



## SCIENTIFIC LETTER

### Elderly patients in a Mexican intensive care unit: A retrospective analysis<sup>☆</sup>



### El adulto mayor en una unidad de cuidados intensivos mexicana, análisis retrospectivo

Dear Sir,

The world population is experiencing an aging process.<sup>1</sup> Elderly people are defined as those that have reached 65 years of age.<sup>2</sup> In Mexico such people represent 9% of the population—a figure that is expected to increase to about 28% by the year 2050.<sup>2</sup> A longer life expectancy in turn is associated to an increased demand for medical care due to chronic diseases and their complications—in some cases within the setting of the Intensive Care Unit (ICU).<sup>1</sup>

In developed countries, elderly people can represent up to 50% of all admissions to the ICU.<sup>1,3,4</sup> In Mexico the information referred to this age group is limited.

The present study describes the characteristics upon admission and their association to the outcome of elderly patients in the ICU of a tertiary hospital.

A retrospective observational study was carried out in patients of either gender aged 65 years or older and admitted to the ICU of a public hospital in the period between January 2015 and August 2016. Patients with first admission to the ICU were eligible for inclusion in the study, while readmissions were excluded. The following characteristics were recorded: age, gender, comorbidities, body mass index (BMI), reason for admission to the ICU, hospital stay prior to admission to the ICU, type of patient (surgical or medical), ICU stay, severity of disease as assessed by the APACHE II and SOFA scores, organ dysfunction upon admission as evaluated by the SOFA scale, need for and duration of mechanical ventilation, need for renal replacement therapy, and nosocomial infections. The follow-up endpoint was patient discharge from the ICU.

Quantitative variables were reported as the mean and standard deviation (SD) or median and interquartile range

(IQR). Nominal variables were expressed as percentages. Continuous variables were compared using the Student's *t*-test or Mann–Whitney *U*-test, while nominal variables were compared using the chi-squared test or Fisher exact test. Statistical significance was considered for  $p < 0.05$ . Multiple logistic regression analysis was performed with the different patient clinical characteristics and patient clinical condition at ICU discharge as outcome, with estimation of the respective odds ratio (OR) and corresponding 95% confidence interval (95%CI). The study was approved by the local research committee (R 2016-3501-9).

During the follow-up period a total of 929 patients were admitted to the ICU; of these, 243 (26.16%) were 65 years of age or older. A total of 230 subjects were considered for analysis while 13 were excluded due to readmission to intensive care. The mean patient age was  $72.86 \pm 6.01$  years; 69.1% ( $n = 159$ ) were males and 30.9% ( $n = 71$ ) females. The median BMI was  $26.76 \text{ kg/m}^2$  (IQR 24.9–30.9). The main reasons for admission to the ICU were ischemic heart disease (37.82%;  $n = 87$ ), septic shock (19.56%;  $n = 45$ ), aortic surgery (12.17%;  $n = 28$ ), hemorrhagic shock (11.74%;  $n = 27$ ) and high-risk surgery (9.56%;  $n = 22$ ). The patients were grouped according to clinical condition at discharge from the ICU (Table 1). The patients that died in the ICU were older ( $p = 0.0001$ ), had more severe acute disease as rated by the APACHE II scale ( $p = 0.0001$ ), and suffered greater organ dysfunction upon admission as evidenced by the SOFA score ( $p = 0.0001$ ). The most frequent organ dysfunctions among the patients that died were of a neurological, hemodynamic, renal and hematological nature. The need for and duration of mechanical ventilation were greater among the patients that died ( $p < 0.0001$ ). Renal replacement therapy was used in only 10.43% of the cases ( $n = 24$ ), and the mortality rate was higher among those patients that required such therapy ( $p = 0.04$ ). The mortality rate in the ICU was 24.3% ( $n = 56$ ). Lastly, nosocomial infections were more prevalent among the patients that died ( $p = 0.01$ ).

The multivariate analysis identified those basal parameters showing significant differences in relation to clinical condition at discharge: patient age, disease severity (APACHE II score), the presence of acute respiratory failure and the need for mechanical ventilation were associated to increased mortality risk in the ICU (Table 2).

The present study evaluated the clinical and mortality characteristics of elderly patients admitted to the ICU of a public hospital in Mexico. We found older age, greater acute disease severity (APACHE II score), a greater presence

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**Table 1** General characteristics of the study sample.

	Total n = 230	Survivors n = 174	Deceased n = 56	p-Value
Age in years, mean $\pm$ SD	72.86 $\pm$ 6.00	71.91 $\pm$ 5.69	75.80 $\pm$ 6.02	0.0001 <sup>a</sup>
Males, n (%)	159 (69.1)	119 (68.4)	40 (71.4)	0.67 <sup>b</sup>
Medical patients admitted, n (%)	105 (45.7)	84 (48.3)	21 (37.5)	0.16 <sup>b</sup>
Comorbidities, n (%)	195 (84.8)	151 (86.78)	44 (78.57)	0.13 <sup>b</sup>
Systemic arterial hypertension	150 (65.2)	117 (67.2)	33 (58.9)	0.26 <sup>b</sup>
Diabetes mellitus	91 (39.6)	68 (39.1)	23 (41.1)	0.79 <sup>b</sup>
Heart disease	87 (37.8)	64 (36.8)	23 (41.1)	0.57 <sup>b</sup>
COPD	38 (16.5)	25 (14.4)	13 (23.2)	0.12 <sup>b</sup>
Chronic renal failure	27 (11.7)	17 (9.8)	10 (17.9)	0.1 <sup>b</sup>
Cancer	15 (6.5)	11 (6.3)	4 (7.1)	0.76 <sup>c</sup>
APACHE II upon admission to ICU, median (IQR)	14 (9–21)	13 (8–18)	22 (12–26.75)	0.0001 <sup>d</sup>
SOFA upon admission to ICU, median (IQR)	4 (2–8)	3 (2–6)	8 (4–11)	0.0001 <sup>d</sup>
Organ dysfunction upon admission to ICU, n (%)				
Neurological	42 (18.3)	25 (14.4)	17 (30.4)	0.007 <sup>b</sup>
Respiratory	179 (77.8)	133 (76.4)	38 (67.9)	0.37 <sup>b</sup>
Hemodynamic	111 (48.3)	73 (42)	46 (82.1)	0.01 <sup>b</sup>
Renal	91 (39.6)	62 (53.6)	39 (51.8)	0.03 <sup>b</sup>
Hepatic	30 (13)	22 (12.6)	8 (14.3)	0.75 <sup>b</sup>
Hematological	64 (27.8)	41 (23.6)	23 (41.1)	0.01 <sup>b</sup>
Need for mechanical ventilation, n (%)	156 (67.8)	101 (58)	55 (98.2)	0.0001 <sup>b</sup>
Days of mechanical ventilation, median (IQR)	1 (0–3)	1 (0–2)	2 (1–4)	0.0001 <sup>d</sup>
Need for renal replacement therapy, n (%)	24 (10.43)	13 (7)	9 (16.1)	0.04 <sup>b</sup>
Nosocomial infection, n (%)	24 (10.4)	13 (7.5)	11 (19.6)	0.01 <sup>a</sup>
Days of ICU stay, median (IQR)	2 (1–4)	2 (2–4)	2 (1–5.75)	0.27 <sup>d</sup>
Body mass index in kg/m <sup>2</sup> , median (IQR)	26.76 (24.91–30.09)	26.86 (24.99–30.08)	26.44 (24.86–30.24)	0.72 <sup>d</sup>

APACHE II: Acute Physiology and Chronic Health Evaluation II; SD: standard deviation; COPD: chronic obstructive pulmonary disease; IQR: interquartile range; SOFA: Sequential Organ Failure Assessment; ICU: Intensive Care Unit.

<sup>a</sup> Student's *t*-test.

<sup>b</sup> Chi-squared test.

<sup>c</sup> Fisher exact test.

<sup>d</sup> Mann–Whitney *U*-test.

**Table 2** Risk factors for mortality in the Intensive Care Unit among elderly patients. Multivariate analysis.

	OR	95%CI	p-Value
APACHE II	1.09	1.04–1.14	0.001
Age (years)	1.108	1.04–1.18	0.001
ARF	10.17	2.31–44.65	0.002
Mechanical ventilation	17.45	2.31–134.91	0.002

APACHE II: Acute Physiology and Chronic Health Evaluation II; 95%CI: 95% confidence interval; OR: odds ratio; ARF: acute respiratory failure.

Hosmer–Lemeshow  $\chi^2$ : 7.0;  $p = 0.53$ , aROC 0.86 (95%CI 0.81–0.91);  $p \leq 0.0001$ .

of acute respiratory failure, and a greater need for mechanical ventilation to be correlated to increased mortality risk in the ICU. The mortality rate in our ICU was similar to that reported in other Latin American countries and in other parts of the world.<sup>5-8</sup> It has been seen that the mortality among patients aged 65 years or older is slightly greater or similar to that found in younger patients after adjusting for confounding variables. In this regard, age may contribute less to mortality risk than the severity of disease—though this circumstance was not evidenced in our series.<sup>5,9</sup> The clinical characteristics that increase mortality risk in the ICU were similar to those described in other populations.<sup>4,6-10</sup>

Our study has some limitations, such as its retrospective design and the sample size involved. Nevertheless, it offers a global view of the characteristics and mortality risk factors in the ICU in our population. In conclusion, patient age, the severity of disease, the presence of acute respiratory failure, and the need for mechanical ventilation are risk factors for mortality in the ICU. The early identification of these risk factors may help improve the outcomes of elderly patients in the ICU.

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