

Maternal Mortality and Near Miss Morbidity at the University Teaching Hospital in Kigali, Rwanda

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ABSTRACT

Objective: To evaluate maternal mortality and near-miss morbidity at the University Teaching Hospital (CHUK) in Kigali, Rwanda, a tertiary referral hospital.

Methods: A retrospective chart review was performed. All cases of maternal mortality and near-miss maternal morbidity at CHUK from October 1, 2012-October 31, 2013 were analyzed. All maternal intensive care unit admissions were determined to be near-miss maternal morbidity events. Charts were obtained through medical records and manual data extraction performed.

Results: There were 80 deaths during the study period. The three major sources of maternal mortality were sepsis (32%), hemorrhage (20%), and hypertensive disease (12%). Of interest, 46% of sepsis cases resulting in death were status post cesarean section. The most common causes of near-miss morbidity (n=53) were also sepsis (30%), hemorrhage (21%), and hypertensive disease (17%). Overall, 96% of total cases (death and near miss) were transfers from district hospitals. Seventy one percent of total patients had abnormal vital signs on admission.

Conclusion: Sepsis was the most common cause of maternal mortality and near-miss morbidity for the study period. This data set is being used to actively improve maternal outcomes not only at CHUK but also across Rwanda. Educational campaigns focused on the specific problem areas noted could result in dramatically decreased morbidity and mortality.

Keywords: Maternal mortality, sepsis, Rwanda

INTRODUCTION

The World Health Organization defines a maternal death as death of a woman while pregnant or within 42 days of termination of pregnancy, from any cause related to pregnancy or its management. This excludes accidental causes. Maternal mortality ratio is defined as the number of maternal deaths per 100,000 live births [1]. Near-miss maternal mortality is defined as a medical condition that would have resulted in maternal death, if not for significant medical intervention. Most authorities acknowledge any obstetrical intensive care unit (ICU) admission to be a near-miss event [2].

The purpose of this study is: 1) to evaluate maternal mortality and near-miss morbidity at the university hospital CHUK in Kigali, Rwanda 2) to raise continued global awareness of the need for excellent obstetric care in Rwanda.

METHODS

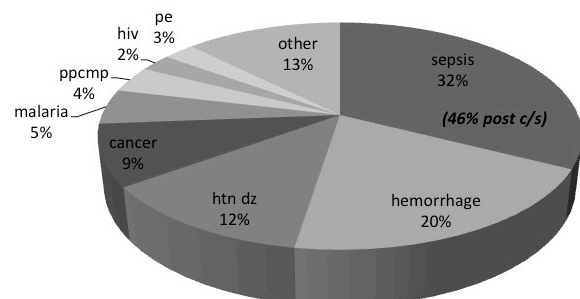
All maternal deaths and near-miss maternal mortality events at the University Teaching Hospital Kigali (CHUK) from October 1, 2012 to October 1, 2013 were analyzed. Information was extracted from the patient record, which consisted mostly of paper charts. All obstetric intensive care unit (ICU) admits were determined to be near-miss events. Clinical data obtained for review were as follows: antepartum versus postpartum status; marital status; delivery mode; cause of death or diagnosis on ICU admit; performance of transfusion, cardiopulmonary

resuscitation, and intubation; prevalence of hypertensive disease and hemorrhage; abnormal vital signs on admission; gravidity/parity. This study was approved by the Sacred Heart Hospital and University Teaching Hospital of Kigali Institutional Review Boards.

RESULTS

During the study period, 2,267 live births occurred. A total of 80 deaths and 53 ICU admissions were analyzed. Twenty four of the ICU admissions died. For both maternal deaths and near misses, the mean patient age was 29 years, with mean gravidity of 3 and parity of 2.

Cause of Death (n=80)



pe=pulmonary embolus, hiv=human immunodeficiency virus, ppcmp=peripartum cardiomyopathy, c/s=cesarean section

Figure 1: Cause of Death / The major cause of death was sepsis.

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There were 80 deaths during the study period. The major causes of death were sepsis (33%), hemorrhage (20%), and hypertensive crisis (13%). Notably, 46% of the deaths due to sepsis were status post a cesarean section (figure 1). The major three referring hospitals were Kibagabaga (11%), Muhima (8%), and Rwamagana (8%) (figure 2). The majority of patients were married (51%), had no past medical history (59%) (figure 3), and were in the postpartum period (54%). Main delivery modes were cesarean section ("c-section ") (32%), followed by spontaneous vaginal (24%) and postmortem c-section (10%). These delivery modes were not related to cause of death. Interventions were analyzed: 54% of patients were intubated, 50% received CPR, while 39% received verified blood transfusion. Seventy four percent had abnormal vital signs on admission. Eighty percent of maternal mortality cases were confirmed transfers from outlying facilities. Most patients (43%) did not receive surgery at CHUK. Rather, most were transferred in the postoperative period.

Hospital of Transfer

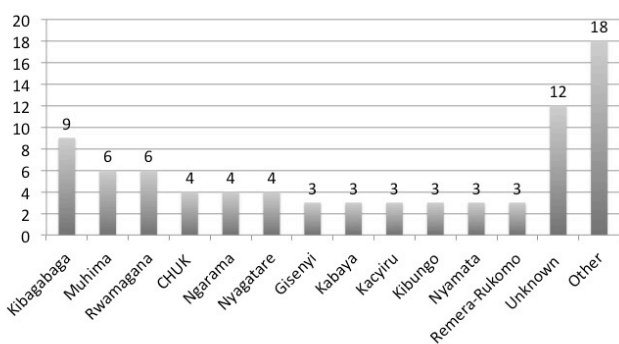
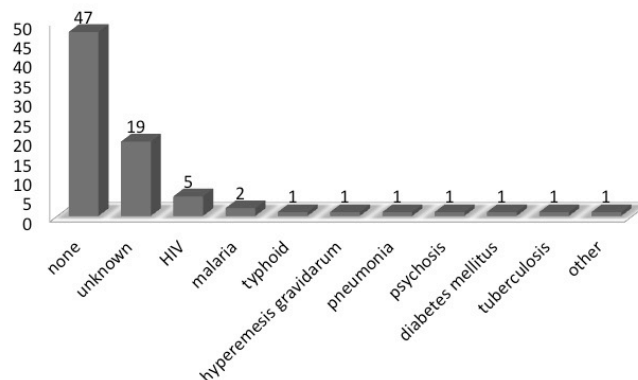


Figure 2: Hospital of Transfer / The major transfer hospital identified was Kibagabaga.

A separate analysis was performed on near-miss cases, comprised of all obstetric patients admitted to the intensive care unit. There were 53 obstetric admissions to the intensive care unit during the study period. Twenty four (45%) of these admissions died. Length of ICU stay ranged from 1 to 14 days, with an average of 5 days. Major admission diagnoses were sepsis (30%), hemorrhage (21%), hypertensive disease (17%), pulmonary embolism (6%), cardiomyopathy (6%), and malaria (4%). Most were married (55%), had no contributive past medical history (51%), and were in the postpartum period (53%). Main delivery modes were c-section (49%) and spontaneous vaginal (15%). Six percent of ICU admits did not deliver during their hospital stay. Interventions performed in the ICU were analyzed: 70% were intubated, 38% received a verified blood transfusion, and 21% underwent CPR.

The term "unknown" was used to describe data that were unavailable for analysis. This occurred in three major scenarios: 1) no chart available 2) significant portion of chart missing 3) days in which no patient care activities were recorded.

Medical Comorbidities



DISCUSSION

This study, identifying sepsis as the major cause of both maternal mortality and near-miss morbidity, is the first of its kind for Rwanda.

Rwanda has a population of approximately 11 million. Maternal mortality has decreased tremendously since 15 years ago; however, it is still high. According to the 2010 Rwanda Demographic and Health Survey, the maternal mortality ratio was 476 maternal deaths per 100,000 live births. This is an improvement from the ratio in the year 2000, which was 1,071 maternal deaths per 100,000 live birth [3]. The University Teaching Hospital at Kigali (CHUK) is one of four national referral hospitals, providing inpatient and outpatient care. CHUK is Rwanda's largest referral center, receiving 70% of Rwanda's referrals from 48 district hospitals and over 440 health centers. These district hospitals and health centers often have little educational or physical resources to manage the complex pregnancy cases they receive. By the time of arrival at CHUK, many patients reviewed for our study were clearly already extremely ill, as evidenced by abnormal vital signs on admission. Additionally, lack of prenatal care for most women delays diagnosis of serious complications. Indigent women in general are less likely to receive prenatal care. Limited access to prenatal care is associated with a higher maternal mortality risk [4]. By nature of the referrals received, CHUK naturally has a high maternal mortality rate.

The four leading causes of maternal mortality worldwide are hemorrhage, hypertension, sepsis, and abortion [5]. The majority of these cases are seemingly avoidable. CHUK is no exception. Sepsis was the leading cause of death in this patient population. The majority of these sepsis cases developed after cesarean section. Poor technique and substandard sterile conditions likely contributed to this high infection rate. Due to the traditional culture of the country, elective termination of pregnancy is illegal, and therefore very few maternal deaths coincided with termination.

Gravidity is a known contributing factor to maternal mortality [6]. The average patient in this study was in her third pregnancy. Patients with at least one child may think they do not need medical care during their pregnancies, even if they had a prior complicated pregnancy. Additionally, patients who have not had a prior term delivery, but rather spontaneous or medical abortion,

are at greater risk for not seeking medical attention [6]. Educating women about the importance of medical care despite their parity cannot be overemphasized.

A new concept being used in the United Kingdom for alerting of a critically ill obstetric patient is the MEOWS (modified early obstetric warning system). Variables evaluated include systolic blood pressure, diastolic blood pressure, heart rate, respiratory rate, oxygen saturation, temperature, and consciousness level. These variables are evaluated and a score is given. High scores alert of sick patients [7].

Based on this system, we decided to evaluate for abnormal vital signs on admission. Nearly 75% of our maternal mortality cases had abnormal vital signs on admission. Early recognition of a potentially unstable patient is crucial to improving outcomes. Providing interventions when there is only one unstable vital sign could lead to significant reductions. We advise using such a warning system as a triage method, particularly in resource-poor settings.

Globally, about 800 women die daily from pregnancy related causes, most of which are preventable. Ninety nine percent of these deaths occur in developing countries. A woman's risk of maternal death is much higher in developing countries. The probability that a 15 year old will die at some point from a pregnancy-related cause is 1 in 3800 in developed countries, compared to 1:150 in developing countries [8]. Although Sub-Saharan Africa in general bears 24% of the global disease burden, only 4% of the world's healthcare providers serve this region [9].

The United Nations Millennium Development Goal Number 5 is to reduce maternal mortality by 75% by the year 2015. Achieving this goal is also critical to achieving Millennium Goal Number 4, to reduce child mortality [10]. In 2011, 47 million babies were delivered without skilled providers across the world. There is a large disparity of maternal health in African countries, where access to healthcare in general is poor. Although global maternal mortality has decreased by approximately 50% since 1990, sub-Saharan Africa has the highest maternal mortality ratio in the entire world [11]. In contrast to Rwanda's 476 per 100,000, the maternal mortality ratio in the United States is 21 per 100,000 live births (which is actually higher than other industrialized nations) [12].

One limitation of this study is the high percentage of information labeled "unknown." The majority of the time, this term was used when a significant portion of the patient record was missing. This limitation stresses the need for education regarding the importance of proper documentation, and also of preservation of the patient record. It also opens an idea for instituting the electronic medical record in the future.

CONCLUSION

Sepsis was the most common cause of maternal mortality and near-miss morbidity for the study period. This data set is being used to actively improve maternal outcomes not only at CHUK but also across Rwanda. Educational campaigns focused on the specific problem areas noted could result in dramatically decreased morbidity and mortality. Data were used in an initiative to actively improve maternal outcomes across Rwanda. Educational campaigns focused on the specific problem areas noted could result in dramatically decreased morbidity and mortality, but these campaigns must be backed with

evidence-based data, specific to the region, in order to be taken seriously. Measures taken to reduce cesarean section rate, and to improve surgical and sterile technique, would likely reduce the incidence of sepsis. Early recognition of abnormal vital signs in a transferred patient would quickly alert healthcare providers to the presence of a potentially unstable patient since the majority of cases were transfers from district hospitals, the forthcoming educational programs will be focused at these hospitals, in order to increase overall awareness at these centers.

CONDENSATION: Maternal mortality and near-miss morbidity were analyzed over one year at University Teaching Hospital Kigali, Rwanda. Major cause of mortality and near-miss morbidity was sepsis.

CONFLICTS OF INTEREST: Dr Julie DeCesare is a paid speaker for Bayer. Drs Jessica Jackson, Brittney Williams, Stephen Rulisa, and Washington Hill report no additional conflicts of interest.

PRESENTATION: The findings of this study were presented at the Consortium of Universities for Global Health Conference in Washington, DC in May 2014. It was also presented at the ACOG District XII Annual District Meeting oral resident research competition in August 2014, where it won first place for the district.

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