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Original Article

Clinical characteristics and outcomes of obstetric patients in intensive care in Paraguay: a retrospective observational study

Características clínicas y desenlace de pacientes obstétricas en cuidados intensivos en Paraguay: estudio observacional retrospectivo

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ABSTRACT

Introduction: Maternal mortality is a key indicator of the quality of health systems. Over the past decades, a global decline in maternal mortality has been observed, a trend that is also reflect in Paraguay, although significant challenges remain in the care of critically ill obstetric patients. **Objectives:** To describe the clinical characteristics and outcomes of obstetric patients admitted to the multi-purpose intensive care units of two public hospitals in Paraguay during the period 2018-2023. **Methodology:** An observational, descriptive, retrospective study was conducted in two public referral hospitals in Paraguay between January 2018 and December 2023. All obstetric patients admitted to polyvalent intensive care units during the study period were included. **Results:** A total of 95 obstetric patients were analyzed, representing 2.08% of all admissions to the intensive care units. The median age was 28 years (interquartile range [IQR]: 10). Most patients were postpartum (63.7%), with a predominance of surgical postpartum. The most frequent comorbidities were hypertension (27.45%) and a history of hypertensive pregnancy (21.56%). The main causes of admission were hypertensive disorders of pregnancy (62.5% of obstetric admissions) and postpartum hemorrhage (26.8%). Thirty-nine point five six percent of patients required invasive mechanical ventilation, with a median intensive care unit stay of 4 days (IQR: 4). The median APACHE II score was 10 (IQR: 5) and the initial SOFA score was 2 (IQR: 3). The observed mortality rate was 3.29% (95% CI: 0.7-9.3). **Conclusions:**

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Obstetric patients represent a low percentage of intensive care admissions in the hospitals studied. They were characterized as a young population, predominantly postpartum women, whose main causes of admission were hypertensive disease of pregnancy and postpartum hemorrhage. The observed mortality was low compared to similar studies in the region.

Keywords: maternal mortality; intensive care; obstetrics; comorbidity; morbidity.

RESUMEN

Introducción: La mortalidad materna es un indicador clave de la calidad de los sistemas de salud. En las últimas décadas se ha observado una disminución global de esta mortalidad, tendencia que también se refleja en el Paraguay, aunque persisten desafíos significativos en la atención de las pacientes obstétricas críticamente enfermas. **Objetivos:** Describir las características clínicas y desenlaces de las pacientes obstétricas ingresadas en las unidades de cuidados intensivos polivalentes de dos hospitales públicos de Paraguay durante el período 2018-2023. **Metodología:** Se realizó un estudio de diseño observacional, descriptivo y retrospectivo en dos hospitales públicos de referencia de Paraguay entre enero de 2018 y diciembre de 2023. Se incluyó a todas las pacientes obstétricas ingresadas a las unidades de cuidados intensivos polivalentes durante el período de estudio. **Resultados:** Se analizaron las fichas clínicas de 95 pacientes obstétricas, que representó el 2,08% del total de ingresos a las unidades de cuidados intensivos. La mediana de edad fue de 28 años (rango intercuartílico [RIC]:10). La mayoría de las pacientes eran puérperas (63,7%), predominando el puerperio quirúrgico. Las comorbilidades más frecuentes fueron hipertensión arterial (27,45%) y el antecedente de enfermedad hipertensiva del embarazo (21,56%). Las principales causas de ingreso fueron la enfermedad hipertensiva del embarazo (62,5% de los ingresos obstétricos) y la hemorragia puerperal (26,8%). El 39,56% de las pacientes requirió ventilación mecánica invasiva, con una mediana de estancia en la unidad de cuidados intensivos de 4 días (RIC: 4). La mediana del score APACHE II fue 10 (RIC: 5) y del score SOFA inicial fue 2 (RIC: 3). La mortalidad observada fue de 3,29% (IC 95%: 0,7-9,3). **Conclusiones:** Las pacientes obstétricas representan un bajo porcentaje de los ingresos a cuidados intensivos en los hospitales estudiados. Se caracterizó por ser una población joven, predominantemente puérperas, cuyas principales causas de ingreso fueron la enfermedad hipertensiva del embarazo y la hemorragia puerperal. La mortalidad observada fue baja en comparación con estudios similares de la región.

Palabras clave: mortalidad materna; cuidados intensivos; obstetricia; comorbilidad; morbilidad.

Introduction

Maternal mortality constitutes one of the most relevant indicators of health service quality. According to the WHO, it is defined as the death of a woman from causes related to or aggravated by pregnancy or its management, occurring during pregnancy, childbirth, or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy [1]. Over the last decades, maternal mortality has experienced a significant global reduction, attributable to improvements in health resources and access to quality obstetric care [2,3].

In Paraguay, the maternal mortality ratio decreased from 164 per 100,000 live births in 2000 to 67.3 in 2017 [4]. However, the COVID-19 pandemic caused an increase reaching figures similar to those of two decades ago [4,5], ighlighting the vulnerability of maternal health systems and the need to strengthen obstetric

care services, including ICUs.

The prevalence of obstetric patient admissions to the ICU ranges between 0.7 and 13.5 per 1,000 pregnancies [6-8]. In developed countries, they represent less than 1% of ICU admissions, with mortality ranging between 5% and 20% [7]. In contrast, in resource-limited countries, this percentage can reach up to 25.7%; this heterogeneity reflects differences in available resources, admission criteria, and quality of perinatal care [9,10].

Pregnancy presents anatomical and physiological changes that can complicate the management of critically ill pregnant women. Knowledge of these alterations is essential for optimal management. Patients frequently require continuous monitoring and specialized therapeutic interventions [11].

Obstetric complications requiring ICU management include hypertensive disorders of pregnancy (preeclampsia, eclampsia, HELLP syndrome), hemorrhage, and infectious complications. Non-obstetric conditions include autoimmune, cardiovascular, respiratory, neurological, and metabolic diseases. The distribution varies according to the level of development: in developed nations, hemorrhagic complications and hypertensive disorders predominate, while in resource-limited countries, infectious causes are more relevant [11,12].

In Paraguay, there is a scarcity of published information on obstetric patients in the ICU. This gap limits the implementation of specific strategies adapted to the national context. To date, only one national study has been published, underscoring the need to generate local evidence to characterize this population and guide maternal health policies [13].

The objective of the present study was to describe the epidemiological, clinical, and obstetric characteristics, as well as the outcomes, of pregnant and postpartum patients requiring admission to general ICUs in two public referral hospitals in Paraguay during the 2018–2023 period.

Materials and Methods

Study Design and Setting

An observational, descriptive, retrospective, multicenter study was conducted. The study took place at the Hospital de Clínicas of the Faculty of Medical Sciences of the National University of Asunción (tertiary-level hospital, San Lorenzo) and the Hospital General San Lorenzo of the Ministry of Public Health and Social Welfare (secondary-level hospital, Central Department). Both institutions have adult polyvalent ICUs. The study period spanned from June 2018 to June 2023.

Study Population

An obstetric patient was defined as any adult woman who was pregnant, postpartum, or with a recent abortion requiring ICU admission. Patients aged ≥18 years with ongoing pregnancy, postpartum period (up to 42 days), or recent abortion who required ICU care due to clinical severity were included. Patients with incomplete medical records and those transferred without known outcomes were excluded.

Study Variables

The variables analyzed included:

- Demographic: age.
- Obstetric: status at admission (pregnant, postpartum, post abortion); gestational age; parity (nulliparous, primiparous, multiparous); previous pregnancies; type of postpartum period and abortion.
- Clinical: pre existing comorbidities (chronic arterial hypertension, diabetes mellitus, chronic kidney disease, heart disease, autoimmune disease, obesity, asthma, epilepsy); history of hypertensive disorders of pregnancy.

Reasons for admission were classified as obstetric (hypertensive disorders of pregnancy including preeclampsia, eclampsia, HELLP syndrome; postpartum hemorrhage; septic

abortion; endomyometritis) and non-obstetric (respiratory failure, non-obstetric postoperative care, neurological complications, COVID-19, dengue, cardiac arrest).

Severity scores (APACHE II and initial SOFA within the first 24 hours), interventions (mechanical ventilation, days on ventilation, vasopressors, hemodialysis, blood products, surgical reintervention), and outcomes (ICU length of stay, in-hospital mortality) were recorded.

Data Collection

Data were obtained through systematic review of physical and electronic medical records using a standardized data collection form. Confidentiality was ensured by assigning numerical codes without personal identifiers.

Statistical Analysis

Data were analyzed using Microsoft Excel 2019. Continuous variables were expressed as medians and interquartile ranges (IQR). Categorical variables were expressed as absolute frequencies (n) and percentages (%). The 95% confidence interval for mortality was calculated using the Wilson method. No inferential analyses were performed due to the descriptive nature of the study.

Ethical Considerations

The study adhered to the principles of the Declaration of Helsinki. The protocol was approved by the Ethics Committee of the Faculty of Medical Sciences of the National University of Asunción (approval No. 359/2023). Due to the retrospective design and the use of anonymized data, a waiver of informed consent was obtained. Confidentiality was ensured through coding and access restricted to the researchers. Results were presented in aggregate form without individual identification.

Results

General Characteristics of the Population

During the period 2018–2023, a total of 4,565 patients were admitted to the ICUs of both centers. Of these, 95 were obstetric patients (2.08%). The records of 4 patients under 18 years of age were excluded; consequently, the records of 91 patients were analyzed.

The median age was 28 years (IQR: 10), ranging from 18 to 45 years. Regarding parity, 40 patients (43.9%) were nulliparous, 13 (14.3%) primiparous, and 38 (41.8%) multiparous. The median number of previous pregnancies was 2 (IQR: 1).

Fifty-one patients (56.0%) presented comorbidities. The most frequent were chronic arterial hypertension (27.5%), a history of hypertensive disorders of pregnancy (21.6%), gestational diabetes (7.8%), obesity (7.8%), epilepsy (7.8%), and asthma (7.8%). Other less frequent comorbidities included type 2 diabetes mellitus, heart disease, chronic kidney disease, and myasthenia gravis (3.9% each). The characteristics are presented in **Table 1**.

Obstetric Status and Reasons for Admission

At admission, 28 patients (30.8%) were pregnant, 58 (63.7%) postpartum, and 5 (5.5%) post-abortion, showing a predominance of postpartum cases.

Pregnant patients had a median gestational age of 25 weeks (IQR: 10). Among postpartum patients, 57 (90.5%) had undergone cesarean delivery and 1 (1.6%) vaginal delivery. Abortions included 4 spontaneous (80%) and 1 induced (20%).

Obstetric causes accounted for admission in 56 patients (61.5%), while non-obstetric causes accounted for 35 (38.5%). Among obstetric causes, hypertensive disorders of pregnancy were most frequent (35 patients; 62.5% of

Table 1. Demographic characteristics, obstetric history, and comorbidities of obstetric patients admitted to intensive care units. Multicenter study. Paraguay, 2018–2023 (n:91).

Variable	n = 91
Age in years, median (IQR)	28 (10)
Obstetric history, n (%)	
Nulliparous	40 (43,9)
Primipara	13 (14,3)
Multiparous	38 (41,8)
Previous pregnancies, median (IQR)	2 (1)
Comorbidities, n (%)	51 (56,0)
Type of comorbidity, n (%)[a]	
Chronic high blood pressure	14 (27,5)
Previous hypertensive disease of pregnancy[b]	11 (21,6)
Epilepsy	4 (7,8)
Obesity	4 (7,8)
Gestational diabetes	4 (7,8)
Asthma	4 (7,8)
Type 2 diabetes mellitus	2 (3,9)
Heart disease	2 (3,9)
Chronic kidney disease	2 (3,9)
Myasthenia gravis	2 (3,9)

IQR: Interquartile range.

[a] Percentages were calculated based on the total number of patients with comorbidities (n=51).

[b] History of hypertensive disease in previous pregnancies.

obstetric admissions), followed by postpartum hemorrhage (15; 26.8%), septic abortion (5; 9.0%), and endomyometritis (1; 1.8%).

Among non-obstetric causes, acute respiratory failure was most frequent (47.1%), followed by non-obstetric postoperative care (17.6%), neurological complications (11.8%), COVID-19 (8.8%), dengue with warning signs (8.8%), and post–cardiac arrest (5.9%) **Table 2**.

Severity Scores and Life Support Measures

The median initial SOFA score was 2 (IQR: 3), and the median APACHE II score was 10 (IQR: 5), indicating mild to moderate severity.

During the stay, 36 patients (39.6%) required invasive mechanical ventilation with a median duration of 2 days (IQR: 5). Vasopressor support was required in 20 patients (22.0%) and hemodialysis in 2 (2.2%).

The use of blood products was required in 69 patients (75.8%).

Regarding surgical reinterventions, 11 patients (12.1%) required additional obstetric surgery and 11 (12.1%) required non-obstetric surgery.

ICU Stay and Mortality

The median length of stay was 4 days (IQR: 4), with a range of 1 to 28 days.

Mortality was 3.3% (3 of 91 patients), equivalent to 33 per 1,000 obstetric admissions. The 95% confidence interval was 0.7–9.3%, reflecting imprecision due to the small number of events.

The causes of death were hemorrhagic shock (33.3%), gynecologic septic shock (33.3%), and subarachnoid hemorrhage (33.3%). All three patients had multiple risk factors. Data are presented in **Table 3**.

Table 2. Obstetric status, reasons for admission and clinical characteristics of critically ill obstetric patients admitted to intensive care units. Multicenter study. Paraguay. 2018-2023 (n:91).

Variable	n = 91
Obstetric status at admission, n (%)	
Pregnant woman	28 (30,8)
Postpartum	58 (63,7)
Post-abortion	5 (5,5)
Median gestational age in weeks (IQR)[a]	25 (10)
Type of puerperium, n (%)[b]	
Surgical (cesarean section)	57 (90,5)
Non-surgical (vaginal)	1 (1,6)
Type of abortion, n (%)[c]	
Spontaneous	4 (80,0)
Induced	1 (20,0)
Reason for admission, n (%)	
Obstetric	56 (61,5)
Non-obstetric	35 (38,5)
Obstetric reasons for admission, n (%)[d]	
Hypertensive disorders of pregnancy[e]	35 (62,5)
Postpartum hemorrhage	15 (26,8)
Septic abortion	5 (9,0)
Endomyometritis	1 (1,8)
Non-obstetric reasons for admission, n (%)[f]	
Acute respiratory failure	16 (47,1)
Postoperative non-obstetric surgery	6 (17,6)
Neurological complications	4 (11,8)
COVID-19	3 (8,8)
Dengue with warning signs	3 (8,8)
Post-cardiac arrest	2 (5,9)

IQR: Interquartile range. **a** Gestational age calculated for the 28 pregnant patients at admission. **b** Percentages calculated based on 63 postpartum (58) and post-abortion (5) patients. **c** Percentages calculated based on 5 patients with abortion. **d** Percentages calculated based on 56 admissions for obstetric causes. **e** Includes preeclampsia, eclampsia, and HELLP syndrome. **f** Percentages calculated based on 35 admissions for non-obstetric causes.

Table 3. Severity scores, life support interventions, and outcomes of obstetric patients during intensive care stay. Multicenter study. Paraguay, 2018–2023 (n=91).

Variable	n = 91
Severity scores, median (RIC)t	
Initial SOFA	2 (3)
APACHE II	10 (5)
Need for additional surgery, n (%)	
Obstetric cause	11 (12,1)
Non-obstetric cause	11 (12,1)
Life support interventions, n (%)	
Invasive mechanical ventilation	36 (39,6)
Use of vasopressors	20 (22,0)
Hemodialysis	2 (2,2)
Transfusion of blood products	69 (75,8)
Days of mechanical ventilation, median (RIC) [a]	2 (5)
ICU length of stay (days), median (RIC)	4 (4)
ICU mortality, n (%)	3 (3,3)
Causes of death, n (%) [b]	
Hemorrhagic shock	1 (33,3)
Septic shock of gynecological origin	1 (33,3)
Subarachnoid hemorrhage	1 (33,3)

APACHE II: Acute Physiology and Chronic Health Evaluation II; ICU: Intensive care unit; IQR: Interquartile range; SOFA: Sequential Organ Failure Assessment. **a** Median calculated based on 36 patients who required mechanical ventilation. **b** Percentages calculated based on 3 deceased patients.

Discussion

This study represents the first multicenter analysis of obstetric patients in ICUs across two public hospitals in Paraguay. The main findings included a low admission rate, a young patient population, a predominance of postpartum status, hypertensive disorders as the leading cause, short length of stay, and low mortality (3.3%), a figure comparable to that of developed countries.

The median age of 28 years is similar to that reported in previous studies from Paraguay and Brazil, reflecting the Latin American reproductive pattern [13,14]. In contrast, studies from Canada and China report a higher proportion of patients over 30 years of age, attributable to socioeconomic and cultural factors that lead to delayed childbearing [15,16].

The observed ICU admission rate (2.08%) falls within an intermediate range compared to the literature. In developed countries, obstetric patients account for <1% of intensive care admissions, whereas in resource-limited countries, rates vary between 0.48% and 4.6%. Exceptionally, Anane et al. reported

a rate of 25.7% in Ghana [9]. This variability reflects differences in admission criteria, available resources, and the organization of maternal health services.

The predominance of postpartum patients is consistent with regional literature [17,18] and other European reports [19,20], suggesting that severe complications occur primarily in the postpartum period. The high proportion of nulliparous women (43.9%) is also consistent with other studies [17-20] and may be associated with a higher risk of complications during the first pregnancy.

Obstetric causes predominated (61.5% vs 38.5%), a finding consistent with other authors [13,18]. Hypertensive disorders were the leading cause, followed by postpartum hemorrhage, coinciding with South American studies [21-23] and those from other countries outside the region [24,25]. In contrast, Chantry et al. in France reported hemorrhage as the primary cause of admission, reflecting differences in prenatal care and risk factors between populations [20].

In the present study, the most frequent comorbidities were arterial hypertension and a history of hypertensive disorders of pregnancy; this profile is similar to the studies published by Saintrain and Wanderer [23,24], but differs from the report by Vargas et al. [6].

Admission APACHE II and SOFA scores indicated low to moderate severity. These scores have limitations in predicting mortality in obstetric patients, tending to overestimate the risk [26,27]. Currently, no ideal prognostic score exists for this specific population [28].

Mechanical ventilation was required in slightly more than one-third of the population; literature reports vary from 25% in Argentina [7] to 68% in India [6]. Ethiopian studies report 50% [29], Austrian studies 34% [19], and the Paraguayan study by Zorrilla et al. mentions 37% [13]. This variability reflects differences in intubation criteria and disease severity at admission.

The use of vasopressors, less than 25%, was similar to the study in India [30]. Blood products were required in 75.8% of cases, higher than the 46% reported by Sailaja et al. [30], which can be explained by the higher proportion of postpartum surgical patients and postpartum hemorrhages.

The median length of stay of 4 days is consistent with the literature, which generally reports a range of 3 to 6 days [13, 19, 20, 22].

The mortality rate (3.3%; 95% CI: 0.7–9.3%) was similar to that found in Argentine [17] and European [19, 20] studies, and substantially lower than in African studies, such as that by Tasew et al. [29], which reported a high mortality rate (27%) for this patient population in Ethiopia.

Study Limitations

The retrospective design entails intrinsic limitations regarding data recording, which restricted the analysis of certain variables. During the COVID-19 pandemic, patients were diverted to a specific referral hospital; consequently, only three such cases were included in this study, representing a significant bias. Furthermore, as the study was restricted to two public hospitals in the Central region, the findings may not be generalizable to other settings. Despite these limitations, this study provides valuable insights into the characteristics of critically ill obstetric patients in Paraguay.

Practical Implications

The results have implications for the organization of maternal health services in Paraguay. The identification of hypertensive disorders and postpartum hemorrhage as the leading causes underscores the need to strengthen prevention, early detection, and timely management. The observed low mortality suggests that, given adequate critical care resources, the prognosis for these patients can be favorable.

Conclusions

Obstetric patients accounted for 2.08% of ICU admissions, characterized as a young population that was predominantly postpartum, particularly following cesarean sections.

Hypertensive disorders of pregnancy and postpartum hemorrhage were the leading obstetric causes, accounting for nearly 90% of admissions for obstetric indications. Arterial hypertension was the most frequent comorbidity.

The most frequently used interventions were the transfusion of blood products (75.8%) and invasive mechanical ventilation (39.6%). Length of stay was short (median: 4 days), and mortality was low (3.3%), a figure comparable to that of developed countries.

Timely multidisciplinary management is fundamental to optimizing maternal outcomes. These findings reinforce the need to strengthen the prevention and early detection of obstetric complications, ensuring timely access to ICUs capable of managing critically ill obstetric patients.

It is recommended that future prospective studies be conducted, including a larger number of hospital centers throughout the country, to obtain a more comprehensive view of the national reality in Paraguay.

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