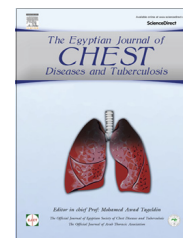




The Egyptian Society of Chest Diseases and Tuberculosis  
Egyptian Journal of Chest Diseases and Tuberculosis

[www.elsevier.com/locate/ejcdt](http://www.elsevier.com/locate/ejcdt)  
[www.sciencedirect.com](http://www.sciencedirect.com)



ORIGINAL ARTICLE

# Comparison of the mortality prediction of different ICU scoring systems (APACHE II and III, SAPS II, and SOFA) in a single-center ICU subpopulation with acute respiratory distress syndrome



Abdelbaset Saleh <sup>a,\*</sup>, Magda Ahmed <sup>b</sup>, Intessar Sultan <sup>c</sup>, Ahmed Abdel-lateif <sup>d</sup>

<sup>a</sup> Chest Department, Saudi German Hospital Al-Madinah, Chest Medicine, Mansoura University, Egypt

<sup>b</sup> Chest Medicine, Taiba University and Mansoura University, Egypt

<sup>c</sup> Internal Medicine, Taiba University and Cairo University, Egypt

<sup>d</sup> ICU, Saudi German Hospital Al-Madinah, Egypt

Received 14 April 2015; accepted 17 May 2015

Available online 9 June 2015

## KEYWORDS

Acute respiratory distress syndrome;  
APACHE II;  
APACHE III;  
SAPS II;  
SOFA

**Abstract** *Background:* Scoring systems can be used to define critically ill patients, estimate their prognosis, help in clinical decision making, guide the allocation of resources and estimate the quality of care in the ICU.

*Purpose:* This study compared the predictive accuracy of four predictive scoring systems in the ICU.

*Methods:* A prospective cohort study including consecutively admitted 110 adult ICU patients (88 males) with ARDS from Saudi German Hospital, Madinah, was performed from June 2013 to January 2015. The median age of the patients was 38 years, the median duration of illness before ICU admission was 6 days, and the median duration of ICU admission was 27 days. The APACHE II, APACHE III, SAPS II, and SOFA scores were calculated based on the worst values during the first 24 h of admission.

*Results:* The actual mortality rate (27.3%) was higher than the estimated mortality rates, with the highest predicted rate of 11.3% obtained using the APACHE II. All four severity scores were significantly associated with mortality ( $F = 62.772$ ,  $p = 0.000$ ) and explained 83% of its variability ( $R^2 = 0.834$ ). However, after adjustment, only the APACHE III scoring system was a significant predictor (Beta =  $-0.753$ ,  $p = 0.000$ ). Three scoring systems were significantly associated with mortality ( $F = 42.055$ ,  $p = 0.000$ ) and explained almost 70% of its variability ( $R^2 = 0.712$ ), but after adjustment, only the APACHE II was a significant predictor (Beta =  $-0.631$ ,  $p = 0.041$ ).

\* Corresponding author at: Saudi German Hospital Al-Madinah, Department of Chest, Mansoura University, Mansoura 35516, Egypt.  
E-mail address: [baset.m.saleh@gmail.com](mailto:baset.m.saleh@gmail.com) (A. Saleh).

Peer review under responsibility of The Egyptian Society of Chest Diseases and Tuberculosis.

<http://dx.doi.org/10.1016/j.ejcdt.2015.05.012>

0422-7638 © 2015 The Authors. Production and hosting by Elsevier B.V. on behalf of The Egyptian Society of Chest Diseases and Tuberculosis. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

The combination of the severity score and mortality prediction was a significant predictor of mortality (Beta =  $-1.397$ ,  $p = 0.000$  and Beta =  $0.517$ ,  $p = 0.036$ , respectively).

**Conclusion:** The accuracy of the studied scoring systems for predicting ICU mortality in ARDS patients is limited. The performance of the APACHE II/III scoring systems was superior to that of other systems in terms of predicting the severity and mortality, and the combination of scores improved the performance. There is a need to develop ARDS-specific scoring systems. Until a new system is developed, it is better to use the updated versions of the APACHE scoring system or a combination of all ICU scoring systems.

© 2015 The Authors. Production and hosting by Elsevier B.V. on behalf of The Egyptian Society of Chest Diseases and Tuberculosis. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

Clinical assessment of the severity of illness is an essential component of medical practice to predict the mortality and morbidity of critically ill patients, especially in the intensive care unit (ICU) [1,2]. Physiologically based scoring systems are more applicable than diagnosis-based scoring systems and can estimate the risk based on the degree of variation from the normal function of major organ systems [1,2]. Acute respiratory distress syndrome (ARDS) is among the leading causes of mortality in critically ill patients. ARDS is an acute, diffuse, inflammatory lung injury, leading to increased pulmonary vascular permeability, increased lung weight, and a loss of aerated lung tissue. The clinical hallmarks of ARDS are hypoxemia and bilateral radiographic opacities, while the pathological hallmark is diffuse alveolar damage [3].

The Acute Physiology And Chronic Health Evaluation (APACHE), introduced in 1981, takes into consideration various parameters, such as physiological variables, vital signs, urine output, the neurological score, age and co-morbid conditions, which may have a significant impact on the outcome of critically ill patients [4]. The APACHE II, formulated in 1985, estimates the risk based on the worst variables available within the first 24 h of admission. The APACHE II is widely used to quantify the severity of illness in the ICU, and has been validated in many clinical trials. The APACHE III scoring system is similar to the APACHE II system, except that several variables have been added (e.g., diagnosis, prior treatment location) [5].

The Simplified Acute Physiology Score (SAPS) streamlines data collection and analysis without compromising the diagnostic accuracy. The SAPS II is the most widely used version. It calculates a severity score using the worst values measured during the initial 24 h in the ICU for 17 variables [6]. The Sequential Organ Failure Assessment (SOFA) uses simple measurements of major organ functions to calculate a severity score. The scores are calculated 24 h after admission to the ICU and every 48 h thereafter. The mean and the highest scores are most predictive of mortality. In addition, scores that increase by approximately 30% are associated with a mortality rate of at least 50% [7]. The original SOFA instrument was derived from a cohort of 1449 patients admitted to 40 ICUs in 16 countries [8].

There have been no large, prospective studies that have compared the different ICU predictive scoring systems in a subset of patients with ARDS. A systemic review of the SOFA, SAPS II, APACHE II, and APACHE III scoring systems found that the APACHE systems were slightly superior

to the SAPS II and SOFA systems in predicting ICU mortality [9]. In a previous study, the accuracy of both the SAPS II and APACHE instruments improved when combined with the assessment of sequential SOFA scores.

Four predictive scoring systems were evaluated in the present study to determine, which system is the best for predicting the outcomes of ARDS patients. These were the Acute Physiology and Chronic Health Evaluation (APACHE) systems II and III, the Simplified Acute Physiology Score II (SAPS II), and the Sequential Organ Failure Assessment score (SOFA). According to a Medline search, no study comparing these four scoring systems had been reported in our region (Middle East). Thus, we designed this study to compare the performance of the four scoring systems in ARDS patients.

## Subjects and methods

This prospective cohort study was conducted in the Adult ICU at the Saudi German Hospital Al-Madinah, KSA. One hundred and ten consecutively admitted adult patients admitted between June 2013 and January 2015 were included in the study after obtaining consent from the institutional review board. The consent for participation was obtained at time of admission from the patients themselves or from the relatives who were most acquainted with the patient; a waiver of informed consent was granted by the IRB due to the minimal risk of the observational study.

The diagnostic evaluation was performed on admission to exclude other differential diagnoses and to identify the specific causes of ARDS. We included patients who met the 2012 Berlin definition criteria for ARDS [10].

The exclusion criteria included acute interstitial pneumonia (Hamman–Rich syndrome), disseminated cancer, eosinophilic pneumonia, diffuse alveolar hemorrhage associated with collagen vascular diseases, and cardiogenic pulmonary edema. Patients were also excluded if they refused to participate, died within 24 h of the ARDS diagnosis, or when the diagnosis of ARDS or other alternative causes of acute hypoxemic respiratory failure could not be established based on the clinical context, symptoms, signs, and bronchoscopy in patients whose acute hypoxemic respiratory failure remained of uncertain etiology after non-diagnostic flexible bronchoscopy if one or more of the diagnostic possibilities under consideration might warrant targeted therapy or would substantially change the prognosis.

Scoring systems: The APACHE II, APACHE III, SAPS II, and SOFA scores were calculated based on the worst values recorded during the first 24 h of admission. All enrolled patients were followed during their ICU stay, and the outcome

Download English Version:

<https://daneshyari.com/en/article/3399949>

Download Persian Version:

<https://daneshyari.com/article/3399949>

[Daneshyari.com](https://daneshyari.com)