



# **Obstetric Admission into the Intensive Care Unit (ICU) of the University of Port Harcourt Teaching Hospital: A Ten-Year Review**

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## **Authors' contributions**

*This work was carried out in collaboration between both authors. Authors KIG and NCO designed the study; author KIG performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author NCO managed the literature searches. Both authors read and approved the final manuscript.*

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## **ABSTRACT**

**Background and Aims:** This study examines the spectrum of diseases, booking status of women, surgical interventions and maternal outcome of obstetric patients admitted to the intensive care unit (ICU) in the past 10 years.

**Methodology:** A 10-year retrospective review of all obstetric admissions into the ICU from January 2006 to December 2016. The ICU records and case files of the patients were used to extract relevant information.

**Results:** A total of 1548 patients were admitted into the ICU during this period, and 302(19.5%) were obstetric patients. The obstetric patients admitted into the ICU represented 1% of all 31,200 deliveries within the study period.

Majority of patients admitted (51.79%) were of the 21-30-year age bracket. Similarly, unbooked patients contributed majority (59%) of admissions. Hypertensive disorders, e.g. Severe pre-eclampsia and Eclampsia constituted the most frequent obstetric diagnosis with a rate of 31.6%.

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Majority of these patients (65%) had caesarean sections, about 21% had an abdominal hysterectomy and 15% had laparotomy with uterine and bladder repair. The unbooked mothers had a statistically significant incidence of complications which include hypertensive disorders (severe PET, Eclampsia), ruptured uterus compared to the booked obstetric patients. Also, the unbooked mothers were more likely to die than the booked mothers. The maternal mortality was 28.99% of total admissions, amongst which the unbooked mothers accounted for 94% of these deaths and booked mothers 6%.

**Conclusion:** Obstetric patients admitted into the ICU especially the unbooked ones had a high mortality rate and severe morbidity rate in our environment. Therefore, the adoption of the safe motherhood principles remains a key tool in reducing maternal morbidity and mortality, especially in unbooked patients.

*Keywords: Unbooked patients; ICU; maternal morbidity and mortality.*

## 1. INTRODUCTION AND OBJECTIVES

Critically ill obstetric patients are always a challenge to Intensive Care Unit (ICU) physicians and account for as much as 7% of the ICU admissions in developing countries, while they account for a smaller proportion in developed countries [1]. The care of these patients poses a challenge in our environment due to the need for highly specialized care and equipment where the populace is still grappling with poverty, ignorance and scarcity of skilled attendants. Admission of obstetric patients occurs approximately at 0.1-0.9% of the deliveries [2]. The overall maternal death rate in the ICU varies from 3.4-21% [3]. Inadequate knowledge about the illness and infrequent admission of the obstetric patients results in high mortality and morbidity. WHO states that, "there is a story behind every maternal death or life-threatening complication" [4]. So a better knowledge of the spectrum, characteristics, and outcomes of the disease involving this group of patients is the first step towards achieving prevention and hence, reduction of both maternal morbidity and mortality [5].

Maternal mortality is a primary health care indicator that reflects the health care adequacy of a country. It remains unacceptably high in many developing countries like Nigeria unlike the developed nations and many pregnant women in these countries will require critical care during pregnancy and will be managed in ICU. This difference is very likely related to improved socioeconomic conditions, availability of comprehensive antenatal, obstetric, anaesthetic and intensive care services, as well as access to more advanced treatment modalities in the developed countries [5].

The primary objective of this study is to evaluate the pattern of admission, surgical intervention

and maternal outcome of obstetric patients admitted into the intensive care unit (ICU) of the University of Port Harcourt Teaching Hospital (UPTH) in the past 10 years.

## 2. METHODOLOGY

This study was carried out at the ICU of UPTH, Rivers state. The 8 bedded ICU in UPTH serves a population of about 9.5 million persons within Rivers state and its environs. Mechanical ventilation is available in the present ICU but monitoring of respiratory function by arterial blood gases (ABG) and end-tidal carbon dioxide tension (ETCO<sub>2</sub>) is presently lacking.

This was a retrospective review of obstetric admissions into the ICU of UPTH over a 10-year period. Data relevant to the obstetric patients were extracted from the admissions and discharge register of the ICU and the case files of the individual patients. Information retrieved contained age, parity, co-morbidities, obstetric history, booking status, mode of delivery, surgical intervention. Other information retrieved were length of stay in the ICU and outcome for the patients. The data obtained were analysed using descriptive statistical package SPSS 20.

## 3. RESULTS

A total of 1548 patients were admitted into the ICU during this period and 302(19.5%) were obstetric patients.

Table 1 shows that the unbooked patients constituted majority 183 (59.61%) of admissions and about 40% of the patients were booked. Also, a majority, 223 (73%) of the patients admitted into the ICU had Caesarean delivery compared to 84(23%) that had the vaginal delivery. Majority of the admissions were made

postpartum. 56 patients out of the 84 that had vaginal delivery went on to have an exploratory laparotomy due to uterine rupture. Thus 92.4% of obstetric admissions had surgical interventions such as caesarean section, abdominal hysterectomy and laparotomy with repair of the uterus and /or bladder.

Table 2 shows the indications for the surgeries. Hypertensive disorders (Eclampsia, Severe pre-

eclampsia and severe pregnancy- induced hypertension) were the leading indications in 97(31%) of cases. Others are cephalopelvic disproportion, ruptured uterus and primary postpartum haemorrhages in 60(19.56%), 43(14%) and 32(10.4%) of cases respectively. The outcome of patients admitted to the ICU is also shown. The maternal mortality was 29.0% of total admissions, of which the unbooked mothers accounted for 94% and booked mothers 6%.

**Table 1. Patients characteristics**

Characteristics	Freq n=307	Percentage (%)
<b>Age</b>		
≤20 years	9	2.93
21-30	159	51.79
31-40	127	41.37
41-50	12	3.91
<b>Mean</b>	30.52±5.28	
<b>Booking Status</b>		
Booked	124	40.39
Un-booked	183	59.61
<b>Mode of Delivery</b>		
Operative	223	72.64
Vaginal Delivery	84	27.36

**Table 2.**

Characteristics	Freq n=307	Percentage (%)
<b>Type of Surgery</b>		
Caesarean section	201	65.47
Laparotomy with hysterectomy	63	20.52
Laparotomy with repair of uterine rupture and injury to the bladder	15	4.89
Nil	28	9.12
<b>Indication for Surgery</b>		
<b>Hypertensive disorders</b>	<b>97</b>	<b>31.60</b>
Severe PET	27	8.79
Eclampsia	67	21.82
Severe PIH	3	0.98
CPD	60	19.54
ruptured uterus	43	14.01
PPH	32	10.42
<b>Placenta abnormalities</b>	<b>22</b>	<b>7.17</b>
Placenta praevia	16	5.21
placenta abruptio	5	1.63
placenta increta	1	0.33
Repeat c/s	13	4.23
Others	16	5.21
Nil	24	7.82
<b>Outcome</b>		
PNW	91	29.64
Died	89	28.99
UBLW	66	21.50
Discharged	30	9.77
Other wards	31	10.10

Fig. 1 shows the type of surgeries that the patients had. Caesarean section was the most common form of surgery done to these patients, constituting 65% of admission, while 21% had abdominal hysterectomy and 5% had the laparotomy for repair of bladder and bowel injury.

Table 3 shows the association between age, mode of delivery and booking status. Compared to booked mothers, unbooked mothers were younger in age ( $29.9 \pm 5.48$  vs.  $31.44 \pm 4.85$ ;  $p < 0.001$ ). Also, unbooked mothers that were less or equal to 30 years were statistically significantly greater, 59.56% vs. 47.58% ( $\chi^2 = 3.81$ ;  $p = 0.05$ ). Unbooked mothers were also 1.62 times more likely to be younger compared to booked mothers (OR=1.62; 95%CI= 1.01-2.64;  $p = 0.05$ ).

Table 4 shows that the Unbooked mothers had a statistically significant higher incidence of Hypertensive disorders (Severe PET, Eclampsia, Severe PIH) (36.61% vs. 24.19%) and Ruptured uterus (83.72% vs. 5.65%) ( $p = 0.001$ ) compared to the booked mothers.

Table 5 shows that Unbooked mothers have a higher probability of dying (45.90% vs. 4.03%) compared to booked mothers ( $\chi^2 = 201.56$ ;  $p = 0.001$ ).

Table 6 shows that Unbooked mothers have a higher proportion of delivery by emergency laparotomy due to uterine rupture than booked

mothers (25.68% vs. 12.90%) and for Laparotomy with repair of uterine rupture and injury to bladder ( $\chi^2 = 19.65$ ;  $p = 0.001$ ).

#### 4. DISCUSSION

A relatively small number of obstetric patients develop complications that may require ICU admissions. During the 10-year study period, Obstetric admissions to the ICU were 302 and this represented 0.96% of the 31,200 deliveries which occurred in the hospital during that period. This was similar to a study of Okafor [6] in Abuja(Nigeria) which indicated 0.97% and another study by Osinaike [7] et al in Ibadan(Nigeria), who reported a relatively higher figure(1.4%).

In other countries, Marbie and Sibai reported that 1% of women delivered at the University of Tennessee were admitted to Obstetrical ICU [8]. Only 0.4% of obstetrical patients needed ICU treatment in a study by Harris & Foley at the University of California, San Fransico [9]. Niyaz et al reported obstetric patients accounts for 0.41% of all ICU admission [10]. These variations might be due to differences in defining major morbidity criteria for ICU admission & availability of high dependency unit (HDU), an intermediate care unit. In our study a relatively high obstetric ICU admission might be due to lack of HDU.

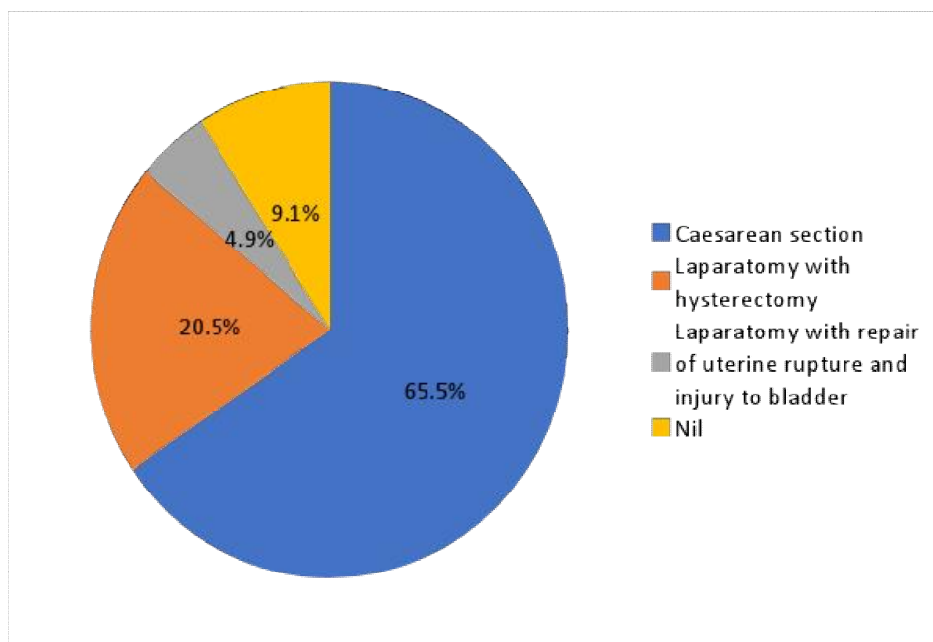


Fig. 1. Type of surgery

**Table 3. Association between age group, mode of delivery and booking status**

Age group	Booking status		Total	Chi-square (χ <sup>2</sup> )	P-value	OR (95%CI)
	Unbooked	Booked				
≤30	109 (59.56)	59 (47.58)	168 (54.72)	3.81	0.05*	1.62 (1.01-2.64)
31 and above	74 (40.44)	65 (52.42)	139 (45.28)			
<b>Total</b>	<b>183</b>	<b>124</b>	<b>307</b>			
<b>Mean age</b>	<b>31.44±4.85</b>	<b>31.44±4.85</b>		<b>t-test</b> 2.52	<b>P-value</b> 0.01*	
Mode of delivery	Booking status		Total	Chi-square (χ <sup>2</sup> )	P-value	OR (95%CI)
	Unbooked	Booked				
Vaginal delivery	68 (37.16)	16 (12.90)	84 (27.36)	20.68	0.001*	3.99 (2.10-7.66)
Operative	115 (62.84)	108 (87.10)	223 (72.64)			
<b>Total</b>	<b>183</b>	<b>124</b>	<b>307</b>			

\*Statistically significant (P&lt;0.05)

**Table 4. Association between Indication for surgery and booking Status**

Indication for surgery	Booking status		Total	Chi-square (χ <sup>2</sup> )	P-value
	Unbooked	Booked			
CPD	22 (12.02)	38 (30.65)	60 (19.54)	49.35	0.001*
placenta abnormalities	7 (3.83)	15 (12.10)	22 (7.17)		
PPH	18 (9.84)	14 (11.29)	32 (10.42)		
Hypertensive disorders	67 (36.61)	30 (24.19)	97 (31.60)		
Repeat c/s	3 (1.64)	10 (8.06)	13 (4.23)		
Ruptured uterus	36 (83.72)	7 (5.65)	43 (14.01)		
Others	9 (4.92)	7 (5.65)	16 (5.21)		
Nil	21 (11.48)	3 (2.42)	24 (7.82)		
<b>Total</b>	<b>183</b>	<b>124</b>	<b>307</b>		

\*Statistically significant (P&lt;0.05)

**Table 5. Association between outcome and booking status**

Outcome	Booking Status		Total	Chi-square (χ <sup>2</sup> )	P-value
	Un-booked	Booked			
Died	84 (45.90)	5 (4.03)	89 (28.99)	201.56	0.001*
Discharged	8 (4.37)	22 (17.74)	30 (9.77)		
PNW	7 (3.83)	84 (67.74)	91 (29.64)		
UBLW	65 (35.48)	1 (0.81)	66 (21.50)		
Other wards	19 (10.38)	12 (9.68)	31 (10.10)		
<b>Total</b>	<b>183</b>	<b>124</b>	<b>307</b>		

\*Statistically significant (P&lt;0.05)

**Table 6. Association between type of surgery and booking status**

Outcome	Booking status		Total	Chi-square (χ <sup>2</sup> )	P-value
	Un-booked	Booked			
Caesarean section	103 (56.28)	98 (79.03)	201 (65.47)	19.65	0.001*
Laparotomy with hysterectomy	47 (25.68)	16 (12.90)	63 (20.52)		
Laparotomy with repair of uterine rupture and injury to bladder	9 (4.92)	6 (4.84)	15 (4.89)		
<b>Nil</b>	<b>24 (13.11)</b>	<b>4 (3.23)</b>	<b>28 (9.12)</b>		
<b>Total</b>	<b>183</b>	<b>124</b>	<b>307</b>		

\*Statistically significant (P&lt;0.05)

Majority of the patients were young women in their twenties, who had no antenatal care and were admitted in the postpartum period. This was consistent with findings from a similar study at Ile-Ife by Faponle et al and also similar to findings from a study in Bangalore, India. [11,12] This study found a statistically significant association between a lack of antenatal care and admission of obstetric patients into the ICU.

The commonest indications for ICU admissions in this study were known causes of maternal morbidity and mortality in West Africa: Eclampsia and Obstetric haemorrhages [11,13] These indications are also associated with a high fatality rate, reflecting the poor quality of obstetric care generally available in most parts of the sub region [11,13,14].

Admission into the ICU was followed by operative delivery in 73% of cases. Sixty-five percent of the patients were admitted after emergency caesarean deliveries as a result of obstetric complications in labour and 21% had total abdominal hysterectomy for intractable obstetric haemorrhage. There was a statistically significant risk of admissions into the ICU following surgical interventions for delivery in these patients. This is consistent with several other studies which show that most admissions to the ICU followed emergency Caesarean deliveries [12,13]. This group of women have a higher chance of developing complications that may necessitate ICU admissions. This may be accounted for by the increased blood loss and risk of injury to intra-abdominal viscera in operative delivery and may not be unrelated to the primary diagnosis.

The maternal mortality was 28.99% of total admissions, similar to the study done in Borno state(Northern Nigeria) but lower than the mortality rate from the study in Ile-Ife(South-Western Nigeria). [11,13] Mortality rates from developed and developing countries with better obstetric services, high dependency obstetric units and properly equipped intensive care units were lower, even though the incidence of obstetric admissions were high and the indications for ICU admissions and primary obstetric diagnosis were similar [15].

Mortality was also noted to be higher among unbooked patients than booked patients. Unbooked mothers accounted for 94% of these deaths and booked mothers 6%. This disparity in the maternal mortality rate between the booked

and unbooked patients has again highlighted the importance of antenatal care as an important tool in the prevention of maternal morbidity and mortality. The unbooked patients had a statistically greater proportion of complications like hypertensive disorder, ruptured uterus and surgical interventions like laparotomy compared to the booked patients.

## 5. CONCLUSION

Obstetric patients admitted into the ICU, especially the unbooked patients had severe morbidities and a high mortality rate. Therefore, the adoption of the principles of safe motherhood initiative remains a key tool in reducing maternal mortality and morbidity especially in unbooked patients.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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