Tropical Journal of Obstetrics & Gynaecology
ISSN-Print: 0189-5117
Online: 2545-148X
Official Publication of Society of Obstetrics & Gynaecology of Nigeria

■ Original Research Article

Pregnant and Postpartum Admissions to the Intensive Care Unit: A Ten-Year Review from Southwest Nigeria.

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ABSTRACT

Background: Obstetric admissions into the Intensive Care Unit (ICU) reflect the scope of severe maternal morbidities and maternal near-miss events prevalent in the local obstetric population. Previous studies found no difference in the profile of ICU admissions between developing and developed countries. Therefore, differences in ICU management outcomes may be associated more with the contextual nature of obstetric delays. Understanding the characteristics of patients needing ICU care may facilitate the early identification of obstetric risk, prompt risk assessment and timely transfer to the ICU. We studied the profiles and outcomes of such patients over 10 years. **Objectives**: To analyze the characteristics, profiles, and clinical outcomes of obstetric admissions into the ICU at a tertiary hospital setting. **Methods**: A retrospective review of 49 obstetric admissions into the University of Medical Sciences ICU in Ondo, southwest Nigeria was conducted. Relevant data was extracted into pro forma forms designed for this purpose. The ICU admission outcome was compared with the characteristics of these patients using binomial regression statistics. **Results**: The leading diagnoses associated with obstetric ICU admissions over the study period were hypertensive diseases of pregnancy (34.7%), sepsis (20.4%), anaesthetic/cardio-pulmonary complications (18.2%) and postpartum haemorrhage (12.2%). Over 70% of admissions had Glasgow coma scale scores of 8 or less. Clinical outcome was significantly associated with a Glasgow Coma Scale score of ≤ 8 on admission. Maternal mortality was 61%, the majority of which occurred within 24 hours of admission. **Conclusions**: The poor ICU admission outcome reflects the severity of the patient's clinical status at presentation. The delay in seeking expert care might have worsened the already high severe maternal morbidity incidence in the community, contributing to the high mortality observed in this study. Efforts to mitigate late presentation at the tertiary centres require strong healthcare reforms. Efforts to establish high-dependency units should be explored to reduce the burden of obstetric admissions in the ICU.

Keywords: Obstetric Admissions, Intensive Care Unit, Severe maternal morbidities, High Dependency units, Healthcare Outcomes.

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INTRODUCTION

Pregnant and postpartum admissions into the Intensive Care Unit (ICU) represent an escalation of treatment options available to the Obstetrician. Such admission is a tacit acknowledgement of the deteriorating clinical and metabolic state of the obstetric patient, and a collective effort to mitigate possible maternal mortality through intensive monitoring and timely interventions. Obstetric admission into the Intensive Care Unit (ICU) is therefore indicative of severe morbidity.[1] The unique nature of obstetric medicine, with its altered physiology of pregnancy and the simultaneous management of two lives with different physiologies, presents a challenge.[2] The potential for catastrophic complications is constant and may develop rapidly.[3]

The ICU often provides for closer monitoring of the obstetric patient and the prompt interventions often required to avert poor obstetric outcome.[2] It should be noted that all medical conditions that can complicate pregnancy and the puerperium are treated in the ICU. There is a need for periodic audits of obstetric data resulting from these critical interventions to evaluate established management protocols and provide guidance for crafting and designing fresh management templates and policies. Obstetric admissions into the ICU would therefore reflect the scope of severe maternal morbidities and the maternal near-miss events prevalent in the local obstetric population.

With a maternal near-miss incidence ratio of 70 per 1000 live births and severe maternal outcome of 85 per 1000 live births, our facility is a ready source of eligible clientele for possible ICU admissions.[4] Despite the availability and perceived advantages of ICU care, financial and other socio-cultural constraints may hinder prompt ICU admissions. It had been previously established that there is no difference in the profile of ICU admissions in developing compared to developed countries, with hypertensive disorders of pregnancy being the most prevalent indication for ICU admission.[3] These indications for ICU admission are often the same causes of maternal mortality in the population.[4] Nigeria with a maternal mortality rate of 576 per 100,000 live births, is responsible for 10% of global deaths for pregnant women. [5]

While the causes of maternal mortality are generally known and are similar worldwide, delays in accessing specialist care are generally responsible for differences in mortality rates between high-resource and low-resource countries. The recognition that clinical and community services are inextricably linked, and the contextual nature of obstetric delays, should inform the study of the factors responsible for such delays in the local environment. Even where ICU facility is available, admissions to these institutions are often hampered by the same prevalent delays in the local environment. Such delays tend to compound what may already be a dire clinical situation. There exists a knowledge gap in our region of the delays that hinder obstetric admissions to our intensive care units, and their impact on clinical outcome. Understanding the characteristics and profiles of patients needing such care may be the necessary first step for early identification, quick risk assessment and timely transfer to the ICU. Our aim is to analyse the patients' characteristics, profiles and outcomes of pregnant and postpartum admissions to ICU in a tertiary facility in southwest Nigeria, with a focus on identifying factors associated with poor outcome.

MATERIALS AND METHODS

This study is a retrospective review of all pregnant and postpartum admissions into the Intensive Care Unit (ICU) at the University of Medical Sciences Teaching Hospital in Ondo, South-West Nigeria. The study period spans from January 1, 2014, to December 31, 2023. The UNIMEDTH started in late 2012 as the Mother and Child Hospital, offering free obstetric care. Fee-paying commenced in late 2016 till 2019, with criteria-based subsidized insurance services operating from 2020 till date. The Intensive Care Unit is a 5-bed closed unit that started providing services from inception, sourcing its clientele mainly from the Surgical and Trauma Units within which it is located. The ICU has always been a fee-for-service unit. Pregnant and postpartum admissions into the ICU are routed through the Emergency unit of the Obstetrics and Gynaecology Department for referred cases. Direct admissions of booked patients do occur from our wards and postoperatively from our obstetric theatre.

Data Collection

Data were collected from the patient's records, ICU admission and discharge register, and the hospital's electronic health records. The list of all women admitted into the ICU was first compiled from the source population of all admissions in the ICU admission register. All pregnant and postpartum women were identified and subsequently extracted from this list. The case files of these women were subsequently retrieved from our Health Information unit for study and data extraction. The following information was extracted into a structured pro forma for each patient: age, parity, gestational age at admission, year of admission, reason for admission, length of stay in the ICU, interventions performed in the ICU, and patient outcomes. This initial data collection was done by one of the authors, an intensivist working in the ICU. Subsequently, obstetric case file reviews were performed by the leading author.

Ethical clearance for the study was obtained from the University of Medical Sciences Review

Board. The University Teaching Hospital Management permitted the use of anonymised data because of the study's retrospective nature. Informed consent from patients was not necessary because only anonymised data from the medical records was used.

Inclusion Criteria

The study population included all pregnant women and those within six weeks postpartum admitted into the ICU during the study period. Of 64 possible obstetric admissions identified from the ICU admission register, only 49 women had casefiles available for further study.

Exclusion Criteria

Non-obstetric patients and all those obstetric patients with unavailable records were excluded from the study.

Data Analysis

The data collected were verified from multiple sources, primarily from the patient's case-note, then from registers in the Intensive Care unit and the Labour ward. Missing data was identified and recorded on the appropriate tables. They were subsequently excluded from specific analysis.

Data were inputted into and analysed using SPSS version 20. Descriptive statistics were computed for all variables. The commonest causes of admission were determined as well as the outcomes of these admissions. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Baseline Characteristics

Over the ten years 2014 to 2023, the case files of 49 patients admitted into the ICU were available for review. There were a total number of 18054 deliveries during this period. (Table 2) The average rate of obstetric admission into the ICU was 2.7 per 1000 deliveries. The highest number of admissions was 12 in 2019 while there was no recorded admission for 2017. (Table 2; Figure 1) The mean age of study participants was 32 years (±7.24). A majority (65.3%) of the participants were multiparous. (Table 1). Based on available data, 55.1% had caesarean delivery in the indexed pregnancy, while 20.4% delivered vaginally. Postpartum admission into the ICU was indicated in 95.9% of participants while 4.1% had antepartum admission. An equal number (17/34 or 50%) of patients were admitted from our facility as were referred from outside for ICU care. The ICU admission duration was up to 24 hours or less in 24 (48.9%) of 49 participants. Only 6 participants were on admission for more than one-week duration. (Table 1)

Indications for Admission

The various primary indications for ICU admission are shown in Table 3. Obstetric indications were responsible for the majority (51%) of admissions. The highest

Table 1. Baseline characteristics of patients admitted into the ICU

Characteristic feature	frequency	frequency	percent
Age in years	< 20	1	2.0
	20 – 24	8	16.3
	25 -39	35	71.4
	≥ 40	4	8.2
	Missing	1	2.0
Parity	0	1	2.0
	1- 4	32	65.3
	≥ 5	2	4.1
	Missing	14	28.6
Mode of delivery	SVD	10	20.4
	C/S	27	55.1
	Missing	12	24.5
Time of admission	Ante-partum	2	4.1
	Post-partum	47	95.9
Initial place of treatment prior to ICU admission	Outside UNIMEDTH	17	34.7
	UNIMEDTH	17	34.7
	Missing	15	30.6
Duration of ICU admission	0 – 1 day	24	49.0
	2- 3 days	8	16.3
	4 – 7 days	6	12.2
	> 7 days	6	12.2
	Missing	5	10.2

Table 2. Record of year of admission to the ICU [a]

Year	No of admission	Annual delivery	Rate per 1000 delivery
2014	6	2894	2
2015	3	3340	0.8
2016	4	2210	1.8
2017	0	1294	0
2018	6	1146	5
2019	12	1943	6
2020	5	1594	3
2021	1	828	1
2022	4	1329	3
2023	7	1476	4
Total	48	18054	

[a] 1 patient did not have year of admission reported

obstetric indication for admission was due to Hypertensive diseases of pregnancy, contributing to 17 cases or 34.7%, while obstetric haemorrhage was the reason in 6 patients (12.2%). Non-obstetric indications were responsible for ICU admission in 49% of patients. Sepsis contributed the highest reason for admission in 10 patients or 20.4% of cases. This is followed by anaesthetic complications (9 cases or 18.2%).

In this study, Hypertensive diseases, Sepsis, anaesthetic complications and haemorrhage contributed 85.7% of indications for ICU admissions. Additionally, estimates of effect size may be unstable and vulnerable to sampling variability.

In view of the above, further studies with larger cohorts may be necessary to further interrogate our findings and bolster the robustness of the conclusions derived.

Table 3. Diagnosis of patients at the time of admission to the ICU

Reasons for Admission		Freq	%
Obstetric	Hypertensive diseases of pregnancy	17	34.7
	Haemorrhage	6	12.2
	IUFD	2	4.1
Non-Obstetric	Sepsis	10	20.4
	Anaesthetic complication	9	18.4
	Cardiomyopathy	1	2.0
	Haemoglobinopathy	1	2.0
	Pulmonary Oedema (? Amniotic fluid embolism)	1	2.0
	Respiratory	1	2.0
Missing		1	2.0
Total		49	100

Table 4. GCS scores of patients admitted to the ICU (≤8 = 25)

Variable		Frequency	Percent
GCS score	3	15	30.6
	4	4	8.2
	6	1	2.0
	7	2	4.1
	8	3	6.1
	10	4	8.2
	14	1	2.0
	15	5	10.2
	Missing	14	28.6
Total		49	100.0

Initial Clinical Assessment in ICU

The assessment of clinical severity using the Glasgow Coma Scale score, was recorded for 35 of 49 ICU admissions. Of these, 25 individuals (71.4%) had a GCS score of 8 or less. The remaining 10 individuals were assigned scores equal to 10 or more. (Table 4). The mean GCS score of survivors was 9.91±4.5571 while the mean GCS score of those who died was 5.21±3.647. (Figure 3). The difference was statistically significant. (Mann-Whitney U test p= 0.006)

Table 5. Complications in patients admitted to the ICU*

Complications	Subtypes of complications	Freq.	%
Pulmonary	Pulmonary oedema, ARDS, Respiratory insufficiency	21	42.9
Cardiovascular	Cardiac arrest, Cardiopulmonary arres Acute Left Ventricular Failure, Hypovolaemic shock, Haemorrhagic shock.	16	32.7
Renal	AKI	14	28.6
Others	Hypoxic brain injury, HELLP syndrome, Sepsis, Intra-abdomina sepsis, Septic shock, Enterocutaneous fistul DIC, Puerperal sepsis.	8	16.3

* Multiple responses included. AKI- Acute kidney injury, ARDS- acute respiratory distress syndrome,
HELLP- Haemolysis elevated liver enzymes low platelets.

Table 6. Interventions administered in the ICU for admitted patients

Interventions	Frequency	Valid Percent
Mechanical ventilation	33	67.3
Inotropes	22	44.9
Radiological Interventions	10	20.4
Central Catheter	5	10.2
Haemodialysis	4	8.2
ECG/ECHO	1	2.0
Anticoagulants	1	2.0

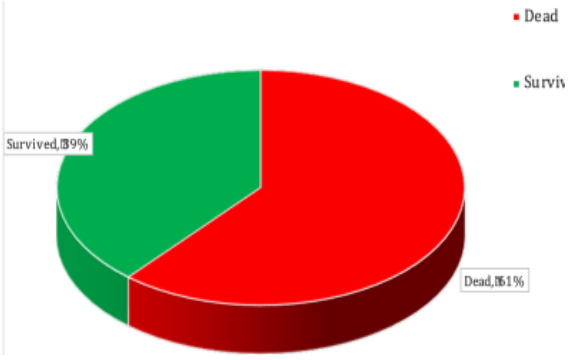

Figure 2. Clinical Outcome of Patients admitted to the ICU

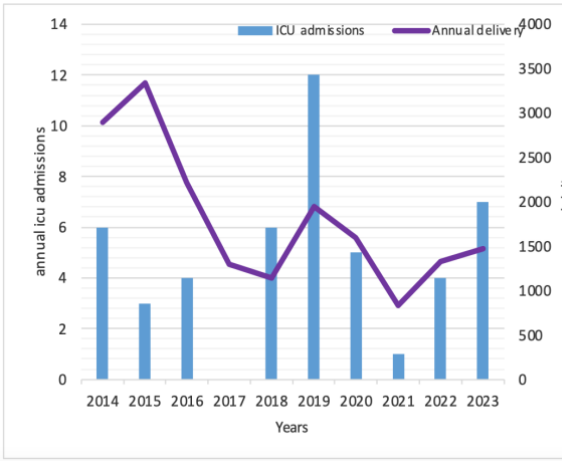

Figure 1. Annual ICU admissions and delivery rates 2014 – 2023

Table 7. Admission diagnosis vs clinical outcome

		Freq	Clinical Outcome	
			Alive	Dead
Obstetric				
	Hypertension	18	7	11
	Haemorrhage	6	3	3
Total		24	10	14
Non-Obstetric				
	Anaesthetic/ Cardiopulmonary	9	5	4
	Sepsis	10	2	8
Total		19	7	12
Missing		6	2	4

Complications Encountered and Interventions Given

Often, complications had occurred by the time of ICU admissions. The different complications encountered in all 49 individuals admitted to the ICU are detailed in Table 5. These complications are grouped collectively into pulmonary, cardiac, renal, and other conditions. Pulmonary complications were diagnosed in 21 individuals, 16 individuals had cardiac challenges and 14 had complications in the kidneys. (Table 5) Multiple organ disease was present in 5 patients. Individuals

Table 8. Results of analytical models

Model	*P value*	
Binomial log regression for GCS vs clinical outcome	0.004	Sig
Log Regression of Duration of ICU stay vs Clinical outcome	0.079	NS
Log regression to predict effect of Assisted ventilation intervention on clinical outcome	0.665	NS

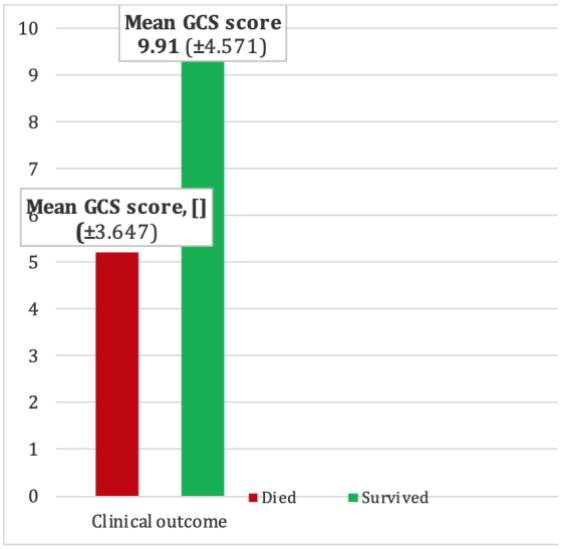

Figure 3: Mean Glasgow Coma Scale scores vs patients' clinical outcome (Died/Survived). The mean GCS score for the 30 mortality cases was relatively lower at 5.21±3.647 compared with that for the 19 patients who survived which is 9.91 (±4.571).

with a diagnosis of eclampsia and sepsis suffered multiple complications that included acute kidney injuries, HELLP syndrome, and multiple organ diseases. Therefore, multiple complications may be present in the same individual. The pulmonary complications were mainly hypoxic events that necessitated intubation and mechanical ventilation. Thirty-three of 49 (67.3%) patients required mechanical ventilation. (Table 6) Cardiac cases mandated the use of inotropic drugs while some anaesthetic complications were due to inadvertent "high spinal" administered preparatory to surgical deliveries. The renal complications mostly emanated from women with initial diagnosis of hypertensive disorders of pregnancy. These acute kidney injuries (AKI) were sometimes treated with dialysis. Patients with multiple organ disease, hypoxic brain injuries, pulmonary oedema, and disseminated intravascular coagulopathies, were represented and grouped as

"Others". The interventions necessitated by these complications are tabulated in Table 6. Noteworthy is that 33 individuals (67.3%) required mechanical ventilation.

Clinical Outcome of Patients Admitted to ICU

A total of 30 (61.2%) patients died following ICU admission while 19 (38.8%) survived. (Figure 2, Table 7). Seven of 18 (38.8%) individuals with a primary admission diagnosis of hypertension survived. Three of 6 (50%) individuals with a primary admission diagnosis of haemorrhage survived. Only two of 10 (20%) individuals with a primary admission diagnosis of sepsis also survived. Of the total 30 deaths in this study, 19 deaths occurred within 24 hours of ICU admission. Overall, 11 of 17 individuals with an admission diagnosis of hypertension died, while 8 of 10 individuals with sepsis died. The admission diagnosis of sepsis had the highest case fatality rate of 80%. The top four reasons that accounted for 85.7% of ICU admissions were responsible for 26 (86.6%) of the total 30 deaths.

Statistical Analysis

The binomial regression model comparing the clinical outcome with the Glasgow coma assessment score reached statistical significance with a p-level of 0.004. (Figure 3) The same binomial model comparing clinical outcomes with the duration of ICU admission did not reach statistical significance. (p-value of 0.079) Whether or not a patient had assisted ventilation (intubation plus mechanical ventilation) did not significantly influence clinical outcome (p-value of 0.665).

The distribution of the GCS score at the time of admission was assessed for normality using the Shapiro-Wilk test ($W = 0.775$, $p < 0.001$), with the result confirming a non-normal distribution. A Mann-Whitney U test was thus considered to compare the admitting GCS between the group of patients that survived and those who died. There was a significant difference in the mean GCS score between the two groups; $z = -2.730$, $p = 0.006$.

Power Analysis

Despite a moderate rank-biserial correlation (≈ 0.56), the estimated power was only 8.4%, which is well below the conventional threshold of 80%. This suggests a high probability of predisposition to Type II error.

Limitations of the Analysis/Study

The small sample size (n = 35 for "GCS") severely limits the statistical power to detect significant associations between cohorts of survivors and mortalities. Low power increases the risk of false-negative findings (Type II error).

DISCUSSION

This study represents the first audit of the hospital data on pregnant and postpartum admissions to the ICU unit of our facility. Obstetric admissions into the ICU were 64 (10.3%) of a total of 620 admissions (both obstetric and non-obstetric). The mortality rate of 61% among obstetric ICU admissions in this study is higher than the figures of Onyekwulu et al. [] (39.7%) from Nigeria and Prin and colleagues (49%) from Malawi. [7]

Our figure reflects the severity of morbidities of the patients in this study at presentation, a pointer to significant delay in accessing expert obstetric care. Our study showed that 71.4% of patients in this study had Glasgow Coma Scale scores of 8 or less on ICU admission, further confirming the obstetric delay prevalent in our area. Their poor clinical outcome was significantly associated with the Glasgow Coma Scale score of 8 or lower. The mean Glasgow Coma Score of those who survived was significantly higher compared with those who died. We agree with the findings of Adeniran et al that the clinical state of the critically ill obstetric patients at admission remains a major determinant of the outcome of ICU care.

The development of severe complications in these individuals within 24 hours of admission and the need for mechanical ventilation in 67.3% of these patients were pointers to the progression and severity of the disease process. The need for mechanical ventilation has been shown to portend increased mortality risks following ICU admission.[8,9] Adeniran and co-workers found that mechanical ventilation is a statistically significant predictor of obstetric ICU deaths.[8] The study by Anane-Fenin and colleagues from Ghana found those patients intubated to be at least six times more at risk of death when compared with those who were not.[9] Others found that as many as 90% of ICU patients in developing countries would require mechanical ventilation.[2] Our study did not find a significant association between the need for mechanical ventilation and clinical outcome. This was probably due to the moribund clinical state of our patients at presentation, blunting the treatment impact of mechanical ventilation.

The plethora of complications ranging from HELLP (haemolysis, elevated liver enzymes, low platelet count) AKI, acute respiratory distress, hypoxia and others, very early in the admission, may be responsible for this finding. It is important therefore to consider this and other factors when comparing the clinical outcomes of different studies. Lower ICU maternal mortality rate may reflect a lower threshold for ICU admission. [12] Obstetric admissions from the study by Zhao and colleagues in China, had a mean

Sequential Organ Failure Assessment score of 2, a pointer to the low admission threshold in their cohort. Cases of inadvertent 'high spinal' early in the life of our institution, added to our poor clinical outcome.

Hypertension in pregnancy, postpartum haemorrhage, sepsis and cardio-pulmonary complications were the indications for ICU admission in the majority of the patients in this study. This finding is consistent with other studies from low-resource nations. [6,8-11] Despite this similarity with other studies, 63.3% (19 out of 30) died within 24 hours of ICU admissions, due mostly to diagnoses of hypertensive diseases of pregnancy, postpartum haemorrhage and sepsis. More than half (53.9%) of ICU obstetric deaths occurred within 24 hours of admission in the series from Anane-Fenin and her colleagues from Ghana. The mortality in the study by Onyekwulu et al however occurred within 3 days. The delay of access to expert obstetric care appears to be a common factor operating in low-resource countries. It is possible that the poorer outcome in our study stemmed from a longer delay of access to expert care.

The duration of ICU admission has no significant association with clinical outcomes in this study. When deaths from cardio-pulmonary causes are excluded, 22 of 30 deaths in this study were due to hypertensive disorders of pregnancy, sepsis, and postpartum haemorrhage. These diseases are eminently predictive and preventable. The strategies for predicting and assessing these obstetric indications for ICU admission should be our critical focus if we desire to significantly reduce ICU admission mortality. Such efforts would involve the early recognition of these diseases, prompt morbidity risk assessment, and the timely transfer to tertiary centres to receive expert care. Therefore, heightened clinical vigilance by healthcare providers, especially at lower-level health institutions, is essential.

The delay of access to expert obstetric care had been previously recognised by other investigators.[12] It remains the major constraint to the reduction of these maternal mortalities. Efforts to mitigate late presentation at tertiary centres would require strong health sector reforms. These should include upgrading the quality of care at the lower-level health centres, through continuous training and re-training of the healthcare personnel and the provision of relevant equipment necessary for needed risk assessment. Continuous and periodic quality of care assessment should be carried out especially at the lower-level health centre in accordance with WHO vision and standards. [13] Tertiary care centres should maintain continuous interaction with community care personnel in their locality through periodic participatory lectures, workshops and training in basic obstetrics, particularly in areas related to the recognition and assessment of maternal morbidities and other high-risk obstetrics

Our study found that 50% of obstetric ICU admissions were referrals from outside facilities. We found no evidence that patients referred from outside had a worse clinical outcome than those admitted directly from our facility.

Maternal ICU admission is recognised as an indicator of severe maternal morbidity. [14-16] Despite our high maternal near-miss incidence,[4] the critical care utilisation of 2.7 per 1000 deliveries in this study, is low. Our figure is lower than the 5.87% reported by Onyekwulu and co-workers from Enugu, southeast Nigeria.[6] Anane-Fenin and others reported 14.7 ICU obstetric admissions per 1000 deliveries. Individual hospital and administrative protocols are probably responsible for these differences. Among other factors contributing to delay in accessing ICU admissions, financial considerations, probably made significant impact, especially in relation to the relatively low patronage of our facility. Our ICU demands the payment of a mandatory premium financial deposit before admission. This appears contradictory in a setting where emergency obstetric services were free to patients for several years during the ten-year study period.

The charging of high fees contributed to an avoidable delay that resulted in lower ICU patronage by those in dire need of admission. The ease of access to ICU admission is also affected by the paucity of these facilities in our geographical area, noting that no ICU facility is dedicated to the exclusive use by obstetric patients. Our 5-bed ICU was designed primarily to serve the needs of the surgical and trauma clientele of our hospital and remains the only government facility in the south senatorial zones of Ondo state. The consequent high ICU burden from obstetric admissions needs to be relieved. Our high maternal mortality rate from this study supports the need for urgent service delivery improvements. Hence the need to rethink our ICU admission policies.

While ICU admission is primarily geared towards addressing organ failures, the majority of obstetric indications for ICU admission require continuous surveillance of their clinical parameters. Also, ICU admissions mean a rising need for more medical resources and expenses. There should therefore be a move away from obstetric ICU admission to the continuous reduction of our high maternal morbidity burden. This is particularly relevant to our low-resource setting. The evidence from the work of Beza and co-workers from Ethiopia showed that the expansion of High Dependency Units (HDUs) is key for mitigating the ICU burden from obstetric admission. [11]

Anane-Fenin and colleagues from Ghana supported the same standards. HDU will fulfil this role when severe maternal morbidities are referred early before complications set in. The patients in our study had already developed serious complications and organ

damage within the first 24 hours of ICU admission. This is evident from the number of complications encountered by our patients, even within 24 hours of admission. The study by Gu et al from China, affirmed that the introduction of HDU was followed by a reduction in ICU utilization in their obstetric population. They found that the establishment of HDU led to a 20% decrease in ICU admission. [17] In the face of chronic financial and personnel shortages, the HDU option should be explored. Our results and experiences with HDU would then dictate policy reforms. While HDU provides a level of care which lies in between a general obstetric ward and an ICU, it is uncertain whether they could improve patient outcomes. This is an area for further investigation and future research.

Limitations of this Study

The retrospective nature of this study suffered from limitations of data quality evidenced by missing data on some important items like Glasgow Coma Scale scores. The possibility of inherent selection bias cannot be completely ruled out. Also, the generalisation of the findings in this study is limited as they are derived from a single institution with relatively small number of eligible participants. The small sample size for GCS scores limits the statistical power to detect significant associations between cohorts of survivors and those who died. Further studies with larger cohorts may be necessary to bolster the robustness of the conclusions so derived. A prospective multicentre study might have provided a better and more reliable data set.

CONCLUSION

We found a high maternal mortality of 61% amongst our cohort of ICU admissions. The majority of these ICU admissions had significantly poor GCS scores on admission. The high maternal mortality in this series is associated with significantly lower Glasgow Coma Scores. Those who survived had significantly higher GCS scores than those that died. Our findings point to significant delays in accessing expert obstetric care in the context of an already high prevalence of severe maternal morbidity. Training and re-training of healthcare workers, particularly at primary and secondary health facilities, would improve their recognition of obstetric morbidities, their assessment and the timely referral for expert obstetric care. Our findings demand a policy change in healthcare administration to address prevalent obstetric delays. Based on available evidence from other health centres in low-resource settings, we believe the establishment of High Dependency units is an option worth exploring.

Recommendation

a. Identify the scope of severe maternal morbidities and near-miss events in the community.
b. Reduce the burden of severe maternal morbidities by mitigating the factors responsible for obstetric delays in the population under consideration. Strong health sector reforms are necessary for this to happen.
c. Explore the option of establishing High Dependency Units as a first step towards limiting the burden of obstetric ICU admissions. This may prove to be a more cost-effective solution in a low-resource setting.

Conflict of Interest: There is no conflict of interest.

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