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Health insurance status and outcomes of critically ill obstetric patients: A prospective cohort study in Argentina ☆

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ABSTRACT

Purpose: In Argentina, uninsured patients receive public health care, and the insured receive private health care. Our aim was to compare different outcomes between critically ill obstetric patients from both sectors.
Methods: This is a prospective cohort, including pregnant/postpartum patients requiring admission to 1 intensive care unit in the public sector (uninsured) and 1 in the private (insured) from January 1, 2008, to September 30, 2011.
Results: A total of 151 patients were included in the study. In uninsured (n = 63) vs insured (n = 88) patients, Acute Physiology and Chronic Evaluation II (APACHE II) and Sequential Organ Failure Assessment scores were 11 ± 6.5 vs 8 ± 4 and 3 (2-7) vs 1 (0-2), respectively, and 84% vs 100% received prenatal care ($P = .001$ for all). Multiple organ dysfunction syndrome (MODS) was present in 32 (54%) uninsured vs 9 (10%) insured patients ($P = .001$), and acute respiratory distress syndrome developed in 18 (30.5%) of 59 vs 2(2%) of 88 ($P = .001$). Neonatal survival was 80% vs 96% ($P = .003$). Variables independently associated with the development of MODS were APACHE II (odds ratio, 1.30 [1.13-1.49]), referral from another hospital (odds ratio, 11.43 [1.86-70.20]), lack of health insurance (odds ratio 6.75 [2.17-20.09]), and shock (odds ratio 4.82 [1.54-15.06]). Three patients died, all uninsured.
Conclusions: Uninsured critically ill obstetric patients (public sector) were more severely ill on admission and experienced worse outcomes than insured patients (private sector). Variables independently associated with MODS were APACHE II, shock, referral from another hospital, and lack of insurance.

1. Introduction

Each year, nearly 300 000 maternal deaths occur, almost exclusively in developing countries, characterizing maternal mortality as a health indicator of social inequality [1]. In Argentina, where maternal and perinatal mortality are higher than in developed countries, 70% of these deaths occur in hospitals, mainly in intensive care units (ICUs), with significant differences across provinces and socioeconomic groups [2]. The Argentine health system is composed of public and private sectors, the latter consisting of work-related health insurance and by individually paid health insurance [3]. Almost 64% of the population has some type of paid health insurance [4]. Generally, higher income and educated people are insured and seek care in the private sector, whereas low-income and less-educated are uninsured and receive health care in the public sector [3].

Two US studies reported that critically ill uninsured patients received fewer critical care services and probably experienced higher hospital mortality than insured patients [5,6]. This suggests that lack of insurance may be an independent risk factor for death among critically ill patients [5,6]. A retrospective study of obstetric patients from Indonesia showed higher mortality and more severe morbidity in the public health sector compared with the private sector, but only 5% of patients in that study were critically ill [7]. In Australia, another population-based retrospective study revealed a higher level of obstetric intervention in the private sector [8]. Munnur et al [9] compared populations of critically ill obstetric patients from India (public hospital) and the United States (private hospital) and found that the former were more severely ill on admission, had higher maternal and fetal mortality, received lower levels of prenatal care, and experienced a grater delay in reaching hospital than US patients did.

☆ Conflict of interest statement: We declare that we have no conflicts of interest.

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The objective of this study was to explore associations between health insurance status and severity of illness in critically ill obstetric patients. As maternal mortality has fallen in the last decades, other outcome indicators were proposed for assessing maternal care. In this case, we chose the development of multiple-organ dysfunction as a severity indicator and insurance status, presence of comorbidity, referral from other centers, and prenatal care, among others, as potential predictors. Our hypothesis was that uninsured critically ill obstetric patients were more severely ill than insured patients.

2. Materials and methods

This was a prospective cohort study, which included all pregnant/postpartum (<42 days) patients requiring admission to an ICU in the public health sector (uninsured) vs an ICU in the private sector (insured) in Argentina between January 1, 2008 and September 30, 2011. The only exclusion criterion for entering the study was an unwillingness to participate, but none refused consent. The private clinic, located in the city of Buenos Aires, is a 186-bed center where 2000 children are born per year. The public hospital is a university-affiliated 449-bed center in the city of La Plata in the province of Buenos Aires, where 3000 infants are delivered annually. Both hospitals are referral centers and offer the same standard health care. Both intensive care units (ICUs) are medical-surgical units managed by intensivists, with 14 beds in the public hospital and 12 in the private hospital, the nurse-to-patient ratio being 1:2 and 1:2-3, respectively. The training and experience of the nursing staff in both sectors are similar.

Demographic data, comorbidity (Charlson score) [10], admission diagnosis, obstetric (occurring only in pregnant/postpartum patients) vs nonobstetric causes of admission (also occurring in nonpregnant patients) [11], obstetric history including ante/postpartum admission, gestational age, minimal vs standard prenatal care (at least 1 vs 5 visits for a term pregnancy) [12], parity, history of induced or spontaneous abortions, and type of delivery were recorded. Also registered were length of stay (LOS) in the ICU and in the hospital; severity of illness scores during the first 24 hours in the ICU, using the worst values for each parameter (Acute Physiology and Chronic Evaluation II [APACHE II] [13] and Sequential Organ Failure Assessment [SOFA] [14]); level of intervention in the ICU (mechanical ventilation [MV], days on MV, Therapeutic Intervention Scoring System 28 [$TISS_{28}$] [15], central lines, or Swan-Ganz catheter requirement); and complications in the ICU such as acute respiratory distress syndrome (ARDS) [16], septic [17] or hypovolemic shock [18], and multiple-organ dysfunction syndrome (MODS) (dysfunction of ≥2 organs according to the SOFA score) [17]. Intensive care unit and hospital maternal mortality [19] and fetal-neonatal losses were recorded. Induced abortions were separately analyzed from fetal losses. Severe neonatal morbidity was also documented.

2.1. Statistical analysis

Categorical variables are shown as numbers (percentages), and continuous variables, as mean ± SD or median (interquartile range [IQR]), according to their distribution. Continuous normally and non-normally distributed variables were compared with Student t test and the Wilcoxon test, respectively, and categorical variables were compared with the χ^2 or Fisher test. Multiple comparisons between categorical variables were performed using the multiple χ^2 test with a Bonferroni correction. $P \leq .05$ was considered significant.

A multivariable analysis adjusting for potential confounders was performed to evaluate the relationship between predictor and outcome variables. A multiple logistic regression model was built using MODS as the dependent variable. Variables included in the model were those related to MODS in the univariate analysis with $P \leq .20$. The multivariate model was built manually, including variables with a level of significance of $P \leq .05$ on the Wald test and/or confounding effects (variation coefficient ≥20%). The model was calibrated with the Hosmer-Lemeshow goodness-of-fit test to evaluate the discrepancy between observed and expected MODS values. Model discrimination was evaluated with the area under the receiver operating characteristics curve (AUROC). STATA 11.1 and SPSS 15 (SPSS, Inc, Chicago, Ill) were used for the analysis.

2.2. Sample size calculation

The sample size of 57 patients in each group was calculated considering a severity of illness measure, namely, the percentage of patients requiring MV in the public health sector vs the private health sector, at an $\alpha = .05$ and $\beta = .8$. This was based on a previous study [20], where 41% of patients required MV in the public sector, and a pilot study, where 15% of patients required MV in the private sector.

2.3. Ethical considerations

This study was approved by the ethics committee of each center and was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Informed written consent was requested from each patient or caregiver/relative, in the event the patient was unable to provide consent upon admission to the ICU. Once able to consent for themselves, those patients consented voluntarily.

3. Results

Over the study period, 151 obstetric patients were admitted to both ICUs: 63 in the public sector (all uninsured) and 88 in the private sector (all insured). These admissions represented 7% of all ICU admissions (n = 884) in the public and 3.4% in the private sector (n = 2601; $P < .000$). During the same period, 10 260 deliveries were performed in the public sector and 6970 in the private, totaling an ICU admission rate of 614/100 000 (0.61%) and 1262/100 000 (1.26%), respectively ($P < .000$).

Uninsured patients were younger, illustrated more comorbidity, were more severely ill on admission, and stayed longer in the ICU than insured patients (Table 1). Three uninsured patients died, 2 during the first 24 hours after admission to the ICU. Causes of admission for these

Table 1
Characteristics and outcomes of uninsured (public health sector) vs insured (private health sector) critically ill obstetric patients

	Uninsured (public)	Insured (private)	P
n	63 (42)	88 (58)	
Age (y)	26 ± 7.5	33 ± 6	**.000**
Charlson 0 (without comorbidity)	51 (81)	83 (94)	**.029**
APACHE II	11 ± 6.5	8 ± 4	**.000**
APACHE risk (%)	12 (5-20)	6 (2.5-13)	**.000**
$SOFA_{24}$	3 (2-7)	1 (0-2)	**.000**
Location before admission to ICU			**.004**
Operating room	21 (33)	45 (51)	
Ward	17 (27)	19 (22)	
Emergency	14 (22)	22 (25)	
Other hospital	11 (18)[a,b]	2 (2)	
Antepartum admission	14 (22)	23 (26)	.55
ICU-LOS (d)	4 (2-9)	3 (2-4)	**.008**
Hospital-LOS (d)	11 (6-21)	6 (4-8)	**.000**
ICU mortality	2 (3.2)	0 (0)	.17
Hospital mortality	3 (4.8)	0 (0)	.057

Data are shown as mean ± SD, median (IQR), or n (%). $SOFA_{24}$ indicates Sequential Organ Failure Assessment (during the first 24 hours of admission).

[a] Post hoc analysis to specifically evaluate where the difference was: other hospital vs operating room, $P = .006$.

[b] Post hoc analysis to specifically evaluate where the difference was: other hospital vs emergency department, $P = .048$.