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Evaluation of Obsterics and Gyneacological patient's admitted to a tertiary hospital intensive care unit

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Abstract
Background: High mortality rates have been reported for obstetric and gynecological cases admitted to ICUs in sub-Saharan Africa. These ICUs, often managed by anesthetists, face challenges such as limited bed capacity and inadequate monitoring equipment. Understanding the sociodemographic factors, reasons for admission, and outcomes is essential for improving patient care.
Objectives: This study investigates the sociodemographic characteristics, admission reasons, complications, and maternal outcomes of obstetric and gynecological patients in the ICU.
Methods: A retrospective observational study analyzed patient records from the ICU at University College Hospital, Ibadan. Data collected included sociodemographic information, risk factors, and outcomes. Descriptive statistics and logistic regression were used to identify mortality predictors.
Results: Eighty-three patients were admitted, with 78.3% due to obstetric causes and a 28.9% mortality rate. The patients' ages ranged from 17 to 54, with 59% having tertiary education. Most had a GCS of 13-15, and 60.2% required ventilation. Key interventions included ventilation support (60.2%) and blood transfusion (55.4%). Eclampsia (33.7%) and obstetric hemorrhage (20.5%) were the most common reasons for admission. Sepsis (16.9%) was the top complication, with most deaths occurring within 24 hours. Significant mortality predictors included age, GCS, delivery before ICU, and ventilation support.
Conclusion: ICU presence has improved maternal outcomes. Enhanced collaboration between traditional birth attendants and hospitals, along with training on aseptic techniques and risk recognition, is crucial to further reduce maternal deaths.

Keywords: Obstetric and Gynecological ICU, maternal mortality, sociodemographic factors

Introduction
Managing critically ill obstetric patients poses unique challenges due to the physiological changes of pregnancy and the need to balance maternal and fetal well-being [1]. While pregnancy is typically viewed as a natural process, complications can arise, requiring admission to the Intensive Care Unit (ICU), particularly around delivery. Most obstetric ICU patients stay less than 48 hours, with better outcomes than other ICU patients [2], though mortality remains a concern, especially for women over 30 years old [3]. Indications for intubation and mechanical ventilation of the obstetric patient has been known to assist ICU patient in situations such as inadequate oxygenation, inadequate ventilation, and airway protection but are adjusted to address changes in a pregnant woman's physiologic condition and puerperium [36].

Hypertensive disorders, hemorrhage, and sepsis are the leading causes for obstetric ICU admissions, with ICU referrals often linked to pregnancy complications [2, 3, 7]. The rise in ICU admissions is attributed to factors such as advancing maternal age, obesity, and other comorbid conditions. Despite these challenges, many pregnant women requiring ICU care experience favorable outcomes, though risks remain elevated for both mothers and neonates.

In sub-Saharan Africa, mortality rates for obstetric and gynecological ICU patients range from 34.8% to 49% [10, 11]. In Nigeria, most ICUs are located in teaching hospitals, particularly in the South-West zone, and operate under a general open model overseen by an Anaesthetist. However, limited bed capacity and inadequate monitoring equipment hinder optimal care [12]. Understanding the sociodemographic characteristics, indications, risk factors, and outcomes of ICU admissions is crucial for improving patient care and reducing maternal mortality.

Methodology

A retrospective observational study was undertaken to analyze data pertaining to obstetric and gynecological patients admitted to the Intensive Care Unit (ICU) from 1st Mar. 2021 to 31st Feb. 2023. The study was conducted at the University College Hospital in Ibadan, a tertiary care facility equipped with a dedicated ICU tailored for obstetrics and gynecology cases.

Data Collection: Patient case records were meticulously extracted from the hospital's archives and scrutinized to gather relevant information. These encompass sociodemographic characteristics such as age, parity, as well as indications for ICU admission, underlying risk factors, encountered complications, and maternal outcomes.

Data Analysis: Descriptive statistical methods were applied to analyze sociodemographic characteristics, indications for admission, complications, and maternal outcomes. Additionally, logistic regression analysis was employed to identify potential risk factors associated with mortality among the study cohort. Data collected from the study were analyzed using appropriate statistical methods to assess characteristics of the patients, including mean, median, standard deviation.

Ethical Considerations

The study adheres strictly to ethical guidelines and protocols, obtaining requisite approvals from the University of Ibadan/ University College Hospital Ibadan Institutional Review Board (IRB) before commencement of the study. Confidentiality of patient information was maintained throughout all phases of the study, with data anonymization procedures implemented where necessary to protect patient privacy.

Results

Background and clinical characteristics of study patients

A total of 83 patients were admitted to the ICU during the study period, with obstetric causes accounting for 78.3% of admissions. None of the patients had a repeat ICU admission from a different pregnancy. The mortality rate was 28.9%. Patients' ages ranged from 17 to 54 years, with a mean of 32 years. Most had tertiary education (59%), and a Glasgow Coma Scale (GCS) score between 13 and 15 (57.8%). Ventilatory support was required for 60.2% of the patients, and additional interventions included ionotropic support (24.1%), surgical interventions (22.8%), and blood transfusion (55.4%). The majority (83.1%) had delivered before ICU admission, and the average ICU stay was 4.9 days, with 81.9% of patients staying for 1-6 days.

Table 1: Socio-demographic and clinical characteristics of study patients

Variables	Frequency(N=83)	Percentage (%)	Died(N)	Discharged (N)
Age				
≤25	17	20.5	2	15
26-35	45	54.2	13	32
≥35	21	25.3	9	12
Mean age(±SD)	32.0(±8.3)			
Level of Education				
Secondary	33	41.0	7	26
Tertiary	49	59.0	17	32
Reasons of ICU admission				
Obstetric	65	78.3	13	52
Non-Obstetric	18	21.7	7	11
Parity				
Primigrivida	55	66.3	16	39
Multigravidia	28	33.7	8	20
Duration of stay (Days)				
1	11	13.3	9	2
2	10	12.0	1	9
3	15	18.1	3	12
4	11	13.3	2	9
5	11	13.3	2	9
6	10	12.0	2	9
≥7	15	18.1	5	10
Mean age(±SD)	4.9(±4.2)			
GCS				
3-8(unconscious)	24	28.9	16	8
9-12(semi-conscious)	11	13.3	2	9
13-15conscious)	48	57.8	6	42
Ventilation support				
No	33	39.8	1	32
Yes	50	60.2	23	27
Interventions				
ionotropic support	20	24.1	16	4
anticonvulsant	25	30.1	11	14
intravenous antihypertensive	24	28.9	4	20
pelvic ultrasound (USS)	8	9.6	3	5
tracheostomy	1	1.2	1	0
haemodialysis	4	4.8	2	2
laparotomy	3	3.6	2	1
Blood Transfusion	46	55.4	13	33
Delivery before ICU admission				
No	14	16.9	9	5
Yes	69	83.1	15	54
Outcome				
Died	24	28.9		
discharged	59	71.1		

Indications for ICU admissions

Eclampsia (33.7% (28)) and obstetric haemorrhage (20.5% (17)) were the top two indications for obstetric ICU admission during the review period, followed by sepsis (13.3% (14)) as illustrated in fig 1.

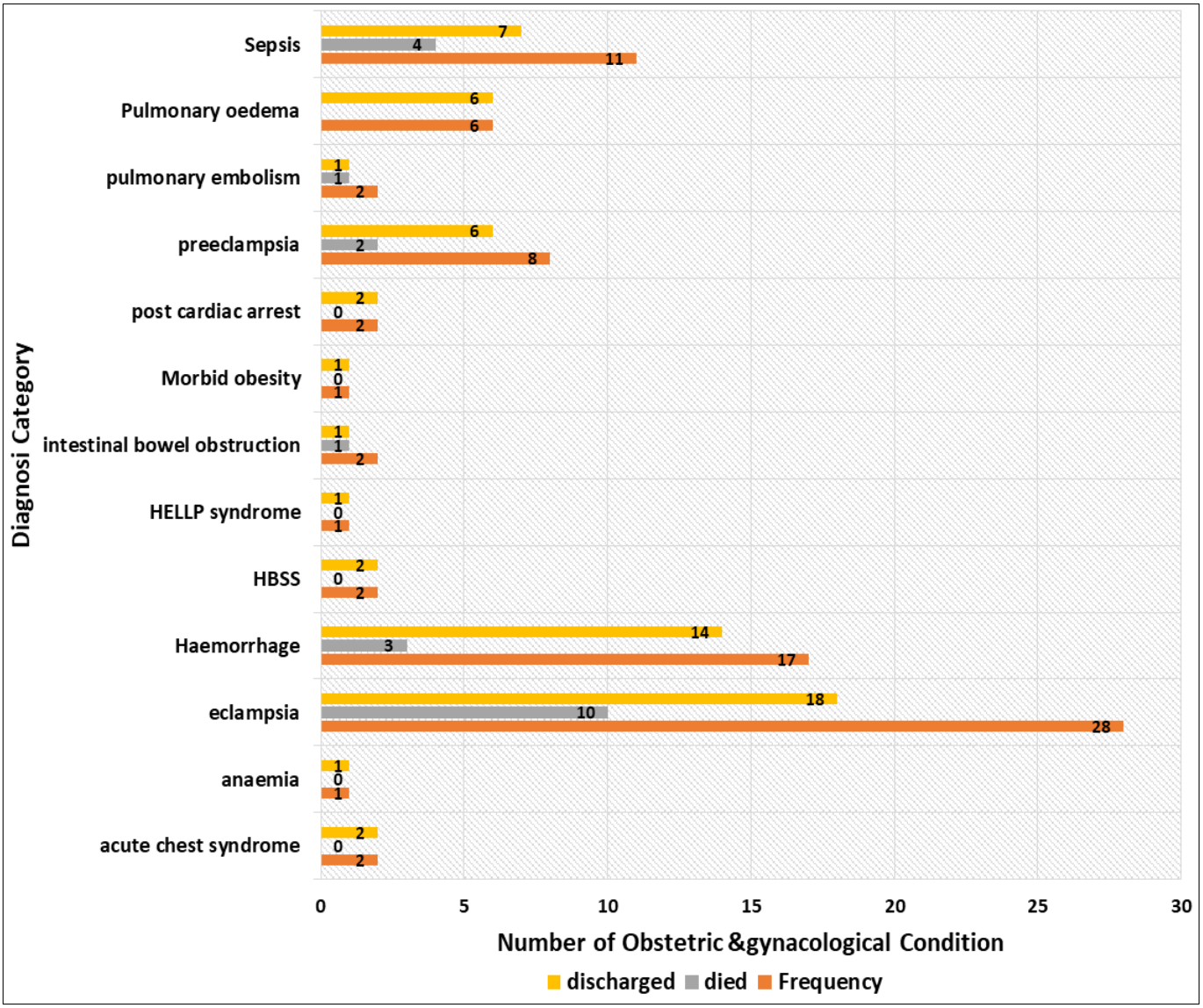

Fig 1: Comparison of major Diagnosis for obstetrics & Gynaecology ICU admission in University College Hospital, Ibadan between 1st march 2021- 31st Feb. 2023

Complications associated with ICU admission

Sepsis (16.9% (6)) was the top complication associated with obstetric ICU admission during the review period, followed by seizure, anemic heart failure, hypotension, and acute kidney injury (AKI), each accounting for 7.2% (6), as illustrated in Figure 2.

Factors influencing outcomes following obstetric ICU admission

In the study, 10.84% of participants died on the first day of ICU admission, followed by 1.2% on the second day and 3.61% on the third day. A significant proportion of obstetric deaths in the ICU (37.5%) occurred within the first 24 hours of admission. Key factors associated with maternal mortality included age, Glasgow Coma Scale (GCS) score, delivery before ICU admission, and the need for ventilation support.

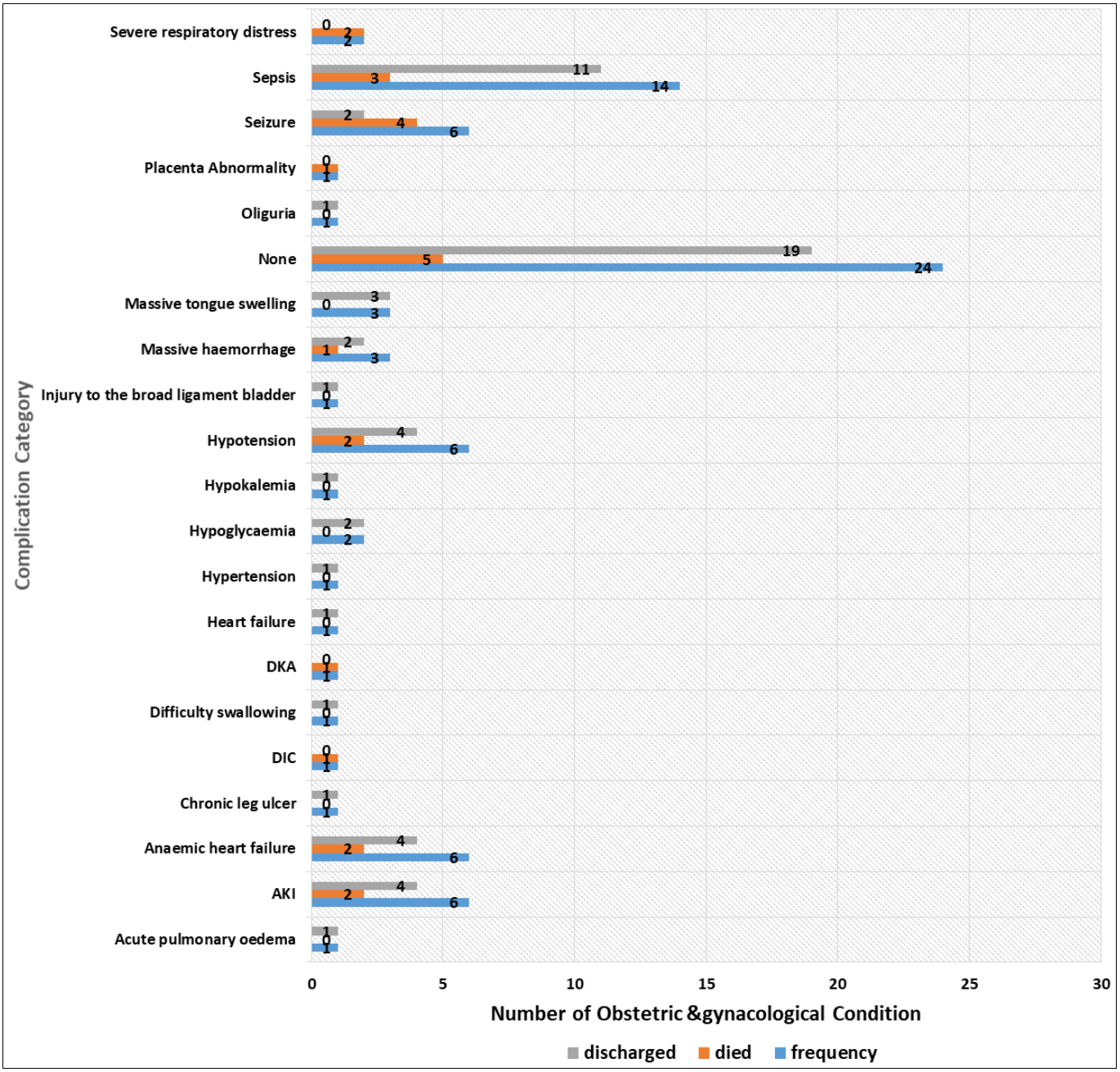

Fig 2: Comparison of Complications with obstetrics & Gynaecology ICU admission in University College Hospital, Ibadan between 1st march 2021- 1st Feb. 2023

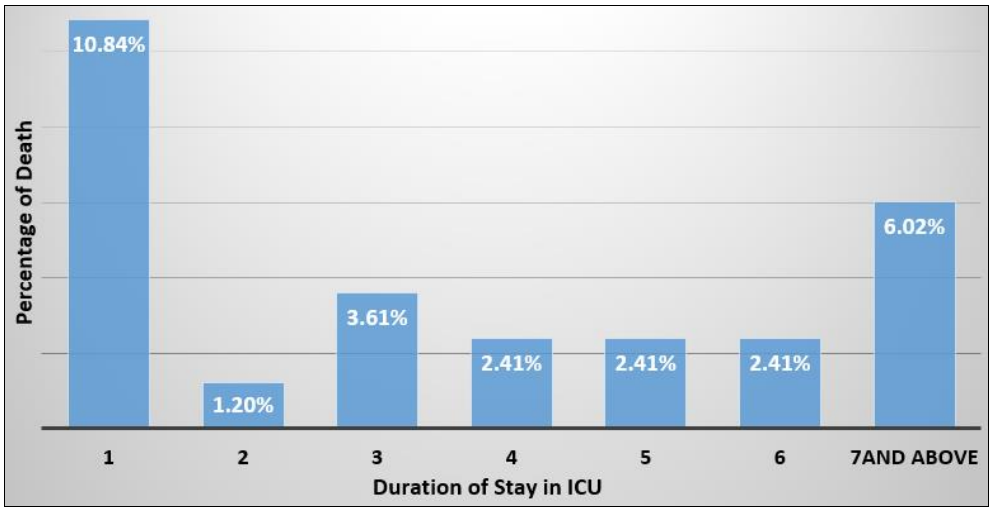

Fig 3: Comparison of duration of stay among obstetrics & Gynaecology ICU admission in University College Hospital, Ibadan between 1st march 2021- 1st Feb. 2023

Table 2: The relationship between risk factors and maternal outcome

Risk factors	Odd Ratio	P-Value
Age group	0.453	0.04*
Level of Education	0.488	0.167
Parity	0.567	0.425
GCS	7.987	0.000*
Delivery before ICU	45.016	0.000*
Ventilation Support	0.037	0.02*
Surgical Intervention	2.1833	0.380

*= Statistically significant

Age group, GCS, Delivery before ICU, and ventilation support were significant for maternal mortality.

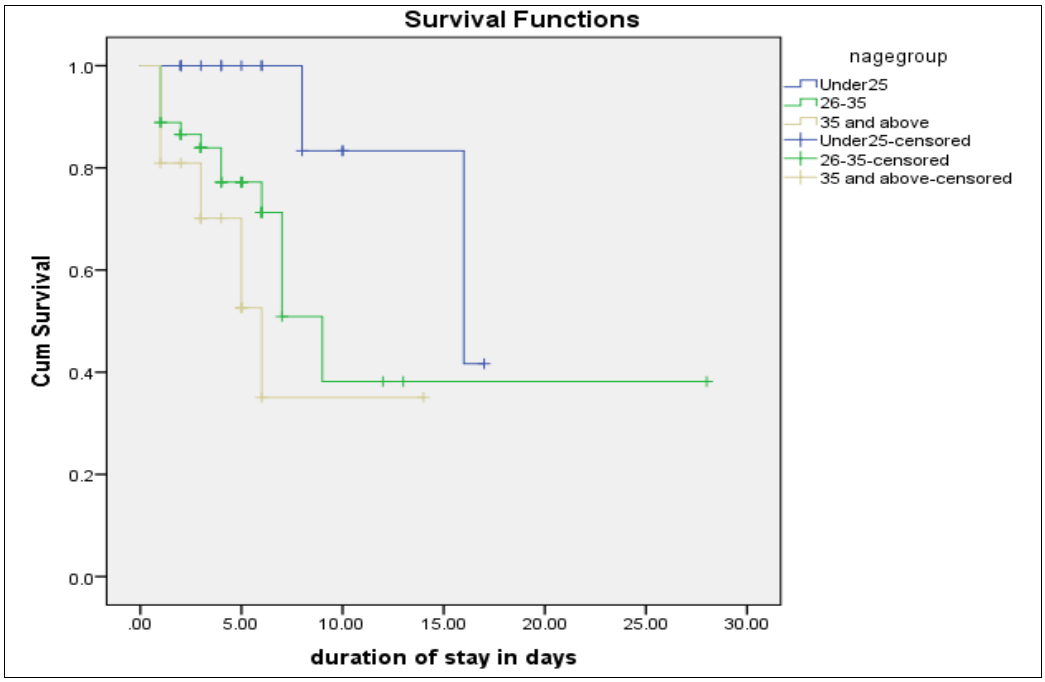

Fig 4: Kaplan-Meier Survival estimates following obstetric and gynaecological ICU admission compared among different patients' age group

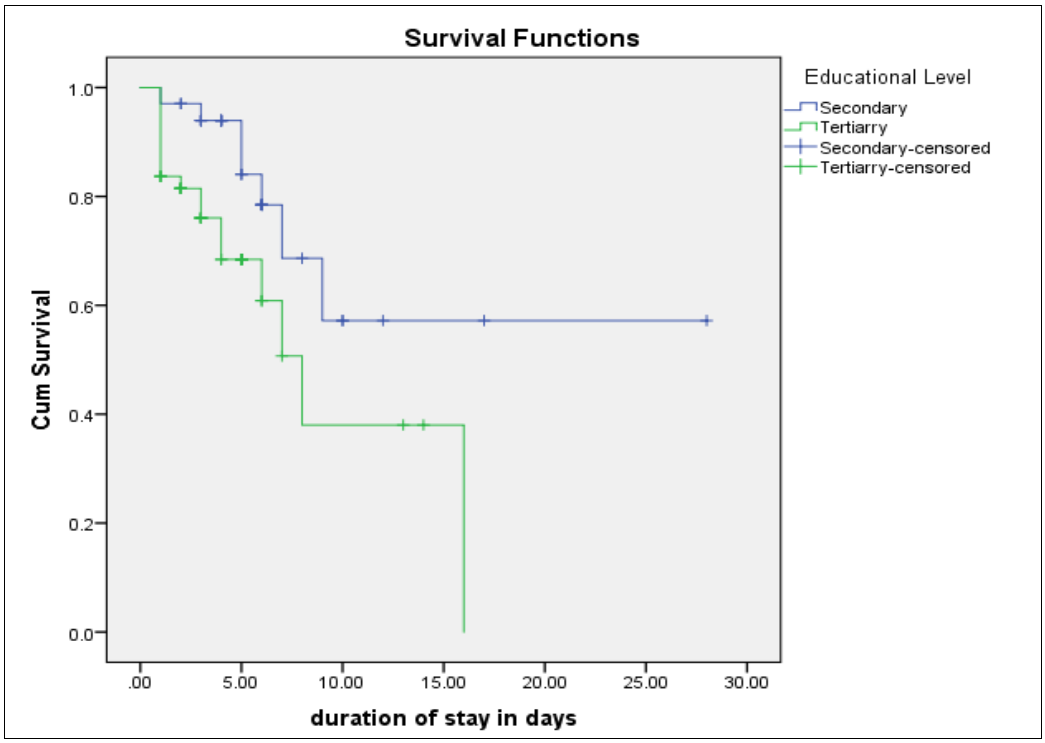

Fig 5: Kaplan-Meier Survival estimates following obstetric and gynaecological ICU admission compared among different patients' Educational Level

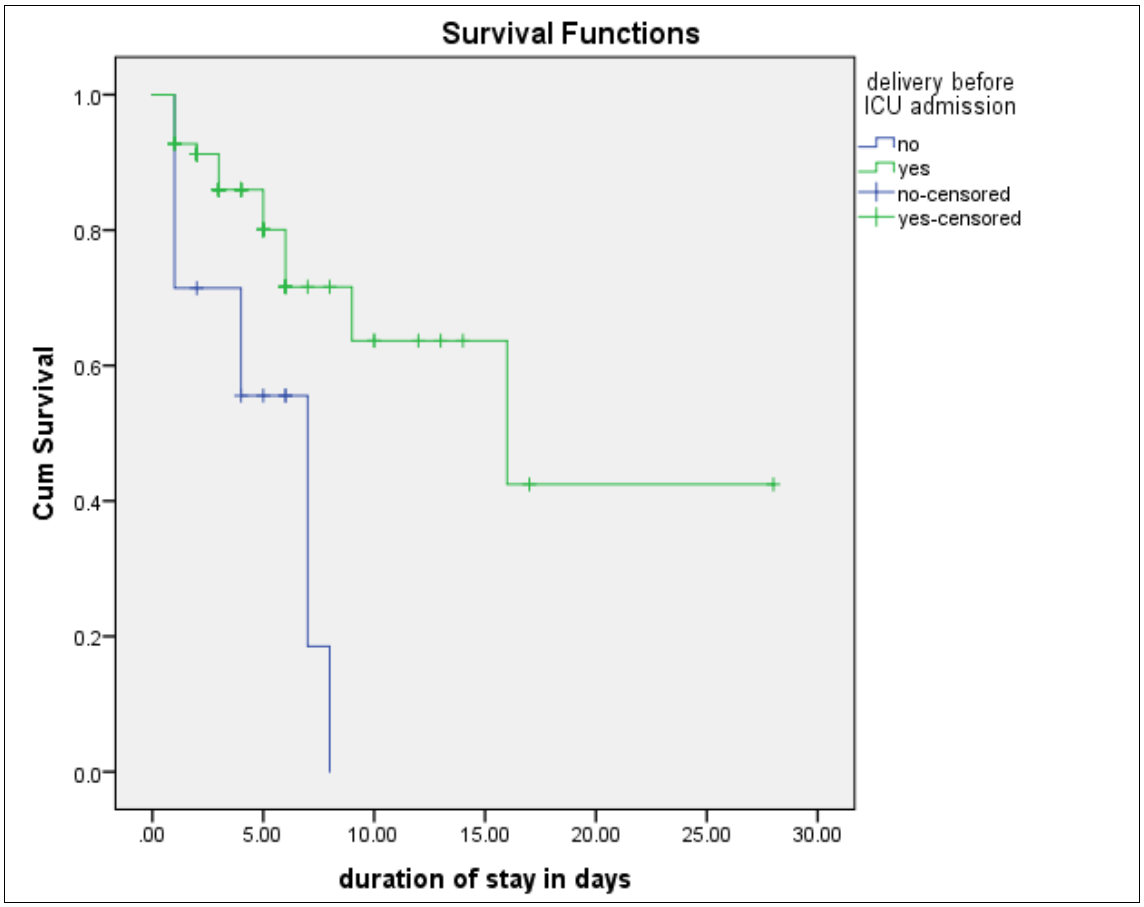

Fig 6: Kaplan-Meier Survival estimates following obstetric and gynaecological ICU admission compared between participants who delivered before ICU and those who delivered in ICU

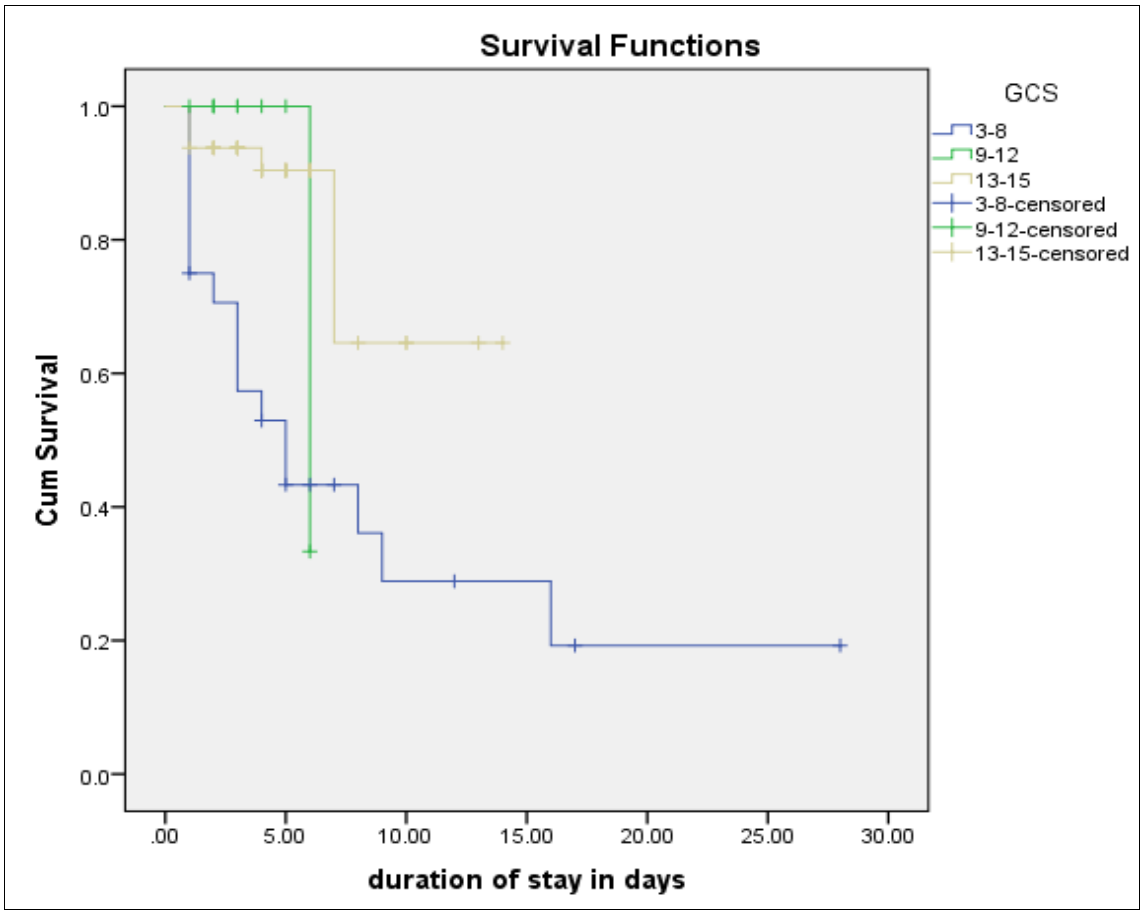

Fig 7: Kaplan-Meier Survival estimates following obstetric and gynaecological ICU admission compared among different patients' GCS score

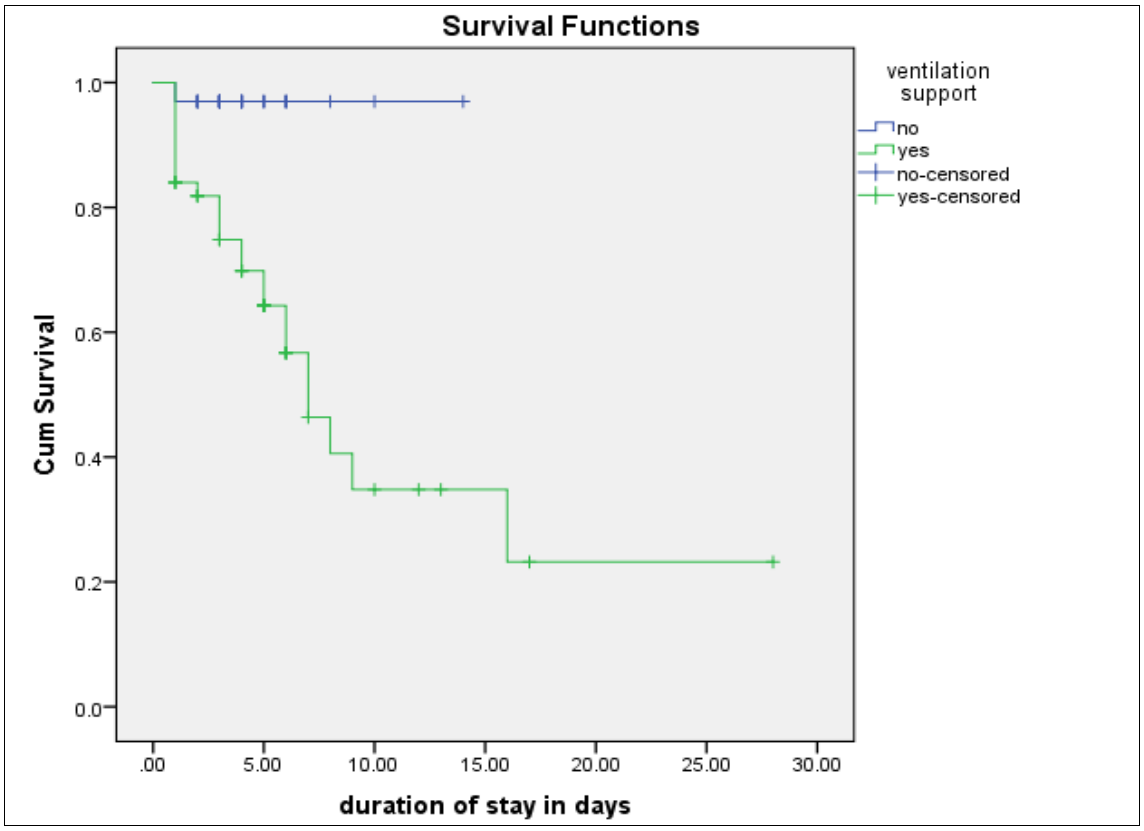

Fig 8: Kaplan-Meier Survival estimates following obstetric and gynaecological ICU admission compared between participants who had ventilation support and those who did not have

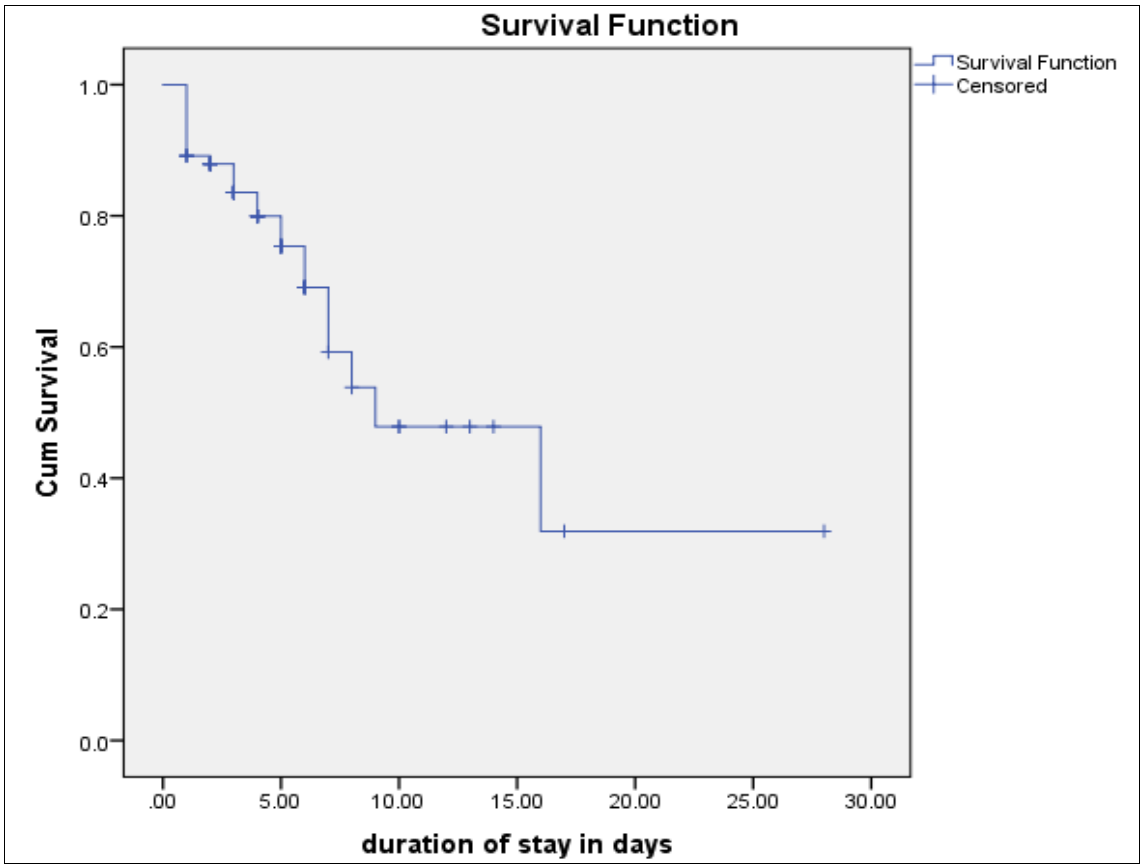

Fig 9: Kaplan-Meier overall Survival estimates following ICU admission

Discussion

This study includes 83 patients with an average age of 32 treated in UCH ICU within the duration of one month, March 2024 to April 2024. The study evaluates diagnoses for obstetrics and gyneacology ICU admissions, their outcomes, and the factors influencing these outcomes to

support continuous quality improvement in obstetrics and gynecology care at the University College Hospital, Ibadan, Nigeria. Obstetric ICU admissions made up 78.3% of the total, while non-obstetric conditions (Gyneacological) accounted for 21.7%. The mortality rate for obstetric and gyneacological ICU admissions was 28.9%, compare to 17.6% of obstetrics ICU patient death in multidisciplinary ICU in tertiary care hospital in northern India [31]. Significant predictors of death, as identified by logistic regression analysis, includes higher age, lower Glasgow Coma Scale (GCS) scores, the need for mechanical ventilation, and delivery before ICU admission. Our findings of a higher rate of obstetric admissions are consistent with other studies, which have shown a greater incidence of ICU admissions among obstetric patients compared to those seeking gyneacological care [2, 3].

The study found that women over 25 years old had a higher risk of ICU deaths compared to those under 25 years, with the highest risk observed in those over 35 years. This aligns with a study by Walter from 19 units hospital within the South East Thames region and he concluded maternal mobidity following admission in ICU occur in mothers that are >34 year [13, 33]. This is expected for women aged 35 years and above, as this age group has a greater risk of obstetric complications and potential underlying medical conditions that may predispose them to a higher likelihood of death [14-16]. The level of education was not a significant factor in maternal mortality in this study. However, educating providers and women of advanced maternal age (AMA) is crucial for facilitating clinical decision-making [32]. This education should take into account cultural influences, risk perception, and women's health literacy, and should also address providers' biases and systemic issues in the region.

Eclampsia (33.7%), obstetric haemorrhage (20.5%), and sepsis (16.9%) were the most prominent indications for ICU admission during the review period, consistent with previous studies identifying these conditions as major risk factors responsible for 70-80% of obstetric admissions worldwide [2, 17-20].

In our study, primigravidae, and increasing maternal age are known risk factors for the occurrence of these conditions [19-23], this finding indirectly supports this conclusion. In our study, sepsis emerged as the primary complication following ICU admission, consistent with many studies that have reported a high fatality rate and frequent occurrence of maternal sepsis [24, 25]. Given the significant contribution of eclampsia, haemorrhage, and sepsis to obstetric and gynecological ICU admissions in our study, particularly the high incidence of sepsis complications, it is crucial to emphasize screening, prevention, and early diagnosis of preeclampsia. This approach facilitates timely and appropriate management to prevent severe morbidity that may necessitate ICU admissions. Emergency preparedness in care units for pregnant women and labor wards is equally vital, as early interventions during the initial moments of haemorrhage can significantly impact outcome care; thus, early recognition of the need for ICU care, adequate pre-ICU resuscitation and supportive care and prompt referral will improve the outcome of care [13]. Maintaining a high index of suspicion for sepsis in at-risk women is essential for prompt diagnosis and initiating treatment with suitable antimicrobials. Additionally, implementing antibiotic sensitivity patterns and stewardship is important to ensure effective management and improve outcomes for septic patients.

During the study period, 60.2% of obstetrics and gynecology ICU admissions required mechanical ventilation. This rate is lower than the 90% reported in ICU, Delta state teaching hospital, Abraka, Nigeria [26] and the 95% reported in the ICU of Kamuzu Central Hospital, Malawi [10] but higher than rates observed in Kara University Hospital, Ghana [27] and in St. Paul's Hospital, in Addis Ababa, Ethiopia [28]. The disparity between our findings and those from other African countries may stem from differences in the severity of morbidity at presentation. It is possible that while late referrals to UCH, Ibadan may have been cause of obstetrics ICU death compared to the other study sites mentioned above in Nigeria and Malawi. It has been reported that among the factors of maternal death in Nigeria include poor ante-natal care which often result to delivery at home, mission houses with unattended problem of prolong obstructed labour risk of uterine rupture and severe antepartum or postpartum haemorrhage [34], compared to developed countries [35].

The current study aligns with an earlier report where mechanical ventilation was identified as a statistically significant predictor of obstetric ICU deaths [29, 30]. Delayed access to ventilator support can lead to irreversible hypoxic damage and exacerbate the condition of patients who require it. Therefore, improving accessibility to ventilators is crucial for enhancing outcomes. Despite the interventions of inotropic support, anticonvulsants, intravenous antihypertensive, pelvic ultrasound (USS), tracheostomy, haemodialysis, laparotomy, and blood transfusion, mortality rates remained slightly elevated. It is presumed that in many of these obstetric cases, pre-existing conditions may have been exacerbated by pregnancy. Promoting health measures to mitigate risk factors such as smoking, excessive alcohol consumption, and sedentary lifestyles is essential to reduce the impact. Furthermore, tackling this challenge requires expertise in specialized fields such as maternal-fetal medicine, critical care medicine and nursing, obstetric and gynecological anesthesiology, cardiology, and neonatology. Strengthening these disciplines will enhance healthcare providers' capabilities to effectively manage these complex cases.

Conclusion

In this study, eclampsia, haemorrhage, and sepsis emerged as the primary reasons for ICU admission among obstetrics and gynecology patients. Key interventions included cardiovascular and ventilator support. The availability of an ICU has notably helped to reduce maternal mortality rates in the region. To further mitigate maternal deaths, we suggest initiatives aimed at fostering collaboration between traditional birth attendants (TBAs) and hospitals. Training on aseptic delivery techniques and early identification of risk factors for conditions like pregnancy-induced hypertension, antepartum hemorrhage, and sepsis are crucial steps to reduce maternal mortality associated with these complications.

Conflict of Interest

Not available

Financial Support

Not available

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