

**ASSESSMENT OF MEDICAL EQUIPMENT IN THE MATERNITY UNIT AT A  
DISTRICT HOSPITAL OF THE GREATER TUBATSE SUB-DISTRICT**

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A research report submitted to the Faculty of Health Sciences, University of the  
Witwatersrand, in partial fulfilment of the requirements for the degree of Master of  
Public Health in the field of Hospital Management

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**DECLARATION**

I, Makeku Stella Phala, declare that this research report is my own work. It is being submitted for the degree of Master of Public Health in the field of Hospital Management at the University of the Witwatersrand, Johannesburg. It has not been submitted before any degree or for any examination at this or any other University.

.....  
September 2011

**DEDICATION**

I dedicate this work to:

My husband who supported and encouraged me throughout the period of the study.

My daughter and the two sons who understood and supported me throughout the period this study, which often kept me away from home.

My sister Mohlale for the support she gave to me during the period of my study. She took care of my disabled husband who needed close attention and my last born son whom she ensured he takes care of his schoolwork.

My colleagues and friends who encouraged me to continue with the studies, irrespective of all the hardships I was faced with during the period of my studies. The echo of their comforting and encouraging messages assisted me to complete the studies.

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I am also grateful of the staff and the executive management of Mecklenburg Hospital for accepting the topic of my study. The District Executive Manager ensured that the necessary resources are available on time and where I encountered challenges, she was able to intervene well on time.

I am thankful to my supervisor Dr M Govender and to Dr D Basu who supported and dedicated time towards the successful completion of my study.

## **ABSTRACT**

**BACKGROUND:** Mecklenburg Hospital provides a comprehensive package of promotive, preventive, curative and rehabilitative reproductive health services for women which are not available in primary health care clinics and community health centres. These services require special equipment (such as cardiotochograph machine) and personnel (such as medical doctors) that are not available in these health facilities. The availability of medical equipment is one of the crucial components of effective maternal health services. Specific life saving medical equipment must be available for routine and emergency management of maternal and neonatal complications. This study is undertaken since no formal study has been done to systematically study the availability and related cost of medical equipment in a district Hospital maternity ward.

**AIM:** To determine the availability and related cost of medical equipment used in the maternity ward at Mecklenburg Hospital.

**METHODOLOGY:** A cross sectional study design was used to review past records over a period of one year (April 2008 to March 2009). Information was extracted from the hospital information system and no primary data was collected. The setting of the study was in maternity ward of Mecklenburg Hospital in Limpopo Province. Data was collected on various variables linked to availability and cost of medical equipment and, related consumables in a maternity ward.

**RESULTS:** Majority of the capital equipment in the maternity unit was still relatively new. The Unit is non-compliant with all the lists (WHO, District Health Service Package and NCCEMD) for vacuum extraction. In addition, the Unit do not have equipment needed for steam steriliser and ICU beds as recommended by WHO. In terms of the District Health Service Package list, additional exceptions were equipment needed for forceps deliveries. There was a single ultrasound machine, 5 CTG machines and a single operating theatre available for use. With respect to consumables needed for the operation of the equipment, the mean number of days to receive the order was 7.4 days (Standard deviation 4.6 days and range 1 to 12 days). The study calculated the total asset value of

capital (R 767,303.66) and minor (R 146,164.50) medical equipments based on purchase price. The total cost of these consumables for the study period was R1052.76 (R 87.73/ month). Although 10 Procurement meetings were held during the study period, no additional capital medical equipment was procured. There were a total of 2405 deliveries, no maternal deaths, 46 stillbirths and 17 neonatal deaths recorded during this study period.

CONCLUSION: The study highlighted that the Unit was overall compliant with WHO list as well as national guidelines (NCCEMD and DHSP lists). The study also identified gaps which would require more detailed and prospective study to improve the services and clinical outcomes in the Unit. The results of the study will provide insight into areas, which were not researched in the past. The findings will be presented to both District and Provincial Health Departments and hopefully similar studies would be conducted in other level 1 district hospital maternity wards with similar challenges.

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## **GLOSSARY OF TERMS**

Assets: These are property or valuable items. They are classified as ordinary assets (< R5000.00) e.g. infusion pump, drip stands. Fixed assets (> R5000.00) e.g. anaesthetic machine, cardiotochograph machine. All these type of assets are recorded in the maternity ward asset and allocation registers.

Availability: Refers to status of medical equipment, which was present on the facility asset register at the end of the study period and, in working order implying that it was ready and accessible at this point in time in the maternity ward for both emergency and routine obstetrical case interventions.

Capital Medical Equipment: All equipment with cost price above five thousand rand (R5000.00) according to the South African Treasury Regulations.

Minor medical equipment: All equipment with cost price less than five thousand rand (R5000.00) according to the South African Treasury Regulations.

Cost: Procurement price at time of purchase.

Consumables: These are items kept in stores and pharmacy available to maternity ward, whose unit price is less than R1000.00 for e.g. scissors, gel related to the medical equipment, stationery or disposable items such as indwelling catheters, disposable syringes, and plastic aprons.

Maternity Care: Maternity care refers to an integral component of primary health care and free health services for pregnant mothers. From the South African point of view, the Maternal and Child Health programme is located in general development policies, which are focused on meeting the basic needs of rural and urban communities, maximising human resources potential, the economy and spreading its benefits as well as democratising society and its institutions. In

order to comply with these principles, the Minister of Health in July 1994 announced the introduction of free health services for pregnant mothers and children under 6 years, which marked a great era of democratic achievement of the ANC led government.

Maternity ward: It is a ward where pregnant and post delivery mothers are cared for.

Medical devices: Medical devices refer to any instrument, apparatus, appliance, software, material or other articles, whether used alone or in combination, including the software intended by its manufacturer to be used specifically for diagnostic and /or therapeutic purposes and necessary for its proper application, intended by the manufacturer to be used for human beings. Devices are to be used for the purpose of: (a) Diagnosis, prevention, monitoring, treatment or alleviation of disease. (b) Diagnosis ,monitoring, treatment, alleviation of or compensation for an injury or handicap, (c) Investigation , replacement or modification of the anatomy or of a physiological process and (d) Control of conception. This includes the devices that do not achieve its principal intended action in or on the human body by pharmacological, immunological or metabolic means, but which may be assisted in its function by such means (Directive 2007/47/EC of European Parliament).

Medical Equipment: In the South African context, these refer to expensive medical devices (costing more than R5000.00) and are known as capital medical equipment. These devices usually require maintenance and calibration.

## LIST OF ABBREVIATIONS

ALOS	Average Length Of Stay
ANC	African National Congress (Political Organisation).
BAS	Basic Administration System.
BBA	Born Before Arrival
CS	Caesarean Section
CTG	Cardiotochograph
DHSP	District Hospital Service Package
DHS	District Health System
EC MARK	European Commission Approval mark
FDA	Food and Drug Administration
FSB	Fresh still births
GMtP	Good Management Practices
GHTF	Global Harmonization Task Force
HT	Health Technology
MMR	Maternal mortality rate
NCCEMD	National Committee on Confidential Enquiry into Maternal Deaths
MSB	Macerated still-births
NVD	Normal vaginal delivery
PMTCT	Prevention of Mother To Child Transmission
SABS	South African Bureau of Standards
SD	Standard deviation
UBUR	Usable Bed Utilisation Rate
WHO	World Health Organization

## **CHAPTER 1**

### **INTRODUCTION**

The purpose of this study was to determine the utilisation of medical devices (equipment and related consumables) and related costs in the performance of clinical activities in the maternity unit of Mecklenburg Hospital (a district hospital in Limpopo Province) during a one year study period. This introductory chapter will cover the background to the study, statement of the problem, its aims and objectives and an outline of subsequent chapters.

#### **1.1 BACKGROUND**

Maternal health services has received increasing attention around the world. This is due to unexpectedly high maternal mortality and morbidity in many countries; most of them are from the sub-Saharan Africa. Poor quality of services is often responsible for maternal death worldwide. Maternal deaths are detrimental to social development and well-being, as millions of children become orphans every year. In view of this, maternal health was added as one of the Millennium development goals (MGG monitor, 2007). The World Health Organization (WHO) and member countries would like to reduce maternal deaths by three quarters by the year 2015 (WHO, 2009).

Optimal and efficient allocation and use of resources is important for the improvement of maternal service delivery. Hospitals around the world are currently using increasing number of medical equipment. These equipment are recognised as the key inputs for maternal service delivery e.g. availability of Ultrasound, cardiotochograph and Doppler machines. Hospitals spend significant amount of financial resources for procurement, and maintenance of these equipment.

The process of procuring the medical equipment in the Hospital under study is

done through monthly budget meetings.

## **1.2 STATEMENT OF THE PROBLEM**

Medical equipment management in district hospitals is a major challenge due to shortage of skilled resources. This inadequacy has resulted in frequent breakdown of these equipment, reduced life span and unavailability of essential equipment. For some medical equipment that operates with consumables, the lack of these items can also impact on overall availability of the equipment. From a management perspective it is important to have baseline information about the status( availability for use) and, cost of the medical equipment in the maternity unit in order to plan for improved service delivery. The current situation is that this important information is not available.

## **1.3 JUSTIFICATION OF THIS STUDY**

Maternal health services in the hospitals are increasingly dependent on the use of medical equipment. However, no formal study has been conducted to systematically study availability and cost of medical equipment and related consumables in the public sector hospitals of South Africa. It is envisaged that this study will address some of the deficiencies in our knowledge in this respect. The focus of the study will be on the practical availability of medical equipment (including consumables) and the related cost.

The study is expected to provide the Hospital, district and provincial management some reflection as regard the level of compliance against the national guidelines on the availability and cost of medical equipment utilised in maternity ward. In addition, the study would hopefully provide the Limpopo Provincial Government with a resource input that could be utilised to make some impact on medical equipment management issues to ensure that medical equipment used in



maternity wards are managed effectively.

#### **1.4 RESEARCH QUESTION**

What is the availability of medical devices (equipment and related consumables) and cost of utilising these devices in the performance of clinical activities in the maternity unit of a district hospital in South Africa for the period April 2008 to March 2009?

#### **1.5 STUDY OBJECTIVES**

##### **1.5.1 BROAD OBJECTIVE**

To describe the availability of medical devices (equipment and related consumables) and cost of utilising these devices in the performance of clinical activities in the maternity unit of Mecklenburg Hospital for the period April 2008 to March 2009.

##### **1.5.2 SPECIFIC OBJECTIVES**

- To describe the types of medical equipment (capital and minor) available during the study period with respect to known equipment lists [WHO Interagency list of essential Medical Devices for Reproductive Health, and National guidelines (Saving mothers report and District Hospital service package for South Africa)].
- To describe the consumables directly related to medical equipment (such as ultrasound gel and graph papers for ultrasound machine) used during the study period.
- To describe the clinical activities performed during the study period
- To describe the utilisation of medical equipment in the performance of

- clinical activities of the Maternity Unit.
- To determine the cost of medical equipment and related consumables utilised during the study period

## 1.6 SUBSEQUENT CHAPTERS

Brief outline of following chapters are described below.

**Chapter Two Literature Review:** The purpose of the literature review is to review pertinent literature and to discuss concepts related to the maternity services with particular reference to antenatal booking at district hospitals in South Africa and elsewhere.

**Chapter Three Research Methodology:** The chapter describes the research methodology, study design, setting and scope and data management techniques used in this study.

**Chapter Four: Presentation of Results:** This chapter deals with an analysis of the data collected for this study relating to its aims and objectives.

**Chapter Five: Discussion:** The findings from the review of the literature are incorporated in this chapter with the results obtained from the analysis in order to address the aims and objectives of the study.

**Chapter Six: Conclusions and Recommendations:** This constitutes the last chapter of the report and derives conclusions from the research related to the objectives of this study, makes recommendations and advocates areas for future research in the field of antenatal booking in a district hospital setting.

## **CHAPTER 2**

### **LITERATURE REVIEW**

In this chapter, relevant reports into maternal health services with particular reference to use of medical equipment in the maternity unit are discussed. In addition to published literature, information from various unpublished sources is also reviewed.

#### **2.1 MATERNAL HEALTH SERVICES**

Maternal health refers to the health of women during pregnancy, childbirth and the postpartum period. The maternal mortality rate in sub-Saharan Africa is highest in the world (900 per 100,000 live births) and slightly more than half of maternal deaths occur in these countries (WHO, 2005). Recent attention and focus on maternal health has resulted in some achievements such as increasing availability and utilisation of antenatal care services, availability of family planning services and reduction of teenage pregnancy in a number of countries (McCord and Chowdhury, 2003).

In South Africa however, very little change has been observed. The maternal mortality rate (MMR) in South Africa by 2005 was 150 per 100,000 live births. There has been a 20% increase in maternal mortality recorded and, MMR varies amongst the provinces with the lowest and highest being in the Western Cape and KwaZulu-Natal Provinces respectively (NCCEMD, 2007).

The NCCEMD (2007) proposed ten key recommendations to improve maternal health services. One of these recommendations was to establish norms on medical equipment for every health institutions concerned with care of pregnant women.

## **2.2 MEDICAL EQUIPMENT USED IN MATERNAL HEALTH SERVICES**

Medical equipment is essential to the provision of basic reproductive and maternal health services. Rational selection of medical equipment is a crucial component in ensuring improved access to maternal health commodities, followed by efficient procurement, logistical systems, and rational use and demand, which are equally important (WHO, 2008).

Availability of appropriate medical equipment is a key element to the delivery of an efficient and effective maternal health care service. This also helps to reduce adverse events. One study in a large hospital in the USA found that 32% of adverse events in a large hospital are linked to equipment mal-function (Nuckols, Bell, Paddock, et al., 2008). These findings are similar to that of another study conducted in the operations theatres by Cooper et al. (2002). Lathwal and Banerjee (2005) conducted a study in a district hospital in India and demonstrated that only 39% of the required number of medical equipment was available for use. Interestingly, this study also revealed that a significant number of medical equipment was kept in reserve for use only if there was a breakdown.

In 2008, WHO developed an Inter-Agency list of Essential Medical Devices for Reproductive Health. This continues to serve as a management guide relating to the availability of appropriate life saving medical equipment in the maternity ward. In order to render quality care to mothers and babies Munjanja, Majoko and Lindmark (2008) also put emphasis on the fact that certain medical equipment (such as vacuum extractor) are essential in maternity wards even in resource poor settings.

## **2.3 MEDICAL EQUIPMENT MANAGEMENT IN PUBLIC HOSPITALS IN SOUTH AFRICA**

Medical equipment management has been receiving increasing attention from the National and Provincial Government of South Africa over the last decade. In 1998, the Hospital Rehabilitation and Reconstruction Program was initiated by the National Government to improve hospital systems with respect to infrastructure, health technology, organisational management and service quality. Unfortunately, to date the program has made little progress in terms of medical equipment management which is one of the focus areas of the programme (Harrison 2009). Also in 1998, the South African Government has established the South African Medicine and Medical Devices Regulatory Authority (South Africa, 1998) to regulate the use of medical equipment in the health care sector. In addition, a new classification system for medical equipment has been proposed according to the Regulatory Requirements National Health Act of 2003 in order to update the existing system (South Africa, 2003).

The maintenance and care of the medical equipment available in public hospitals is in accordance with section 38(1) (d) of the Public Finance Management Act 1 of 1999 as amended which states that “the accounting officer for a department, trading entity or constitutional institution is responsible for the management, including the safeguarding and the maintenance of the assets of the department” (South Africa, 1999). Based on this Act, public hospitals must keep inventory an asset registers, procurement and maintenance plans for the effective and efficient management of medical equipment available in public sector hospitals.

The Department of Health in 2001 published norms and standards for district hospitals in South Africa. This includes a list of essential medical equipment (DHSP list) for Maternity unit of a district Hospital (South Africa, 2001).

**Table 2.1 List of equipment in maternity unit in terms of DHSP list**

<b>Name of equipment</b>
Fully equipped theatre and delivery room
Wall and mobile oxygen supply
Good light source and a range of specula
Ultrasound
Cardiotocograph with paper
Wall or portable suction apparatus
Forceps
Vacuum
Neonatal resuscitation trolley including Laerdal type (not Samson Bleeze) ambubag, and neonatal laryngoscope blades
Facilities for Kangaroo care and for sick neonates including Incubators (minimum of 2).
A waiting mothers area of sufficient size to accommodate mothers from 37 weeks gestation for hospitals serving deep rural areas
Beds for postnatal mothers with sick babies
Manual vacuum aspiration equipment
Equipment to perform PAP smear

NCCEMD (2007) proposed a list of equipment for various levels of health facilities (NCCEMD list). A district hospital should have an essential set of medical equipment such as vacuum extractor, cardiotocograph, intravenous fluid infusion pump, and defibrillator (Table 2.2).

**Table 2.2 List of equipment in maternity unit in terms of NCCEMD**

<b>Name of equipment</b>
Ultrasound machine
Vacuum extraction
Medical equipment for a fully equipped operating theatre to perform caesarean section and manual removal of placenta
Anaesthetic equipment for regional and general anaesthesia
Cardiotocograph (CTG)
Infusion pump
Defibrillator
X-ray equipment

Both these lists do not specify the equipment necessary for essential maternity services such as operating theatre.

### **2.3.1 FACTORS INFLUENCING THE EFFECTIVE USE OF MEDICAL EQUIPMENT IN SOUTH AFRICA**

No formal study has been done in South Africa to document the factors, which may influence the effective use of medical equipment. An official report prepared for Gauteng Department of Health documented few factors such as: faulty and old equipment, poor maintenance, increase use and inappropriate use (Gauteng Department of Health, 1999).

#### **2.3.1.1 COST OF MEDICAL EQUIPMENTS IN SOUTH AFRICA**

Although hospitals spend a significant amount of financial resources for the purchase and maintenance of medical equipment as well as procurement of consumables for these equipment, no formal study has been done in South Africa to document this.

Medical equipment are an essential component of effective maternal health services in today's world. The South African public hospitals have been spending significant resources for the procurement of medical equipment, related consumables and their maintenance. However, no formal study has been done to document availability of medical equipment in the maternity wards, the expenditure incurred by public hospitals and to enquire effective and efficient use of these equipment. This study is planned as a first step to address the knowledge gap in this important area.



## **CHAPTER 3**

### **METHODOLOGY**

The methodology for this study was selected on the basis of its aims. The study design is presented first followed by setting and scope of the study, and data collection methods, research tools and data analysis. Finally, issues surrounding ethics are discussed.

#### **3.1 STUDY DESIGN**

A cross-sectional study design was used for this study.

#### **3.2 SCOPE OF STUDY**

This study involved a retrospective review of existing medical equipment records from maternal and neonatal units. The records of medical equipment available for diagnostic and therapeutic procedures conducted in maternity ward were included in this study.

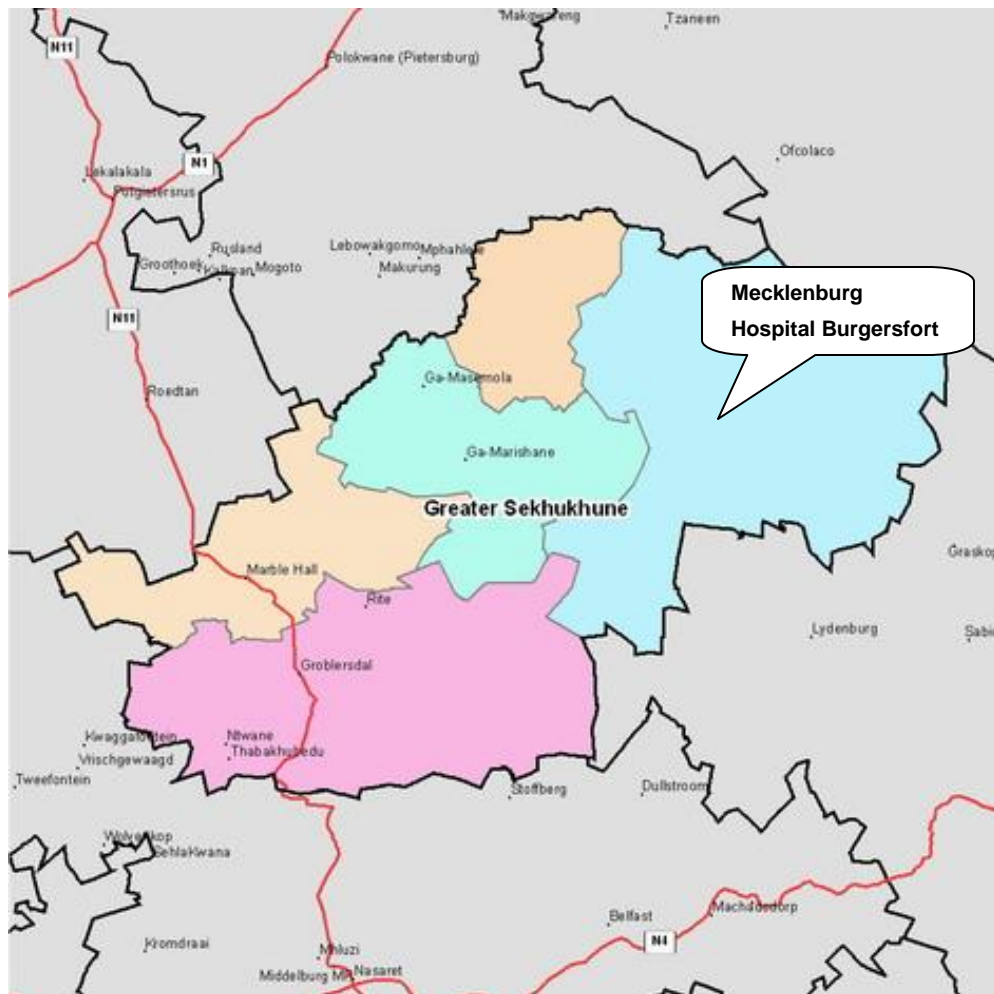
#### **3.3 STUDY SETTING**

The study was conducted at the maternity unit of the Mecklenburg Hospital, one of the two district hospitals in the Greater Tubatse Sub-district, which is a part of the Greater Sekhukhune District Municipality of the Limpopo Province.

##### Greater Sekhukhune District

The Greater Sekhukhune District Municipality is situated in the Limpopo Province. The district headquarter is in Groblersdal. The District has four sub-districts namely: Greater Tubatse, Fetakgomo, Greater Marble Hall and

Makhuduthamaga. The total population of the district is 933918, of which 55% are females. The District has two regional hospitals, five district hospitals, 3 community health centres (CHC) and 84 Primary Health Care (Clinics) and 21 mobile clinics.



**Figure 3.1 Greater Sekhukhune District**

### Mecklenburg Hospital

Mecklenburg Hospital is situated in the town of Burgersfort. It is about 500m along the eastern part of the R37 road (Burgersfort & Polokwane). This is a level one district hospital in the Greater Tubatse Sub-district, forming part of the

District Health System (DHS). The Hospital serves the people living in the Greater Tubatse and Fetakgomo Sub-districts. Greater Tubatse sub-district has two Community Health Centres, seven satellite clinics which render 24 hours services and seven mobile clinics. Nine primary health care facilities (PHC) from the surrounding areas refer complicated cases to this Hospital including the attached gateway clinic which forms the catchment population (353,000).

Mecklenburg Hospital has 109 approved beds, 37 of the beds are in the Maternity Unit. The unit has a well equipped obstetric theatre where both emergency and elective Caesarean Sections are done. The Unit consists of eight cubicles and six side wards (Table 3.1).

**Table 3.1 Number of beds in maternity ward of Mecklenburg Hospital**

<b>Maternity ward</b>	<b>No of beds</b>
Antenatal	9
Caesarean Section	4
Postnatal	16
Kangaroo	4
High risk	4
<b>Total</b>	<b>37</b>

All complicated cases are referred to the level two regional hospitals (St Ritas and Philadelphia) and one tertiary hospital (Polokwane Academic) for specialised high care.

During the study period, the maternity unit was staffed as follows: one Chief medical officer (Gyn. & Obstetrics.), two advanced midwives, seven midwives, eight staff nurses, one lay counsellor, ten assistant nurses and four ward cleaners. The hospital social worker is not part of the maternity staff although appointed in the hospital. The maternity unit benefits from the monthly Regional family Physician outreach programme.

The health services rendered in Maternity Unit are free and include: Antenatal care (ANC), High-risk clinic for pregnant mothers referred from PHC facilities, Deliveries, Kangaroo mother care (babies weighing >1kg), and premature Nursery (babies weighing <1kg), Nursery for sick babies, Postnatal care, Emergency operating theatre, Choice on termination of pregnancy, PMTCT, Family planning and Immunisations.

The average length of stay of Maternity ward (ALOS) is 4 days, at Usable Bed Utilisation Rate (UBUR) between 65% -80%. The monthly deliveries ranges between 143-226 and approximately 9,000 patients are admitted in the Unit every year. The Caesarean Section rate ranges between 11% - 15% on monthly basis. All these services require availability of functional medical equipment.

The Maternity Unit keeps an asset register for both capital and minor equipment procured and utilised for routine and emergency procedures. A bar coding system has been implemented for asset identification. Medical equipment are periodically serviced by a dedicated service provider according to the hospital maintenance plan. Some consumables related to the capital and minor equipment are initially provided by the service provider such as graph paper. The unit keeps invoices of all consumables obtained via pharmacy and stores which are either directly or indirectly needed for the safe and effective use of the medical equipment.

Patient care service is a cost centre, which was allocated R1, 213, 000.00 for the procurement of both capital and minor medical equipment during the study period (2008-2009). The implementation of the activity based budget is informed by a drawn business plan, operational plan and a procurement plan in order to avoid the fruitless expenditure as stated in section 38(1) (d) of the Public Finance Management of 1999 as amended. The above plans assist in preventing either over or under spending by the hospital units.

### **3.4 STUDY PERIOD**

The study period was one financial year (April 2008 to March 2009).

### **3.5 STUDY POPULATION AND SAMPLING**

Since all the listed equipment allocated to this maternity unit formed part of the study, no sampling was done in this respect.

### **3.6 DATA MANAGEMENT**

#### **3.6.1 STUDY INSTRUMENTS**

The data collection tools developed for this study were based on the WHO Interagency list of essential medical equipments for reproductive health (WHO, 2008). (Appendix B) A separate spreadsheet was designed to collect the data related to costs and clinical activities in the unit.

#### **3.6.2 VARIABLES**

The variables for this study are listed in the Table 3.2.

**Table 3.2 Relevant objectives and study variables**

Objectives	Variables	Indicators
1	Medical equipment	Types of medical equipment Number of Medical equipment/ category
2	Consumables related to medical equipment	Types of consumables Number of consumables used / category
3	Clinical activities	Number of deliveries Number of CS (Emergency and elective) Number of instrumental deliveries Number of still birth (fresh and macerated) Number of maternal deaths Number of neonatal deaths
4	Utilisation of medical equipment	Estimated utilisation ratios (ultrasound machine, CTG machine and specific operating room equipment)
5	Cost of medical equipment Cost of related consumables	Unit cost of medical equipment Total cost of medical equipment Unit cost of consumables Total cost of consumables

The following ratios were calculated to describe the utilisation of medical equipment in the performance of clinical activities of the Maternity Unit. These calculations were done for three main types of equipment: Ultrasound machine, CTG machine and Anaesthetic machine and other operating room equipment (Table 3.3).

These ratios were calculated based on an assumption that the deliveries happen regularly throughout the year and each patient who delivered should have at least one ultrasound examination and have CTG machine monitoring during

labour.

**Table 3.3 Estimated Utilisation Ratios calculated for medical equipment and clinical activities**

<b>Machines</b>	<b>Ratios</b>
Ultrasound machine	$\frac{\text{Number of deliveries}}{\text{Number of ultrasound machines available X 365 days}}$
CTG machine	$\frac{\text{Number of deliveries}}{\text{Number of CTG machines available X 365 days}}$
Anaesthetic machine and other operating room equipment	$\frac{\text{Number of deliveries}}{\text{Number of Anaesthetic machines available X 365 days}}$

### **3.6.3 DATA COLLECTION**

The study did not involve any primary data collection. Retrospective data was collected from the following sources:

- Objective 1: Asset registers.
- Objective 2: Equipment manual (to identify consumables required for medical equipments) Stores and pharmacy requisitions and commitment registers for consumables related to medical equipment ordered from Stores and Pharmacy units during the study period.
- Objective 3: Maternity ward register for clinical activities performed during the period.
- Objective 4: Maternity ward register and Commitment register from the Finance department.
- Objective 5: Hospital service delivery report.

### **3.6.4 DATA ANALYSIS**

The data collected for the study was analysed with NCSS software (NCSS, 2007).

Descriptive statistics were used to report the findings of the study. The variables used in this study are categorical variables. Therefore, proportion and counts were used to summarise these variables such as types of capital equipment (unit cost more than R5000) and minor equipment (unit cost less than R5000) and types of consumables

### **3.7 PILOT STUDY**

A pilot study was conducted in Dilokong level one District Hospital within the Greater Tubatse Sub- district in Limpopo Province. The pilot study was aimed at testing the reliability and validity of the data collection tool. Based on the findings of the pilot study, the tools were edited to eliminate weakness, before initiating data collection for this study.

### **3.8 ETHICAL CONSIDERATION**

The study was done in a way that ensures and maintains the confidentiality and dignity of all stakeholders. The permission to conduct the study was obtained from the Department of Health and Social Development, Limpopo Province.

In addition, the project was presented to Human Research Ethics Committee of the Witwatersrand University (M10839). The project commenced after obtaining approval from the Ethics Committee.



## **CHAPTER 4**

### **RESULTS**

The results obtained from the analysis of data are described in this chapter.

#### **4.1 CAPITAL EQUIPMENT**

##### **4.1.1 MATERNITY WARDS**

The capital equipment used in the maternity unit and their age is listed in Table 4.1. The majority of the equipment is relatively new except for the Phototherapy Unit (13 years old).

The compliance with WHO Interagency list of essential Medical Devices for Reproductive Health (WHO list), Guidelines for maternity care in South Africa (Maternity care list) and District Hospital service package for South Africa (DHSP list) are listed in Table 4.2.

The Unit is compliant with the WHO list except Vacuum extraction, Steam sterilizer and ICU beds. On the other hand, the Unit is non-compliant with the NCCEMD list with Vacuum extraction. Lastly, the Unit was non-compliant with the DHSP list for Forceps and vacuum aspiration. In addition, the Unit also has other facilities in terms of the DHSP list such as Kangaroo care, beds for postnatal mothers with sick babies, and facilities for PAP-smear. However, the Unit does not have a waiting mother's area to accommodate mothers from 37 weeks gestation which is needed for hospitals serving deep rural areas such as this one.

**Table 4.1 Capital equipment available in maternity wards**

	Number available	Age of the equipment (years)
<b>Medical Diagnostic Equipment</b>		
Doppler foetal heart detector	2	1
Ultrasound	1	4
<b>Sterilisation Equipment</b>		
Steam Steriliser	0	
Non-steam Steriliser	1	8
<b>Hospital Equipment</b>		
Electrosurgical unit	0	
Mobile examination light	5	2
Mobile theatre operating light	1	7
Theatre operating light (ceiling mounted)	1	7
Portable suction pump	5	6
<b>Other hospital equipment &amp; furniture</b>		
Hospital standard bed	37	4
Intensive Care Unit hospital bed	0	
Delivery bed	8	9
Operating theatre table	1	8
Electrocardiograph (ECG)	1	1
Cardiotochograph (CTG)	5	1
Fluid warmer	5	6
Cardiocap	1	1
Emergency trolley	2	4
<b>Miscellaneous other equipment</b>		
Vacuum extractor	0	
Forceps	0	
<b>Anaesthesia/Resuscitation Equipment</b>		
Anaesthetic machine	1	2
Anaesthetic table stainless steel	1	2
Incubator	6	2
Portable patient monitor	1	2
Nebuliser	1	1
Oxygen concentrator/SET	0	
Defibrillator	1	5
Phototherapy unit	3	13
Portable pulse oximeter	1	3
Infusion pump	4	2
Suction unit	1	6
Resuscitation table( newborn)	3	2
Ventilator (adult-child)	1	1
Baby warmer(electric set)	5	8
X-Ray viewing box	1	8
Wall mounted and mobile oxygen supply	1	8

**Table 4.2 Listed capital equipment available in maternity wards**

	Number available	WHO list	NCCEMD list	DHSP list
<b>Medical Diagnostic Equipment</b>				
Doppler foetal heart detector	2	Yes	N/A	N/A
Scanner ultrasound,	1	Yes	Yes	Yes
<b>Sterilisation Equipment</b>				
Steam steriliser,	0	No	N/A	N/A
Non-steam Steriliser	1	Yes	N/A	N/A
<b>Hospital Equipment</b>				
Electrosurgical unit	0	No	N/A	N/A
Mobile theatre examination light	5	Yes	N/A	N/A
Mobile operating theatre light	1	Yes	N/A	Yes
Theatre operating light (ceiling mounted)	1	Yes	N/A	Yes
Portable suction pump, ,	5	Yes	N/A	N/A
<b>Other hospital equipment &amp; furniture</b>				
Standard hospital bed	37	Yes	N/A	N/A
Intensive Care Unit hospital bed	0	No	N/A	N/A
Delivery bed	8	Yes	N/A	N/A
Operating theatre table	1	Yes	N/A	N/A
ECG	1	Yes	N/A	N/A
CTG	5	Yes	Yes	Yes
fluid warmer,	5	Yes	N/A	N/A
Cardiocap	1	Yes	N/A	N/A
emergency trolley,	2	Yes	N/A	N/A
<b>Miscellaneous other equipment</b>				
Vacuum extractor	0	No	No	No
Forceps	0	N/A	N/A	No
<b>Anaesthesia/Resuscitation Equipment</b>				
Anaesthesia machine	1	Yes	Yes	Yes
Anaesthetic table stainless steel	1	Yes	Yes	Yes
Incubator	6	Yes	Yes	Yes
Portable patient monitor	1	Yes	Yes	Yes
Nebuliser	1	Yes	Yes	Yes
Oxygen concentrator set	0	No	Yes	Yes
Defibrillator	1	Yes	Yes	Yes
Phototherapy unit	3	Yes	Yes	Yes
Portable Pulse oximeter	1	Yes	Yes	Yes
Infusion Pump	4	Yes	Yes	Yes
Superpower suction unit	1	Yes	Yes	Yes
Resuscitation table(newborn)	3	Yes	Yes	Yes
Ventilator resuscitation (adult-child)	1	Yes	Yes	Yes
Baby warmer (electric)	5	Yes	Yes	Yes
X-Ray viewing box	1	Yes	Yes	Yes
Wall mounted and mobile oxygen supply	1	N/A	Yes	Yes

#### 4.1.2 MINOR EQUIPMENT

The minor medical equipment used in the Maternity Unit is listed in Table 4.3. The Unit had all the necessary minor medical equipments in terms of the WHO list.

**Table 4.3 WHO Compliance of Minor medical equipment**

Equipment Name	Number available	Compliant with WHO list
Examination coach	2	Yes
Over bed trolley	1	Yes
Medicine trolley	5	Yes
Dressing trolley	13	Yes
Delivery trolley (2 shelves)	4	Yes
Foot stool steel(1 step)	10	Yes
Infant crib	15	Yes
Adult cot bed	3	Yes
Steel cardiac Table	6	Yes
Mayo table	1	Yes
Mobile drip stand	8	Yes
Refrigerator	6	Yes
Manual Haemoglobin meter	1	Yes
Electrical Haemoglobin meter	1	Yes
Stretcher	5	Yes
Adult scale	1	Yes
Infant scale	6	Yes
Kick about stainless steel with lid	3	Yes
Plastic bucket 20 with lid	2	Yes
Mobile site lamp	1	Yes

## 4.2 CONSUMABLES

### 4.2.1 ORDERING OF CONSUMABLES

Ordering of consumables is described in Table 4.4. Batteries LR14 were ordered three times, Batteries R20 were ordered four times, Batteries AA were ordered three times, Silicon spray was ordered five times, Ultrasound gel high viscosity was ordered eight times and Ultrasound gel medium viscosity was ordered seven times. The mean number of days to receive the order was 7.4 days (Standard deviation 4.6 days and range 1 to 12 days).

**Table 4.4 Consumables used in the maternity wards**

<b>Consumables</b>	<b>Associated equipment</b>	<b>Days to receive</b>
Silicon spray	Steriliser	7.4 ± 4.6 days
Battery,1.5v.LR14.CR14	Laryngoscope (medium)	3 days
Battery,20 PP	Laryngoscope (large)	5 days
Battery, AA	Wall watch to calculate the duration of the operation	13 days
Ultrasound gel high viscosity 250ml	Ultrasound machine	1-13 days
Ultrasound gel medium viscosity 250ml	Ultrasound machine	1-15 days

Quantity of consumables ordered during this period is listed in Table 4.5.

**Table 4.5 Quantity of consumables**

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Feb	Mar	Tot al units
Silicon spray (311g)	3	2	8	0	0	0	3	0	0	0	20
Battery sv LR14 CR 14 (for laryngoscope)	2	0	0	0	0	2	0	0	4	0	8
Battery R20PP (for large laryngoscope)	0	4	0	0	2	0	4	0	0	2	12
Battery AA	2	0	3	0	0	1	0	0	2	0	7
Ultrasound Gel high Viscosity (250ml)	2	0	1	0	2	3	0	2	3	1	15
Ultrasound Gel Medium Viscosity (250ml)	2	0	1	1	3	3	2	0	0	4	14

### **4.3 MEDICAL EQUIPMENT AND CLINICAL ACTIVITIES OF THE MATERNITY UNIT**

#### **4.3.1 MATERNITY UNIT ACTIVITIES**

The activities in the maternity unit are described in Table 4.6. There were 2405 deliveries, 86% (2075) normal vaginal deliveries (NVD), 11% (274),CS 1% (30) vaginal breech deliveries and remaining born before arrival (BBA). More emergency Caesarean Sections were done during this period (77%, 212) than elective CS (23%, 62).

The maternal and perinatal outcomes are described in Table 4.7. There was no maternal death during the study period. However there were 46 still-births (19/1000 live births) and 17 neonatal deaths (7/1000 live births). There were more Macerated still-births (MSB) (40, 87%) than fresh still births (FSB) (6, 13%).

**Table 4.6 Activities in the Maternity Ward during the study period**

	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
Total Delivery	209	212	215	224	193	226	189	167	209	220	143	198	2405
NVD	178	181	184	199	173	195	168	145	183	193	105	171	2075
Breech	3	3	0	6	2	0	0	1	4	7	2	2	30
CS	23	26	30	18	15	29	19	20	17	18	35	23	274
-Elective	3	7	7	5	1	6	6	6	1	4	6	6	62
-Emergency	17	19	23	13	14	23	13	14	16	14	29	17	212
Forceps	0	0	0	0	0	0	0	0	0	0	0	0	0
Vacuum	0	0	0	0	0	0	0	0	0	0	0	0	0

**Table 4.7 Maternal and perinatal outcomes during the study period**

	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
Maternal death	0	0	0	0	0	0	0	0	0	0	0	0	0
Still birth	4	3	4	4	3	2	5	5	5	4	4	3	46
-Macerated	3	2	4	4	1	2	5	5	5	3	3	3	40
-Fresh	1	1	0	0	2	0	0	0	0	1	1	0	6
Neonatal death	0	0	3	2	1	1	2	1	2	0	2	3	17

#### **4.3.2 RELATIONSHIP BETWEEN MEDICAL EQUIPMENT AND CLINICAL ACTIVITIES OF THE MATERNITY UNIT**

Following ratios were calculated based on the available information (Table 4.8).

**Table 4.8 Relationship between medical equipment and clinical activities**

<b>Machines</b>	<b>Ratios</b>	
Ultrasound machine	$\frac{\text{Number of deliveries}}{\text{Number of ultrasound machines available X 365 days}}$	6.6 patients per equipment per day
CTG machine	$\frac{\text{Number of deliveries}}{\text{Number of CTG machines available X 365 days}}$	1.3 patients per equipment per day
Anaesthetic machine and other operating room equipments	$\frac{\text{Number of deliveries}}{\text{Number of Anaesthetic machines available X 365 days}}$	0.8 patients per equipment per day

There is only one ultrasound machine in the Unit. This implies that the Unit is using on an average 6.6 patients per day for the ultrasound machine. The CTG machines are available for approximately 1.3 patients per day (this is based on an assumption that every patient would be put on a CTG machine during active phase of labour). There is only one fully functional operating theatre and based on the assumptions in this calculation, this was used by 0.8 patients per day.

#### **4.4 PRICE OF CAPITAL EQUIPMENT AND CONSUMABLES**

##### **4.4.1 CAPITAL EQUIPMENT**

Purchasing price of capital medical equipments used in the Maternity ward is listed in Table 4.9.



**Table 4.9 Price of Capital medical equipment**

	Unit costs	Unit cost	total costs
<b>Medical Diagnostic Equipment</b>			
Doppler foetal heart detector	2	R 22,000.00	R 44,000.00
Scanner, ultrasound,	1	R 262,200.00	R 262,200.00
<b>Sterilisation Equipment</b>			
Steriliser, steam	0		R 0.00
Steriliser,non-steam	1	R 47,000.00	R 47,000.00
<b>Hospital Equipment</b>			
Electrosurgical unit	0		R 0.00
Light,examination,mobile,	5	R 690.00	R 3,450.00
Light, Operating theatre, mobile,	1	R 35,000.00	R 35,000.00
Light Operating. theatre ceiling,	1	R 35,000.00	R 35,000.00
Pump,suction,portable	5	R 2,850.00	R 14,250.00
Other hospital equipment & furniture			R 0.00
Bed,hospital,standard,w/mattress	37	R 7,247.13	R 268,143.81
Bed, hospital, ICU,w/mattress	0		R 0.00
Bed, labour/delivery,w/access	8	R 3,186.30	R 25,490.40
Table,Oper.theatre,w/access.	1	R 44,032.50	R 44,032.50
ECG	1	R 19,479.00	R 19,479.00
CTG	5	R 11,884.00	R 59,420.00
Warmer, fluid	5	R 18,723.00	R 93,615.00
Cardiocap	1	R 11,884.00	R 11,884.00
Trolley,emergency,w/drawers	2	R 9,181.66	R 18,363.32
<b>Miscellaneous other equipment</b>			
Vacuum extractor	0		R 0.00
Forceps	0		R 0.00
<b>Anaesthesia/Resuscitation Equipment</b>			R 0.00
Anaesthesia system, free-standing	1	R 25,109.99	R 25,109.99
Anaesthetic table stainless steel	1	R 44,032.50	R 44,032.50
Incubator, newborn, automatic,	6	R 22,424.00	R 134,544.00
Monitor, patient, portable,	1	250,00	R 250.00
Nebuliser, atomizer, electrical compressor SET	1	R 18,548.65	R 18,548.65
Oxygen concentrator/SET	0		R 0.00
Defibrillator	1	R 23,658.00	R 23,658.00
Phototherapy unit, w/access	3	R 18,000.00	R 54,000.00
Pulse oximeter portable, w/access	1	R 48,865.98	R 48,865.98
Pump infusion,	4	R 41,245.00	R 164,980.00
Suction, unit, superpower	1	R 10,500.00	R 10,500.00
Table,resusc,newborn,	3	R 19,000.00	R 57,000.00
Ventilator, resuscitation (adult-child), w/ access	1	R 68,266.00	R 68,266.00
Warmer,baby,electric/SET	5	R 22,425.00	R 112,125.00
Theatre,X-Ray, viewing box	1	R 5,423.54	R 5,423.54

#### 4.4.2 MINOR EQUIPMENT

Purchase price of minor medical equipments used in the Maternity ward is listed in Table 4.10.

**Table 4.10 Price of minor medical equipment**

<b>Equipment Name</b>	<b>No available</b>	<b>Unit price</b>	<b>Total price</b>
Examination coach	2	R 1,240.00	R 2,480.00
Trolley,overbed	1	R 3,186.30	R 3,186.30
Trolley, medicines	5	R 3,186.30	R 15,931.50
Trolley dressings	13	R 1,624.50	R 21,118.50
Trolley delivery with 2 shelves	4	R 1,624.50	R 6,498.00
Footstool,steel,1 step	10	R 780.00	R 7,800.00
Infant crib steel w/mattress	15	R 1,321.48	R 19,822.20
Cot-bed steel adult w/mattress	3	R 3,573.00	R 10,719.00
Table,steel,cardiac,mobile w/wooden top	6	R 999.00	R 5,994.00
Table, mayo	1	R 1,972.66	R 1,972.66
Drip stand, steel, mobile	8	R 1,080.20	R 8,641.60
Refrigerator, vaccines	6	R 2,500.00	R 15,000.00
HB meter/manual	1	R 418.11	R 418.11
HB meter /electrical	1	R 3,427.00	R 3,427.00
Stretcher	5	R 2,660.85	R 13,304.25
Scale, adult	1	R 1,540.00	R 1,540.00
Scale infant	6	R 1,140.00	R 6,840.00
Kick-about stainless steel w/ lid	3	R 83.22	R 249.66
Bucket,plastic,20LW/lid	2	R 265.86	R 531.72
Site lamp mobile	1	R 690.00	R 690.00

#### 4.4.3 CONSUMABLES

The total cost of consumables for one-year study period is listed in Table 4.11. The cost of consumables directly associated with medical equipment was R1052.76 (R 87.73/ month).

**Table 4.11 Total expenditure for consumables**

<b>Consumables</b>	<b>Unit price</b>	<b>Unit</b>	<b>Total price</b>
Silicon spray (311g)	R 14.99	20	R 400.00
Battery sv LR14 CR 14 (for laryngoscope)	R 2.00	8	R 16.00
Battery R20PP (for large laryngoscope)	R 32.00	12	R 384.00
Battery AA	R 17.00	7	R 119.00
Ultrasound Gel Medium Viscosity (250ml)	R 4.09	14	R 57.26
Ultrasound Gel High Viscosity (250ml)	R5.10	15	R76.50
<b>Total</b>			<b>R 1052.76</b>

## **CHAPTER 5**

### **DISCUSSION**

In this chapter, the results obtained from the analysis of the data are discussed and compared with those from other published studies.

#### **5.1 INTRODUCTION**

This study was done in order to determine the availability, cost and procurement processes of medical equipment and related consumables in maternity ward of Mecklenburg Hospital for the period April 2008 to March 2009. No studies have been conducted at the level of a district hospital in the Limpopo Province to document these issues. In addition, not many studies addressed this topic at national or international levels and most of the published literatures are based on studies done at tertiary level hospitals in developed countries. Published studies done in African continent are few except some unpublished official documents and reports from Departments of Health. Therefore, the findings of this study could not be effectively compared with other studies.

The findings documented in this report are data obtained from routine data collecting tools namely, Asset register, pharmacy and Stores records. The data for the study were extracted for detailed analysis.

#### **5.2 MEDICAL EQUIPMENT AVAILABLE IN THE MATERNITY UNIT**

All the equipment needed for the operation of the labour ward was available according to the WHO, NCCEMD and DHSP lists except few items such as Forceps and Vacuum, Steam sterilizer and Oxygen concentrator set.

Availability of few CTG machines is of concern. Although there were a significant number of MSB during the study period, it is difficult to make any association

between the access to limited equipment and foetal outcome since the booking status of the patients was not known. This is a limitation of this study. However, the importance of using CTG machines in both antenatal clinics and wards to conduct non-stress tests in high risk mothers is recognised. Inadequate equipment does not allow these maternity units to effectively use these technologies to support the provision of basic maternity care.

Equipment for vacuum deliveries was not available in the Unit. This is a serious concern, since performing vacuum delivery as a form of assisted delivery is recognised by international agencies like WHO and UN as a critical component of providing baseline emergency obstetric care (UNICEF,1997). According to the South African national obstetric guidelines relating to Prevention of mother to child transmission (PMTCT), instrumental deliveries may increase the risk for vertical transmission of HIV and is therefore not recommended in this particular setting (McCoy, Besser, Visser, et al., 2002) which is supported by other studies conducted elsewhere (Rudin, Camli, Schnuriger, et al, 1995; Haram, Jensen, Dalen, et al., 2002). Although vacuum deliveries is a relative contra-indication in HIV positive patients, it can be life –saving for most of the HIV negative women and, this should be available since the HIV transmission rate has subsequently been reduced with the provision of antiretrovirals. It is important to note that these findings are applicable to HIV positive patients and is not an absolute contra-indication for patients already on antiretrovirals. Studies on basic obstetric care in Africa however, have demonstrated an overall decline in assisted deliveries overall (Bailey, Paxton, Lobis, et al. 2006), with a subsequent increase in the rate of Caesarean Section (Notzon,1990; Stephenson, 1993; Read, Prendiville, Dawes, et al., 1994; Pearson and Shoo 2005).

This practice should be reviewed against international and national guidelines in this regard to determine if this is acceptable in terms of quality and range of emergency services that should be offered in this setting.

In addition, the performance of instrumental and operative deliveries and other procedures such as manual removal of placenta requires skilled health professionals. These important skills should be taught to midlevel health professionals, which would not only increase access to vital obstetric care, but would also indirectly reduce risks associated with CS delivery and overall costs of care (Bailey, 2005).

### **5.3 CONSUMABLES UTILISED IN THE MATERNITY UNIT**

The consumables that were needed for the routine operationalisation of the capital equipment included batteries, gels and sprays. Since these consumables are linked to the use of the capital equipment, their availability directly affects the utilisation of the respective equipment in this unit. According to Malkin (2007), the lack of consumables was demonstrated to be “*the most common cause for a piece of medical equipment being out-of-service.*” In addition, a later study revealed that unavailable relevant consumables were the only cause for the non-utilisation of equipment (Malkin and Allison, 2010).

This study revealed that it took an average of 7.4 days to receive these consumables once an order was placed. It is important to note that this delay may have impacted on equipment use and service delivery in the maternity unit. Since, the information regarding ward stock levels and the state of the existing consumables were not known, it is difficult to comment further in this regard.

### **5.4 MEDICAL EQUIPMENT UTILISED IN THE PERFORMANCE OF CLINICAL ACTIVITIES IN THE MATERNITY UNIT**

There is only one ultrasound machine in the Unit. This implies that if this machine breaks down no ultrasound would be done for patients, which is of serious concern. The Unit is using the machine on an average 6.6 patients per day. The

actual use and availability and un-availability of the machine are not known and is a limitation of this study.

There were five CTG machines in the Unit during the study period. No records were available on actual availability of these machines and if any adverse outcomes were associated with the lack of availability of these machines.

There is one fully functional operating theatre. Two hundred seventy four CS were performed during the study period (less than one/ day) although it might happen that more than one patient might require CS at the same time which may lead to an adverse outcome. However, no adverse events were documented.

Further studies are necessary to record the actual use of these equipments so that the utilisation rates can be calculated.

## **5.5 COST OF MEDICAL EQUIPMENT AND RELATED CONSUMABLES USED IN MATERNITY**

The capital equipment used in the maternity unit are not very old except the Phototherapy unit. No capital equipment was procured during the study period and no equipment was condemned. The study calculated the total asset value of capital (R 767,303.66) and minor (R 146,164.50) medical equipment based on purchase price.

The consumables during the study period are less than R 100 per month. However, it takes sometimes a prolonged period to receive these consumables, which could affect the use of these equipment if there are episodes of stock-out.

## **CHAPTER 6**

### **CONCLUSION AND RECOMMENDATIONS**

In this chapter, the results obtained from this study were assessed in relation to the aims and objectives of the study, so that appropriate conclusions can be drawn. The limitations of the study were articulated. Appropriate recommendations were made within the context of the findings of this study.

#### **6.1 CONCLUSIONS RELATED TO THE AIMS OF THE STUDY**

This was a cross-sectional study that looked at broad issues pertaining to the use of medical equipment in a rural district hospital in the Limpopo Province. This was first study done on medical equipment in a district hospital setting in Limpopo and probably in South Africa.

##### **6.1.1 DESCRIPTION OF THE AVAILABLE TYPES OF MEDICAL EQUIPMENT**

The Maternity Unit was well equipped with medical equipment, which were relatively new. The Unit is compliant with the WHO, NCCEMD and DHSP lists except few items such as Forceps and vacuum, Steam sterilizer and Oxygen concentrator set. Among these items lack of vacuum extraction set is of concern.

##### **6.1.2 DESCRIPTION OF THE AVAILABILITY OF CONSUMABLES RELATED TO MEDICAL EQUIPMENT**

The study identified few consumables that were directly associated with use of these medical equipment. This study revealed that it took some days to receive these consumables once an order was placed, which is of concern.



### **6.1.3 RELATIONSHIP BETWEEN MEDICAL EQUIPMENT AND CLINICAL ACTIVITIES OF THE MATERNITY UNIT**

The study attempted to link the availability of certain medical equipment (such as Ultrasound, CTG and Operating theatre equipments) with clinical activities and outcomes. Availability of only one ultrasound machine in the Unit might not be adequate to offer a quality service. The unit had only five CTG machines, which were placed in the labour ward. The Unit might benefit with more CTG machines placed in the antenatal ward and clinic so that non-stress test can be done routinely for high-risk patients. Thus would assist the unit to reduce the SB and possibly neonatal deaths. Availability of one operating theatre might be enough in view of low number of CS. However, contingency plan should be in place to avoid situation where more than one patient might require emergency CS at the same time.

### **6.1.4 DETERMINATION OF THE COST OF MEDICAL EQUIPMENT AND RELATED CONSUMABLES**

The capital equipment used in the maternity units were relatively new. It was not clear about the maintenance and service plan for these equipments. No capital equipment was procured during the study period and no equipments were condemned. The study calculated the total asset value of capital (R 767,303.66) and minor (R 1446, 164.50) medical equipments based on purchase price. Not much consumable were used during this period (less than R 100 per month).

### **6.1.5 HOSPITAL PROCUREMENT PROCESS FOR MEDICAL EQUIPMENT AND CONSUMABLES DURING THE STUDY PERIOD**

The supply of consumables took a relatively long period to reach the Unit. The procurement and supply management function in the hospital should be reviewed

to identify gaps and challenges to reduce this time-period.

## **6.2 RECOMMENDATIONS**

The recommendations were based on the findings from this study as well as from the suggestions made by the Hospital staff. The analysis of the data also revealed some areas that need to be evaluated and recommendations were made based on the results of this study. Recommendations for further or more in depth research were also made.

### **6.2.1 FOLLOW UP**

Medical equipment is currently a priority for the Limpopo Provincial Department of Health. The findings of the study were presented to the Mecklenburg Hospital and the Greater Sekhukhune District management. It is hoped that this would assist the Hospital and District Management to develop a better understanding of the challenges associated with high prevalence of unbooked mothers in the District.

### **6.2.2 FUTURE RESEARCH**

The researcher would like to propose following studies as a follow up of this study:

- A further study should be done to document the functional state of these equipment.
- Equipment availability and utilisation studies
- Adverse patient outcomes and non-availability of equipment and consumables
- The procurement and supply management function in the hospital should be reviewed to reduce these time periods.

- A time-flow study in the theatre and maternity ward would assist the Hospital to develop a better understanding about the utilisation of the operating theatre and other medical equipment in the maternity.
- A long-term prospective study that would involve interviewing health professionals to develop an understanding of the challenges faced by them in terms of use of medical equipment
- A prospective study to document the availability/unavailability of medical equipment including the time for repair and their impact on clinical outcomes.
- Development of guidelines and tools to assist managers in terms of determining adequacy of medical equipment at their facilities.

### **6.3 SUMMARY AND CONCLUSION**

This was the first study done on medical equipment in a district hospital setting in Limpopo and probably in South Africa. A cross-sectional study was used that looked at broad issues pertaining to the use of medical equipments in a rural district hospital in the Limpopo Province. Retrospective data analysis of routinely collected hospital data provided some valuable information. The study highlighted that the Unit was overall compliant with WHO list as well as national guidelines (NCCEMD and DHSP lists). The study also identified gaps which would require more detailed and prospective study to improve the services and clinical outcomes in the Unit.

The results of the study will provide insight into areas, which were not researched in the past. The findings will be presented to both District and Provincial Health Departments and hopefully similar studies would be conducted in other level 1 district hospital maternity wards with similar challenges.

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## **APPENDICES**



**APPENDIX A**  
**ETHICS CLEARANCE CERTIFICATE AND LETTERS OF PERMISSION**





## **APPENDIX B: DATA COLLECTION TOOLS**