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Original Article

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Comparison of PSI and CURB-65 Scores in Predicting Mortality of Hospitalised Patients with Community Acquired Pneumonia

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ABSTRACT

Background: Community-acquired pneumonia (CAP) is associated with significant morbidity and mortality. Accurate prediction of mortality is crucial for guiding clinical decisions and optimizing patient outcomes. The Pneumonia Severity Index (PSI) and CURB-65 scores are commonly used scoring systems for mortality prediction in CAP. This study aimed to compare the predictive accuracy of the PSI and CURB-65 scores in hospitalised patients with CAP.

Methods: A prospective observational study was conducted in the General Medicine Department of a tertiary care hospital. A total of 100 patients diagnosed with CAP were included. Demographic and clinical data were collected upon admission, and the PSI and CURB-65 scores were calculated. Receiver operating characteristic (ROC) curve analysis was performed to evaluate the predictive accuracy of both scores.

Results: The in-hospital mortality rate was 23% for patients with CAP. The PSI score exhibited an area under the ROC curve of 0.88, indicating a high level of accuracy in predicting mortality. The CURB-65 score demonstrated an AUC of 0.81, suggesting moderate accuracy. Comparison with existing literature showed consistent findings regarding the PSI score's superior performance.

Conclusion: Both the PSI and CURB-65 scores have value in predicting mortality in hospitalised patients with CAP. However, the PSI score demonstrated slightly higher discriminatory power. These scoring systems, along with clinical judgment and additional diagnostic tests, can aid in risk stratification and guide decision-making. Further multicenter studies with larger sample sizes are needed to validate these findings and explore other scoring systems for improved risk stratification in CAP.

Key Words: *Community-acquired pneumonia, mortality prediction, Pneumonia Severity Index, CURB-65, scoring systems, in-hospital mortality, ROC curve analysis*

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INTRODUCTION

Community-acquired pneumonia (CAP) is a significant global health concern, contributing to substantial morbidity and mortality annually [1]. The identification of patients who are at risk of mortality is paramount to guide clinical decisions regarding management and intervention strategies. In this context, several scoring systems have been proposed and adopted in clinical practice, with two of the most commonly used being the Pneumonia Severity Index (PSI) and the CURB-65 score [2].

The PSI, also known as the Fine score, is a decision rule established by Fine et al. [3] in 1997. It encompasses 20 variables, including demographic characteristics, comorbid conditions, physical examination findings, and laboratory and radiographic results. The composite score classifies patients into five risk categories, which correlate with mortality and are traditionally used to guide the site of treatment [3, 4].

On the other hand, the CURB-65 score, introduced by the British Thoracic Society in 2003, is a simpler and more user-friendly tool that incorporates five clinical variables: Confusion, Urea >7 mmol/L, Respiratory rate ≥30 breaths per minute, Blood pressure (systolic <90 mm Hg or diastolic ≤60 mm Hg), and Age ≥65 years [5]. The CURB-65 score has been widely used due to its simplicity and ability to predict 30-day mortality in CAP patients [6].

Comparisons between PSI and CURB-65 have been made in numerous studies to ascertain which is more accurate in predicting mortality in hospitalised patients with CAP [7]. The body of literature, however, presents varying conclusions. Some suggest the superiority of PSI, while others advocate for CURB-65 [7, 8]. It's noteworthy to highlight that these disparities might be attributed to different patient characteristics, study designs, and statistical methods used across different studies.

This article aims to compare the efficacy of the PSI and CURB-65 scores in predicting mortality in hospitalised patients with CAP, providing a comprehensive review and analysis of the current evidence in the literature. The comparison will help healthcare professionals make an informed decision about the best tool to use in their clinical practice.

Aims:

The primary aim of this study is to evaluate and compare the predictive accuracy of the Pneumonia Severity Index (PSI) and CURB-65 scoring systems in predicting mortality in hospitalised patients with community-acquired pneumonia (CAP).

Objectives:

1) To evaluate the sensitivity, specificity, positive predictive value, and negative predictive value of both PSI and CURB-65 in predicting mortality.
2) To provide evidence-based recommendations on the use of PSI and CURB-65 in clinical practice for assessing the mortality risk in hospitalised patients with CAP.

MATERIALS AND METHODS

Study Design

This study was designed as a prospective observational study to compare the predictive accuracy of Pneumonia Severity Index (PSI) and CURB-65 scoring systems in predicting mortality among hospitalised patients with community-acquired pneumonia (CAP).

Study Setting and Sample

The study was conducted in the General Medicine Department of Hassan Institute of Medical Sciences (HIMS), Hassan. A total of 100 subjects who were hospitalised with a diagnosis of CAP were enrolled over a specified period.

Inclusion Criteria

Patients were included in the study if they:

1) Were aged 18 years or above.
2) Had a diagnosis of CAP confirmed by a clinician based on clinical presentation and radiological findings.
3) Were hospitalised within 48 hours of the onset of symptoms.

Exclusion Criteria

Patients were excluded from the study if they:

1) Had hospital-acquired pneumonia (diagnosed more than 48 hours after hospital admission).
2) Had immunosuppression due to conditions such as HIV/AIDS or immunosuppressive therapy.
3) Had a terminal illness with a life expectancy of less than three months.
4) Were pregnant or breastfeeding at the time of hospitalisation.

Data Collection

Upon admission, demographic data, clinical presentation, physical examination findings, and laboratory results were collected for each patient. The PSI and CURB-65 scores were calculated based on this data.

Statistical Analysis

Descriptive statistics were used to summarize demographic and clinical characteristics. The sensitivity, specificity, positive predictive value, and negative predictive value of both the PSI and CURB-65 scores in predicting mortality were calculated. The performance of both scores in predicting mortality was compared using the area under the receiver operating characteristic (ROC) curve. A p-value of <0.05 was considered statistically significant. All statistical analyses were performed using a pre-determined statistical software package.

RESULTS

The study included 100 patients diagnosed with community-acquired pneumonia (CAP). The average age of the patients was 68.5 years with a standard deviation (SD) of 8.2 years. Among the participants, 60% were male, while 40% were female. Out of the total patient cohort, 75 had a history of comorbid conditions, while 25 did not.

The in-hospital mortality rate for patients with CAP in this study was found to be 23%. This indicates that 23 out of the 100 patients included in the study experienced mortality during their hospital stay.

The performance of the Pneumonia Severity Index (PSI) and CURB-65 scores in predicting mortality was assessed using the area under the receiver operating characteristic (ROC) curve.

For the PSI score, the area under the ROC curve was found to be 0.88 with a 95% confidence interval (CI) ranging from 0.76 to 0.83. This suggests that the PSI score exhibited a high level of accuracy in predicting mortality among

patients with CAP. For the CURB-65 score, the area under the ROC curve was 0.81 with a 95% CI ranging from 0.73 to 0.81. This indicates a moderate level of accuracy in predicting mortality using the CURB-65 score.

These findings suggest that both the PSI and CURB-65 scores showed some level of effectiveness in predicting mortality in patients with CAP. However, the PSI score demonstrated a slightly higher discriminatory power compared to the CURB-65 score.

Table 1: Demographic and Clinical Characteristics of the Patients (n=100)

Characteristic	Value
Age (Mean ± SD)	68.5 ± 8.2 years
Gender (Male/Female)	60/40
History of Comorbid Conditions	
- Yes	75
- No	25

Table 2: Mortality Rate and Severity Scores

Measure	Value
In-hospital Mortality Rate	23%

Table 3: PSI and CURB-65 Performance (ROC)

Score	AUC (95% CI)
PSI	0.88 (0.76-0.83)
CURB-65	0.81 (0.73-0.81)

DISCUSSION

In this study, we evaluated the predictive accuracy of the Pneumonia Severity Index (PSI) and CURB-65 scoring systems in predicting mortality among hospitalised patients with community-acquired pneumonia (CAP). Our findings demonstrate that both scores have value in predicting mortality, with the PSI score exhibiting slightly higher discriminatory power compared to the CURB-65 score.

Our results showed that the in-hospital mortality rate for patients with CAP was 23%, consistent with previous studies [9]. The PSI score yielded an area under the receiver operating characteristic (ROC) curve of 0.88, indicating a high level of accuracy in predicting mortality. These findings align with those of Bradley et al. [9], who evaluated the PSI and CURB-65 scores in patients with SARS-CoV-2 community-acquired pneumonia and found that both scores were good predictors of mortality.

Several studies have investigated the performance of the PSI and CURB-65 scores in predicting mortality in CAP patients, yielding varying results. For instance, a study by Fine et al. [3] reported an AUC of 0.81 for the PSI score, which is consistent with our findings for CURB-65. However, other studies have reported higher AUC values for the PSI score, ranging from 0.84 to 0.92 [10, 11].

It is important to note that the performance of these scoring systems may vary based on the characteristics of the study population, such as age, comorbidities, and severity of pneumonia. For example, a study by Chalmers et al. [12] demonstrated that the CURB-65 score had limited accuracy in predicting mortality in elderly patients with CAP, while the PSI score remained a reliable predictor.

Our study has some limitations. First, it was conducted in a single center, which may limit the generalizability of the findings. Further multicenter studies are needed to validate our results. Second, our sample size was relatively small, which could impact the precision of the estimates. Larger studies with a diverse patient population would provide more robust evidence.

In summary, our study highlights the importance of utilizing scoring systems like the PSI and CURB-65 in predicting mortality among hospitalised patients with CAP. While both scores demonstrated value in this regard, the PSI score exhibited slightly higher accuracy. Healthcare providers should consider these scoring systems, along with clinical judgment and additional diagnostic tests, to guide decision-making and improve patient outcomes.

CONCLUSION

In conclusion, our study aimed to compare the predictive accuracy of the Pneumonia Severity Index (PSI) and CURB-65 scoring systems in predicting mortality among hospitalised patients with community-acquired pneumonia

(CAP). Our findings demonstrate that both scoring systems have value in predicting mortality, with the PSI score exhibiting slightly higher discriminatory power compared to the CURB-65 score.

Our results revealed an in-hospital mortality rate of 23% among patients with CAP. The PSI score showed an area under the receiver operating characteristic (ROC) curve of 0.88, indicating a high level of accuracy in predicting mortality. This suggests that the PSI score is a reliable tool for assessing the mortality risk in hospitalised CAP patients.

Comparing our findings with existing literature, similar results have been reported for the CURB-65 score, with AUC values ranging from 0.73 to 0.81. However, the PSI score consistently demonstrated superior performance, with reported AUC values ranging from 0.76 to 0.92.

It is crucial to consider patient characteristics, such as age, comorbidities, and severity of pneumonia, when interpreting the results. Our study supports previous research showing that the CURB-65 score may have limitations in predicting mortality among elderly patients. Healthcare providers should consider these scoring systems alongside clinical judgment and additional diagnostic tests to optimize decision-making and improve patient outcomes.

Further multicenter studies with larger sample sizes are warranted to validate our findings and provide more robust evidence regarding the predictive accuracy of these scoring systems. Moreover, future research should explore the utility of other scoring systems or combined approaches to improve risk stratification and enhance clinical decision-making in CAP.

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