Causes of obstetric Intensive Care Unit admissions in a tertiary level hospital in Mexico

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Abstract

***Introduction*: For most women, pregnancy is a normoevolutive physiological state; however, this is not true in all cases, as some obstetric patients present with life-threatening complications requiring admission to the obstetric Intensive Care Unit (ICU).**

Our study aimed to identify the primary reasons for admission to the obstetric ICU of a tertiary care center in Sinaloa, Mexico, from January 1 to December 31, 2023. This objective is crucial for understanding and improving maternal healthcare.

Our study was a retrospective, cross-sectional, and descriptive analysis of 83 patient records from the Women's Hospital of Sinaloa ICU. This unique approach provides valuable insights into the leading causes of obstetric ICU admissions.

***Results*: The mean age was 24±7.25 years; the patients had a minimum of 1 and a maximum of 6 pregnancies; 65% had been terminated by delivery, 72.2% by cesarean section, and 14.1% by abortion. Prenatal care had not been provided in 27.7% of cases. The mean length of stay in the ICU was 3.1 days. Regarding marital status, 15.7% were single, 41.4% were married, and 43.4% were in a common-law relationship. Twenty-five point three percent had primary education, 42.2% had secondary education, 27.7% had high school, and 4.8% had professional studies. The most common diagnoses were preeclampsia with severity criteria (25.3%), obstetric hemorrhage (21.7%), hemolysis, elevated liver enzymes and low platelets (HELLP) syndrome (9.6%), and eclampsia (7.2%).**

***Conclusions*: Our findings underscore the significance of hypertensive disorders of pregnancy and obstetric hemorrhage as the leading causes of ICU admissions in our hospital. This knowledge is crucial for improving maternal healthcare.**

Key words: Obstetric Intensive Care Unit, maternal morbidity, preeclampsia, obstetric hemorrhage, sepsis.

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Introduction

For most women, pregnancy is a physiological condition that usually progresses; however, we know that this is not always the case; some obstetric patients present with life-threatening complications that require admission to the obstetric Intensive Care Unit (ICU). (1)

Worldwide, obstetric hemorrhage and hypertensive disorders of pregnancy are recognized as the two leading causes of ICU admission; however, mortality from these causes is low, ranging from 0.2% to 9.7%, (2) highlighting the importance of care by a multidisciplinary team with knowledge of the physiological changes that occur during pregnancy, led by obstetric intensivists. (3,4)

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the risk factors for ICU admission that should be known and asked of all obstetric patients, including maternal age, prepregnancy peak body index, tobacco use, nulliparity, maternal baseline disease, education, attempted vaginal delivery, thrombocytopenia, and hypertensive disorders of pregnancy. (5)

In the United States, the leading causes of ICU admission were cesarean section, preeclampsia or eclampsia, postpartum hemorrhage, cardiomyopathy or another heart disease, genitourinary tract infection, ectopic pregnancy complication, miscarriage, sepsis, cerebrovascular disease, and pulmonary embolism. (5-7)

Our findings align with global trends, as hypertensive disorders of pregnancy and obstetric hemorrhage have been reported as the leading causes of ICU admission in Europe as well. (8,9) This shared understanding strengthens our collective efforts in maternal healthcare.

In Mexico, the leading causes of ICU admission are preeclampsia, hemorrhage, and sepsis. (10) Because pregnancy is a high-risk period for women, criteria for ICU admission have been proposed (**Table 1**) to reduce maternal mortality. (11)

The primary objective of our study was to determine the leading causes of admission to the obstetric ICU of a tertiary care center in Sinaloa, Mexico, from January 1 to December 31, 2023. This objective guided our research and underscored the importance of our findings.

Materials and methods

A retrospective, cross-sectional, observational, and descriptive study was performed. The sampling method was non-probability and consecutive. No intervention design was required.

Eighty-three records of patients admitted to the ICU of the Women's Hospital of Sinaloa, Mexico, in 2023 were analyzed. The primary admission diagnosis was determined.

Inclusion criteria: pregnant patients with immediate, mid, or late pathological puerperium and obstetric or non-obstetric pathology complicating pregnancy.

Exclusion criteria: non-pregnant patients, patients without puerperium, and patients with gynecological pathology.

Instruments or techniques: Data collection was performed from the digitized clinical records of the SIGHO system (Hospital Management System) of patients diagnosed with some criteria for admission to the ICU of the Women's Hospital of Sinaloa.

The author of the study was responsible for data collection.

Ethical aspects: No risks were considered, and fundamental principles were violated in conducting this research, which was carried out exclusively by collecting information from existing records and clinical histories/electronic files. The confidentiality of the information was maintained. Thus, the investigator was the only person authorized to use the data obtained exclusively for the study.

Statistical analysis

The necessary variables were collected in an Excel™ database, namely marital status, education, principal diagnosis of admission to the ICU, maternal age, number of pregnancies, method of abortion, prenatal control, obstetric control ultrasound, and days of hospitalization. The information was summarized in tables and graphs. Subsequently, all the data obtained were analyzed using the SPSS statistical package, version 27.

Results

The data of the 83 patients were obtained directly from the SIGHO electronic medical record. The mean age was 24.10±7.25 years; as for the gynecologic-obstetric history of the patients hospitalized in the ICU during the study period, they had presented at least one and a maximum of six pregnancies, of which 32 (38.55%) (limits=1-4) had terminated by delivery, 60 (72.2%) (limits=1-4) by cesarean section, and 14 (16.81%) (limits=0-2) by abortion. As for prenatal control, 60 (72.2%) had it (range=1-4). The mean length of stay in the intensive care unit was 3.16 days (range=1-12).

Regarding marital status, 13 (15.6%) of the participants were single, 34 (41%) were married, and 36 (43.4%) were in a cohabiting relationship. Regarding education, 21 (25.3%) had primary education, 35 (42.2%) had secondary education, 23 (27.7%) had higher education, and only 4 (4.8%) had professional education (**Figure 1**).

Table 1 shows the most common direct obstetric diagnoses, preeclampsia, the most common disease with 25.3%, followed by obstetric hemorrhage (21.7%), HELLP syndrome (9.6%), and eclampsia (7.2%). The leading indirect obstetric cause was urosepsis (14.5%).

Discussion

In Mexico, it is known that up to 15-20% of obstetric patients have a history or concomitant pathology during pregnancy or present an adverse obstetric event that warrants ICU care. (10) Globally, maternal morbidity reflects the quality of medical care. Despite significant scientific advances, disparities in medical care persist in some countries to the det-

riment of obstetric patients. (8)
The study shows the leading obstetric causes of ICU admission were hypertensive disorders of pregnancy and obstetric hemorrhage in 62.5%, as reported by Franco Sansaloni A. et al. in 2017 (62%). In similar circumstances, Gilberto Hernandez Falcon et al. reported a higher percentage of admissions to the ICU caused by hypertensive disorders of pregnancy and their complications (with 54.2% for eclampsia, 9.3% for severe preeclampsia, and l0.2% for HELLP syndrome). (12)
The third most common obstetric cause of ICU patient acceptance in this study was sepsis, with 15.7% of which 14.5% was due to urosepsis and 2.4% to chorioamnionitis/preterm placental abruption. Maternal sepsis is estimated to cause 11% of maternal deaths worldwide, mainly due to chorioamnionitis, endometritis, and urosepsis. (13,14) Notably, there were no maternal deaths in the ICU at our hospital during the study period.
Sol Zenith González Mendoza et al. conducted a similar study in Tamaulipas from 2012 to 2018, including 21 patients. They reported that the leading cause of admission to the ICU in their hospital was eclampsia (34.1%). (15) However, results differed from those obtained in the study since only 7.2% of the patients admitted to the ICU during our research presented this pathology. (16) This may be due to environmental, genetic, and geographic factors that differ from the population.
It should be noted that most of the population studied lived together (43.4%), 41% were married, and the remaining 15.7% were single; the mean age was 24 years (range 13-41 years), and all had at least one prenatal visit. Similar data were reported in the work of Franco Sansaloni A, who reported a short stay in the ICU, indicating the effectiveness of the hospital's multidisciplinary team. (8) In another study by Feitosa Mourão L. et al. (2018), they reported that most of the patients admitted to the ICU belonged to the age group between 20 and 29 years, lived in a stable union, had average schooling, were in their first pregnancy, and had 4 to 6 prenatal control visits. (16) Epidemiological results are very similar to those reported in this study (**Table 2** and **Figure 1**).
Because our study had a retrospective and descriptive design, we know its limitations; therefore, obstetric care providers should routinely assess patients' risks, ensure adequate maternal care, and establish multidisciplinary plans to improve maternal health and reduce mortality risk.

Conclusions

The leading causes of admission to the ICU of our hospital were hypertensive disorders of pregnancy and their complications, followed by obstetric hemorrhage. Therefore, continuous training by international or national experts is required on topics such as hypertensive disorders of pregnancy and the management of obstetric hemorrhage and sepsis; these are the main pathologies that our hospital deserves to develop skills to reduce maternal mortality.

Authors' contributions

FJCA, JMLL, JGRO, and GMPG designed the review. FJCA, DMO, ETC, FMO, and MGPTCL searched the selected articles and performed data extraction and analysis. FJCA led the writing of the review. JAUV, ACR, and JMH revised several drafts of the article. JMLL, JV, JAMG, and FJCA read and approved the final version. All authors approved the final version of the manuscript before submission.

Funding

No specific grants from public, commercial, or for-profit agencies were received for this research.

Conflicts of interest

The authors declare that they have no competing interests.

Ethical responsibilities for human and animal protection

The authors declare that no human or animal experimentation was involved in this research data confidentiality. The authors declare they have followed their center's protocols for publishing patient data right to privacy and informed consent. The authors have obtained the informed consent of the patients and/or human subjects referred to in the article.

Table 1. Criteria for admission to the obstetric Intensive Care Unit

Pathologies associated with pregnancy	Pathologies not associated with pregnancy
- Preeclampsia with severity criteria and multiple organ dysfunction - Obstetric hemorrhage and hypovolemic shock - Peripartum heart disease - HELLP syndrome - Acute fatty liver of pregnancy - Amniotic fluid embolism - Severe sepsis/septic shock of obstetric origin	- Complicated heart disease (high-degree AV block, multifocal ventricular extrasystole, supraventricular tachycardia, left ventricular failure, congestive heart disease, etc.) - Aortic dissection - Acute respiratory distress syndrome and pregnancy - Pulmonary edema - Massive pulmonary thromboembolism - Diabetic ketoacidosis during pregnancy - Sepsis/septic shock of any etiology - Status epilepticus

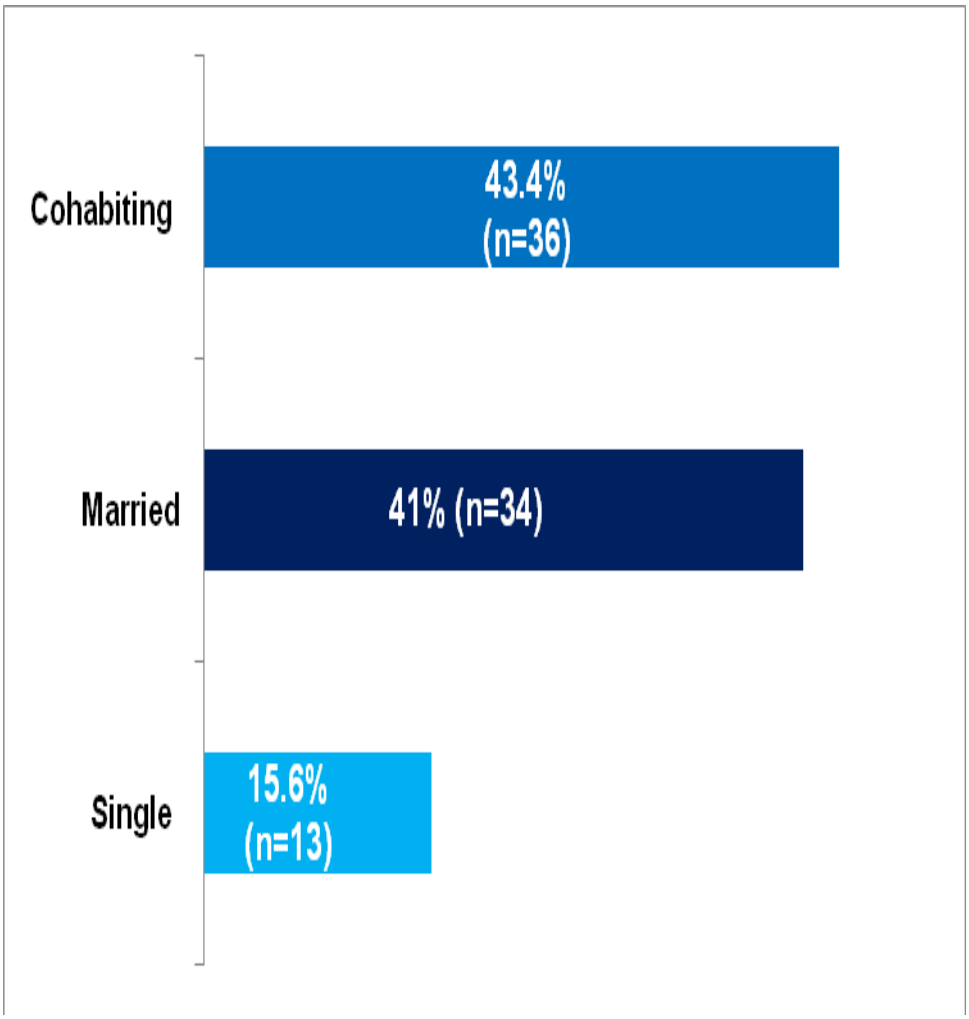
Legend: HELLP=hemolysis, elevated liver enzymes, and low platelets; AV=atrioventricular.

Table 2. Frequencies and percentages of diagnoses in obstetric intensive care unit (ICU) patients

Diagnoses	*f*	*%*
- Preeclampsia with severity criteria	21	25.3
- Eclampsia	6	7.2
- HELLP syndrome	8	9.6
- Obstetric hemorrhage	18	21.7
- Urosepsis	12	14.5
- Sepsis (pathological chorioamnioitis/ puerperium due to remains)	2	1.4
- Placenta Spectrum Accreta	4	4.8
- Trophoblastic disease	1	1.2
- Hypovolemic shock due to ruptured ectopic	1	1.2
- Acute pancreatitis	2	2.4
- Bacterial meningitis	1	1.2
- Chest pain	1	1.2
- Hydroelectrolyte imbalance	1	1.2
- Acute pulmonary edema	1	1.2
- Pulmonary thromboembolism	1	1.2
- Influenza	1	1.2
- Acute Fatty Liver of Pregnancy	1	1.2
- Mild head trauma	1	1.2

Legend: HELLP=hemolysis, elevated liver enzymes, and low platelets.
Source: SIGHO (n=83).

Figure 1. Marital status as a percentage of patients in the obstetric intensive care unit (ICU)



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