

Admission Indications and Outcomes of Obstetric Patients in the Intensive Care Unit (ICU) at the University Teaching Hospital of Kigali (CHUK): A retrospective descriptive study

Authors: E. Tuyishime^{1,2,*}; B. Kalala^{1,2}; K. Laaman²; J.P. Mershon³; J. Uwineza^{1,2}; M. Durieux³; P. Banguti²

Affiliations: ¹University Teaching Hospital of Kigali; ²University of Rwanda; ³University of Virginia

ABSTRACT

BACKGROUND: Maternal mortality in Rwanda has decreased dramatically in the last 15 years, but little is known about indications for admission and outcomes of obstetric patients admitted to the intensive care unit (ICU) in Rwanda. The objective of this study was to determine the indications for admission and the outcome of obstetric patients admitted to the ICU at University Teaching Hospital of Kigali (CHUK).

METHODS: We performed a retrospective case-file review of obstetric patients admitted to the ICU at CHUK during the 1-year period of June 2016 to July 2017. The outcomes measured were indications for ICU admission and the ICU case fatality rate.

RESULTS: 72 patients were enrolled, of which 64 (89%) had sufficient data to be included in the study. The median patient age was 28 years, the median length of stay was two days, and the overall mortality was 61%. The indications for admission were post-partum hemorrhage-PPH (28%), respiratory failure (20%), preeclampsia/eclampsia/HELLP syndrome (19%), sepsis/septic shock (17%), and other (14%). The case fatality rate was highest for sepsis/septic shock (90%) followed by PPH/hemorrhagic shock (72%), respiratory failure (62%), preeclampsia/eclampsia (33%), cerebral malaria (50%), and heart failure (50%).

CONCLUSION: The results of this study suggest that despite great improvements in maternal care in Rwanda, much work remains to be done in order to improve maternal ICU mortality rates. Further studies are needed to identify ways to improve the management of the common causes of maternal mortality across the referral system in Rwanda.

Keywords (MeSH): Maternal Mortality; Intensive Care Units; Developing countries.

BACKGROUND

The indications for admission and the outcomes of obstetric patients admitted to the ICU depend on a country's development status as well as access to resources. In developed countries, common indications for admission are hypertensive diseases of pregnancy and post-partum hemorrhage (PPH); the overall mortality is low, often around 1-3% [1,2].

In low-income countries, PPH, pregnancy-associated hypertension, and septic shock are commonly seen in obstetric ICU patients. Maternal mortality rates (MMR) in these countries are often dramatically higher, ranging from 6% in Hong Kong to

27% in Pakistan [3,4]. Few studies have been done in Africa, highlighting the need for more data; a single study from Nigeria found indications similar to previous studies in low income countries for ICU admission, but an MMR as high as 33%[5]. Another study from Malawi found that the mortality of obstetric patients admitted to the ICU was 45 % [6].

In Rwanda, there is no systematic data collection on obstetric ICU patients. The country has been steadily improving maternal care with a concomitant decline in mortality, but much remains to be achieved to meet sustainable targets in maternal health. Despite reaching the Millennium Development Goal (MDG) 3, the MMR is still high in Rwanda, at 210 per 100,000 in 2015 [7]. The common

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causes of overall maternal mortality in Rwanda are PPH, infections, eclampsia, obstructed labor, and malaria [7].

Objectives: This study aims to determine the common indications of admission and outcomes of obstetric patients in the ICU at the University Teaching Hospital of Kigali (CHUK)

METHODS

Study design and study population: A retrospective descriptive study of case-files of all obstetric patients admitted in ICU from June 2016 to July 2017.

Study setting: This study was conducted at CHUK, the main referral hospital in Rwanda. CHUK has approximately 513 beds and serves approximately 6,200,000 people[8]. CHUK has 60 maternity beds and conduct approximately 2,000 deliveries annually. The ICU department has 7 beds and admits around 200 adult patients annually. During the study period 340 obstetric patients with complications were transferred to CHUK from district hospitals, however this number is largely higher than the ICU capacity.

Study participants: All obstetric patients who were admitted to the ICU during the study period with necessary information available in their case-files.

Sample size: Since this was a retrospective study of all patients admitted for the study period, a sample size calculation was not required.

Data collection, variables, outcomes and questionnaire:

The research team collected the data retrospectively, using a pre-designed questionnaire from patient charts (clinical files). The questionnaire was designed using the World Health Organization (WHO) International Classification of Diseases (ICD-10) [9]. The primary outcomes were indications of admittance to the ICU for obstetric patients and case fatality rate (number of death/total number of patients with diagnosis). The secondary outcomes were length of stay and mortality (number of death/total number of patients admitted during the study period).

Data management and analysis: Data were entered electronically into a Microsoft Excel sheet from the paper questionnaires. Descriptive statistics were used to report patient demographics, indications of admission, case fatality rate, and mortality. Frequencies and percentages were used for categorical data, and the median was used for continuous data.

RESULTS

Seventy-two obstetric patients were admitted to the ICU during the study period and 64 (89%) had complete data and so were included in this study. For the eight patients with missing data on main outcomes, only sociodemographic characteristics were reported (Table 1). The median patient age was 28 years-of-age, the median length of stay was 2 days, and the overall mortality was 39 (61%) (Table 1).

Table 1: Sociodemographic characteristics

Variable	N (72) %
Age	
<18	1 (1%)
18-26	32 (44%)
27-35	24 (33%)
>35	15 (21%)
Median	27.5
Insurance	
Yes	63 (88%)
No	9 (13%)
Length of stay (days)	
<3	48 (67%)
4-8	17 (24%)
>9	7 (10%)
Median	2
Mortality	
Yes	39 (61%)
No	25 (39%)

The 4 most common indications for admission were PPH (n=18; 28%), respiratory failure (n=13; 20%), preeclampsia/eclampsia (n=12; 19%), and sepsis (n=11; 17%. See Table 2). The case fatality rate was highest for sepsis/septic shock (90%), PPH (72%), and respiratory failure (62%).

DISCUSSION

This study aimed to determine the common indications of admission and outcomes of obstetric patients in the ICU at the University Teaching Hospital of Kigali (CHUK).

Table 2: Indications of admission and case fatality rate

Indication of admission	Number=64 (%)	Case fatality rate n=39 (%)
Postpartum hemorrhage	18 (28)	13 (72)
Respiratory failure	13 (20)	8 (62)
Preeclampsia/Eclampsia	12 (19)	4 (33)
Sepsis	11 (17)	10 (91)
Cerebral malaria	6 (9)	3 (50)
Heart Failure	2 (3)	1 (50)
Status epilepticus	1(2)	0 (0)
Pulmonary embolism	1(2)	0 (0)

While we are unable to assess the overall ICU mortality for obstetric patients in Rwanda as a whole, the data collected in this study show that the mortality in the CHUK ICU is high at 61%. This is likely due in part to the fact that CHUK is the chief public hospital in Kigali, and therefore the most complex cases are referred to CHUK. These patients often arrive late in the disease course due to long and difficult travel between hospitals and because of care delivery at lower level care facilities. In addition, limited ICU capacity may also play a role in the mortality rate as there capacity to receive only the sickest of cases.

This high mortality is similar to that reported from other low-income countries [3-6] but the mortality rate at CHUK for obstetric patients is still unacceptable if compared to high-income countries [1,2].

The common causes of ICU mortality (PPH, sepsis, respiratory failure, and pre-eclampsia) are similar to the causes of maternal mortality in obstetric departments across Rwanda, however, the case fatality rate is high, particularly for sepsis (90%) and PPH (72%) [7,10]. More than 90% of patients with sepsis and PPH were transferred from district hospitals and it is possible that staff in those hospitals lack the experience, skills, equipment, and systems of care (including protocols) to prevent, quickly diagnose, and appropriately manage sepsis and PPH as described in previous studies [8,11].

Several interventions have been shown to decrease in-hospital maternal mortality from PPH, sepsis, and preeclampsia; these interventions include training in emergency obstetrics, use of guidelines to screen for risk factors and management of complications, and use of emergency kits for essential drugs and supplies [11,12].

This study had a number of limitations. It consisted of a modest sample size from one referral hospital; therefore, the results will not be generalizable to the whole country. In addition, this was a retrospective study and some data were missing from patients' charts. However, this missing data did not concern the main out-

comes and has a low chance of affecting the validity of our results.

CONCLUSION

The results of this study suggest that despite great improvements in maternal care in Rwanda, much work remains to be done in order to improve ICU mortality for obstetric patients from preventable causes such as PPH, pre-eclampsia, and sepsis. Further studies are needed to identify ways to improve the management and the outcome of the common preventable causes of maternal mortality across the referral system in Rwanda.

Ethical considerations

Authors' contributions: ET and BK led the study design, protocol development, data analysis and manuscript writing. KL, JPM, JBU, MED and PRB contributed to study design, protocol development and results interpretation. ET and BK led and supervised data collection and data cleaning and analysis. All authors critically reviewed and approved the final manuscript.

Ethics approval and consent to participate: Ethical approval was obtained from the University of Rwanda College of Medicine and Health Sciences Institutional Review Board (Reference number No 280/CMHS IRB/2017) and waived by the University of Virginia.

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