Obstetric ICU admissions and their outcomes in Ayder Comprehensive Specialized Hospital: Institution based retrospective study

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Abstract

Introduction: Critically ill obstetric patients (Near misses) present a unique clinical challenge to the health care workers and become more accurately reflection of the impact of obstetric care on the wellbeing of women. The intensive care unit (ICU) is a health care delivery service for patients who are critical with potentially recoverable diseases. They can benefit from more detailed observation, monitoring, and treatment than is generally available in the standard lying-in ward or department. So Obstetric ICU admission (obstetric transfer to ICU) becomes one indicator of pronounced maternal morbidity. Since the start of our ICU in Ayder Comprehensive specialized hospital, there were critically sick obstetric patients being admitted to the ICU. But systematic analysis of the outcome of these patients was never assessed; this study was therefore conducted to evaluate the obstetric ICU admissions and their outcomes in the five years before the study.

Objective: To assess the obstetric ICU admissions and their outcomes in Ayder Comprehensive Specialized Hospital (ACSH), Mekelle, Tigray, Ethiopia.

Methods: A retrospective chart review was conducted for Obstetric patients admitted to ACSH Adult ICU from January 1, 2013 – December 31, 2017.

Result: -The hospital records of 75 patients out of 102 obstetrics patients were retrieved and analyzed from the total 2071 AICU (Adult Intensive Care Unit) admitted patients over a period of five years. And a total of 13521 deliveries giving an ICU admission rate of 7.54 per 1000 deliveries and the 102 obstetric patients admitted to AICU makes ICU utilization rate of 4.92%.Pregnancy-induced hypertension (PIH) (32 %, n=24/75) and severe obstetric hemorrhage (13.3%, n=10/75) were the most frequent indications for Obstetric ICU admission. There were 18 (17.65%) maternal deaths in the course of these 102 Obstetrics ICU admitted patients in the study period and the retrieved records of 11patients analyzed. Multiorgan failure (54.5%) and disseminated intravascular coagulation (27.3%) were the most common causes of maternal death in this study.

Conclusion: pregnancy induced hypertension was the most frequent indication for ICU admission followed by Obstetric hemorrhage. Early detection and management of these severe obstetric complications would have reduced the complications and maternal mortality.

Key words: Obstetric ICU admission, Indications, Outcome and Ayder Comprehensive Specialized Hospital.

Introduction

Pregnancy is a very important event from both social and medical points of view. Therefore, pregnant women should receive special care and attention from the family, community and from the health care system (1).

The World Health Organization (WHO) envisions a world where every pregnant woman and newborn receives quality care throughout the pregnancy, childbirth and the postnatal period (2). Although the obstetric population is generally young and healthier (3), in 2016, at the start of the Sustainable Development Goals (SDGs) era, pregnancy-related preventable morbidity and mortality remains unacceptably high. Particularly maternal mortality ratio (MMR) is higher in most of the developing countries (4). And around 99% of maternal deaths occur in low-resource settings and most can be prevented (3).

In the consecutive Ethiopian demographic health survey (EDHS); which was done (in 2000,2005, 2011 and 2016) the MMR shows a steady decline, that is 871, 673, 676, and 412 deaths per 100,000 live births respectively(5).

Though Ethiopia has registered a significant fall in maternal mortality (MMR 871 in 2000 – 412 in 2016) (5) still a lot has to be done to avoid preventable maternal deaths.

In the developing world maternal mortality ratio (MMR) assessment is still important, but in modern obstetrics it is an inadequate measure of the quality or success of obstetric care. Therefore, attention has been shifted to alternative indicators of care such as severe maternal morbidity / near miss /critically ill obstetric patient (7).

The critically ill obstetric patient presents a unique clinical challenge to the health care workers because of maternal physiological adaptations to pregnancy; pregnancy specific conditions, which may require critical care management and also the presence of a fetus whose well-being is linked to the mother (3).Thus, severe obstetric morbidity (Near miss) may more accurately reflect the impact of obstetric care on the well being of women; become one indicator of pronounced

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maternal morbidity is obstetric transfer to intensive care unit(7).

The ICU is a health care delivery service for patients who are critical with potentially recoverable diseases. They can benefit from more detailed observation, monitoring, and treatment than is generally available in the standard lying-in ward or department (8).

The main purpose of the ICU is to prevent mortality by intensively monitoring and treating critically ill patients who are considered at high risk of mortality. This, however, comes at a huge cost to all the parties involved the hospital, the personnel, and the caregivers (13). Since these patients are critically ill, the outcome of intervention is sometimes difficult to predict.

In developed countries obstetric patients account only for small proportion (0.1-0.9%) of ICU admissions, while this figure rises to 8.5% in developing countries (4). Clear data on national, regional or local obstetric ICU admissions and their outcomes are not available.

Obstetric admissions to intensive care unit is a well-established criteria (WHO) to identify severe obstetric morbidity and a study of obstetric ICU admissions can help devise intervention strategies and implement preventive measures (6).

Considering the Ethiopian context, where MMR is higher, admitting and providing ICU service for critically ill obstetric patients (Near misses) does have a significant impact on improvement of maternal outcome.

Since only few studies have been published concerning ICU admissions of obstetric patients in developing world (4). And either no study has been conducted and published or accessed in Ethiopian setup, there is a base line information gap on the basic and general health service status of Obstetric ICU admissions and their outcomes. Thus, the present study is conducted to assess the proportion, the indications for admission and outcomes of obstetric admissions to the AICU in ACSH.

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Methods and Materials

Study setting

The study was conducted in ACSH located in Mekelle City, Tigrai, Ethiopia. ACSH is a teaching hospital for both undergraduate and postgraduate students and has 24 hours a day specialty care. The hospital began its service in 2008 and gives service to close to 8 million people living in the northern part of the country.The hospital has a total of 500 inpatient beds in four major departments and other specialty units. Under obstetrics and gynecology department there are eighty-seven (87) inpatient beds and provides outpatient clinic, ANC, emergency care, gynecologic surgeries, labour and delivery services. Currently provides delivery service for around 3293 pregnant women per year. Those critically ill obstetrics patients who need ICU admission are transferred to Adult ICU that accommodates 8 beds with functioning mechanical ventilators that provide services for all departments except for Pediatrics patient.

Study design and period

A cross sectional design was employed and information was retrieved from patient charts from January 1/2013 to December 31/2017.

Population

The source population was all obstetric patients in ACSH & the study population all obstetric patients admitted to the hospital adult intensive care unit (AICU) during the study period.

Sample size and sampling procedure

All obstetric ICU admitted patient during the study period were included.

Data Collection Methods

Patient card numbers were retrieved from Obstetric operation log book, labor ward log book, ICU admission log book, and Emergency OPD log book. OBGYN residents and midwives collected these cards from card achieve room.

Data Analysis: Data was entered into Epi info version 3.5.1 statistical package after checking for completeness and cleaning and analyzed using SPSS version 23. Analysis was made and results presented in the form of tables, graphs and percentage. The proportion of ICU admitted obstetric patients was computed by dividing those obstetric patients with the total admitted obstetric patients during study period (denominator).

Ethical consideration: Ethical clearance was obtained from Mekelle University, College of Health sciences research and community services committee and submitted to the medical director of the hospital before the start of the study.

Names were not used in collecting the data from the medical files, and confidentiality maintained by keeping the data collection forms locked in a cabinet and the electronic data files were kept in a password-protected computer.

Results

The hospital records of 75 patients out of 102 obstetrics patients were retrieved and analyzed from the total 2071 AICU admitted patients over a period of five years. The mean age of the patients was 27.8 years. Forty-eight (64%) of the patients were admitted in the postpartum period. The most common mode of delivery was vaginal delivery accounting for 62.5%. Sixteen (33.3%) of the patients had emergency caesarean delivery. The duration of stay in the intensive care unit ranged from 1 day to 46 days (Mean– 11.28 days). There were a total of 2071 patients admitted in our hospital ICU. And a total of 13521 deliveries giving an ICU admission rate of 7.54 per 1000 deliveries and the 102 obstetric patients admitted to ACSH AICU makes ICU utilization rate of 4.92%. An ICU intervention during the stay of the patients in terms of mechanical ventilation was used in 26.67% of cases. Other ICU interventions included blood and blood product transfusion in 29 (38.67%), inotropes in 15 (20%), anti-hypertensive drugs in 30 (40%), anticonvulsants in 35 (46.67%) & dialysis in 8 (10.67%) cases. As a surgical intervention laparotomy, Total abdominal Hysterectomy (TAH), tracheostomy, Evacuation and Curettage; and suction and evacuation were done for 10cases.

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Table1: Patient Characteristics and obstetrical details of Obstetric ICU admissions, ACSH, January 1, 2013 to December 31, 2017

Age		**Number of cases**	**Percentage (%)**
<20		10	13.33
20-30		41	54.67
> 30		24	32
Parity			
Nulliparous		8	10.67
Primiparous		29	38.67
Multiparous		38	50.67
Antenatal care			
Booked		57	76
Not-booked		5	6.67
Unknown		13	17.33
Source of referral			
Referred	Hospitals/clinics	35	46.67
	HC	18	24
Direct from home		16	21.33
Unknown		6	8
Timing of admission			
1^{st} TM		2	2.67
2^{nd} TM		5	6.67
3^{rd} TM		11	14.67
Postpartum		48	64
Post abortal/GTD		9	12
Mode of delivery			
Vaginal delivery		30	62.5
Caesarean section		16	33.3
Laparotomy		2	4.2
Duration of stay in the ICU		Mean: 11.28 days	Range: 1- 46 days

Table 2: ICU interventions of Obstetric ICU admissions, ACSH, January 1, 2013 to December 31, 2017

Interventions	Number	Percentage (%)
Antibiotics	67	89.3
Oxygen supplementation	67	89.3
Anti-coagulant	35	46.67
Anti-convulsant	35	46.67
Anti-hypertensive	30	40
Blood and blood products	29	38.67
Mechanical ventilation	20	26.67
Inotropic support	15	20
Anti-malaria	10	13.33
Surgical intervention	10	13.33
Hemodialysis	8	10.67

Pregnancy-induced hypertension (32 %, n=24/75) and severe obstetric hemorrhage (13.3%, n=10/75) were the most frequent indications for ICU admission. For the non-obstetric cause heart disease and respiratory problems each accounting for 8 (10.67%) were most common indication for ICU admission followed by complicated malaria 5 (6.67%).Other indications were obstetric related sepsis (puerperal sepsis (2.67%) and septic abortion (2.67%)), Neurologic (5.3%), severe sepsis of ((chest (2.67%), GI (1.3%), UTI (1.3%)), PPCM (2.67%) and DKA, severe hypokalemia and acute fatty liver of pregnancy each accounts (1.3%).

Table 3: Indications for ICU admissions of Obstetric patients, ACSH, January 1, 2013 to December 31, 2017

Obstetric / medical complication		Number of cases	Percentage (%)
Hemorrhage	APH	4	5.33
	PPH	5	6.67
	GTD	1	1.33
PIH	Severe preeclampsia	9	12
	Eclampsia	15	20
Sepsis related	Puerperal sepsis	2	2.67
	Septic abortion	2	2.67
PPCM		2	2.67
Non obstetrics			
Neurologic	Meningitis	1	1.33
	Intracranial hemorrhage	1	1.33
	ICSOL	1	1.33
	CVT	1	1.33
	GBS	1	1.33
Respiratory problem	ARDS	3	4
	Asthma	1	1.33
	Pulmonary edema	2	2.67
	PTE(suspected)	2	2.67
Cardiac disease	CRHD	5	6.67
	HHD	1	1.33
	CHD	1	1.33
	Pericardial effusion (Malignant)	1	1.33
Hepatic	Acute fatty liver of Pregnancy	1	1.33
Sepsis	Chest	2	2.67
	GI	1	1.33
	Urosepsis	1	1.33
Complicated malaria		5	5.67
Anesthesia complication	High spinal	2	2.67
DKA		1	1.33
Severe hypokalemia		1	1.33
Total		75	100

There were 18 (17.65%) maternal deaths in the course of these 102 Obstetrics ICU admitted patients in the study period;and the retrieved records of 11patients analyzed. Multi organ failure (MOF) (54.5%) and disseminated intravascular coagulation (DIC) (27.3%) were the most common causes of maternal death in this study

Table 4: Maternal mortality and its cause in ICU admitted Obstetric patients, ACSH, January 1, 2013 to December 31, 2017

S. No	ICU admission diagnosis	Cause of death
1	APH(Abruption)	MOF
2	PPH(Trauma)	DIC
3	Eclampsia	DIC
4	Eclampsia	Hypoxic brain injury
5	Septic shock(chest)	MOF
6	Septic shock(chest)	MOF
7	Pyogenic meningitis	MOF
8	Complicated malaria	MOF
9	Acute fatty liver of Pregnancy	DIC
10	CHF(CRVHD)	Cardiac arrest
11	PTE(Suspected)	MOF

DISCUSSION

A total of 102 patients were admitted during the study period with magnitude of ICU admission of 0.75% of all deliveries during the study period and 4.92% of all ICU admission, which was quite high when compared to studies done in developed countries, where obstetrical patients account only for small proportion (0.1-0.9%) of ICU admissions (4). Leung et al.2010 (HK) and Daniel O et al. 2005(UK) in their studies showed 0.13% and 0.11% admission of all deliveries, and 0.65% and 0.8% all ICU admission. These variations might be due to differences in defining major morbidity criteria for ICU admission and availability of high dependency unit (HDU), an intermediate care unit in the developed countries and the low maternal health care provision; ANC from a skilled provider (62%), Birth attended by a skilledprovider (28%), Birth occurred in a health facility (26%) (5) may contribute for high maternal morbidity in our set up where mothers come late with severe complications. The 0.75% ICU admission of all deliveries, which was relatively comparable to 0.73 percent of the14779 deliveries of a Nigerian study (25).

Mean age of patients in our study was 27.8± (range, 18-40 years) which is comparable to study conducted by Jain

M et al., Ebrim LN et al. and Okafor et al. which are 25 years, 29.84 years and 30.51 years respectively (6,25,34).

In the present study, the average length of ICU stay was 11.28 days, which is longer than the previously reported Nigerian, Indian and UK studies. The shortest duration was of 1 day and maximum duration was of 46 days. Since prolonged ICU stay reflects the severity of the complication, this result may reflect that most of the patients had had major complication during their ICU admission and also absence of high dependency unit (HDU) in the set up to transfer those patients who can be discharged from ICU but not fit to be managed in the ward.

The major indications of admission were hypertensive disorder of pregnancy 32% followed by obstetric hemorrhage 13.33%.This is comparable with studies conducted in Nigeria, South Africa, and UK, which showed hypertensive disorders and hemorrhage were the leading indications for ICU admission (7,24,34). However, other studies in India and Nigeria found obstetric hemorrhage as their leading indications for ICU admission (21,23,25).This variation could be because in our hospital, most obstetric hemorrhage cases were successfully managed in the labour ward instead of the ICU. Besides, a possible delay in diagnosing PIH and its complications and unavailability of required materials and staffs to properly manage PIH in the referring hospitals and health centers has significantly increased the proportion of PIH cases in our study.

The mortality rate of patients admitted to the ICU was 17.6%, which was comparable to a study done in India (23). In other developing countries, studies in Nigeria and one study in Burkina Faso have shown ICU maternal mortality rates of 60 percent, 40.7 percent and 27.78 percent respectively (25,34,35).

Although the marked difference in mortality reported in these sub Saharan countries and this study may have several reasons; majority of the obstetric patients admitted in the ICU in their series did not receive antenatal care and may not have had their labour supervised by skilled attendants and underutilization of ICU seen in this study (4.92% Vs (28.1 and 14.7%)); which was

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significantly low compared to the above studies may also impact the variation.

Conclusion and recommendations

This study concludes that critically ill obstetric patients account for 4.92 % of total AICU admissions and 0.75% of all the deliveries required critical care. Pregnancy induced Hypertension (PIH) was the most frequent reason for admissions of the obstetric patients to the ICU followed by obstetric hemorrhage. Both these obstetric complications are preventable and therefore early detection and treatment would have significantly reduced the severe morbidity and their AICU admissions.

Optimization of admission rate to intensive care unit and reduction of obstetric patient morbidity and mortality can be achieved by providing early referral service for critically ill obstetric patients, availing of high dependency unit (HDU) and by creating a formal link between obstetric department and ICU centre or a special obstetric ICU.

Conflict of interests

None of the authors has any conflict of interest with respect to this study.

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