

ASSESSMENT OF MANAGEMENT OF NEWBORN BABIES WITH NEONATAL
ASPHYXIA AT MATERNITY UNITS OF A STATE HOSPITAL IN WINDHOEK

A RESEARCH THESIS SUBMITTED IN FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF NURSING SCIENCE
OF
THE UNIVERSITY OF NAMIBIA

BY

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MARCH 2018

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ABSTRACT

Despite guidelines on essential and obstetric emergency care devised by the Ministry of Health and Social Services to address obstetric and neonatal related challenges in Namibia, the report on perinatal and neonatal death review of April 2010 - March 2012, indicated that birth asphyxia is in first position contributing 49.4 % to neonatal deaths. This reflects the severity of asphyxia as a public health concern in Namibia (MoHSS, 2014).

The aim of the study was to assess the management of newborn babies with neonatal asphyxia at maternity units of a hospital in Windhoek. A quantitative, descriptive and retrospective study was used on a total population of 90 patients' files who died due to asphyxia. The sample and the population were the same (90 numbers of patients' files). Data were collected by means of a structured checklist, analyzed with Epi info 7, as software computer package for statistical analysis purpose and presented as descriptive statistics. The results of the study showed that there was a delay with early recognition and timely decision-making on the safer method of delivery especially for cases of breech presentations, cephalopelvic disproportion (CPD) and prolonged first stage of labour. Referral of patients from district and regional hospitals to a national referral hospital takes too long. The results of the study further showed that many deliveries were conducted by registered midwives in the absence of a pediatrician or medical doctor.

Recommendations were made with regard to improvement of knowledge and skills on maternal and neonatal care by health care providers in order to provide quality antenatal care to pregnant women, conduction of safe deliveries and provision of efficient care to the new-born babies who are at risk of asphyxia. Deliveries of cases at risk to be conducted with the presence of a paediatrician for expert resuscitation. Regulations of the referral system on maternal care should strictly be put in place regarding the hours mothers have to stay in labour after complications have been detected to prevent avoidable neonatal deaths especially due to asphyxia.

TABLE OF CONTENTS

ABSTRACT.....	ii
TABLE OF CONTENTS.....	iv
LIST OF FIGURES	vii
LIST OF TABLES	ix
ABBREVIATIONS AND ACRONYMS	x
DEDICATION	xi
ACKNOWLEDGEMENTS	xiii
CHAPTER 1: INTRODUCTION AND BACKGROUND	1
1.1. Introduction.....	1
1.2 Background of the study	3
1.3 Statement of the research Problem.....	5
1.4. Purpose of the Study	6
1.5. The Objectives of the Study.....	6
1.5 Significance of the Study	7
1.6. Paradigmatic Perspectives of the Study	7
1.6.1 Ontology	8
1.6.2 Epistemology	8
1.6.3 Axiology	9
1.7. Definition of the key concepts in the study.....	10
1.8 Outline of chapters.....	10
1.9. Summary	11
CHAPTER 2: LITERATURE REVIEW	12
2.1 Introduction.....	12
2.2 DESCRIPTION OF ASPHYXIA AND MANAGEMENT	13
2.2.1 Neonatal Asphyxia.....	13
2.2.2 Universal factors associated with neonatal asphyxia	14
2.2.3 Management of universal factors which are associated with neonatal asphyxia	17
2.3 THE MANAGEMENT OF NEWBORN WITH ASPHYXIA	19

2.3.1 The management of newborn with asphyxia at birth.	20
2.3.2 The management of a newborn with asphyxia after birth.	23
2.4 Theoretical Framework.....	29
2.5 Summary.....	32
CHAPTER 3: RESEARCH DESIGN AND METHOD	34
3.1 Introduction.....	34
3.2 Research design	34
3.2.1 Quantitative design	34
3.2.2 Descriptive study.....	35
3.2.3 Retrospective study	35
3.2.4 Research method.....	36
3.2.5 Study population	36
3.2.6 Sampling	36
3.2.7 Inclusion criteria	37
3.2.8 Exclusion criteria	37
3.2.9 Data collection method	37
3.3. Validity and reliability	39
3.3.1 Validity	39
3.3.2 Reliability of the instrument	40
3.3.3 Pre-test	41
3.3.4 Data collection procedure	41
3.3.5 Data analysis	42
3.4 Ethical considerations	42
3.5 Summary	43
CHAPTER 4: DATA ANALYSIS AND INTERPRETATION OF RESULTS.....	44
4.1. Introduction.....	44
4.2. PRESENTATION OF RESULTS	45
4.2.1 SECTION A: DEMOGRAPHIC INFORMATION.....	45
4.2.2. SECTION B: MANAGEMENT OF BABIES WITH ASPHYXIA AT BIRTH:	50
4.2.3 SECTION C: MANAGEMENT OF BABIES WITH ASPHYXIA AFTER BIRTH.	58

CHAPTER 5: DISCUSSIONS, CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY	84
5.1. Introduction.....	84
5.2. DISCUSSION OF RESULTS.....	84
5.2.1 ASSESSMENT	84
5.2.2 MANAGEMENT OF BABIES WITH ASPHYXIA AT BIRTH.....	88
5.2.3 MANAGEMENT OF NEWBORN BABIES WITH ASPHYXIA AFTER BIRTH. .	93
5.2.4 PLANNING	103
5.2.5 IMPLEMENTATION	104
5.2.6 EVALUATION.....	106
5.2.7 RECORD KEEPING	107
5.3 Conclusions of the study	108
5.3.1 Conclusions regarding the first objective:.....	108
5.3.2 Conclusions regarding the second objective:	109
5.2.3 Conclusions regarding the third objective:	110
5.4. Recommendations.....	111
5.5 Limitations of the study	112
5.6 Summary	113
Reference list	114
ANNEXURES	121
ANNEXURE 1: LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH ON MoHSS PREMISES.....	121
ANNEXURE 2: PERMISSION LETTER FROM THE OFFICE OF THE PERMANENT SECRETARY OF THE MoHSS.....	122
ANNEXURE 3: LETTER OF PERMISSION FROM UNAM POSTGRADUATE STUDIES RESEARCH COMMITTEE	124
ANNEXURE4: CHECKLIST FOR DATA COLLECTION FOR A NEWBORN BABY WITH ASPHYXIA	125
ANNEXURE 5: EDITORIAL AND STATISTICAL ANALYSIS CONFIRMATION LETTER	132

LIST OF FIGURES

	Page
Figure 4.1: Number of days lived by asphyxiated babies before death	45
Figure 4.2: Weight distribution of babies	46
Figure 4.3: Gestation period	47
Figure 4.4: Mode of delivery	47
Figure 4.5: Apgar score	48
Figure 4.6: Head circumference	49
Figure 4.7: People who conducted delivery	52
Figure 4.8: Presence of pediatrician or medical doctor at birth	52
Figure 4.9: Resuscitation was done at birth	53
Figure 4.10: History of the mother being tired during second stage of labour	53
Figure 4.11: Shoulder dystocia	54
Figure 4.12: Fetal distress at birth	55
Figure 4.13: Cephalopelvic disproportion	55
Figure 4.14: Trauma at birth	56
Figure 4.15: Ante Partum Hemorrhage	56
Figure 4.16: Pregnancy-induced hypertension	57
Figure 4.17: Resuscitation after birth	58
Figure 4.18: Intubation	59
Figure 4.19: Type of oxygen therapy	59
Figure 4.20: Ventilation in days	60
Figure 4.21: Administration of oxygen	60
Figure 4.22: Level of oxygenation	61
Figure 4.23 Chest X-Rays	61
Figure 4.24: Blood pressure assessment	62
Figure 4.25: Administration of inotropes	63

Figure 4.26: Treatment of hypovolemia with a bolus of saline	63
Figure 4.27: Fluid intake and output	65
Figure 4.28: Urea level	66
Figure 4.29: Creatinine level	66
Figure 4.30: Hyper/hypoglycemia treatment	67
Figure 4.31: Seizures	68
Figure 4.32: Sodium bicarbonate given for acidosis	69
Figure 4.33: Full Blood Count tests	70
Figure 4.34: Blood transfusion for low Haemoglobin	71
Figure 4.35: Platelets transfusion	71
Figure 4.36: C-Reactive Protein (CRP)	72
Figure 4.37: CRP level	73
Figure 4.38: Blood gases	74
Figure 4.39: Thompson score	75
Figure 4.40: Administration of sedatives	76
Figure 4.41: Assessment of the general body appearance	77
Figure 4.42: Nursing care plan	77
Figure 4.43: Execution of orders	78
Figure 4.44: Orders that were not carried out	79
Figure 4.45: Reporting of newborn babies' conditions	80
Figure 4.46: Receipt of prescribed medication	81
Figure 4.47: Monitoring of babies' conditions	81
Figure 4.48: Changes in the condition	82

LIST OF TABLES

	Page
Table 1.1: Statistics of neonatal deaths at Maternity wards during 2009-2016	1
Table 4.1. Referral status	49

ABBREVIATIONS AND ACRONYMS

AKI	Acute kidney injury
ANC	Antenatal care
APH	Antepartum hemorrhage
BBA	Born before arrival
BP	Blood pressure
CAB	Circulation airway breathing
CPAP	Continuous positive airway pressure
CPD	Cephalopelvic disproportion
CRP	C-reactive protein
CTG	Cardiotocography
DHIS	District health information software
EEG	Electroencephalographic
FBC	Full blood count
HIE	Hypoxic ischemic encephalopathy
MoHSS	Ministry of Health and Social Services
PH	Potential hydrogen
PIH	Pregnancy induced hypertension
UNCRC	United Nations Convention on the Rights of the Child
WHO	World Health Organization

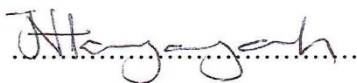
DEDICATION

This thesis is dedicated to my parents, Julius and Maria Nelulu for supporting me and always encouraging me to study and take education seriously. Thanks for laying a strong foundation of God-fearing and discipline. It is because of you that I am where I am today. May the Lord continue protecting and blessing you abundantly.

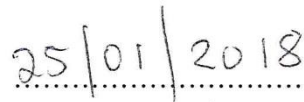
DECLARATION

I, Johanna Penduka Kemanguluko Tuyakula Hanyanya, hereby declare that this study is a true reflection of my own research, and that this work, or part thereof, has not been submitted for a degree at any other institution of higher education.

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JPKT Hanyanya



Date

ACKNOWLEDGEMENTS

Firstly, I would like to thank my heavenly Father, the Almighty God for His grace, and for granting me the wisdom, knowledge and understanding to make this study possible. All the glory and victory belongs to you Jehovah El Shaddai. My gratitude further goes to the Ministry of Health and Social Services for granting me permission to conduct the study at the maternity units of the study hospital.

I also want to express my sincere gratitude and appreciation to the following individuals who contributed to the success of this study:

Dr. K. Amakali, my supervisor, for your guidance, support and encouragement throughout the course of this work. It has been an absolute privilege to have worked with you.

Dr. J. Kloppers, my co-supervisor for your patience, guidance and support throughout this study.

Mr. Richard Adupa, the statistician for my research thesis. Thanks for devoting your time towards assisting me. I may not possibly thank you enough.

To my husband, Henok and my two sons Jesau and Blessing, for the motivation, love, support and patience. Thanks for believing in me and for your understanding during the times I could not be there for you when you needed me most.

Dr. T. Mawire, for the patience towards my continuous absence from work to attend the scheduled tutorial sessions.

Prof Pieper, the neonatologist, for the assistance in directing my study.

Ms. Anna Paulus, Senior Health Information System Officer at Windhoek Central Hospital for the support.

Mrs. Ruth Nangobe, Epidemiologist at Oshakati state Hospital, for the support, motivation and encouragement.

My relatives and friends, who assisted and wished me well during this study endeavor.

CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1. Introduction

Newborn babies with asphyxia are delivered almost every day at different hospitals. However, complications can develop that the newborn loses his/her life after delivery in hospital. Yet most of these deaths could be avoided if preventative measures are taken and adequate care availed when needed (Ministry of Health and Social Services, 2014). Neonatal mortality rates remain high in developing countries, of which Namibia is no exception. Fact fish statistics (2014) indicate that Namibia ranks 63rd in the world, in infant and neonatal mortality rate per 1,000 live births. The Khomas region where this study was conducted ranked second in the country, thus reporting 64 deaths per 1000 live births according to the perinatal and neonatal death reviews report of April 2010 - March 2012, (MOHSS, 2014). The District Health Information Software (DHIS) (2014) of the Ministry of Health and Social Services (MoHSS) indicate that there are progressive neonatal deaths per 1000 live births at the maternity units of the study hospital as displayed in Table 1.1 (DHIS, 2014).

The factors associated with neonatal deaths at maternity units are: asphyxia prematurity, sepsis, pneumonia and congenital abnormalities (DHIS, 2014), of which asphyxia is one of the main causes for neonatal deaths at the facility.

Table 1.1: Statistics of neonatal deaths at Maternity units during 2009-2016

Year	Neonatal death rate
2009	19/1000*100 = 1.9%
2010	27/1000*100 = 2.7%
2011	29/1000*100 = 2.9%
2012	32/1000*100 = 3.2%
2013	69/1000*100 = 6.9%
2014	35/1000*100 = 3.5%
2015	43/1000*100 = 4.3%
2016	54/1000*100 = 5.4%

Asphyxia in newborn babies occurs when there is insufficient oxygen, excessive carbon dioxide and lactic acid in the blood during labour and after delivery (Johnson & Taylor, 2007). According to Sellers (2013), asphyxia is a condition in which a viable newborn baby fails to initiate and sustain respiration after birth. The incidences of asphyxia are recognised indicators of the quality of health care services rendered to a newborn at the health facility. Early neonatal deaths (within 7 days) of asphyxiated babies who weigh 2500g or more in facilities, is an indicator for a newborn care service at delivery (WHO, 2010). Prematurity, prolonged rupture of membranes, obstructed labour, infections and medication given to the mother during labour are also potential causes for asphyxia (Sellers, 2013; Guha, 2008).

All newborn babies are rightfully entitled to receive quality care at health facilities. The United Nations Convention on the Rights of the Child (UNCRC) (2009) advocates that the state parties must ensure that every child is not deprived of his or her right of access

to quality health care services, and should therefore enjoy the highest attainable standard of health. Concurrently, in its patient's charter of rights, the Ministry of Health and Social Services (MoHSS) (2016) indicates that every patient visiting its facilities must receive quality care on the basis of needs to care regardless of variables like age. By implication, appropriate antenatal care should be provided for each pregnant woman and appropriate care should be rendered during the labour process in order to minimize morbidity and mortality including neonatal asphyxia. These would ensure healthy newborn babies. Equally, each newborn baby should reasonably and practically be attended to as soon as possible according to their health needs. Newborn babies who are at risk of conditions such as neonatal asphyxia should receive quality care to prevent neonatal death. These actions could reduce the high rate of neonatal deaths.

1.2 Background of the study

Newborn babies die worldwide every day due to asphyxia. The risk of death during the neonatal period is six times greater in developing countries than in developed countries (World Health Organization (WHO), 2012). A study conducted by Singh, Brodish & Haney (2014) in Sub-Saharan Africa showed that Africa has the slowest improvements in neonatal mortality rates with a decline of only 19% from 1990 to 2010 in contrast to the 43% decline witnessed in high income countries. Moreover, Africa accounts for 39% of neonatal deaths with the majority of these deaths occurring specifically in sub-Saharan Africa (Singh, et al. 2014). Besides, a study conducted by Ncube (2011), reveals that the highest risk of neonatal death in Africa occurs in Sub-Saharan regions of

western, middle and eastern Africa, with an average of 42 and 49 neonatal deaths per 1000 live births compared to America and Caribbean where neonatal death is 15 to 19 per live births (Ncube, 2011). Furthermore, Kinney, Kerber and Black, (2010) conclude that the main causes of newborn deaths in sub-Saharan Africa are birth asphyxia.

Like other African countries, Namibia is also challenged by high neonatal deaths. The Ministry of Health and Social Services (MoHSS), (2010) indicates that neonatal mortality increased from 27 per 1000 live births in 2006/7 with wide geographic disparities, ranging from 10 neonatal deaths per 1000 live births in the north western part of the country to 39 per 1000 live births in the north east. Namibia's child survival strategy of 2014 - 2018 reported that systematic analysis of under-5 mortality for 2008 showed that neonates had died of birth asphyxia, prematurity, sepsis and pneumonia (MoHSS, 2014).

Asphyxia is one of the major causes of early neonatal deaths in Namibia. According to the perinatal and neonatal death reviews report of April 2010 - March 2012, MoHSS, (2014) reveals that birth asphyxia is in first position in contributing 82 (49.4 %) of neonatal deaths. In distant second place is prematurity, contributing 21 (12.7%) deaths and in joint 3rd place are congenital abnormalities and neonatal sepsis contributing to 18 (10.8%) deaths in all regions of Namibia (MoHSS, 2014). This means that asphyxia related deaths are leading in neonatal deaths in Namibia. These statistics reflect the severity of asphyxia as a public health concern in Namibia. The global strategies to reduce neonatal deaths related to asphyxia include safe delivery practices, availability of

facilities and well- trained and adequate staff, just to mention a few (Khan, Saeed, Bangash and Klfayat, 2015; World Health Organization, 2012). Respiratory support, cardiovascular support, correction of metabolic system, skin care and infection control are part of asphyxia management (Cloherty, Eichenwald and Stark, 2008).

The Ministry of Health and Social Services (MoHSS) (2009) devised the guidelines on essential and obstetric emergency care to address obstetric and neonatal related challenges in Namibia in order to assure positive outcomes of pregnancy and child birth. Despite the guidelines on essential and obstetric emergency care by the MoHSS, the directives of the guidelines to render quality neonatal care and prevent neonatal deaths from asphyxia seem not to be applied. The fact that some newborns are still dying unexpectedly raised a concern to the researcher to assess the management of newborn babies with asphyxia related deaths at the study hospital maternity units.

1.3 Statement of the research Problem

Asphyxia is one of the major causes of early neonatal deaths in Namibia. There is a trend of increased neonatal deaths due to asphyxia at the state hospital's maternity units. Incidences of neonatal deaths due to asphyxia at the hospital maternity units were 16/1000 live births for the year 2012, 42/1000 live births for the year 2013 and 51/1000 live births for the year 2014 (DHIS, 2014). It is evident that birth asphyxia is in first position as it contributes to 49.4 % of neonatal deaths in Namibia according to the perinatal and neonatal death reviews report of April 2010 - March 2012 (MoHSS, 2014).

Despite the trends indicating an increase in asphyxia associated neonatal deaths at the hospital maternity units, little is stipulated on the guidelines of MoHSS on essential obstetric and emergency care regarding the management or neonatal care of a newborn with asphyxia. In fact, little is known if the guidelines on essential obstetric and neonatal emergency care are implemented for the management of newborn babies with asphyxia or not. This prompted the researcher to conduct a study to assess the management of newborn babies with neonatal asphyxia related deaths at maternity units of the state Hospital.

1.4. Purpose of the Study

The purpose of the study was to assess the management of newborn babies with neonatal asphyxia at the maternity units of the hospital.

1.5. The Objectives of the Study

The research objectives therefore formulated were to

- Determine and describe the management of newborn babies with neonatal asphyxia at birth at the maternity units of the study hospital
- Determine and describe the management of newborn babies with neonatal asphyxia after birth at the maternity units of the study hospital
- Determine and describe factors that are associated with asphyxia related deaths at maternity units of the study Hospital

1.5 Significance of the Study

The information to be obtained from this study would inform the MoHSS about the management of newborn babies with asphyxia at the maternity units of the hospital. In that regard, the results from the study would inform policy makers on health care providers' knowledge and skills regarding neonatal care of newborn babies with asphyxia to prevent neonatal deaths related to asphyxia at the maternity units of the hospital. The outcome of this study can serve as baseline information to address neonatal asphyxia concerns nationally.

1.6. Paradigmatic Perspectives of the Study

A paradigm is essentially a way of thinking about or a phenomenon, or an overarching frame of reference (Chinn and Kramer, 2008). Furthermore, a paradigm gives contemporary meaning, using it to describe basic sets of viewpoints and practices that scientists agree on at a particular point in time (Killam, 2013). A paradigm is a set of beliefs, world-view or group of idea that guides research (Webster, 2015). Therefore, Killam (2013) concluded that paradigms are frameworks that researchers use as a basis for everything else that they do.

The study was based on the philosophy of positivism, and applied the ontology, epistemology and axiology assumptions of the positivism perspective. Positivism holds the view that the scientific method is the only way to establish truth and objective reality. Thus, ontology, epistemology and axiology interact and overlap each other to describe what is viewed as reality, the relationship of the researcher and what is

unknown, and the values and ethical morals of the researcher and the subjects under the study (Killam, 2013; Wagner, Kawulich & Garmer, 2012). The assumptions of the positivism were applied to this study as explained in the next sessions.

1.6.1 Ontology

Ontology refers to the researcher's beliefs about the nature of reality. According to Wagner, Kawulich, and Garmer (2012), the fundamental ontological assumption of positivism is that there is a reality out there that can be studied and known. Therefore, the nature of reality is that it is relatively constant across time and setting, and can be effectively studied, explored and known (Wagner, et al. (2012). There is a strong contrasting perception of reality that is realism. According to Killam (2013), realists believe that an objective reality or the truth exists, which is separate from human perception. A realist would want to find out what really happened. A realist believes in one truth that can be found and measured. In this study, the truth lays in the patients' files (records) on the management of newborn babies with asphyxia related deaths.

The assumption was that what is not recorded in the patient's file (record) regarding the management of newborns with asphyxia is considered not provided for the patient.

1.6.2 Epistemology

Epistemology refers to how we come to know what we know. Epistemology examines the relationship between knowledge and the researcher during discovery (Killam, 2013). Epistemology has to do with the nature of knowledge and the relationship between the

researcher and the would-be known. The knowledge of the reality can be tested empirically; the data are objective and therefore independent of the values of the researcher (Wagner, et al. 2012). Based on the epistemological assumption, the data collection instrument for this study was pre-tested to ensure that the results being collected produce the truth. Equally, it was necessary to conduct a desk review because the truth lies in the reality of what is recorded in the patients' files (records) regarding the management of newborns with asphyxia.

Assumption: It can be assumed that information gathered from the desk review will enable the researcher to gain knowledge and insight on the management of newborn babies with asphyxia at the maternity units of the hospital.

1.6.3 Axiology

Axiology addresses the nature of ethical behaviour. Webster (2015) defines axiology as the study of the nature, types and criteria of value judgments, especially in ethics. According to Wagner, et al. (2012), axiology focuses on the role of values and ethics in research, which are basic beliefs that the researcher has drawn up so that the users of the research know the context in which the research was conducted. By implications, axiology refers to what the researcher believes is valuable and ethical (Killam, 2013). Nursing as a profession ascribes to certain values. Therefore, the researcher was aware of the values and how these values influenced the research study.

Assumption: it can be assumed that neonatal deaths due to asphyxia can be reduced if positive, neutral interpersonal caring relationships between a well-informed nurse and

the newborn is created and maintained in order to provide quality neonatal care all the time.

1.7. Definition of the key concepts in the study

Neonate: Refers to a newborn baby, under 28 days of age irrespective of the gestational age or birth weight (Tiran, 2009).

Neonatal death: In this study, neonatal death refers to a baby born alive but dies within 28 days of birth or life (Medforth, Battersby, Evans, Marsh & Walker, 2011).

Asphyxia: Refers to insufficient oxygen, excessive carbon dioxide and lactic acid in the blood of the newborn during labour and after delivery (Johnson & Taylor, 2007).

Management: In this study, management means the appropriate and timely performance of the care interventions and treatment of newborn babies with asphyxia by nurses, midwives and doctors (World Health Organization, 2012).

1.8 Outline of chapters

This study is presented in 5 chapters:

Chapter 1: Introduction and background

Chapter 2: Literature review

Chapter 3: Research design and method

Chapter 4: Data analysis and interpretation of data

Chapter 5: Discussions, conclusions, recommendations and limitations of the study

1.9. Summary

There is a trend of increased neonatal deaths due to asphyxia at maternity units of the study hospital. An overview of the background information to asphyxia as the main cause for neonatal deaths at maternity units is described. The goal and objectives necessary to guide the study were outlined. The study significance was stated with regards to the policy makers about the status of neonatal care of newborn babies with asphyxia. Applications of assumptions of a positive paradigmatic perspective such as the ontology, epistemology and axiology which form the references for the study were explained and its application to the study was inferred. In addition, key concepts in the study were defined. The next chapter covers the literature review, to contextualize the current study with the existing relevant literature.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This section presents the literature review that is relevant to the topic under investigation to place the study in the context of existing knowledge. According to De Vos, Strydom, Fouche and Delport (2011), literature review is defined as a process that involves finding, reading, understanding and forming conclusions about the published research and theory on a particular topic. The purpose of the literature review is to convey to the reader what is currently known and not known regarding the topic of interest, to obtain clues to the research designs and data collection methods for a study and to assist in interpreting study findings and in developing implications and recommendations (Brink, Vd Walt & Rensburg, 2013). The literature in this review was obtained from secondary data sources. The literature review was conducted under the following headings:

- description of asphyxia and management
- neonatal Asphyxia
- universal factors associated with neonatal asphyxia
- management of universal factors which are associated with neonatal asphyxia
- the management of newborn baby with asphyxia at birth and after birth.
- theoretical framework of the study.

2.2 DESCRIPTION OF ASPHYXIA AND MANAGEMENT

As described in the introduction, asphyxia is the leading cause of neonatal death at the maternity units of the state hospital in Windhoek. The next sessions present the literature review on neonatal asphyxia to contextualize the current study with the existing literature. The factors associated with clinical problems and the management of neonatal asphyxia are elaborated.

2.2.1 Neonatal Asphyxia

Asphyxia in a fetus means lack of oxygen to the brain and other organs of the fetus either because of difficulty or cessation in exchange of oxygen and carbon dioxide at placental level. Asphyxia is diagnosed in a newborn who fails to breath within 60 seconds of birth. There are 2 categories of asphyxia, namely moderate and severe asphyxia. Sellers (2013) indicates that moderate asphyxia is characterized by an Apgar score of 4-6 out of total 10 score, poor muscle tone, central cyanosis, poor efforts respiratory rate, heart rate of 100 beats per minute (bpm) and grimace (reflex irritability). In severe asphyxia, there is an Apgar score of 0-3, placid muscle tone, pale in colour, no efforts respiratory rate, the heart rate is less than 100 beats per minute and there is no response on reflex irritability (Sellers, 2013).

Asphyxia arises during the first and second stage of labour and is identified by fetal acidosis, as measured in umbilical arterial blood. Asphyxia in a newborn during or, after birth implies failure to establish adequate and sustained respiration by one minute after

birth because of difficulty or cessation in exchange of oxygen and carbon dioxide at pulmonary level, with the resultant hypoxia (lack of oxygen), hypercapnia (an abnormal increase in the amount of carbon dioxide and respiratory acidosis (too much acid) in the blood (Guha, 2008; Johnson & Taylor, 2007).

Hypercapnia, ischemia, hypoxemia, respiratory acidosis and metabolic acidosis are the consequences of asphyxia. The waste products (acids) build up in the systems and cause temporary or permanent damage to the vital organs. Moreover, Guha, (2008) concluded that without oxygen, the respiratory-, and cardiovascular-, blood-, central nerves- and metabolic system cannot function properly. Therefore, Sellers (2013) concludes that asphyxia causes hypoxemia which leads to neurological system (brain) damage, deafness, eye movement problems and death. A study conducted in Nigeria by Adebami (2015) substantiates that asphyxia is responsible for long-term neurological disability and impairment. Hypercapnia causes vasodilation of the cerebral vessels leading to brain edema and as a result, increases intracranial pressure and hemorrhage (Seller, 2013). These critical statuses need vigilance by a nurse in provision of intensive nursing management to prevent neonatal deaths. The section below presents the universal factors that are associated with neonatal asphyxia.

2.2.2 Universal factors associated with neonatal asphyxia

There are universal factors associated with neonatal asphyxia such as head circumference, prematurity, prolonged rupture of membranes and obstructed labour

which carry a substantially higher risk of birth asphyxia for the newborn. A study led by Lee, Darmstadt and Khatry (2009) reveal that a large head circumference (≥ 33.5 cm) carried a 1.6 times increased adjusted risk of birth asphyxia compared with a head circumference of 32.6 to 33.5 cm. Furthermore, Cloherty, Eichenwald and Stark (2008) indicate that premature babies are at risk of asphyxia because of immature pulmonary functioning as a result of a deficiency in lung surfactant. Furthermore, a study conducted in Brazil about the perinatal outcomes associated with low birth weight in a historical cohort showed that in addition to abnormal fetal heart rate, thick meconium, premature delivery is also a risk factor for perinatal asphyxia (Coutinho, Cecatti and Surita, 2011).

Malpresentation and cephalopelvic disproportion (CPD) are also contributing factors to asphyxia. A study done by Islam, Ara and Choudhury (2012) reveal that the commonest cause of asphyxia is obstructed labour of which CPD, malposition and malpresentation of shoulder, breech, face and brow are the most common preventable causes of neonatal asphyxia related death in developing countries. According to Sellers (2013), breech presentation in vaginal delivery may cause difficulties with damage to and delay in delivering the fetal head, including the upward moulding of the after-coming head, and which can result in asphyxia. Furthermore, vaginal delivery of a breech presentation (while the head is still in the pelvis) causes premature inspiration, meconium aspiration and subsequent birth asphyxia (Sellers, 2013).

The gravity of harm from asphyxia to the newborn depends on how long and how severe the period of asphyxia is, and the efficiency of administration of the right treatment that

is given. Two stages of injury can happen with birth asphyxia. The first stage happens within minutes without oxygen. Cell damage occurs with the initial lack of blood flow and oxygen (Guha, 2008). The second stage of damage is called "reperfusion injury" and can last for days or even weeks after birth (Guha, 2008). This injury occurs after restoration of normal blood flow and oxygen to the brain, however is due to toxins released from the damaged cells. Furthermore, Guha (2008) indicates that too little oxygen in the mother's blood before or during birth, and very long or difficult delivery, a serious infection in the mother or baby, high or low blood pressure in the mother, block the baby's airway and when the baby's blood cells cannot carry enough oxygen (anemia), causes asphyxia.

Infections, meconium aspiration, malformations and medications given to the mother are also associated with asphyxia for the newborn. A Namibian study conducted by Liomba (2006) reveals that aspiration of meconium or thick mucus can impair respiration, despite normal nervous stimulation of the respiration effort. Furthermore, Liomba (2006) explains that drugs given to the mother such as Pethidine or anaesthetics may also depress the respiratory system of the newborn that can contribute to asphyxia. Administration of pethidine to the mother during early hours of the first stage of labour in order to reduce the pain induces respiratory depression to the baby that increases the risks for neonatal asphyxia (Rylance, Harvey & Aranda, 2013)

Moreover, Cloherty, Eichenwald and Stark, (2008) indicate that malformation of the respiratory system and cyanotic congenital heart disease of the newborn can increase the

risks of asphyxia. Additionally, decreased blood flow from placenta to fetus impairs gas exchange across the placenta or at the fetal tissue level and this increases the fetal oxygen requirement that leads to asphyxia (Cloherty, et al. 2008). These can result from the maternal factors such as antepartum hemorrhage and severe hypertension which reduce the fetal circulation and results into neonatal asphyxia. Ladewig, London and Davidson (2007) indicate that there is a risk for impaired gas exchange of the fetus related to decreased blood volume due to the antepartum hemorrhage. In this regards, the authors argue that hypertension in pregnancy causes maternal vasospasm which results in fetal hypoxia then asphyxia.

Substandard care during pregnancy, during and after birth also increases the risks for asphyxia. Ladewig, London and Davidson (2007) found that the most common substandard care neglecting to supervise fetal wellbeing, neglecting signs of fetal asphyxia, incautious use of oxytocin and choosing a non-optimal mode of delivery, contribute to neonatal asphyxia.

Neonatal asphyxia can therefore be prevented or anticipated to a large extent when maternal and/or fetal adverse factors are recognized and adequately taken care of.

2.2.3 Management of universal factors which are associated with neonatal asphyxia

Asphyxia can be preventable, as it is often due to substandard ANC for pregnant women. Ladewig et al. (2007) indicate that a thorough assessment and prompt action on the part of the health care team can improve the fetal outcome. Assessment for antenatal

and labour history that can help to anticipate the risks for asphyxia includes the gestational age, fetal heart status, nature of membranes, fetal presentation and position, maternal hypertension and hemorrhage.

According to Ladewig, London and Davidson (2007), an estimation of the gestational age before or at birth should be done so that careful attention can be given to age-related problems. The authors further indicate that low birth weight and small for gestational baby has a risk for impaired gas exchange due to immature pulmonary vasculature and inadequate surfactant production (Ladewig, et al., 2007). In post mature baby, asphyxia in utero and after birth is common due to placental insufficiency syndrome caused by infarcts and villous degeneration (Sellers, 2013).

Fetal heart rate should be closely monitored before and at birth. A study conducted by Berglund (2010) reveals that midwives are expected to be skilled in interpreting the Cardiotocography (CTG) and to act in a timely and appropriate manner when fetal heart rate patterns indicate a compromised fetus that can lead to asphyxia. The longer the abnormal CTG, the higher the risk of low Apgar score for the newborn (Berglund, 2010). Therefore, midwives and obstetricians can also improve their shared understanding of how to act in cases of imminent fetal asphyxia and how to choose a timely and optimal mode of delivery to reduce asphyxia related death.

Thorough abdominal palpation, deep pelvic and vaginal assessments need to be performed in order to exclude abnormalities such as malposition and malpresentation.

Early recognition and timely decision on the safer methods of delivery for occipitoposterior position, breech, face and brow presentation as well as cephalopelvic disproportion (CPD) can prevent asphyxia related death (Sellers, 2013), because the above-mentioned malposition and malpresentation can prolong or cause obstructed labour that leads to birth asphyxia. Laughon, Berghella, Reddy, Sundaram, Lu and Hoffman (2014) reveal that the first stage of labour is regarded as prolonged when the active phase lasts longer than 10 - 12 hours in primi gravida and 6 - 8 hours in multigravida women. Laughon et al. (2014) further stipulate that a prolonged second stage of labour in nulliparous women is when labour exceeds 2 hours, while in multiparous women labour exceeds 1 hour. Therefore, prolonged first and second stages of labour can be avoided by performing caesarian section or instrumental delivery when appropriate.

2.3 THE MANAGEMENT OF NEWBORN WITH ASPHYXIA

Management is the process of controlling an intervention in order to realize the set goal (Webster, 2015). Therefore, the management of the new born baby with asphyxia refers to the appropriate and timely performance of the care interventions and treatment of asphyxia as outlined in the guidelines for obstetric and neonatal emergency care to prevent neonatal deaths. Sellers (2013) reveals that management of asphyxia constitutes a series of actions that are taken to revive the newborn in order to obtain and maintain a normal respiration/pulse rate, blood pressure, colour hemodynamics and the normal general activity level to avoid neonatal death. The management of asphyxia is

implemented in two phases, namely at birth and after birth as described in the next sessions.

2.3.1 The management of newborn with asphyxia at birth.

At delivery and during delivery, skilled health care should be applied to identify risk factors that put the newborn at risk for neonatal asphyxia. Safe delivery practices and quality immediate care at birth can reduce premature related neonatal deaths (World Health Organization, 2012). Therefore, a study conducted in Malawi by Bayley, Colbourn and Nambiar (2013) about the quality of obstetric and newborn care concurs that skilled attendance at birth can prevent neonatal deaths due to asphyxia, because potential problems are anticipated and averted. A paediatrician and a midwife with advanced skills in maternal and neonatal care should be present at delivery for expert resuscitation. The resuscitation equipment should be fully functional for efficient use at delivery (Macdonald & Magill-Cuerden, 2011).

Hypoxemia damages the brain and hypercapnia causes vasodilation of the cerebral vessels leading to brain edema as well as the increased intra cranial pressure and hemorrhage (Sellers, 2013). Bayley et al. (2013) pointed out that all the asphyxiated newborn babies require assistance to begin breathing at birth. Therefore, the guidelines on essential obstetric and emergency care indicate that at birth, a newborn is assessed for aspiration of amniotic fluid, breathing patterns, skin colour and Apgar score to rule out hypoxia. Patterns of crying and muscle tone are assessed (MOHSS, 2009; Sellers,

2013). If any of the aforesaid is absent, or the Apgar score is 4 - 6 out of a total of 10, then immediate resuscitation is commenced with the initiation and maintenance of circulation, airway, breathing (CAB) and the administration of medications to provide substrate and stimulation for the heart in order to support circulation of oxygen and nutrients to the brain as well as to correct metabolic acidosis (MOHSS, 2009). Birth attendants need to resuscitate the newborn using the CAB technique as stipulated in the guidelines on essential and emergency obstetric care (MOHSS, 2009). Therefore, a basic resuscitation of a newborn with a bag and mask is needed to be ready for use at birth.

The newborn's airways are suctioned to clear it from the secretions and meconium. Cloherty, et al. (2008) indicate that in the presence of significant secretions, mouth and pharynx should be aspirated with a bulb syringe after head delivery and before breathing begins. The respiration is assessed for any risk of ineffective breathing patterns. Oxygen and carbon dioxide levels should be maintained in the normal range. Positive pressure ventilation with a resuscitation bag and 100% oxygen is indicative immediately after birth if the new born is apneic, gasping or the heart rate is less than 100b/m (MOHSS, 2009; Sellers 2013). Furthermore, evidence from trial studies conducted in sub-Saharan African countries such as South Africa (SA) and Malawi demonstrates that continuous positive airway pressure (CPAP) reduces the need for positive pressure ventilation for babies with respiratory distress (Lawn, et al. (2013). The same report also states that 67% of babies on CPAP survived compared to 24% without CPAP but on

oxygen only (Lawn, et al. 2013). However, excessive pressure may be detrimental, contributing to hyperinflation and increased pulmonary vascular resistance which can impair venous return, cardiac output and pulmonary blood flow (Polin & Yoder, 2007). Therefore, excessive or inappropriate use of oxygen may be harmful; it needs to be avoided by administering the right amount of oxygen according to the prescription or standing order of the unit. A study conducted by Jobe and Kallapur (2010) reveal that the amount of oxygen delivered to the baby should depend on the flow rate and the weight of the baby. Thus, if the flow (per min) exceeds weight (in kg) the concentration will be 100% (Jobe & Kallapur (2010).

As indicated by Cloherty, et al. (2008), cardiovascular stability and adequate mean systemic arterial blood pressure are important in order to maintain adequate cerebral perfusion. With regard to the cardiovascular system the heart rate and the blood pressure (BP) are monitored in order to rule out bradycardia, arrhythmia, hypovolemia and ischemia respectively. A chest compression is initiated, if despite the adequate artificial ventilation, the newborn's heart rate remains less than 60 per minutes (Macdonald & Magill-Cuerden, 2011).

The management of a newborn with asphyxia at birth also includes thermal care and safe oxygen use in the delivery room. Verklan and Walden (2010) state that an increase of the delivery room temperature and preheat of the radiant warmer are part of thermal care at birth. In addition, the newborn is kept dry and warm by timely placing him/her under a pre-heat warmer to prevent hypothermia and heat loss (Cloherty, et al. 2008).

2.3.2 The management of a newborn with asphyxia after birth.

Asphyxiated newborns should be admitted at neonatal units for close monitoring of all the vital signs and for further management. The management of a newborn with asphyxia after birth includes continued assessment of the respiratory, hematology/blood, cardiovascular, neurological and metabolic system of the newborn. The risk of neonatal sepsis is ruled out. According to Joolay, Horn, Raban, Harrison, Tooke and Rossouw (2015) ventilation should aim for normal PaCO₂ of 4.7-6.0kPa and oxygen saturation of 90 - 100% for the newborn. The authors further state that if oxygen is needed and respiratory effort is good, nasal CPAP or nasal cannula are often adequate. Else, ventilation ought to be initiated if the baby presents with apnea or respiratory acidosis with pH ≤ 7.25 (Joolay, et al., 2015). Moreover, if ventilated, blood gases should be performed on a 6 hourly basis or more often if abnormal until normal (Joolay, et al., 2015). Chest X-ray needs to be performed in case of unequal air entry to exclude pneumothorax (MOHSS, 2009).

The management of a cardiovascular system includes monitoring of the pulse and blood pressure. Joolay, et al. (2015) indicate that an echocardiogram needs to be performed to assess the cardiac function that can inform fluid and inotropes management. Hypotension is treated with inotropes while pulmonary hypertension is treated with sildenafil. A bolus of saline is administered when there is suspected hypovolemia. In contrary, metabolic acidosis is not an indication for a fluid bolus (Joolay, et al., 2015).

The management of a newborn with asphyxia after birth also includes assessment of a metabolic system, inclusive of the gastro-intestinal and renal system. Abdominal examination needs to be performed. In this regard, Joolay, et al. (2015) indicate that the abdomen should be assessed in order to rule out necrotizing enterocolitis as a complication for neonatal asphyxia. Feeds should be slowly introduced, while the newborn with moderate to severe asphyxia are usually maintained nil by mouth on admission then commence 3 hourly feeds after 12 - 24 hours (Joolay, et al., 2015).

Fluid intake and output should be assessed and monitored to assess the end-organ functions. Asphyxia can cause damage to almost every tissue and organ in the body. A study conducted by Gopal (2014) reveals that acute kidney injury (AKI) is common in asphyxiated neonates. A newborn's kidneys are very sensitive to oxygen deprivation; renal insufficiency may occur within 24 hours of a hypoxic ischemic episode, which if prolonged, may even lead to irreversible cortical necrosis of the kidneys and subsequent renal failure. Early recognition of AKI is important for the newborn baby with asphyxia to facilitate appropriate fluid and electrolyte management, as maintaining a stable biochemical milieu is vital in improving the outcomes in these babies (Gopal, 2014). Therefore, blood tests for urea, creatinine and electrolytes should be performed to assess the renal function.

As part of the metabolic system management, a newborn with asphyxia is closely monitored for metabolic acidosis and for potential seizures after birth. Seizures (or convulsions) are common following birth asphyxia. A study conducted by Evans,

Levene and Tsakmakis (2007) recommends that anticonvulsant medication be given to babies soon after possible birth asphyxia to control seizures, thereby preventing and protecting the brain damage and as result, an improved outcome. Concurrently, the standard order at neonatal units of the study hospital indicates that a baby with asphyxia should be treated with Phenobarbitone 20mg/kg IV infused over 10 minutes or phenytoin or according to the specific prescription to prevent or treat seizures.

Blood glucose, blood gases, serum electrolytes, urea and creatinine should be monitored for metabolic and hemodynamic stabilities, i.e. to rule out hypoglycemia, hypoxia, hypocalcemia as well as the risk for arrhythmia and metabolic acidosis (Cloherty et al. 2008). The laboratory-based assessments are important to maintain the biochemicals in the normal ranges and to determine whether correction is required (Cloherty et al., 2008; Sellers, 2013).

Moreover, serum calcium and blood glucose levels should be maintained. Hypocalcaemia can compromise cardiac contractility and may cause seizures. Hypoglycemia may potentiate excitotoxicity amino acid while hyperglycemia leads to an increase in brain lactate, damage to cellular integrity and increases cerebral edema and the resultant suppression of the vital centers (Cloherty et al. 2008).

Furthermore, the Namibia standard treatment guidelines stipulate that hypoglycemia can be managed with dextrose: 2 mL/kg of 10% dextrose or 1ml/kg of 50% dextrose diluted with 1ml of sterile water (MoHSS, 2011). Sodium Bicarbonate 4.2% solution (4ml/kg) is

administered slowly over 2 minutes intravenously through the umbilical vein to correct acidosis when the serum Ph. falls below 7.35 (MoHSS, 2009). When there's hypovolemia, cardiovascular volume expansion must be considered. Therefore, Normal Saline 10ml/kg is administered intravenously through umbilical vein over 5 - 10 minutes to reverse hypovolemia (MOHSS, 2009).

An anti-respiratory depressant such as Naloxone can be administered when there's a history of the mother having been given a central nerves depressant, such as Pethidine or Morphine within 2 hours of delivery (Sellers, 2013). In addition to maintenance of the biochemical in the normal ranges, a cooling or therapeutic hypothermia may be introduced.

Cooling/therapeutic hypothermia is a treatment associated with lowering body temperature of a newborn at the age of 6 hours, up to 34.5°C for a period of 72 hours as part of the management of metabolic system for a newborn baby with asphyxia. Birth asphyxia (also known as hypoxic ischemic encephalopathy (HIE) occurs due to limited blood flow to the brain that causes oxygen deprivation at or near the time of birth and which results into brain injury or damage. Therefore, the amount of damage that asphyxia causes can be limited by promptly using therapeutic hypothermia or body cooling to slow the extent of brain damage (Reiter & Walsh, 2016). Thus, the authors claim that, therapeutic hypothermia has shown promising results in improving the outcomes for babies with birth asphyxia by slowing the metabolic rate and allowing cells to recover over longer periods of time (Reiter & Walsh, 2016). This prevents further

brain damage that can occur when normal oxygenation or blood flow to injured cells is restored efficiently. A study conducted by Ergenekon (2016) reveals that babies undergoing therapeutic hypothermia or body cooling may feel stress and pain, therefore optimal sedation and analgesia should be administered.

Neonatal sepsis should be ruled out in a newborn baby with asphyxia. Therefore, broad spectrum antibiotics such as Penicillin and Gentamycin should be administered intravenously to prevent and treat sepsis (MoHSS, 2011). Ladewig, et al., (2007) argue that newborn babies with asphyxia are often subjected to invasive procedures such as umbilical catheterization, intubation, resuscitation and ventilator support, all of which increase the risks for neonatal infection. Therefore hygienic cord and skin care need to be performed to prevent sepsis. The basic hygienic practices such as hand washing and a clean environment need to be maintained, because substandard practices of these practices predispose the newborn baby with asphyxia to nosocomial infection and the risk for neonatal deaths.

The management of a newborn with asphyxia after birth also includes assessment of the hematology/blood system and neurological system. Blood tests such as full blood count (FBC), C-reactive protein (CRP), PH and blood gases should be performed as part of the management of hematology/blood system. The results of a study conducted by Brucknerova, Ujhazy, Dubovicky and Mach (2008) report that intensification of oxidative stress at and after birth and redistribution of blood circulation to the organs of a newborn with asphyxia cause a decrease in erythrocytes, hemoglobin and platelets. If

hematological changes are detected and treated early, the duration of hypoxemia (acute or chronic) can be minimized (Brucknerova et al, 2008). Laboratory findings are often vital for neonatologist in case of unknown history of fetal asphyxia ((Brucknerova et al. 2008).

The last aspect of the management of a newborn with asphyxia discussed under the literature review is the neurological system.

Neurological system

Asphyxia affects the neurological system negatively, thus resulting into hypoxic ischemic encephalopathy (HIE). Joolay, et al., (2015) stipulates that there are 3 commonly used staging/scores of asphyxia for clinical neurological assessment, namely: Thompson score, Sarnat and Levine staging with 3 stages each. These scores may be used to predict the neuro-development outcome of a newborn baby with asphyxia.

The Thompson score assesses the clinical signs such as limb tone, level of consciousness, visible fits, posture, moto, grasp, suck, respiration and fontanel appearance (Joolay, et al., 2015). The WHO (2010) indicate that a score of 15 or more shows a positive predictive value of 92%, negative predictive value of 82% and sensitivity of 71% . The Sarnat clinical signs include levels of consciousness, muscle tone, tendon reflexes, myoclonus, suck reflex, moto reflex, grasp reflex, dolls' eye reflex, pupils, respiration, heart rate, convulsions, EEG (Electroencephalographic) findings and duration of symptoms (Joolay, et al., 2015). Moreover, Levine staging's

clinical signs include levels of consciousness, muscle tone, suck/respiration and seizures (Joolay, et al., 2015). The score should be performed on admission and daily until the baby becomes normal/well.

As a neurological system, the brain is susceptible to damage in a baby with asphyxia. Therefore, the brain scan should be performed to rule out brain damage or to see the gravity of brain damage. Reiter and Walsh (2016) illustrated that brain scans give doctors pictures of the baby's brain as well as helping to diagnose injuries such as HIE caused by asphyxia.

The section below presents the last aspect of the literature review, the caring process as theoretical framework of the study.

2.4 Theoretical Framework

This study was based on the theoretical framework of a caring process as framework for providing clinical care to newborn babies, the application of which are explained in the next sessions.

The caring process includes nursing care interventions and medical treatment that are based on the concept of the nursing process which formed the theoretical framework. The nursing process of nursing is the scientific instrument which enables midwives to render quality neonatal care. According to Meyer, Naude, and Shangase (2009), the nursing process is a problem-solving technique which assists the nurse\midwife to

identify the problems and needs of the newborn, and to plan, render and also evaluate nursing care in an orderly and scientific manner. Through the caring process, a nurse/midwife and a doctor apply intellectual skills, technical skills, interpersonal skills and philosophical approach with regard to the value of life and norms of the profession (Carpenito-Moyet, (2007). A caring process consists of assessing care, planning care, implementing actions and evaluating the newborn's response to care. Thus, assessment, diagnosis, planning, implementation, evaluation and recording phases of the nursing process must be applied to the care of newborn babies in order to minimize neonatal deaths due to asphyxia.

Assessment: Assessment is the first step of this caring process. It is applicable to the study because if a doctor or a nurse/midwife conducts a delivery of a newborn, she/he is expected to observe the newborn and to determine her/his needs, problems and identify a diagnosis. In the assessment phase, a doctor or a nurse/midwife collects information about the newborn and identifies evidence of problems or risks for health problems (Carpenito-Moyet, (2007). In this study, assessment of objective data was gained from the diagnostic observation made by the doctor and the nurse/midwife during history taking, physical assessment and analysis of laboratory reports (Carpenito-Moyet, (2007). Data can also be obtained from the parents of the newborn, medical records and health care team that work with the newborn as a patient.

Diagnosis: The second step in this caring process is diagnosis. Diagnosis is the judgment made based on the assessment data. Carpenito-Moyet (2007) defines diagnosis

as an intellectual activity in which critical skills are applied to identify the relation between physiological, emotional and social variables and draw conclusions. In this study, diagnosis described the newborn's response to asphyxia and can justify medical and nursing intervention. Diagnosis of health needs is the basis for providing individualized neonatal care (Carpenito-Moyet, (2007).

Planning: Planning is performed after a diagnosis has been identified in step 2, thus the doctor and the nurse/midwife have to plan according to the diagnosis made. Planning includes activities such as determining the goals of care, selecting interventions and creating a plan of care. The care plan should be specific to the health needs of the asphyxiated newborn baby (Carpenito-Moyet, 2007).

Implementation: Implementation involves activating the plan of care and carrying out planned interventions (Seaback, 2013). In the implementation phase, identified interventions are put into action. Skills involved in effective implementation include observation, interpretation of data and continuous assessment of change in the newborn's condition. Moreover, Meyer, et al. (2009) reveals that the implementation process involves provisional interventions that are implemented to address the identified risks for a newborn with asphyxia. These would help the newborn to move from a present health state to the health state described in the expected outcomes.

Evaluation: Evaluation is a continuous and ongoing process that takes a critical look at the results of implemented interventions. According to Seaback (2013), the purpose of the evaluation phase is to gauge the effectiveness and quality of care provided to the

neonate or the newborn baby. Evaluation involves evaluating whether the goals have been met and whether expected outcomes have been achieved or not. With regards to this study, evaluation referred to the appraisal of the effectiveness of the management interventions for a newborn with asphyxia.

Record keeping: Record keeping is performed continuously from admission. Recording is a very important form of communication between members of the health care team who provide care to the newborn. Clinical records are legal documents (Meyer, et al. 2009) which provide evidence of commissions and omissions during care to the neonate or newborn baby. Therefore, the records of care rendered to a new born with asphyxia should reflect the observation, interpretation of the data, the provisional interventions that were implemented towards the management of the newborn and the outcomes.

2.5 Summary

In this chapter, relevant literature was reviewed and presented accordingly. The literature review has highlighted the factors associated with asphyxia. The management of newborn babies with asphyxia was fully reviewed. The literature indicated that at delivery, skilled health care should be applied to identify risk factors for neonatal death due to asphyxia. Respiratory support, cardiovascular and biochemical support, metabolic support, neurological support and infection control are part of asphyxia management.

The nursing process forms a theoretical framework of the study. Chapter 3 presents the study design and methods used to research the problem.

CHAPTER 3: RESEARCH DESIGN AND METHOD

3.1 Introduction

In Chapter 2, the literature review was conducted to contextualize the current study with the existing body of knowledge. This chapter describes and explains the research design and method used in this study. Aspects such as target population, sampling, data collection instrument (the checklist), pilot study, procedure for data collection, data analysis, validity and reliability and ethical considerations applied to the study are discussed.

3.2 Research design

Research design is a general plan or blueprint that describes how the research is conducted (LoBiondo-Wood & Haber, 2014). A quantitative, descriptive and retrospective study was used to assess the management of newborn babies with asphyxia related deaths at the maternity units of the study hospital. The research design therefore, spells out the approaches the researcher plans to adopt to develop information that is accurate and interpretable (Grove, Burns & Gray (2013) in order to provide evidence that address the research question adequately (LoBiondo-Wood & Haber, 2014).

3.2.1 Quantitative design

According to De Vos et al. (2011), the quantitative approach involves a systematic objective process that has its roots in positivism and makes use of deductive logic. Quantitative design is empirical, using numeric and quantifiable data. Moreover, this

study involved variables that are not manipulated by the researcher and are studied as they exist. As a result, conclusions are based on non-experimental, objective and systematic observation.

3.2.2 Descriptive study

A descriptive study provides descriptions of the variables, identifying problems with current practice, justifying current practice and determining what others in similar situations are doing (Grove et al., 2013). In this study, a descriptive study has been employed to describe the management of newborn babies with asphyxia at the maternity units of the state hospital. Records (patients' files) have been studied and the reality of findings has been described and documented. The factors that are associated with asphyxia related deaths at maternity units are described.

3.2.3 Retrospective study

Retrospective study refers to the investigation of events that have already happened (Lapan & Quartaroli, 2009). A retrospective study was used alongside the descriptive design in which the researcher looked back in time using existing or available patient data in the period between January 2013 and December 2014 to assess the management of newborn babies with asphyxia related death at the maternity units of the hospital.

3.2.4 Research method

Research method focuses on the research processes, the tools and procedures used in the study. In this study, a documentary study was conducted through a review of files of cases of neonatal deaths associated with asphyxia at maternity units in the period of 2013 to 2014. Secondary data on the care provided or not provided were collected from the existing records as sources of data (Guest & Namey, 2015).

3.2.5 Study population

A study population includes all the members, or units, of a group that can be clearly defined in terms of their distinguishing criteria, whether they are people, objects or events and about whom the research results can be generalized (Grove, Burns and Gray 2013). A total of 93 cases of neonatal deaths which are related to asphyxia were identified, but only the records of 90 cases could be retrieved. All these 90 files of patients who died of asphyxia from January 2013 - December 2014 at the maternity unit were included in the study.

3.2.6 Sampling

A sample is a small portion of the total set of the population. Sampling is the most feasible way of studying large populations, given resources, time and financial limitations (De Vos et al., 2011). For this study, the sample and the population were the same (90 numbers of patients' files). Given the small sample of 90 files of patients who

died of asphyxia from January 2013 - December 2014 at the maternity units of the study hospital, no sampling was performed. All 90 files were included in the study to ensure validity of the data.

3.2.7 Inclusion criteria

The study included all the files of newborn babies who were admitted and died within 28 days due to asphyxia. The study also included all babies who were born and died as well as all the referrals and babies born before arrivals (BBA).

3.2.8 Exclusion criteria

The study excluded asphyxiated babies who died after 28 days of life, because this study focuses only on the neonates.

3.2.9 Data collection method

Data collection was done by means of a structured checklist. The next session provides a description of the checklist that was used to collect data for this study.

3.2.9.1 The development and compilation phase of the checklist.

A thorough literature review on neonatal care and the guidelines on obstetric emergency and essential care were conducted in order to identify and determine the aspects that had to be included in this checklist. The checklist was drafted with the help of an

experienced neonatologist and it was then sent to the study supervisors for evaluation. The checklist included the information about the care of the newborn with asphyxia and adapted to the nursing process. Thus the information in the checklist was arranged according to the phases of the caring process of: assessment, diagnosis, planning, implementation, evaluation and record keeping.

The Information that represents the assessment phase were: recorded labour unit history for the baby, resuscitation done at birth and afterbirth, management done at birth in the labour unit and after birth in neonatal units according to the respiratory, cardiovascular, hematologic/blood, metabolic and renal, the gastro-intestinal and neurological system. The information that represents the planning phase included the care plan that was developed with admission as part of management of the newborn with asphyxia. The data for the implementation phase included the information about the execution of the planned interventions for the new born with asphyxia, while the data for evaluation referred to the evaluation of the interventions and the impact of the caring interventions and treatment of the newborn with asphyxia. Lastly, the checklist also contained the assessment of accuracy of recording of the care provided.

The checklist consisted of two sections: Section A collected information on the demographic information of newborn babies with asphyxia. Section B collected information about the management of newborn babies with asphyxia at birth. Section C collected information about the management of newborn babies with asphyxia after birth.

3.3. Validity and reliability

3.3.1 Validity

Validity is the degree to which an instrument actually measures what it intends to (De Vos et al. 2011). De Vos et al. (2011) pointed out that validity is doing what it is intended to do and measuring what it is supposed to measure. Face, content and construct validity were considered in this study.

Face validity: Face validity refers to whether the test looks valid to individuals who use and administer the test (Lapan & Quartaroli, 2009). In this study, face validity was ensured through verification of data collection instrument by a neonatologist, two (2) colleagues and supervisors, who agreed that the items appeared to be representative of the purpose of the study. The items included in the instrument were assessed, and modifications were made accordingly.

Content validity: Content validity is the extent at which test items are assessed as appropriate for inclusion in a test (Lapan & Quartaroli, 2009). In this study, content validity was ensured through a checklist that contains adequate care interventions of the essential emergency obstetric and neonatal care for the prevention of neonatal death associated with asphyxia. Content validity was also ensured through the guidance of experts - a neonatologist, in developing the checklist.

Construct validity: Construct validity determines how well a test measures a theoretical construct (Lapan & Quartaroli, 2009). Construct validity was maintained by the content

of the checklist which is relevant to the guidelines on essential obstetric and emergency care of the MoHSS (2009) as well as the manual of neonatology present at the facility.

3.3.2 Reliability of the instrument

Reliability is the consistency of the data collection instrument in producing similar results when used on different occasions under similar circumstances (Lapan & Quartaroli, 2009). In this study, equivalence and internal consistency were maintained to ensure reliability of the checklist for data collection.

Equivalence: Equivalence reliability was maintained by using the same checklist to all the patients' files (Grove, Burns & Gray 2013).

Internal consistency: Internal consistency is assessing how well test items measure the test content and construct. Lapan and Quartaroli (2009) revealed that a test should demonstrate temporal consistency (test-retest reliability) by producing similar results with the same participants over time.

In this study, internal consistency was maintained through pre-tests on 10 patients' files. The researcher and an independent assistant (nurse) reviewed these 10 records separately and compared the results. Both the researcher and the independent assistant obtained the same results.

3.3.3 Pre-test

De Vos et al. (2011) indicated that in conducting a pilot study, a researcher should orientate himself and identify possible defects in the planned study. For this study, a pilot study was conducted and the checklist was pre-tested using 10 files of newborns that died of asphyxia in 2015. The pre-tested files were not included in the main study. A pre-test was conducted in order to determine whether the required data could be obtained to identify and correct the inadequacies in the instrument and to note the time for completion of each patient's file. Through the pre-test, it was established that it takes 35 minutes to complete-check one file of the case of neonatal death related to asphyxia respectively. Furthermore, documented information in each of the file was assessed against the standards of one checklist (Guest & Namey, 2015). Adjustments were made to the checklist regarding clarity and arrangements of some items.

3.3.4 Data collection procedure

The data was obtained by means of the checklist. Information was retrieved from the patients' record files during the period of May - July 2016. The records were used retrospectively and only the information for the years January 2013 - December 2014 were collected. Documentary evidences documented on the management of the newborn with asphyxia were collected in order to identify factors associated with asphyxia related deaths at maternity units. The implementation of the essential emergency obstetric and essential care guideline by health care providers at the

maternity units in care of each case of a newborn with asphyxia related death was assessed. Care that was provided or not provided was verified (Fox & Bayat, 2007). The determinant factors for asphyxia associated deaths were therefore identified/determined.

3.3.5 Data analysis

In this study, descriptive data analysis was conducted. Data was entered, cleaned, coded and edited for inconsistencies before analyzed with Epi Info version 7, as computer software packages for statistical analysis. As a descriptive analysis, distributions of variables were displayed using frequencies and percentages to describe the demographic characteristics of the newborn babies who died due to asphyxia. Frequency distribution and percentages were also produced to describe the management carried out on newborn babies with asphyxia related deaths. Some of the results are displayed in charts, and some were presented by means of graphs.

In this study, the central tendency was also used to estimate the "center" of a distribution of values. The two major types of estimating the central tendencies that were used in this study were mean age and range. Statistics inferences on the possible management factors associated with asphyxia related deaths were derived from the study sample.

3.4 Ethical considerations

Ethical principle of autonomy, respect for a person, beneficence and justice were observed (Brink et al., 2013). Overall permission to access clients' files to collect information was obtained from the offices of the Permanent Secretary (PS) of the

Ministry of Health and Social Services, the Medical Superintendent of the hospital, and the Nursing Service Manager at maternity units. Confidentiality of information from the clients' files was assured: the findings were reported in general and no individual names from the files were revealed. The study did not incur any risk to human beings because secondary data were collected from the clients' files as the only source of information. The findings and the recommendations of the study are to be shared with the authority of the hospital maternity units for possible solutions to neonatal deaths related to asphyxia at the health facility.

3.5 Summary

This chapter described the research design, methods and procedures followed in the study. A quantitative, descriptive and retrospective method was used to assess the management of premature and newborns with asphyxia related deaths at the maternity units of the hospital. The study population comprised 90 files of patients who died of asphyxia from January 2013 - December 2014 at the maternity unit. Relevant data collection methods and process of data analysis were outlined. The principles of validity and reliability as well as the ethical issues that were taken into consideration during the research process were discussed and explained. The next chapter, namely chapter 4 presents the research results.

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION OF RESULTS

4.1. Introduction

This chapter describes the research results on the demographic information and management of newborn babies with asphyxia at the maternity units at the study hospital. Data was analyzed descriptively by means of the Epi Info version 7 computer software. The purpose of this chapter is to present the results of the study and report the results objectively. The results of the observational checklist are presented according to the sequence of the sections in the instrument used for data collection. The results presented are taken from a sample of 90 cases of asphyxia related neonatal deaths from January 2013 to December 2014. The information obtained is presented in charts and graphs.

This chapter is divided into three sections, namely, A, B and C. Section A presents the demographic information of the cases of asphyxia related deaths and section B presents the information regarding the management of newborn babies with the condition of asphyxia at birth. Section C presents the findings on management of babies with asphyxia after birth. Section C is divided into 11 subsections for systemic management of a newborn with asphyxia after birth. These included: assessment at neonatal unit, management of respiratory system, cardio vascular, renal system, metabolic, hematopoietic /haematology/blood, and neurological system. The caring process

included planning, implementation, evaluation and record keeping associated with the management of newborn babies with asphyxia.

4.2. PRESENTATION OF RESULTS

4.2.1 SECTION A: DEMOGRAPHIC INFORMATION

4.2.1. 1 Age of babies in days

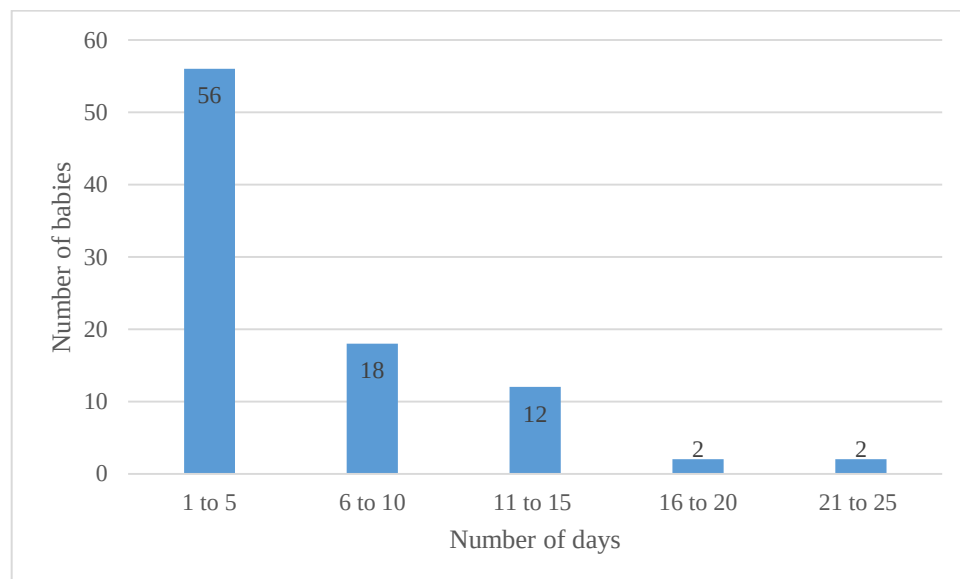


Figure 4.1: Number of days lived by asphyxiated babies before death

The majority of asphyxia victims died within five days after birth. Out of 90 cases, 56 died within five days, representing 62% of the total sample. Another 20% lived between 6 to 10 days, 13% lived between 11 and 20 days and an equal percentage of 2% each lived between 16 to 20 days and 21 to 25 days respectively. The statistics above show that most newborn babies with asphyxia died within five days from the time of birth.

4.2.1.2 Gender of newborn babies

The majority of newborn babies who died because of asphyxia were males, constituting 56% out of the 90 cases of the study population while female babies constituted the remaining 44%.

4.2.1.3 Weight of babies at birth in kilograms

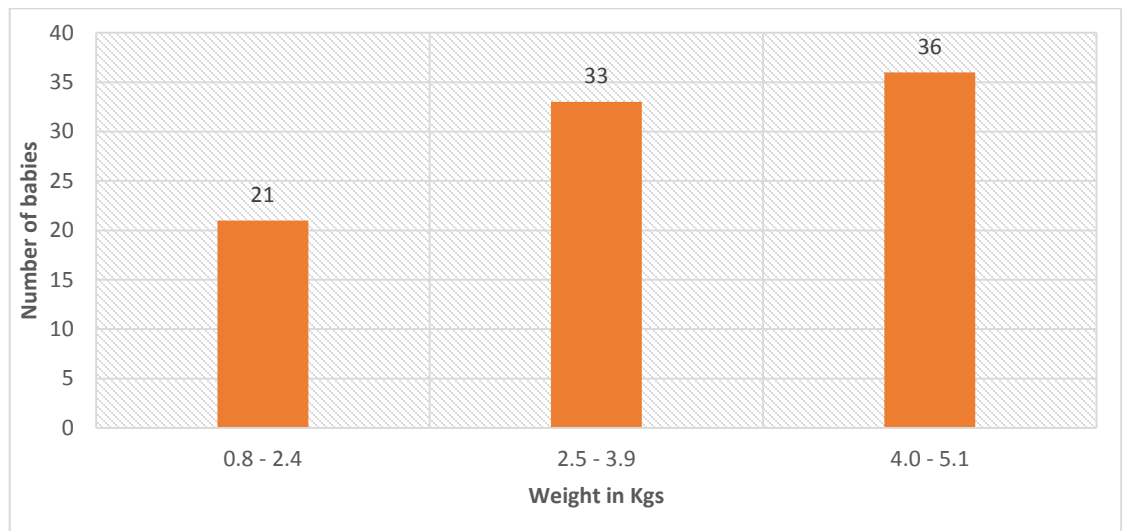


Figure 4.2: Weight distribution of the newborns

Statistics above show that 23% of the newborns weighed between 0.8 to 2.4kg at birth, 37% weighed between 2.5 to 3.9kgs, and the remaining 40% weighed between 4 and 5.1kgs.

4.2.1.4. Gestation period in weeks

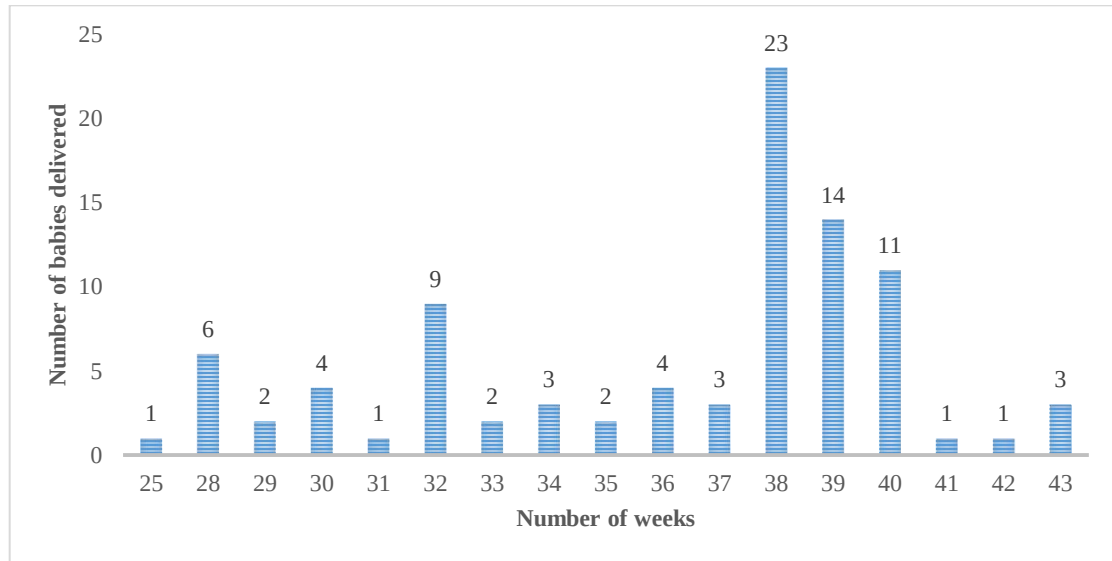


Figure 4.3: Gestation period

In this study, the mean for gestational period was 36 weeks, with a range of 25-43 weeks. The findings indicate that 26.7% of the babies were born premature.

4.2.1.5. Mode of delivery

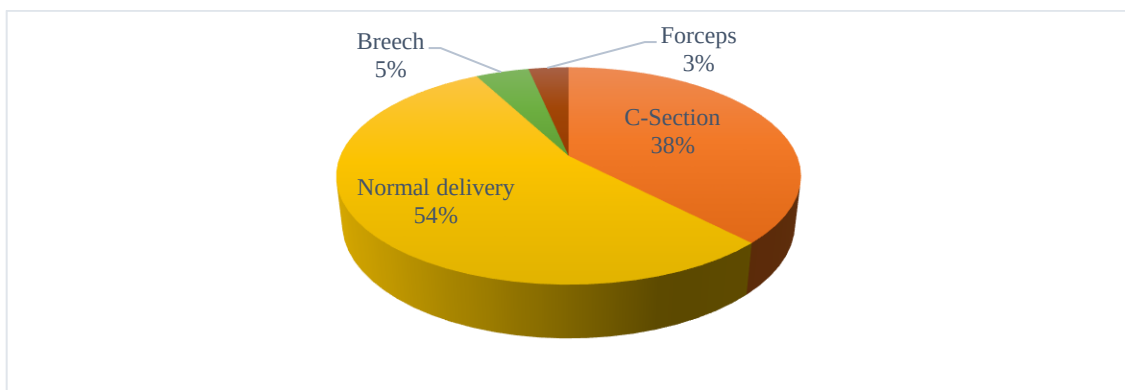


Figure 4.4: Mode of delivery

The majority (54%) of the cases who died due to asphyxia were delivered normally, 38% were delivered through C-section, 5% through breech and the remaining 3% were delivered through forceps.

4.2.1.6 Apgar score

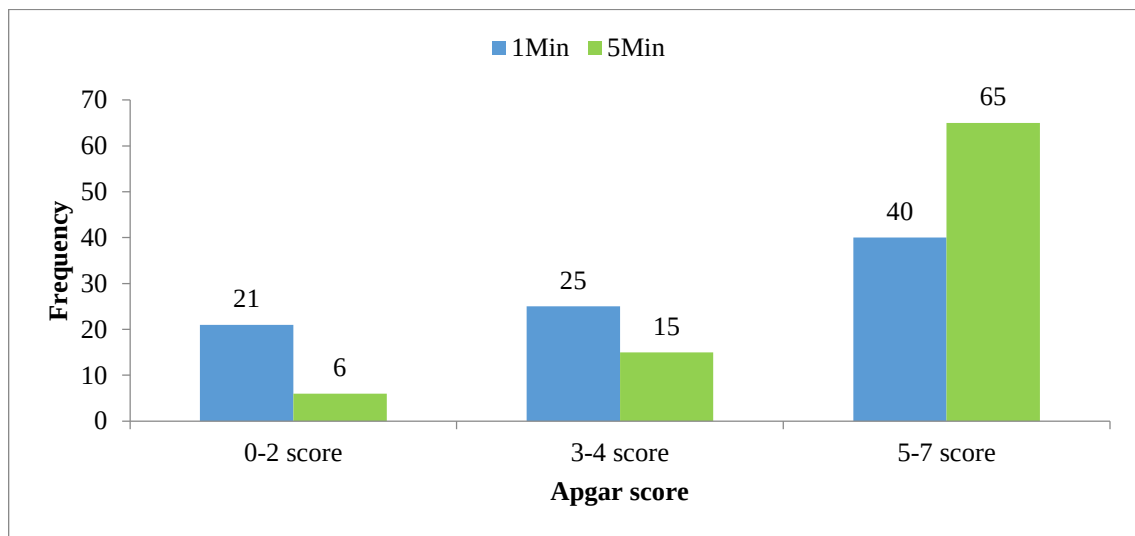


Figure 4.5: Apgar score

The results show that 21 and 6 newborn babies had an Apgar score of between 0 - 2 for one minute and for 5 minutes respectively, 25 and 15 had an Apgar score of between 3 and 4 for one minute and five minutes respectively while 40 and 65 had an Apgar score of between 5 and 7 respectively.

4.2.1.7. Head circumference of babies at birth

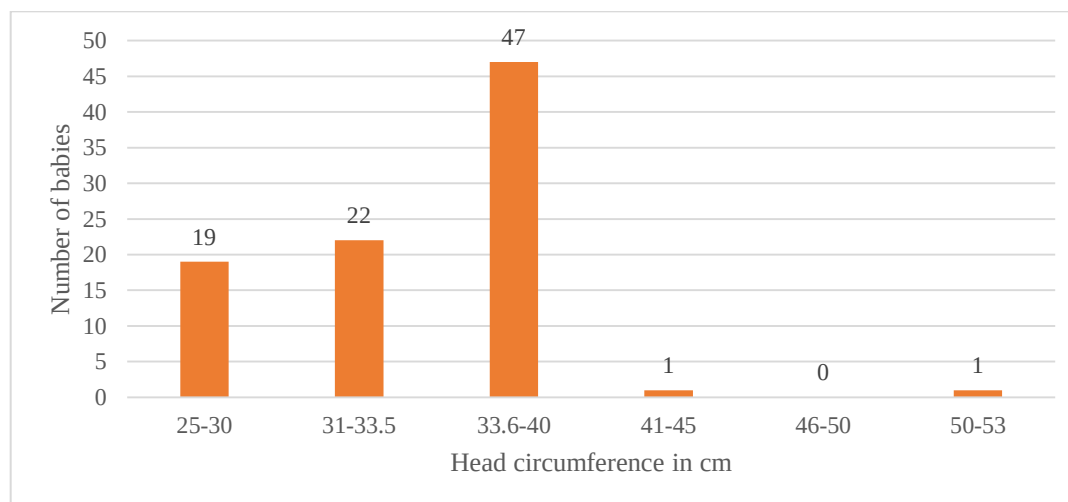


Figure 4.6: Head circumference

The statistics show that 21% of the cases studied were born with a head circumference of between 25 and 30 cm, and 24% were born with a head circumference of between 31 and 33.5 cm. The majority of 53% of the babies were born with a head circumference of between 33.6 and 40 cm, 1% had a head circumference of between 41 to 45 cm and the remaining 1% had a head circumference of between 50 and 53 cm.

4.2.1.8 Referral status

	Referred from other hospitals	Not referred	Total
Number of cases	62	28	90
Percentage	69%	31%	100%

Table 4.1. Referral status

Out of 90 cases studied, 62 representing 69% of the sample were referral cases, while the remaining 31% were not referral cases.

4.2.1.9 Antenatal Care (ANC) booking

Out of 90 cases studied, 92% had ANC records while only 8% never had ANC records to show the progress in the development of the unborn babies.

4.2.1.10 Place of delivery

The majority of babies who died due to asphyxia were born at Windhoek Central hospital. Out of 90 cases examined, 96% were born at the hospital facility while only 4% were born before arrival at the hospital facilities.

4.2.2. SECTION B: MANAGEMENT OF BABIES WITH ASPHYXIA AT BIRTH:

ASSESSMENT AT THE LABOUR WARD

4.2.2.1 Records of fetal heart conditions

Out of 90 cases, 93% had their fetal heart status examined and recorded while only 7% never had their fetal heart status examined.

4.2.2.2 Partogram records

Statistics show that 70% of the mothers whose babies succumbed to asphyxia had graphical records about the progress of their active labour observed and recorded while in the ANC unit. A significant number (26%) of the babies sampled were born without

the progress of labour being observed and recorded while 4% of the cases sampled were born before arriving at the hospital.

4.2.2.3 Assessment of whether mothers had prolonged first stage of labour

Out of 90 cases studied, 81% were born after a prolonged first stage of labour. Only 15% of the babies were born without a prolonged first stage of labour.

4.2.2.4 Assessment of whether mothers had prolonged second stage of labour

Out of a total sample of 90 cases, 42% of the cases who died due to asphyxia were born after a prolonged second stage of labour, 4% were born before arriving at the hospital while the remaining 54% were born without a prolonged second stage of labour.

4.2.2.5 Assessment of whether the status of membranes was indicated

The results show that 64% of the cases studied had the nature of their membranes indicated. Moreover, 29% of the subjects studied never had the nature of their membranes indicated while the records of the remaining 7% were unknown.

4.2.2.6 Assessment of whether or not the membranes were ruptured

Out of 58 newborn cases babies whose membranes were indicated, 62% had their membranes ruptured spontaneously while for the remaining 38% the membranes were ruptured artificially.

4.2.2.7 People who conducted the delivery

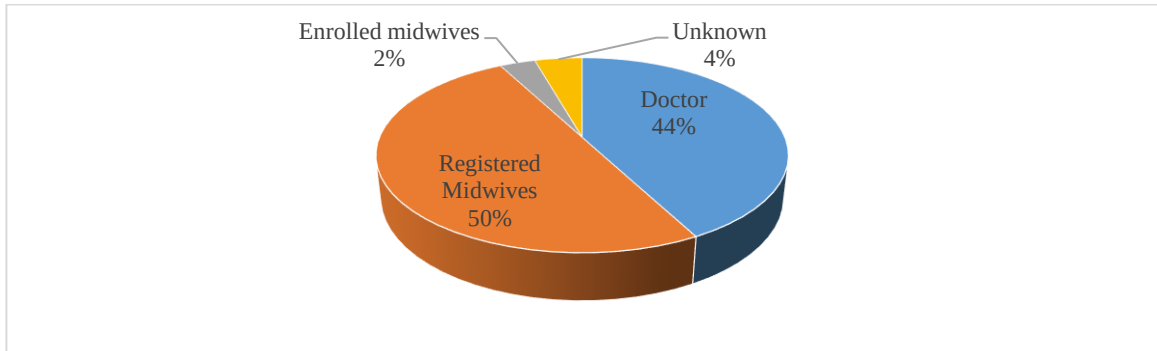


Figure 4.7: Professionals who conducted delivery

The results showed that 44% of the deliveries were conducted by doctors, 50% were conducted by registered midwives, 2% were conducted by enrolled midwives, while the remaining 4% were conducted by unknown people probably traditional birth attendants, as 4% of the cases studied were born before arrival at the study hospital.

4.2.2.8 Presence of pediatrician or medical doctor at birth

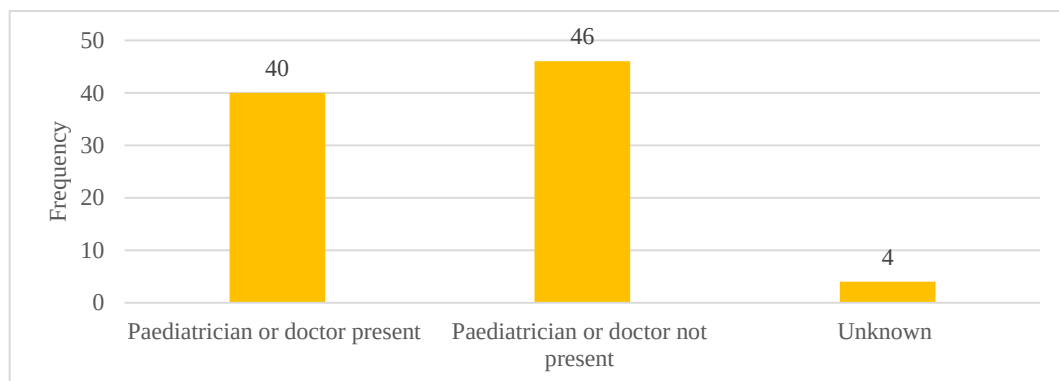


Figure 4.8: Presence of pediatrician or medical doctor at birth

The results indicate that 44% of the cases were born under the supervision of pediatricians or a medical doctor, 52% were born in the absence of pediatricians or a medical doctor and the remaining 4% were born before arrival at the hospital.

4.2.2.9 Presence of meconium aspiration at birth

Out of a total of 90 records of cases sampled, 64% had meconium aspiration syndrome (MAS), 29% never had MAS while it was not easy to establish the status of the remaining 7% of the records of the babies sampled.

4.2.2.10 Assessment of whether or not any resuscitation was done at birth

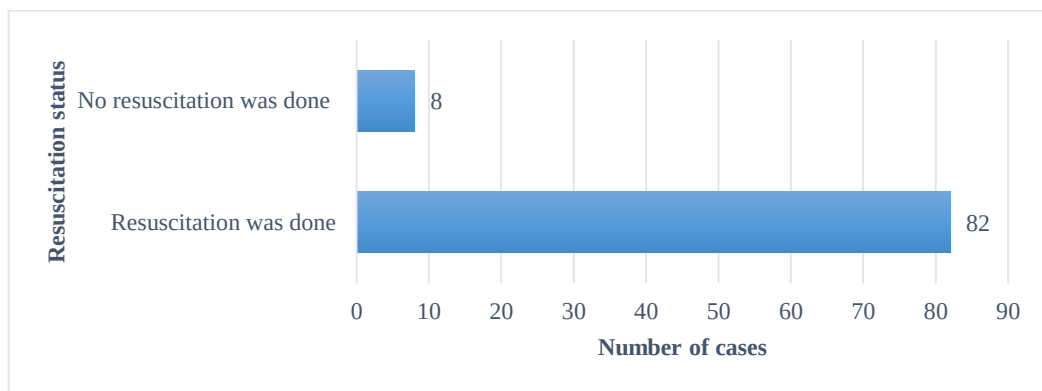


Figure 4.9: Resuscitation done at birth

Out of 90 babies, 82 cases representing 91% of the total sample were resuscitated. Only 9% of the babies were not resuscitated.

4.2.2.11 Assessment of whether or not mothers had any history of being tired during second stage of labour

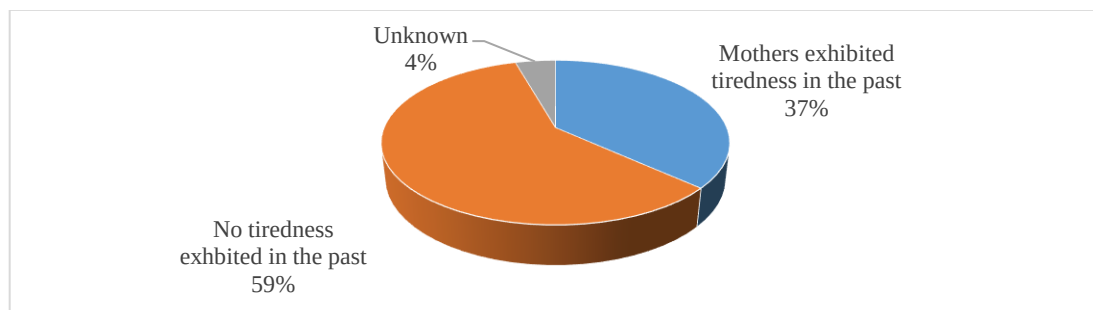


Figure 4.10: History of the mother being tired during second stage of labour

Out of 90 cases studied, 37% were born by mothers who had experienced tiredness during the second stage of labour. The majority of the babies however were born by mothers who never had any history of tiredness during the second stage of labour, while the status of the mothers of the remaining 4% of the newborn babies was not known.

4.2.2.12 Presence of shoulder dystocia

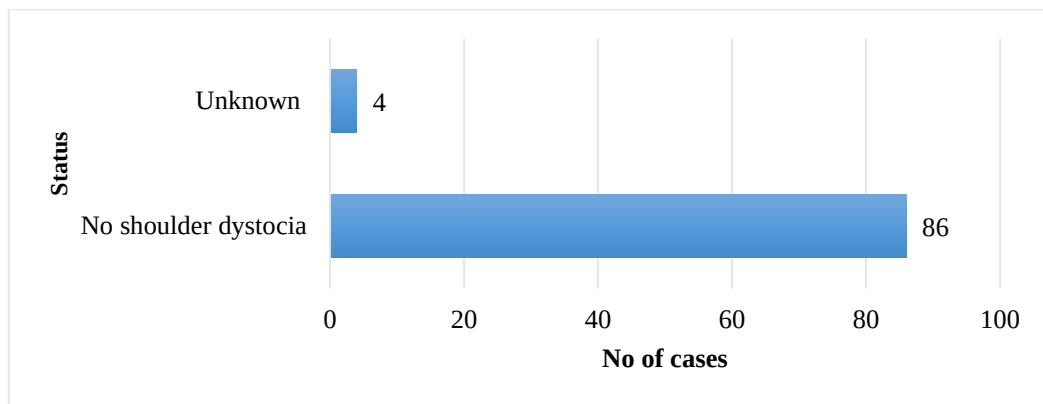


Figure 4.11: Shoulder dystocia

There was no shoulder dystocia observed in all the babies born in the hospital facility. Shoulder Dystocia status of the remaining 4 cases was not known because they were born before arriving at the hospital.

4.2.2.13 Existence of fetal distress at birth

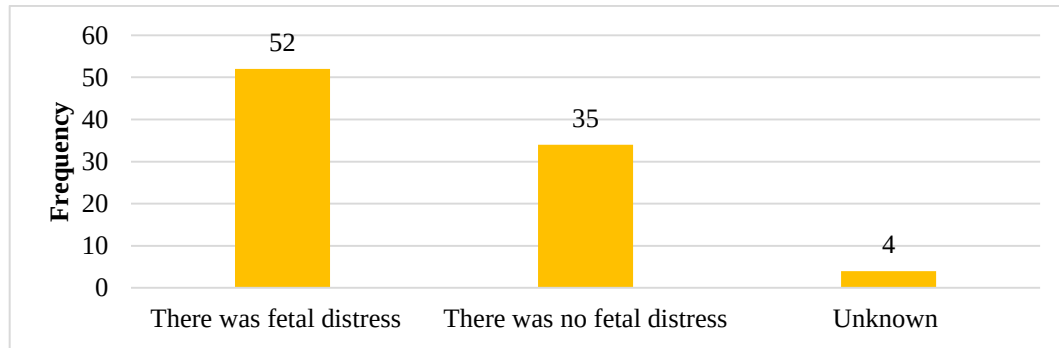


Figure 4.12: Fetal distress at birth

Out of 90 newborn babies, there was fetal distress in the birth of 57%. There was no fetal distress during the birth of 39% of the babies while the status of the remaining 4% was not known.

4.2.2.14 Cephalopelvic Disproportion (CPD) at birth

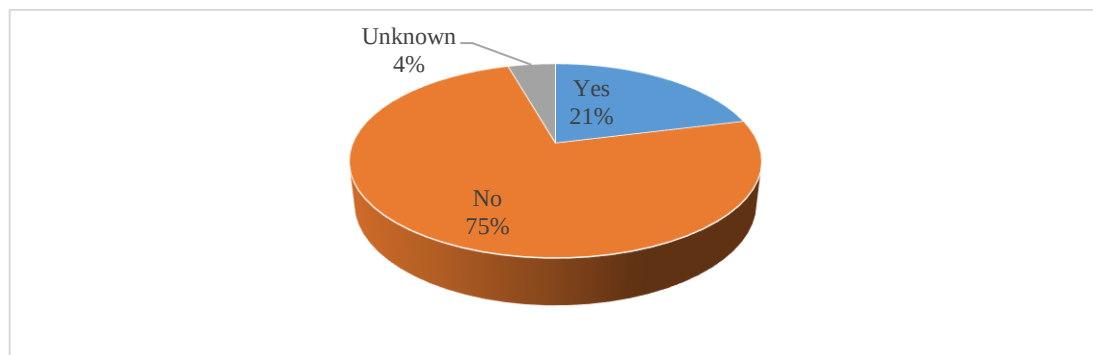


Figure 4.13: Cephalopelvic disproportion

The results indicated that 21% of the cases were delivered by women whose pelvis were too small to allow safe delivery of babies, 4% were unknown, and 75% of the babies however were born to mothers with the pelvic of normal measurements.

4.2.2.15. Existence of trauma at birth

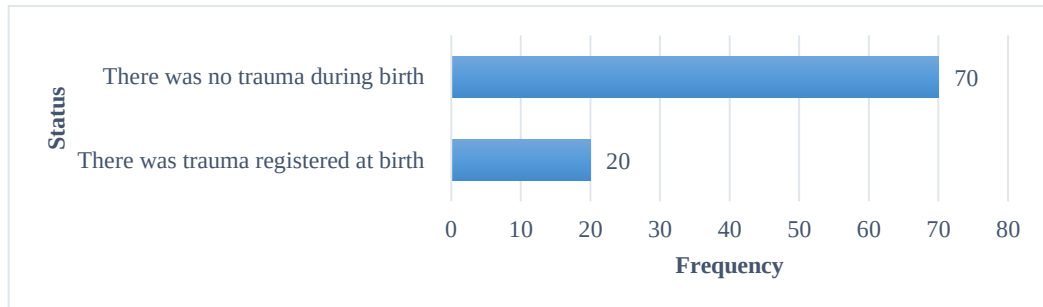


Figure 4.14: Trauma at birth

Out of 90 cases, 78% never had trauma at birth while the remaining 22% had trauma at the time of their birth.

4.2.2.16. Existence of Ante Partum Hemorrhage (APH): abruptio placentae, placenta previa/accreta)

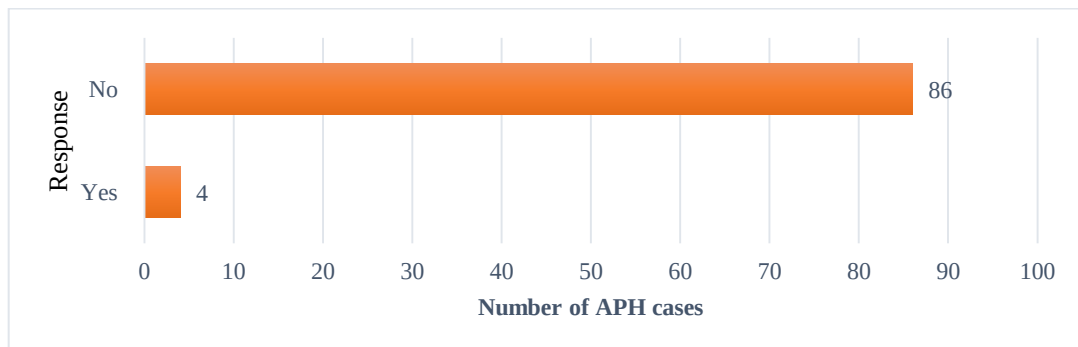


Figure 4.15: Ante Partum Hemorrhage

Out of 90 cases studied, only 4% were born by women who had ante partum hemorrhage. The remaining 96% were born by women who never had ante partum hemorrhage.

4.2.2.17. Existence of pregnancy-induced hypertension (PIH) of the mother

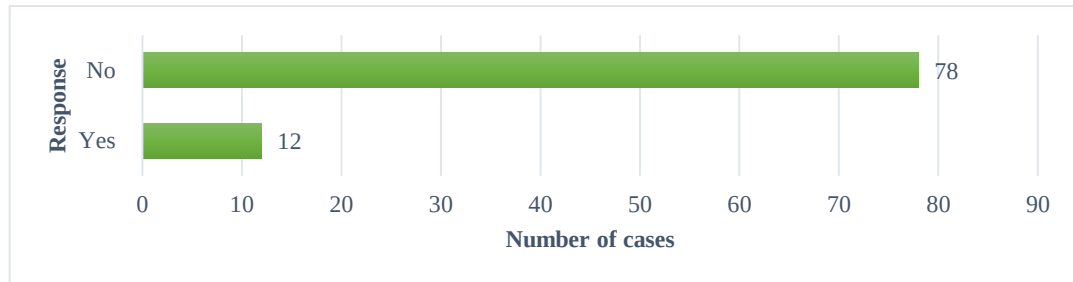


Figure 4.16: Pregnancy-induced hypertension (PIH)

Out of 90 cases investigated, only 13% were born by mothers who suffered from PIH and the remaining 87% were born by mothers who were free from PIH.

4.2.2.18. Existence of cord prolapses at birth

Out of 90 cases studied, 96% were born without umbilical cord prolapse complications while only 4% had umbilical cord prolapse complications.

4.2.3 SECTION C: MANAGEMENT OF BABIES WITH ASPHYXIA AFTER BIRTH

4.2.3.1 MANAGEMENT OF RESPIRATORY SYSTEM FOR NEWBORN BABIES WITH ASPHYXIA AFTER BIRTH

4.2.3.1.1 Whether or not respiratory system was assessed and oxygen therapy was administered

The results show that all 90 cases had their respiratory systems assessed and were subjected to oxygen therapy.

4.2.3.1.2 Whether resuscitation was done after birth

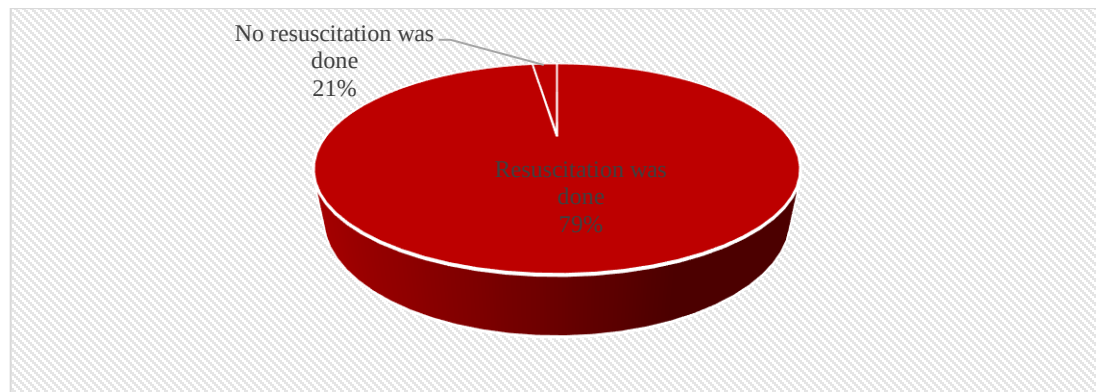


Figure 4.17: Resuscitation after birth

Out of 90 cases, 79% of the babies were resuscitated and 21% of the babies studied resuscitation was not performed.

4.2.3.1.3 Intubation of babies

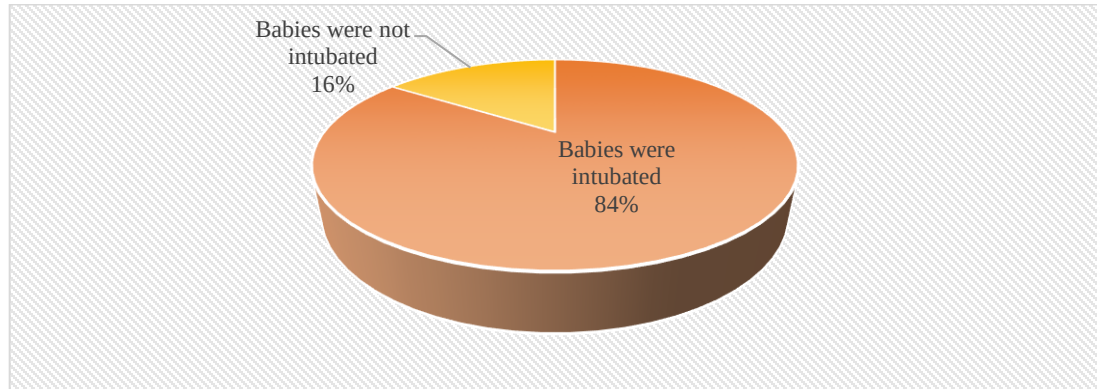


Figure 4.18: Intubation

Out of 90 cases, 84% were intubated while only 16% were not intubated.

4.2.3.1.4. Type of oxygen therapy administered

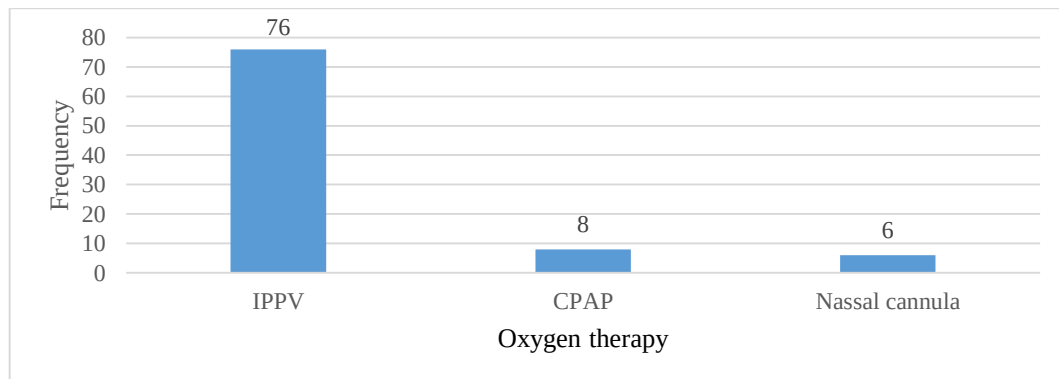


Figure 4.19: Type of oxygen therapy

The majority of cases were given intermittent positive pressure ventilation (IPPV) oxygen therapy. Out of 90 newborn babies studied, 84% were given IPPV oxygen therapy, 9% were given continuous positive airway pressure (CPAP) oxygen therapy and 7% were given nasal cannula oxygen therapy.

4.2.3.1.5 Duration of ventilation in days

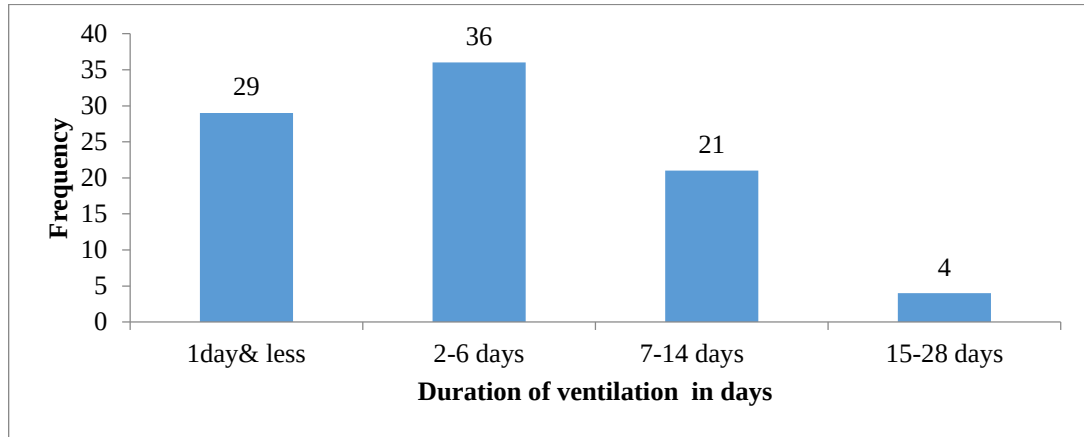


Figure 4.20: Ventilation in days

The results indicated that 32% of the babies were ventilated for a period of one day and below, 40% were ventilated for a period of between 2 and 6 days, 23% were ventilated for a period of between 7 and 14 days and the remaining 5% were ventilated for a period of between 15 and 28 days.

4.2.3.1.6 Assessment of whether oxygen was administered in accordance to doctors' prescriptions

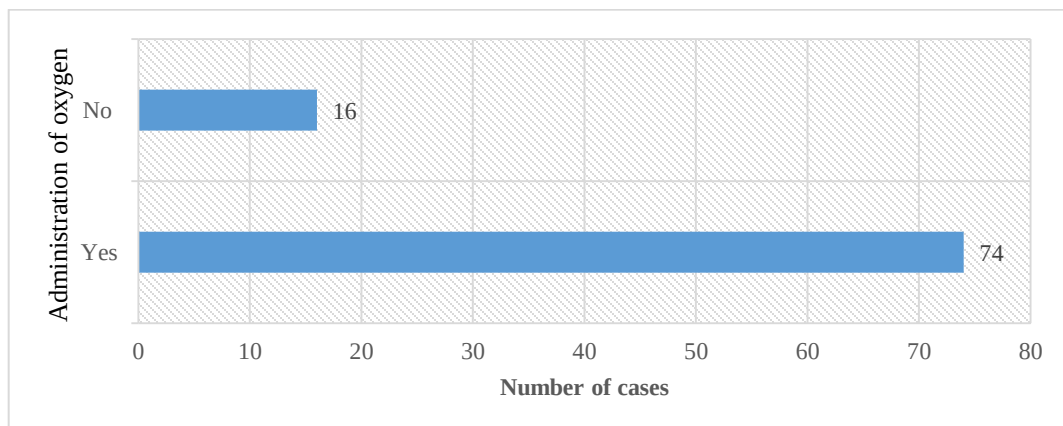


Figure 4.21: Administration of oxygen

Oxygen was properly administered to 82% out of 90 cases studied. The remaining 18% however did not receive the right administration of oxygen.

4.2.3.1.7 If no oxygen was administered accordance to doctors' prescriptions, the level of oxygenation

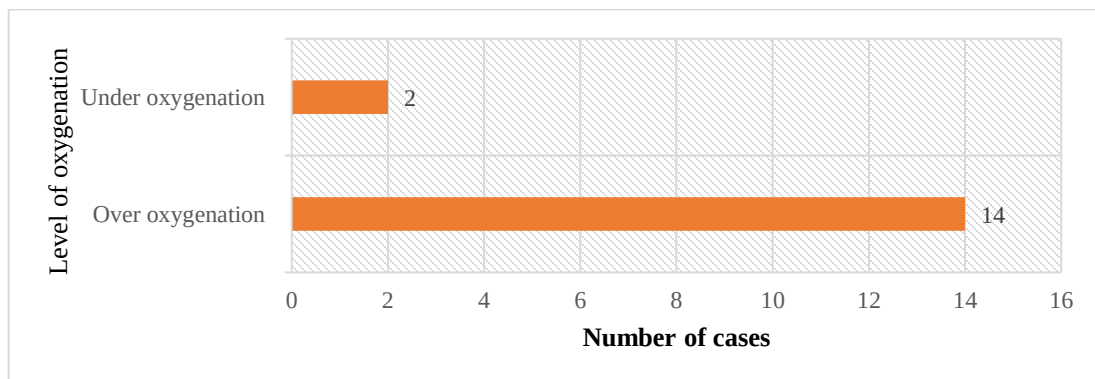


Figure 4.22: Level of oxygenation

Out of 74 cases who received oxygen therapy, 19% were over-oxygenated while 2.7% were under-oxygenated. Improper administration of oxygen could have claimed the newborns' lives.

4.2.3.1.8 Assessment of whether chest X-rays were done

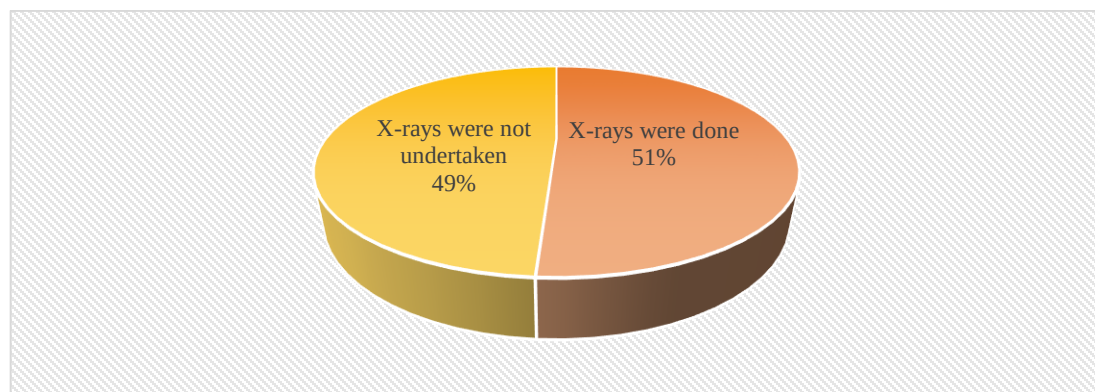


Figure 4.23: Chest X-Rays

Chest X-rays were conducted on 51% of the cases studied while the remaining 49% of the 90 cases never underwent chest X-ray tests.

4.2.3.2 MANAGEMENT OF CARDIOVASCULAR SYSTEM FOR NEWBORN BABIES WITH ASPHYXIA AFTER BIRTH

4.2.3.2.1 Whether or not blood pressure was assessed

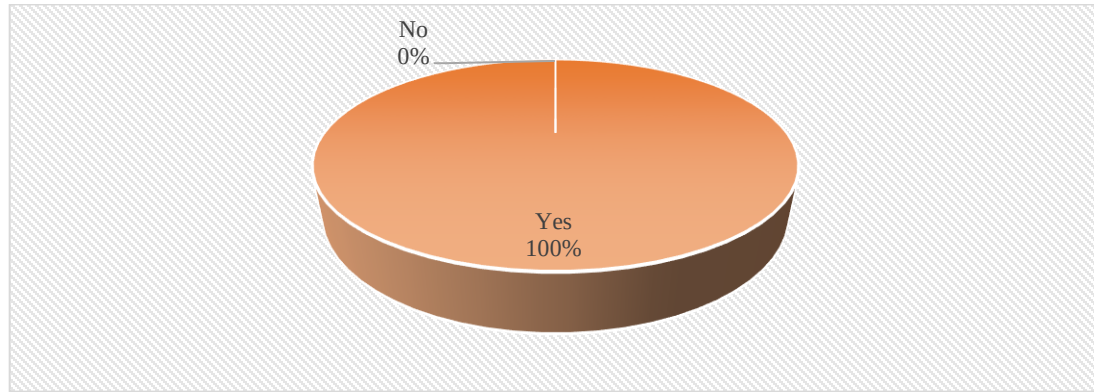


Figure 4.24: Blood pressure assessment

Results from the investigation revealed that all the 90 cases of neonatal asphyxia related deaths their blood pressure were not taken.

4.2.3.2.2 Administration of inotropes given for hypotension

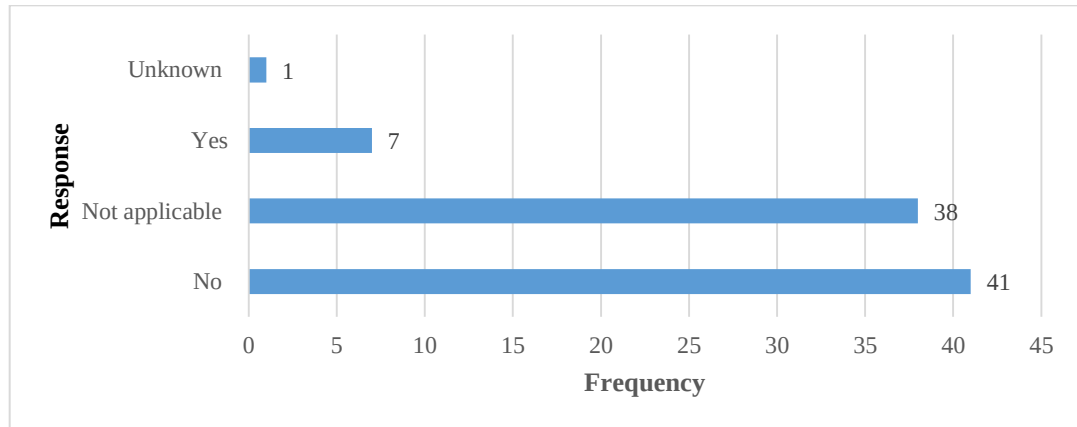


Figure 4.25: Administration of inotropes

Inotropes were only administered to 8% out of a total of 90 newborn babies studied. The remaining 92% of the cases studied were not given inotropes.

4.2.3.2.3 Assessment of whether hypovolemia was treated with a bolus of saline

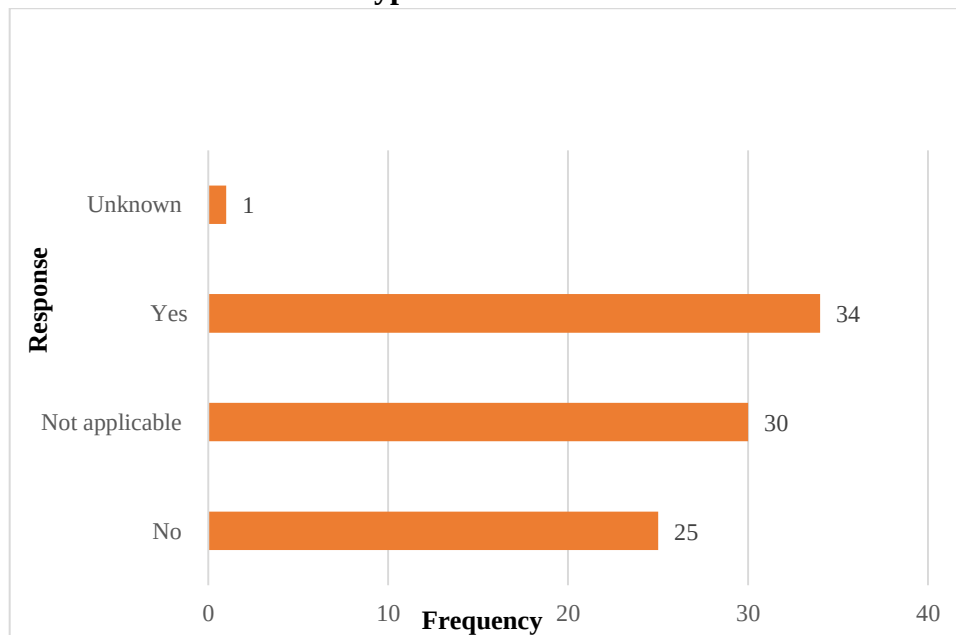


Figure 4.26: Treatment of hypovolemia with a bolus of saline

The results from the investigation revealed that 38% of the babies who died due to asphyxia were treated with bolus of saline. The remaining 62% were not treated using bolus.

4.2.3.2.4. Assessment of whether sildenafil was given to the babies for pulmonary hypertension

Out of a total of 90 cases studied, only 23% were given sildenafil as treatment for pulmonary hypertension and 66% were never given sildenafil. It was not certain whether or not 3% of the babies were given sildenafil while the remaining 8% of the babies did not need sildenafil.

4.2.3.2.5. Assessment of whether heart sonar was done for the study cases who had hypertension

Heart sonar was performed on only 20% cases under this study; About 57% of the cases never had heart sonar performed on them; a heart sonar was not applicable on 22% of the cases, while the status of the remaining 1% were unknown.

4.2.3.3 MANAGEMENT OF RENAL SYSTEM OF BABIES WITH ASPHYXIA AFTER BIRTH

4.2.3.3.1. Assessment of whether or not abdomen was assessed

The abdomens of all the 90 newborn babies under investigation were assessed.

4.2.3.3.2. Monitoring of fluid intake and output of newborn babies

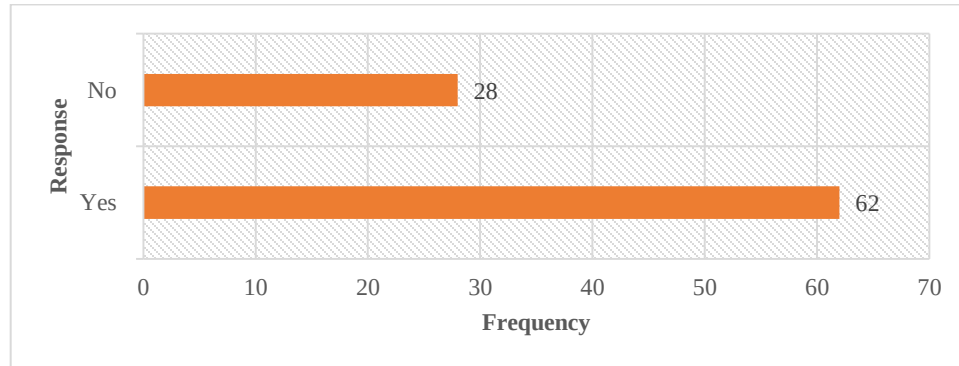


Figure 4.27: Fluid intake and output

The results from the documents reviewed revealed that 62 (69%) out of the 90 cases studied had their fluid intake and output monitored while 28 representing 31% of the total sample never had their fluid intake and output monitored.

4.2.3.3.3 Testing of blood urea and electrolytes

Out of 90 cases studied, 61% never had urea and electrolytes blood tests performed but only a minority of 39% had urea and electrolytes blood tests.

4.2.3.3.4 Highest level of urea carried out

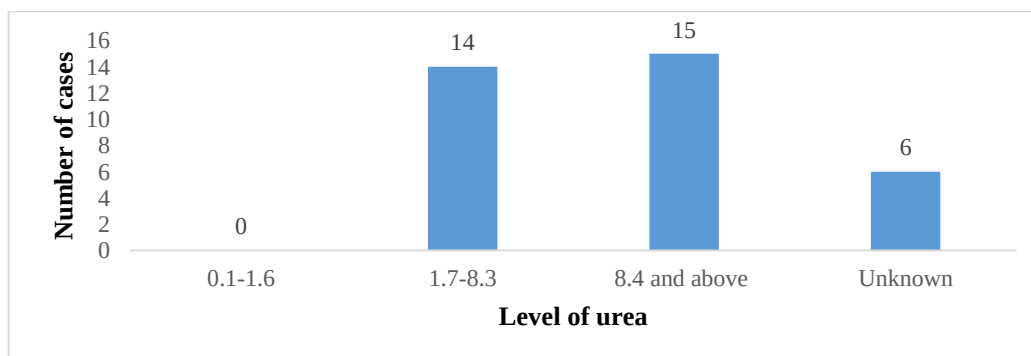


Figure 4.28: Urea level

Out of 35 cases whose urea and electrolytes blood tests were performed, 40% had normal urea level of between 1.7 to 8.3mg/dL and 43% had high urea level of 8.4 mg/dL. The urea level of the remaining 17% was unknown.

4.2.3.3.5. Creatinine level

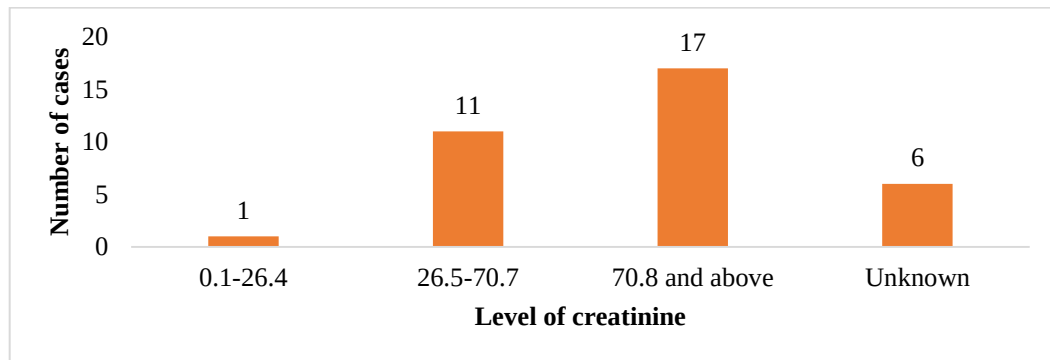


Figure 4.29: Creatinine level

Out of 35 cases whose urea and electrolytes blood tests were performed, 31% had normal creatinine level of between 26.5 and 70.7 $\mu\text{mol/L}$, 3% had creatinine level of between 0.1 and 26.4 $\mu\text{mol/L}$, 49% had high creatinine level of 70.8 $\mu\text{mol/L}$ and above and the remaining 17% had their creatinine status unknown.

4.2.3.4 MANAGEMENT OF METABOLIC SYSTEM OF BABIES WITH ASPHYXIA AFTER BIRTH

4.2.3.4.1. Assessment of glucose

A majority (94%) of the 90 cases studied had their glucose levels assessed. Only 6% never had their glucose levels assessed.

4.2.3.4.2. Treatment of hypo/hyperglycemia

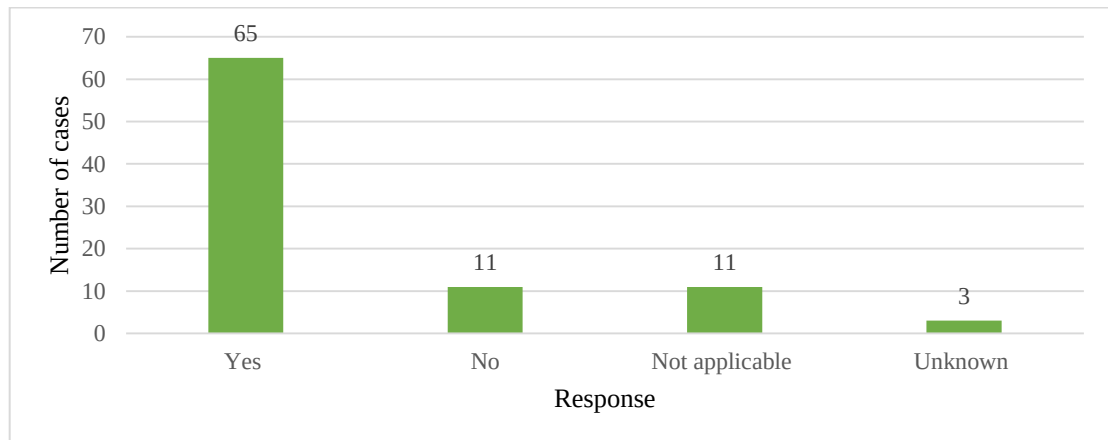


Figure 4.30: Hyper/hypoglycemia treatment

Out of a sample of 90 newborn cases, 72% were put under hyper/hypoglycemia treatment, 12% were not treated for hyperglycemia, and hyperglycemia treatment was not applicable to 12% of the studied while the status of hyperglycemia treatment of 4% of the cases who succumbed to asphyxia was not known.

4.2.3.4.3. Whether or not any seizures were observed

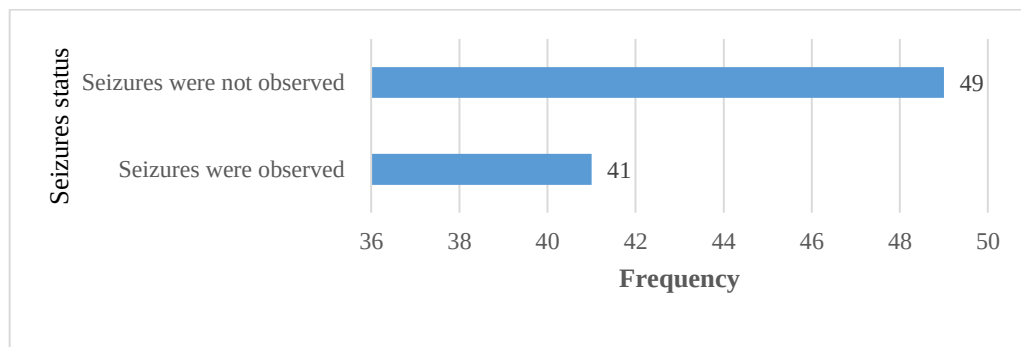


Figure 4.31: Seizures

Out of 90 cases studied, 41 (46%) had seizures after birth while the remaining 49 (54%) never had seizures after being born.

4.2.3.4.4 Whether anti-convulsion treatment was given to babies with seizures

Out of 41 cases that had seizures, 98% of them received anti-convulsion treatment in an attempt to save their lives. Only 2% of cases who had seizures never received anti-convulsion treatment.

4.2.3.4.5 Whether penicillin was 12 hourly given or commenced for sepsis

Results from the document reviews revealed that 77% of the 90 cases were given penicillin 12 hourly or commenced for sepsis. However, 23% never received such treatment.

4.2.3.4.6 Assessment of whether gentamycin was given or commenced for sepsis

The results indicate that 77% of the cases who died because of asphyxia were given gentamycin for sepsis while the remaining 23% never received such medication.

4.2.3.4.7 Assessment of whether cooling/therapeutic hypothermia was applied

Therapeutic hypothermia was only applied to 6% out of the 90 newborn babies considered in this study. A majority of 64% however did not receive therapeutic hypothermia. It was not established whether or not 1% of the newborn babies received therapeutic hypothermia while therapeutic hypothermia was not applicable to 29% of the newborn babies studied.

4.2.3.4.8 Assessment of whether sodium bicarbonate was given for acidosis

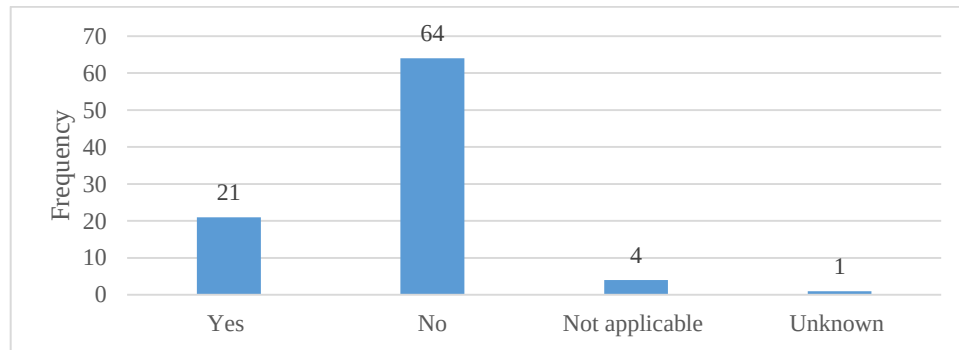


Figure 4.32: Sodium bicarbonate given for acidosis

Out of a total sample of 90 cases who died because of asphyxia, 23% of them were given sodium bicarbonate for acidosis. A majority of 64% of the cases however were not given sodium bicarbonate for acidosis.

4.2.3.5 MANAGEMENT OF THE HEMOPOIETIC/HAEMATOLOGY/BLOOD SYSTEM FOR A NEWBORN WITH ASPHYXIA AFTER BIRTH

4.2.3.5.1. Performance of Full Blood Count (FBC) tests

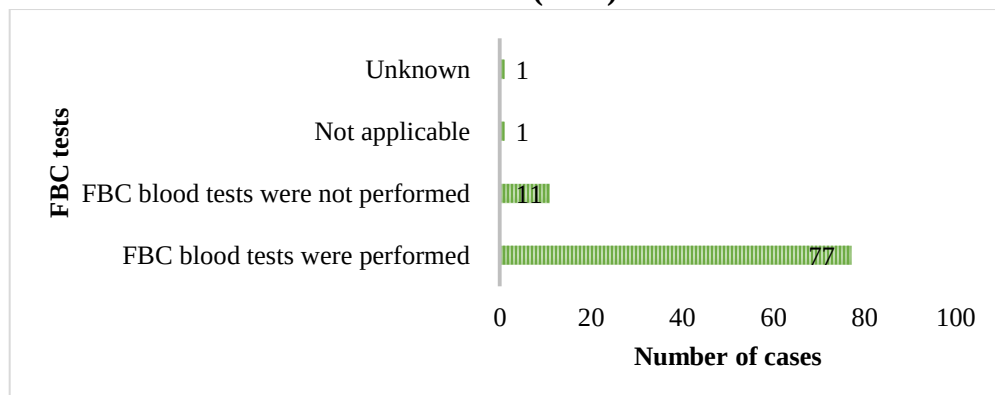


Figure 4.33: Full blood count (FBC) tests

Out of a total of 90 newborn babies, 86% had full blood count tests performed, 12% never had full blood count tests, 1% died before a full blood count test could be carried out while the remaining 1% never had any records of whether or not a full blood test count was conducted.

4.2.3.5.2. Assessment of whether cases with low Hemoglobin (HB) got blood transfusion

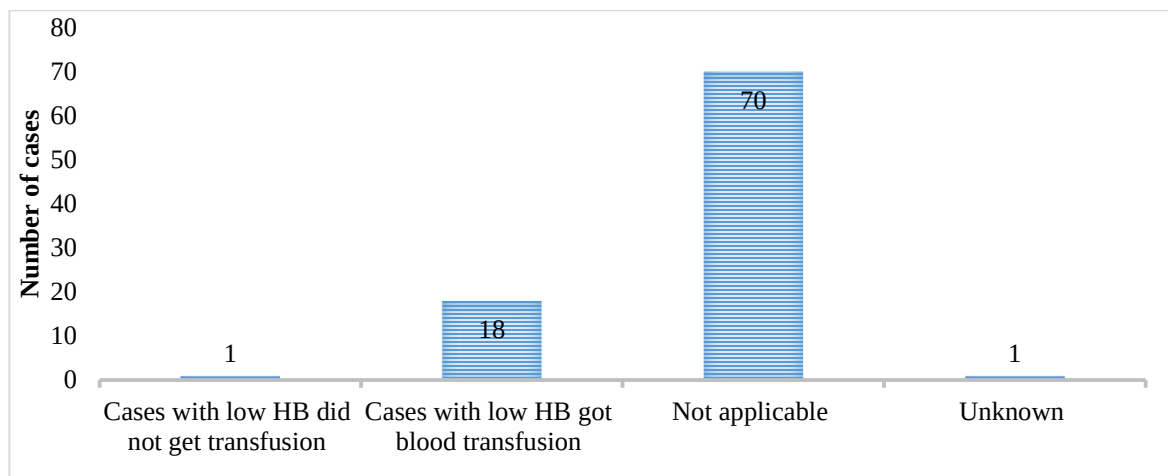


Figure 4.34: Blood transfusion for low Hemoglobin

Out of 19 cases with low hemoglobin, 99% got blood transfusion while only 1% never got blood transfusion.

4.2.3.5.3. Assessment of whether babies with low platelets got platelets transfusion

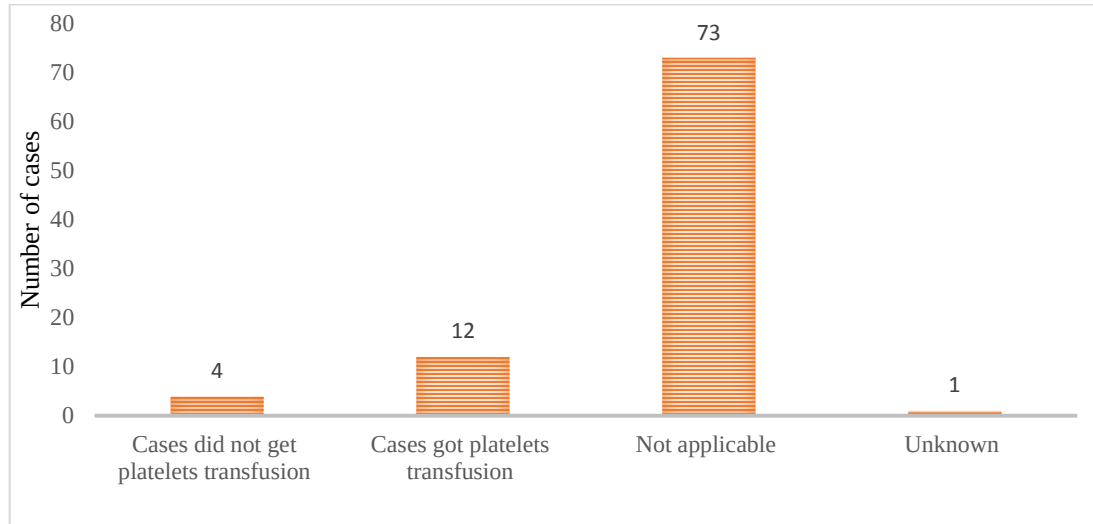


Figure 4.35: Platelets transfusion

Documents review of 90 newborns suffering from asphyxia revealed that 16 cases needed platelets transfusion. Out of the 16 cases who had platelets transfusion, 75% got platelets transfusion while the remaining 25% did not.

4.2.3.5.4 Assessment of whether any C-Reactive Protein (CRP) blood tests were done

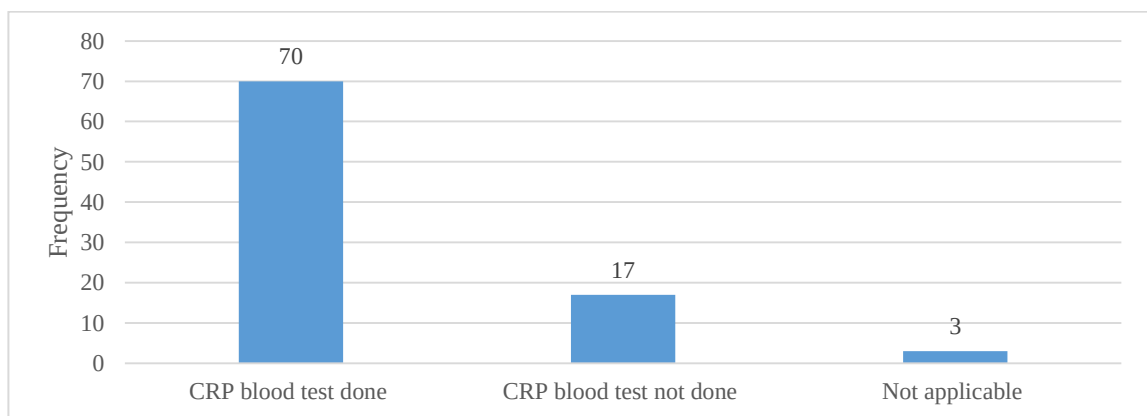


Figure 4.36: C - reactive protein (CRP)

Of the 90 cases drawn for investigation, 78% had CRP blood tests, 19% never had CRP blood tests, and CRP test was not applicable to the remaining 4% of the cases.

4.2.3.5.5. The highest value of CRP blood test

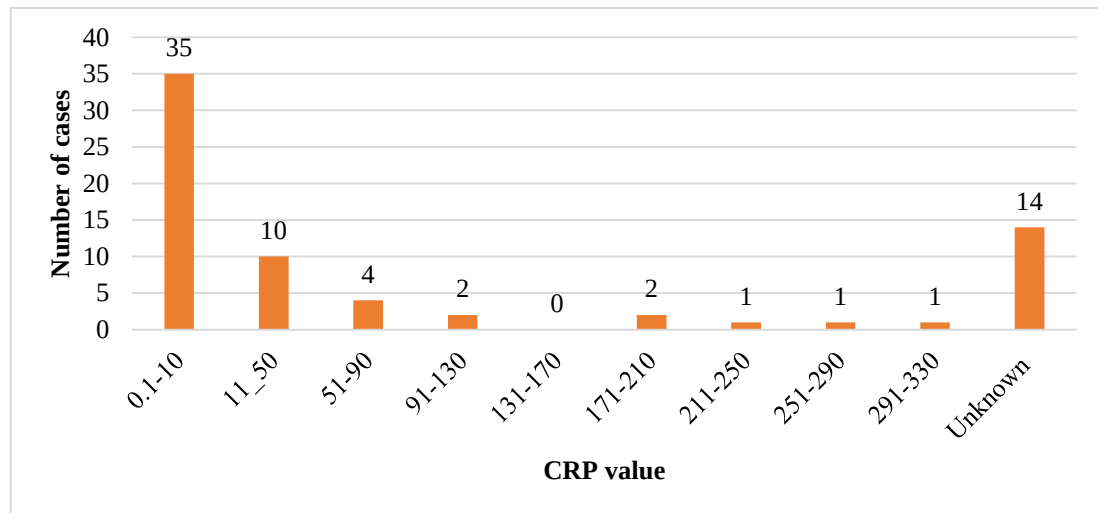


Figure 4.37: CRP level

The findings indicated that 39% had a normal CRP value of between 0.1 mg/L and 10 mg/L, 11% had CRP value of between 11 and 50 mg/L, 5% had CRP value of between 51 and 100 mg/L, an equal percentage of 2% each had CRP value of 91 L to 130 mg/L and 171 to 210 mg/L while 1% each had CRP value of between 211 to 250 mg/L, 251 to 290 mg/L and 291 to 330 mg/L respectively. It was not possible to ascertain the CRP values of the remaining 16% of the cases.

4.2.3.5.6. Performance of blood Potential Hydrogen (PH)

Results from the document review revealed that blood PH was performed on 81% of the 90 study cases who died because of birth asphyxia. No blood PH however was performed on 19% of the new born babies.

4.2.3.5.7. Performance of blood gases

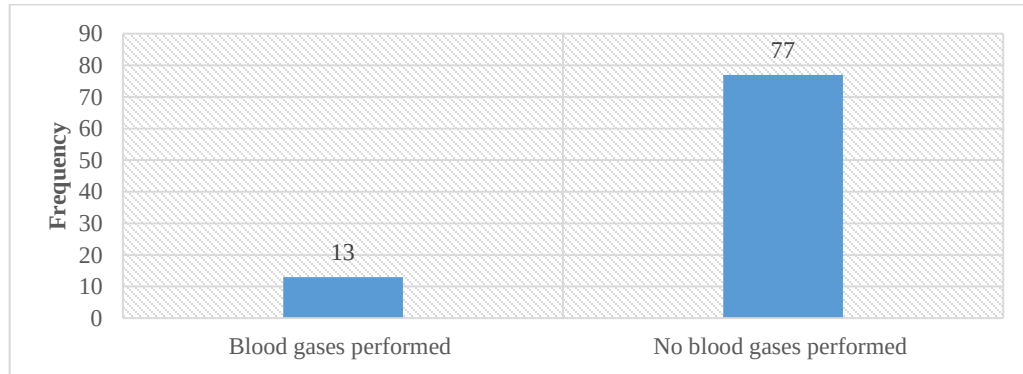


Figure 4.38: Blood gases

Out of 90 records of babies who died due to asphyxia, a majority of 86% never had tests to determine their blood gases. Only a minority of 14% had such tests carried out.

4.2.3.6 MANAGEMENT OF THE NEUROLOGICAL SYSTEM FOR A NEWBORN WITH ASPHYXIA AFTER BIRTH

4.2.3.6.1. Assessment of whether a Thompson score was done for Hypoxic Ischemic Encephalopathy (HIE)

The findings indicated that a Thompson score was performed on only 14% of the study sample.

4.2.3.6.2. Highest Thompson score for HIE

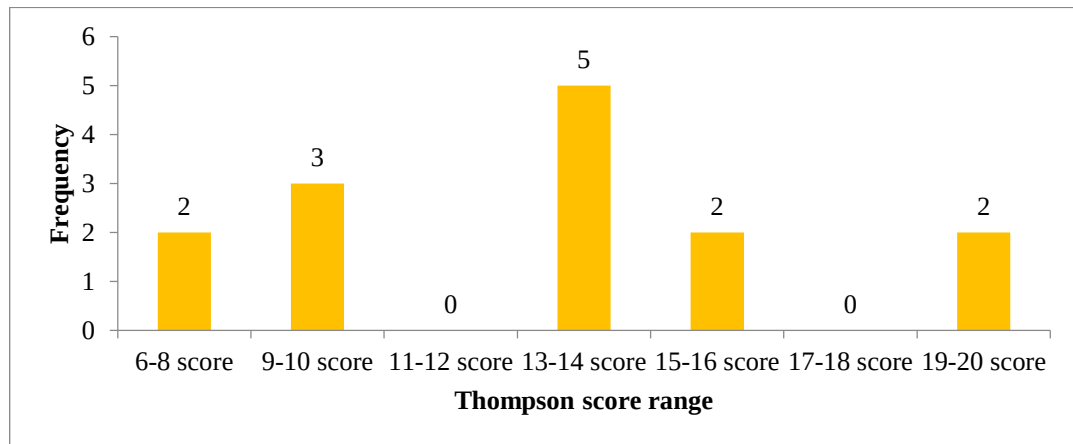


Figure 4.39: Thompson score for Hypoxic Ischemic Encephalopathy

Out of 14 cases whose HIE's were carried out, an equal percentage of 14% each scored HIE score range of 6 to 8, 15 to 16 and 19 to 20 respectively; 21% had HIE score range of 9 to 10 while the remaining 36% had a score range of between 13 and 14. None of the babies scored HIE score range of 11 to 12 and 17 to 18 respectively.

4.2.3.6.3. Performance of Levine staging score for HIE

The results indicated that the Levine staging score was not performed for any of the cases that were studied.

4.2.3.6.4. Performance of Sarnat staging score done for HIE

No Sarnat staging for all 90 newborn babies who succumbed to asphyxia was performed.

4.2.3.6.5. Assessment of whether care was effectively withdrawn

The results indicated that 21% of the newborns who died because of asphyxia had their care withdrawn effectively while the majority of 79% never had their care withdrawn effectively.

4.2.3.6.6. Performance of brain scan

Brain scan was not carried out on 11% of the cases who died because of asphyxia. The majority of 89% however received brain scan done.

4.2.3.6.7. Administration of sedatives

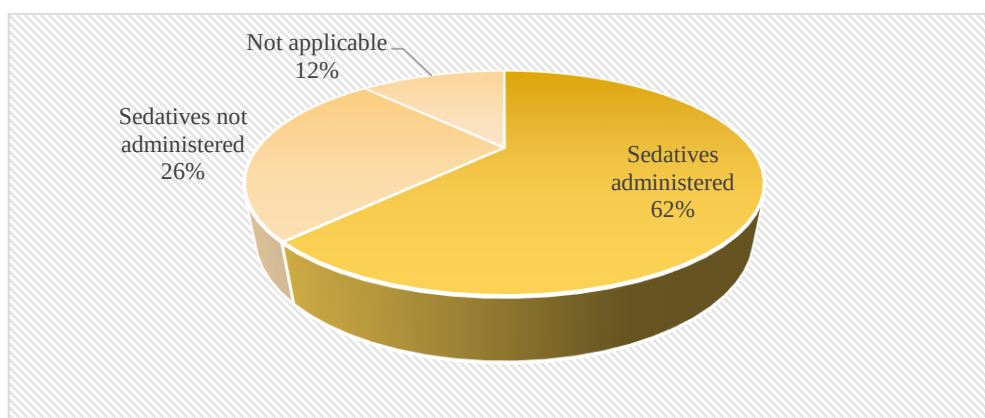


Figure 4.40: Administration of sedatives

Out of 90 cases studied, 62% were sedated, 26% never received any sedation while sedation was not possible on the remaining 12% of the cases studied.

4.2.3.6.8. Assessment of the general body appearance

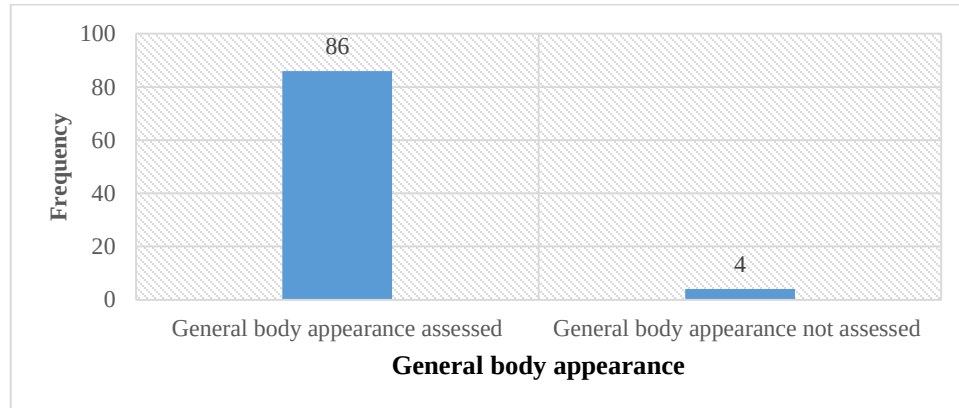


Figure 4.41: Assessment of the general body appearance

All 86 cases who were delivered in the hospital facility were subjected to general body check in order to ascertain general body appearance.

4.2.3.7 PLANNING

4.2.3.7.1. Assessment of whether a care plan was developed on admission

Results indicate that a proper care plan was developed on admission to 44% of the study cases who died due to asphyxia while for 56%, a care plan was not developed.

4.2.3.7.2. Assessment of whether the care plan was written in clear and understandable mode.

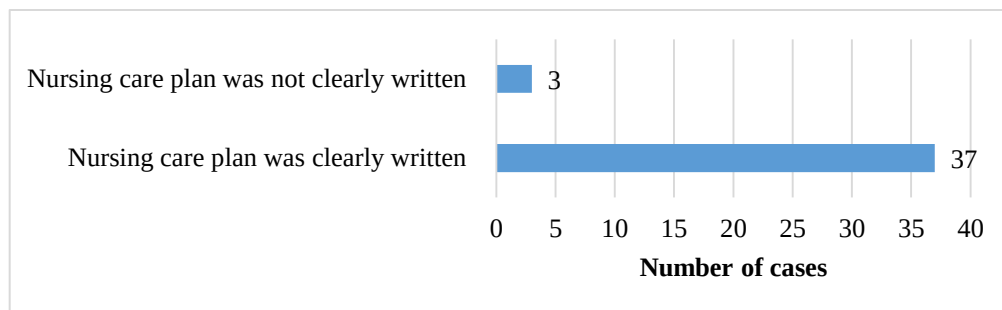


Figure 4.42: Nursing care plan

Out of 90 cases studied, 93% of the records revealed that the care plan was written in a clear mode while only 7% of the records could not easily be understood.

4.2.3.8 IMPLEMENTATION

4.2.3.8.1. Assessment of whether all requested orders were successfully carried out

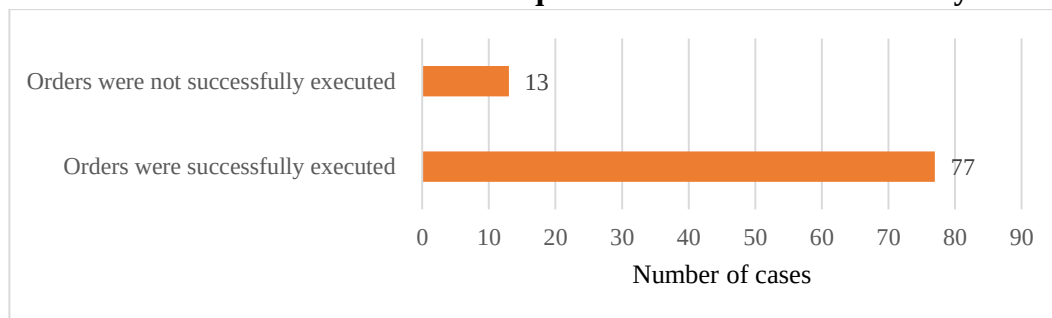


Figure 4.43: Execution of orders

A majority (86%) of doctors' orders were successfully carried out. The remaining 14% of the orders could not be carried out because the babies died before the orders could be executed.

4.2.3.8.2. Types of orders requested by doctors that were not carried out

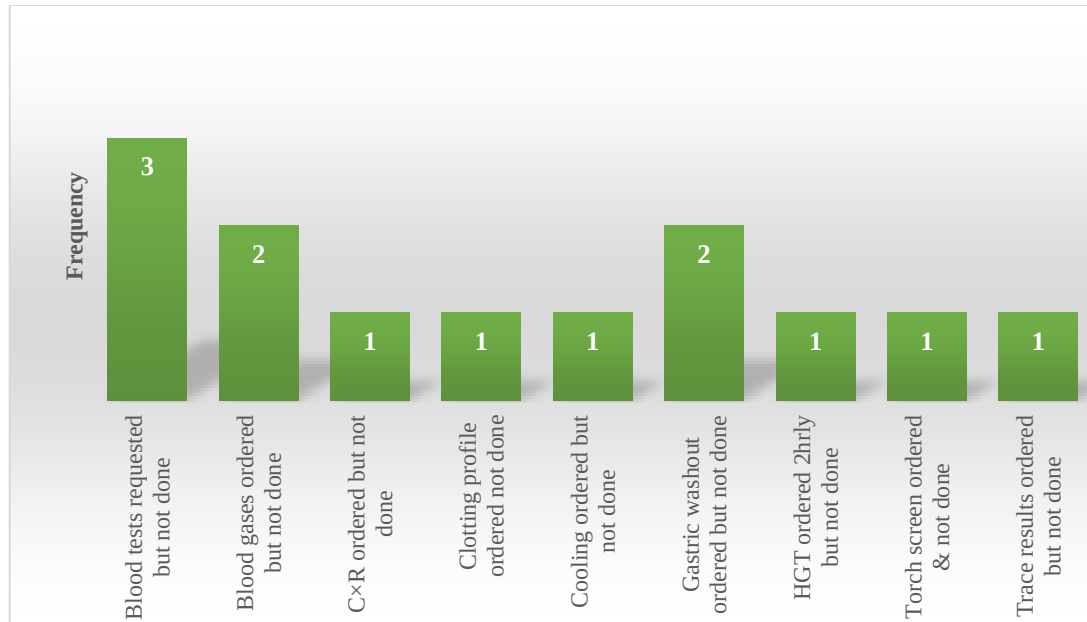


Figure 4.44: Orders that were not carried out

Results indicated that out of 13 orders that were not successfully carried out, 23% were not carried out because blood tests were requested but were not carried out, an equal percentage of 15% each were not carried out because blood gases were not performed and gastric washout was not done respectively while an equal percentage of 7.5% were due to nonperformance of chest x-ray (CXR), clotting profile, cooling orders, HGT 2 hourly, torch screen, and trace results.

4.2.3.8.3. Assessment of whether babies suffering from asphyxia were managed based on accurate interpretation of data obtained

Out of 90 records of deceased former asphyxia baby patients, 73% had their data correctly interpreted while the data for the remaining 27% was wrongly interpreted.

4.2.3.8.4. Whether any changes in conditions of babies were reported immediately to the doctors

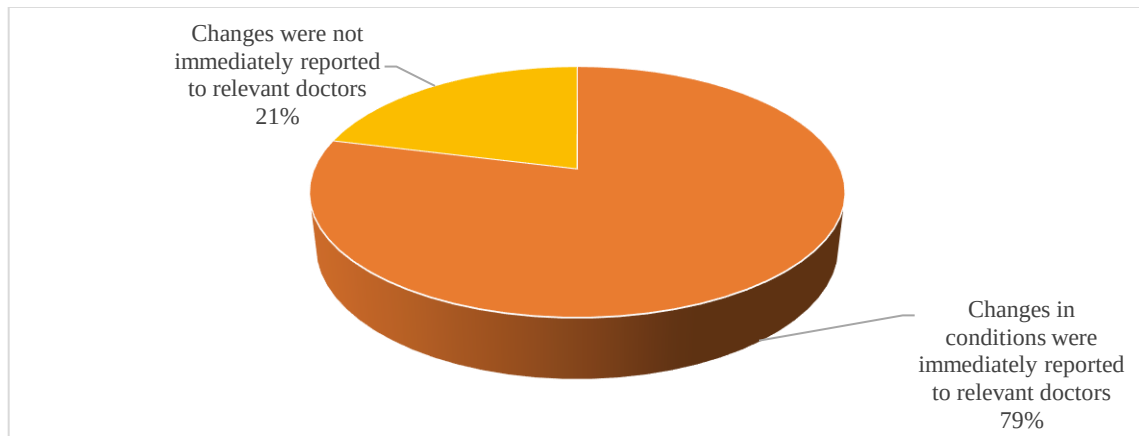


Figure 4.45: Reporting of newborn babies' conditions

Findings indicated that for the majority (79%) changes were reported immediately while for 21% changes were not reported immediately.

4.2.3.8.5. Assessment of whether immediate interventions were implemented/performed following changes in condition.

Out of 71 cases whose medical conditions were reported to medical doctors or pediatricians immediately, 99% received immediate interventions while only 1% did not receive immediate interventions.

4.2.3.8.6. Assessment of whether study cases received all prescribed medication

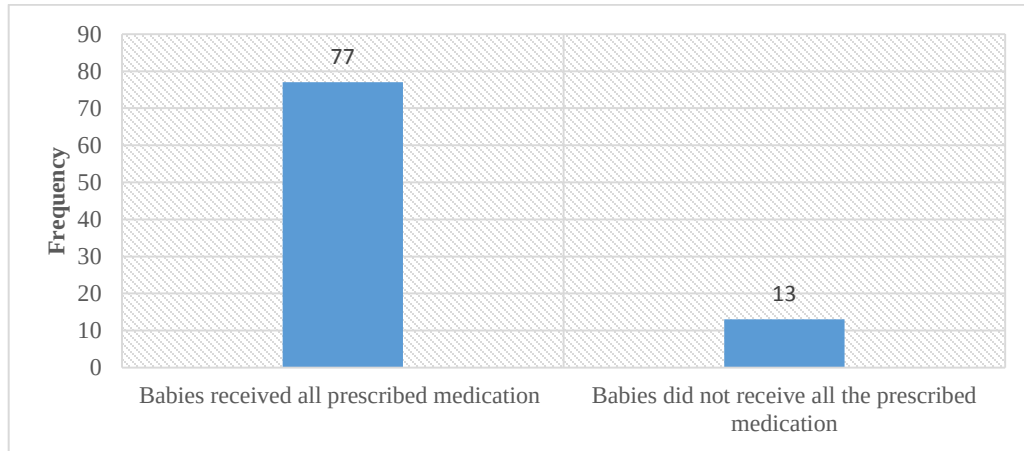


Figure 4.46: Receipt of prescribed medication

The findings indicated that 86% of the cases whose records were studied received all prescribed medication while the remaining 14% died before completing the medications that were prescribed for them.

4.2.3.9 EVALUATION

4.2.3.9.1. Assessment of whether newborn babies' conditions were timeously monitored and evaluated

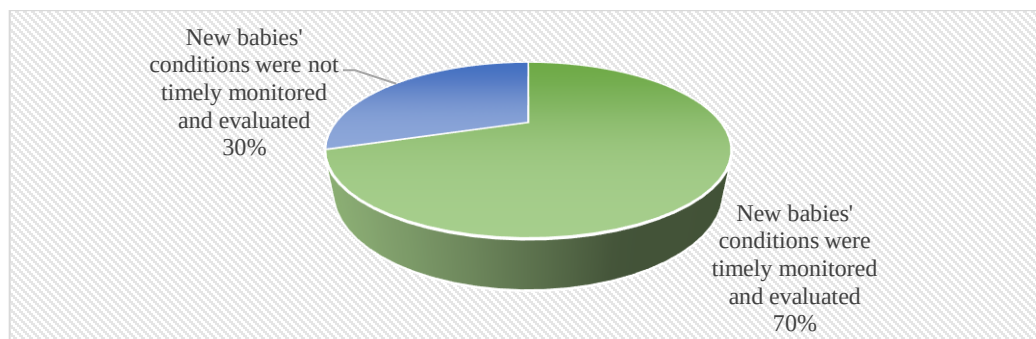


Figure 4.47: Monitoring of babies' conditions

The results indicate that 70% of newborns' conditions were timely reviewed, monitored and evaluated while the remaining 30% never had their conditions reviewed, monitored and evaluated on time.

4.2.3.9.2. Assessment of whether subsequent care plan indicated any changes in the condition

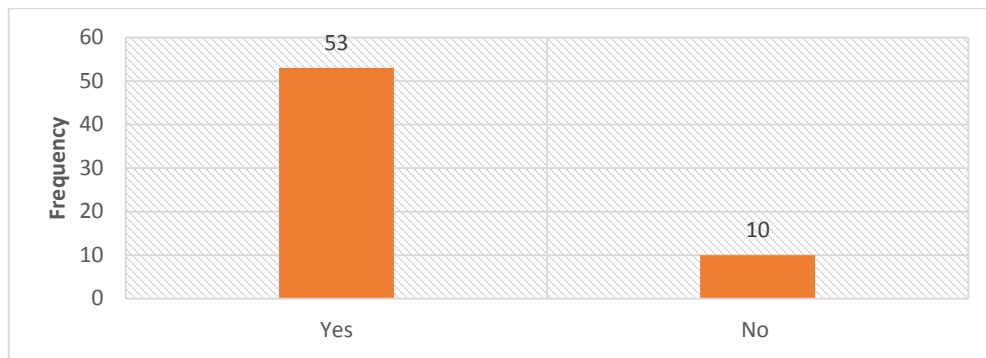


Figure 4.48: Changes in the condition

Out of the 63 cases whose conditions were closely monitored and evaluated, 84% showed positive change in their medical conditions while the remaining 16% never showed any improvement.

4.2.3.10 RECORD KEEPING

4.2.3.10.1. Whether the deaths of babies were certified by the relevant doctor with date and time

Results indicated that 99% of the deaths of the study cases who suffered from asphyxia were certified by doctors indicating date and time while only 1% was certified by the doctor indicating the date but with an unclear time of death.

4.2.3.10.2. Whether handwriting on the records was legible

Documents reviewed revealed that 92% of the records of the cases were legibly written.

The records of 8% of cases were not legible.

4.2.3.10.3. Assessment of whether all records were always signed

Out of 90 study cases who died because of asphyxia, 94% of the cases indicated that recordings were signed with legible signatures, while 6% of the cases indicated that some recordings were not signed on every entry of activities/procedures performed.

4.2.3.10.4. Assessment of whether dates were always recorded

Out of 90 study cases who died because of asphyxia, 27% never had dates recorded on them while the remaining 73% had correctly captured the dates of birth and death of neonates who suffered from asphyxia.

4.2.3.10.5. Assessment of whether time was always recorded

The above statistics show that some records did not reflect all the necessary details that need to be captured at such a time. Out of a sample of 90 records, only 79% of the records had the time correctly recorded while the remaining records did not reflect time.

4.3 Summary

This chapter presented the findings on the management of newborns with neonatal asphyxia. The results presented the demographic information of the newborn with asphyxia and the ANC records of the mother. The findings on the management of newborns with neonatal asphyxia at birth (delivery room) and after birth in the neonatal unit conclude the chapter. The next chapter presents the discussions, conclusions, recommendations and limitations of the study.

CHAPTER 5: DISCUSSIONS, CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY

5.1. Introduction

The preceding chapter presented the results obtained from document reviews of 90 records of newborn babies who died due to asphyxia from January 2013 - December 2014. In this study, retrospective, quantitative, descriptive study was used in order to assess the management of newborn babies with asphyxia related deaths. The discussion of the results are presented in relation to the existing literature and according to the sequence of the nursing care plan (assessment, planning, implementation and evaluation). This chapter also draws the conclusions in the context of the purpose and stated objectives of the study. From these conclusions, recommendations for the improvement of care offered to newborn babies suffering from asphyxia were formulated. Limitations of the study were highlighted and placed in context.

5.2. DISCUSSION OF RESULTS

The first session presents the discussions of the findings according to the assessment phase of the nursing process.

5.2.1 ASSESSMENT

The discussion under the assessment presents the findings of the demographic information, and the management of the newborn with asphyxia at the labour ward and

neonatal unit. The findings on the demographic information with regards to the weight of the babies, gestational period, modes of delivery, Apgar score, head circumference and ANC of the mothers are presented first.

The results indicated that 23% of the babies were underweight while 40% were overweight. The weight of babies at birth is associated with asphyxia. Both underweight and overweight increases the chance of newborns to suffer from asphyxia. Cloherty, Eichenwald and Stark (2008) indicate that premature babies are at risk of asphyxia because of immature pulmonary functioning owing to the deficient lung surfactant. This observation made was consistent with the findings of a later study conducted by Coutinho, Cecatti and Surita (2011) who indicated that both low birth weight and high birth weight of over 3.5kgs lead to abnormal fetal heart rate, thick meconium, and premature delivery, hence, leading to perinatal asphyxia. Subsequently, the findings of this study concluded that a total of 20% of the study cases were underweight and 40% were overweight, the features that put them at risk of asphyxia. The second aspect on the demographic information is the gestational period.

Babies born before the end of the 37th gestational week or after 40 weeks are more likely to suffer from asphyxia. Results from the study population of 90 cases, show that 6% of the babies were born post-term and as a result they were at risk for neonatal asphyxia. The mode of delivery also has an influence on the risk for neonatal asphyxia and its results are presented in the next paragraph.

The mode of delivery is an important determinant of the wellbeing of newborn babies. A study by Ladewig, London and Davidson (2007) found that the most common substandard care contributing to asphyxia as: neglecting to supervise fetal wellbeing, neglecting signs of fetal asphyxia, incautious use of oxytocin and choosing a non-optimal mode of delivery. The mode of delivery is therefore associated with the outcomes of the Apgar score for the newborn.

The results show that 21 and 6 of the study cases had an Apgar score of between 0-2 for one minute and for 5 minutes respectively, 25 and 15 had an Apgar score of between 3 and 4 for one minute and five minutes respectively, while 40 and 65 had an Apgar score of between 5 and 7 respectively. The Apgar score is a useful method used to assess the overall health status of the newborn baby immediately after birth. Therefore, the findings from this study suggested that low Apgar scores in the majority (74.4%) of cases led to asphyxia related neonatal deaths. However, it is inappropriate to use the Apgar score alone to establish the diagnosis of asphyxia (McElrath, et al. 2010). Other fetal factors such as large head circumference are associated with a difficult delivery and as a result, the newborns may suffer from neonatal asphyxia.

The normal head circumferences measures 32.6 to 33.5cm. The majority (53%) of the cases had head circumference of between 33.6 and 40 cm, 1% had a head circumference of between 41 to 45 cm and the remaining 1% had a head circumference of between 50 and 53 cm. Generally, the larger the head circumference of the baby, the more complicated it is in giving birth as the labour period gets prolonged. Therefore Lee,

Darmstadt and Khattry (2009) concluded that a large head circumference ($\geq 33.5\text{cm}$) carried a 1.6 times increased adjusted risk of birth asphyxia.

Substandard ANC for pregnant women creates a risk of asphyxia for the new-born. On the other hand, satisfactory attendance of the ANC by a pregnant woman is associated with a positive outcome of the pregnancy as the potential risks are identified and preventive measures implemented.

The results indicated that majority of mothers had ANC bookings which showed history of the development of the unborn baby during the gestation period. Health care personnel were in a position to predict the complications that may set in at the time of giving birth. This trend concurs with the claim by Ladewig et al. (2007) who state that assessment for antenatal and labour history can help to anticipate the risks for asphyxia. These include the confirmation of gestational age, fetal presentation and position, assessing of the fetal heart, nature of membranes, maternal hypertension and hemorrhage. The results revealed that a majority of the study cases were referral cases and 69% of the cases who were delivered at other health facilities. Only 31% of the cases were delivered at the study context. The study further revealed inefficient referrals of patients from the district and regional hospitals to a national referral hospital and this trend put the fetus at risk of asphyxia. The next sessions present the discussions on the findings about management of newborns with asphyxia.

5.2.2 MANAGEMENT OF BABIES WITH ASPHYXIA AT BIRTH

The findings on management of a newborn with asphyxia are presented under recording, nature of membrane, competencies of health professionals who conducted the delivery, cephalopelvic proportion, duration of the 2nd stage of labour and incidences of post-partum hemorrhage and pregnancy-induced hypertension as presented in the next sessions.

Records of fetal heart conditions

The findings indicated that the majority (93%) of the cases had their fetal heart condition assessed and only 7% of the cases were not assessed. This could be attributed to the fact that four mothers gave birth before arriving at the hospital, and therefore, health care personnel had no way of examining the fetal heart condition of the babies. Assessment of the fetal heart status of unborn babies help nurses and doctors to detect any complications that might arise, and to determine whether the baby is at risk or not. A study done by Ladewig et al. (2007) reveal that asphyxia can be prevented through closely monitoring the fetal heart status of unborn babies at the time of birth. To enhance their assertion, Berglund et al. (2010) suggested that midwives should be skillful in interpreting the CTG (Cardiotocography) and to act in a timely and appropriate manner when fetal heart rate patterns indicate a compromised fetus that can lead to asphyxia.

Partogram records

A significant number (26%) of the babies sampled were born without the progress of labour being observed and recorded while 4% of the cases sampled were born before arriving at the hospital, and thus, it was not possible to observe the progress of labour. For some cases, the mothers underwent an emergency caesarean section due to complications which arose. By observing the progress of labour, health personnel are able to identify abnormalities and invent appropriate interventions. From the above statistics, it can be inferred that, there was some degree of negligence on the side of health personnel by not subjecting the labour process for 26% of the babies who were born in the hospital facility to a partogram.

Status of membranes

The majority of cases studied had the nature of their membranes indicated vis-à-vis whether intact or ruptured before the onset of the second stage of labour. However, 29% of the subjects studied never had the nature of their membranes indicated while the records of the remaining 7% were unknown. Despite the fact that only 4 children were born before arrival at the hospital, the records of 2 children born in the hospital were not reflected. A study by Lee, Darmstadt and Khatry (2009) indicate that prolonged rupture of membranes carries a higher risk of birth asphyxia for the newborn. Therefore, failure to assess and indicate the nature of membranes makes the babies susceptible to asphyxia. Out of the 58 cases whose status of the membranes were indicated, 62% had their membranes ruptured at the 1st stage while for the remaining 38% the membranes were

ruptured artificially in the 2nd stage of labor. This result suggests that, in spite of the care given by health care practitioners, there was a high risk of most babies dying because of early ruptured membranes. This assertion is corroborated by a study conducted by Lee et al (2009), the findings of which indicated that prolonged rupture of membranes carries a higher risk of birth asphyxia for the newborn.

Competencies of health professionals who conducted the delivery

The presence of well-qualified health care practitioners increases the probability of conducting safe deliveries. Most of the deliveries for the study cases were supervised by well-qualified medical practitioners. As indicated by the results of 44% of the deliveries which were conducted by medical doctors, 50% by registered midwives, 2% were conducted by enrolled midwives while the remaining 4% were conducted by unknown people probably the traditional birth attendants. The uncertainty about the status of the remaining 4% arises because they were born before arriving at the hospital. However, 52% of the study cases born in the hospital were delivered in the absence of pediatricians or medical doctors. Furthermore, the findings showed that resuscitation was done on almost all babies selected for review. Therefore the study conclude that although the medical personnel did what they could medically do, the medical conditions of the affected babies could not be reversed, hence they died.

Cephalopelvic Disproportion (CPD) at birth, prolonged 2nd stage of labour, and shoulder dystocia and fetal distress

The results indicate that 21% of the babies were born to women whose pelvis was too small to allow safe delivery of babies, 4% were unknown, and 75% of the babies however were born without interference. Cephalopelvic disproportion causes prolonged labour, fetal distress and a delayed second stage of labour, hence, increasing the risk of babies being born with less oxygen in the brain. These results are consistent with earlier findings by other scholars. For example, a study done by Islam, Ara and Choudhury (2012) reveal that the commonest cause of asphyxia is obstructed labour of which CPD, malposition and malpresentation of shoulder, breech, face and brow are the most common preventable factors of neonatal asphyxia related death in developing countries. Therefore, since the above results are consistent with literature, it suffices to conclude that some newborns succumbed to asphyxia because of CPD which made babies to experience fetal distress and subsequent neonatal asphyxia.

The majority of the babies were born by the mothers who never had any history of tiredness during the second stage of labour. The mothers who were tired prolonged the second stage of labour. As a result, their unborn babies were deprived of adequate oxygenation. There was no shoulder dystocia observed in all the babies born in the hospital facility while shoulder dystocia status of the remaining 4 children was not known because they were born before arrival to the hospital. Absence of shoulder

dystocia meant that the cases under investigation were born with relative ease. It is therefore concluded that in this study, shoulder dystocia was found not to be a factor associated with asphyxia related deaths.

As a possible result of prolonged labour, the document reviews revealed that there was fetal distress during the delivery of the majority (57 %) of babies under review. There was no fetal distress during the birth of 39% of the babies while the status of the remaining 4% was not known.

Existence of Ante Partum Hemorrhage (APH), pregnancy-induced hypertension (PIH) of the mother and cord prolapse at birth

Birth trauma in newborn babies is caused by injuries resulting from compression and traction during the birth process. The findings indicate that a sizeable number of newborn babies never had trauma at the time of their birth.

Furthermore, there were cases of APH. When there is APH, the mother losses blood which carries oxygen, hence, depriving newborn babies of oxygen and which results in neonatal asphyxia. The results above are in line with the conclusions arrived at by Ladewig et al. (2007). According to Ladewig et al. (2007), there is a risk for impaired gas exchange of the fetus related to decreased blood volume due to the antepartum hemorrhage and this risks the newborn from asphyxia.

Pregnancy-induced hypertension (PIH) increases the risk of asphyxia for the newborn as vasoconstrictions deprive the fetus from oxygen supply. However, most of the babies studied were born to mothers who did not suffer from pregnancy-induced hypertension.

Moreover, a small number of babies were born with umbilical cord complications including umbilical cord prolapse. Umbilical cord prolapse usually occurs prior to or during delivery of the baby. The findings therefore suggest that the majority of study cases never had cord prolapse at birth, as a risk for neonatal asphyxia. The next session presents the findings on the management of respiratory system for newborn babies with asphyxia after birth.

5.2.3 MANAGEMENT OF NEWBORN BABIES WITH ASPHYXIA AFTER BIRTH.

5.2.3.1 MANAGEMENT OF RESPIRATORY SYSTEM FOR NEWBORN BABIES WITH ASPHYXIA AFTER BIRTH

The results on the management of respiratory system for newborn babies with asphyxia after birth include assessment of respiratory system, resuscitation after birth, administration of oxygen therapy and the type of oxygen therapy that was administered.

Assessment of respiratory system

The results showed that all 90 newborn babies had their respiratory systems assessed. Assessing the respiratory system of the newborn babies allowed the health practitioners to properly diagnose any medical threats that babies might have and therefore

appropriate management measures could be applied to respond to such threats. These measures included resuscitation, intubation and the administration of oxygen therapy.

Principally, resuscitation was performed on the majority of the newborn babies. Resuscitation is performed with the initiation and maintenance of circulation, open airway, breathing (CAB) and the administration of the medications to provide substrate and stimulation for the heart in order to support circulation and delivery of oxygen and nutrients to the brain as well as to correct acidosis (MOHSS, 2009). Thus the findings suggested that for the majority of the cases, appropriate measures to sustain oxygenation were implemented.

Alongside the resuscitation, intubation was performed on the majority of the newborn babies under review. Ladewig, et al., (2007) indicates that newborn babies with asphyxia are often subjected to invasive procedures such as intubation which increases the risk of neonatal infection. By implication, the potential for premature deaths of such babies was high since the majority of them were subjected to intubation. As part of the respiratory resuscitation, all 90 cases were subjected to oxygen therapy. This implies that all newborn babies studied needed artificial oxygenation.

The majority (84%) of the cases was given intermittent positive pressure (IPPV) oxygen therapy, 9% were given continuous positive airway pressure (CPAP) oxygen therapy, and 7% were given nasal cannula oxygen therapy. Furthermore, although oxygen was administered for 84% in accordance to doctors' prescriptions or by a standard order, in some cases, oxygen therapy was not administered to the newborn babies in accordance

to the prescriptions. Inappropriate degases and intervals of oxygen administration may have deprived the study cases from sufficient oxygen supply, henceforth it led to neonatal asphyxia. The next session presents the discussion on the findings about management of cardiovascular system for newborn babies with asphyxia after birth.

5.2.3.2 MANAGEMENT OF CARDIOVASCULAR SYSTEM FOR NEWBORN BABIES WITH ASPHYXIA AFTER BIRTH

The management of cardiovascular system for newborn babies with asphyxia after birth includes monitoring of blood pressure, pulse patterns, hypovolemia, hypotension and performance of heart sonar.

The results from the investigation revealed that all the 90 (100%) newborn babies who died due to asphyxia did not have their blood pressure taken. Measuring blood pressure enables health professionals to determine health risks such as hypo/hypertension that newborn babies may be exposed to, and hence, take necessary interventions to normalize the blood pressure level. Heart sonar was also performed on only 20% newborn babies under this study. Overall, heart sonar was not necessary for most of the babies under review.

5.2.3.3 MANAGEMENT OF RENAL SYSTEM OF BABIES WITH ASPHYXIA AFTER BIRTH

Management of the renal system of babies with asphyxia after birth includes the assessment of the abdomen, monitoring of fluid output and adjustment of fluid intake and monitoring of blood electrolytes and nitrogen as discussed in the next sessions.

By conducting abdominal examination of newborn babies, health practitioners would ensure that babies suffering from asphyxia were given the necessary care and treatment.

The findings indicated that abdomens for all the study cases were assessed. In examining the abdomens of newborn babies, health care practitioners evaluate the abdomen for distension, enlarged organs, or masses to rule out necrotizing enterocolitis as a complication for neonatal asphyxia (Joolay, et al. 2015).

The findings from documents reviewed further showed that for the majority (69%), fluid intake and output were correctly monitored. However, 31% of the total sample never had their fluid intake and output monitored. Gopal (2014) indicates that measurement of fluid intake and output are important to help evaluate a patient's fluid and electrolyte balance which helps to suggest various diagnoses and allows prompt interventions to correct any imbalances. From the above statistics, it can be concluded that failure by health professionals to monitor fluid intake and output for some cases of this study could have contributed to the babies' premature deaths.

Another aspect of the management of the renal system concerns with the monitoring of the blood electrolytes and nitrogen. A majority of newborn babies who succumbed to

asphyxia never had urea and electrolytes blood tests. Urea and electrolytes blood tests provide essential information to health practitioners on renal function, especially on the removal of metabolic wastes from the body to prevent metabolic acidosis and a result to maintain homeostasis. Failure to carry out urea and electrolytes blood tests on 61% of the sampled newborns who died due to asphyxia could have contributed to such deaths. This conclusion is supported by Gopal (2014). According to Gopal (2014), early recognition of acute kidney injury (AKI) is important for the newborn babies with asphyxia to facilitate appropriate fluid and electrolyte management, as maintaining a stable biochemical milieu is vital in improving the outcomes in these babies.

The next session presents the discussion on the findings about the management of metabolic system of babies with asphyxia after birth.

5.2.3.4 MANAGEMENT OF METABOLIC SYSTEM OF BABIES WITH ASPHYXIA AFTER BIRTH

The management of metabolic system includes the assessment of the glucose, treatment of hypoglycemia and hyperglycemia, observation for the seizures, administration of the anti-consultants, treatment of sepsis, treatment of hypothermia and treatment for acidosis.

The majority (94%) of newborn babies who died due to asphyxia had their glucose levels assessed. Only 6% did not have their glucose levels assessed. This shows that blood glucose level as a vital sign was monitored and the health care practitioners were able to detect any metabolic complications that might arise.

Equally, the majority (72%) of newborn babies who died due to asphyxia were treated for hyper/hypoglycemia, 12% were not treated for hyper/hypoglycemia, while hyper/hypoglycemia treatment was not applicable to 12% of the newborn babies studied. The status of hyper/hypoglycemia treatment of 4% of the newborn babies who succumbed to asphyxia was not known. The findings further revealed that a significant number of the study cases had seizures after birth. Seizures in newborn babies are a result of brain injury due to inadequate supply of oxygen to the brain. Adequate management was therefore needed in order to save the lives of those with seizures related to asphyxia. Therefore, the findings indicated that 98% of them received anti-convulsion treatment in an attempt to save their lives.

The results further indicated that a majority (77%) of the newborn babies who died because of asphyxia were also given Penicillin and gentamycin for sepsis and only a few (23%) of them were not reported to have been treated for sepsis. Penicillin and Gentamicin is one of the first-line broad spectrum antibiotics to prevent and treat sepsis (MoHSS, 2011).

Therapeutic hypothermia or performance of cooling is another aspect of metabolic management for the newborn with asphyxia. Reiter and Walsh (2016) claim that cooling/therapeutic hypothermia has shown promising results in improving the outcome of babies with birth asphyxia by slowing the metabolic rate and allowing cells to recover over longer periods of time. However, in contrary to the suggestions by the literature, therapeutic hypothermia was only applied to a mere 6% of the study cases.

A majority of the cases did not receive therapeutic hypothermia, while it was not established whether or not 1% of the newborn babies received therapeutic hypothermia and this situation could have contributed to asphyxia related death among the cases.

Another aspect of metabolic management was the administration of sodium bicarbonate for the treatment of acidosis as based on the laboratory results of the serum acid-base balance. Nevertheless, the majority of newborn babies had a serum PH of below 7.35, and therefore they had acidosis and were at risk of death. Hence they needed treatment with sodium bicarbonate to reverse the acidosis. The findings indicated that few of the cases had a serum PH which was above 7.35. The Ministry of Health and Social Services in Namibia recommends that health care professionals administer sodium bicarbonate 4.2% solution (4ml/kg) slowly over 2 minutes intravenously through the umbilical vein to correct acidosis when the serum PH falls below 7.35. Failure to administer sodium bicarbonate for acidosis might have contributed to death in newborn babies suffering from asphyxia.

5.2.3.5 MANAGEMENT OF THE HEMATOPOIETIC/HAEMATOLOGY/BLOOD SYSTEM FOR A NEWBORN WITH ASPHYXIA AFTER BIRTH

The management of the hematopoietic/hematology/blood system for a newborn with asphyxia after birth includes a testing of Full Blood Count (FBC), blood gases analysis

and serum PH, C - Reactive Protein (CRP) the findings of which guides treatments for the newborn with asphyxia. When necessary, blood transfusion was administered.

As stated in figure 4.33, the results showed that FBC tests were performed on a majority of the study cases. Assessment of the full blood count is essential to establish the blood's oxygen carrying capacity, clotting mechanism and the body's ability to fight the infection. The results indicated that for the majority (n=77) (85.5%), Full Blood Count was assessed and 25% of them had low haemoglobin (Hb). Similarly, the majority (99%) of newborn babies who had low hemoglobin got blood transfusions. These statistics suggest that although the lives of the babies could not be preserved, necessary interventions were undertaken by medical personnel to save the lives of newborn babies suffering from asphyxia. However, failure to conduct FBC on a significant 12% (n=11) of the study cases could have contributed to the deaths of some newborn babies.

Another aspect of the management of the Hematopoietic system is the testing of C - Reactive Protein (CRP) of the newborn. The results showed that a majority of the study cases had a CRP blood test carried on them. A reactive CRP test enables health practitioners to measure the protein that resemble the genetic materials of infective organisms and the general levels of inflammation in the body. Failure to conduct a CRP test on some newborn babies suffering from asphyxia could have contributed to the deaths of those babies.

Of most importance is testing of blood gases to rule out metabolic or respiratory acidosis, as may be reflected by a lower serum PH of less than 7.35. However, the

results from document reviews revealed that the blood gases analysis were not performed for the majority (86%) (n=77) of the study cases. Blood gases analysis was only performed for 14% of the study cases. This omission could have contributed to asphyxia related death of the cases. According to Sellers (2013) and Cloherty (2008) laboratory-based assessments are important to maintain the biochemicals in the normal ranges and to determine whether correction is required. Therefore, since blood gases help health professionals to determine adequacy of oxygenation, ventilation, and the baby's acid-base balance, non-performance of blood gases tests may have contributed to wrong prescription of medicine and hence, deaths of newborn babies due to asphyxia.

5.2.3.6 MANAGEMENT OF THE NEUROLOGICAL SYSTEM FOR A NEW BORN WITH ASPHYXIA AFTER BIRTH

The management of the neurological system for a newborn with asphyxia includes the performance of a Thompson score for Hypoxic Ischemic Encephalopathy (HIE), Levine staging score for HIE, Sarnat staging score done for HIE, brain scan, administration of sedatives, assessment of the general body appearance up to the withdrawal of care.

Hypoxic Ischemic Encephalopathy (HIE) test enables health care professionals to ascertain the extent of brain damage that could have occurred due to inadequate supply of oxygen and blood into the brain (Hypoxic Ischemic Encephalopathy). However, the Thompson score was not conducted on the majority, but was only conducted on 14 out of 90 of the study cases. Failure to carry out the HIE Thompson score prevented doctors

from taking immediate interventions that could have saved the young lives and therefore could have contributed to the death of newborns as a result of birth asphyxia.

Moreover, there was no Levine staging score for HIE done. The Levine staging score is used to predict the neuro development outcome of a newborn with asphyxia. It is therefore imperative to carry out a Levine staging score for HIE so as to enable health care practitioners to determine appropriate interventions.

Similarly, no Sarnat staging for all 90 newborn babies who succumbed to asphyxia was performed. The Sarnat staging is used to grade the severity of an HIE injury. Failure to conduct a Sarnat staging deprived health practitioners to obtain information about the prognosis of the newborn babies.

The findings further indicated that brain scans were not carried out on 11% of the babies who died because of asphyxia. The majority of 89% however received brain scans. Reiter and Walsh (2016) discovered that brain scans give doctors pictures of the baby's brain as well as helping to diagnose injuries such as hypoxic ischemic encephalopathy (HIE) associated with asphyxia. It can therefore be inferred that failure to carry out a brain scan on 11% of the newborn babies studied could have contributed to their deaths.

The assessment of the general appearance of the newborn with asphyxia is also of importance. The findings from this study indicated that all 86 newborn babies who were delivered in the hospital facility were subjected to general body check in order to ascertain general body appearance. The general body appearance of four babies who were BBA at the hospital facility was not conducted. Conducting general body

appearance of newborn babies enables health professionals to identify any complications in newborns and, hence, take appropriate medical interventions.

Finally, as the conditions of the newborn with asphyxia deteriorated and upon doctors' advice and parents' consent, resuscitation was not attempted on 19 newborn babies because their cases were beyond active resuscitation. On the other hand, even for the 79% for whom resuscitation was attempted, it was unsuccessful and they died.

5.2.4 PLANNING

This phase of nursing care process includes the development of care plan with appropriate interventions which are eligibly documented.

The study results indicate that proper care was given on admission of 56% of the newborn babies who died due to asphyxia. There was however no care plan developed on admission for the remaining 44% of the babies suffering from asphyxia. Failure to develop a proper care plan on admission for patients may increase the risk of death.

The majority (93%) of the records showed that care plans were legibly written and understandable for the health care professionals to interpret and implement the prescribed interventions. However, 7% of the records could not easily be understood. Failure to understand the care plan makes it difficult for midwives to carry out doctors' instructions. This could lead to omissions and misadministration of treatment which may lead to death of the newborn babies with asphyxia.

5.2.5 IMPLEMENTATION

Implementation refers to the execution of requested orders/prescriptions, based on their accurate interpretations. The findings showed that a majority of doctors' orders were successfully carried out, while 15% of the orders were not successfully carried out, omissions which may have contributed to the patients' deaths. From these statistics, it can be inferred that although the medical professionals did what they could do to save the lives of the newborn babies suffering from asphyxia, the lives of the young ones could not be saved.

The files that were studied show that there was a number of orders requested by the doctors, but the orders were not carried out. Although requested, the blood tests for three newborn babies could not be carried out. Other requests that were not carried out were the analysis of blood gases, gastric washout, chest X-Ray, blood tests for the clotting profiles, cooling, torch screen, HGT test and to trace results. Most of these tests could not be carried out because the babies died before the procedures could be carried out.

Accuracy on interpretation of data

Furthermore, the findings showed that some health practitioners were not able to correctly interpret data. Therefore, out of 90 records of deceased former asphyxia baby patients, 73% had their data correctly interpreted while the data for the remaining 27%

was wrongly interpreted. This could have resulted in some babies dying from asphyxia, which death could have been averted if there was accurate interpretation of data.

Moreover, the records revealed that there was some form of negligence in reporting changes in the conditions of babies suffering from asphyxia to doctors. Even though a large number of cases were immediately reported to doctors for action, changes in conditions of significant cases of the babies who died because of asphyxia were not reported. Failure to timely report changes in the medical conditions of babies could have contributed to their deaths. One of the recommendation made by Meyer et al. (2009) regards to how to implement the care plan in order to reduce the risk of deaths associated with asphyxia. According to Meyer, et al. (2009) proper interpretation of medical data of newborns reduces the risks of newborns dying from asphyxia. These would help the newborn to move from a present health state to the health state described in the expected outcomes.

Timing of interventions and receipt of prescribed medication is also an important factor in the implementation of health care interventions. In this regard, the results indicated that the majority of cases received immediate interventions. Giving immediate interventions was a necessary step towards saving the lives of the newborn babies. The results further showed that 86% of the babies whose records were studied received all prescribed medication while the remaining 14% died before completing the medication that was prescribed for them. It should however be noted that, although immediate interventions were duly done, the lives of those babies could not be saved. These

statistics show that although a sizeable number of babies who suffered from asphyxia received all the necessary medication, all of them ended up dying. Their deaths therefore may not be associated with the level of management of newborn babies suffering from asphyxia.

5.2.6 EVALUATION

The evaluation applied to this study concerns with the monitoring of newborn babies' conditions and the evaluation of the impact of the nursing interventions as per the care plans of the study cases. From the documents reviewed, the findings indicated that 70% of the 90 children's records examined were timeously recorded and monitored while the remaining 30% were not recorded on time and were never evaluated. Failure to monitor and evaluate babies' conditions could have resulted in the deaths of some babies suffering from asphyxia. According to Seaback (2013), the purpose of evaluation is to gauge the effectiveness and quality of care provided to the neonate. Seaback (2013) further alludes that evaluation involves evaluating whether the goals have been met and whether expected outcomes have been achieved or not.

Therefore, the findings indicated that 70% (n=63) of the babies whose conditions were closely monitored and evaluated, 84% of them showed positive change in their medical conditions while the remaining 16% never showed any improvement. Irrespective of slight changes in the medical condition of some babies, they eventually also died.

5.2.7 RECORD KEEPING

Recording as was applied to this study, focused on the verification of the authenticity of the clinical records for the study cases. The findings from the documents reviewed revealed that except for 8% of the cases that had poor record keeping, a majority (92%) of the records of newborn babies who died because of asphyxia were legibly written.

Similarly, the findings from the review indicated that for all the cases reviewed who died as a result of asphyxia, they were certified by doctors indicating the date and time however with 1% of them where the time of death was unclear.

Poor handwriting causes poor communication between members of the health care team regarding the care and treatment of the baby. Furthermore, the findings indicated that although the records for the majority of the cases were correctly dated, records for a notable 27% and 21 of the cases never had dates and times recorded on them respectively. Thus, the findings concluded that some of records did not reflect all the necessary details that needed to be captured. This revelation shows that there is some negligence of record keeping among health care providers.

Recording of date and time is important to evaluate efficiency in provision of health care interventions. All records should be dated, in order to inform other staff members who provide care to the care the patient know when a particular procedure was performed. In that regards, proper recording would avert the duplication of procedures, over dosages, enhance efficient performance and therefore the prevention of medical legal hazards.

According to Meyer, et al. (2009) reveals that clinical records are legal documents which provide evidence of commissions and omissions during care to the neonate or newborn baby.

5.3 Conclusions of the study

The first conclusions to be discussed will be regarding the first objective of the study.

5.3.1 Conclusions regarding the first objective: Determine and describe the management of newborn babies with asphyxia at birth at the maternity units of the hospital.

This study found that the majority of babies who died due to asphyxia had their fetal heart status examined. The majority of mothers whose babies succumbed to asphyxia had graphical records about the progress of their active labour while in the antenatal unit observed and recorded. This study also found that although majority of babies were born in the absence of pediatricians or medical doctors, many were delivered by registered midwives. Resuscitation was done on almost all babies selected for review. Intubation was carried out on the majority of newborn babies under review.

All 90 newborn babies were subjected to oxygen therapy, and appropriate measures to sustain oxygenation were implemented.

5.3.2 Conclusions regarding the second objective: Determine and describe the management of newborn babies with asphyxia after birth at maternity units of the study hospital.

This study has revealed that although oxygen was mostly administered to newborn babies in accordance to doctors' prescriptions or by a standard order, some health care professionals did not administer oxygen to newborn babies in accordance to the prescriptions. This study also revealed that all the 90 newborn babies who died due to asphyxia did not have their blood pressure monitored. Therefore the study revealed that a majority of the babies who died due to asphyxia were not treated for hypo/hypertension.

The results from the documents reviewed also revealed that a majority of the newborn babies were given Penicillin and Gentamycin antibiotic for sepsis prophylaxis. Therapeutic hypothermia was only applied to 6% out of the 90 newborn babies. The Thompson score was not performed on the majority of newborn babies. Moreover, Levine and Sarnat staging scores were also not performed at all.

This study found that 44% of the babies who died from asphyxia had no care plan developed on admission. In some cases data were not correctly interpreted. Some loopholes in the study were also identified such as not recording the date and time for performance of certain procedures coupled with illegible signatures

5.2.3 Conclusions regarding the third objective: Determine and describe the factors associated with asphyxia related deaths at maternity units of the study hospital.

The study revealed that a majority of babies who died because of asphyxia were born after prolonged first and second stages of labour. However, the mothers who were tired prolonged the second stage of labour that may have affected the birth of babies, depriving them of adequate oxygenation. The findings further indicated that cephalopelvic disproportion was responsible for asphyxia among 21% of the study cases who were born by mothers with narrowed pelvises that could not allow safe delivery of babies. Documents reviewed revealed that there was fetal distress during the delivery of the majority of babies under review that could have led to asphyxia related deaths.

This study found that some orders that were prescribed by doctors were not implemented. The study also found that there was some form of negligence in timeously reporting of changes in conditions of babies suffering from asphyxia to doctors. Negligence was also found in managing or prolonging referrals from district and regional hospitals to a national referral hospital that could be a factor that contributed to the asphyxia related deaths. Premature and prolonged rupture of membranes carried a higher risk of death due to asphyxia during pregnancy, at birth and afterbirth. There were cases of Ante partum Haemorrhage (APH) that risk the babies from asphyxia during pregnancy, at birth and afterbirth. Pregnancy-induced hypertension (PIH) was responsible for asphyxia among 4 % of the study cases.

Other factors in this study that were identified to be associated with asphyxia related deaths were: underweight, overweight, gestational age of less than 37 weeks or more than 40 weeks, modes of delivery, low Apgar score of less than 7, larger head circumference and poor attendance of antenatal care attendance by the mothers.

5.4. Recommendations

Based on the study findings, recommendations were made with regard to improvement of knowledge and skills of maternal and neonatal care by the health care providers in order to **provide quality ANC to pregnant women, conduction of safe deliveries** and provision of **efficient care to the new-born babies who are at risk of asphyxia** as explained below.

- Pelvic assessment should be performed by the gynaecologists or advanced midwives to all pregnant women as part of ANC care to allow safe delivery of babies. Sensitize all pregnant women about the importance of regular antenatal visits. Regulation of the referral system on maternal care should strictly be put in place regarding the hours mothers have to stay in labour after complications have been detected to prevent avoidable neonatal deaths due to asphyxia.
- All deliveries with cases at risk should be conducted in the presence of a pediatrician for expert resuscitation. Prolonged labour should be managed or resolved efficiently by early recognition and timely decision-making on the safer method of delivery especially with first stage of labour.

- Health care providers should be provided with additional in-service education and training on asphyxia management.
- All cases of asphyxia should have a care plan developed on admission.
- Ministry of Health and Social Services need to ensure that the national referral hospital has specialists in neonatal care and advanced midwifery.
- Doctors and nurses should be reminded of the importance of proper record keeping with dates and legible signatures all the time and that records can provide evidence in court.
- The study recommends the use of the checklist from this study by health care providers for the care of newborns with asphyxia for the audit of interventions provided to the newborn with asphyxia.
- The study recommends further research to explore the management of asphyxia from the health care practitioners' perspective as well as from the parents of the deceased babies from asphyxia.

5.5 Limitations of the study

The researcher identified some limitations in the study which are highlighted below.

It was difficult for the researcher to find the files because most of the files were stored in boxes which were dusty, therefore the researcher had to wear aprons, gloves and a face mask in order to trace the files. Since this study relied only on a desk review, quantitative and descriptive study could not allow exploring a problem or concepts in depth such as from

the health care practitioners' perspective as well as from the parents of the deceased babies from asphyxia.

5.6 Summary

The purpose of this study was to assess the management of newborn babies with asphyxia at the maternity units of the study hospital. Overall, this study has established that there is an acceptable level of care given to newborn babies suffering from asphyxia. It also established that although reasonable care is exercised by health professionals, absolute care was not demonstrated resulting into the deaths of some babies who could have been saved. For example, failure to carry out all the requested orders in time resulted into the deaths of some babies. Based on the study findings, recommendations were made with regard to improvement of knowledge and skills on maternal and neonatal care by the doctors and midwives. The limitations of the study were stated. It is hoped that the study will make a contribution to the improvement of the management of newborn babies with asphyxia.

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ANNEXURES

ANNEXURE 1: LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH ON MoHSS PREMISES

P.O. Box 5523
Ausspannplatz
26 February 2016

The Permanent secretary
Ministry of Health and Social Services
Private Bag 13198
Windhoek

Dear Sir

Re: Request for permission to conduct a research on assessment of management of premature and new-born with asphyxia related death at the maternity units, Windhoek Central Hospital.

I am currently doing Masters in nursing science at University of Namibia under Faculty of Health Science, Department of Nursing. To conduct a research on any topic pertaining health concern is one of my requirements to be awarded the above mentioned degree.

There is a trend of increased neonatal deaths due to asphyxia and prematurity at Windhoek Central Hospital maternity units. Prematurity and asphyxia are the main causes of neonatal deaths at the maternity units of Windhoek Central hospital (Ministry of Health and Social Services, 2014). Health information system indicates that prematurity had 69 cases in 2012, 142 cases in 2013 and 90 cases in 2014 (Ministry of Health and Social Services, 2014). Health information system also indicates that asphyxia had 16 cases in 2012, 42 cases in 2013 and 51 cases in 2014 (Ministry of Health and Social Services, 2014). Despite the trends indicating an increase in prematurity and asphyxia associated with neonatal deaths, little is known about the factors associated with these causes of neonatal deaths at Maternity units, Windhoek Central Hospital. This prompted the researcher to conduct a study to assess the assessment of management of premature and new-born with asphyxia related death at the maternity units, Windhoek Central Hospital.

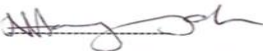
The information on the management of premature and new-born with asphyxia related death will be collected from a sample of 205 files of the total 410 files of neonatal deaths that are caused by prematurity and asphyxia at the maternity units of Windhoek Central Hospital.

The finding of this study will help to make recommendations for the improvement of neonatal care and the prevention of neonatal death by asphyxia and prematurity at maternity units, Windhoek Central Hospital. Confidentiality of information from the clients' file will be assured

Based on the above information, I therefore apply for permission to carry out research at maternity units of Windhoek Central Hospital as from March 2016.

Your positive response will be highly appreciated.

Yours faithfully



Johanna P.K.T. Hanyanya (The researcher) Contact No: 0813970587

ANNEXURE 2: PERMISSION LETTER FROM THE OFFICE OF THE PERMANENT SECRETARY OF THE MoHSS



REPUBLIC OF NAMIBIA

Ministry of Health and Social Services

Private Bag 13198
Windhoek
Namibia

Ministerial Building
Harvey Street
Windhoek

Tel: 061 – 203 2510
Fax: 061 – 222558
E-mail: Ester.Shaama@mhss.gov.na

OFFICE OF THE PERMANENT SECRETARY

Ref: 17/3/3

Enquiries: Ms. E.N. Shaama

Date: 05th April 2016

Ms. Johanna P.K.T. Hanyanya
P.O. Box 5523
Ausspahnplatz

Dear Ms. Hanyanya

Re: Assessment of Management of Premature and New-born with Asphxia related death at the Maternity Units, Windhoek Central Hospital.

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 completion of your Masters in Nursing Science;
 - 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' information 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 of Health and Social Services for the publication of the findings.

Yours sincerely,



Andreas Mwoombola (Dr)
Permanent Secretary

"Health for All"

ANNEXURE 3: LETTER OF PERMISSION FROM UNAM POSTGRADUATE STUDIES RESEARCH COMMITTEE

University of Namibia, Private Bag 13301, Windhoek, Namibia
340 Mandume Ndemufayo Avenue, Pioneers Park
☎ +264 61 206 3111; URL.: <http://www.unam.edu.na>



Date: 24 February 2016

TO WHOM IT MAY CONCERN

RE: RESEARCH PERMISSION LETTER

1. This letter serves to inform that student: **Johanna Hanyanya** (Student number: **200128507**) is a registered student in the School of Nursing at the University of Namibia. His/her research proposal was reviewed and successfully met the University of Namibia requirements.
2. The purpose of this letter is to kindly notify you that the student has been granted permission to carry out postgraduate studies research. The School of Post-graduate Studies has approved the research to be carried out by the student for purposes of fulfilling the requirements of the degree being pursued.
3. The proposal adheres to ethical principles.

Thank you so much in advance and many regards.

Yours truly,

Name of Main Supervisor: Dr K Amakal (Main) Dr J Kloppers (Co)

Signed: _____

Dr. M Hedimbi

Signed: _____

Director: Centre of Postgraduate Studies

Tel: 206 4662

Fax: 206 3290

E-mail: mhedimbi@unam.na

ANNEXURE4: CHECKLIST FOR DATA COLLECTION FOR A NEWBORN BABY WITH ASPHYXIA

Identification number-----

Section A: Demographic data of the baby

1. Age at death in days -----
2. Sex ☐ F M ☐
3. Weight-----
4. Gestational age in weeks-----
5. Mode of delivery:
a) Normal Delivery ☐ c) Forceps/vacuum ☐
b) C-section ☐ d) Breech ☐
6. Apgar score: 1min----- 5min-----Unknown-----
7. Head circumference ----- (cm)
8. A referral Yes ☐ No ☐
9. Booked case yes ☐ no ☐
10. BBA yes ☐ no ☐

Section B: MANAGEMENT OF BABIES WITH ASPYXIA AT BIRTH

1. ASSESSMENT (LABOUR WARD)	YE S	NO	UN KNO- WN	N/A
1.1 Any fetal heart recorded				
1.2 Any Partogram used/ opened?				
1.3 Prolonged 2 nd stage of labour?				
1.4 Prolonged 1st stage of labour?				
1.5 The status of membranes indicated				
1.6 If yes to 1.5, Membranes ruptured spontaneous				
1.7 Indicate who conducted the delivery-----	Doctor ☐ R/Midwifery ☐ E/Midwifery ☐ Unknown ☐			
1.8 Any paediatrician or doctor present at birth?				
1.9 Any meconium aspiration present at birth?				
1.10 Any resuscitation done at birth?				
1.11 Any history of mother being tired/poor maternal effort during 2 nd stage of labour?				
1.12 Any shoulder dystocia?				
1.13 Any fetal distress?				
1.14 Any CPD?				

1.15 Any birth trauma?				
1.16 APH: placenta abruptio/previa/accreta				
1.17 PIH or PET				
1.18 Cord Prolapse				
Section C: MANAGEMENT OF BABIES WITH ASPYXIA AFTER BIRTH				
2. ASSESSMENT (NEONATAL UNIT)				
2.1 Was the respiratory system assessed?				
2.2 Any resuscitation done after?				
2.3 Was the baby intubated?				
2.4 Any oxygen therapy administered?				
2.5 If yes to 2.4, specify by ticking the appropriate box.	nasal cannula ☐ CPAP ☐ IPPV ☐			
2.6 Indicate the duration of ventilation provided	1day & less ☐ 2-6 days ☐ 7-14days ☐ 15- 28days ☐			
2.7 Was oxygen administered and adjusted according to the doctor's prescription/standard order?				
2.8 If no to 2.6, indicate oxygenation	Over ☐ under ☐			
2.9 Any chest X ray done?				
3. MANAGEMENT OF CARDIO VASCULAR SYSTEM FOR A NEW BORN WITH				

ASPHYXIA AFTER BIRTH				
3.1. Any blood pressure assessed?				
3.2 Any Inotropes given for hypotension?				
3.3 Was hypovolemia treated with a bolus of saline?				
3.4 Any Sildenafil given to the baby for pulmonary hypertension?				
3.5 If hypo/hypertension, any heart sonar done?				
4.MANAGEMENT OF RENAL SYSTEM OF A BABY WITH ASPHYXIA AFTER BIRTH				
4.1 Was the abdomen assessed?				
4.2 Was the fluid intake assessed and output monitored?				
4.3 Any U & E blood tests done?				
4.4 If yes, specify highest urea----- creatinine-----				
5. MANAGEMENT OF METABOLIC SYSTEM OF A BABY WITH ASPHYXIA AFTER BIRTH				
5.1 Was glucose assessed?				
5.2 Was hypo/hyperglycemia treated?				
5.3 Any seizures observed?				
5.4 If yes 5.5, any (anti convulsion) given to the baby for seizures?				
5.5 Was Penicillin given 12 hourly or commenced for				

sepsis?				
5.6 Was Gentamycin given or commenced for sepsis?				
5.7 Was cooling/therapeutic hypothermia done?				
5.8 Any sodium bicarbonate given for acidosis?				
6. MANAGEMENT OF THE HEMOPOETIC\ HAEMATOLOGY\BLOOD SYSTEM				
6.1 Any FBC blood tests performed				
6.2 If low Hb, did the baby get blood (packed cells) transfusion?				
6.3 If low platelets, did the baby get platelets transfusion?				
6.4 Any CRP blood test done?				
6.5 If yes to 6.4, specify the highest value-----				
6.6 Any blood PH performed?				
6.7 Any blood gases performed?				
7. NEUROLOGICAL SYSTEM				
7.1 Was the Thompson score done for HIE?				
7.2 If yes to 7.1, specify the highest score-----				
7.3 If yes to 7.2, Did it improve?				
7. 4 Was the Levine staging score done for HIE?				
7.5 If yes to 7.4, specify the highest score-----				
7.6 If yes to 7.5, Did it improve?				

7.7 Was the Sarnat staging score done for HIE?				
7.8 If yes to 7.7, specify the highest score-----				
7.9 If yes to 7.8, did it improve?				
7.10 Was the care electively withdrawn?				
7.11 Any brain scan performed?				
7.12 Any sedative administered?				
7.13 General body appearance assessed?				
PLANNING				
7.14 Is the care plan developed on admission?				
7.15 If yes to 7.6, Is the nursing care plan written in a clear and understandable manner?				
IMPLEMENTATION				
7.16 Were all the requested orders carried out?				
7.17 If no to 7.9, specify-----				
7. 18 Was management done reflecting the interpretation of obtained data correctly?				
7.19 Were the changes in condition reported immediately to relevant doctor?				
7.20 Was there immediate intervention done?				
7.21 Did the baby receive all the prescribed medications?				
EVALUATION				

7.22 Was the newborn's condition timely monitored and evaluated?				
7.23 If yes to 7.13, subsequent care plan indicated any changes in the condition?				
RECORD KEEPING				
7.24 Was the death certified by the relevant doctor with date and time?				
7.25 Handwriting on the records legible?				
7.26 Are all records signed?				
7.27 Date always recorded?				
7.28 Time always recorded?				

ANNEXURE 5: EDITORIAL AND STATISTICAL ANALYSIS CONFIRMATION LETTER



Adupa Consultancy & Trading CC

P.O Box 1707, Windhoek

e-mail: adupaconsultancy@gmail.com

Cell: +264812987668

Date... 25/01/2018

RE: EDITORIAL AND STATISTICAL ANALYSIS OF A MASTERS THESIS

This serves to confirm that I undertook the above services on the research thesis titled '*Assessment of Management of New-borns with Asphyxia at Maternity Units, Windhoek Central Hospital*' authored by Johanna Hanyanya (200128507) - a masters student at the University of Namibia.

To the best of my knowledge, the paper is free from any material errors.

Adupa Richard Kizito

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Research consultant

Adupa Consultancy, 41, Johann Albrecht street, Windhoek West, Windhoek.