IMPACT OF FREE MATERNITY HEALTH SERVICES ON QUALITY OF CARE OFFERED TO WOMEN PRESENTING WITH LATE OBSTETRIC HAEMORRHAGE AT KENYATTA NATIONAL HOSPITAL

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DECLARATION

I, the principal author of this document, declare that this is my original work that has not been submitted anywhere else for consideration for publication or for the award of another degree. I also declare no conflict of interest.

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DEDICATION

This work is dedicated to my children; Lanisha Nyaboke and Kiyondi Messah and to my loving husband and friend Dr. Bernard Omboi who were very patient, understanding and who gave me unfailing support during this period.

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LIST OF ABBREVIATIONS AND ACRONYMS

APH – Ante-partum haemorrhage

BBA - Born Before Arrival

BP- Blood Pressure

CCT- Controlled Cord Traction

C/S- Caesarean Section

DIC-Disseminated Intravascular Coagulopathy

EDD- Expected Date of Delivery

EWA- Examination without anaesthesia

GoK- Government of Kenya

Hb- Haemoglobin

HCP - Health Care Provider

ICU - Intensive care unit

IMR - Infant Mortality Rate

IVF- Intravenous fluids

KDHS- Kenya Demographic and Health Survey

KNH - Kenyatta National Hospital

KQM- Kenya Quality Management

KSPA- Kenya Service Provision Assessment

LMP- Last Menstrual Period

MCH- Maternal and Child Health

MDGs - Millennium Development Goals

MMR - Maternal Mortality Ratio

Mls- Millilitres

MNH - Maternal and Neonatal Health

MoH - Ministry of Health

MPS - Making Pregnancy Safer

NBU - Newborn unit

NHSSP -National Health Sector Strategic Plan

NICU - Neonatal intensive care unit

NMR -Neonatal Mortality Rate

OC- Obstetric Care

PPH - Postpartum haemorrhage

RH - Reproductive Health

RPOC- Retained products of conception

SBAs - Skilled Birth Attendants

SMI - Safe Motherhood Initiative

SMIAG - Safe Motherhood Inter-Agency Group

TBAs - Traditional Birth Attendants

WHO - World Health Organization

X-match- Cross-match

OPERATIONAL DEFINITIONS

Maternal Death/Mortality - Death of a woman while pregnant or within 42 days of termination of the pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

Maternal Mortality Ratio - Number of maternal deaths per 100,000 live births.

Maternal Morbidity - Maternal morbidity is any symptom or condition resulting from or made worse by pregnancy. In developing and developed countries alike, there are 12 to 16 serious maternal complications to each maternal death.

Perinatal mortality rate-Number of still births + number of early neonatal deaths) divided by (Total number of still births + live births) per 1000

Neonatal mortality rate- Number of neonatal deaths per 1000 live births

Ante-Partum Haemorrhage (APH)

Essential feature :- ≥ 28 weeks gestation with clinically observed vaginal bleeding.

Confirmation : Placenta praevia via ultrasound or at surgery, placenta abruption via presence of a retro placental clot.

Uterine Rupture - Rupture of uterus during labour with confirmation at laparatomy

Post-Partum Haemorrhage(PPH) - Bleeding from the birth canal after delivery of the foetus at gestation ≥ 28 weeks until 6 weeks amounting to 500mls or more or any amount that causes alteration of the maternal condition.

Primary PPH- Bleeding from the birth canal after the birth of the baby within the first 24 hours of delivery. Gestation of pregnancy ≥ 28 weeks with perceived blood loss more than 500 ml and/or clinical signs and symptoms of shock.

Late Obstetric Haemorrhage– Genital tract bleeding occurring at gestation ≥ 28 weeks, during and or after delivery. Defined as ante-partum, intra-partum or post-partum haemorrhage.

Skilled Attendant - refers to "an accredited health professional - such as midwife, doctor or nurse - who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management or referral of complications in women and newborns". Traditional birth attendants (TBAs) either trained or not, are excluded from this category of skilled health workers (WHO, 2004).

Clinical guidelines - Systematically developed statements which assist in making decisions about appropriate health care for specific conditions - not intended to dictate an exclusive course of management or treatment. They are based upon available evidence or research.

Clinical protocol - A way of describing exactly what must be done in specific situations. This often relates to high-risk situations.

Kenya Quality Model (KQM)-Integrates Evidence Based Medicine (EBM) through wide dissemination of public health and clinical Standards and guidelines with Total Quality Management (TQM) and Patient Partnership (PP).

Standard - Sets out what is best practice and gives some idea of how that level of care is to be achieved. It is a basis for measurement by which the accuracy or quality of something is judged. Sometimes called the objective.

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ABSTRACT

Study title: Impact of free maternity health services on quality of care to women presenting with late obstetric haemorrhage at Kenyatta National Hospital.

Background: Obstetric hemorrhage is the leading cause of pregnancy – related mortality worldwide and is considered to be the most preventable cause of maternal mortality. Skilled care averts majority of maternal/fetal morbidities and mortalities that may occur due to unskilled care. Free maternity services in Kenya was a step to increasing SBA utilization. With the free maternal care policy in play, it is cited that the burden on facility resources and health professionals increases without adequate increases in compensation and/or staffing which threatens quality of medical services and outcomes. Increased staff load and problems in handling patient load clearly indicate that emergency obstetric care will be suboptimal. For patients with obstetric haemorrhage, delayed care or poor monitoring arising from the overburdened resources is catastrophic. Improved quality of medical care is the most important factor for the prevention of mortality due to obstetric hemorrhage and therefore there is need to improve the capacity of the facilities to provide quality services to mothers especially in the Sub-Saharan Africa where majority of maternal mortality occurs.

Objective: To compare the quality of care offered to women presenting with late obstetric hemorrhage at Kenyatta National Hospital one year after and one year before the free maternity care policy in Kenya.

Methodology:
Study design: This was a quasi-experimental study of the pre-post design in which treatment group of women (174 women presenting with late obstetric haemorrhage one year after introduction of free maternity care policy) were compared with control group (174 women presenting with late obstetric haemorrhage one year before introduction of free maternity care policy) for quality of care at Kenyatta National Hospital.
Setting: Kenyatta National Hospital labour ward unit.
Study population : Women presenting with late obstetric hemorrhage seeking care at the Kenyatta National Hospital labour ward unit for the periods(June 1st 2011 to May 31st 2012) and (June 1st 2014 to May 31st 2015).
Sample size :174 for each group.
Data Collection Instruments: Structured mainly pre-coded questionnaires.
Data analysis : The data was analyzed using SPSS version 18. Basic frequencies were run and data scrutinized for cleaning and identification of outliers. Grouped data analysis was done in accordance to the pre- and post- intervention measures for structure, process and outcomes. Comparisons were based on differences btw structure, process and outcome indicators for the periods before and after. Appropriate tests of significance were applied (Chi-square), and a p value of <0.05 was considered statistically significant. Logistical regression analysis was used to determine the relative significance of the factors identified.

Results: A percentage availability score showed no major changes in resource availability and staffing during the two periods. There was a significant change in the

admission status of maternity clients (p = 0.006), referred patients increased from 42 (24.1%) to 81 (46.6%) while there was reductions in clinical attendants at the facility (19.5 to 9.8%) and attendees with an unrecorded admission status (41.1 to 30%).There were significant improvements in documenting patient severity classification (p = 0.019), expected date of delivery (p = 0.038) and ANC decision on mode of delivery (p < 0.001). Blood pressure measurement improved from 69 versus 90.8% (p < 0.001), pulse rate (60.9-88.5%, p < 0.001), respiratory rate (44.7 to 81%, p < 0.001), temperature (5.7 to 27%, p < 0.001). Decline in performance following the intervention were fundal height reporting that declined by 49% (OR 0.51, 95% CI 0.30-0.87), recording of admission character of FHR (OR 0.39, 0.25-0.60), speculum/ VE findings (OR 0.61, 0.39-0.97), and results of PMTCT or PITC HIV testing (OR 0.50, 0.32-0.79). The prevalence of uterine rupture OR 1.72(1.07-2.77) and PPH OR 11.93(1.49-95.88) as causes of obstetrical hemorrhage increased significantly .To achieve hemostasis, uterotonic use as the primary mechanism increased (8 to 38.5%, p < 0.001), as did uterine repair (4 to 10.3%, p = 0.027). The CS rate increased from 43.1% to 48.3% OR 1.23(0.81-1.88), p = 0.333. Use of general anesthesia declined (30.5 to 21.3%) while use of spinal anesthesia increased (14.9 to 28.7%). The median duration between decision to conduct CS and delivery was 70 minutes in 2011/12 and this duration increased to 110 minutes in the post intervention period (p = 0.05). The complication rates following CS increased significantly from 3 (1.7%) to 15 (8.6%), p = 0.009. Documentation of outcome of care improved in the following areas: delivery data (60.3 to 73%, p = 0.013), delivery time (60.9 to 71.8, p = 0.032), reporting of duration of 2^{nd} stage (58 to 74.1%, p = 0.009), newborn outcome reporting (58 to 74.1%, p < 0.001), mode of delivery (60.3 to 79.9%, p = 0.002), APGAR and weight documentation. Declines were noted in documenting NBU outcomes (10.3 to 6.3%, p = 0.03).

Conclusion: Quality of care declined with the introduction of free maternity services in Kenya. It is noted that the structure measures remained constant with increased patient loads. The processes of care were affected directly resulting in increases in PPH , uterine rupture and post caesarian section complications. While free maternity services was a strategy by the government to improve both fetal and maternal outcomes, absence of significant changes on patient outcomes following the intervention is a setback to the initiative. If free maternity care is to be effective in improving health, quality issues must be addressed..

Recommendations: There is need to increase the staffing numbers and essential resources in proportion to patient numbers. KNH should be set aside as a referral facility to handle patients needing tertiary care while patients requiring primary care to be managed in primary care facilities. Quality assurance programmes to be put in place to constantly monitor performance. A standard admission care continuity form to be derived for late obstetric haemorrhage. Late obstetric haemorrhage champions could be identified amongst HCW to advocate for good practice in management. Continuous medical education to keep all staff up to date with current management protocols for emergency obstetric care. Protocols for shock and APH should be displayed in KNH labour ward unit to constantly serve as a reminder for good practice

CHAPTER 1

1.1 INTRODUCTION AND STUDY BACKGROUND

Maternal hemorrhage is the leading cause of pregnancy–related mortality worldwide and is considered to be the most preventable cause of maternal mortality.[1] Improved quality of medical care is the most important factor for the prevention of mortality due to obstetric hemorrhage.[2] More than 90% of the potentially preventable morbidity and mortality due to hemorrhage is because of provider-related factors notably incomplete or inappropriate management.[3] A 2011 study found that delay in treatment or diagnosis, ineffective management and lack of proper preventive measures for hemorrhage led to preventable pregnancy-related death and extreme morbidity.[3] In many low resource settings, four primary delays contribute to higher rates of maternal morbidity and mortality by increasing the time from onset of the obstetric complication to receipt of care. One of these delays is delay at referral facilities in providing quality emergency treatment.[4]Despite appropriate guidelines, healthcare services worldwide often fail to deliver high-impact evidence-based care.[5]

Quality of care is a priority for the World Health Organization (WHO). Globally, the focus on quality (not just coverage) is essential because quality is critical for impact. Central to the future direction of WHO, and the ongoing post-2015 discussion, is Universal Health Coverage (UHC) and the message of equity of access for all.[6] Underpinning UHC is the need for quality of care and the unique role of facility-based maternity services. This brings an unprecedented opportunity to bring together UHC, quality of care and the unique role of facility-based services in providing universal access to improved maternal and newborn health.

In Kenya, maternal morbidity and mortality have remained undesirably high.[7]The majority of these adverse outcomes are due to direct causes compounded by lack of access to quality services and inadequate infrastructure with access to skilled delivery being a challenge.[7,8]Delivering in health centres with qualified personnel is a strategy known to reduce maternal mortality.[9]On June 1, 2013, the Government of Kenya took action to address this problems by initiating a policy of free maternity services in all public facilities, effective immediately.[10]

With quality being key to provision of health care services, it is important to measure the clinical effectiveness of healthcare interventions and their impact on patients. The first step in improving obstetric care quality is evaluation, to identify problems. The provision of quality of care must not become a simple mantra or abstract vision; it is a vitally important component in interventions that save lives. As implementation of the free maternity services policy continues in earnest, there is need to engage multiple stakeholders to ensure that quality of care remains high on the maternity agenda.

High quality health care ensures effective use of available resources and improves staff morale.[11] It is recognized that a reputation for providing quality care attracts women to use a facility providing maternal services.[11] This can only happen where careful planning, monitoring and supported motivated staff exist.[11]Critical human resource shortages, particularly in low-resource settings, require not only development of long-term strategies for increased production and retention of health workers but more importantly strengthening the productivity and performance of available workforce so as to get the best possible results and the highest impact with existing resources.[12]

In order to achieve this high goal of care it is important to know what is considered best practice according to the available scientific evidence and expert opinion both locally and generally. Guidelines on providing quality care are written using best practice, which are in turn used to develop specific standards. Services should aim to provide a standard of care that results in the best possible outcome given the available resources and the care given should not inhibit utilization of services.[13]

Kenyatta National Hospital offers free comprehensive maternity care services from booking, through antenatal period, delivery, (Including caesarian section) and covers routine investigations and drugs during admission for any medical or surgical complication.

This study examined the effect of implementation of the free maternity care policy on the quality of clinical care offered to women presenting with late obstetric haemorrhage at Kenyatta National Hospital. Key aspects of structure (staff, layout, equipment and supplies), process (actual care offered against standard of care) and outcomes (maternal/neonatal morbidity and mortality) of care with respect to late obstetric haemorrhage were selected and systematically evaluated against explicit standards of care criteria. With free maternity services as an intervention, periods before and after were compared for quality of care given.

1.2 LITERATURE REVIEW

Kenya has long suffered from high maternal morbidity and mortality rates. The most recent estimates set the maternal mortality rate at 488 deaths per 100,000 live births, well above the MDG target of 147 per 100,000 by 2015.[8]For every woman who dies in childbirth in Kenya, it is estimated that another 20-30 women suffer serious injury or disability due to complications during pregnancy or delivery.[14]

Haemorrhage during labour, delivery and postpartum accounts for one-third of all obstetric deaths in the world and is the leading cause of maternal deaths in Africa (34%) and Asia (31%).[2] Half of the maternal deaths from severe bleeding in the world occur in sub-Saharan Africa[15] and about 65% of these deaths occur in the postpartum period. In Kenya, antepartum haemorrhage accounts for 8%of maternal deaths and postpartum haemorrhage accounts for 26% of all maternal deaths.[16]Severe obstetric hemorrhage has been suggested as a complimentary indicator for assessing the quality of obstetric care in developed countries.[17]

Obstetric outcome is largely dependent on the quality of maternal and newborn healthcare. Evidence suggests that an important contributor to maternal mortality in low- and middle-income countries is sub-optimal quality of obstetrical care.[18-23] Numerous authors have demonstrated gaps in the provision of obstetric care to women treated in hospitals.[15, 24, 25] Improvements in quality of care have been shown to reduce in-hospital maternal mortality by as much as 50%.[24]

A number of needs assessments carried out by the Government of Kenya, including the Kenya Service Provision Assessment (KSPA), the Kenya Demographic Health Survey

(KDHS), those by the World Health Organisation (WHO) and UN Population Fund (UNFPA) and Population Council have identified the no use of standards and guidelines as a limiting factor in ensuring appropriate quality maternal care.[13]To achieve its aims the government has developed and implemented standards of care and adopted a quality improvement process to promote delivery of quality services (as highlighted in the Kenya Quality Model policy documents). However, as noted in the 3rd Kenya Health Sector Strategic Plan "very little work and implementation has been undertaken" to narrow the gap between quality medical services on paper and services in practice.[26]

Although health sector infrastructure has grown over the past decade,[27] The Kenya Health Sector Strategic & Investment Plan (2012-2018) estimates that current staff levels meet only 17% of minimum requirements needed for effective operation of the health system. Many women still live at a considerable distance from health facilities, cannot afford to pay fees for maternal services, and/or face other barriers to accessing quality care.[26]Free maternity services in all public facilities is an intervention aimed at addressing some of these issues. Several Kenyan women interviewed by the press have stated their fear that free maternity care may lead to an even further decline in quality and hinder the ability of the health service providers to respect their individual human rights.[28]If fee exemptions are to be effective in improving health, quality issues must be addressed.[29]A review of the literature on fee exemptions for healthcare services in 5 African countries showed that removing them generally has positive effects on utilization of services, but also highlighted issues of quality, workload, provider satisfaction, andimplementation.[30]

Quality of care is a problematic concept to measure, as it is a multifaceted construct. A common conceptualization of quality of care is to divide it into three components: structure, process and outcome.[31, 32] Structure is concerned with the adequacy of facilities and equipment, the qualifications of staff and the operation of programmes. Process considers the appropriateness of patient management and care. Patient outcomes can indicate good and bad quality of care in aggregate.[32]Of these three components, process is the most difficult to measure[31] but may be the best indicator of whether medicine is properly practised.[32]

Standardized criteria for evaluating quality of care was previously determined and then compared against patients' medical records to evaluate whether or not a minimal standard of care was met.[20,34] Patient data was aggregated, thereby preserving anonymity but also allowing for a global picture of whether a health structure met an agreed-upon standard of care.[33]

Explicit criteria used in this study was extracted from "Standards for maternal Care in Kenya" Manual[13] and Kenya National Guidelines for Quality Obstetrics and Perinatal Care.[35]

The standards and the relevant Structure, Process, Outcome criteria were as follows:

Every woman with obstetric bleeding in pregnancy assessed within 30 minutes and initial treatment commenced.

Table 1.1: Structure criteria for obstetric bleeding in pregnancy

Structure criteria

Basic structure specifically:
• Couch and light source
• BP machine
• Stethoscope
• Foetoscope
• Emergency tray with:
  o IV cannula and fluids/blood giving set
  o IV fluids
  o Specimen bottles
  o Catheter
  o Syringes and needles
• Blood and blood products
• Protocols for management of bleeding in pregnancy

Table 1.2: Process criteria for obstetric bleeding in pregnancy

Process criteria

For any woman presenting with bleeding in pregnancy:
• A detailed history is taken
• A complete physical examination is done
• The foetal condition is assessed
• A speculum examination is done to determine source of bleeding and status of cervix
• A digital vaginal examination is NOT performed unless placenta praevia is first excluded (e.g. by ultrasound examination)
• Blood loss is estimated from history and examination and recorded
• Initial treatment is commenced consisting of:
  o IV cannula inserted and IV fluids administered as indicated by vital signs: preferably crystalloids initially and not colloids
  o Blood transfused if IV fluids alone do not stabilize client's vital signs
• *A senior member of staff is actively involved in client management.*[3]
• Flow chart instructions are followed.
• A decision is made about continued management.
• Uterus evacuated as indicated depending on gestation if delivered, severity of bleeding, fetal condition, cause of bleeding as determined by ultrasound or EWA.
• All findings are accurately documented on the client's record.

[3]*This could be senior or experienced consultant, resident doctor*

Table 1.3: Outcome criteria for obstetric bleeding in pregnancy

Outcome criteria
• Shock is prevented or detected and treated early in all cases of bleeding in pregnancy • Reduced case fatality rate for bleeding in pregnancy • Reduction in maternal and fetal/perinatal loss due to Haemorrhage

The health care provider diagnoses and manages all cases of Post-partum Haemorrhage immediately

Table 1.4: Structure criteria for PPH

Structure criteria
• Clinical management guidelines of PPH • Flow chart for management of PPH • And the structure criteria for bleeding for standard 1 above

Table 1.5: Process criteria for PPH

Process criteria

• Flow chart displayed
• History is taken
• Physical examination done
• Blood loss estimated and clinical findings recorded
• PPH diagnosed and cause identified
• Supportive treatment started:
  ○ Uterine massage instituted immediately
  ○ Bladder emptied
  ○ 18-20 G IV cannula fixed
  ○ Group and Xmatch blood obtained
  ○ IV fluid infusion commenced
  ○ Oxytocics administered
  ○ Transfusion done as necessary
Senior member of staff actively involved immediately
• Definitive management instituted as per guideline and protocol

Table 1.6: Outcome criteria for PPH

Outcome criteria
• Reduced case fatality rate • Reduced case morbidity

Every woman with suspected retained products of conception (including retained placenta) undergoes uterine exploration and/or manual removal of placenta within 1 hour of diagnosis.

Table 1.7: Structure criteria for retained placenta

Structure criteria
• Basic protocol on management of retained products of conception

Table 1.8: Process criteria for retained placenta

Process criteria
• Protocol displayed • Bladder emptied • 18 -20 G cannula fixed • Grouped and X matched blood obtained • IV fluid infusion commenced *Senior member of staff actively involved immediately* • Uterine exploration done • Definitive management done as per protocol for clinical management is followed • Oxytocics administered • Observe for excessive lochia loss • Transfusion done if necessary • All care activities documented

Table 1.9: Outcome criteria for retained placenta

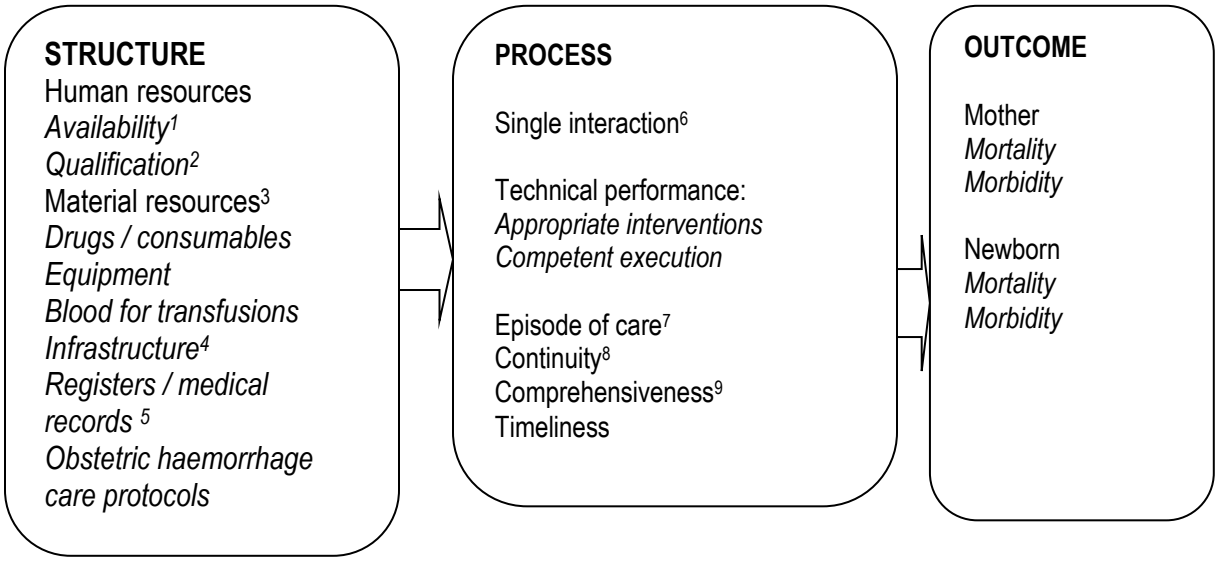
Outcome criteria
• Reduced case fatality rate • Reduced incidence of case complications • Reduced need for transfusion • Reduced hospital stay

The study used evidence from KNH to provide comparison data on quality of care to patients with late obstetric hemorrhage before and after free maternity care was rolled out. The information gathered was to be utilised at promoting improvement at a national and lower levels in order to inform resource allocation and advice key stakeholders on best practices moving forward.

1.3CONCEPTUAL FRAMEWORK

1.3.1 Narrative

The conceptual framework can be viewed as a constellation of factors as shown below. Quality of care has been defined explicitly as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge"[36].This conceptual framework follows the Donabedian model**,** a conceptual model on the causal pathway with structure, process and outcome criteria.[32]



1.Number of human resources on staff and on duty 24 hrs/day, 7 days/week. 2 *Qualification* is the fact, for example, of having a degree in medicine, midwifery, etc.; this is not to be confused with *competence*, which is expressed in the care process: qualification and competence are not automatically interrelated. 3 Should be available at all times, functional, and in sufficient quantity. 4 Including buildings and support services (sterilization, laundry, etc.). 5Should be in user-friendly formats and well maintained. 6 Between the caregiver and the patient. 7 All of the single interactions, and how they are interconnected, from the beginning to the end of the patient's treatment. This looks at how services are organized. 8 Within the health facility and, if the patient is referred, from

one facility to another. 9 All the services required are provided.

Figure 1.1: Conceptual model for the quality of obstetric care

1.3.2 Conceptual Framework(Schematic)

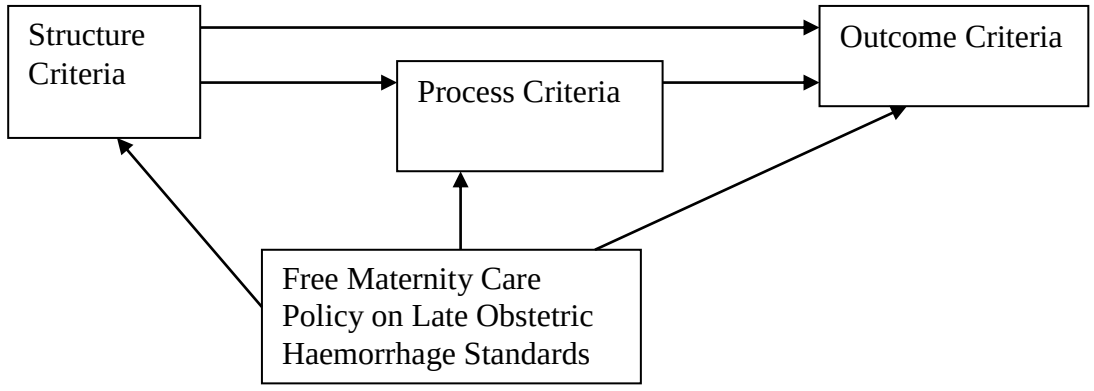


Figure 1.2: Conceptual framework

1.4 STUDY JUSTIFICATION

Obstetric hemorrhage is the leading cause of pregnancy – related mortality worldwide and is considered to be the most preventable cause of maternal mortality. There is need for immediate action to improve the capacity of the facilities to provide quality services to mothers especially in the Sub-Saharan Africa where majority of maternal mortalities occur.

In Kenya, only 62% of deliveries are attended by skilled attendants.[37]Skilled care averts majority of maternal/fetal morbidities and mortalities that may have occurred due to unskilled care. Free maternity services in Kenya is a step to increasing SBA utilization. With the free maternal care policy in place, it is cited that the burden on facility resources and health professionals increases without adequate increases in compensation and/or staffing which threatens quality of medical services and outcomes. Increased staff load and problems in handling patient load clearly indicate that emergency obstetric care will be suboptimal. For patients with obstetric haemorrhage, delayed care or poor monitoring arising from the overburdened resources is catastrophic. Improved quality of medical care is the most important factor for the prevention of mortality due to obstetric hemorrhage. More than 90% of the potentially preventable morbidity and mortality due to hemorrhage is because of provider-related factors notably incomplete or inappropriate management.

There had been no study carried out to evaluate specifically, the impact of free maternity health policy on quality of care offered to women with late obstetric hemorrhage in Kenya and Africa. This study sought to carry out an investigation into the

policy versus quality of care to women with the leading cause of maternal mortality and morbidity (obstetric hemorrhage), assess progress and promote improvement at a national level and therefore inform resource allocation and make recommendations to policy makers and key stakeholders on best practices moving forward for attainment of desired goals.

1.5 RESEARCH QUESTION

What is the difference in the quality of care offered to women presenting with late obstetric hemorrhage one year after (post- group) compared to one year before (pre-group) the free maternity care policy in Kenyatta National Hospital?

1.6 HYPOTHESIS

Null hypothesis (H_o)

There is no difference in the quality of maternity care offered to women presenting with late obstetric hemorrhage one year after compared to one year before the free maternity care policy in Kenyatta National Hospital.

1.7 OBJECTIVES

1.7.1 Broad objective

To compare the quality of care offered to women presenting with late obstetric hemorrhage one year before and one year after introduction of the free maternity care policy at Kenyatta National Hospital.

1.7.2 Specific objectives

Among women presenting with late obstetric hemorrhage one year after and one year before the free maternity care policy in Kenyatta National Hospital, compare:

1. The structure of care indicators such as human resource (number/qualifications) and material resource (drugs/consumables, blood for transfusions, equipment and infrastructure) available for management.
2. The processes of care indicators which includes appropriate intervention with competent execution i.e. care episode and continuity; comprehensiveness and timeliness of care offered against the standard of care.
3. Obstetric outcomes which includes maternal morbidity indicators such as blood transfusion rates, admissions to ICU, admissions for renal dialysis and increased hospital length of stay; perinatal/neonatal morbidity indicators such as poor APGAR scores and admissions to newborn ICU; maternal mortality; and perinatal/neonatal mortality.

1.8STUDY LIMITATIONS

The patient's medical record review used retrospective data, which had limitations related to quality and completeness. Data about provider adherence with standards of care were not independently verified. Direct observations of care offered to women with late obstetric haemorrhage might produce additional important insights into the quality of maternity care and should be considered in future research.

CHAPTER 2

METHODOLOGY AND MATERIALS

2.1 Study Design

This was a quasi-experimental study of the pre-post design. One hundred and seventy four patients presenting with late obstetric haemorrhage over 1 year before introduction of free maternity care policy (the control) were compared with an equal number of patients presenting with late obstetric haemorrhage for 1 year after introduction of the policy (the experimental group) through record review. The intervention of interest was free maternity services decreed by the president on 1st June, 2013. Data was collected on women with late obstetric hemorrhage managed in labour ward unit 1 year before (June 1st 2011 to May 31st 2012) the introduction of free maternity services (pre-) and 1 year after (June 1st 2014 to May 31st 2015) the intervention (post-). Both the pre - and post - groups were compared for structure, process and outcome indicators through review of records. Structure measures included the human resource e.g. number/qualifications of staff and material resources e.g. drugs/consumables, blood for transfusion, equipment and infrastructure available for care in the labour ward unit. Process measures included completeness of admission notes, adequacy of history taking, adequacy of clinical examination, appropriate intervention which is timely with competent execution against standards of care for late obstetric haemorrhage. Outcome measures included maternal morbidity e.g. blood transfusion rates, admissions to ICU, admissions for renal dialysis and increased hospital length of stay; maternal mortality; perinatal/neonatal morbidity e.g. poor APGAR scores and admissions to newborn ICU; and perinatal/neonatal mortality. The study design employed a quantitative approach

through the use of pre - coded questionnaires on patient's case records, pharmacy stock lists, blood transfusion unit inventories, procurement inventories and patient registers in labour ward and maternity theatre.

2.2 Study Site and Setting

The study was conducted at the Kenyatta National Hospital labor ward unit. The Kenyatta National Hospital is both the largest referral hospital in Kenya and the training site for the School of Medicine, University of Nairobi. It covers an area of 45.7 hectares and within it are College of Health Sciences (UON); the Kenya Medical Training College; Kenya Medical Research Institute; National Laboratory Service(Ministry of Health) and several other government agencies.

It has 50 wards, 22 out-patient clinics, 24 theatres (16 specialized) and Accident and Emergency Department. Out of the total bed capacity of 1882(1455 beds and 427 cots), 209 beds are for the private wing . Sometimes, the average bed occupancy rate goes up to 300%.In addition, at any given day the hospital hosts in its wards between 2500 to 3000 patients. On average the Hospital caters for over 80, 000 in-patients and over 500,000 out-patients annually. It has over 6000 staff.

There is a public labour ward unit occupying the ground floor of the KNH complex which has a 25 patient beds and 7 delivery couches. The unit hosts between 60-120 patients per day with a monthly average of about 1400. It has 45 nurses all trained in midwifery and advanced life support in obstetrics and emergency obstetric care. For every 24 hours there are 2 resident doctors , 2 specialist consultants and 20 nurses on duty in shifts. Services offered to mothers include fetal(including use of CTG when

indicated)and maternal monitoring, diagnostic ultrasound, normal vaginal deliveries, caesarian sections and first examination of the baby. Available in labour ward unit are standard operating procedures (SOPs) for management of PPH but none for APH.

2.3 Study Population

The study population constituted women presenting with late obstetric hemorrhage seeking care at the Kenyatta National Hospital labor ward unit for the periods(June 1st 2011 to May 31st 2012) and (June 1st 2014 to May 31st 2015).

2.4 Inclusion Criteria and Exclusion Criteria

2.4.1 Inclusion Criteria: Women who presented to KNH labour ward unit with late obstetric hemorrhage defined as either ante-partum, intra-partum or early postpartum hemorrhage within the periods specified above.

2.4.2 Exclusion Criteria: It excluded women with late obstetric hemorrhage who were seen for periods less than 24 hours and those who had other co-morbidities e.g. eclampsia, sepsis and cardiac disease among others.

2.5 Sampling Procedure

Records of women admitted with late obstetric hemorrhage within the periods specified were selected using systematic random sampling until a sample size of 174 women records was achieved for each of the periods.

2.6 Sample Size Determination

This was a quasi- experimental study in which the proportions of study participants who had the indicators for structure, process and outcome documented before and after the

introduction of free maternity care were compared. Therefore, sample size was estimated using the formula for comparing 2 proportions[38]

$$N = 2 \frac{(Z\alpha + Z\beta)^2 \bar{P}(1 - \bar{P})}{(P_1 - P_2)^2}$$

$Z\alpha = 1.96$ (at 95% Confidence level)

$Z\beta = 0.84$ (with 80% Power)

P_1 = Pre-intervention rate based on SIRCLE survey of February2013[39]=58%

P_2 = Post intervention rate=43%

$\bar{P}$ = Mean of $P_1 + P_2$= 50.5%

Where;

N- Sample size for each group

Z- Constant which depends on α and β

P_1 - estimated proportion of participants who had the quality of care indicators documented before introduction of free maternity services

P_2 - proportion of participants who had the quality of care indicators documented after introduction of free maternity that indicates an impact on quality of care

$\bar{P}$ - average between the proportions before and after introduction of free maternity services

Statistical significance (α) was set at 5% (0.05) and statistical power at 80% (β=0.84). Using standard tables, the value of Z at α=0.05 and β=0.2 is 7.9

P_1 was informed by results of the SIRCLE survey[39] in which the median percentage of participants who had the indicators documented was 58% (0.58)

Table 2.1: SIRCLE survey findings: Level of care in patients with obstetric haemorrhage

	Indicator	Percentage of time documented	
1	Blood pressure charting	80%	
2	Pulse rate charting	76%	
3	Respiratory rate charting	70%	
4	Catheter	39%	
5	Fluid input-output chart	25%	Median 58%

The effect size i.e. the smallest change in percentage of participants with documented indicators that will indicate a difference in quality of care was arbitrarily set at 15% (0.15).

Therefore P_2 will be 0.58 ± 0.15

Using these values, the sample size comes to 174 for each group.

With this sample size, the study had an 80% power of detecting a 20% change in percentage of participants with documented indicators at a 5% significance level.

$$N = 2 \frac{(1.96 + 0.84)^2 \times 0.505(1-0.505)}{(0.58 - 0.43)^2}$$

$$N = 2 \frac{(7.84) \times 0.505(0.495)}{0.15^2}$$

$$N = \frac{15.68 \times 0.249975}{0.0225}$$

$$N = 174$$

2.7 Data Variables

The dependent variables were variables for quality of maternal care e.g. Structure of care variables such as human resource (number/qualifications) and Material resource (drugs/consumables, blood for transfusions, equipment and infrastructure); process of care variables which included completeness of admission notes, adequacy of history taking, adequacy of clinical examination, appropriate intervention which was timely with competent execution against standards of care for late obstetric haemorrhage and obstetric outcome variables included maternal morbidity measures e.g. blood transfusion rates, admissions to ICU, admissions for renal dialysis and hospital length of stay; case fatality; perinatal/neonatal morbidity e.g. poor APGAR scores and admissions to newborn ICU; and perinatal/neonatal mortality. The independent variable was free maternity services. The study aimed to determine if introduction of free maternity services (the main intervention and hence exposure / explanatory / independent variable) had an effect on the quality of care (the main response / outcome / dependent variable).

2.8 Data Collection Instruments

This was structured mainly pre-coded questionnaires.

2.9 Data Collection Techniques

Data was collected on resource availability using structured pre-coded questionnaires on records from the health information department and labour ward unit. Process and outcome criteria were evaluated by examining individual inpatient case records for key indicators and data abstracted using the structured pre-coded questionnaires.

2.10 Data Management and Analysis

Once data collection was finalized , the completeness of filling of the questionnaire was ascertained .The data was entered into the computer and analyzed using Statistical Package for Social Sciences (SPSS) version 18. Basic frequencies were run and data scrutinized for cleaning and identification of outliers. Grouped data analysis were then done in accordance to the pre- and post- intervention measures for structure, process and outcomes. Comparisons were based on differences between structure, process and outcome indicators for the periods before and after free maternity care was rolled out and the data presented in tables and charts and. Appropriate tests of significance were applied (Chi-square), and a p value of <0.05 was considered statistically significant. Logistical regression analysis was used to determine the relative significance of the factors identified.

2.11 Ethical Considerations

The study proposal was subjected to review by the Kenyatta National Hospital/ University of Nairobi Ethical Review Committee (KNH/ UoN ERC) for approval before study procedures. Since the study did not involve actual patients but patient records, no harm befell the study subjects. At the same time the records were numbered and sampling using the numbers instead of names was used.

2.12 Quality Control

All aspects of this study were subject to strict quality control. Regular meetings to review emerging issues that were relevant to quality control were held between the PI, RAs and the records officers. There was a mid-term review of the application of the procedure of data collection and entry to ensure that the uniformity was maintained. There was strict surveillance of the data collection and there was strict observation of the ethical aspects of the study.

CHAPTER 3

RESULTS

3.1 Structure Measures

Two structural aspects of maternity care – resource availability and staffing – were evaluated in order to determine the quality of care in KNH before and after implementation of free maternity care.

3.1.1 Resource availability

A percentage availability score calculated by presenting the available items as a percentage of all required items showed that KNH had adequate structure to provide maternity care both before and after free maternity care policy implementation (Table 3.1). In theatre all three layout requirements were met. The layout of labor ward met 14 out of the 16 (87.5%) structure requirements with two items missing namely guidelines for management of shock and APH that were not displayed. All required non-pharmaceutical consumables and essential drugs were available in labor ward but warm water (an essential non-medical supply was unavailable). Except for a tiltable table, all remaining required resuscitation equipment were available in both labor ward and maternity theater.

3.1.2 Staffing

The number of client-staff contact episodes by medical officer interns allocated in the maternity unit declined in the post intervention period ($p < 0.001$). CO interns ($p = 0.001$) and consultants ($p = 0.006$) contact episodes however, increased. Nursing and resident obstetrician contact episodes remained constant before and after free maternity care introduction (Table 3.2).

Table 3.1: Inventory of essential resources required for provision of maternity care in KNH

	Item availability	**Missing items**
Layout	14/16(87.5%)	Guidelines for shock and APH
Equipment	7/8(87.5%)	Long gloves for manual removal of placenta
Non-pharmaceutical consumables supplies	12/12(100%)	-
Essential non-medical supplies	2/3(66.6%)	Warm water
Resuscitation drugs	6/6(100%)	-
Resuscitation equipment	17/18(94.4%)	Tiltable table
Labor ward theatre		
Layout	3/3(100%)	-
Equipment	11/13(84.6%)	Backup anesthetic machine, functional endoscope, functional tracheoscope
Resuscitation equipment	17/18(94.4%)	Tiltable table
Non-pharmaceutical consumable supplies	11/15(73.3%)	Linen, blades size 16/ 21, Vicryl suture 2
Essential drugs	26/32(81.3%)	PGE2, parenteral Diclofenac, oral ibuprofen, oral paracetamol, oral Diclofenac, oral tramadol, HSD
Intravenous fluids and plasma expanders	7/8 (87.5%)	HSD

Table 3.2: Contact episodes according to health worker cadre in KNH maternity unit

	Time period		
	2011/12	**2014/15**	**P**
	Median (IQR)	**Median (IQR)**	
Consultant specialists	0(0-1)	1(0-2)	0.006
Residents (obstetrics/ gynecology)	5(3-8)	5(3-8)	0.944
Medical officer (interns)	1(0-1)	0(0-1)	<0.001
Clinical officers (interns)	0(0-1)	0(0-1)	0.001
Nurses	22(15-33)	24(17-32)	0.453

3.2 Processes of Care

There was a significant change in the admission status of maternity clients in KNH following the introduction of free maternity care (p = 0.006), (table3.3). The patients who were referred from other facilities increased from 42 (24.1%) to 81 (46.6%) and this was accompanied by reductions in clinical attendees at the facility (19.5 to 9.8%) and attendees with an unrecorded admission status (41.1 to 30%)

Table 3.3: Characteristics of maternity clients in KNH before and after introduction of free maternity care

	Time period			
	2011/12	**2014/15**	**Chi square**	**P**
Patient classified as:				
High risk	1(0.6)	11(6.3)	1	0.315
Unrecorded	173(99.4)	163(93.7)		
ANC decision on mode of delivery				
Yes	12(6.9)	36(20.7)	0.3	0.575
No	162(93.1)	138(79.3)		
Admission status				
Referred from another facility	42(24.1)	81(46.6)	12.5	0.006
Clinic attendee at this hospital	34(19.5)	17(9.8)		
Walk in	26(14.9)	22(12.6)		
Unrecorded	72(41.4)	54(31.0)		
Blood group				
A	25(14.4)	34(19.5)	1.3	0.863
B	24(13.8)	26(14.9)		
AB	10(5.7)	9(5.2)		
O	61(35.1)	63(36.2)		
Unknown	54(31.0)	42(24.1)		
Rhesus type				
Positive	102(58.6)	118(67.8)	0.4	0.839
Negative	10(5.7)	10(5.7)		
Unknown	62(35.6)	46(26.4)		
ANC VDRL				
Positive	0(0.0)	2(1.1)	0.8	0.658
Negative	101(58.0)	113(64.9)		
Unknown	73(42.0)	59(33.9)		
HIV PMTCT or PITC				
Positive	19(10.9)	16(9.2)	0.7	0.882
Negative	102(58.6)	109(62.6)		
Refused testing	1(0.6)	0(0.0)		
Unknown	52(29.9)	49(28.2)		

3.2.1 Comprehensive history taking

There were significant changes in documentation of three out of the 15 areas of client history assessed for the period before and after free maternity care (Table 3.4). There were significant improvements in documenting patient severity classification ($p = 0.019$), expected date of delivery ($p = 0.038$) and ANC decision on mode of delivery ($p < 0.001$). Clients seen after the introduction of free maternity were three times more likely to have an ANC decision on mode of delivery documented OR = 3.48(95% CI 1.74-6.96), almost twice as likely to have an EDD reported OR = 1.68(95% CI 1.03-2.74) and also have a severity classification OR = 11.67(95% CI 1.49-91.44).

There were no changes in LMP documentation ($p = 0.109$), recording of age ($p =0.311$), gestation ($p = 0.812$), parity ($p = 0.559$), gravidity ($p = 0.364$), chief complaints ($p = 0.062$) or reporting of routine ANC investigations (Table 3.4).

Table 3.4: Documentation of comprehensive history taking before and after free maternity care

	Time period			
	2011/12	**2011/12**	**OR (95% CI)**	**P**
LMP	124(71.3)	137(78.7)	1.49(0.92-2.44)	0.109
Expected date of delivery	121(69.5)	138(79.3)	1.68(1.03-2.74)	0.038
Age recorded	164(94.3)	168(96.6)	1.71(0.61-4.81)	0.311
Patient classified	1(0.6)	11(6.3)	11.67(1.49-91.44)	0.019
ANC decision made on mode of delivery	12(6.9)	36(20.7)	3.48(1.74-6.96)	<0.001
Gestation age recorded	124(71.3)	126(72.4)	1.06(0.66-1.69)	0.812
Parity documented	169(97.1)	167(96.0)	0.71(0.22-2.27)	0.559
Gravidity documented	170(97.7)	167(96.0)	0.56(0.16-1.95)	0.364
Chief complain recorded	171(98.3)	164(94.3)	0.29(0.08-1.06)	0.062
Hemoglobin results available	107(61.5)	105(60.3)	0.95(0.62-1.47)	0.826
Blood group documented in records	120(69.0)	127(73.0)	1.22(0.76-1.93)	0.409
Rhesus grouping documented	112(64.4)	128(73.6)	1.54(0.97-2.44)	0.064
Results of VDRL documented	101(58.0)	115(66.1)	1.41(0.91-2.18)	0.122
HIV results documented	122(70.1)	125(71.8)	1.09(0.68-1.73)	0.723
Previous deliveries recorded	131(75.3)	131(75.3)	1.22(0.49-3.05)	0.667

3.2.2 Comprehensive physical examination

There were significant improvements in patient monitoring after the free maternity care implementation compared to the pre intervention period. Blood pressure measurement improved from 69 versus 90.8% ($p < 0.001$), pulse rate (60.9-88.5%, $p < 0.001$), respiratory rate (44.7 to 81%, $p < 0.001$), temperature (5.7 to 27%, $p < 0.001$). The areas that showed decline in performance following the intervention were fundal height reporting that declined by 49% (OR 0.51, 95% CI 0.30-0.87), recording of admission

character of FHR (OR 0.39, 0.25-0.60), speculum/ VE findings (OR 0.61, 0.39-0.97), and results of PMTCT or PITC HIV testing (OR 0.50, 0.32-0.79).The set of four vital measurements namely blood pressure, temperature, pulse and respiratory rate were 10 (5.7%) in the pre-intervention period increasing significantly to 47 (27%) in the post intervention period, OR 7.24 (95% CI 3.3-15.89 (p < 0.001). Comprehensive assessment of fundal height and fetal lie, presentation and head descent did not differ significantly in the pre and post intervention periods with 71.8 and 67.8% documentation for the two periods, respectively OR 0.83, 95% CI 0.52-1.31, p = 0.414 .

Table 3.5: Documentation of comprehensive physical examination before and after free maternity care

	Time period			
	2011/12	**2014/15**	**OR (95% CI)**	**P**
State of pallor	172(98.9)	167(96.0)	0.28(0.06-1.35)	0.113
Blood pressure measured	120(69.0)	158(90.8)	4.44(2.42-8.15)	<0.001
Pulse recorded	106(60.9)	154(88.5)	4.94(2.83-8.62)	<0.001
Respiratory rate assessed	83(47.7)	141(81.0)	4.68(2.89-7.58)	<0.001
Temperature recorded	10(5.7)	47(27.0)	6.07(2.95-12.48)	<0.001
BP, RR, pulse rate and temperature assessed*	8(4.6)	45(25.9)	7.24(3.30-15.89)	<0.001
Fundal height measured	147(84.5)	128(73.6)	0.51(0.30-0.87)	0.013
Admission fetal lie documented	144(82.8)	151(86.8)	1.37(0.76-2.47)	0.298
Admission fetal presentation recorded	143(82.2)	152(87.4)	1.50(0.83-2.71)	0.181
Admission descent of fetal head	142(81.6)	149(85.6)	1.34(0.76-2.38)	0.312
Fundal height, fetal lie, presentation and descent of fetal head*	125(71.8)	118(67.8)	0.83(0.52-1.31)	0.414
Admission character of fetal heart recorded	84(48.3)	46(26.4)	0.39(0.25-0.60)	<0.001
Fetal heart rate recorded	78(44.8)	89(51.1)	1.29(0.85-1.96)	0.238
Findings of VE/ speculum examination recorded	130(74.7)	112(64.4)	0.61(0.39-0.97)	0.037
Results of HIV test (PMTCT or PITC) available	126(72.4)	99(56.9)	0.50(0.32-0.79)	0.003
Documented admission diagnosis	174(100.0)	167(96.0)	1.00(1.00-1.00)	NA

The leading indication for C/S in the periods before and after implementation of free maternal care was APH (63.79% versus 43.68%), (Figure 3.1). However indication for C/S was not recorded among more patients in the period after free implementation of maternal care compared to before implementation of free care.

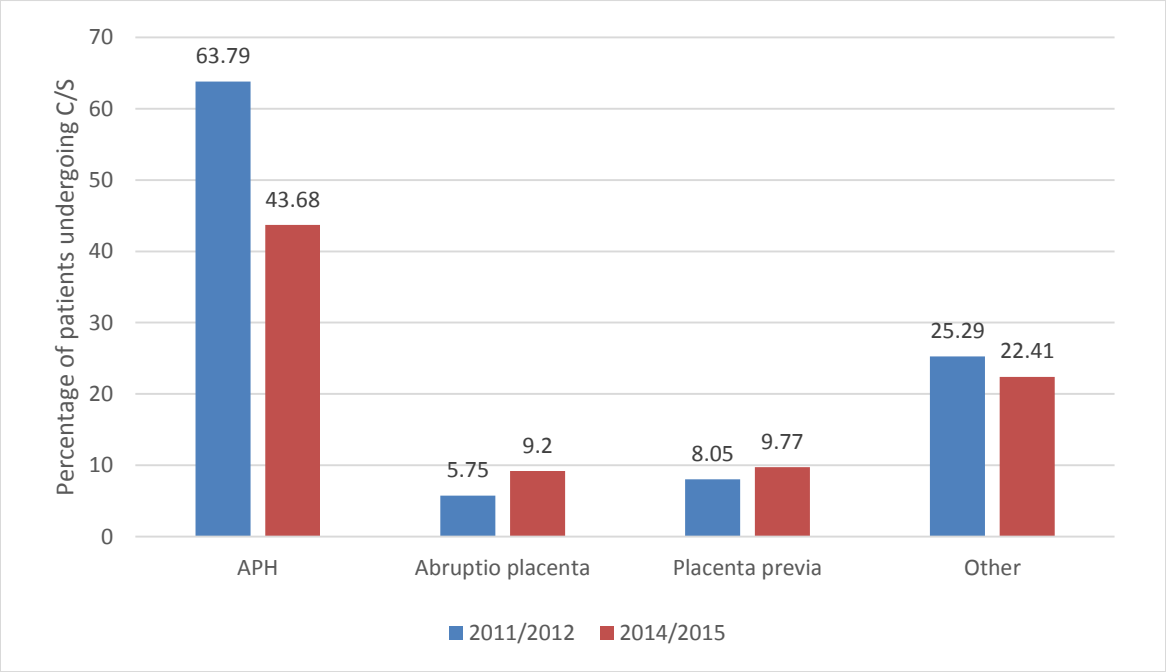


Figure 3.1: Indications of CS in maternity clients at KNH before and after implementing free maternal care

3.2.3 Acute emergency care

Obstetric hemorrhage attributable to placenta previa OR 2.03 [1.04 – 3.96], uterine rupture OR 9.44 [1.18-75.3] and PPH OR 11.93 [1.49-95.88] increased significantly in the post intervention period. Use of different mechanisms for achieving hemostasis differed significantly in the two time periods with uterotonics use as the primary mechanism increasing (8 to 38.5%, $p < 0.001$), as did uterine repair (4 to 10.3%, p =

0.027). The use of emergency C/S as a mode of controlling bleeding declined by 88%, OR 0.12(0.07-0.23).

Blood transfusion rates and use of blood products in the two periods did not change significantly OR 1.32(0.85-2.04), p = 0.219 (Table 3.6).

Table 3.6: Causes and management of obstetric hemorrhage

	Time period			
	2011/12	**2014/15**	**OR (95% CI)**	**P**
Cause of obstetric hemorrhage				
APH	69(39.7)	58(33.3)	0.76(0.49-1.18)	0.221
PPH	44(25.3)	57(32.8)	1.72(1.07-2.77)	0.026
Abruption placenta	11(6.3)	21(12.1)	2.03(0.95-4.36)	0.068
Placenta previa	15(8.6)	28(16.1)	2.03(1.04-3.96)	0.037
Ruptured uterus	1(0.6)	9(5.2)	9.44(1.18-75.30)	0.034
Other	7(4.0)	9(5.2)	1.30(0.47-3.58)	0.61
Hemostasis achieved through:				
Uterotonics	14(8.0)	67(38.5)	7.16(3.83-13.38)	<0.001
Repair of tears	7(4.0)	18(10.3)	2.75(1.12-6.77)	0.027
Laparatomy	0(0.0)	8(4.6)	NA	
Mechanical	1(0.6)	38(21.8)	48.34(6.55-356.55)	<0.001
Hysterectomy	1(0.6)	6(3.4)	6.18(0.74-51.87)	0.093
Not recorded	25(14.4)	21(12.1)	0.82(0.44-1.52)	0.527
Emergency CS	78(44.8)	16(9.2)	0.12(0.07-0.23)	<0.001
Others	41(23.6)	19(10.9)	0.40(0.22-0.72)	0.002
Blood transfusion/ use of blood products				
Yes	63(36.2)	72(41.4)	1.32(0.85-2.04)	0.219
No	106(60.9)	92(52.9)	1.00(ref)	
Oxygen given				
Yes	92(52.9)	52(29.9)	0.38(0.25-0.60)	<0.001
No	80(46.0)	118(67.8)	1.00(ref)	

Causes of obstetric hemorrhage were recorded for most patients before (98.3%) and after (94.8%) introduction of free maternity care (p = 0.093). With the exception of reporting of grouping and cross matching findings which declined from 131 (75.3%) to 107 (61.5%), p = 0.006, the remaining aspects of management for hemorrhage did not change significantly following implementation of free maternal care (Table 3.7).

Table 3.7: Management of hemorrhage before and after free maternal care

	Time period			
	2011/12	**2014/15**	**OR (95% CI)**	**P**
Cause of obstetric hemorrhage recorded	171(98.3)	165(94.8)	0.32(0.09-1.21)	0.093
IV access secured	137(78.7)	129(74.1)	0.77(0.47-1.27)	0.313
IV fluid given	132(75.9)	132(75.9)	1.00(0.61-1.63)	1.000
Blood grouping and cross matching available	131(75.3)	107(61.5)	0.52(0.33-0.83)	0.006
Patient catheterized	128(73.6)	116(66.7)	0.72(0.45-1.14)	0.161
Input output chart available	15(8.6)	19(10.9)	1.30(0.64-2.65)	0.471
BP charted	71(40.8)	80(46.0)	1.23(0.81-1.89)	0.331
Pulse chart available	71(40.8)	80(46.0)	1.23(0.81-1.89)	0.331
Respiratory chart available	71(40.8)	80(46.0)	1.23(0.81-1.89)	0.331
Temperature chart available	71(40.8)	80(46.0)	1.23(0.81-1.89)	0.331

3.2.4 Caesarean sections

The CS rate before free maternity was 43.1% compared to 48.3% in the post intervention period OR 1.23(0.81-1.88), p = 0.333 (Table 3.8). Use of general anesthesia declined following intervention (30.5 to 21.3%, p = 0.002) while use of spinal anesthesia increased (14.9 to 28.7%, p = 0.001). There were no significant changes in the use of different incision techniques with Pfannenstiel incisions predominating in both periods (32.8 versus 35.1%).

Table 3.8: CS rates and practices before and after free maternity care

	Time period			
	2011/12	**2014/15**	**OR (95% CI)**	**P**
CS done	75(43.1)	84(48.3)	1.23(0.81-1.88)	0.333
Type of anesthesia				
General	53(30.5)	37(21.3)	0.38(0.20-0.71)	0.002
Spinal	26(14.9)	50(28.7)	2.81(1.49-5.28)	0.001
Epidural	1(0.6)	0(0.0)	NA	NA
Incision type				
Sub-umbilical midline	10(5.7)	10(5.7)	0.94(0.37-2.41)	0.905
Extended sub-umbilical midline	7(4.0)	5(2.9)	0.66(0.20-2.17)	0.492
Pfannenstiel	57(32.8)	61(35.1)	1.07(0.53-2.16)	0.85
Unrecorded	4(2.3)	6(3.4)	1.46(0.40-5.39)	0.569

3.2.5 Timeliness of CS procedures and complications following CS

The median duration between decision to conduct CS and delivery was 70 minutes in 2011/12 and this duration increased to 110 minutes in the post intervention period (p = 0.05). The complication rates following CS increased significantly from 3 (1.7%) to 15 (8.6%), p = 0.009

Table 3.9: Timeliness of CS procedures and complications following CS

	Time period			
	2011/12	**2014/15**	**OR (95% CI)**	**P**
Median (IQR) duration form decision to undergo CS to procedure performance	70 min (30-142)	110 min (40 – 237)	NA	0.05
Complication following CS	3(1.7)	15(8.6)	5.50(1.53-19.80)	0.009

3.3 Outcomes of Care

3.3.1 Documentation of outcomes of maternity care

Documentation of outcome of care improved in the following areas: delivery data (60.3 to 73%, p = 0.013), delivery time (60.9 to 71.8, p = 0.032), reporting of duration of 2nd stage (58 to 74.1%, p = 0.009), newborn outcome reporting (58 to 74.1%, p < 0.001), mode of delivery (60.3 to 79.9%, p = 0.002), APGAR and weight documentation. Declines were noted in documenting NBU outcomes (10.3 to 6.3%, p = 0.03).

Table 3.10: Documentation of outcomes of maternity care before and after free maternity care implementation

	Time period			
	2011/12	**2014/15**	**OR (95% CI)**	**P**
Delivery data recorded	105(60.3)	127(73.0)	1.78(1.13-2.79)	0.013
Delivery time recorded	106(60.9)	125(71.8)	1.64(1.04-2.56)	0.032
Duration of 1st stage recorded	4(2.3)	10(5.7)	2.59(0.80-8.43)	0.113
Duration of 2nd stage recorded	104(59.8)	127(73.0)	1.82(1.16-2.86)	0.009
Mode of delivery documented	105(60.3)	139(79.9)	2.61(1.62-4.21)	<0.001
Newborn's outcome documented	101(58.0)	129(74.1)	2.07(1.32-3.26)	0.002
APGAR score documented	103(59.2)	126(72.4)	1.81(1.15-2.84)	0.01
Weight documented	108(62.1)	127(73.0)	1.65(1.05-2.60)	0.03
Resuscitation documented	35(20.1)	42(24.1)	1.26(0.76-2.10)	0.367
NBU outcome reported	18(10.3)	11(6.3)	0.20(0.05-0.79)	0.022
Blood loss estimated	128(73.6)	144(82.8)	1.72(1.03-2.90)	0.039
Maternal complication documented	5(2.9)	5(2.9)	1.10(0.31-3.88)	0.88
Hospital length of stay recorded	165(94.8)	164(94.3)	0.89(0.35-2.26)	0.814

3.3.2 Maternity outcomes

There was a significant increase in the number of documented C/S in 2014/15 (24.7%) compared to 2011/12 (11.5%), p = 0.037. The number of fresh still births also increased significantly in the post intervention period from 4(2.3%) to 17 (9.8%), p = 0.023. The maternal mortality rates during the study periods before and after free maternity care were not significantly different with 3(1.7%) deaths in the pre intervention period and 5(2.9%) deaths post intervention OR 1.69(0.40-7.17). The percentages of mothers with delivery related complications during each period was 2.9% (OR 1.10, 95% CI 0.31-3.88). Number of resuscitations, NBU admissions and total length of stay did not change significantly during the pre- and post-intervention period.

Table 3.11: Maternity outcomes in mothers with obstetric hemorrhage in KNH before and after implementation of free maternity care

	Time period			
	2011/12	**2014/15**	**OR (95% CI)**	**P**
Mode of delivery				
SVD	20(11.5)	43(24.7)	1.90(1.04-3.49)	0.037
Assisted vaginal	3(1.7)	2(1.1)	0.50(0.08-3.03)	0.448
C/S	82(47.1)	94(54.0)	0.59(0.33-1.05)	0.072
Baby's outcome				
Alive	92(52.9)	105(60.3)	0.43(0.19-0.97)	0.041
Fresh still birth	4(2.3)	17(9.8)	3.68(1.20-11.31)	0.023
Macerated still birth	5(2.9)	7(4.0)	1.10(0.34-3.58)	0.872
Baby resuscitated				
Yes	9(5.2)	5(2.9)	0.48(0.16-1.47)	0.199
No	26(14.9)	37(21.3)	1.41(0.78-2.53)	0.255
Unrecorded	73(42.0)	78(44.8)	0.89(0.51-1.54)	0.679
NBU admission				
Yes	22(12.6)	23(13.2)	0.83(0.43-1.59)	0.575
No	89(51.1)	109(62.6)	1.04(0.55-1.95)	0.912
Outcome of NBU admission				
Baby discharged alive and well	7(4.0)	3(1.7)	0.46(0.10-2.17)	0.328
Neonatal death	8(4.6)	7(4.0)	1.26(0.34-4.75)	0.729
Discharged with complications	2(1.1)	0(0.0)	NA	NA
Others	4(2.3)	6(3.4)	2.55(0.58-11.28)	0.217
Maternal complications recorded	5(2.9)	5(2.9)	1.10(0.31-3.88)	0.880
ICU admission	1(0.6)	4(2.3)	4.07(0.45-36.79)	0.211
Subtotal/ total hysterectomy	1(0.6)	4(2.3)	4.07(0.45-36.79)	0.211
Dialysis/ referral for dialysis	0(0.0)	1(0.6)	NA	NA
Cardiopulmonary resuscitation	0(0.0)	1(0.6)	NA	NA
Maternal mortality	3(1.7)	5(2.9)	1.69(0.40-7.17)	0.479
Total length of stay				
<72hours	64(36.8)	59(33.9)	0.90(0.57-1.40)	0.628
72-120 hours	59(33.9)	57(32.8)	0.97(0.61-1.52)	0.881
>120 hours	42(24.1)	48(27.6)	1.22(0.75-1.98)	0.419

CHAPTER 4

DISCUSSION

The purpose of this study was to determine impact of free maternity services on quality of health care offered to women presenting with obstetric haemorrhage where the Donabedian Model was used following the structure, process and outcome criteria which is in agreement with the standards for maternal care in Kenya.

While assessing structure it was noted that resource availability using the percentage availability score remained the same for the two periods, this could reflect a strain on the financial resources given the associated increases in patient numbers noted after the introduction of the free maternity care policy. Essential items for emergency obstetric care such us long gloves for manual removal of placenta and displayed protocols for shock and APH were missing for the both the control and intervention period which is a setback to management of emergency obstetric care.

Staffing was noted to have remained the same despite the increased patient numbers. This has been proven in other studies to reduce the quality of maternity care[30, 12] because of the increased workload which overwhelms the available resources and staff.

The admission status of maternity clients post intervention period changed significantly where patients referred from other facilities increased .This signifies an increased number of patients requiring tertiary level emergency obstetric care from low level facilities where there could be overwhelming patient loads resulting in increased patient complications possibly due to strained resources resulting in incomplete or in inappropriate patient monitoring and management. Significant reductions in antenatal

clinic attendees admitted with late obstetric haemorrhage is a pointer to the importance of antenatal care for all pregnant women. It is assumed that the clinic attendees have the advantage of having better education for danger signs to watch for in pregnancy, those at risk are more likely to be identified earlier and managed appropriately thus prevention of obstetric emergencies.[24]

Despite significant increases in documenting patient severity classification, EDD and ANC decision on mode of delivery, generally in both periods the patient classification as either high risk or low risk was poor, very few clients had ANC decision on mode of delivery and there was a significant number of patients that did not have an ANC profile investigations. This findings are worrisome because it could reflect lack of documentation or may demonstrate a gap between knowledge, attitude and clinician's behaviour in implementing proven clinical practice[24,25]. This could also mean with or without free maternity care women are still seeking skilled care quite late[4].

Overall patient monitoring using vital signs improved which contradicts studies done elsewhere i.e. in Ghana, 2007[29],it was found that there was worsening of patient monitoring with elimination of user fees. However, for both periods care still remained suboptimal. Physical examination such as state of pallor is noted to have worsened. Performance declined post intervention on basic obstetric examination of Fundal height, admission character of FHR and speculum/VE findings. It is possible that with the increased patient numbers the basic general examination was done and a detailed general and obstetric examination was difficult to attain.

After implementation of free maternity health care, there was significant increases for obstetric hemorrhage attributable to placenta previa, uterine rupture and PPH. This could be due to late patient presentation, incomplete initial care episode, lack of comprehensive care, poor continuity of care attributable to increased patient loads [3,13,32,35]lack of or suboptimal ANC care or due to overwhelming patient numbers resulting in delayed timely care[4]. Uterotonics use as primary mechanisms for achieving hemostasis increased attributable to the increased numbers of PPH and uterine rapture.

The caesarian section(C/S) rate increased significantly as did the complications following C/S. This may be explained by the increased number of patients with referrals doubling the pre intervention period. The increased C/S rates explains the worsening timeliness for C/S where the structure remained the same before and after the intervention.

Documentation of outcomes of care generally improved except for documentation of NBU outcomes where declines were noted. This is may be due to poor or lack of follow-up of infants admitted to NBU by the labour ward team.

The increases in numbers of documented C/S may be due to the increased patient numbers referred from other facilities which may lack facilities to allow for surgery or this may also be because of poor patient monitoring resulting to increased complications for both mother and fetus increasing the likelihood for C/S. The number of FSBs also increased significantly in the post intervention period clearly because of poor detailed obstetric examination and poor feto-maternal monitoring attributable to the strained resources.

There was no significant changes on maternal mortalities, occurrence of maternal complications, NBU admission rates, NBU outcomes and the total length of hospital stay. These finding was different from what may be expected going with the knowledge that increased patient numbers is associated with worsening of the above listed factors. It is possible that KNH being a national referral centre is more equipped in handling patients requiring emergency care and therefore curtailing catastrophic outcomes.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

As per the Standardized criteria for evaluating quality of care as previously determined, generally the quality of care declined with the introduction of free maternity services in Kenya. It is noted that the structure measures remained constant with increased patient loads. The processes of care were affected directly resulting in increases in PPH ,uterine rupture and post caesarian section complications. While free maternity services was a strategy by the government to improve both fetal and maternal outcomes, absence of significant changes on patient outcomes following the intervention is a setback to the initiative. If free maternity care is to be effective in improving health, quality issues such as staff numbers and essential resources commensurate to the increased workload must be addressed.

5.2 RECOMMENDATIONS

To enhance better outcomes it is necessary to increase the staffing numbers and essential resources in proportion to patient numbers.

Kenyatta National Hospital should be set aside as a referral facility to handle patients needing tertiary care while patients requiring primary care to be managed in primary care facilities. This will improve care processes and in turn quality of care

Quality assurance programmes to be put in place to constantly monitor performance

A standard admission care continuity form to be derived for late obstetric haemorrhage which outlines the expected standard of care to eliminate errors of omission in the care process.

Protocols for shock and APH should be displayed in KNH labour ward unit to constantly serve as a reminder for good practice.

More studies assessing quality of care as improvements are made to identify gaps that may require solutions and how to implement the solutions.

Regular feedback to the Ministry of Health outlining challenges/obstacles to achieving better quality health care while managing late obstetric haemorrhage and possible solutions.

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APPENDIX A: DATA COLLECTION TOOLS

1. MATERNITY STRUCTURE TOOL

Date				
Survey number				
QoC Evaluator				
LAYOUT, EQUIPMENT AND SUPPLIES			**COMMENT**	
LABOUR WARD				
Layout				
1.1	ANC cards/file retrieval in labour ward			
a.	Are ANC cards/files kept in the ANC	Y □	N □	
b.	If Yes is there a system to retrieve ANC cards/files in labour ward during the day	Y □	N □	
c.	If Yes is there a system to retrieve ANC cards/files in labour ward at night	Y □	N □	
1.2	Is there a designated admission room?	Y □	N □	
1.3	Is there a designated 1st stage room?	Y □	N □	
1.4	Is there a designated 2nd stage and delivery room?	Y □	N □	
1.5	Is there a designated 4th stage (recovery) room?	Y □	N □	
1.6	Is there a designated acute room?	Y □	N □	
1.7	Maternity theatre			
a.	Is there a designated maternity theatre?	Y □	N □	
b.	If No is there quick access to the general theatre?	Y □	N □	
c.	If yes approximately how many minutes' walk from labour ward _____minutes *(record actual time it takes to walk to theatre from labour ward in minutes)*			
1.8	Are the following protocols/ guidelines/job aids available and displayed on wall?			

a.	Shock	Y □	N □	
b.	Post-partum hemorrhage	Y □	N □	
c.	Antepartum hemorrhage	Y □	N □	
d.	AMSTL (Active Management of third stage of labour)	Y □	N □	
e.	New Born resuscitation	Y □	N □	
f.	APGAR score chart	Y □	N □	
Equipment				
2.1	Is there a Blood pressure machine with adult cuffs	Y □	N □	
2.2	Is there a stethoscope?	Y □	N □	
2.3	Is there a suction machine?	Y □	N □	
2.4	Are there drip stands? If yes Number available _____	Y □	N □	
2.5	Are there speculums? If yes Number available _____	Y □	N □	
2.6	Are there examination/ procedure light? If yes Number available _____	Y □	N □	
2.7	Are there standard delivery Beds? If yes Number available _____	Y □	N □	
2.8	Are there long gloves (gynecological examination gloves) for manual removal of placenta?	Y □	N □	
Non-Pharmaceuticals consumable supplies				
3.1	Are there intravenous fluid giving sets	Y □	N □	
3.2	Are there blood transfusion giving sets?	Y □	N □	
3.3	Are the following suction tubes/catheters available?			
a.	12 FG	Y □	N □	
b.	14 FG	Y □	N □	

c.	16 FG	Y □	N □	
d.	18 FG	Y □	N □	
3.4	Is cotton wool available?	Y □	N □	
3.5	Is gauze available?	Y □	N □	
3.6	Is strapping available?	Y □	N □	
3.7	Are sterile vaginal packs available?	Y □	N □	
3.8	Are sterile delivery packs available?	Y □	N □	
3.9	Is oxygen supply available?	Y □	N □	
Essential non-medical supplies				
4.1	Are maternity pads available?	Y □	N □	
4.2	Is warm water for bathing available?	Y □	N □	
4.3	Are warm drinks (tea, cocoa, porridge, soup) available?	Y □	N □	
Resuscitation drugs				
5.1	Parenteral Chlorpheniramine	Y □	N □	
5.2	Parenteral hydrocortisol	Y □	N □	
5.3	Adrenaline for injection 1;1000	Y □	N □	
5.4	Diazepam IV	Y □	N □	
5.5	Sodium bicarbonate	Y □	N □	
5.6	Furosemide IV	Y □	N □	
Resuscitation equipment				
6.1	Resuscitation tray with equipment and drugs	Y □	N □	
6.2	Endotracheal tube cuffed Tick all available □ No 7 □ No 6.5	Y □	N □	
6.3	Laryngoscope	Y □	N □	
6.4	Suction tubes	Y □	N □	
6.5	Resuscitator bag valve and mask (adult)	Y □	N □	
6.6	Airways	Y □	N □	
6.7	Needles	Y □	N □	

6.8	Branulas	Y □	N □	
6.9	Strapping	Y □	N □	
6.10	Cotton	Y □	N □	
6.11	Gauze packs	Y □	N □	
6.12	Intravenous fluids	Y □	N □	
6.13	Specimen bottles	Y □	N □	
6.14	Urethral catheters	Y □	N □	
6.15	Oxytocin	Y □	N □	
6.16	Misoprostol	Y □	N □	
6.17	Oxygen	Y □	N □	
6.18	Tiltable table	Y □	N □	
Labour ward Theatre (theatre where C/S is performed)				
Layout				
7.1	Is there a back-up power supply?	Y □	N □	
7.2	Is there a designated scrubbing area?	Y □	N □	
7.3	Is there a designated recovery area?	Y □	N □	
Equipment				
8.1	Is there a standard operating table?	Y □	N □	
8.2	Are the operating lamps/lights functional? If yes All □ Some □	Y □	N □	
8.3	Is there a functional anesthetic machine?	Y □	N □	
8.4	Is there a back-up anesthetic machine?	Y □	N □	
8.5	Is there a functional diathermy machine?	Y □	N □	
8.6	Is there a functional cardio-pulmonary monitor?	Y □	N □	
8.7	Is there a functional endoscope?	Y □	N □	
8.8	Are there functional endotracheal tubes?	Y □	N □	
8.9	Are there functional air ways?	Y □	N □	
8.10	Are there functional tracheoscopes	Y □	N □	

8.11	Is there a functional pulse oximeter?	Y □	N □	
8.12	Is there oxygen supply?	Y □	N □	
8.13	Is the theatre sterile supply unit (TSSU) functional?	Y □	N □	
Non-Pharmaceuticals consumable supplies				
9.1	Are the following theatre linen and foot wear available?			
a.	Theatre clothes (scrubs)	Y □	N □	
b.	Linen	Y □	N □	
c.	Boots	Y □	N □	
9.2	Are the following complete operation sets available?			
a.	Caesarian section	Y □	N □	
b.	General	Y □	N □	
c.	Examination under anesthesia	Y □	N □	
d.	Hysterectomy	Y □	N □	
9.3	Are there spinal needles?	Y □	N □	
9.4	Are the following surgical blades available?			
a.	Size 16	Y □	N □	
b.	Size 21	Y □	N □	
9.5	Are the following Vicryl sutures available?			
a.	2	Y □	N □	
b.	1	Y □	N □	
c.	0	Y □	N □	
d.	2/0	Y □	N □	
e.	3/0	Y □	N □	
Essential drugs				
10.1	Are the following general pre-operative anesthetic drugs available?			
a.	Atropine sulphate	Y □	N □	
b.	Diazepam	Y □	N □	
c.	Promethazine	Y □	N □	
d.	Morphine	Y □	N □	

e.	Hyoscine hydrobromide	Y □	N □	
10.2	Are the following general induction anesthetic drugs available?			
a.	Suxamethonium	Y □	N □	
b.	Thiopentone Sodium	Y □	N □	
c.	Ketamine	Y □	N □	
10.3	Are the following general maintenance anesthetic drugs available?			
a.	Propofol	Y □	N □	
b.	Pancuronium	Y □	N □	
c.	Halothane	Y □	N □	
d.	Nitrous Oxide	Y □	N □	
10.4	Is neostigmine reversal anesthetic drug available?	Y □	N □	
10.5	Are the following drugs for spinal/epidural anesthesia available?			
a.	Macaine	Y □	N □	
b.	Bupivacaine	Y □	N □	
10.6	Are the following drugs for local anesthesia available?			
a.	Lignocaine	Y □	N □	
b.	Lignocaine and Adrenaline	Y □	N □	
10.7	Are the following uterotonics available?			
a.	Oxytocin	Y □	N □	
b.	Ergometrin	Y □	N □	
c.	Misoprostol	Y □	N □	
d.	Prostaglandins E2	Y □	N □	
e.	Prostaglandin F2α	Y □	N □	
10.8	Are the following analgesics/anti-pyretics available?			
a.	Parenteral Diclofenac	Y □	N □	
b.	Oral ibuprofen	Y □	N □	
c.	Oral paracetamol	Y □	N □	
d.	Oral Diclofenac	Y □	N □	
e.	Per-rectal Diclofenac	Y □	N □	
f.	Parenteral tramadol	Y □	N □	

g.	Oral Tramadol	Y □	N □	
h.	Pethidine	Y □	N □	
i.	Morphine	Y □	N □	
10.9	Is parenteral dexamethasone available?	Y □	N □	
10.10	Are the following intravenous fluids and plasma expanders available?			
a.	50% dextrose	Y □	N □	
b.	10% dextrose	Y □	N □	
c.	5% dextrose	Y □	N □	
d.	Normal saline	Y □	N □	
e.	Ringers lactate	Y □	N □	
f.	Hartmann's solution	Y □	N □	
g.	Half Strength Darrow's	Y □	N □	
h.	Dextran 70	Y □	N □	

Note: Complete a new form for each case record		
Survey unique identifier:	Date:	
Human resource number and qualification (Complete this section for all)		
10.11	**Count number of reviews done**	
	Consultant specialists	Number _____
	Residents in Obstetrics and Gynaecology	Number _____
	Medical officer interns	Number _____
	Clinical officer interns	Number _____
	Nurses	Number _____

2 MATERNITY PROCESS TOOL

Note: Complete a new form for each case record	
BIODATA	
Survey unique identifier:	Date:
SECTION A): COMPLETENESS OF ADMISSION NOTES **(Complete this section for all)**	
1.0	**Are the following recorded in the history section of admission notes?**
a.	Date of admission _____ □ Unrecorded *(write actual date)*
b.	Age _____ □ Unrecorded *(write actual age)*
c.	Hospital number □Yes □No If yes write number_____
d.	Patient classified as □ Low risk □ High risk □Unrecorded
e.	Was an antenatal decision made on mode of delivery? □Yes □No If yes what was the planned mode of delivery? □ Vaginal (normal) □Elective C/S □Vaginal birth after caesarian (VBAC) section /trial of scar
f.	Indication of admission status □ Referred from another facility □ Clinic attendant at this hospital □ Walk in □ Unrecorded □ Others
g.	Last menstrual period (LMP) _____ □ Unrecorded *(write date of actual LMP)*
h.	Expected date of delivery _____ □ Unrecorded *(write actual expected date of delivery)*
i.	Gestation by date in weeks _____ □ Unrecorded *(write actual gestation by date in completed weeks)*

j.	Parity live births _____ Parity abortions_____ □ Unrecorded
k.	Gravida _____ □ Unrecorded *(write actual Gravida) (Gravida is more than Parity)*
l.	Presenting complaint or Chief complaint □Yes □No
m.	Antenatal Hemoglobin (HB) level _____mg/dl or_____ g/l □ Unrecorded *(write actual HB)*
n.	Antenatal PCV _____ % □ Unrecorded
o.	*(write actual PCV)*
p.	Antenatal Blood group □ A □ B □ AB □ O □ Unknown
q.	Antenatal Rhesus type □ Positive □ Negative □ Unknown
r.	Antenatal VDRL □ Positive □ Negative □ Unknown
s.	Antenatal HIV test (PMTCT or PITC) result □ Positive □ Negative □ Refused testing □ Unknown
t.	Is there a list of previous deliveries? □Yes □No (not applicable for primigravidas or Para 0+0)
1.1	**Are the following recorded in the physical exam section of admission notes?**
a.	Admission State of pallor □Yes □No
b.	Admission Blood pressure Systolic _____Diastolic _____ □ Unrecorded *(write actual blood pressure)*
c.	Admission pulse _____ □ Unrecorded *(write actual pulse)*
d.	Admission Respiratory rate _____ □ Unrecorded *(write actual respiration)*
e.	Admission temperature _____ ^{o}C □ Unrecorded *(write actual temperature)*

f.	Admission Fundal height _____ □ Unrecorded *(write actual fundal height)*
g.	Admission Fetal lie □Yes □No
h.	Admission Presentation □Yes □No
i	Admission Descent of the fetal head □Yes □No
j.	Admission Fetal heart rate character □ Fetal heart rate heard and regular (FHHR) □ Fetal Heart rate heard and irregular □ Fetal Heart rate not heard □ Not recorded Actual fetal heart rate ———————————— Not recorded (this part missing)
k.	Admission Vaginal exam findings ; the following recorded □ External genitalia and perineum □ Cervical dilatation □ Membranes □ Caput □ Moulding □ Liquor □ Cord □ Other If Vaginal exam was not done proceed to (l) below
l.	Admission speculum exam findings ; the following recorded □ External genitalia and perineum □ Vagina inspection findings □ Posterior fornix inspection findings □ Cervical inspection findings
m	HIV test (PMTCT or PITC) result at discharge (peruse through the notes including discharge summary) □ Positive □ Negative □ Refused testing □ Unknown

1.2	**What is the diagnosis on admission:** Diagnosis 1_____ Diagnosis 2_____ Diagnosis 3_____

□ Antepartum Hemorrhage
□ Abruptio placenta
□ Placenta Praevia
□ Ruptured uterus
□ Postpartum haemorrhage
□ Other *(list)*
□No diagnosis recorded

SECTION B: OBSTETRIC HEMORRHAGE
(APH ,PPH AND RUPTURED UTERUS)

2.0	What is the cause of obstetric hemorrhage? □ APH □ PPH □ Ruptured Uterus □ Other _____
2.1	**From the case record is there evidence of the following?**
a.	Intravenous access secured (IV cannula fixed or cut down) □Yes □No
b.	Intravenous fluids given □Yes □No How many liters given as start dose (bolus) _____liters How many liters first 24 hours from admission _____liters
c.	Grouping and cross match done □Yes □No
d.	Patient catheterized □Yes □No
e.	Input output chart kept (urine output monitoring) □Yes □No
f.	Blood pressure charting done □Yes □No If yes Initial Blood pressure record Systolic _____Diastolic _____ How many times was blood pressure recorded first 24 hours from admission _____

g.	Pulse rate charting done □Yes □No If yes Initial pulse _____ How many times was pulse recorded first 24 hours from admission _____
h.	Respiration charting done □Yes □No If yes Initial respiration rate _____ How many times was respiration rate recorded first 24 hours from admission _____
i.	Temperature taken □Yes □No If yes Initial temperature _____ How many times was temperature recorded first 24 hours from admission_____
j.	Oxygen given □Yes □No
k.	Blood transfusion/use of blood products □Yes □No (actually given not ordered) If yes how many pints first 24 hours from admission_____
l.	How was homeostasis achieved ***Tick all that apply*** □ Uterotonics □ Repair of tears □ Laparatomy □ Mechanical □ Hysterectomy □ Unrecorded □ Other

SECTION C: EMERGENCY CAESARIAN SECTION

3.0	What was the indication of caesarian section in this case record Indication 1 Indication 2 Indication 3 Other

□ Antepartum Hemorrhage □ Abruptio placenta □ Placenta Praevia □ Ruptured uterus □ Other *(list)*		
3.1	What was the date and time of decision to have the patient undergo cesarean section? Date _____Time _____	
3.2	What was the date and time when cesarean section was started? Date _____Time _____	
3.3	What was the type of anesthesia used in this case (tick all that apply): □ General □ Spinal □ Epidural □ Other	
3.4	What incision was used to enter abdominal cavity? □ Sub-umbilical midline □ Extended sub-umbilical midline □ Pfannenstiel □ Unrecorded	
3.5	Are there immediate cesarean section associated maternal complications □ Yes □No ***If yes tick all that apply***	
□ Extension of intrauterine incision □Uterine lacerations □Bladder injury □Ureteral injury □Gastrointestinal tract injury □ Shock		□Uterine atony and primary PPH □Caesarian hysterectomy □ Anesthetic complications □Thromboembolic disorders /disseminated intravascular coagulopathy (DIC) □Other

3 MATERNITY OUTCOME TOOL

Note: Complete a new form for each case record	
BIODATA	
Survey unique identifier	**Date:**
1.0	Date of delivery _____ □ Unrecorded
1.1	Time of delivery _____ □ Unrecorded
1.2	Duration of 1st stage of labour _____Hours _____ Minutes □ Unrecorded
1.3	Duration of 2nd stage of labour _____Hours _____Minutes □Progressed to C/S □Unrecorded
1.4	Mode of delivery: □ SVD □ Assisted vaginal □ C/S □Unrecorded
1.5	Baby: □ Alive □ Fresh Still birth □ Macerated Still birth □ Unrecorded If multiple gestation add a baby "add a baby" should reflect in 1.4, 1.5, 1.6, 1.7, 1.8, 1.9
1.6	APGAR score at 5 minutes _____ □ Unrecorded
1.7	Baby's weight _____ □ Unrecorded
1.8	Baby Resuscitated: □ Yes □No □Unrecorded
1.9	Did this baby get admitted to NBU □ Yes □ No If 'yes' what is the final outcome (Check NBU notes and mothers file including discharge summary); □Baby discharged alive and well □Neonatal death □Discharged with complications □Other
2.0	Estimated blood loss _____ml □ Unrecorded

2.1	Are there any maternal complications recorded □ Yes □No (check the whole file for this admission) If yes tick all that apply □ Admitted to ICU/referred to ICU □ Underwent subtotal/total hysterectomy □ Underwent dialysis/Referred for dialysis □ Cardiopulmonary resuscitation □ Coma/unconsciousness □ Maternal death
2.2	Total length of hospital stay □< 72 hours □72-120 hours □> 120 hours

APPENDIX B : KNH- UoN ERC proposal Approval document

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Ref: KNH-ERC/A/449

6th November 2015

Dr.Diana Marion
H58/64060/2013
Dept. of Obs/Gynae
School of Medicine
University of Nairobi

Dear Dr. Marion

Research proposal: Impact of Free Maternity Health Services on Quality of Care to Women presenting with late obstetric haemorrhage at Kenyatta National Hospital (P587/09/2015)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH-UoN ERC) has reviewed and approved your above proposal. The approval periods are 6th November 2015 – 5th November 2016.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH-UoN ERC before implementation.
c) Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

Protect to Discover

For more details consult the KNH/UoN ERC website **http://www.erc.uonbi.ac.ke**

Yours sincerely,

PROF. M.L . CHINDIA
SECRETARY, KNH-UoN ERC

c.c. The Principal, College of Health Sciences, UoN
The Deputy Director CS, KNH
The Chairperson, KNH- UoN ERC
The Assistant Director, Health Information, KNH
The Dean, School of Medicine,UoN
The Chair, Dept.of Obs/Gynae,UoN
Supervisors: Prof.Joseph G. Karanja, Dr.John Kinuthia