NDAYISHIMIYE Martin

UNIVERSITY OF RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF MEDICINE

RESPONSIVENESS TO LIFE THREATENING OBSTETRICAL EMERGENCIES

A dissertation presented in partial fulfilment of the requirement for the Award of a Master of Medicine in Obstetrics and Gynecology

Presented by: **Dr. NDAYISHIMIYE MARTIN**

Supervisor: **Dr. RULISA Stephen**

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DECLARATION

I, **Dr. NDAYISHIMIYE Martin,** hereby declare that, this dissertation entitled **RESPONSIVENESS TO LIFE THREATENING OBSTETRICAL EMERGENCIES »** is my original work and has never been presented elsewhere for academic qualification.

Student Name: **Dr. NDAYISHIMIYE Martin**

Student Number: PG

Sign _____ Date _____

Certification by the supervisor

This research has been submitted with my approval as the Supervisor of University of Rwanda

Name: **Dr. RULISA Stephen**

Sign _____ Date _____

For and on behalf of University of Rwanda .

DEDICATION

To my wife and my children

To my Parents

To my sisters

To my brother

To all my Friends and relatives

I dedicate this work

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ACRONYMS AND ABBREVIATIONS

ACTG: US AIDS Clinical Trials Group

ACOG: American College Of Obstetrician And Gynecologist

BUTH: Butare University Teaching Hospital

CD : Cesarean delivery

CMHS/IRB: College Of Medicine And Health Sciences/ Institutional Review Board

CTEB : Cooperation Technique Belge

DIC: Disseminated Intravascular Coagulopathy

EmOC: Emergency Obstetrical Care

IOM: Institute Of Medicine

KUTH: Kigali University Teaching Hospital

MDG: Millennium Development Goals

PPH: Post partum haemorrhage

SIRS: Systemic Inflammatory Response Syndromk

SPSS: Statistical Package for Social Sciences

WHO: World Health Organisation

Abstract

Background: While most pregnancies and births are uneventful, all pregnancies are at risk for complications. Approximately 15% of all pregnant women develop a potentially life-threatening complication that requires skilled emergency obstetric care.

Objective: This study aimed at assessing the clinical practice in managing life threatening obstetrical emergencies in three large health facilities in Rwanda.

Methodology: A prospective descriptive study design was conducted from October 2015 to December 2015 in three hospitals in Rwanda on all successive patients admitted with life-threatening obstetrical conditions (sepsis, surgical site infection (SSI), postpartum hemorrhage (PPH) and needing emergency cesarean delivery (CD) . Data was collected from both the patients' records and interview using a structured questionnaire administered by midwives**.** . In instances where suboptimal patient outcomes (maternal mortality, perinatal mortality, maternal "near miss" event) were encountered, an attempt was made to determine whether the barrier to delivery of expeditious emergency care was primarily at the level of the patient, the providers, the system, or a combination of those three factors. For each poor outcome identified, an attempt was made to assign a relative weight to each of the three factors felt to have contributed to the adverse event .Statistical analysis was performed using SPSS for Windows.

Results: A total of 405 patients with life threatening obstetrical conditions were admitted during the study period: 164(40.3%) are from Kigali Teaching Hospital 134 (33.3%) from Butare University Teaching Hospital and 107(26.4%) from Kibagabaga District hospital. At

all of the sites, it was found that the emergency cesarean delivery was the most common emergency and represent 40% of all emergencies at admissions. Sepsis was the second most common obstetrical emergency. The mean time from admission to the first evaluation by physician was 21 minutes, range (0-240 minutes). The mean interval from decision to incision for cesarean section was 54.7 minutes range (10-150 minutes). In this study, it was found that it required 2.63 hours (1-3.5hours) to commence surgery in the setting of hemorrhage, and it took 6.43 hours (2-19hours) for surgery to begin in the setting of infection. If transfusion was required the average time to obtain blood was 71 (25-360 minutes) minutes. Among challenges encountered, It was found that systems issues, as opposed to provider issues or patient issues, accounted for over three quarters of the barriers to patients receiving timely emergency care.

Conclusion: There were significant delays in initiating surgery in the setting of hemorrhage and sepsis, although CD was able to be begun relatively quickly in our setting." then, "Our study data…point out the challenges encountered at the level of both patients, providers, and the health system, all of which need to be addressed in order to expedite emergency obstetric care and lower maternal mortality in our setting.

Introduction

While most pregnancies and births are uneventful, all pregnancies are at risk. Around 15% of all pregnant women develop a potentially life-threatening complication that calls for skilled care, and some will require a major obstetrical intervention to survive. Almost 1,000 women die from pregnancy or childbirth-related complications around the world every day; of these, 99% occur in low-resource countries.

Improving maternal health is one of the eight Millennium Development Goals (MDGs) adopted by the international community in 2000. The fifth MDG is to achieve a 75% reduction in maternal mortality between 1990 and 2015. In cooperation with WHO, USAID, CTEB, in 2008 Rwanda initiated a new approach ~~of~~ to emergency obstetrical care (EmoC) for the reduction of maternal morbidity and mortality. In 2008, the maternal maternity ratio (MMR) was 750/100,000, and the target was to reduce it to 250/10000 by 2015[1] .

EmOC is a package of medical interventions that has been developed to treat the five direct obstetric complications: obstetric hemorrhage, obstructed labor, septicemia, hypertensive disorders in pregnancy, and unsafe abortion, which are responsible for 75% of maternal deaths. EmOC includes access to skilled birth attendants, emergency delivery services, transfusion, family planning, and this package has been implemented globally to reduce maternal mortality. However, in spite of global efforts to reduce mortality, the World Health Organization (WHO) reports that the global MMR declined by only 2.3% per year between 1990 and 2008. This is far from the annual decline of 5.5% required to achieve the fifth MDG.

In settings where maternal mortality is highest, three crucial delays are directly associated with elevated rates of maternal mortality: (1) delay in seeking health care (delay in recognizing the problem and making a decision to seek care), (2) delay in reaching a health facility, and (3) delay in obtaining appropriate care upon reaching a health facility.

To improve obstetric outcomes, a woman must recognize that she is experiencing an obstetric emergency, her family must be supportive of her seeking care at a health facility, she must be able to access transportation and be successfully transported to the appropriate health facility, and she must receive the care that she needs. Many women experiencing an obstetric complication arrive at public hospitals in a critical state at admission.

Outcomes of these emergencies depend on a rapid and coordinated response to the problem. Unfortunately, although women may overcome the first two delays, they often die because they do not receive timely, appropriate care.

While important clinical interventions and technologies are available to manage obstetric emergencies, delay in diagnosis; outdated clinical protocols; inadequately trained staff; failure to employ sufficient medical and surgical staff; and lack of essential medications, equipment, and supplies all may contribute to suboptimal outcomes.

In addition, lack of communication and teamwork within the obstetric and midwifery teams have frequently been identified as leading causes of maternal and perinatal deaths.

While the acceptable level for intrapartum and very early neonatal death rates has not been determined, case fatality rates from maternal and newborn emergencies remain high in most low-resource countries, and are a measure of the quality of emergency obstetric and newborn care. Standards and guidelines for implementing EmOC have existed for decades, but countries have had enormous difficulties implementing them. Since 1997, experience in more than 40 countries has shown that while health systems often have at least one facility providing comprehensive EmOC per 500,000 population, and sometimes more, fully functioning facilities providing basic EmOC are much less common (the WHO standard is four basic EmOC facilities for 500,000 population).[2]

Our goal was to establish baseline data about the frequency of life threatening obstetrical emergencies at three large hospitals in Rwanda. We will also looked at response times and examined the factors associated with delays in the management of critical patients. It is hoped that with the establishment of baseline data that quality improvement measures can be established and monitored.

METHODS

The study is an observational, prospective chart review of patients presenting for emergency obstetrical services in three large hospitals in Rwanda, Kigali University Teaching Hospital (KUTH), Butare University Teaching Hospital (BUTH) and Kibagabaga District Hospital. Kigali and Butare University Teaching Hospitals are tertiary referral teaching hospitals which receive referrals from regional district hospitals and Kibagabaga District Hospital receives referrals from local health centers .During 2015, 2040 women delivered at KUTH, with 764 (38.7%) by cesarean delivery

(CD), 1647 women delivered at BUTH, with 658 (40%) by cesarean section, and at Kibagabaga District Hospital 4758 women delivered, with 1474 (31%) by cesarean section.

All cases admitted with severe obstetrical morbidity from October 2015 to December 2015 were reviewed for inclusions. This included all life threatening conditions such as hypertensive crisis (severe preeclampsia/eclampsia), sepsis, surgical site infection (SSI), hemorrhage, emergency Cesarean delivery (CD). Women who were pronounced dead on admission [or who arrived pulseless] were excluded.

A total of 405 patients met study criteria and were included. Data collection included patient demographics, diagnosis on admission, timeline of events, interventions ordered and received, and their timeline. The time from admission to the first evaluation by a doctor in admissions, and the time from decision to surgical and nonsurgical interventions, were recorded on all patients.

The data were entered in Epidata, and analyzed in SPSS software The following were standards upon which we based our audit: Time from admission to the first evaluation by doctor in emergency condition, and time taken from the decision to next management, time from decision to incision for emergency cesarean section, time for infection source control (surgery), and for others operations. Prior to the enrollment of the first case, the protocol was submitted to the Butare and Kigali University Teaching Hospital Ethics Committees and CMHS institutional review board (IRB) for review and approval. Patients were identified by the code created using initials of the health facility, followed by the record number of the patient in the registry. Data sheets were kept in a locked cabinet which was only accessed by the investigators.

RESULTS

The case load for severe obstetric morbidity was high : the total number of cases in three months was composed 405 patients, 164 (40,3%) are from KUTH, 134 (33.3%) were from BUTH and 107 (26.4%) from Kibagabaga District Hospital. The incidence of severe obstetric morbidity was most likely to be associated with labor dystocia, hemorrhage, hypertensive diseases, and sepsis. The majority of cases were in a critical state at the time of admission to the hospital.

Most patients (92.7%) were between 20 and 39 years old with 29 years as mean patient age. About seventy six per cent of women were multiparous, and 24% were primiparas. The majority of the patients at KUTH and BUTH where transfers with 68.8% and 61.1% transferred respectively.

At all sites, cesarean delivery was the most frequent intervention, performed in 56.7% all site combined admissions, with 52.1% at KUTH, 47.6% at BUTH and 76.6% at Kibagabaga Hospital. Sepsis was the second most common diagnosis at KUTH and BUTH (25% and 21.6% respectively) (Table 1).

Table 2 shows the time taken to respond during the emergency cesarean section, from admission to incision. It was divided into four intervals; the interval time from admission to the first evaluation by a doctor and taken the decision for next management; the interval time from the decision to operate to the time to enter the theater; the time interval from entering theater to incision, and the time interval from decision to incision.

It was found that, by site, it took 17.5 minutes, 24.9 minutes, and 21.4 minutes to be evaluated at emergency by a doctor respectively at KUTH, BUTH and KIBAGABAGA district hospital. It took 33.4 minutes; 31.2 minutes, and 31.5 minutes from decision to enter theater at each site; and, after entering the theater to incision it was found that to take 24.6minutes; 25.6minutes; and 18.1 minutes respectively at each site. The interval time from decision to incision then was 57.7 minutes; 55.7 minutes; 49.3 minutes respective to the site, with a mean of 54.7 minutes for all sites combined. Table 3 shows the time taken to respond during the surgeries other than cesarean section, from admission to incision, as well as the and time needed to get blood if required. It was found that it took 2.63 hours to perform surgery for clean surgeries such as laparotomy for ectopic, and postpartum hemorrhage, and 6.43 hours for infection source control, such as wound infections and laparotomy for peritonitis. If transfusion was required, it took 71 minutes to get blood. In all cases combined, average times if transfusion is needed were 62 minutes in non-septic patients, and 96 minutes in septic patients. The time to obtain antibiotics from admission for septic patients in different sites was 56.8 minutes at KUTH and 78 minutes at BUTH; Kibagabaga District hospital managed 2 cases and received antibiotic after 120 minutes from admission. (Table 2)

The challenges described in Table 4 are those systems issues that were observed in managing emergencies, such as delay in getting blood, no sterile surgical kits, surgeon not available, no room in theater/busy were the principal challenges encountered, together accounting for over a quarter of the delays. There were probably other significant systems issues, such as the failure of the pharmacy to keep critical antibiotics in stock, as well as the ability of the patient to afford the drugs needed, and the fact there may not have been a patient care giver with a transfer patient who could go buy the needed medicines, etc

DISCUSSION

As demonstrated in Table 5, the standardized time intervals recommended by the IOM and ACOG [3] were not able to be met in our settings in all cases. Nevertheless, over two thirds of patients were able to be seen by a physician within 15 minutes of admission at all three institutions .Time interval from decision to incision for emergency cesarean section was standardized by many societies at 30 minutes[4 5 6] ; however, in our study only 22.5% at KUTH, 17% at BUTH, and 20.6% at KIBAGABAGA district hospital met the criteria. It might be pointed out however that ACOG has now changed the wording of its recommendation for "decision to incision" time from "within 30 minutes", to "within a reasonable time period", recognizing the difficulty many rural hospitals in the United States have in achieving "the 30-minute rule". There is also evidence that performing CD within 30 minutes may not necessarily be associated with the best outcomes [4 6].

Perinatal outcomes was not bad there was 4 neonatal deaths or 30 asphyxiated(low APGAR score less than 6) infants were born to women included in cases of emergency CD in 251 babies;11of those 34 were operated within 30min.maybe the time taken was dependant to the kind of emergency.

As regards the care of septic cases, at KUTH 75% and 48% at BUTH of cases were operated within 6 hours according to the standard of 6 hours [7 8]. Findings show that at KUTH 54,5% and at BUTH 58.6% of patient received antibiotic within 1 hours to admission according to the standards[9 10]. (Here you might also refer to the key papers on "early goal-directed therapy" for sepsis [I can try to find the references], as well as the critiques of those studies).

This study represents baseline characteristics of emergency obstetric care in three large Rwandan Hospitals. Baseline data is necessary to evaluate for areas of improvement. There is no similar study in Rwanda so this study can be used as reference in subsequent study. KUTH, BUTH and KIBAGABAGA district hospital authorities will have baseline data on how patients are being managed, so policy aimed at quality improvement can be instituted and further detailed studies can be started. In summary, we recommend that the individual sites, as well as national policy makers, should strive to educate women during antenatal care to anticipate potential complications of childbirth, and to have a plan of action in an emergency, to strengthen the standards and policies relevant to emergency obstetric management during the training of skilled birth attendants, to prioritize the availability of the materials and equipment necessary to effectively manage obstetric emergencies in the national hospital system; and to develop a communication and transportation system to overcome the delays in management that lead to the loss of life of mothers and babies in Rwanda.

CONCLUSIONS

The interval between decision and emergency obstetric surgery substantially exceeded the 30 minutes generally advocated for emergency Caesarean delivery (CD) in industrialized countries, but seemed to be a reasonable interval given the generally good perinatal outcomes most infants did well .The interval from admission to infection source control and antibiotic administration significantly exceeded that which is generally advocated by the literature, although the patients were critically ill and required prompt surgery to save the mother's life.

The reasons for the long delays were multiple and complex, but the main factors governing them were the huge case load for severe obstetric morbidity, and the absence of any clear policy towards ensuring prompt and adequate treatment for life-threatening emergencies This study has a number of limitations that may affect the generalizability of the findings. Emergency care was only examined in three hospitals and for a limited number of cases over a short time interval. Case selection relied on the midwife, and although midwives were advised to aim for a general representation of cases, the worst cases could have been selected for audit. Even if we report on the most severe cases, the extreme time intervals reported here are symptomatic of the major case load and organizational problems faced by the hospitals in our setting.

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Table 1: Socio-demographic characteristic of study participant by site

		CHUK N(%)	CHUB N(%)	KIBAGABAGA N(%)	TOTAL N(%)
GROUPE AGE	20-29	69(42.2)	69(51.4)	64(56)	202(48)
	30-39	86(52.6)	60(44.7)	43(35.5)	189(44.6)
	>=40	9(5.6)	5(2.2)	0	14(2.2)
GRAVIDITY	G1	51(31)	20(14.9)	27(25.2)	98(24.1)
	G2	43(26.2)	42(31.3)	36(33.6)	121(29.8)
	G3	30(18.2)	42(31.3)	25(23.3)	97(23.9)
	G4+	40(24.3)	30(22.3)	19(17.7)	89(21.9)
TRANSFERED	NO	51(31)	52(38.8)	84(78.5)	187(46.1)
	YES	113(68.9)	82(61.1)	23(21.4)	218(53.8)
TYPE OF EMERGENCIES	Cesarean delivery	85(51.8)	64(47.7)	82(74.7)	231(57)
	PPH	17(10.3)	20(15)	10(9.3)	47(11.6)
	SEPSIS	41(25)	29(21.6)	2(1.8)	72(17.7)
	ANTEPARTUM HEMORRHAGE	17(10.3)	17(12,6)	7(6.5)	41(10)
	HYPERTENSIVE CRISIS	4(2.2)	4(2.9)	6(5.6)	13(3.2)

Table 2: Times frame of events during emergency cesarean section

		N	Mean	95%Confidence Interval for Mean	RANGE
TIME FROM ADMISSION TO THE FIRST EVALUATION BY DOCTOR ANDDECISION	KUTH	102	17.5	14.2-20.8	0-240
	BUTH	83	24.9	19.1-30.6	10-120
	KIBAGABAGA	63	21.5	18.6-24.4	010-60
	Total	248	21	18.5-24	0-240
TIME FROM DECISION TO ENTERING THEATER	KUTH	158	33.4	30.4-36.4	10-120
	BUTH	121	31.2	28.6-34	010-70
	KIBAGABAGA	106	31.5	28.5-34.5	010-70
	Total	385	32.2	30.5-34	10-120
TIME FROM ENTER THEATER TO INCISION	KUTH	158	24.6	23.2-26	010-45
	BUTH	121	25.6	24.1-27	010-48
	KIBAGABAGA	106	18.1	16.7-20	010-45
	Total	385	23.1	22.3-24	010-48
DECISION TO INCISION FOR CESAREAN SECTION	KUTH	158	57.7	54-61	20-150
	BUTH	121	55.7	52.1-59.2	20-107
	KIBAGABAGA	106	49.3	45.7-53	20-105
	Total	385	54.7	52.6-57	20-150
TIME INTERVAL FROM ADMISSION TO RECEIVE ANTIBIOTICS IF ADMITTED WITH SEPSIS	KUTH	44	56.8	61.3-95.5	20-300
	BUTH	29	57.8	62.3-91.1	30-200
	KIBAGABAGA	2	0	0-120	0-120
	Total	75	49.6	67.5-90.4	20-300

Table 3: Time to surgery for non-cesarean cases and time required to get blood for transfusion when needed, all sites combined.

		N	Mean (hours)	95%Confidence Interval for Mean	Range
TIME TO SURGERY	Surgery(nonseptic)	123	2.63	1.38-3.88	1-3.5
	Surgery(septic)	64	6.43	5.6-7,3	002-19
	Total	187	3.93	3.0-4.8	001-19
TIME TO TRANSFUSION	Nonseptic	116	62.36	57.3-67,36	25-180
	Septic	40	96.37	76.3-116.4	30-360
	Total	156	71.08	64.4-77.71	25-360

Table 4: : Challenges resulting in delay of management

	Frequency	Percent
Delay in getting blood	48	11.8
No sterile surgical kits	11	2.7
Surgeon not available	18	4.4
No room in theater/busy	27	6.6
Difficult to get special consult	16	3.9
Patient issues	15	3.7
No challenges	268	66.7
	405	100

TABLE5: Promptness of Interventions

Time interval from admission to the first evaluation by				
	Time	CHUK Frequency (%)	CHUB Frequency (%)	KIBAGABAGA Frequency (%)
Admission to the first evaluation by doctor	≤15min	72(70)	56(67.5)	40(66,6)
	>15min	30(29)	27(32.5)	23(33)
TOTAL		102(100)	83(100%)	63(100)
Time interval from decision to incision for emergency cesarean section.				
CESEREAN	≤30min	21(22.5)	13(17)	20(21.5)
	>30min	72(77.4)	63(82.8)	73(78.5)
		93(100)	76(100)	93(100)
Time interval to surgery for infection source control				
SEPSIS	≤6Hrs	27(75)	13(48.1)	0
	>6Hrs	9(25)	14(49.9)	2
		36(100)	27(100)	2
time interval to be given antibiotic in sepsis				
Interval to antibiotics	<+1Hrs	25(54,5)	17(58.6)	0
	>1Hrs	19(45,4)	12(41.3)	2
Total		44(100)	29(100)	2