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Original Research Article

Role of HRCT Chest Severity Score in Predicting Clinical Outcomes in Patients with Community-Acquired Pneumonia: A Prospective Observational Study

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Abstract:

Background: Community-acquired pneumonia is an important cause of hospitalization, respiratory failure, ICU admission, and mortality. HRCT provides a detailed assessment of lung parenchymal involvement and may help in predicting clinical outcomes.

Aim and Objective: To assess the role of HRCT chest severity score in predicting clinical outcomes among patients with community-acquired pneumonia.

Materials and Methods: This prospective observational study included 120 adult patients diagnosed with community-acquired pneumonia. HRCT of the chest was performed, and the severity score was calculated using a semi-quantitative lobar involvement method. Patients were categorized into low-score (0–7), moderate-score (8–15), and severe-score (>15) groups. Clinical outcomes, including oxygen requirement, non-invasive ventilation, ICU admission, mechanical ventilation, hospital length of stay, and mortality, were assessed.

Results: Among 120 patients, 35 (29.2%) had a low HRCT severity score, 52 (43.3%) a moderate score, and 33 (27.5%) a severe score. Oxygen requirement increased from 10 patients (28.6%) in the low-score group to 36 patients (69.2%) in the moderate-score group and 32 patients (97.0%) in the severe-score group. ICU admission was required in 1 patient (2.9%), 8 patients (15.4%), and 19 patients (57.6%) in the low, moderate, and severe groups, respectively. Mean hospital stays increased from 4.6 ± 1.8 days to 7.2 ± 2.6 days and 11.4 ± 4.1 days across the three groups. Mortality was observed in 10 patients (8.3%), with the highest mortality in the severe HRCT score group.

Conclusion: HRCT chest severity score is a useful radiological marker for predicting oxygen requirements, ICU admission, hospital stay, and mortality in patients with community-acquired pneumonia. It may be used as an adjunct to clinical assessment for early risk stratification and treatment planning.

Keywords: Community-acquired pneumonia, HRCT chest, severity score, ICU admission, oxygen requirement, mortality.

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Introduction

Community-acquired pneumonia (CAP) is an acute infection of the pulmonary parenchyma acquired outside the hospital or within the first 48 hours of hospital admission. It remains one of the most important causes of morbidity, hospital admission, intensive care unit (ICU) utilization, and infection-related mortality worldwide [1]. Although many patients recover with timely antimicrobial therapy and supportive care, the clinical course of CAP is highly variable. Some patients present with mild disease suitable for outpatient management, whereas others develop hypoxemia, respiratory failure, sepsis, need for mechanical ventilation, prolonged hospitalization, or death [1,2].

Early assessment of disease severity is therefore a central component of CAP management. Clinical severity scores such as the Pneumonia Severity Index (PSI) and CURB-65 are commonly used to support decisions regarding hospitalization, ICU admission, and prognosis [2,3]. PSI was developed to identify low-risk patients with CAP who may be suitable for outpatient care, whereas CURB-65 uses confusion, urea, respiratory rate, blood pressure, and age ≥65 years to stratify patients by mortality risk [3,4]. However, these clinical scoring systems

mainly depend on demographic variables, comorbidities, vital signs, and laboratory parameters. They may not adequately reflect the anatomical extent of lung involvement, distribution of disease, or radiological complications, all of which may influence oxygen requirement, ICU admission, length of hospital stay, and mortality.

Chest imaging plays an essential role in the diagnosis and evaluation of CAP. Chest radiography is widely used as the initial imaging modality. Still, it has limitations in detecting subtle infiltrates, multilobe disease, early complications, and disease extent, especially in elderly patients, obese individuals, immunocompromised patients, and patients with pre-existing lung disease [5]. High-resolution computed tomography (HRCT) provides better anatomical detail than chest radiography and can identify the pattern, distribution, and extent of parenchymal involvement. HRCT can also detect complications such as pleural effusion, necrotizing pneumonia, cavitation, abscess formation, empyema, and acute respiratory distress syndrome-like changes, which may have prognostic implications [5,6].

Recent studies have suggested that CT-based evaluation may improve the assessment of severity in CAP. Haga et al. reported that computed tomography was superior to chest radiography for diagnosing and assessing the severity of CAP in elderly patients [6]. Nemoto et al. observed that adding chest CT findings to established clinical scores, such as CURB-65 and A-DROP, improved prediction of 30-day mortality in patients with CAP [7]. More recently, the CT severity score has been evaluated as a radiological marker of disease burden in CAP patients admitted to the ICU, with higher CT severity scores associated with increased mortality and improved prognostic performance when combined with clinical severity scores [8]. These findings indicate that radiological severity may provide additional prognostic information beyond routine clinical parameters.

The HRCT chest severity score is a semi-quantitative method used to estimate the extent of lung involvement by assigning scores to affected lung regions or lobes. A higher score reflects greater parenchymal involvement and may correlate with impaired gas exchange, higher oxygen requirement, need for ventilatory support, ICU admission, prolonged hospital stay, and adverse outcomes. During the COVID-19 pandemic, CT severity scoring gained attention as a practical imaging-based tool for stratifying pulmonary involvement and predicting disease severity and mortality in viral pneumonia [9,10]. However, evidence regarding the prognostic role of HRCT chest severity score in non-COVID community-acquired pneumonia remains comparatively limited, particularly in prospective observational settings.

Assessing HRCT chest severity scores in patients with CAP may help clinicians identify high-risk patients at presentation and guide early escalation of care. It may also support better communication between the Departments of Medicine and Radiology by providing an objective radiological estimate of disease burden. Therefore, the present prospective observational study is planned to evaluate the role of the HRCT chest severity score in predicting clinical outcomes in patients with community-acquired pneumonia, with special reference to oxygen requirement, ICU admission, duration of hospital stay, and mortality.

Materials and Methods

This prospective observational study was conducted in the Department of Medicine, in collaboration with the Department of Radiology, at Mansarover Medical College, Bhopal, over a period of 1 year, from June 2025 to June 2026. The study was carried out to assess the role of the HRCT chest severity score in predicting clinical outcomes among patients diagnosed with community-acquired pneumonia.

All adult patients admitted with clinical and radiological features suggestive of community-acquired pneumonia were screened for eligibility. Community-acquired pneumonia was defined as an acute infection of the lung parenchyma acquired outside the hospital setting, presenting with clinical features such as fever, cough, sputum production, breathlessness, pleuritic chest pain, or altered sensorium, along with new pulmonary infiltrates on chest radiograph or HRCT. Patients aged 18 years or older, diagnosed with community-acquired pneumonia, and undergoing chest HRCT as part of their clinical evaluation were included in the study after written informed consent was obtained.

Patients with hospital-acquired pneumonia, ventilator-associated pneumonia, recent hospitalization within the previous 14 days, active pulmonary tuberculosis, known interstitial lung disease, lung malignancy, pulmonary oedema, or pulmonary embolism were excluded from the study. Patients with severe immunocompromised states such as HIV infection, post-transplant status, or current chemotherapy were also excluded. Patients with incomplete clinical, radiological, or outcome data were excluded from the final analysis.

A total of 120 patients fulfilling the eligibility criteria were enrolled in the study. A detailed clinical history was obtained from each patient, including age, sex, duration of symptoms, fever, cough, sputum production, breathlessness, chest pain, smoking history, and presence of comorbidities such as diabetes mellitus, hypertension, chronic obstructive pulmonary disease, chronic kidney disease, and ischemic heart disease. A general physical examination and a

systemic examination were performed at the time of admission. Vital parameters, including temperature, pulse rate, respiratory rate, blood pressure, and oxygen saturation measured by pulse oximetry, were recorded.

All patients underwent routine laboratory investigations as per institutional protocol. These included complete blood count, total leukocyte count, differential leukocyte count, platelet count, serum urea, serum creatinine, serum electrolytes, liver function tests, and C-reactive protein. Procalcitonin, arterial blood gas analysis, blood culture, and sputum culture were performed wherever clinically indicated. These laboratory parameters were recorded to assess the inflammatory status and overall clinical severity of pneumonia.

HRCT chest was performed using a multidetector computed tomography scanner. Images were acquired from the lung apices to the bases during full inspiration. Axial sections were reconstructed using a high-resolution algorithm, and coronal and sagittal reconstructions were reviewed whenever required. HRCT images were assessed by the radiologist for consolidation, ground-glass opacity, interstitial thickening, nodular opacities, tree-in-bud pattern, multilobar involvement, bilateral lung involvement, pleural effusion, cavitation, abscess formation, and lymphadenopathy.

The HRCT chest severity score was calculated using a semi-quantitative lobar involvement method. Each of the five lung lobes was assessed separately according to the percentage of parenchymal involvement. A score of 0 was assigned for no involvement; 1 for less than 5% involvement; 2 for 5–25% involvement; 3 for 26–50% involvement; 4 for 51–75% involvement; and 5 for more than 75% involvement. The total HRCT chest severity score was obtained by summing the individual scores for all five lobes. Therefore, the total possible score ranged from 0 to 25.

Based on the total HRCT chest severity score, patients were divided into three severity groups. Patients with a score of 0–7 were classified as having low HRCT severity; those with a score of 8–15 as having moderate HRCT severity; and those with a score of more than 15 as having severe HRCT involvement. These groups were compared with respect to clinical presentation, laboratory parameters, radiological findings, and final clinical outcomes.

The main outcome variables assessed in the study were oxygen requirement, need for non-invasive ventilation, ICU admission, requirement of mechanical ventilation, duration of hospital stay, and in-hospital mortality. Oxygen requirement was defined as the need for supplemental oxygen by nasal cannula, face mask, non-rebreathing mask, high-flow oxygen, non-invasive ventilation, or invasive mechanical ventilation during hospitalization. ICU admission was defined as transfer to the intensive care unit due to respiratory failure, hemodynamic instability, altered sensorium, septic shock, or requirement of advanced respiratory support. Duration of hospital stay was calculated from the date of admission to the date of discharge or death. Mortality was defined as death occurring during the same hospital admission.

All data were collected prospectively using a predesigned case record form. Demographic details, clinical features, comorbidities, laboratory parameters, HRCT findings, HRCT severity score, treatment details, oxygen requirement, ICU admission, hospital stay, and outcome were recorded for each patient. The data collected were entered into a master chart and checked for completeness and accuracy before statistical analysis.

Statistical analysis was performed using appropriate statistical software. Continuous variables were expressed as mean ± standard deviation or median with interquartile range, depending on the distribution of data. Categorical variables were expressed as numbers and percentages. Comparisons among low, moderate, and severe HRCT severity score groups were performed using one-way ANOVA or Kruskal-Wallis test for continuous variables and Chi-square test or Fisher's exact test for categorical variables. A p-value of less than 0.05 was considered statistically significant.

The study was conducted after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all study participants or their legally authorized representatives before enrolment. Confidentiality of patient information was maintained throughout the study, and the collected data was used only for research purposes.

Results

A total of 120 patients diagnosed with community-acquired pneumonia were included in the present prospective observational study. Based on the HRCT chest severity score, patients were categorized into three groups: low severity (0–7), moderate severity (8–15), and severe (> 16). Among the 120 patients, 35 (29.2%) had a low HRCT severity score, 52 (43.3%) had a moderate HRCT severity score, and 33 (27.5%) had a severe HRCT severity score.

The mean age of the study population was 56.8 ± 15.2 years. The mean age increased with increasing HRCT severity score, from 49.6 ± 13.8 years in the low-score group to 61.9 ± 14.8 years in the severe-score group. Overall, 73 patients (60.8%) were males, and 47 patients (39.2%) were females.

Diabetes mellitus was present in 44 patients (36.7%), hypertension in 41 patients (34.2%), COPD in 23 patients (19.2%), and smoking history in 49 patients (40.8%). Baseline demographic characteristics were comparable across the three HRCT severity groups, although comorbidities were numerically more frequent among patients with severe HRCT scores.

Clinically, fever was the most common presenting symptom, observed in 114 patients (95.0%), followed by cough in 109 patients (90.8%), breathlessness in 86 patients (71.7%), and chest pain in 38 patients (31.7%). Mean oxygen saturation at admission was lower in patients with severe HRCT scores than in those with low or moderate HRCT scores. Mean total leukocyte count, C-reactive protein, and serum procalcitonin also increased progressively with increasing HRCT severity score, suggesting greater inflammatory burden in patients with severe radiological involvement.

Regarding HRCT findings, consolidation was observed in 92 patients (76.7%), ground-glass opacity in 65 patients (54.2%), multilobe involvement in 76 patients (63.3%), bilateral lung involvement in 58 patients (48.3%), and pleural effusion in 32 patients (26.7%). Multilobe involvement, bilateral involvement, and pleural effusion were more common in patients with severe HRCT severity score. Mean HRCT chest severity score was 5.1 ± 1.4 in the low-score group, 11.3 ± 2.1 in the moderate-score group, and 20.2 ± 3.2 in the severe-score group.

Clinical outcomes showed a strong association with the HRCT chest severity score. Oxygen requirement was observed in 78 patients (65.0%) overall. Oxygen requirement increased from 10 patients (28.6%) in the low-score group to 36 patients (69.2%) in the moderate-score group and 32 patients (97.0%) in the severe-score group. ICU admission was required in 28 patients (23.3%) overall, including 1 patient (2.9%) in the low-score group, 8 patients (15.4%) in the moderate-score group, and 19 patients (57.6%) in the severe-score group. Mechanical ventilation was required in 17 patients (14.2%), and its requirement was highest in the severe HRCT score group. Mortality was observed in 10 patients (8.3%) overall, with no mortality in the low-score group, 2 deaths (3.8%) in the moderate-score group, and 8 deaths (24.2%) in the severe-score group.

The mean hospital stay duration also increased with HRCT severity. The mean hospital stay was 4.6 ± 1.8 days in the low-score group, 7.2 ± 2.6 days in the moderate-score group, and 11.4 ± 4.1 days in the severe-score group. Patients with severe HRCT scores had significantly higher oxygen requirements, ICU admission rates, mechanical ventilation requirements, longer hospital stays, and mortality compared with patients with low or moderate HRCT scores. On binary outcome analysis, a severe HRCT score >15 was associated with increased odds of oxygen requirement, ICU admission, and mortality.

These findings indicate that the HRCT chest severity score is significantly and positively associated with adverse clinical outcomes in patients with community-acquired pneumonia and may serve as a useful radiological predictor of disease severity and prognosis.

Table 1: Baseline demographic and comorbidity profile according to HRCT chest severity score

Variable	Low score 0–7 n=35	Moderate score 8–15 n=52	Severe score >15 n=33	Total n=120	p value
Age, years, mean ± SD	49.6 ± 13.8	57.4 ± 14.6	61.9 ± 14.8	56.8 ± 15.2	0.004
Age >60 years	10 (28.6%)	22 (42.3%)	19 (57.6%)	51 (42.5%)	0.045
Male sex	20 (57.1%)	31 (59.6%)	22 (66.7%)	73 (60.8%)	0.703
Female sex	15 (42.9%)	21 (40.4%)	11 (33.3%)	47 (39.2%)	0.703
Diabetes mellitus	9 (25.7%)	19 (36.5%)	16 (48.5%)	44 (36.7%)	0.150
Hypertension	8 (22.9%)	18 (34.6%)	15 (45.5%)	41 (34.2%)	0.145
COPD	4 (11.4%)	9 (17.3%)	10 (30.3%)	23 (19.2%)	0.128
Smoking history	11 (31.4%)	20 (38.5%)	18 (54.5%)	49 (40.8%)	0.137
Mean BMI, kg/m²	23.8 ± 3.4	24.5 ± 3.8	25.1 ± 4.2	24.5 ± 3.8	0.318

Table 2: Clinical presentation and laboratory parameters

Variable	Low score 0–7 n=35	Moderate score 8–15 n=52	Severe score >15 n=33	Total n=120	p value
Fever	32 (91.4%)	50 (96.2%)	32 (97.0%)	114 (95.0%)	0.527
Cough	31 (88.6%)	47 (90.4%)	31 (93.9%)	109 (90.8%)	0.755
Breathlessness	17 (48.6%)	38 (73.1%)	31 (93.9%)	86 (71.7%)	<0.001

Chest pain	9 (25.7%)	17 (32.7%)	12 (36.4%)	38 (31.7%)	0.621
Respiratory rate/min, mean ± SD	22.4 ± 3.2	27.1 ± 4.5	32.8 ± 5.1	27.3 ± 5.9	<0.001
SpO_2 at admission, %, mean ± SD	94.1 ± 2.8	89.6 ± 4.3	82.8 ± 6.2	89.1 ± 6.4	<0.001
TLC, cells/mm³, mean ± SD	10,850 ± 3,210	13,940 ± 4,180	17,620 ± 5,240	13,990 ± 4,980	<0.001
CRP, mg/L, mean ± SD	42.5 ± 19.4	84.8 ± 36.2	142.6 ± 58.8	87.6 ± 55.1	<0.001
Procalcitonin, ng/mL, median	0.38	0.92	2.85	0.96	<0.001
CURB-65 score, mean ± SD	0.9 ± 0.7	1.6 ± 0.8	2.6 ± 1.0	1.6 ± 1.1	<0.001

Table 3: HRCT chest findings according to severity score

HRCT finding	Low score 0–7 n=35	Moderate score 8–15 n=52	Severe score >15 n=33	Total n=120	p value
Mean HRCT severity score	5.1 ± 1.4	11.3 ± 2.1	20.2 ± 3.2	12.0 ± 6.4	<0.001
Consolidation	20 (57.1%)	42 (80.8%)	30 (90.9%)	92 (76.7%)	0.004
Ground-glass opacity	11 (31.4%)	30 (57.7%)	24 (72.7%)	65 (54.2%)	0.002
Multilobe involvement	10 (28.6%)	35 (67.3%)	31 (93.9%)	76 (63.3%)	<0.001
Bilateral lung involvement	6 (17.1%)	25 (48.1%)	27 (81.8%)	58 (48.3%)	<0.001
Pleural effusion	3 (8.6%)	13 (25.0%)	16 (48.5%)	32 (26.7%)	<0.001
Cavitation/abscess	1 (2.9%)	3 (5.8%)	5 (15.2%)	9 (7.5%)	0.119
Lymphadenopathy	2 (5.7%)	8 (15.4%)	9 (27.3%)	19 (15.8%)	0.049

Table 4: Clinical outcomes according to HRCT chest severity score

Outcome	Low score 0–7 n=35	Moderate score 8–15 n=52	Severe score >15 n=33	Total n=120	p value
Oxygen requirement	10 (28.6%)	36 (69.2%)	32 (97.0%)	78 (65.0%)	<0.001
NIV requirement	2 (5.7%)	11 (21.2%)	16 (48.5%)	29 (24.2%)	<0.001
ICU admission	1 (2.9%)	8 (15.4%)	19 (57.6%)	28 (23.3%)	<0.001
Mechanical ventilation	0 (0.0%)	4 (7.7%)	13 (39.4%)	17 (14.2%)	<0.001
Hospital stays, days, mean ± SD	4.6 ± 1.8	7.2 ± 2.6	11.4 ± 4.1	7.5 ± 3.9	<0.001
Mortality	0 (0.0%)	2 (3.8%)	8 (24.2%)	10 (8.3%)	<0.001
Discharged improved	35 (100.0%)	50 (96.2%)	25 (75.8%)	110 (91.7%)	<0.001

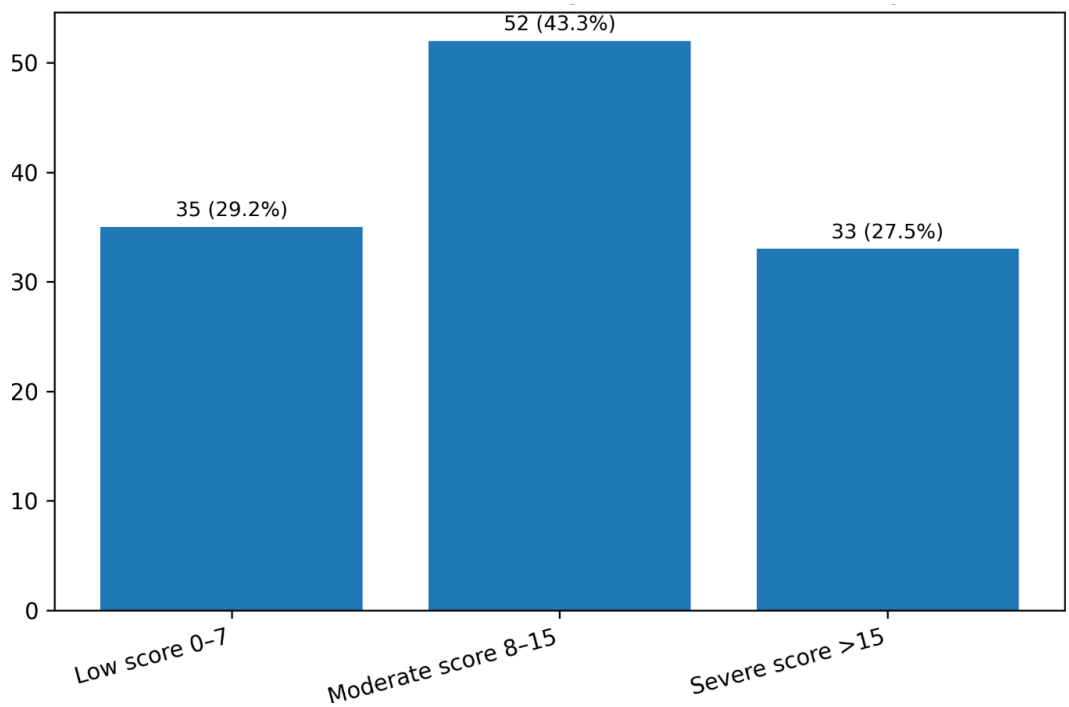

Figure 1: The distribution of patients by HRCT chest severity score. Of 120 patients, 35 (29.2%) had a low HRCT severity score of 0–7, 52 (43.3%) had a moderate score of 8–15, and 33 (27.5%) had a severe score of>15. Thus, the maximum number of patients belonged to the moderate HRCT severity score group.

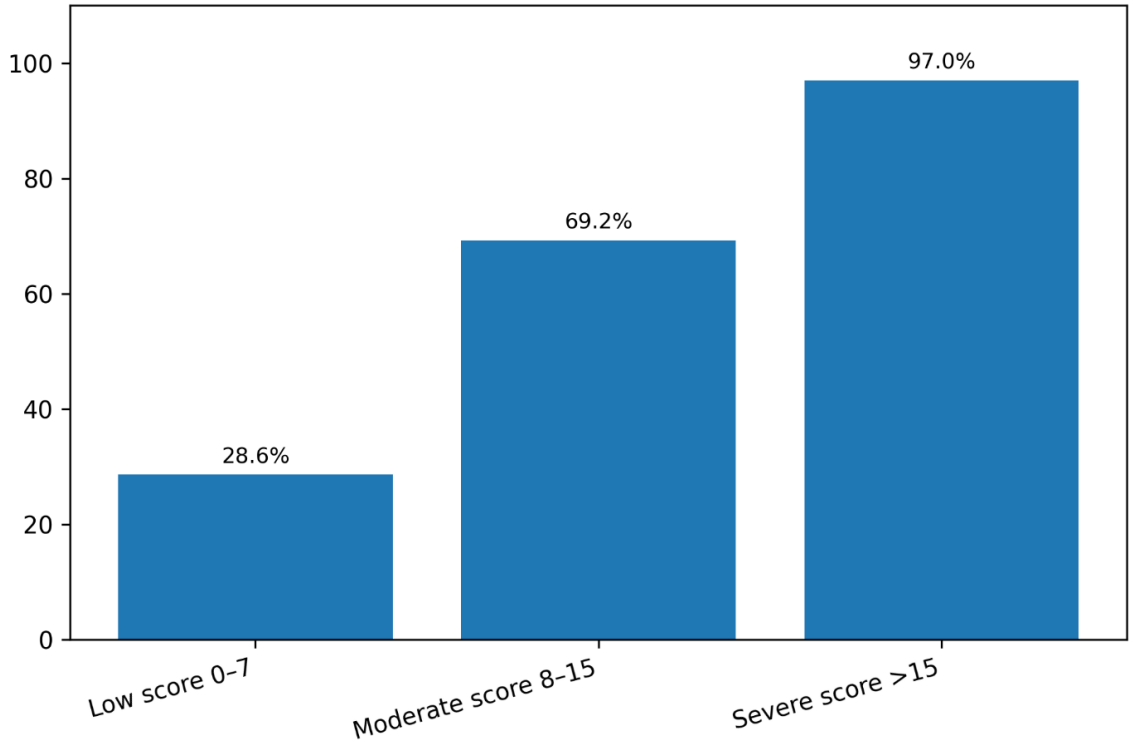

Figure 2: The oxygen requirement by HRCT chest severity score. Oxygen support was required in 10 patients (28.6%) with a low HRCT severity score, 36 patients (69.2%) with a moderate score, and 32 patients (97.0%) with a severe score. Oxygen requirement increased progressively with higher HRCT chest severity scores, indicating greater respiratory compromise among patients with severe radiological involvement.

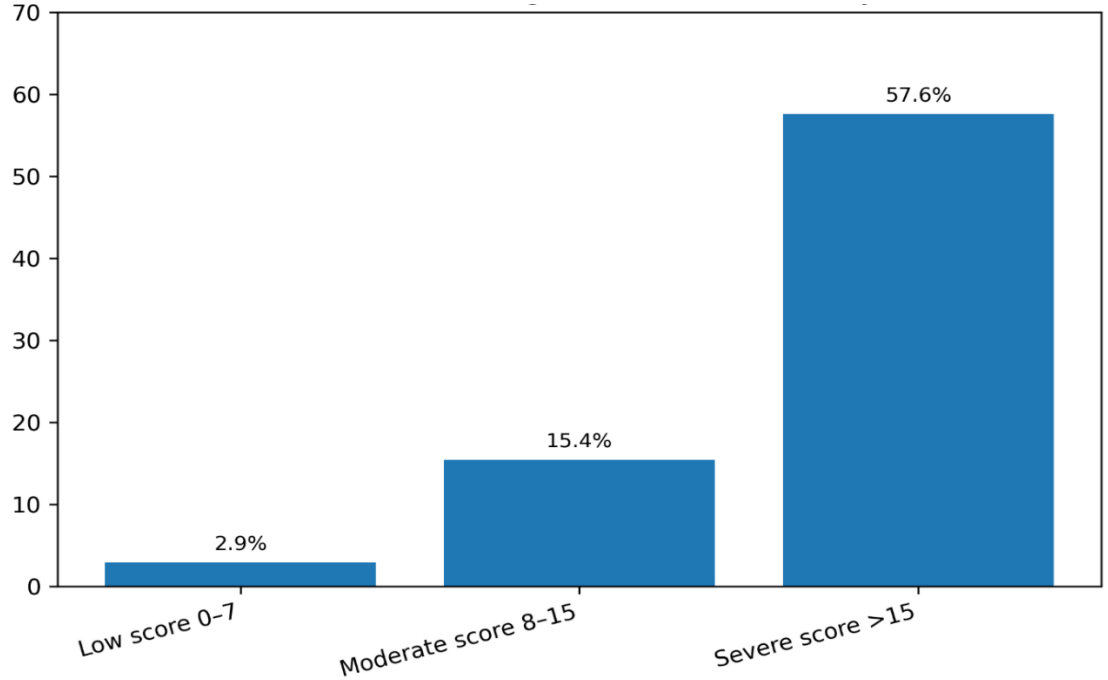

Figure 3: ICU admissions by HRCT chest severity score. ICU admission was required in 1 patient (2.9%) with a low HRCT severity score, 8 patients (15.4%) with a moderate score, and 19 patients (57.6%) with a severe score. The ICU admission rate was highest among patients with severe HRCT involvement, suggesting that a higher HRCT severity score was associated with increased need for intensive care monitoring and advanced respiratory support.

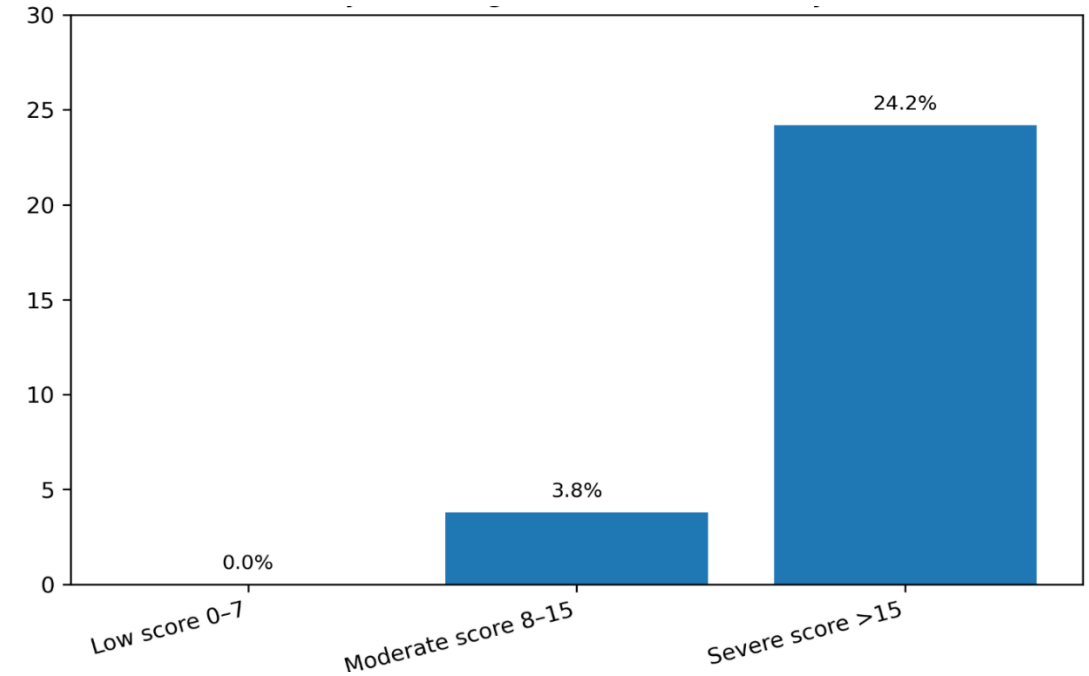

Figure 4: Mortality according to HRCT chest severity score. No mortality was observed among patients with a low HRCT severity score. Mortality was observed in 2 patients (3.8%) with a moderate HRCT severity score and 8 patients (24.2%) with a severe HRCT severity score. Mortality increased with increasing HRCT chest severity score, indicating that severe radiological involvement was associated with poorer clinical outcome.

Discussion

Community-acquired pneumonia remains a worthy cause of hospitalization, respiratory failure, ICU admission, and mortality. Although clinical severity scoring systems such as CURB-65 and the Pneumonia Severity Index are widely used for risk stratification, they primarily rely on clinical, demographic, and laboratory parameters. These

scoring systems are useful for predicting mortality and deciding the site of care, but they do not directly quantify the anatomical extent of lung involvement. In the present study, the HRCT chest severity score was evaluated as a radiological marker to predict clinical outcomes in patients with community-acquired pneumonia.

In the present study, a higher HRCT chest severity score was associated with increasing age, higher respiratory rate, lower oxygen saturation, greater inflammatory burden, and higher CURB-65 score. These findings suggest that extensive lung involvement on HRCT reflects both radiological and physiological severity of pneumonia. Patients with severe HRCT involvement had greater impairment of oxygenation, which may be due to widespread consolidation, ground-glass opacity, and multilobar parenchymal involvement resulting in ventilation-perfusion mismatch and reduced gas exchange. Similar observations have been reported in previous studies, in which a greater radiological extent of pneumonia was associated with poorer clinical outcomes and greater disease severity [1].

The present study showed that oxygen requirement increased progressively with increasing HRCT severity score. Oxygen requirement was lowest among patients with low HRCT scores and highest among patients with severe HRCT scores. This finding is clinically relevant because oxygen requirement is one of the earliest indicators of disease progression in pneumonia. The association between CT severity and oxygenation status supports the role of HRCT as an objective tool for assessing the burden of lung parenchymal involvement. Nemoto et al. reported that chest CT findings added prognostic value to established severity scores such as CURB-65 and A-DROP in patients with community-acquired pneumonia, supporting the concept that CT-based assessment can improve clinical risk stratification [11].

ICU admission was also significantly higher among patients with severe HRCT chest severity score. This indicates that patients with extensive radiological involvement are more likely to develop respiratory compromise, hemodynamic instability, or need advanced monitoring and organ support. The ATS/IDSA guideline defines severe CAP using major criteria such as respiratory failure requiring mechanical ventilation and septic shock requiring vasopressors, along with minor criteria including respiratory rate ≥30/min, multilobar infiltrates, confusion, hypoxemia, and other systemic markers [7]. The findings of the present study are consistent with these severity concepts, as patients with higher HRCT scores had greater oxygen requirements and were more likely to be admitted to the ICU.

In the present study, multilobar involvement, bilateral lung involvement, and pleural effusion were more common among patients with severe HRCT scores. These radiological findings are important because they indicate a greater disease burden and more diffuse inflammatory involvement of the lungs. Liaison et al. reported that bilateral radiographic involvement in hospitalized CAP patients was associated with worse prognosis and higher mortality. In contrast, unilateral multilobe involvement alone did not carry the same prognostic impact [12]. This supports the present observation that bilateral and extensive HRCT involvement may help identify patients at higher risk of adverse outcomes.

The present study also demonstrated that hospital stay duration increased with higher HRCT severity scores. Patients with low HRCT scores had shorter hospital stays, whereas those with severe HRCT involvement had longer hospital stays. This may be explained by greater oxygen requirements, slower clinical recovery, need for ICU care, and higher complication rates in patients with extensive parenchymal involvement. Shah et al. also reported that mortality rate, ICU admission, prolonged antibiotic requirement, and duration of hospital stay increased progressively with increasing pneumonia severity scores [13]. Although their study focused on clinical scoring systems, the same principle appears applicable to radiological severity scoring.

Mortality in the present study was highest among patients with severe HRCT chest severity score. This finding suggests that the HRCT severity score may be useful not only for assessing anatomical disease burden but also for predicting prognosis. Recent evidence has also emphasized the prognostic value of the CT severity score in CAP. Cetin et al. reported that computed tomography severity score, along with PSI, CURB-65, and inflammatory biomarkers, was associated with mortality among ICU patients with community-acquired pneumonia [8]. Thus, HRCT severity scores may provide additional prognostic information when used along with clinical and laboratory parameters.

The strength of the HRCT chest severity score lies in its simplicity and its ability to quantify the extent of lung involvement objectively. Unlike chest radiography, HRCT can more accurately detect ground-glass opacity, early consolidation, multilobar disease, bilateral involvement, pleural effusion, cavitation, and other complications. Claessens et al. reported that early chest CT can assist diagnosis and guide treatment decisions in suspected community-acquired pneumonia, especially when chest radiography is inconclusive [14]. However, routine HRCT may not be necessary in all CAP patients and should be used judiciously, especially in patients with moderate-to-severe disease, diagnostic uncertainty, poor response to treatment, or suspected complications.

The findings of this study suggest that the HRCT chest severity score can be considered a useful adjunct to clinical assessment in hospitalized patients with community-acquired pneumonia. It may help clinicians identify high-risk patients at admission, anticipate oxygen requirements, plan early ICU referral, counsel patients and relatives regarding prognosis, and monitor disease severity. However, HRCT scores should not replace clinical judgement or established severity scores. Instead, it should be interpreted alongside clinical condition, oxygen saturation, laboratory markers, comorbidities, and severity-scoring systems such as CURB-65 or PSI.

The present study has certain limitations. This was a single-center prospective observational study with a limited sample size. HRCT was performed only in patients in whom imaging was clinically indicated; therefore, selection bias cannot be completely excluded. Microbiological confirmation was not available for all patients. Long-term outcomes after discharge were not assessed. Interobserver variability in HRCT scoring was also not evaluated. Further multicentric studies with a larger sample size are required to validate the role of the HRCT chest severity score as an independent predictor of clinical outcomes in community-acquired pneumonia.

Overall, the present study shows that a higher HRCT chest severity score is associated with increased oxygen requirement, higher ICU admission rates, longer hospital stay, greater need for ventilatory support, and increased mortality. These findings support the utility of HRCT chest severity scoring as a practical radiological marker for predicting clinical outcome in patients with community-acquired pneumonia.

Conclusion

The present study concluded that the HRCT chest severity score is a useful radiological marker for predicting clinical outcomes in patients with community-acquired pneumonia. Patients with higher HRCT severity scores had greater lung involvement and were more likely to require oxygen support, non-invasive ventilation, ICU admission, and mechanical ventilation. Severe HRCT scores were also associated with longer duration of hospital stay and higher in-hospital mortality. These findings suggest that the HRCT chest severity score reflects the anatomical burden of pneumonia and correlates well with clinical severity. Although clinical scores such as CURB-65 remain important for initial assessment, HRCT severity scoring can provide additional prognostic information, especially in hospitalized patients with moderate-to-severe pneumonia or diagnostic uncertainty. Therefore, HRCT chest severity score may be used as an adjunct to clinical and laboratory parameters for early risk stratification, treatment planning, ICU referral decisions, and prognostic assessment in patients with community-acquired pneumonia.

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