THE MATERNAL AND FETAL OUTCOMES AMONG WOMEN WITH OBSTETRIC EMERGENCIES REFERRED TO THE KENYATTA NATIONAL HOSPITAL, NAIROBI, KENYA

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Mr. Robinson Njoroge, the statistician who assisted me in the data analysis.

DECLARATION

This is to certify this thesis submitted is my original work and has never been presented for a degree in any other University or in any other forum. References to others work has clearly been indicated.

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Abbreviations

No	Number
Km	kilometre
UTI	Urinary Tract Infection
CPD	CephaloPelvic Disproportion
APGAR	Activity/Tone; Pulse/Heart rate; Grimace; Appearance/Colour; Respiration
NBU	New Born Unit
CD	Compact Disc
SD	Standard Deviation
CBD	Central Business District
PGH	Provincial General Hospital
KNH	Kenyatta National Hospital
MDG	Millennium Development Goal
KDHS	Kenya Demographic and Health Survey
WHO	World Health Organization
UN	United Nations
UNICEF	United Nations Children's Fund
UNFPA	United Nations Population Fund
ICD	International Classification of Diseases
ANC	Antenatal Care
IQR	Interquartile Range
APH	Ante-Partum Haemorrhage
PPH	Post-Partum Haemorrhage
PPROM	Preterm Premature Rupture of Membranes
SPSS	Statistical Package for Social Scientists

Definition of Terms

Morbidity: A term used in statistical analyses to indicate sickness or poor health, the rate of sickness and ill health, or prevalence of disease in a particular area.

Maternal mortality: (ICD-10) Death of a woman while pregnant or within 42 days of termination of pregnancy irrespective of 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: The number of maternal deaths in a population per 100,000 live births. It is calculated as the number of maternal deaths during a given time period per 100,000 live births during same time period.

Maternal Mortality Rate: The number of maternal deaths in a population per 100,000 women of reproductive age (15-49). It is calculated as the number of maternal deaths in a given period per 100,000 women of reproductive age during same time period.

Perinatal Mortality Rate: The number of deaths of fetuses between 28 weeks intrauterine life and the first seven days of extrauterine life in a specific time period per 1000 total births.

Live Birth: Newborn that breathes spontaneously or shows signs of life such as a heartbeat of definite spontaneous movement of voluntary muscles irrespective of the duration of pregnancy.

Still birth: The absence of signs of life at birth.

Neonatal death: Early neonatal death refers to death of a live born neonate during the first 7 days of life. Late neonatal death refers to death after 7 days but before 29 days of life.

Summary

Background: Obstetric performance is assessed in terms of maternal and neonatal morbidity and early perinatal and maternal mortality. The known cases of maternal mortality in our set-up are namely haemorrhage, obstructed labour, sepsis, unsafe abortion and hypertensive disorders in pregnancy. According to the Kenya Demographic and Health Survey of 2008-09(5), the Maternal Mortality Rate is 488/100,000 live births. The interaction of a variety of factors may contribute to limiting or delaying access to maternal health care services particularly emergency obstetric care when life threatening complications occur. Weaknesses and deficiencies in the health systems especially with regard to referral linkages may affect access to emergency obstetric care and negatively influence maternal and fetal outcomes. Kenyatta National Hospital is a tertiary hospital that receives most of these emergency obstetric referrals.

Objectives: To determine the outcomes of pregnancy and childbirth that occur in emergency obstetric referrals, the reasons for referral and factors related to the outcomes.

Study Design: This was a cross-sectional descriptive survey.

Setting: The study was conducted in the Labour Ward of The Kenyatta National Hospital (KNH), Nairobi.

Study Population: This comprised of women with obstetric emergencies referred to the KNH Labour Ward.

Methods: Following ethical approval by The KNH Ethics and Research Committee, eligible participants were enrolled into the study. The principal investigator and three Research Assistants used a pre-tested structured questionnaire to collect the relevant data. Data was stored in a password protected computer under the safe custody of the principal investigator. Data was analysed by a Statistical Package for Social Scientists (SPSS) version 17 software.

Results: During the study period from May to July 2011, there were 228 women referred with obstetric emergencies to KNH. The mean age of the women was 26.4 years (SD 5.5) and majority (93.4%) had received antenatal care. The main referring health units were privately run hospitals and clinics respectively accounting for 34.2% and 20.6% and most of the women were transported to KNH in hospital vehicles (52.7%). The most common reasons for referral was lack of theatre (34.2%) while lack of supplies accounted for 25.9%. About 80.3% of the women and 57.4% of the neonates had good outcomes. The main adverse maternal outcomes were anaemia (6.6%) and postpartum haemorrhage (4.8%). Among the fetal outcomes, asphyxia accounted for 23.2% and 12.8% were premature. The mean birth weight recorded was 2800grams. There were two direct maternal deaths due to haemorrhage and eclampsia and two neonatal deaths due to complications of severe asphyxia recorded.

Conclusion: Most of the emergency obstetric referrals were of low socio-economic status and were referred from lower level health facilities that is, Level two to four. Most of the mothers and neonates had good outcomes. The results indicate a gap in basic provision of emergency obstetric services and untimely referral from the referring health facilities.

Recommendations: Specific elements of the current referral system particularly supervision and regulation of privately run hospitals and clinics, inter-facility communication (person-to-person and transport) and supply of essential drugs, supplies and equipment need to be improved.

1. Introduction and Literature Review

Worldwide more than 50 million women suffer consequences of poor reproductive health care such as serious pregnancy related illnesses and disability. Each year, an estimated 600,000 women die due to pregnancy-related complications, majority of them being from the developing world. Millions of other women sustain serious health problems due to pregnancy and childbirth. One in sixteen women dies of pregnancy complications in the developing world whereas one in 2,800 will die of similar problems in developed countries. Almost 95% of these yearly maternal deaths occur in Sub-Saharan Africa and Asia(1).

Current figures report that an estimated 358,000 maternal deaths occurred worldwide in 2008 with developing countries contributing to 99% (355,000) of deaths. Sub-Saharan Africa and South Asia accounted for 87% (313,000) of global maternal deaths(2).

The goal of all labour and delivery units is a safe birth for both new-born and mother. The United Nations Population Fund Maternal Mortality Update focuses on emergency obstetric care and provides three strategic interventions to reduce maternal mortality worldwide. These are the provision of family planning to ensure that every birth is wanted, skilled care by a health professional during pregnancy and childbirth, and timely access to care for pregnant women who develop complications(3-4). The Kenya Demographic and Health Survey of 2008-09 reported that 44%(5) of births in Kenya are delivered by a health professional up from the figure of 42%(6) reported in the Kenya Demographic and Health Survey of 2003.

Many obstetric emergencies cannot be predicted and a rapid coordinated response is essential to good outcomes. The outcomes of pregnancy is usually measured in terms of negative indices namely number of still births, number of neonatal deaths, number of preterm deliveries, low birth weight rate, number of maternal deaths and maternal morbidity. Maternal and perinatal mortality are the best indicators of the quality of antenatal care and obstetrics in a community(7). Aggarwal in 1980 reported a high maternal mortality amongst emergency obstetric referrals. Although they constituted

only 3% of the total deliveries, they were responsible for about 60% of the total maternal deaths in Kenyatta National Hospital(8).

Makokha did two reviews of maternal mortality rate in KNH. Between 1972-1977, he found an average maternal mortality rate of 196/100,000 live births and between 1978-1987, he reported a maternal mortality rate of 320/100,000 live births(9). Contributory factors were slowness of surgical management of emergencies, prolonged confinement of mothers with cardiac disease and lack of emergency supplies of blood and drugs for complicated deliveries.

Other studies in Kenya have found unacceptably high ratios: Adam in Kilifi found 771/100,000 live births(10) and Jaldesa in Garissa found 1700/100000 live births(11) between 1993 and 1995.

According to Statistics and analysis of Labour Ward records of patient case files, majority of the obstetric emergency referrals were from institutions near and far from KNH. Some of these include Mbagathi District Hospital, Tigoni Sub-district Hospital, Pumwani Maternity Hospital, Maria Immaculata Hospital, Ngong Sub-district Hospital and Meru District Hospital. The most common reasons for referral included severe preeclampsia, eclampsia, obstructed labour and shock due to antepartum and/or post-partum haemorrhage. A number of referrals were from lower level health institutions which do not have the facilities to handle certain obstetric emergencies such as performing caesarean section and administering blood transfusion.

The Millenium Development Goals are eight international development goals that were developed out of the eight chapters of the United Nations Millenium Declaration and signed by the 191 UN member states in September 2000 and agreed to be achieved by the year 2015. Neonatal and maternal outcomes are addressed by the MDG number 4 (to reduce the under 5 mortality rate by two-thirds between 1990 and 2015) and MDG number 5 (to improve maternal health with a target of reducing maternal mortality ratio by three quarters between 1990 and 2015(12), respectively.

A retrospective descriptive study done in KNH in 2006 to review if there was any change in maternal mortality rate since the inception of the MDG Number 5 in 1990

reported the maternal mortality rate to be 921.5/100,000 live births. The study concluded that there was need for re-emphasis on antenatal care clinic attendance, early referrals and delivery under skilled care(13).

Current trends and evidence suggest that the maternal mortality ratio may be increasing in Kenya. The 1998 and 2003 Kenya Demographic and Health Surveys (KDHS) recorded a national maternal mortality ratio of 590(14) and 414(6) deaths per 100,000 live births respectively. The 2008-09 Kenya Demographic and Health Survey reported a maternal mortality rate of 488 maternal deaths per 100,000 live births(5).

The regions with the highest maternal mortality ratios are Africa, Asia and Latin America. In some areas of Sub-Saharan Africa, maternal mortality ratios may be as high as 1,000 maternal deaths per 100,000 live births and in some countries of Latin America, the ratio may be as high as 200 per 100,000 live births. In contrast, maternal mortality ratios in developed countries are as low as 10 per 100, 000 live births(15).

Maternal mortality is a result of interaction of a variety of factors that serve to limit or delay access to maternal health care services particularly emergency obstetric care when life-threatening complications occur. Minimizing the causes of delays to emergency obstetric care significantly decrease maternal and neonatal morbidity and mortality. The delays occur at the following three levels(16):

- Delay in making the decision to seek medical care which is influenced by factors like socio-cultural, accessibility and perception or previous experiences about the health facility(ies), or failure to recognize the problem.
- Delay in reaching an appropriate health facility which has a functioning obstetric wing after decision is made due to lack of communication and transportation.
- Delay in receiving appropriate care once at the health facility due to either poor staffing, staff insensitivity, illogical prepayment policies, lack of appropriate resources or poor organizational setups that are not conducive for emergency obstetric care.

In obstetric emergencies, malfunctions at any one level may cost lives and need to be addressed seriously.

In view of the poor prediction of antenatal risk assessment(17-18) the best way of reducing maternal and neonatal morbidity and mortality is anticipation of possible occurrence of emergency obstetric situations and to be prepared to recognize early and refer timely.

A functioning referral system is considered to be a necessary element of the Safe Motherhood programmes. Many healthcare systems in developing countries are failing to optimise women's rapid access to emergency obstetric care and that the poor and marginalised are affected disproportionately. Likely requisites for successful maternity referral systems include a referral strategy informed by the assessment of population needs and health system capabilities, an adequately resourced referral centre, active collaboration between referral levels and across sectors, formalised communication and transport arrangements, agreed setting-specific protocols for referrer and receiver, supervision and accountability for providers' performance, affordable service costs, the capacity to monitor effectiveness, and underpinning all of these, policy support(19).

There is evidence that great gains can be made in maternal health by ensuring that women with pregnancy complications can quickly reach a facility where they can receive high-quality obstetric care. Maternal referral systems also impact upon neonatal health and survival in developing countries. Despite the widespread acceptance of this point, maternity referral systems have been under-documented, under-researched, and under-theorised(19).

Establishing an effective referral system includes educating the community about danger signs during pregnancy, labour and puerperium; improving access to emergency care units; upgrading the peripheral facilities to provide better care nearer to the community; and improving emergency management capability for obstetric complications in existing referral facilities(20).

The referral of patients from basic to more sosphisticated level of care is considered to be an integral part of health systems. The levels of health care delivery in the Kenya Essential Package for Health are Level one which is the community, Level two which are the dispensaries and clinics, Level three which are health centres, maternities and nursing homes, Level four which are the primary or district hospitals, Level five which are the secondary or provincial hospitals and Level six which are the tertiary hospitals.

Signal functions are a set of activities that should be available in a facility for emergency care of women with pregnancy related complications. These functions must be performed by a facility for it to be recognized and categorized as an Emergency Obstetric Care (EmOC) facility. There are eight signal functions and a facility performing six of them is known as a Basic EmOC facility. These are administration of parenteral antibiotics, administration of oxytocic drugs, administration of parenteral anticonvulsants, manual removal of placenta, removal of retained products of conception and performing assisted vaginal delivery. An additional two functions are available at a hospital and these are administration of blood transfusion and the performing of surgical procedures which include caesarean section and laparotomy for ectopic pregnancy. A facility that provides all eight of these functions is known as a Comprehensive EmOC facility. A minimum of four Basic EmOC facilities per 500,000 population and one Comprehensive EmOC facility per 500,000 population is recommended (30). The functions performed at a Basic EmOC facility can stabilize a woman with an obstetric emergency as plans are put in place to refer her to a Comprehensive EmOC facility. In Kenya the availability of Basic EmOC facilities is 0.4 per 500,000 while the Comprehensive EmOC facility is 1.3 per 500,0000(31).

Reducing maternal mortality remains a big challenge facing the attainment of MDG No 5. It is generally agreed that maternal health care has not improved significantly since the MDGs were set. Access to quality and timely emergency obstetric care is crucial as most obstetric complications are unpredictable and yet life threatening.
Previous studies done in Kenya –KNH 1990(21), and the Rift Valley Provincial General Hospital, Nakuru 1998(22) have tried to determine the outcomes of

pregnancies following emergency referrals and ascertain the maternal and perinatal morbidity and mortality. A high maternal and perinatal mortality rate is noted.

As concerned specialists and women's health care physicians, we should: (a) implement programs for safe motherhood to reduce maternal and neonatal morbidity and mortality; (b) support universal access to family planning and reproductive health services and (c) endorse global measures to ensure gender equity, universal education and the equality of women(15).

2. Rationale

Referrals in the Kenyan set-up have been associated with a high maternal and perinatal morbidity and mortality (8,9,13,21,22). In order for individual health institutions in the country to contribute towards the national policy in achievement of MDG No 5 with regards to maternal health, there is still need to research on the factors that influence adverse pregnancy and childbirth outcomes. This study aims to identify the maternal and fetal outcomes among mothers referred for emergency obstetric care, indications for the referrals and to recommend ways to improve the existing referral system, in order to contribute towards the improvement of maternal and fetal outcomes which would subsequently contribute towards achievement of the MDG No. 5.

3. Research Question

What elements of the current referral system contribute to poor maternal and fetal outcomes?

4. Conceptual Framework

Obstetric performance is assessed in terms of maternal and neonatal morbidity and early perinatal and maternal mortality. The interaction of a variety of factors may contribute to limiting or delaying access to maternal health care services particularly emergency obstetric care when life threatening complications occur giving rise to adverse maternal and fetal outcomes. Prevention/effective management of obstetric emergencies will result in better maternal and perinatal outcomes. One way this can be achieved by assessing gaps in the existing referral linkages for emergency obstetric referrals.

This study was a cross-sectional descriptive survey that sought to describe the sociodemographic characteristics of women referred with obstetric emergencies, the reasons for referral and the factors related to the maternal and fetal outcomes.

The maternal and fetal outcomes would depend on the referral linkages and timely or delayed referrals. On arrival at the KNH, the duration taken to be attended to would be assessed. It is possible that those who were referred in good time and arrived in a timely manner would either end up with either positive or negative outcomes. The converse is that those who had delayed arrival to KNH would end up with either positive or negative outcomes.

Obstetric emergency referrals to the Labour Ward of Kenyatta National Hospital were enrolled into the study. Eligible participants were interviewed and information so given entered into a pretested structured questionnaire. This data was supplemented by data extracted directly from patient files.

Outcome variables that were measured.

Maternal:

1. Uneventful
2. Genital injuries
3. Post partum haemorrhage
4. Anaemia

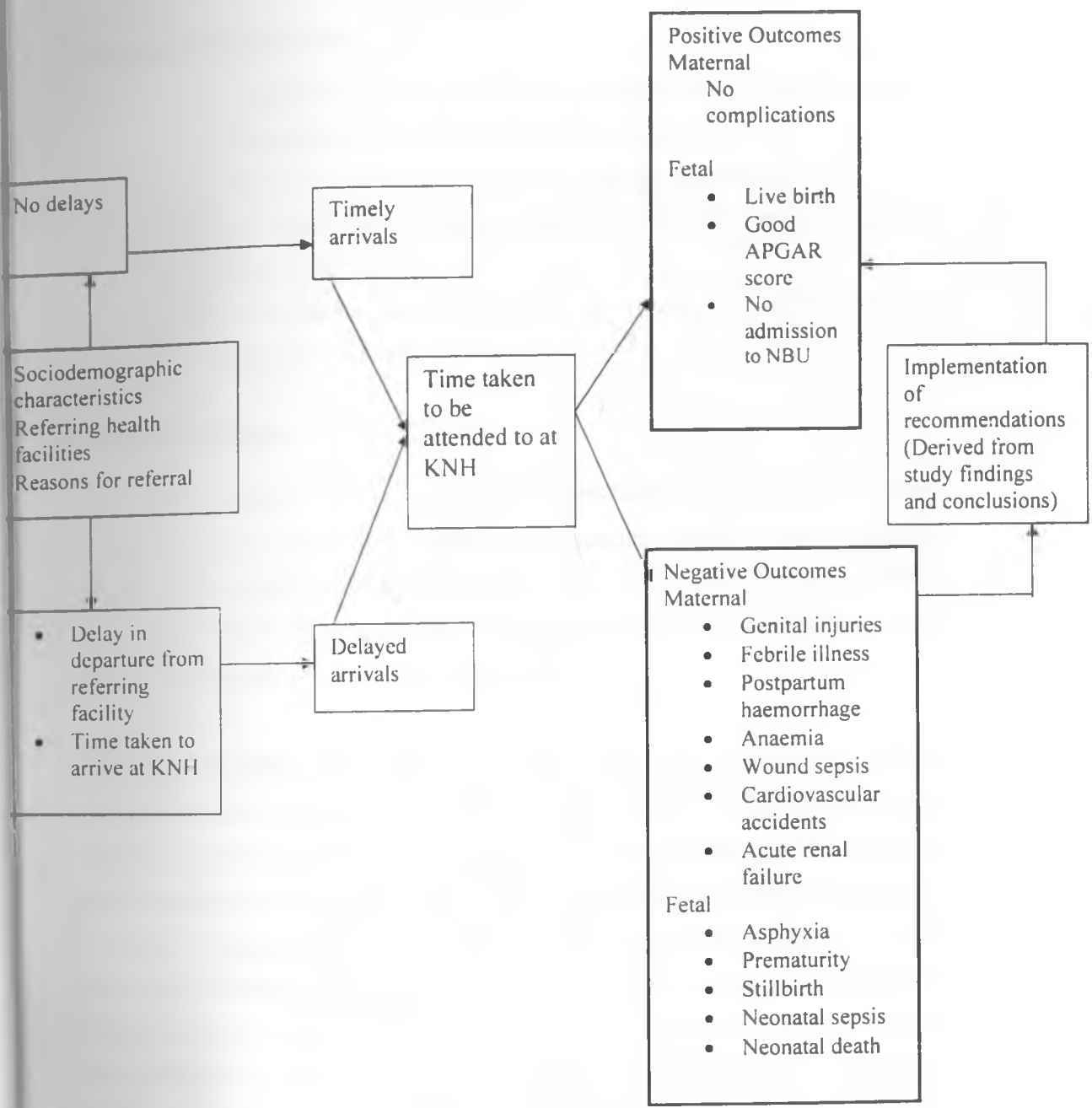
5. Fever
6. Wound sepsis
7. Cardiovascular accidents such as stroke due to convulsions as in eclampsia
8. Acute Renal Failure
9. Coma
10. Death

Fetal:

1. Well/Live
2. Asphyxia
3. Stillbirth
4. Low birth weight less than 2500 grams
5. Admission to New Born Unit
6. Prematurity
7. Low APGAR scores at five minutes
8. Neonatal sepsis-jaundice, fever of $\geq$ 38°C within 24 hours of delivery
9. Neonatal death

The conclusions drawn from the study findings would give rise to recommendations that could be implemented to achieve better maternal and fetal outcomes in women with obstetric emergencies referred from other health facilities to KNH. Efforts should be made to identify them early and any gaps in the current referral system addressed.

Schematic Conceptual Framework



5. Overall Objective

To determine maternal and fetal outcomes among obstetric emergency referrals at Kenyatta National Hospital

5.1 Specific Objectives

1. To describe the socio-demographic characteristics of referred mothers.
2. To establish the referring institution/health facility.
3. To determine the reasons for referral by the referring facility.
4. To describe the maternal and fetal outcomes among emergency obstetric referrals.
5. To determine factors influencing the various outcomes of obstetric emergency referrals.

6. Methodology

6.1 Study Design: This was a cross sectional descriptive study aimed at describing maternal and fetal outcomes in obstetric emergencies referred from other health facilities and making recommendations for improvement of the existing referral systems. It is a suitable design because it depicts a current picture of the health system and linkages in relation to emergency obstetric care.

6.2 Study Setting: The study was conducted between May and July 2011 at Kenyatta National Hospital. It is the largest hospital in Kenya and serves as a national referral hospital that receives high risk, self-referrals and many unbooked patients from Nairobi and its environs as well as from neighbouring hospitals. It also serves as a teaching hospital for the under-graduate and post-graduate students from the University of Nairobi Faculty of Medicine and for the students from the Kenya Medical Training College, Nairobi. It is situated in the capital city of Kenya, Nairobi, along Ngong road and is about 5 km from the Central Business District. It serves the population within and around neighbouring countries of East and Central Africa. It is made up of several specialist departments of which Obstetrics and Gynaecology is one of them. The Obstetrics unit consists of an antenatal clinic, three antenatal/postnatal wards, a labour ward and a maternity operating theatre. For ease of operations, the staff, who are led by consultant obstetrician/gynaecologists, are

divided into three firms who each have weekly running of the labour ward and antenatal clinic days on Tuesdays, Wednesdays and Thursdays for respective individual firms.

Patients who are KNH antenatal clinic attendants are admitted directly to Labour Ward from home. Non-clinic attendants and referrals are admitted to Labour Ward through casualty after having been reviewed by a Senior House Officer in Obstetrics and Gynaecology. The nurse at receiving area triages the patients.

The stable obstetric patient is escorted walking to Labour Ward by a casualty nurse and received by a Labour Ward nurse within the Labour Ward. In the case of an unstable patient, she is wheeled on a stretcher to the Labour Ward accompanied by a casualty nurse. On arrival, she is also received by a Labour Ward nurse and admitted into the Ward. The Senior House Officer (SHO) covering the shift is informed and takes the history and physical examination while the nurse takes the vital signs. Depending on the results of the examination which may indicate a stable mother in labour, the patient is taken to either the first stage or second stage rooms. The patient is taken to the emergency room in the Labour Ward for appropriate continuation of management in cases where the patient is unstable. In cases where there is indication for emergency caesarean section, the patient is taken to the maternity theatre adjacent to the Labour Ward for the operation. After successful delivery of the baby and stabilization of mother, the patient is observed for 12 hours within the Labour Ward and then transferred to the postnatal wards for postnatal care after review by the Senior House Officer.

Fetal surveillance in labour is by intermittent fetal monitoring with a fetoscope and in selected cases, the cardiotocograph machine is used. The midwife or SHO is usually present at the deliveries of such patients because of anticipated neonatal complications, the paediatric SHO on call is alerted in impending second stage of labour or during the emergency caesarean section. Newborn resuscitation is done by both paediatrician and midwife receiving the baby and in cases where the APGAR scores are low, the baby is admitted to the New Born unit for observation and further management.

6.3 Study Population: This comprised of mothers referred with obstetric emergencies to the Labour Ward of Kenyatta National Hospital.

6.4 Eligibility Criteria

Inclusion criteria

The participants included those with the following:

- All referred obstetric patients from other units with a written referral letter.
- Willing to participate after giving informed consent.
- Surrogate consent sought from relatives accompanying eligible participants who were not in a position to give consent for example, unstable patients such as those in shock or under 18 years of age.

Exclusion criteria

The participants who were excluded were those who:

- Refused to participate.
- Had baby born before arrival to the Labour Ward.
- Were self referrals.

6.5 Sample Size and Sampling Procedure

From a previous study carried out in a referral setting - Nakuru Provincial Hospital (22), it was observed that the most conservative pregnancy outcome among referred patients was foetal distress -18.0%. To calculate the sample size that would describe the pregnancy outcomes with 95% confidence with an error margin of ±5%, the following formula was applied:

$$n = Z^2_{\alpha/2} \frac{P(1-P)}{\Delta^2}$$

Where;

$Z_{\alpha/2}$: Is the standard normal deviation at the 95% confidence level for a two tailed test (1.96)

P : Is the assumed proportion of the most conservative pregnancy outcomes (18.0%)

Δ Is the total width of the expected confidence interval (±5%)

$$n = (1.96)^2 * \{0.18(1 - 0.18))/(0.05 * 0.05)\}$$

n = 227 participants

A minimum sample size of 227 participants was sufficient to describe the outcome of pregnancy among referred emergency obstetric patients at the Kenyatta National Hospital.

6.6 Study Instrument and Procedures

Study Instrument

A structured questionnaire designed to contain questions on socio-demographic characteristics, past obstetric history, information on current pregnancy, circumstances surrounding referral and the outcome measures was used to collect data.

Pretesting of the study instrument

The questionnaire was pretested in the Labour Ward of Kenyatta National Hospital by the principal investigator two weeks before the study to establish the suitability, practicability and reliability of the study questions. Modifications and adjustments were made as appropriate. This ensured that errors were minimized before data collection began.

Recruitment and training of research assistants

The principal investigator recruited three research assistants. These were registered nurse-midwives from the Labour Ward. The principal investigator oriented them on the study, trained them on data collection, use of the structured questionnaire, patient recruitment and filling in of the consent form.

6.7 Data Collection

Data was collected by the principal investigator and the three research assistants. On enrolling eligible patients, the principal investigator or research assistant introduced him/herself to the patient and got consent to answer the questionnaire. Surrogate consent was sought from the relatives accompanying eligible participants who were not in a position to give consent. Those relatives were then interviewed. The data

obtained from the questionnaires was supplemented by data extracted directly from the patient files.

6.8 Data Management

Raw data was verified at the end of the day by the principal investigator to check for errors or omissions made while filling in the questionnaires. The filled in questionnaires were in the safe custody of the principal investigator who filed them in a locked cabinet. Data coding was also done to ensure that data entries were in the right format and also to minimise incomplete data entries.

Data collected in this study was stored in a password protected computer and backed up in an external hard drive and CD. The hard drive and CD was under the safe custody of the principal investigator. Each participant entry was under the unique study number so as to ensure confidentiality of the study participants.

6.9 Data Analysis

The primary data was captured in a Microsoft Access database. The data was then entered into a Statistical Package for Social Scientists version 17 (SPSS, Chicago) software, which was used for data analysis. This being a descriptive study, all categorical data was summarised in proportions and represented in the form of tables and graphs. Medians and the interquartile ranges were determined from non-normally distributed continuous data. Continuous data that was normally distributed was summarized as means and standard deviations.

7. Ethical Considerations

The principal investigator instituted all measures to ensure that the ethical rights of the study participants were safeguarded. The following measures were put into place:

- Permission to carry out the study was sought from the Head of KNH Obstetrics and Gynaecology Department and approval obtained from Ethics and Research Committee of The Kenyatta National Hospital.
- The participants were informed about the study in a language that they understood and requested to give informed consent. Surrogate consent was sought from the relatives accompanying eligible participants who were not in a position to give consent. Literate and coherent participants were requested to sign the informed consent form. Non-literate participants who gave consent were requested to provide thumb imprint.
- To ensure confidentiality, the questionnaires bore no patient name or other personal and identifying information. They were numbered by computer generated serial numbers. During data analysis, confidentiality was further enhanced by conducting the analysis using an access password protected computer only accessible to the principal investigator and the statistician. Anonymity was maintained and personal information was not revealed in the report or in any future citations.
- No form of inducement or coercion was used for recruitment into the study.
- Women who were not willing to participate in the study were not victimised and received the same quality of care as those who participated.
- The results of the study will be availed to the Head of KNH Obstetrics and Gynaecology Department in order to identify areas that require improvement in provision of good quality maternal health care.

8. Study Limitations

1. Some patients could not recall information. This was overcome by recruiting more participant's to achieve the required sample size and where possible, this information was obtained from the relative(s) and accompanying nurse.

2. The great majority of the participants were referred from facilities within and around Nairobi. The findings are not easily generalisable for a national picture. However, the information obtained is useful to shed light on the gaps in the existing referral linkages for emergency obstetric referrals and to recommend ways for improvement.

9. Results

During the period of May to July 2011, there were 1618 admissions. Among the referrals, 228 pregnant women met the study criteria and were enrolled into the study.

9.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS

Table 1: Socio-demographic characteristics of women with obstetric emergencies referred to KNH (N=228)

CHARACTERISTICS	Frequency	(%)
Marital status		
Single	34	14.9
Married	192	84.2
Separated	1	0.4
Widowed	1	0.4
Education level		
None	10	4.4
Primary	97	42.5
Secondary	83	36.4
College	33	14.5
University	5	2.2
Current residence		
Rural	37	16.2
Urban	188	82.5
Informal settlement	3	1.3
Occupation		
Student	8	3.5
Housewife	114	50
Self employed	49	21.5
Civil servant	16	7.0
Private sector	24	10.5
Other	17	7.5

Table 1 shows that most (84.2%) of the referred women were married, 42.5% had completed primary level of education and 50% were housewives. Those who resided in urban settlements contributed to 82.5% while 16.2% resided in rural settlements.

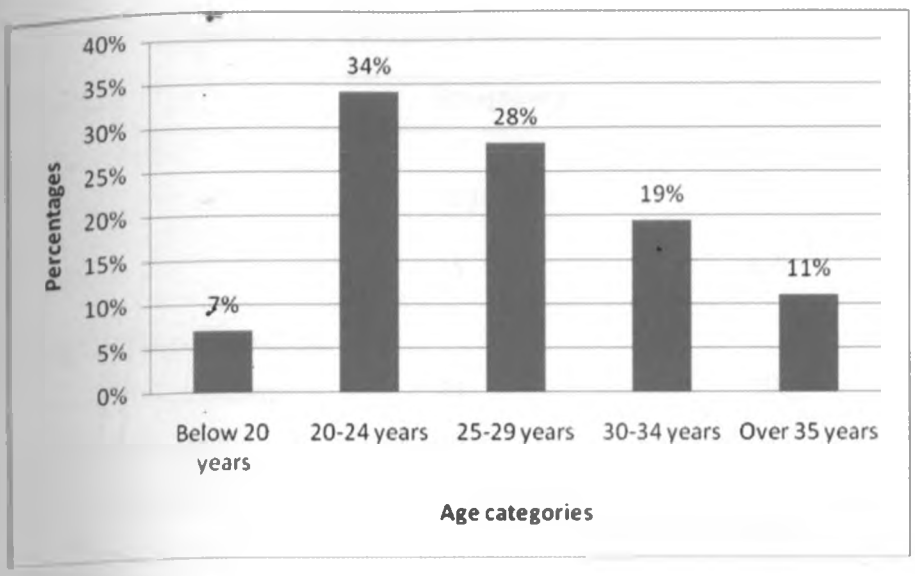


Figure 1: Age in years of women with obstetric emergencies referred to KNH (N=228)

Majority of the patients were aged between 20-24 years (n=77) and 7 % (n=16) were aged less than 20 years as shown in figure 1. Only 11% were over 35 years of age.

Age distribution of the studied population ranged from 17-41 years.

The mean age of the women was 26.4 years (SD= 5.5 years).

Table 2: ANC attendance in Current Pregnancy (N=228)

VARIABLE	Frequency	(%)
Attended ANC		
Yes	213	93.4
No	15	6.6
Place ANC offered (N=213)		
City Council Clinic	84	39.4
Private Clinic	66	31
Health Centre	35	16.4
Private Hospital	25	11.7
Other (specify)	3	1.4
Months started attending ANC		
Median	5.0	
Minimum	1.0	
Maximum	9.0	
Times ANC was sought		
Median	1.0	
Minimum	1.0	
Maximum	3.0	

As shown in table 2, most (93.4%) of the women referred with obstetric emergencies to KNH were antenatal clinic attendants in various health facilities where antenatal care was offered with 39.4% receiving antenatal care from city council clinics and 31% from private clinics. About 1.4% reported having received antenatal care and advice from traditional birth attendants. The median months of gestation at first antenatal visit was five months. The maximum times antenatal care was sought was three.

Table 3: Complications in previous pregnancies

VARIABLE	Frequency	(%)
None	100	80.6
Bleeding in pregnancy <28 weeks	6	4.8
Bleeding in pregnancy >28 weeks	2	1.6
Hypertensive disease	6	4.8
Premature rupture of membranes	1	0.8
Preterm Labour	3	2.4
Other	5	4.0
TOTAL	123	100

Table 3 shows 80.6% reported no complications in previous pregnancies, bleeding in pregnancy <28 weeks gestation and hypertensive disease in pregnancy each contributed 4.8% each. Other reported complications were spontaneous first trimester abortions and venereal disease.

Table 4: Complications in previous deliveries

VARIABLE	Frequency	(%)
None	119	92.2
Prolonged labour	3	2.3
Obstructed labour	1	0.8
Non reassuring fetal status	6	4.6
TOTAL	129	100

Table 4 shows that 92.2% had no complications at their previous deliveries.

Table 5: Outcomes of past pregnancies

VARIABLE	Frequency	(%)
Miscarriage <28 weeks	22	17.1
Miscarriage >28 weeks	2	1.6
Stillbirths	3	2.3
Live births	101	78.3
Neonatal death	1	0.8
TOTAL	129	100

Table 5 shows 78.3% had a favourable fetal outcome and 0.8% had a neonatal death.

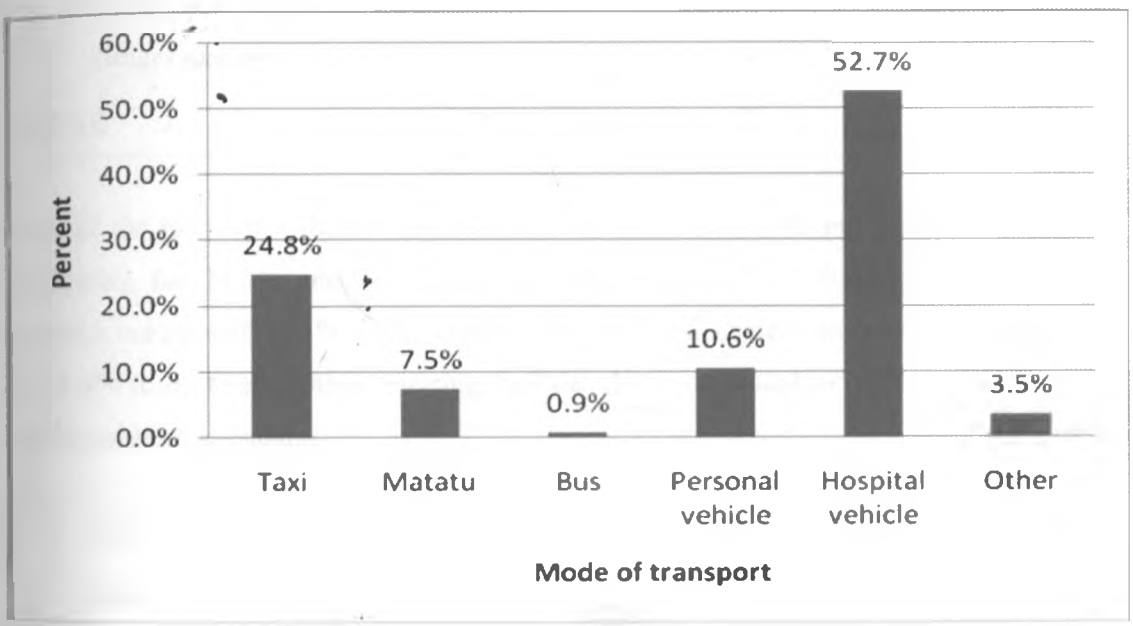


Figure 2: Mode of transport used by women with obstetric emergencies referred to KNH (N=228)

From figure 2, the majority of the mothers were transported to KNH in hospital vehicles (52.7%, n=119). About 24.8% (n=56) hired a taxi and 10.6% (n=24) used their personal vehicles. Others (3.5%) reported to have walked to KNH.

9.2 REFERRING INSTITUTIONS/HEALTH FACILITIES

Table 6: Distribution of health facilities referring women with obstetric emergencies to KNH (N=228)

REFERRING FACILITY	Frequency	(%)
Dispensary	21	9.2
Health centre	20	8.8
Sub district hospital	22	9.6
District hospital	32	14.1
Provincial hospital	7	3.1
Private clinic	47	20.6
Privately run hospital	78	34.2
Other (specify)	1	0.4
TOTAL	228	100

Most of the referrals to KNH were from privately run hospitals and private clinics accounting for 34.2% and 20.6% of all referrals respectively (table 3). District hospitals contributed 14.1% while dispensaries and health centres accounted for 9.2% and 8.8% respectively. Other referring facilities that contributed to 0.4% were from traditional birth attendant.

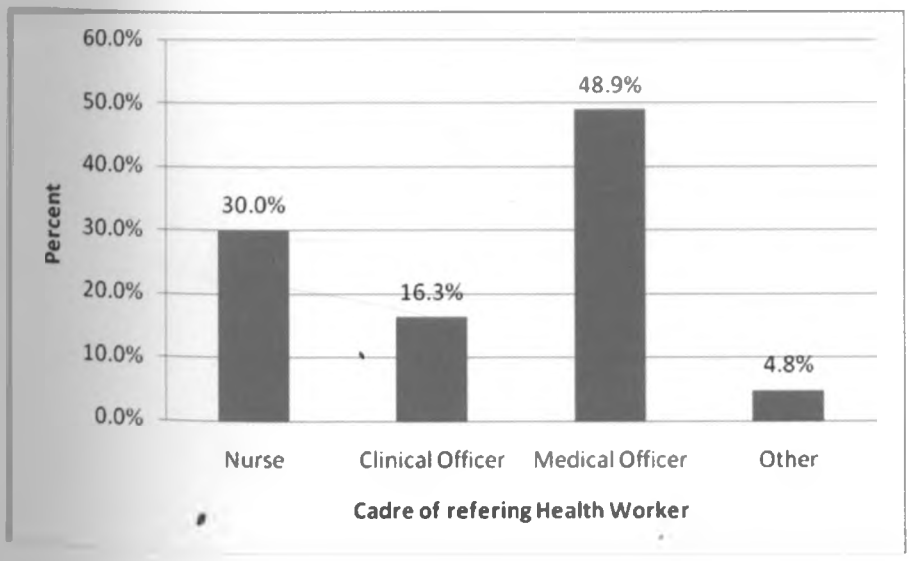


Figure 3: Cadres of health workers that referred women with obstetric emergencies to KNH (N=228)

As illustrated in figure 3 most of the referring health workers were medical officers, who referred 48.9% (n=111) of all the patients. Nurses referred 30% of all the obstetric emergency referrals in this study. Others (4.8%) were consultant obstetrician/gynaecologists and one traditional birth attendant.

Table 7: Duration of time (minutes) taken by women with obstetric emergencies from the referring facility to KNH

		Time taken from decision to refer to time of departure from referring health facility (minutes)	**Time taken from referring facility to arrive at KNH (minutes)**	**Duration taken upon arrival at KNH for patient to be admitted (minutes)**
Median		45.0	60.0	15.0
Percentiles	25^{th}	25.0	30.0	10.0
	75^{th}	60.0	90.0	30.0
IQR		**45.0**	**60.0**	**20.0**

As shown in table 4, the median time taken from decision to refer to time of departure from referring facility was 45 minutes (IQR=45 minutes) and the time taken from the referring facility to arrive to KNH was 60 minutes (IQR= 60 minutes).

After arrival, the median time it took to be attended to was 15 minutes (IQR=20 minutes).

9.3 REASONS FOR REFERRAL

Table 8: Indications given by facilities for referring women with obstetric emergencies to KNH (N=228)

VARIABLE	Frequency	(%)
Lack of supplies	59	25.9
Lack of a doctor	6	2.6
Lack of anaesthetist	5	2.2
Lack of a theatre	78	34.2
Financial constraints	19	8.3
Medical/Obstetric complications	54	23.7
Others (specify)	7	3.1
TOTAL	228	100

The reasons for patient transfers to the Kenyatta National Hospital have been illustrated in table 5. Most of the facilities that referred emergency obstetric patients did not have theatres (34.2%) while 25.9% did not have supplies. Another key reason was medical/obstetric complications contributing 23.7% of the indications for referral. Some of these complications included antepartum haemorrhage/postpartum haemorrhage, severe preeclampsia-eclampsia, malpresentations not compatible with vaginal delivery, twin gestation with preterm premature rupture of membranes and for dialysis due to Acute Renal Failure resulting from poorly managed hypertensive disease in pregnancy. Other reasons that were given for referral contributing to 3.1% were fear of complications, patient and relatives request and that patient went off labour.

Table 9: Diagnosis made at KNH on admission by women referred with obstetric emergencies (N=228)

VARIABLE	Frequency	(%)
Normal labour	43	18.9
Antepartum haemorrhage	30	13.2
Postpartum haemorrhage	13	5.7
CPD in labour	15	6.6
Prolonged labour	14	6.1
Cord prolapse	3	1.3
Obstructed labour	9	3.9
Non reassuring fetal status	28	12.3
Preeclampsia	26	11.4
Eclampsia	19	8.3
Malpresentation	16	7.0
Shock	1	0.4
Others (specify)	11	4.8
TOTAL	228	99.9

The most common diagnosis was normal labour (18.9%) followed by antepartum haemorrhage (13.2%). Non-reassuring fetal status (12.3%) and preeclampsia (11.4%) were also common diagnoses. Other diagnoses contributing to 4.8% were referrals for management of medical illness such hyperthyroidism and asthma, retained second twin, false labour, post-term pregnancy and intrapartum complications of deep transverse arrest and impending uterine rupture (table 6).

Table 10: Treatment administered at KNH on admission by women referred with obstetric emergencies

VARIABLE	Frequency	(%)
Routine observations and monitoring	55	23.1
Assisted vaginal delivery	8	3.3
Induction of labour	53	22.2
Emergency Caesarean section	42	17.6
Antibiotics	18	7.5
Intravenous fluids	13	5.4
Blood transfusion	20	8.4
Augmentation of labour with oxytocin	15	6.3
Other (specify)	15	6.3

As shown in table 7, on review, 23.1 % had routine observations and monitoring done. Majority (22.2%) were prescribed induction of labour while 17.6% underwent emergency caesarean section on admission. About 8.4% received blood transfusion. Other (6.3%) treatment administered was administration of dexamethasone injections, anti-asthmatic and hyperthyroid treatment as well as anti-hypertensive drugs including magnesium sulphate. One patient had manual removal of the placenta. It is worthwhile to note that some of the referred patients had more than one treatment modality administered to them.

Table 11: Stages of Labour on admission in women referred with obstetric emergencies to KNH

STAGE OF LABOUR	Frequency	(%)
Not in labor	77	33.8
Stage 1	122	53.5
Stage 2	25	11.0
Stage 3	4	1.7
TOTAL	228	100

Table 8 shows that most (53.5%) of the referred women arrived in first stage of labour while 33.8% were not in labour. The women in stage four of labour had delivered within KNH before being attended to.

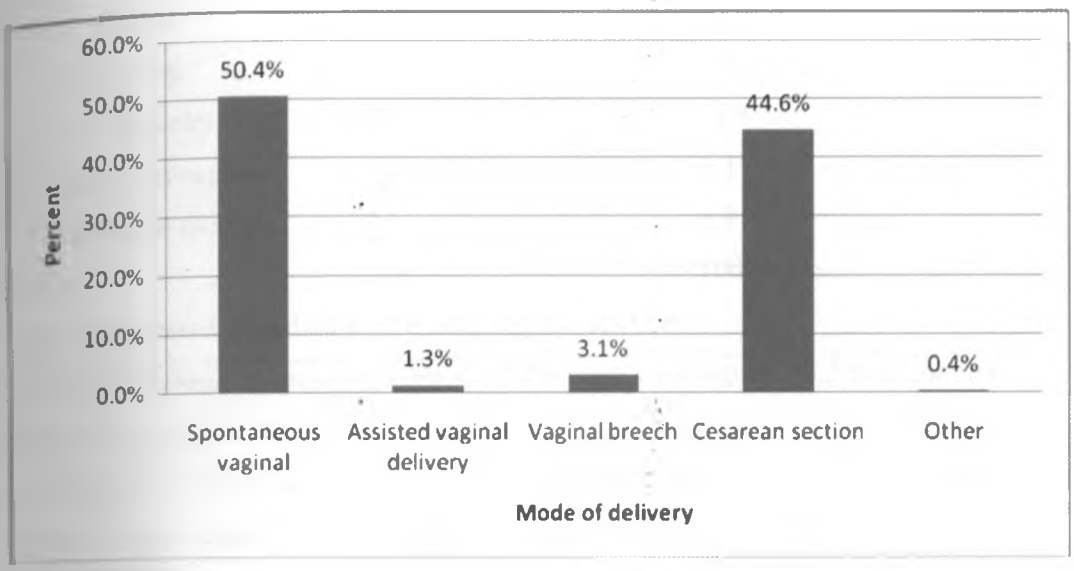


Figure 4: Modes of delivery after referral of women with obstetric emergencies to KNH

As shown in figure 4, most mothers (50.4%) delivered via spontaneous vertex delivery.

About 1.3% had assisted vaginal delivery while 44.6% delivered via emergency caesarean section. The latter included the group who had been prescribed induction of labour and/or augmentation which failed.

9.4 MATERNAL AND FETAL OUTCOMES

Table 12: Fetal outcomes *of women referred with obstetric emergencies to KNH

VARIABLE	Frequency	(%)
Well	131	57.4
Asphyxia	53	23.2
Still birth	10	4.4
Prematurity	29	12.8
Neonatal sepsis	3	1.3
Neonatal death	2	0.9
TOTAL	228	100

* based on diagnosis of pediatrician examining the newborn

Of the fetal outcomes as shown in table 9, 57.4% were well babies, 23.2 % of the live births had asphyxia while 12.8% were premature. There were 10 stillbirths contributing 4.4% of which three were fresh stillbirths and seven were macerated stillbirths. There were two neonatal deaths contributing 0.9%. About 1.3% had neonatal sepsis. Sixty six of all the newborns were admitted to the New Born Unit (28.9%)

The perinatal mortality rate for this group was 22/1000 live births.

Table 13: Fetal outcomes based on APGAR score at 5 minutes

APGAR score	Frequency	(%)
1-3	41	18.8
4-6	17	7.8
7-10	160	73.4
TOTAL	218	100

Most of the fetal outcomes were good of APGAR scores between 7 and 10 contributing 73.4% (table 10).

The mean birth weight recorded was 2800grams.

Table 14: Maternal outcomes after referral to KNH

VARIABLE	Frequency	(%)
Uneventful	183	80.3
Fever>38 C	2	0.9
Genital injuries	3	1.3
Anaemia ≤ 10g/dL	15	6.6
Acute renal failure	5	2.2
Postpartum haemorrhage	11	4.8
Death	2	0.9
Other	7	3.1
TOTAL	228	100

Among the mothers referred with obstetric emergencies, 80.3% had an uneventful course. 6.6% had significant anaemia while 4.8% developed postpartum haemorrhage. There were two direct maternal deaths reported contributing to 0.9% and this were due to excessive haemorrhage and eclampsia (table 11).

In this study, the maternal mortality ratio was 917/100,000 live births.

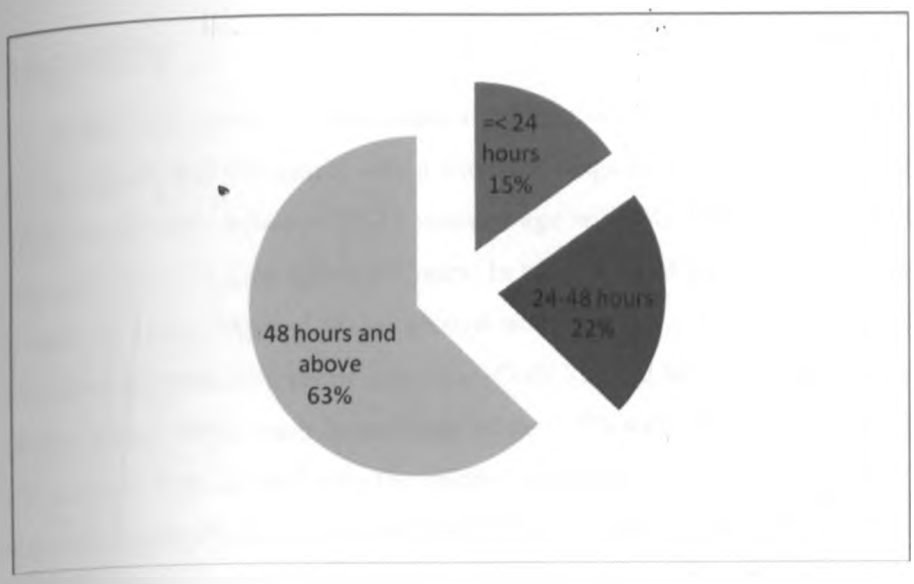


Figure 5: Duration of stay in hospital post delivery

As illustrated in figure 5, 63% percent of the mothers who were referred to KNH as obstetric emergencies stayed in hospital for 48 hours or more. The main reasons that were given for this prolonged stay were; due to the Caesarean section, baby was still in NBU while 2.5% cited financial constraints.

Discussion

The studied population was predominantly young where the mean age of the women was 26.6 years (S.D 5.5 years) with a wide age range of 17-41 years. Majority (34%) of the women were between 20-24 years of age with 7% being below the age of 20 years and only 11% were above 35 years. In total, 51% of the studied population was less than 25 years. Most of these referred women were married (84.2%) and 42.5% had completed primary level of education. Only 7% had salaried employment as civil servants. Most (50%) were housewives while 7.5% were mainly farmers and small scale grocers. This is similar to the studied population at the Rift Valley Provincial General Hospital (PGH), Nakuru in 1998(22) that reported the age distribution of the studied population ranged from 14-44 years with a mean of 24.48 years and 58.2% of the studied patients were less than 25 years.

A retrospective descriptive study done in KNH in 2006 to review if there was any change in maternal mortality rate since inception of the MDG Number 5 in 1990, reported similar findings that 57.7% of the studied population were below the age of 24 years with 42.9% being between 20 and 24 years and 14.8% being between 10 and 19 years (13). About 65.5% were married and only 59.1% having attained primary level of education(13). Despite a large percentage being married, 73.9% were housewives, not engaged in any gainful employment. It was reported that the women were getting married off too young before completing meaningful education. This in turn was accompanied by unplanned pregnancies due to idleness and some barriers to family planning, which is common among these women(9-10).

Low socio-economic status may contribute to poorer outcomes in emergency obstetric referrals. Women of higher socio-economic status have better pregnancy outcomes because they are better informed, are likely to develop better choices, more likely to develop and implement a birth plan and are more socially and financially empowered to make crucial and necessary decisions in case of obstetric emergencies(23).

In this study, 93.4% had received antenatal care at least once while 6.6% did not receive any care. The majority received antenatal care from city council clinics

(39.4%) and private clinics (31%). About 16.4% had received antenatal care at health centres. In a study done at Rift Valley PGH in 1998(22), it was reported that 96.2% had attended an antenatal clinic at least once and that 57.2 % of the referrals had received antenatal care at Level two and three that is, dispensaries and health centres. This is in keeping with the KDHS 2008-09(5) which reported that 92% sought and received antenatal care, an increase from the 88% figure reported in the KDHS 2003(6). In this study, the median number of months of pregnancy at first antenatal visit was five months. The KDHS 2008-09 reported a figure of 5.7(6). This study reported a good antenatal seeking behaviour.

Most of the referred patients in this study were admitted in conditions that required management which could not be performed in the referring units. This is possibly a reflection of the quality of ANC at peripheral units (where such complications may be identified early), quality of obstetrics care at referring units with reference to the availability of signal functions of a Basic EmOC facility and efficiency of the referral system. Delays and misdiagnosis are responsible for near miss mortality and are common among emergency obstetric referrals(24-25).

About 1.4% received the ANC care from traditional birth attendants. The KDHS 2008-09 reported that less than 1% received ANC from traditional birth attendants(5). In this study, the referring facilities were mainly privately run hospitals (34.2%), private clinics (20.6%) and district hospitals (14.1%). Traditional birth attendants referred 0.4% of all the patients. From this study, it is noted that Level two to four are the major contributors to emergency obstetric referrals. In contrast, the study done at Rift Valley PGH in 1998 reported that the majority of referrals were from health centres (51%) while in this study, it was only 8.8%. In the 1998 study, private clinics and hospitals contributed 19.2%. This is possibly because urban women (82.5%) are more likely to go to private hospitals and private clinics than rural women (16.2%) who are more likely to visit government dispensaries and health centres. The KDHS 2008-09(5) reported the shift away from use of nurses and midwives (63%) down from 70% in the KDHS 2003(6) in providing ANC, to doctors (29%) up from KDHS 2003(6) figure of 18%. The major cadres of health workers that referred patients were medical officers contributing 48.9% and nurses (30%). Others were referred by consultant obstetrician/gynaecologists and traditional birth attendants contributing to

4.8%. This is in contrast to a study done at Rift Valley PGH in 1998(22) where majority of the women were reported to have been referred by nurses and clinical officers (73.1%).

In this study, the median time taken from decision to refer to time of departure was about 45 minutes reflecting a delay in departing from the hospital which consequently delayed the patients from getting the timely treatment and management they required. In a study done at Rift Valley PGH in 1998 (22), the mean stay at the referring unit was 7.1 hours with some patients staying upto 72 hours.

In this study, the referring units stated the lack of a theatre and supplies/equipment as the major reasons for referral and this accounted for 34.2% and 25.9% respectively, and therefore unable to manage common obstetric complications and provide emergency obstetric care. Lack of a doctor was given as the reason for referral in 2.6% of the indications. Medical/Obstetric complications accounted for 23.7% of the reasons for referral. In a study done at Rift Valley PGH in 1998 (22), it was reported that the most common reasons for referral were non-availability of a doctor (48.6%) and lack of theatre (26%). There were deficiencies in the availability of life-saving interventions in the referring units that are categorized as Basic EmOC facilities that could help prevent adverse maternal and fetal outcomes in referred patients.
The median time taken to reach KNH was 60 minutes. This is similar to findings at a study done at Rift Valley PGH in 1998 (22) that reported mean time taken from the referring unit to Rift Valley PGH was 1.39 hours. In this study, about 52.7% were transferred from the referring unit to KNH in hospital vehicles. Use of taxi was reported in 24.8% of the cases. In some of the cases that were referred from lower level health facilities such as from Mbagathi district hospital and Ngong subdistrict hospital, prior telephone consultations helped eliminate more delay on arrival at KNH. The mean time it took to be attended to on arrival at KNH was 15 minutes. Better coordinated communication between various health institutions, health workers and KNH is key to achieving better pregnancy outcomes(9).

The common diagnoses made on arrival at KNH by women referred with obstetric emergencies was normal labour (18.9%), antepartum haemorrhage (13.2%), non reassuring fetal status (12.3%) while hypertensive disorders in pregnancy

encompassing the preeclampsia-eclampsia syndrome together contributed 19.7% in total. Obstructed labour was reported in 3.9%. Others (4.8%) were referrals for management of medical illness complicating pregnancy such as asthma and hyperthyroidism, retained second twin and false labour. In a study done at Rift Valley PGH in 1998 (22), non reassuring fetal status (12.5%) was the most common diagnosis on admission while obstructed labour and preeclampsia/eclampsia contributed to 9.6% and 8.2% respectively. During the study period, the KNH maternal mortality review reports reported an average rate of 23.1% (non-reassuring status) as the most common indication for emergency caesarean section for all women admitted in the labour ward while in the referrals, the rate was 12.3%. This shows that the group of mothers with obstetric emergencies had more chances of grim diagnoses on arrival to KNH that necessitated quick intervention to prevent adverse maternal and fetal outcomes.

Most (23.1%) of the referred patients had routine observations and monitoring done in the labour ward while 8.4% received blood transfusion. Given the strong association between maternal mortality and blood availability ensuring availability of blood for prompt access to transfusion is warranted(26). About 17.6% had emergency caesarean section on admission due to reasons aforementioned and this contributed to longer duration of stay of more than 48 hours or more in 63% of the referrals. In this study, emergency obstetric services offered from the referring facilities were not optimal. Many lacked essential equipment and supplies and some health providers did not have critical skills needed to conduct deliveries and manage minor complications. There is an assumption that the health workers are thought to be skilled enough to manage normal deliveries and obstetric complications. The mere presence of skilled attendance at birth may be unlikely to reduce maternal mortality if there is no accompanying supportive environment of essential drugs, supplies and equipment and most importantly a functioning referral system. This initiative is supported by the Kenya National Reproductive Health Strategy 2009-2015 whose overall goal is to enhance the reproductive health status of all Kenyans by increasing equitable access to reproductive health services, improve quality, efficiency and effectiveness of service delivery at all levels and improving responsiveness to client needs(27).

Most (55%) of the women referred with obstetric emergencies arrived in first stage of labour and majority (50.4%) delivered via spontaneous vertex delivery. The referrals also had an overall caesarean rate of 44.6% which included those who had an emergency caesarean section on admission while the vaginal breech delivery rate was 3.1%. The KNH maternal mortality review reports during the study period reported an average emergency caesarean section rate of 34.1% in all women admitted to the Labour Ward. It is noted that in this study, the emergency obstetric referrals had a high caesarean rate in comparison to the total population admitted to Labour Ward indicating that this is a special group of patients who need timely intervention to prevent adverse maternal and fetal outcomes. In this study, the finding of 3.3% for assisted vaginal delivery indicates perhaps unnecessary caesarean sections were carried out for cases such as prolonged labour where the assisted vaginal delivery would have been indicated. From the results of a maternity health facility survey conducted in Nairobi informal settlements and environs in 2006(28), to assess the state of emergency obstetric services, a similar low rate (1.3%) of assisted vaginal delivery was reported. This might have been due to provider preference which could affect characterization of service delivery levels and its impact on overall maternal health.

Of the fetal outcomes, 57.4% were well babies, 23.2% were asphyxiated while 12.8% had complications related to prematurity. Perinatal loss rates are an index of the level of obstetric care(7). Stillbirths tend to decrease as the quality of care during and through out pregnancy improves. Nearly half of the neonatal deaths occur in first day of life (29). As reported, in this study there were two neonatal deaths recorded during the study period contributing to 0.9% while 28.9% were admitted to the New Born Unit. The cause of death was complications related to severe asphyxia. The perinatal mortality rate was 22/1000 live births. As reported from the KNH maternal and perinatal mortality reviews during the study period, the most common cause of neonatal death was related to severe asphyxia with an average rate of 26%. However, in this study, using APGAR scores, most of the fetal outcomes were good between seven and 10 accounting for 73.4%. The mean birth weight recorded was 2800 grams.

Most of the mothers (80.3%) had an uneventful course, 6% had febrile illness, 4.8% developed postpartum haemorrhage while 1.3% had genital injuries. There were two

direct maternal deaths recorded contributing to 0.9% and they died due to eclampsia and haemorrhage. The mother who died due to eclampsia had convulsed twice before arrival and on admission. Glasgow coma scale was 11/15 and resuscitation was commenced. Magnesium sulphate infusion was started and blood sample taken to assess for renal function. An indwelling catheter was put and output was less than 20mls/hour. Renal and ICU team was called in to review but patient succumbed during the waiting period which was about 8 hours. The mother who died of haemorrhage had presented with antepartum haemorrhage and in severe hypovolemic shock. Resuscitation was commenced and one unit of whole blood was availed within one hour. After stabilization, she was taken to theatre and intra-operatively couvelaire uterus was found and fresh stillbirth. She failed to reverse from general anaesthesia and was taken to ICU where she succumbed. The maternal mortality ratio for this study was 917/100,000 live births. During the study period, the KNH maternal mortality reviews reported an overall ratio of 882/100,000 in May 2011 and 1078/100,000 in June 2011. In comparison, a study done at Rift Valley PGH in 1998 (22) reported that 92.3% of the referrals had an uneventful immediate postpartum period while the postpartum maternal morbidity included febrile illness (3.1%) and genital injuries (1.2%)

Despite most of the referred mothers having attended antenatal clinic, the major and minor complications arising at the time of delivery do not seem to have been anticipated and coupled with the delays at various levels, their access to emergency obstetric care was hindered. In cases where they reached a facility that had skilled attendants, lack of a supportive environment in terms of basic supplies, equipment further delayed their accessing the necessary health care.

The need to strengthen the referral linkages as outlined in the Kenya National Reproductive Health strategy 2009-2015 (27) cannot be over emphasized.

Conclusions

From this study, these are the conclusions drawn:

1. There were low socioeconomic characteristics of the women referred with obstetric emergencies to KNH.
2. There was good antenatal seeking behaviour among these women.
3. The main referring institutions were from lower level health facilities Level two to four and mainly referred by doctors and nurses.
4. The main reasons given for referral were lack of theatre and basic drugs and supplies.
5. The main adverse maternal outcomes were anaemia and postpartum haemorrhage while asphyxia was the most common adverse fetal outcome.

Recommendations

1. Supervision and regulation of privately run hospitals and clinics to provide the minimum package of quality antenatal care and obstetric services.
2. Emphasis on incorporation of mobile telephone communication into the referral system linkages especially from lower levels of health care, to improve communication in referral and feedback.
3. Ensure basic supply of essential drugs, supplies and equipment at the lower levels of health care to provide basic emergency obstetric services even in the face of increasing population demand.
4. Functional transport should be readily availed by the referring facility to mothers with obstetric emergencies.

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Appendix 1: Informed Consent Form

STUDY TITLE: THE MATERNAL AND FETAL OUTCOMES IN EMERGENCY OBSTETRIC REFERRALS AT THE KENYATTA NATIONAL HOSPITAL

Principal Investigator: Dr. Elizabeth Njoroge

Introduction and Purpose
My name is.....
I wish to invite you to take part in this research study being conducted in the Department of Obstetrics and Gynaecology. In this research, we will identify the pregnant women who are referred as emergencies to deliver at KNH, the reasons why they are referred and the outcomes of the pregnancies. Please feel free to stop me and ask any questions.

Procedures
You are part of approximately 232 pregnant women who will take part in this study.

Benefits
This research will be very useful in collecting information on the major outcomes of emergency obstetric referrals and causes of maternal and perinatal mortality in a major referral facility. It will assist the hospital in contributing towards safe motherhood and recommend ways to improve existing health systems or to develop newer and effective ones.

Confidentiality
We will ensure that data is handled as confidentially as possible. Your name and other personal information will not be used in the final report, and your identity will not be revealed. Only the person doing the research will be allowed to handle your personal information in the questionnaire. Other patients and health workers will not have access to the content of your questionnaire.

Compensation
You will not be paid for taking part in this study.

Rights
Participation in this research is completely voluntary. You are free to decline to take part in the study without giving any reason. Whether or not you choose to participate in the research or to answer a question, there will be no penalty to you or loss of benefits which you are otherwise entitled to.

Who to Contact
If you have any questions, you may ask them now or later, even after the study has started. If you wish to ask questions later, you may contact any of the following:

Prof K.M. Bhatt
Land Line : 020-2726300-19
Ext. :44102

Dr. Elizabeth W. Njoroge
Mobile:254-722344156
Email: ellshebah@yahoo.com

This proposal has been reviewed and approved by Kenyatta National Hospital Ethics and Research Committee, which is a committee whose task it is to make sure that research participants are protected from harm.

CERTIFICATE OF CONSENT

* *

I have read (been read for) the information about the research. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research.

Print Name of Participant_____

Signature (or left thumb fingerprint) of Participant _____

Date _____/_____/_____
DD/MM/YYYY

Witness name
Signature
Date _____/_____/_____
DD/MM/YYYY
Statement by the researcher/person taking consent:

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands the purpose of the study.
I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Print Name of Researcher/person taking the consent_____

Signature of Researcher /person taking the consent_____

Date _____/_____/_____
DD/MM/YYYY

Appendix 2: Fomu ya Kuidhinisha Ukubalifu Wangu Katika Kushirikishwa Katika Uchunguzi Baada ya Maafikiano

MADA: MATOKEO YA UKUNGA UNAOFANYIKA KATIKA HOSPITALI KUU YA KENYATTA KWA WAGONJWA WANAOTUMWA PALE KWA DHARURA

Mchunguzi mkuu: Dkt Elizabeth Njoroge

Nia na Utangulizi

Jina langu ni.....

Nitafurahia sana iwapo wewe utajitolea katika kuchangia utafiti na uchunguzi unaoshughulikiwa na idara ya ukunga na siha za kuukeni. Mchango wako utawezesha huduma bora na siha nzuri. Katika uchunguzi huu, tutawateua wanawake wajawazito wanaotumwa hospitalini ya Kenyatta kujifungulia hapo kama jambo la dharura. Tutachunguza kiini cha kutumwa kwao na matokeo ya mimba yao. Tafadhali jisikie huru kuuliza swali lolote upatapo mushikili.

Utaratibu

Wewe ni mmoja wa wanawake mia mbili thelathini na tatu wajawazito ambao wametafadhalishwa washirikiane nami katika uchunguzi huu.

Dhima/Faida

Uchunguzi huu utafaa sana katika kukusanya habari kuhusu kunga za uzalishaji. Uchunguzi huu utasaidia hospitali yetu kuunda sera zitakazoelekeza kuboresha mfumo wa afya na matibabu ulioko sasa au kuwezesha kuwako mifumo bora mpya.

Siri

Taarifa zote ambazo zitakusanywa hapa ni za siri kamwe hazitatolewa hadharani. Habari za kibinafsi hazitachapishwa wala kuwekwa katika ripoti itakayotolewa baada ya uchunguzi. Mchunguzi mkuu peke yake ndiye atakayepata habari utakazotoa, hasa zinazokuhusu wewe binafsi. Wagonjwa wengine na wahudumu na wauguzi wa hospitali hawatadiriki kuziona kuzijua taarifa zako.

Fidia

Kushiriki kwako katika uchunguzi huu hakutafidiwa kwa jinsi yoyote. Hakuna malipo yatakayotolewa.

Haki

Mchango wako katika uchunguzi huu ni wa hiari yako na ni huru kabisa. Endapo utaamua kusita kushiri, hakuna adhabu yoyote utakayopata. Usipoweza kujibu swali lolote, wala ukiamua kutojibu vile, hutapungukiwa kwa vyovyote.

Mawasiliano

Endapo utakuwa na haja ya kutaka kujua zaidi wakati wa mahojiano na baadaye, unaweza kuwasiliana na wafuatao:

Profesa K.M. Bhatt
Simu ya mkono: 020-2726300-19
:44102

Dkt. Elizabeth W. Njoroge
Simu ya rununu:254-722344156
Kipepesi:ellshebah@yahoo.com

CHETI CHA IDHINI

Nimesoma (au nimesomewa) taarifa katika utafiti huu. Nimepata fursa ya kuuliza maswali. Maswali yangu yote yalijibiwa kwa majibu yaliyoniridhisha. Ninakubali kujitolea kwa hiari kuwa mshiriki katika uchunguzi wa utafiti huu.

Jina la mshiriki.....

Saini (au alama ya kidole gumba ya kushoto) ya mshiriki.....

Tarehe _____/_____/_____
Siku / Mwezi / Mwaka

Jina la mshahidi
Saini
Tarehe _____/_____/_____
Siku / Mwezi / Mwaka

Maelezo ya mtafiti/anayeidhinishiwa

Nimemsomea mshiriki makala ya utafiti na nikahakikisha. kadiri nilivyoweza. kumfahamisha malengo ya uchunguzi. Ninaidhinisha kwamba mhusika alipewa nafasi ya kutosha kuuliza maswali yote yanayohusiana na uchunguzi ambayo angependa kujua. Maswali yote yaliyoulizwa na mshiriki au mhusika yalijibiwa kikamilifu na kwa jinsi ya kuridhisha. kama nijuavyo. Ningependa pia kuhakikisha kwamba mhusika hakushurutishwa kushiriki katika utafiti huu bali alijitolea kwa hiari. Asingependa asingeshiriki.

Piga chapa jina la mtafiti/anayeidhinishwa.....

Saini ya mtafiti/anayeidhinishwa.....

Tarehe _____/_____/_____
Siku / Mwezi / Mwaka

Appendix 3: Questionnaire

I IDENTIFICATION DATA

In patient number

Serial Number

II SOCIO-DEMOGRAPHIC CHARACTERISTICS

1. What is the age in completed years?

2. How many deliveries has the patient had?

3. What is the marital status?

a) Single

b) Married

c) Separated/Divorced

d) Widowed

4. What is the occupation/profession?

a) Student

b) Housewife

c) Self-employed

d) Civil servant

e) Private sector

f) Other (specify)

5. Where does the patient reside?

a) Rural

b) Urban

c) Informal settlement

6. What level of schooling did the patient attain?

a) Nil

b) Primary

c) Secondary

d) College

e) University

f) Other (specify)

III PAST OBSTETRIC HISTORY

1. How many pregnancies has the patient had?

2. What was the outcome of the past pregnancies?

a) miscarriage

- 28 weeks
- 28 weeks

b) ectopic pregnancy

c) stillbirth

d) live birth

e) neonatal death

f) other (specify)

3. What complications has the patient had during their pregnancies?

a) none

b) anaemia Haemoglobin level 10g/dL

c) bleeding in pregnancy <28 weeks

d) bleeding in pregnancy >28weeks

e) urinary tract infection

f) hypertensive disease

g) malaria

h) cardiac disease

i) premature rupture of membranes

j) premature labour <37 completed weeks

k) diabetes mellitus

l) other (specify)

4. What complications has the patient had during their past deliveries?

a) none

b) prolonged labour

c) obstructed labour

d) cord prolapse

e) malpresentation

f) fetal distress

g) ruptured uterus

h) delayed second stage

i) intrapartum bleeding

j) other (specify)

5. How has the patient delivered their babies in the past?

a) spontaneous vaginal

b) assisted vaginal delivery

c) vaginal breech

d) caesarean

e) other (specify)

6. What complications developed in the immediate post delivery period in the past?

a) none

b) post partum haemorrhage

c) retained placenta

d) puerperal sepsis

e) other (specify)

IV CURRENT PREGNANCY

1. When was the Last Menstrual Period?

2. When is the Expected Date of Delivery?

3. What is the gestation by dates-in completed weeks?

4. Did the patient attend an Antenatal Clinic during this pregnancy?

a) Yes

b) No. If no, please go to section on Referral

5. If Yes to No. 4, where did the patient attend Antenatal Clinic?

a) City Council Clinic

b) Private clinic

c) Health centre

d) Private hospital

e) Obstetrician/gynaecologist

f) Other (specify)

6. At how many months of pregnancy did the patient start attending the antenatal clinic?

7. How many times did the patient attend?

a) 0-4

b) 4-8

c) other (state number)

8. Did the patient have any of the following during this pregnancy?

a) none

b) threatened miscarriage

c) bleeding after 28 weeks of pregnancy

d) anaemia Haemoglobin level 10g/dL

e) premature rupture of membranes

f) urinary tract infection

g) malaria

h) cardiac disease

i) diabetes mellitus

j) other (specify)

V REFERRAL

1. Where was the patient referred from?

a) dispensary

b) health centre

c) subdistrict hospital

d) district hospital

e) provincial hospital

f) private clinic

g) private hospital

h) other (specify)

2. What is the name of the referring institution/health facility?

3. Who referred the patient?

a) nurse

b) clinical officer

c) medical officer

d) other (specify)

4. What was the reason for transfer?

a) lack of supplies

b) lack of a doctor

c) lack of anaesthestist

d) lack of a theatre

e) financial constraints

f) medical/obstetric complications

g) other (specify)

5. What was the interval between the time decision was made to refer and the time left the referring place? (minutes/hours)

6. What mode of transport was used to get here at the Kenyatta National Hospital?

a) handcart

b) bicycle

c) taxi

d) matatu

e) bus

f) personal vehicle

g) hospital vehicle

h) other (specify)

7. How long did it take the patient to reach The Kenyatta National Hospital from where they were referred from? (hours)

8. How long did it take for the patient to be attended from time of arrival to KNH?

9. What diagnosis was made on arrival to the Kenyatta National Hospital?

a) normal labour
b) antepartum haemorrhage
c) postpartum haemorrhage
c) CPD in labour
d) prolonged labour
e) obstructed labour
f) ruptured uterus
g) cord prolapse
h) non-reassuring fetal status
i) preeclampsia
j) eclampsia
k) shock
l) malpresentation
m) other (specify)

10. Were all the requirements for management available?

a) intravenous fluids
b) antibiotics
c) induction of labour
d) augmentation of labour
e) blood transfusion
f) assisted vaginal delivery
g) available emergency theatre
h) routine observations and monitoring
i) other (specify)

11. If none, what was lacking and how was this resolved and after how long?

12. What treatment was administered to the patient on arrival to The Kenyatta National Hospital?

a) intravenous fluids

b) antibiotics

c) induction of labour

d) augmentation of labour

e) blood transfusion

f) assisted vaginal delivery

g) available emergency theatre

h) routine observations and monitoring

i) other (specify)

VI OUTCOME

1. General condition of the mother on arrival

a) good

b) fair

c) poor

2. Stage of labour

a) not in labour

b) first stage

c) second stage

d) third stage

3. State of the fetus (if undelivered)

a) no fetal heart heard

b) irregular fetal heart rate

c) normal fetal heart rate (between 110-160 beats per minute)

d) decreased fetal heart rate (110 beats per minute)

e) increased fetal heart rate (160 beats per minute)

4. Mode of delivery

a) spontaneous vaginal

b) assisted vaginal delivery

c) vaginal breech

d) caesarean section

e) other (specify)

5. Duration of labour (hours)
6. Fetal outcome
    a) live birth
    b) fresh stillbirth
    c) macerated stillbirth
7. Birth weight (grams)
8. Apgar score at 5 minutes
9. Outcome of live birth
    a) well
    b) asphyxia
    c) stillbirth
    d) prematurity
    e) low birth weight
    f) neonatal sepsis
    g) neonatal death
    h) other (specify) e.g malformation

10. Admission to NBU
    a) Yes
    b) No

11. Maternal outcome
    a) uneventful
    b) fever of > 38°C within 24 hours of delivery
    c) wound sepsis
    d) genital injuries such as tears and lacerations
    e) anaemia Haemoglobin level 10 g/dL
    f) acute renal failure
    g) cerebrovascular accidents
    h) coma
    i) death
    j) other (specify)

12. Duration of maternal stay in the hospital from time of delivery to time of discharge

    a) 24 hours

    b) 24 - 48 hours

    c) 48 hours. What was the reason for the long stay?

KENYATTA NATIONAL HOSPITAL
Hospital Rd. along, Ngong Rd.
P.O. Box 20723, Nairobi.
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP", Nairobi.
Email: KNHplan@Ken.Healthnet.org

Ref: KNH-ERC/ A/41

9th March, 2011

Dr Elizabeth W. Njoroge
Dept. of Obs/Gynae
School of Medicine
University of Nairobi

Dear Dr Njoroge

RESEARCH PROPOSAL: "THE MATERNAL AND FETAL OUTCOMES IN OBSTETRIC EMERGENCY REFERRALS TO THE KENYATTA NATIONAL HOSPITAL, NAIROBI, KENYA" (P397/11/2010)

This is to inform you that the KNH/UON-Ethics & Research Committee has reviewed and **approved** your above revised research proposal for the period 9th March 2011 – 8th March 2012.

You will be required to request for a renewal of the approval if you intend to continue with the study beyond the deadline given. Clearance for export of biological specimens must also be obtained from KNH/UON-Ethics & Research Committee for each batch.

On behalf of the Committee, I wish you a fruitful research and look forward to receiving a summary of the research findings upon completion of the study.

This information will form part of the data base that will be consulted in future when processing related research study so as to minimize chances of study duplication.

Yours sincerely,

PROF A N GUANTAI
SECRETARY, KNH/UON-ERC

c.c. The Deputy Director CS, KNH
The HOD, Records, KNH
The Chairman, Dept. of Obs/Gynae, UON
Supervisors: Dr. Alice Mutungi, Dept of Obs/Gynae, UON
Dr. H. Tammoh, Dept of Obs/Gynae, KNH

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KENYATTA NATIONAL HOSPITAL

P.O. Box 20723 – 00202 Fax: 2725272
NAIROBI

RE: KNH/OBS/GYN/RESEAR/16

Date: 30th March, 2011

To

Dr. Elizabeth W. Njoroge
Department of Obstetric & Gynaecology
UNIVERSITY OF NAIROBI

RE: PERMISSION TO CONDUCT RESEARCH STUDY TITTLED THE MATERNAL AND FETAL OUTCOMES IN OBSTETRIC EMERGENCY REFERRALS TO KNH

Your request for permission to conduct the above study in labour of Kenyatta National Hospital has been approved. Ensure that the study does not interfere with normal running and rendering of clinical services.

Kindly liaise with Assistant Chief Nurse Obs/Gyn and labour ward incharge to facilitate your research. The department expects you to give a feedback when you finish the study.

Dr. John Ong'ech
HEAD OF DEPARTMENT
OBSTETRIC AND GYNAECOLOGY, KNH

CC: Chair, Obs/Gyn UON
ACN, Obs/Gyn