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COMPARATIVE STUDY OF PNEUMONIA SEVERITY INDEX AND CURB-65 IN ASSESSING THE SEVERITY OF COMMUNITY ACQUIRED PNEUMONIA

Respiratory Medicine

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ABSTRACT

Background: Community acquired pneumonia (CAP) is a common respiratory infection associated with significant morbidity and mortality worldwide. Early assessment of disease severity is important for appropriate management and reducing complications. Pneumonia Severity Index (PSI) and CURB-65 are commonly used scoring systems for evaluating severity in CAP. **Aim of the Study:** To compare Pneumonia Severity Index and CURB-65 in assessing the severity of community acquired pneumonia **Methodology:** A cross-sectional comparative study was conducted at Sri Siddhartha Medical College & Hospital between January 2024 and December 2025. The research included 118 patients. **Conclusion:** Both PSI and CURB-65 are useful tools for severity assessment in CAP. PSI provides detailed risk evaluation, while CURB-65 is simple and practical for rapid clinical use. Combined clinical judgment with scoring systems improves patient management and outcome. In tertiary care settings, where comprehensive clinical and laboratory data are available, PSI may offer greater clinical utility than CURB-65 for guiding ICU admission and predicting adverse outcomes

KEYWORDS

Community Acquired Pneumonia, Pneumonia Severity Index, Curb-65, Severity Assessment.

INTRODUCTION

Community acquired pneumonia (CAP) remains one of the most common infectious diseases worldwide and continues to be a significant cause of morbidity, hospitalization, and mortality across all age groups. Despite advances in antimicrobial therapy and supportive care, CAP still poses a major public health burden, particularly among elderly individuals and patients with underlying comorbid illnesses.

The clinical presentation of CAP varies widely, ranging from mild respiratory symptoms managed on an outpatient basis to severe disease associated with respiratory failure, septic shock, multi-organ dysfunction, and death. This variability in disease severity makes early and accurate assessment extremely important in routine clinical practice.

Appropriate assessment of severity in CAP plays a crucial role in determining the site of treatment, need for hospitalization, requirement for intensive care management, and overall prognosis. Incorrect assessment may lead to unnecessary hospital admissions or delayed aggressive treatment in critically ill patients.

To improve clinical decision-making and reduce variability in management, several severity assessment tools have been developed over the years. Among these, the Pneumonia Severity Index (PSI) and CURB-65 have emerged as the most widely accepted and clinically validated scoring systems for evaluating CAP severity.

The Pneumonia Severity Index was designed as a comprehensive risk stratification tool that incorporates demographic factors, associated comorbidities, physical examination findings, and laboratory investigations. By integrating multiple variables, PSI categorizes patients into different risk classes based on mortality risk and severity of illness.

One of the major strengths of PSI is its ability to provide detailed prognostic assessment and guide clinicians regarding outpatient management, hospitalization, and intensive care admission. However, its complexity and dependence on extensive clinical and laboratory data may limit rapid application in emergency situations.

CURB-65 was later introduced as a simpler and more practical bedside scoring system for rapid severity assessment in patients with CAP. It is based on five easily measurable clinical parameters: confusion, blood urea nitrogen, respiratory rate, blood pressure, and age greater than 65 years.

Due to its simplicity, ease of calculation, and minimal laboratory requirements, CURB-65 has become particularly useful in emergency departments, primary healthcare centers, and resource-limited settings where immediate clinical decisions are necessary.

Both PSI and CURB-65 share a common objective of reducing uncertainty in the management of CAP by identifying patients at increased risk of complications, mortality, and need for intensive monitoring. These scoring systems assist clinicians in making evidence-based decisions and improving patient outcomes.

Although these scoring systems are highly valuable, neither PSI nor CURB-65 can completely replace clinical judgment. Factors such as functional status, social conditions, immunological status, and subtle clinical findings may influence disease outcome and should be considered along with severity scores.

In recent years, advances in biomarkers, radiological assessment, and machine learning models have been explored as additional tools for pneumonia severity prediction. Nevertheless, PSI and CURB-65 continue to remain the cornerstone of routine clinical assessment because of their proven reliability, accessibility, and widespread acceptance.

Therefore, comparing the effectiveness of Pneumonia Severity Index and CURB-65 in assessing the severity of community acquired pneumonia is essential to identify the most suitable prognostic tool for clinical practice, optimize patient triage, guide treatment strategies, and improve overall patient care and outcomes.

Aim & Objectives of Study

- To compare pneumonia severity index and CURB-65 in assessing the severity of Community Acquired Pneumonia.

OBJECTIVE

- To assess the patient requiring hospital admission and intensive care treatment in community acquired pneumonia by Pneumonia Severity Index
- To assess the patient requiring hospital admission and intensive care treatment in community acquired pneumonia by CURB-65
- To compare pneumonia severity index and CURB-65 in predicting the severity of Community Acquired Pneumonia.

Materials and Methods

Study Design

A hospital-based analytical cross-sectional study was conducted at Sri Siddhartha Medical College and Hospital in the Departments of

Respiratory Medicine and General Medicine over a period of 1 year to compare the predictive performance of Pneumonia Severity Index (PSI) and CURB-65 in assessing the severity of community acquired pneumonia. A total of 118 patients diagnosed with community acquired pneumonia were included in the study.

Statistical Analysis:

Data were analyzed using SPSS version 21.0. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. Chi-square test was used to assess associations between PSI and CURB-65 risk categories with clinical outcomes. Independent sample t-test was applied for comparison of continuous variables between groups. Receiver Operating Characteristic (ROC) curve analysis was performed to evaluate the predictive accuracy of Pneumonia Severity Index (PSI) and CURB-65 for ICU admission and in-hospital mortality using sensitivity, specificity, positive predictive value, negative predictive value, and area under the curve (AUC). A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 118 patients diagnosed with community acquired pneumonia (CAP) were included in the study. The mean age of the study population was 49.81 ± 19.36 years. Most patients belonged to moderate to severe disease categories according to PSI and CURB-65 scoring systems.

Table 1. Baseline Clinical and Laboratory Parameters

The baseline demographic, clinical, and laboratory characteristics of the study population are summarized below. These parameters were assessed at the time of admission.

Parameter	Mean ± SD
Age (years)	49.81 ± 19.36
PSI score	145.74 ± 68.17
WBC count (×10³/μL)	10.46 ± 3.35
Hemoglobin (g/dL)	10.92 ± 2.40
Blood urea (mg/dL)	58.24 ± 23.77
Serum creatinine (mg/dL)	1.48 ± 0.58
PaO_2 (mmHg)	67.71 ± 15.48

Table 2. Type of Admission Among Study Participants

The distribution of patients according to the type of admission is shown below. Most patients required inpatient ward admission.

Admission Type	Number of Patients	Percentage (%)
Inpatient/Ward	106	89.8
OPD/Brief observation	8	6.8
Outpatient	4	3.4
Total	118	100

Table 3. Distribution of Patients According to PSI Class

The distribution of patients according to PSI risk classification is presented below. Majority of patients belonged to higher PSI classes.

	Number of Patients	Percentage (%)
Class I	2	1.7
Class II	12	10.2
Class III	31	26.3
Class IV	42	35.6
Class V	31	26.3
Total	118	100

Table 4. Distribution According to CURB-65 Risk Category

The distribution of patients according to CURB-65 risk categories is shown below. Most patients belonged to low and low-intermediate risk groups.

CURB-65 Risk Category	Number of Patients	Percentage (%)
Low (0–1)	53	44.9
Low–Intermediate (2)	42	35.6
High (3)	18	15.3
Very High (4–5)	23	19.5

Table 5. Duration of Hospital Stay

The duration of hospital stay among study participants is summarized below. Most patients had prolonged hospitalization.

Hospital Stay	Number of Patients	Percentage (%)
<5 days	21	17.8
5–10 days	46	39.0
10–15 days	51	43.2
Total	118	100

Table 6. Association Between PSI Class and Hospital Length of Stay

The association between PSI class and hospital length of stay is presented below. Higher PSI classes were associated with longer hospital stay.

PSI Class	<5 days	5–10 days	10–15 days
Class I	1	0	1
Class II	2	4	6
Class III	6	8	17
Class IV	16	19	42
Class V	20	15	51

Table 7. Association Between CURB-65 Risk Category and Hospital Length of Stay

The association between CURB-65 risk category and hospital length of stay is shown below. Higher CURB-65 scores correlated with prolonged hospitalization.

CURB-65 Risk Category	<5 days	5–10 days	10–15 days	Total
Low (0–1)	14	21	18	53
Low–Intermediate (2)	5	14	23	42
High (3)	2	7	9	18
Very High (4–5)	0	4	19	23

Table 8. Association Between PSI Class and ICU Requirement

The relationship between PSI class and ICU requirement is summarized below. ICU admission increased with increasing PSI class.

PSI Class	ICU Required	ICU Not Required
Class I	0	2
Class II	1	11
Class III	5	26
Class IV	22	20
Class V	31	0

Table 9. Association Between CURB-65 Risk Category and ICU Requirement

The association between CURB-65 risk category and ICU requirement is shown below. Higher CURB-65 scores demonstrated greater ICU requirement.

CURB-65 Risk Category	ICU Required	ICU Not Required
Low (0–1)	6	47
Low–Intermediate (2)	15	27
High (3)	12	6
Very High (4–5)	20	3

Table 10. Association Between PSI Class and In-Hospital Mortality

The association between PSI class and in-hospital mortality is presented below. Mortality increased progressively with higher PSI classes.

PSI Class	Improved/Discharged	Death
Class I	2	0
Class II	11	1
Class III	29	2
Class IV	33	9
Class V	13	18

Table 11. Association Between CURB-65 Risk Category and In-Hospital Mortality

The association between CURB-65 risk category and in-hospital mortality is summarized below. Higher CURB-65 scores were associated with increased mortality.

CURB-65 Risk Category	Improved/Discharged	Death
Low (0–1)	51	2
Low–Intermediate (2)	36	6
High (3)	13	5
Very High (4–5)	11	12

Table 12. Association Between CURB-65 Risk Category and Treatment Response

The association between CURB-65 risk category and treatment response is shown below. Poor treatment response was more common in higher risk groups.

CURB-65 Risk	Good	Moderate	Poor	Total
Low (0–1)	33	6	14	53
Low–Intermediate (2)	12	6	24	42
High (3)	9	3	6	18

Very High (4–5)	12	3	8	23

Table 13. ROC Analysis for ICU Requirement

The ROC analysis for ICU requirement is presented below. PSI demonstrated superior predictive accuracy compared to CURB-65.

Score	AUC	Interpretation
PSI	0.961	Excellent discriminatory ability
CURB-65	0.715	Moderate discriminatory ability

Table 14. ROC Analysis for In-Hospital Mortality

The ROC analysis for in-hospital mortality is summarized below. PSI showed better sensitivity than CURB-65.

Score	AUC	Sensitivity
PSI	0.635	88.2%
CURB-65	0.518	41.2%

DISCUSSION

The present study compared the effectiveness of Pneumonia Severity Index (PSI) and CURB-65 in assessing severity and predicting outcomes in patients with community acquired pneumonia (CAP). Both scoring systems were useful in stratifying disease severity; however, PSI demonstrated superior predictive performance for ICU admission and in-hospital mortality.

Most patients in the study belonged to PSI Classes IV and V, indicating a predominantly moderate to severe disease burden. Higher PSI classes and CURB-65 risk categories were associated with prolonged hospital stay and poorer treatment response, suggesting that increasing severity scores correlate with worse clinical outcomes.

ROC analysis demonstrated that PSI had excellent discriminatory ability for predicting ICU admission (AUC 0.961), whereas CURB-65 showed only moderate predictive performance (AUC 0.715). PSI also demonstrated better sensitivity for in-hospital mortality prediction compared to CURB-65. These findings indicate that PSI is more effective in identifying high-risk patients requiring intensive care management.

The findings of the present study are comparable with previous studies by Ananda-Rajah et al., Kontou et al., and Shah et al., which also reported superior performance of PSI over CURB-65 for predicting severe outcomes and ICU requirement in CAP patients.

Although CURB-65 is simpler and easier to apply at the bedside, it showed comparatively lower sensitivity and tended to underestimate severity in some critically ill patients. PSI, by incorporating multiple clinical and laboratory variables, provides a more comprehensive assessment of disease severity and prognosis.

Overall, the present study suggests that PSI may be more suitable for hospital-based risk stratification and prediction of adverse outcomes, while CURB-65 remains a rapid and practical bedside tool for initial assessment in emergency and resource-limited settings.

CONCLUSION

The present study concludes that both Pneumonia Severity Index (PSI) and CURB-65 are useful and effective scoring systems for assessing the severity of community acquired pneumonia. However, PSI demonstrated superior predictive accuracy for ICU admission and in-hospital mortality compared to CURB-65. Higher PSI classes and CURB-65 risk categories were associated with prolonged hospital stay and poorer treatment response. Although CURB-65 is simple, rapid, and practical for bedside assessment, it showed comparatively lower sensitivity in identifying severe disease and critically ill patients. PSI, by incorporating multiple clinical and laboratory parameters, provides more comprehensive risk stratification and better prediction of adverse outcomes. Therefore, PSI may be more suitable for hospital-based management and identification of high-risk patients, while CURB-65 remains valuable for rapid initial assessment in emergency and resource-limited settings.

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