT OF PHARMACIST- PROVIDED DISCHARGED COUNSELLING ON MEDICATION KNOWLEDGE AND ADHERENCE AMONG PATIENTS WITH HYPERTENSION AND HEART FAILURE AT WINDHOEK CENTRAL HOSPITAL

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 to be submitted to Customer care office, Windhoek Central Hospital upon completion of the study.

Thank you.

Yours sincerely,

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DR. F. ZAM
ACTING CHIEF MEDICAL SUPERINTENDENT

06 -11- 2020
WINDHOEK CENTRAL HOSPITAL

APPENDIX A: MEDICATION ADHERENCE ASSESSMENT FORM

Participant Details

Participant code:	
Date:	
Age:	
Gender:	
Date of admission:	
Date of discharge:	
Pharmacist Initials:	

	HTN (1)	**HF (2)**	**HTN/HF (3)**
Diagnosis			

Hill-Bone Medication Adherence Scale (9-item) –(HB-MAS)

No.	**Item**	**Response:** 1. All the time 2. Most of the time 3. Some of the time 4. None of the time
1.	*How often do you forget to take your HTN/HF medicine?*	
2	*How often do you decide NOT to take your HTN/HF medicine?*	
3.	*How often do you forget to get prescriptions filled?*	
4.	*How often do you run out of HTN/HF pills?*	
5.	*How often do you skip your HTN/HF medicine before you go to the doctor?*	
6.	*How often do you miss taking your HTN/HF when you feel better?*	
7.	*How often do you miss taking your HTN/HF when you feel sick?*	
8.	*How often do you take someone else's HTN/HF pills?*	

9.	*How often do you miss taking your HTN/HF when you are careless?*	

APPENDIX B: MEDICATION KNOWLEDGE ASSESSMENT FORM

- *List the patient's prescription medication including the dosage, form and indication.*
- *For each medication listed, ask the patient questions A to F on the "structured approach to assessing patients' knowledge of their medication"*
- *Record the score for each question in the appropriate column. If the*

patient is unable to or does not know, assign a score of zero.

Prescribed Medication	***Dosage***	***Form***	***Indication***	***A***	***B***	***C***	***D***	***E***	***F***	
1.										
2.										
3.										
4.										
5.										
6.										
Scoring: *For each column, A-F, please add the total number of points and indicate in the boxes to the right.*			***Column totals:***	***A***	***B***	***C***	***D***	***E***	***F***	***Total score:***

Structured approach to assessing patients' knowledge of their medication

Ask the patient the following questions "about each prescribed medication and score

		Score
A.	**What is the name of your medication? (describe box or pill)**	**Score**
	Does not have any idea of the name of the medication.	*1*
	Unsure of the name, pronunciation would not be understood.	*2*
	Fairly confident-pronunciation would be understood.	*3*
	Confident about the name-pronunciation correct.	*4*
B.	**What dose do you take (including 'prn' medication)?**	**Score**
	Does not know how many/how much to take or frequency of administration.	*1*
	Knows how many/how much to take, unsure of frequency of administration.	*2*
	Does not know strength but knows how many/how much to take and frequency.	*3*
	Is confident, knows strength, how many/how much and when to take it.	*4*
C.	**What is this medication used for?**	**Score**
	Has no idea what the medication is used for.	*1*
	Not confident, but has some knowledge with prompting.	*2*
	Knows lay terms (e.g., water tablet).	*3*
	Knows what the medication is and why to take it.	*4*
D.	**How long do you have to take this medication for?**	**Score**
	Has no idea if it is long- or short-term therapy.	*1*
	Unsure, but would seek advice before running out.	*2*
	Knows if it is long or short-term therapy.	*3*
E.	**What would you do if you forgot to take a dose of this medication?**	**Score**
	Would act inappropriately (e.g., take double the quantity next time).	*1*
	Would seek advice from pharmacist, nurse, carer or GP.	*2*
	Would take appropriate action (e.g., take correct dose next time).	*3*
F.	**Do you know about any possible side effects of this medication?**	**Score**
	No idea of the side effects or is incorrect about the side effects.	*1*
	Knows some of the side effects.	*2*
	Knows all of the important side effects.	*3*

APPENDIX C: PARTICIPANT INFORMATION SHEET

TITLE OF THE RESEARCH PROJECT: *THE EFFECT OF PHARMACIST-PROVIDED DISCHARGE COUNSELLING ON MEDICATION ADHERENCE AND KNOWLEDGE AMONG PATIENTS WITH CARDIOVASCULAR DISEASES AT WINDHOEK CENTRAL HOSPITAL, NAMIBIA*

PRINCIPAL INVESTIGATOR: *Ms. LIISA ANGUUO*

ADDRESS: *WINDHOEK CENTRALHOSPITAL, HARVEY STREET, WINDHOEK NORTH*

CONTACT NUMBER: *0612033111 /0612033159*

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 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. In addition, your participation is 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 Committees at the University of Namibia and Ministry of Health and Social Services, and will be conducted according to the ethical guidelines and principles of the International Declaration of Helsinki and Namibian National Research Ethics Guidelines. The management of Windhoek Central Hospital has granted permission for this study to take place at the hospital.

1. What is this research study all about?

The study will be conducted at Windhoek Central Hospital (WCH)'s 4-west ward. We expect to have at least 76 participants during the study period of 6-months.

The study aims to pilot the implementation of a pharmacist-provided discharge-counselling service and evaluate its impact on patients' medication adherence and medication knowledge at WCH. This study focuses on patients with heart conditions such as high blood pressure and HF.

2. Why have you been invited to participate?

You have been invited because you are aged 18 years or older and you admitted to WCH's 4-west ward with HTN and/or HF and you are on medication therapy.

3. What will your responsibilities be?

Your responsibilities will be to truthfully answering some questions relating to you, your condition and medicines. Three short interviews will be done – personally within a day of your admission, 7 and 14 days after your discharge from hospital at a time convenient to you. The interviews after your hospital discharge will be done over the phone. You will therefore need to provide us with your mobile/telephone number. Each interview will take about 10 minutes.

4. Will you benefit from taking part in this research?

There is no immediate benefit to you by participating in the study. However, the information obtained from this study may help improve medication-counselling service at Windhoek Central Hospital.

5. Are there risks involved in your taking part in this research?

There are no risks involved, as every effort will be made to keep your information confidential.

6. If you do not agree to take part, what alternatives do you have?

You may refuse to participate in the study. There are no alternatives for this. You will not lose any of your rights/privileges by refusing to participate in this study.

7. Who will have access to your information provided and recorded?

Every effort will be made to maintain the privacy if your information within the limits of Namibian Laws. Your personal details such as name and date of birth will not be recorded. We may publish the results of this study in a thesis or journal or present in scientific meetings, if we do, we will not use your personal details.

8. Will you be paid to take part in this study and are there any costs involved?

You will not receive any payment for taking part in this study. You will not spend any money to participate in this study.

9. Is there anything else that you should know or do?

(i) You can contact the principal investigator on telephone: +264612033111 or +264612033160 if you have any further queries or encounter any problems.

(ii) You will receive a copy of this information sheet and consent form for your own records.

APPENDIX D: PARTICIPATION CONSENT FORM

A. Declaration by the participant

By signing below, I ………………………………………….. agree to take part in a research study entitled THE EFFECT OF PHARMACIST-PROVIDED DISCHARGE COUNSELLING ON MEDICATION KNOWLEDGE AND ADHERENCE AMONG PATIENTS WITH CARDIOVASCULAR DISEASES AT WINDHOEK CENTRAL HOSPITAL, NAMIBIA.

I declare that:

a. *I have read or had read to me the information sheet and this consent form and is written in a language, 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 have not been pressurized to take part.*
d. *I may choose to leave the study at any time and will not be penalized or prejudiced in any way.*

Signed at (place)…………………………….. on (date)………2020

Signature of participant: *Signature of witness:……………………*

B. Declaration by the principal investigator

I, LIISA ANGUUO declares that:

a. *I have explained the information about the study to ………………………………..*
b. *I encouraged him/her to ask questions and took adequate time to answer them.*

c. I am satisfied that he/she adequately understands all aspects of the research, as discussed above.

d. I did/did not use an interpreter. (If an interpreter is used then the interpreter must sign the declaration below).

Signed at (place)………………………….. On (date)………....2020

Signature of investigator……………………….. Signature of witness…..............................

C. Declaration by interpreter

I …………………………………………….. declare that I assisted the investigator (name)………………….to explain the information in this document to (name of participant) ……………………….. using the language medium of (Oshiwambo, Otjiherero, Damara-Nama, Afrikaans etc.).

APPENDIX E: PHARMACIST-PROVIDED DISCHARGE COUNSELLING TOOL

PROCEDURE

The educational programmes will be ongoing during the intervention phase. Pharmacists will be trained in a standard process to provide discharge counselling. Items to be discussed include the indication for each medication, dose and frequency, what to do for missed doses, possible side effects and what to do in such cases, storage instructions and lifestyle educational modifications.
Counselling will be structured according to the three Prime Question Model; this has been recommended as a way to implement an interactive approach to patient's counselling in pharmacy. Moreover, educational programmes will involve presentations to pharmacists on a number of topics including medication history taking, assessment of patient medication knowledge and adherence, and discharge medication counselling.

WHAT TO INCLUDE IN YOUR COUNSELLING?

1. **What did your doctor tell you this medication is for?**

   - The name and/or description of the box or pill. The medication’s use and expected benefits and action. This may include whether the medication is intended to cure a disease, eliminate or reduce symptoms, arrest or slow the disease process, or prevent the disease or a symptom.

2. **How did your doctor tell you to take this medication?**

   - Dose and frequency
   - How long do you have to take this medication for?
   - What to do for missed doses

3. **What did your doctor tell you to expect?**

   - Potential common and severe adverse effects that may occur, actions to prevent or minimize their occurrence, and actions to take if they occur, including notifying the prescriber, pharmacist, or other health care provider.

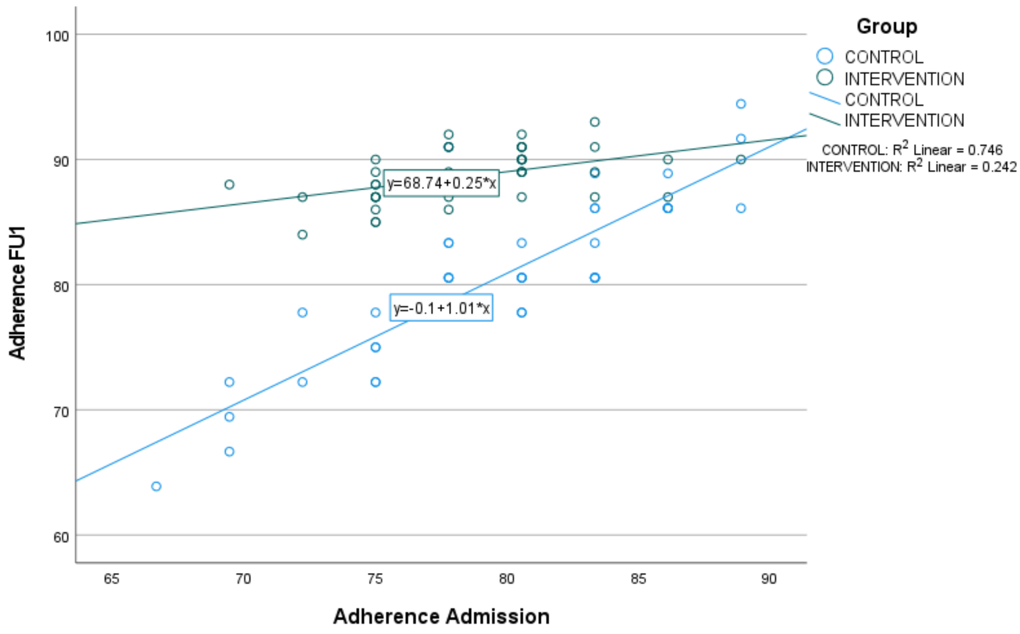
- Techniques for self-monitoring of the pharmacotherapy.
- Potential drug–drug (including non-prescription), drug–food, and drug–disease interactions or contraindications.

4. **Others**

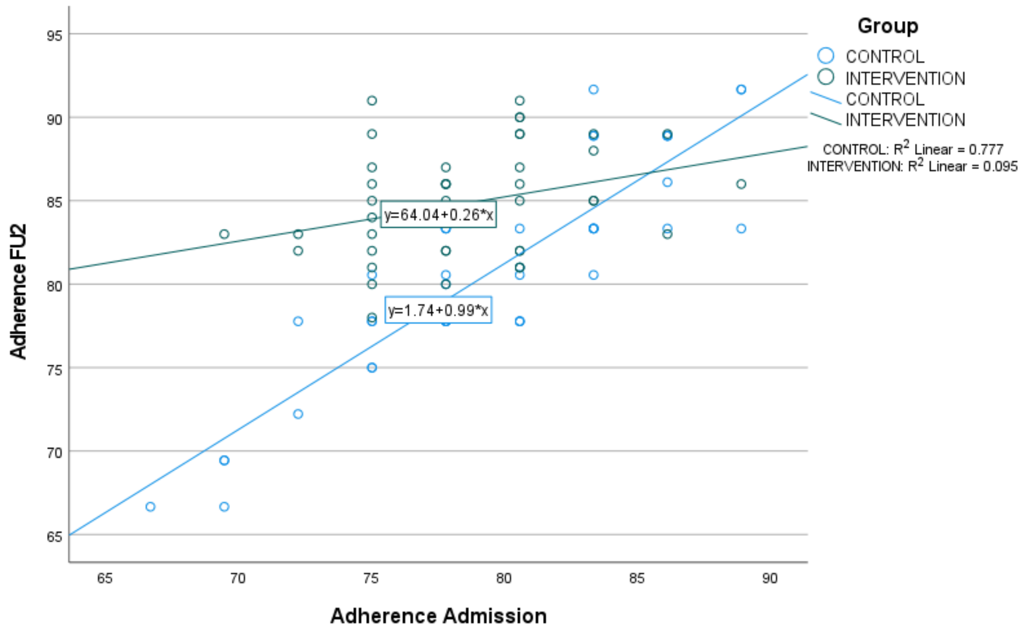
- Storage instructions
- Lifestyle educational modifications and any other information unique to an individual patient or medication.

APPENDIX F: SCATTER PLOTS

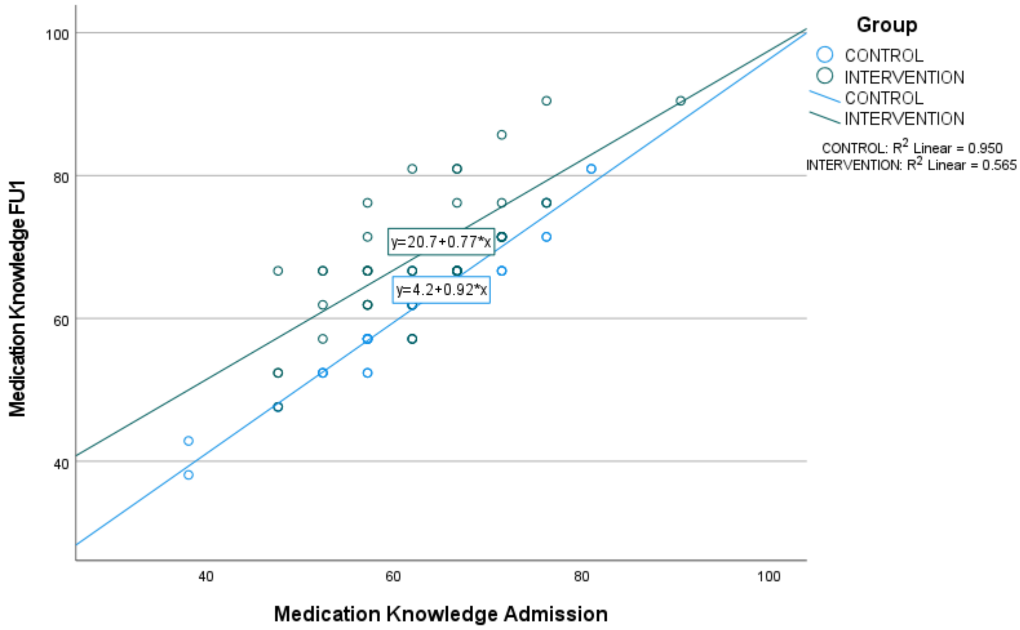
i. Scatterplot =Adherence at admission with adherence 7-days post discharge by group



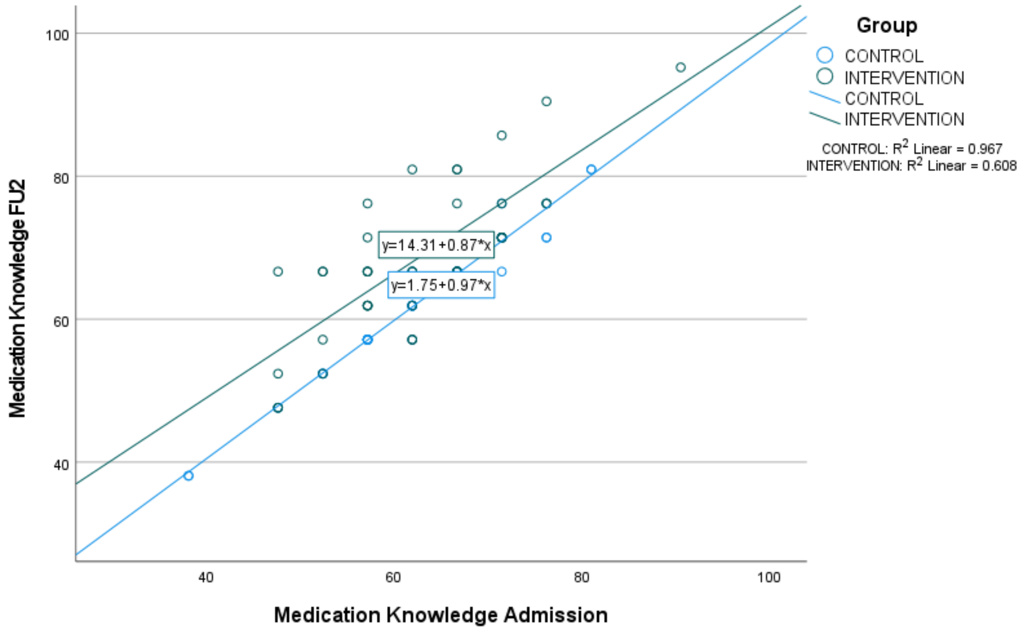
ii. Scatterplot = Adherence at admission with adherence at 14-days post discharge by group



iii. Scatterplot = Medication knowledge at admission with medication knowledge 7-days post discharge by group



iv. Scatterplot = Medication knowledge at admission with medication knowledge at 14-days post discharge by group


Group
CONTROL
INTERVENTION
CONTROL
INTERVENTION
CONTROL: R2 Linear = 0.967
INTERVENTION: R2 Linear = 0.608
y=14.31+0.87*x
y=1.75+0.97*x
Medication Knowledge FU2
Medication Knowledge Admission
100
80
60
40
40
60
80
100