DOI: https://doi.org/10.54393/pjhs.v6i1.1526

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (E): 2790-9352, (P): 2790-9344
Volume 6, Issue 01 (January 2025)

Original Article

OPEN ACCESS

Evaluation of Use of Intensive Care Unit (ICU) Scoring Systems among Healthcare Professionals

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ARTICLE INFO

Keywords:
ICU Scoring Systems, Critical Care Prognosis, Severity Assessment, Pakistan Healthcare Evaluation

How to Cite:
Jahangir, A., Saba, N.-U.-., Raza, M., Hyder, F., & Sultan, S. F. (2025). Evaluation of Use of Intensive Care Unit (ICU) Scoring Systems among Healthcare Professionals: Intensive Care Unit Scoring Systems Evaluation. Pakistan Journal of Health Sciences, 6(1), 119-123. https://doi.org/10.54393/pjhs.v6i1.1526

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Received date: 15th April, 2024
Acceptance date: 6th January,2025
Published date: 31st January, 2025

ABSTRACT

The prognosis of patients in the Intensive Care Unit (ICU) is a matter of worry for critically ill patients, their families, and healthcare personnel. However, predicting the chances of recovery in the ICU can be challenging. Scoring systems serve as standardized instruments utilized in critical care research to determine which patients should be included in a study and to establish the comparability of different patient groups. **Objective:** To determine the frequency of use of Scoring Systems to predict the outcome of critically ill patients in the intensive care units of Pakistan. **Methods:** This cross-sectional study was conducted in all the healthcare institutions of Pakistan that are recognized by CPSP for fellowship in ICU training, from 10th April 2018 till 10th October 2018. Forty-one ICU physicians were included. Pre-designed questionnaires were sent to these physicians. **Results:** Out of 41 physicians, 33 (80.5%) of them used and 8 (19.5%) did not use ICU scoring systems. Only 3 consultants reported the use of Anatomical scoring systems. GCS was the most used Disease Specific Scoring System (97.5%), followed by Child Pugh's Score (80%) and Ranson's Criteria (70%). 50% reported the use of Sequential Organ Failure Assessment (SOFA) and 42% used Multiple Organ Dysfunction Score (MODS). 63% used Acute Physiology and Chronic Health Evaluation (APACHE). 93% did not use any Therapeutic Weighted Score. 77.5% used Richmond Agitation-Sedation Scale (RASS) and 25% used Ramsey's. **Conclusion:** It was found that 80.5% physicians used ICU scoring systems to assess mortality and severity of illness.

INTRODUCTION

Critical illness scoring systems are useful for guiding therapy and evaluating the degree of disease and organ failure [1]. Their usage allows one to forecast the overall performance of an intensive care unit, as well as the patient's clinical results and in-hospital mortality [2]. When making important clinical decisions, these rating systems might be helpful. Consequently, hospital resources may be utilized to their full potential, resulting in a decrease in total cost [3]. One such purpose for them is to sort really sick patients into different groups for clinical studies [4]. Although there isn't a universally accepted way to classify the several ICU scoring systems, they can be grouped according to the system in question, the illness at play, the organ in question, the degree of physiological disturbance, or the therapeutic procedures that have taken place. In addition to this, there are ratings that evaluate more routine aspects of intensive care unit treatment, such as pain management and sedative depth [5]. Early evaluations of outcome prediction relied on doctors' subjective assessments, which Florence Nightingale initiated in 1863 [2]. The fast evolution of intensive care units necessitated the subsequent establishment of scoring systems. Scores have been utilized extensively to evaluate results in intensive care units on a global scale. Additionally, several scoring methods have been contrasted to ascertain whether one produces superior outcomes. Sixty patients in

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critical care were the subjects of a prospective research by Sekulic AD et al [6]. Each patient was given an assessment of APACHE II, SAPS II, and MPM II when they were admitted to the intensive care unit. Multiple time periods following admission were assessed for the SOFA and MPM II: 24 hours, 48 hours, 72 hours, and 7 days later. Consequences were strongly predicted by APACHE II and SAPS II scores. The results of this study led to the introduction of consistent use of APACHE II and SAPS II scores upon ICU admission, as well as MPM II and SOFA scores for the duration of the patient's stay in the ICU. Researchers Hosseini M *et al.*, studied 300 critically sick patients to see how well APACHE II and SOFA predicted outcomes in intensive care units [7]. Those patients who did not make it out of the ICU had far higher APACHE II scores than those who did. Data was collected during the first twenty-four hours of admission for the purpose of comparing LODS and APACHE II in a different study that was conducted on 521 patients who were admitted to the neurological intensive care unit [8]. The death rate that was observed was 10.0%, which is much higher than the mortality rates that were anticipated by LODS and APACHE II, which were 7.2% and 4.8%, respectively. In order to determine whether critically sick patients need sedatives or analgesics, the PAD guidelines advocate using delirium, pain, and sedation score systems in the intensive care unit [9]. Patients on mechanical ventilation are less likely to need ventilator support and spend less time in the Intensive Care Unit (ICU) when pain evaluation is performed, according to research by Haniffa R *et al* [10]. Various metrics have also been used in Pakistani intensive care units to forecast patient outcomes. Patients in critical illness who had higher initial SOFA scores had a greater death rate, according to research by Akbar A et al [11]. Both Lo ML *et al.*, and Hashmi M *et al.*, came to the same conclusion: a high APACHE-II score was inversely related to the duration of stay and increased death risks [12, 13]. Researchers Naqvi IH *et al.*, found that APACHE II, SOFA, and SAP II scores were greater in the non-survivor group compared to the survivor group [14].]. In another study, three scoring systems including Child-Pugh, APACHE II and III were compared to evaluate their prognostic accuracy for predicting short term mortality in patients diagnosed with liver cirrhosis. Among compared scoring systems, Child-Pugh is found to be most reliable one and APACHE scores were found to be less reliable in hospital settings [15]. Several international surveys have found out how frequently these ICU scoring systems are being used. A UK National Survey conducted by Raffa JD *et al.*, found out that 88% of the ICUs used a sedation scoring system [16]. A European survey published in 2001 also showed that sedation scores are most commonly used in the ICUs of UK and Ireland (the Ramsay scale in 74% of cases) So far, no such survey has been conducted in Pakistan [17]. Keeping in mind the numerous benefits of these scoring systems, their use should be common in the ICU settings. However, insufficient data exists regarding their use in this country.

The purpose of this study was to ascertain the frequency with which scoring systems are utilized in Pakistan's intensive care units for the purpose of predicting the outcomes of critically ill patients.

METHODS

This cross-sectional study was conducted in all healthcare institutions of Pakistan that are recognized by CPSP for fellowship in ICU training from 10th April 2020 till 10th October 2020 and 41 physicians were enrolled. Before data collection, CPSP letter approved on 23rd of December 2019 with reference number CPSP/REU/ANS-2016-218-1605 was taken. In order to collect the data, Purposive sampling technique was used as study targeted respondents of specific expertise. Sample size was calculated by using following formula

$$n=\frac{\frac{z.p(1-p)}{e^2}}{1+\frac{z.p(1-p)}{e^2}}$$

Online questionnaire was used to collect date from each hospital which included severity, scoring systems, critically ill, intensive care, risk prediction, APACHE, MODS, RASS, SOFA. Consultants of each ICU in the above-mentioned setting having an ICU working experience of more than 1 year, age greater than 30-70 years, qualification FCPS or any other equivalent foreign degree and either gender were included. Those consultants with an MCPS degree and consultants responding after 6 months were excluded. Pre-designed questionnaires were sent via email to the ICU physicians in Pakistan who are working in institutions recognized for fellowship in ICU training by CPSP. A monthly reminder was sent to the non-responders regularly for 6 months. If they failed to respond within 6 months, they were labeled as "non- responders" in the results. Frequency and percentage were used as categorical variables, whereas Standard Deviation (SD) and mean were utilized as quantitative variables. Data were entered and analyzed using SPSS version 21.0. Descriptive analysis was conducted.

RESULTS

The mean age was 41.25±9.3 years whereas the mean duration of practice was 12.05±9.69 years respectively (table 1).

Table 1: Descriptive Statistics of the Patients (n=41)

Variables	Minimum - Maximum	Mean ± SD
Age (Years)	30 – 63	41.25 ± 9.3
Duration of Practice (Years)	1- 40	12.05 ± 9.69

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Out of the total, 33 physicians (80.5%) utilized the ICU scoring system, while 8 (19.5%) did not, with a statistically significant p-value of <0.005. Among the participants, 33 (80.5%) were male, and 8 (19.5%) were female. Additionally, 24 physicians (58.5%) were under 40 years of age, whereas 17 (41.5%) were over 40. Regarding the duration of practice, 25 physicians (61%) had less than 10 years of experience, while 16 (39%) had more than 10 years. Moreover, 38 participants (92.7%) held an FCPS qualification, and 3 (7.3%) had other qualifications (Table 2).

Table 2: Demographic Information of the Patients (n=41)

Variable	N (%)
Yes	33 (80.49%)
No	8 (19.51%)
Male	33 (80.49%)
Female	8 (19.51%)
Age < 40	24 (58.54%)
Age > 40	17 (41.46%)
Practice Duration < 10	25 (60.98%)
Practice Duration > 10	16 (39.02%)
FCPS	38 (92.68%)
Other	3 (7.32%)

GCS was the most used Disease Specific Scoring System (97.5%), followed by Child Pugh's Score (80%) and Ranson's Criteria (70%) (Figure 1).

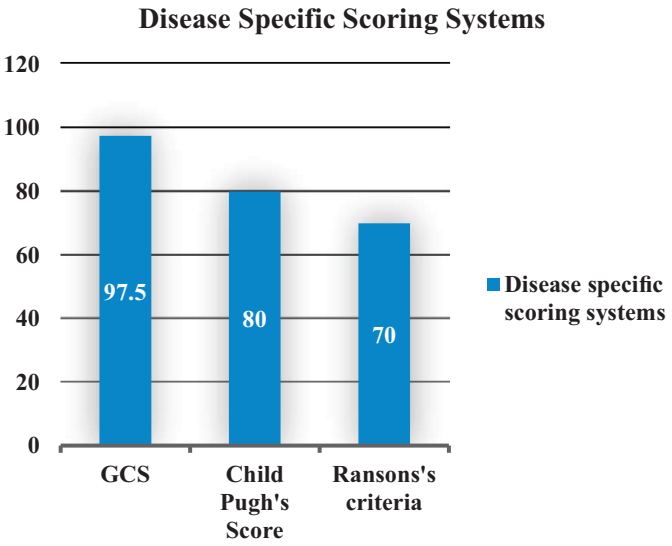

Figure 1: Use of different Scoring Techniques for Disease Diagnosis

50% reported the use of SOFA and 42% used MODS. 63% used APACHE. 93% did not use any Therapeutic Weighted Score. 77.5% used RASS and 25% used Ramsey's. Most commonly used Pain Scale was Visual Analogue Scale (VAS) (60%) followed by Numeric Rating Scale (NRS) (50%), 35% used Confusion Assessment Method for Intensive Care Unit (CAM-ICU) (Table 3).

Table 3: Use of Prediction Scoring Systems

Variables	%
Prediction Scoring Systems	
SOFA	50%
MODS	42%
APACHE	93%
RASS	77.5%
Ramsey's	25%
Therapeutic Weighted Score	
Yes	7%
No	93%
Use of Pain Scale	
VAS	60%
NRS	50%
CAM ICU	
VAS	35%
NRS	65%

DISCUSSION

Common applications of general sickness severity ratings in the intensive care unit include outcome prediction, characterization of disease severity and degree of organ dysfunction, and assessment of resource consumption. The many types of scoring are complementary, not mutually exclusive or competitive. The accuracy of indicators for disease severity and prognosis may be enhanced by their potential synergistic effects. It will be required to update all of these scoring systems when new diagnostic, therapeutic, and prognostic techniques become available and as Intensive Care Unit (ICU) demographics change. While some grading systems are more general and used to all patients in the Intensive Care Unit (ICU), others are more disease-or organ-specific, such as the Glasgow Coma Scale (GCS). Modern critical care, patient demographics, and disease frequency have all undergone dramatic changes, and statistical and computational approaches have also come a long way. In the present study, thirty-three (80.5%) and 08 (19.5%) used and did not use any ICU scoring system. Only 3 consultants reported the use of Anatomical scoring systems. GCS was the most used Disease Specific Scoring System (97.5%), followed by Child Pugh's Score (80%) and Ranson's Criteria (70%). 50% reported the use of SOFA and 42% used MODS. 63% used APACHE. 93% did not use any Therapeutic Weighted Score. 77.5% used RASS and 25% used Ramsey's. Most commonly used Pain Scale was VAS (60%) followed by NRS (50%). 35% used CAM-ICU. In a study, APACHE III and Child-Pugh scores were assessed for all 282 patients. Upper gastrointestinal hemorrhage (38%), liver failure (21%), hepatorenal syndrome (19%), hepatocellular cancer (4%), and spontaneous bacterial peritonitis (6%), were the prominent reasons of death. Survivors had lower Child-Pugh and APACHE III scores (8.6 ± 2.3 and 58.9 ± 35.1)

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compared to non-survivors (10.9 ± 2.7 and 87.4 ± 30.3) with a p-value less than 0.001. While Child-Pugh properly identified 67% of cases using discriminant analysis, APACHE III accurately recognized 75% of cases ($p < 0.05$) [18]. Every intensive care unit in the United Kingdom took part in a separate postal survey that was conducted across the entire country. There were 192 answers obtained, which is 63.5% of the total number of 302 units that were contacted. A sedative scoring approach was utilized by responding critical care units at a rate of 88%, with the Ramsey sedative Scale being utilized by 66.4% of those centers. In addition to the fact that the majority of units have recorded sedation standards, an astounding 78% of those units also provide evidence that sedation holding is performed on a daily basis. The length of action, rather than the cost, is the major consideration that should be taken into account while selecting a sedative from among the various available options. In intensive care facilities in the United Kingdom, it is routine practice to adhere to sedation guidelines and to use a sedation score tool [19-21]. Another research surveyed 647 critical care doctors from 16 western European nations. Only 35% of those who took the survey reported ever using propofol, while 63% reported ever using midazolam. Midazolam was chosen over propofol in several countries, including France, Germany, the Netherlands, Norway, and Austria, among others. Opioids such as morphine (33%), fentanyl (33%), and sufentanil (24%), were given most often for the purpose of pain treatment. Only 18% of Austrians used a sedative scale, compared to 72% of Britons and 22% of Irish. The Ramsay scale was widely regarded as the most accurate way to measure sedative levels when it was in use [17, 20].

CONCLUSIONS

General sickness severity ratings help ICUs evaluate resource utilization, predict prognosis, and characterize disease and organ failure. Disease-specific grading methods are needed because all grades were established for mixed ICU patient groups, reducing subgroup accuracy. ICU populations fluctuate as new diagnostic, therapeutic, and prognostic methods are developed, thus scoring systems must be updated. Since the scoring systems measure diverse things, we think they should complement one other rather than compete. Despite their purpose, organ dysfunction scores predict outcomes. APACHE and SAPS ratings should predict outcomes. These tools assist doctors and management allocate resources and evaluate performance by accurately evaluating illness severity and prognosis.

Authors Contribution

Conceptualization: AJ
Methodology: NUS, MR, FH
Formal analysis: FH
Writing, review and editing: NUS, MR, FH, SFS

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

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