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## A comparative study of QSOFA and news2 with curb-65 in hospitalised patients with community acquired pneumonia

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### Abstract

**Background:** Community-acquired pneumonia (CAP) is a significant global health concern, with a wide range of presentations from mild respiratory symptoms to severe, life-threatening conditions such as sepsis. Due to the diversity of its clinical features, accurate assessment tools are essential for identifying high-risk patients who require intensive care. The CURB-65 score, specifically developed for CAP, predicts 30-day mortality based on clinical parameters. Meanwhile, qSOFA and NEWS2 commonly used for broader sepsis assessment, offer prognostic insights for general deterioration and ICU admission. Thus, this study aimed to compare the effectiveness of qSOFA, and NEWS2 with CURB-65 in hospitalized CAP patients.

**Materials and Methods:** This prospective study involved 70 CAP patients over 18 years, admitted to the general medicine department at BMCRI-affiliated hospitals. Patients were assessed using CURB-65, NEWS2, and qSOFA, with data collected on demographic details, clinical history, blood cultures and chest X-rays, and serum urea levels. Comparative analyses were conducted to determine the sensitivity, specificity, and accuracy of each scoring system, with chi-square tests and statistical measures evaluating the association between scores and outcomes.

**Results:** The study's findings showed that most patients had a qSOFA score of 0 (45.7%) or 1 (38.6%), a NEWS2 score of 0 (61.4%), and a CURB-65 score of 1 (61.4%). Significant correlations were observed between qSOFA and CURB-65 scores ( $p = 0.001$ ) as well as NEWS2 and CURB-65 scores ( $p = 0.001$ ), with higher scores indicating a greater risk of adverse outcomes. Overall, 58.6% of patients survived, while 41.4% died, highlighting the high mortality risk associated with severe CAP.

**Conclusion:** The study underscores the importance of selecting the appropriate scoring system for CAP severity assessment, as qSOFA and NEWS2 scores, while useful, may provide complementary rather than stand-alone insights compared to CURB-65. These findings emphasize the need for accurate prognostic tools to optimize patient care and resource allocation in managing CAP.

**Keywords:** Community acquired pneumonia, qSOFA, NEWS2, CURB-65

### Introduction

Community-acquired pneumonia (CAP) is a major cause of illness and death globally. Its clinical presentation can vary widely, from mild cases with symptoms such as fever and productive cough to severe cases marked by respiratory distress and sepsis. Due to its broad range of clinical features, CAP is often considered in the differential diagnosis of almost all respiratory conditions<sup>[1]</sup>.

Globally, pneumonia confers a high risk of mortality<sup>[2]</sup>. In Colombia, between 2005 and 2012, acute respiratory infections were the leading cause of death from communicable diseases, accounting for 48.6% of such deaths. These infections contributed to 56.2% of communicable disease deaths in women and 43.1% in men<sup>[3]</sup>.

Providing healthcare to patients with severe infections is costly for both the state and its healthcare system. These infections present a clinical challenge, as there are no simple, specific prognostic markers to quickly identify high-risk patients who require specialized care. Therefore, reliable clinical tools are essential to assess the risk of death or complications in patients with suspected infections in emergency departments<sup>[4]</sup>.

The Confusion, Urea, Respiratory Rate, Blood Pressure, and Age 65 or Older (CURB-65) score is a tool specifically designed for community-acquired pneumonia (CAP) to predict 30-day all-cause mortality.

CURB-65 has been validated in large, diverse patient populations and is endorsed by national and international guidelines to support clinical decision-making [5,6].

Additionally, the National Early Warning Score 2 (NEWS2) system, based on standard physiological measurements, was implemented in all hospitals within the English National Health Service (NHS) prior to COVID-19. NEWS2 serves as a general early warning system to prompt escalated care for deteriorating patients, with high scores linked to an increased risk of death or unanticipated ICU admission within 24 hours [7].

The Quick Sequential (Sepsis-Related) Organ Failure Assessment (qSOFA) score is also used to predict mortality and ICU admission among patients with suspected infections in pre-hospital, emergency, and ward settings. Validated through extensive datasets, qSOFA has gained recognition after being recommended by the Sepsis-3 task force [8,9].

The third consensus on sepsis (SEPSIS 3) has recently recommended the use of the qSOFA (quick sepsis-related organ failure assessment) score for early identification of adult patients suspected of acute bacterial infections who are at higher risk of poor outcomes. Similarly, the Colombian Ministry of Health, the Argentine Society of Infectious Diseases, and the Mexican Institute of Social Security all recommend using the CURB-65 score in their guidelines for managing community-acquired pneumonia, despite the absence of local studies to confirm and validate this recommendation [10].

The CURB-65, NEWS, and qSOFA scores are designed to identify patients at elevated risk for complications and mortality. Given that these scores include overlapping clinical variables and that community-acquired pneumonia is a leading cause of sepsis, examining differences in their effectiveness as prognostic models could have significant clinical implications. Additionally, any multivariable model developed for prognostic or diagnostic purposes should be validated in independent populations to ensure reliability. Therefore, this study aimed to conduct a comparative analysis of qSOFA and NEWS2 with CURB-65 in hospitalized patients with community-acquired pneumonia.

## Materials and Methods

This was a prospective study conducted at the department of general medicine of the hospitals attached to BMCRI. A total of 70 patients, diagnosed with CAP attending to the OPD were included in the present study.

## Inclusion Criteria

Patients aged over 18 years with a diagnosis of Community-Acquired Pneumonia (CAP) were included in the study. Additionally, only those who provided informed consent were enrolled.

## Exclusion Criteria

Patients younger than 18 years were excluded from the study. Patients with pulmonary tuberculosis or lung carcinoma were also excluded.

## Methodology

After obtaining approval and clearance from the institutional ethics committee, the patients fulfilling the inclusion criteria were enrolled for the study after obtaining informed consent.

In this study on community-acquired pneumonia (CAP), a structured case record form was used to document each patient's history. Relevant investigations, including blood and sputum cultures, chest X-rays, and serum urea levels, were conducted. To assess CAP severity, the qSOFA, NEWS2, and CURB-65 scoring systems were applied and compared. Parameters used for calculating qSOFA and NEWS2 scores included respiratory rate, oxygen saturation, temperature, heart rate, Glasgow Coma Scale (GCS < 15), level of consciousness, and systolic blood pressure.

Statistical analysis was performed using SPSS version 20, with data entered into an Excel spread sheet for processing. Descriptive statistics, such as mean, standard deviation, median, and interquartile range (IQR), were used for quantitative variables based on data distribution, while frequencies and proportions were calculated for qualitative variables. Inferential statistics involved applying the Chi-square test for qualitative variables, along with diagnostic accuracy assessments such as sensitivity, specificity, negative predictive value (NPV), positive predictive value (PPV), and overall accuracy. A paired t-test or Wilcoxon signed-rank test was used to compare the qSOFA, NEWS2, and CURB-65 scores in CAP patients. The level of significance was set at 5%, with any additional tests determined as needed based on data distribution.

## Results

**Table 1:** Distribution according to age and gender.

Age (Mean ±SD)	59.36±14.37	
Gender	No. of cases	Percentage
Male	53	75.7
Female	17	24.3

The study population had a mean age of 59.36±14.37 years. Gender distribution included 75.7% males (53 cases) and 24.3% females (17 cases).

**Table 2:** Distribution according to qsofa score, News 2 scores and CURB 65 score

qSOFA score	No. of cases	Percentage
0	32	45.7
1	27	38.6
2	5	7.1
3	6	8.6
News 2 scores		
0	43	61.4
1	2	2.9
2	3	4.3
3	2	2.9
4	2	2.9
5	2	2.9
6	2	2.9
7	5	7.1
8	9	12.9
CURB 65 score		
0	2	2.9
1	43	61.4
2	20	28.6
3	5	7.1

The above table showed that the most patients had a qSOFA score of 0 (45.7%) or 1 (38.6%). For NEWS2, 61.4% scored 0, with a range up to 8 (12.9%). In CURB-65, 61.4% scored 1, followed by 28.6% with a score of 2.

**Table 3:** Association of qSOFA with CURB 65

		CURB 65				Total	
		0	1	2	3		
qSOFA	0	N	2	29	1	0	32
		%	6.30%	90.60%	3.10%	0.00%	100.00%
	1	N	0	14	13	0	27
		%	0.00%	51.90%	48.10%	0.00%	100.00%
	2	N	0	0	4	1	5
		%	0.00%	0.00%	80.00%	20.00%	100.00%
	3	N	0	0	2	4	6
		%	0.00%	0.00%	33.30%	66.70%	100.00%
Total		N	2	43	20	5	70
		%	2.90%	61.40%	28.60%	7.10%	100.00%
P value							0.001

A significant association ( $p = 0.001$ ) was observed between qSOFA and CURB-65 scores. Patients with higher qSOFA scores tended to have higher CURB-65 scores, indicating a correlation between the two assessments.

**Table 4:** Association of NEWS 2 score with CURB 65

		CURB65				Total	
		0	1	2	3		
0	N	0	36	6	1	43	
	%	0.00%	83.7%	14.00%	2.30%	100.00%	
1	N	2	0	0	0	2	
	%	100%	0.00%	0.00%	0.00%	100.00%	
2	N	0	3	0	0	3	
	%	0.00%	100%	0.00%	0.00%	100.00%	
3	N	0	2	0	0	2	
	%	0.00%	100%	0.00%	0.00%	100.00%	
4	N	0	2	0	0	2	
	%	0.00%	100%	0.00%	0.00%	100.00%	
5	N	0	0	2	0	2	
	%	0.00%	0.00%	100.00%	0.00%	100.00%	
6	N	0	0	1	1	2	
	%	0.00%	0.00%	50.00%	50.00%	100.00%	
7	N	0	0	3	2	5	
	%	0.00%	0.00%	60.00%	40.00%	100.00%	
8	N	0	0	8	1	9	
	%	0.00%	0.00%	88.90%	11.10%	100.00%	
Total		N	2	43	20	5	70
		%	2.90%	61.4%	28.60%	7.10%	100.00%
P value							0.001

The analysis demonstrated a significant association ( $p = 0.001$ ) between NEWS2 and CURB-65 scores. Patients with a NEWS2 score of 0 were mostly in the CURB-65 score range of 1 (83.7%). Higher NEWS2 scores, such as 7 and 8, were associated with higher CURB-65 scores, indicating a correlation between increased NEWS2 scores and elevated CURB-65 levels.

**Table-5:** Distribution according to outcome

Outcome	No. of cases	Percentage
Survived	41	58.6
Died	29	41.4
Total	70	100

The above table showed that, 41 patients (58.6%) survived, while 29 patients (41.4%) died, resulting in a total of 70 cases.

**Discussion:** Community-acquired pneumonia (CAP) is a severe illness that poses a significant risk to human life.

Establishing safe and effective prognostic assessment systems for CAP is crucial for clinicians. Pneumonia is a leading cause of hospitalization [11], and CAP is associated with a high risk of respiratory failure and septic organ dysfunction. Since 2000, early management of CAP has relied on severity assessment tools, including CURB-65 [12, 13], the pneumonia severity index (PSI), and others. In 2007, the Infectious Diseases Society of America/American Thoracic Society consensus guidelines recommended using both PSI and CURB-65 scoring systems together [14]. More recent guidelines have also suggested using the SOFA and qSOFA scores to assess pneumonia severity. However, the effectiveness of these scoring systems in predicting prognostic outcomes for emergency patients with CAP remains a subject of on-going debate.

In our study, the mean age of participants was  $59.36 \pm 14.37$  years, with a gender distribution of 75.7% males (53 cases) and 24.3% females (17 cases). Most patients presented with a qSOFA score of 0 (45.7%) or 1 (38.6%). For NEWS2, the majority (61.4%) scored 0, with a range extending to 8 (12.9%). Similarly, in CURB-65, 61.4% scored 1, followed by 28.6% with a score of 2.

A significant association ( $p = 0.001$ ) was found between qSOFA and CURB-65 scores, indicating that patients with higher qSOFA scores also tended to have elevated CURB-65 scores, suggesting a correlation between these two assessments. Supporting evidence from a recent systematic review suggests that a positive qSOFA score has high specificity for early in-hospital mortality detection [15]. Additionally, a multicenter study reported that the CURB-65 score is a reliable predictor of mortality in CAP patients [16]. This study also identified a significant association ( $p = 0.001$ ) between NEWS2 and CURB-65 scores. Patients with a NEWS2 score of 0 were primarily found within the CURB-65 score range of 1 (83.7%), while those with higher NEWS2 scores, such as 7 and 8, were more likely to have elevated CURB-65 scores, indicating a correlation between increasing NEWS2 and CURB-65 levels.

In related research, a study by Sbiti-Rohr *et al.*, [17] found that for predicting 30-day mortality, NEWS was less accurate than PSI and CURB-65, with an AUROC of 0.65. However, NEWS outperformed both PSI and CURB-65 for predicting ICU admissions and empyema risk. Additionally, Brabrand *et al.*, [18] found no significant difference between CURB-65 and NEWS in identifying CAP patients at risk of 30-day mortality, suggesting that both tools have similar utility in this specific outcome prediction.

Our findings further demonstrated that a qSOFA score of  $\geq 2$  and a NEWS score of  $\geq 9$  were strongly associated with adverse primary and secondary outcomes, highlighting the need for cautious management of these CAP patients. Comparatively, a study by Abbott *et al.*, [19] reported that a NEWS score of 3 or more was linked to mortality within two days of admission, reinforcing the predictive utility of these scoring systems in clinical practice.

**Conclusion**

In hospitalized patients with community-acquired pneumonia (CAP), the prognostic performance of qSOFA, NEWS2, and CURB-65 for in-hospital mortality and ICU admission was significantly superior to the Pneumonia Severity Index (PSI). qSOFA, which requires only basic vital signs and no laboratory tests, offers a rapid, efficient, and straightforward method for identifying high-risk

patients, making it particularly valuable in emergency departments or settings without respiratory specialists. Given that both NEWS2 and qSOFA do not require laboratory components, these scoring systems are convenient and beneficial for clinicians managing hospitalized patients with CAP.

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