

## ORIGINAL RESEARCH ARTICLE

# Profile and outcomes of management of patients admitted to obstetric high care unit in a tertiary academic hospital in Gauteng Province, South Africa

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## Abstract

The aim of this study was to describe maternal characteristics and pregnancy outcomes of women admitted in a dedicated obstetric high care unit (OHCU) in a tertiary hospital in Gauteng province, South Africa. The study involved review of clinical records of women admitted to OHCU between January and June 2016. Data collected included maternal demographic data, indication for admission, management and outcomes. A total of 4 637 of women gave birth and 114 (2.5%) were admitted to the OHCU during this period. Majority (90, 78.9%) were younger than 35 (mean 29.6) years with 32(28.1%), in their first pregnancy. Obstetric related indications for OHCU admission were mainly, pre-eclampsia and related complications (89, 78.1%), followed by obstetric haemorrhage (32, 28.1%). Cardiac disease, 14(12.3%) and pneumonia 6(5.3%) were the most common non-obstetrics indications for admission. Majority of patients stayed in OHCU for an average of 24-48 hours and were discharged alive (99.86.8%). Only 11(9.6%) were transferred to ICU and complications related to cardiac diseases were the most common reason for the transfer. Preeclampsia, obstetric hemorrhage and cardiac related complications are the most common reasons for OHCU and ICU admissions however most of these condition can be successfully managed in OHCU. (*Afr J Reprod Health 2023; 27 [6]: 27-32*).

**Keywords:** Profile, management, outcomes, obstetrics high care admission

## Résumé

Le but de cette étude était de décrire les caractéristiques maternelles et les issues de grossesse des femmes admises dans une unité de soins obstétricaux spécialisés (OHCU) dans un hôpital tertiaire de la province de Gauteng, en Afrique du Sud. L'étude a impliqué l'examen des dossiers cliniques des femmes admises à l'OHCU entre janvier et juin 2016. Les données recueillies comprenaient des données démographiques maternelles, l'indication d'admission, la prise en charge et les résultats. Au total, 4 637 femmes ont accouché et 114 (2,5 %) ont été admises à l'OHCU durant cette période. La majorité (90, 78,9%) avaient moins de 35 ans (moyenne 29,6) ans avec 32 (28,1%), dans leur première grossesse. Les indications liées à l'obstétrique pour l'admission à l'OHCU étaient principalement la pré-éclampsie et les complications associées (89, 78,1 %), suivies de l'hémorragie obstétricale (32, 28,1 %). Les maladies cardiaques, 14 (12,3 %) et la pneumonie, 6 (5,3 %) étaient les indications non obstétriques les plus courantes pour l'admission. La majorité des patients sont restés à l'OHCU pendant une moyenne de 24 à 48 heures et sont sortis vivants (99,86,8%). Seulement 11 (9,6 %) ont été transférés aux soins intensifs et les complications liées aux maladies cardiaques étaient la raison la plus courante du transfert. La prééclampsie, l'hémorragie obstétricale et les complications cardiaques sont les raisons les plus courantes des admissions à l'OHCU et aux soins intensifs, mais la plupart de ces affections peuvent être gérées avec succès à l'OHCU. (*Afr J Reprod Health 2023; 27 [6]: 27-32*).

**Mots-clés:** Profil, prise en charge, résultats, admission en soins intensifs en obstétrique

## Introduction

In the majority of cases, pregnancy usually proceeds until the delivery of the fetus and postpartum period with no complications<sup>1</sup>. However, there are instances where complications do occur requiring increased medical surveillance

and admission to either an intensive care unit (ICU) or Obstetric High Care Unit (OHCU). The OHCU is a high dependency unit dedicated to managing obstetric related complications. Studies reporting admissions of critically ill obstetric patients in ICU have been extensively reported and in these studies, ICU admission was associated with better outcomes

for both the mother and the foetus<sup>2-4</sup>. Critically ill obstetric patients present a unique challenge because of the altered physiology of pregnancy and also the fact that clinicians have to take into consideration the interest of the developing fetus<sup>2</sup>. Successful management of critically ill obstetric patients is complex, requires a multidisciplinary care team comprised of intensivists, anesthesiologists, physicians and obstetricians<sup>5</sup>. The proportion of these critically ill patients admitted to ICU varies between developed and developing countries<sup>2-4</sup>. In developed countries, only a small proportion of pregnant women gets admitted to ICU, to be exact, less than 2%<sup>2</sup>. This figure can reach up to 10% or more in developing countries<sup>2</sup>. Another notable difference is that maternal mortality among patients admitted to ICU is lower (0 to 4.9% ) in developed when compared to developing countries (0 to 38% )<sup>2-4</sup>. This is despite the fact that the obstetric indications for admission to either an ICU or OHCU are similar in developed and developing countries<sup>2,4,6-10</sup>. Hypertensive disorders of pregnancy and obstetric hemorrhage are the leading obstetric indications for admission to either OHCU or ICU<sup>2-4</sup>. In addition cardiac disease is the most common non obstetric indication for admission to both OHCU and ICU<sup>11,12</sup>.

We aimed to describe the maternal characteristics and pregnancy outcomes among women who were admitted in the dedicated obstetric high care unit at Charlotte Maxeke Johannesburg Academic Hospital over a six month period in Gauteng Province, South Africa.

## Methods

This study was conducted at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH), a tertiary academic hospital in Gauteng province, and one of the ten central/national hospitals in South Africa (SA). CMJAH is affiliated to the University of Witwatersrand's Faculty of Health Sciences. The obstetric unit at CMJAH receives referrals from the Charlotte Maxeke Clinical Cluster (CMCC) made up of four district and six regional hospitals, ten Midwife Obstetric Units (MOUs) and referring primary healthcare facilities, referrals from the private sector and also self-referrals. The hospital offers a full range of secondary, tertiary and highly specialized services. The Department of Obstetrics

and Gynaecology is mainly staffed by subspecialists (Maternal & Fetal Medicine, Obstetrics Critical Care, Gynaecological Oncologists, Reproductive Medicine and Urogynaecologists). The Obstetric component is run by three Maternal and Fetal Medicine specialists, two Maternal and Fetal Medicine fellows, and one Obstetric Critical Care specialist.

This was a retrospective, cross sectional study involving review of clinical records of all obstetric patients who were admitted to the OHCU and general ICU at CMJAH, from the first of January to 31st of June 2016. The data was retrieved from maternity registers in the labour ward, OHCU and general ICU, obstetric theatre and patient files. All patient files were scanned and stored in the ORBIT online system that is managed by patient affairs. The system was accessed using passwords granted by the Department of Patient Affairs. The following data were collected: Patients demographics, obstetrics and medical history, indications for admission to OHCU and ICU, length of stay in OHCU and ICU, management and outcomes.

## Data management and analysis

Data was then captured and entered onto REDCap<sup>13</sup> data management programme and exported to Microsoft Excel® spreadsheet. Data was then transferred to Stata 14.1 (Statacorp, College Station, Texas) for statistical analysis. Descriptive tables were constructed with means or medians (with respective standard deviations or inter-quartile ranges) for continuous variables. Categorical variables were tabulated and their frequencies were recorded.

## Ethical consideration

The study was approved by the University of Witwatersrand's Health Sciences Research Ethics Committee (HREC) (ref no: M170229) and institutional approval was granted by the chief executive officer of CMJAH.

## Results

There were a total of 4 637 deliveries during the study period. Of these deliveries, 2 508 (54.1%) patients delivered via normal vaginal delivery

**Table 1:** Maternal characteristics, n=114

Characteristic	n=114	Percentage
Age (years)		
<25	29	25.4
25-29	25	21.9
30-34	36	31.6
≥35	24	21.1
Gravidity		
1 – 2	59	51.8
3 – 4	46	40.4
≥5	9	7.8
Parity		
0	32	28.1
1 – 2	65	57.0
3 – 4	16	14.0
≥5	1	0.9
Accessed antenatal care		
Yes	102	89.5
No	12	10.5
Gestational age at booking (weeks) Median (inter-quartile range)		
1 <sup>st</sup> trimester	2	12 (12 – 12)
2 <sup>nd</sup> trimester	73	21 (19 – 25)
3 <sup>rd</sup> trimester	10	31 (29 – 33)
HIV status		
Negative	79	69.3
Positive	35	30.7
Received ART		
No	4	8.8
Yes	31	91.2
CD4 count (units) Median (inter-quartile range)	390	278-541
Previous pregnancy complications		
Postpartum haemorrhage	1	0.9
Early neonatal death	3	2.6
Intrauterine foetal death	3	2.6
Preterm delivery	6	5.3
Infant death	1	0.9

(NVD) and the remaining 2 129(45.9%), via caesarean section (CS). A total of 114 (2.5%) pregnant and postpartum patients were admitted to OHCU. Only 11 patients (9.6%) were admitted to the main/general ICU. The demographic characteristics of the study participants are shown in Table 1. The age of the women ranged from 15 to 47 years, with a mean age of 29.6 years (SD±6.5). The majority of the patients, 90(78.9%), were younger than 35 and only 24(21.1%) were 35 years and older. Just over a quarter, 32(28.1%), of the women admitted were primigravidae, with a median gravidity of two (IQR: 2 – 3.) Majority of the patients, 92(80.7%), had a gravidity of three or less. The median parity was one (IQR 0 – 2), and most of the patients, 107 (93.9%), had a parity of

three or less. A greater number had accessed antenatal care; 102(89.5%) and attended antenatal clinics with the median booking gestational of 23 weeks, (IQR: 19 – 26). The mean hemoglobin level at booking was 12.1g/dl (SD±1.7).

All the patients were tested for HIV, including the 12 unbooked patients who were tested on presentation at the hospital. A total of 35 (30.7%) patients were HIV-positive and 31 (91.2%) of those who were HIV positive, were on antiretroviral therapy (ART). The median CD4 cell count (only available for 22 women) was 390 cells/mm<sup>3</sup> (IQR: 278 – 541). In terms of obstetric history, 63(55.2%) patients had a history of a previous NVD and 32 (28.1%), history of previous CS. A total of 20(17.5%) of the previous

**Table 2:** Indications for admissions to high care

Indications for admission to HCA	n=114	Percentage
<i>Obstetric indications</i>		
Pre-eclampsia	67	58.8
Post-partum haemorrhage	32	28.1
HELLP syndrome	14	12.3
Eclampsia	8	7.0
Post-operative sepsis	1	0.9
Other (PPROM and illegal TOP for observation)	2	1.8
<i>Non-obstetric indications</i>		
Cardiac disease	14	12.3
Pneumonia	6	5.3
Anaesthetic complications	2	1.8
Epilepsy	1	0.9
Renal failure	1	0.9
Other (syncope, maternal tachycardia, post-op observation and diabetes mellitus in labour)	4	3.5

**Table 3:** Outcomes of patients admitted in HCA

Maternal outcomes in HCA	n=114	Percentage
Transferred to ICU	11	9.6
Discharged to postnatal ward	99	86.8
Antenatal ward	4	3.5

**Table 4:** Reasons for transfer to ICU

Obstetric indications for transfer to ICU		
Pre-eclampsia	4	3.5
HELLP syndrome	2	1.8
Post-partum haemorrhage	1	0.9
Non-obstetric indications for transfer to ICU		
Cardiac disease	10	8.8
Renal dysfunction	2	1.8
Anaesthetic complications	2	1.8
Post-operative respiratory diseases	1	0.9
Venous thromboembolic disease	1	0.9

pregnancies ended up with miscarriages and two (1.8%) patients each had an ectopic and a termination, respectively.

The most common obstetric indication for admission to OHCU was pre-eclampsia, including HELLP syndrome and eclampsia 89 (78.1%) followed by post-partum hemorrhage 32 (28.1%). There was one case each of post-operative sepsis (0.9%), PPROM (0.9%) and illegal termination of pregnancy or TOP (0.9%). This woman, a 30 year old G1PO went for illegal TOP because after failing to access second trimester TOP from government services. The most common non-obstetric

indication for OHCU admission was pre-existing cardiac disease 14(12.3%), followed by pneumonia 6(5.3%). There were two (1.8%) cases of anesthetic complications as a result of high spinal. There was one (0.9%) case each of epilepsy, renal failure, syncope, maternal tachycardia, post-operative observations and diabetes mellitus in labour (Table 2).

Forty-seven women (42.7%) stayed in OHCU for 24-48 hours and 39 (35.5%) women needed high care for more than 48 hours. Table 3 shows the outcomes of patients admitted to OHCU and Table 4, the reasons for ICU transfer. The majority of the patients 103(86.8%) were discharged directly from OHCU to the postnatal wards, while 11(9.6%) were transferred to ICU. Among the patients transferred to ICU, four (3.5%) patients were transferred because of severe pre-eclampsia, two (18.1%) patients because of HELLP Syndrome and one patient (9.1%) because of post-partum hemorrhage. The non-obstetric indications for transfer to ICU were pre-existing cardiac disease, renal dysfunction, anaesthetic complications, post-operative respiratory diseases and venous thromboembolic disease (Table 4).

Of the 11 patients who were transferred to ICU, four (36.4%) died in ICU, and seven (63.6%) were stepped down back to OHCU. Two of the maternal deaths (50.0%) were due to complications of eclampsia; one death (25.0%) was due to jaundice with hepatosplenomegaly of unknown cause; and one woman (25.0%) was a patient with metastatic breast cancer.

## Discussion

Over a period of six months, the admission rate for obstetric to the OHCU and ICU at CMJAH was 2.5%. This is higher than that the 2% admission rate reported in the developed countries<sup>2</sup>. In the UK, the admission rate to OHCU and ICU was reported to be around 0.75% for the period of 1989 to 1993, with North America at 0.9% for a similar period<sup>10</sup>. The rate may be higher in this study because of the referral bias and the fact that CMJAH is a tertiary hospital receiving high risk pregnancies from several facilities in the catchment area. Another possible explanation could be the existence of co-morbidities such as HIV in the study population. The admission rate to OHCU in this study is however lower than that reported in

other developing countries. In India for example, the admission rate was reported to be around 5.4%<sup>11</sup> and in Nigeria, 2.8%<sup>14</sup>. Two studies in South Africa only focused on admission to ICU, Dr George Mukhari Academic Hospital in Pretoria reported an admission rate of ICU of 5.7%<sup>2</sup> and the other study from Pietersburg Hospital in Limpopo 6.7%<sup>4</sup>. These studies reported on ICU admissions instead of OHCU, making comparison difficult. The rate of ICU admission in this study is still lower than that reported in other obstetric units<sup>2,4</sup>.

Pre-eclampsia, its complications, and obstetric hemorrhage were the leading indications for admission to OHCU and ICU admissions. This is in keeping with the findings from the developing and developed world<sup>12,14-17</sup>. It is interesting that despite the differences in socio-economic status, access to health care and lack of resources in the developing world, the reasons for High care /OHCU and ICU are similar to that of the developed world. This is somehow surprising given the fact that in developing countries pregnant women typically present late, often in a critical condition, with no or poor antenatal care, with co-morbidities such as HIV and a lack of resources<sup>11,18,19</sup>.

Among the non-obstetric reasons for admission to OHCU, were medical disorders, most frequently, preexisting cardiac disease, followed by respiratory infections. Of the women with non-obstetric indications for admission to OHCU, 9.6% were transferred to ICU and the most common reason for the transfer was worsening clinical condition. The top three indications for ICU transfer were pre-existing cardiac diseases, renal and anaesthetic complications. This suggests that OHCU care is not appropriate for every condition and therefore obstetric units should put together OHCU admission criteria which should consider available resources and clinical expertise. The relatively small proportion of patients transferred to ICU may be due to availability of OHCU and the quality of care in the unit. This unit is staffed by highly experienced obstetricians with medical and intensive care support. The high number of cardiac patients may be due to the policy of elective admission of all cardiac patients to ICU and failing which (due to lack of ICU bed), to OHCU. Our findings are similar to those of Motiang *et al.*, at Dr George Mukhari Academic hospital, another academic and one of the central hospitals in South Africa, which showed that cardiac disease was the

leading cause of ICU admission, followed by complications of eclampsia and pre-eclampsia<sup>2</sup>. Women with cardiac disease in pregnancy represent a special group because of the associated high mortality.

Maternal mortality among obstetric patients admitted to ICU from studies done in developed countries is low and ranges from 0 to 4.9% whilst, that in developing world is high and ranges from 2 to 44%<sup>3,4</sup>. Unfortunately, there are limited studies done in OHCU in the developing world to make a comparison. In this study, there were no maternal deaths from patients admitted in OHCU however it must be noted that four of the 11 patients that were transferred to ICU died. However, the fact that majority of patients were successfully managed in OHCU suggests that majority of pregnant patients with pregnancy related complications can be successfully managed in OHCU. Pregnant women are generally young and healthy and one would expect them to recover following unforeseen pregnancy related complications. Majority of the patients in this study were less than 35 and were mainly admitted to OHCU because of pregnancy related complications. This is perhaps some of the reasons for the low mortality in this study.

## Conclusion

Pre-eclampsia and its complications, obstetric hemorrhage and cardiac disease are the most common reasons why obstetric patients required OHCU and ICU admission. This pattern similar to that seen in other parts of South Africa, the developing and developed world. Most of the obstetric patients with complications can be successfully in a HCA however such will require careful patient selection. Our study provides some data regarding the safety and some of the conditions that can be successfully managed in OHCU.

## Authors contribution

L Chauke conceptualised the study, wrote and revised the final manuscript. All authors were involved in the analysis and writing of the manuscript

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## Conflict of interest

None.

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