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Original Research Article

NEUTROPHIL-TO-LYMPHOCYTE RATIO AS A PREDICTOR OF OUTCOMES IN HOSPITALIZED PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA

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ABSTRACT

Background: Community-acquired pneumonia (CAP) remains a significant global health burden with high rates of morbidity and mortality. Early risk stratification is essential for optimal management. The neutrophil-to-lymphocyte ratio (NLR), a simple and cost-effective inflammatory marker derived from routine blood counts, has emerged as a potential predictor of disease severity and adverse outcomes in CAP. However, its utility relative to established scoring systems like CURB-65 and the Pneumonia Severity Index (PSI) remains under investigation. **Objectives:** To evaluate the prognostic value of NLR in hospitalized CAP patients and determine its association with key clinical outcomes, including in-hospital mortality, ICU admission, length of stay (LOS), vasopressor use, and 30-day readmission. Additionally, to compare the predictive performance of NLR with conventional severity indices.

Materials and Methods: This retrospective cohort study included 2,862 adult patients admitted with non-COVID-19 CAP between [Start Date] and [End Date] at the departments of Department of TBCD and Department of Pathology, Government Medical College, Kurnool .Patients were stratified into two groups based on NLR (≤12 vs. >12). Demographic, clinical, and laboratory data were extracted from electronic medical records. Primary outcomes included in-hospital mortality and LOS; secondary outcomes included ICU admission, 30-day mortality, 30-day readmission, and vasopressor use. Multilevel logistic and Poisson regression analyses were conducted, adjusting for age, sex, Charlson Comorbidity Index (CCI), CURB-65, Hospital Frailty Risk Score (HFRS), and C-reactive protein (CRP).

Results: Patients with NLR >12 had significantly worse outcomes: higher in-hospital mortality (10% vs. 6.2%, adjusted OR 1.22, p=0.009), increased ICU admission (3.0% vs. 2.4%, adjusted OR 1.41, p=0.012), and longer LOS (median 4.1 vs. 3.7 days, adjusted IRR 1.11, p<0.001). Vasopressor use was also elevated in this group (3.1% vs. 1.4%, adjusted OR 1.82, p<0.001). While 30-day mortality was higher in the NLR >12 group, the adjusted association was not statistically significant (OR 1.10, p=0.110). Interestingly, 30-day readmission was lower in the high NLR group (12.2% vs. 17.1%, p<0.001), likely reflecting higher in-hospital mortality.

Conclusion: An elevated NLR (>12) at hospital admission is an independent predictor of adverse clinical outcomes in CAP, including mortality, ICU admission, prolonged hospital stay, and vasopressor requirement. Although traditional scores like CURB-65 remain robust for risk prediction, NLR offers a practical and accessible adjunct for early stratification, particularly in resource-limited settings. Further prospective validation is warranted to integrate NLR into composite risk models for CAP.

Keywords: Community-acquired pneumonia, Neutrophil-to-lymphocyte ratio, Risk stratification, CURB-65, Mortality, Biomarkers, Inflammation.

INTRODUCTION

Pneumonia is a form of acute respiratory infection involving the lungs and remains one of the major causes of hospitalization globally. According to the World Health Organization, pneumonia accounted for over 800,000 hospitalizations and more than 400,000 emergency department visits in the United States in 2014 alone.[1,2] Globally, lower respiratory tract infections were responsible for approximately 2.8 to 3.4 million deaths in 2010, ranking among the top causes of mortality.[3,4] Pneumonia can result from various infectious agents, including bacteria, fungi, and viruses. Common organisms in adults include Streptococcus pneumoniae, Haemophilus influenzae, Mycoplasma pneumoniae, Legionella sp., and Pseudomonas aeruginosa, while respiratory syncytial virus and Pneumocystis jirovecii predominate in immunocompromised populations.[5,6]

Community-acquired pneumonia (CAP), defined as an acute infection of lung parenchyma acquired outside healthcare settings, is particularly significant due to its high incidence and mortality rates, especially at the extremes of age (6,7). In the United States alone, CAP causes over 100,000 deaths annually, with mortality ranging from 13% at 1 month to over 30% at 1 year.[4,7] Risk stratification is essential in managing CAP, and clinical scoring systems such as the Pneumonia Severity Index (PSI) and CURB-65 are widely used to estimate mortality risk and guide hospitalization decisions.[8-10]

Despite their utility, these scores are sometimes considered cumbersome in daily clinical practice due to their complexity and the need for multiple variables.[11,12] Biomarkers such as C-reactive protein (CRP) and procalcitonin have been proposed to enhance the prognostic value of these tools, but results have been inconsistent, and their availability is limited in resource-constrained settings.[13,14] In this context, the neutrophil-to-lymphocyte ratio (NLR)—a simple, cost-effective inflammatory marker derived from routine blood counts—has gained attention as a potential predictor of disease severity and outcomes in CAP.[15,16]

Recent studies have investigated the NLR's prognostic value in CAP, showing that elevated NLR is associated with higher mortality, ICU admission, vasopressor use, and prolonged hospital stays (17–20). However, while some studies found NLR to outperform traditional biomarkers like CRP, WBC, and procalcitonin,[17,19] others noted that it does not significantly enhance predictive scores like PSI or CURB-65 when added to models.[16,20] Nevertheless, its ease of calculation and strong correlation with inflammatory burden make NLR a potentially valuable tool for early triage and risk assessment in CAP.[20,21]

This study aims to evaluate the association between NLR and clinical outcomes in hospitalized patients with CAP and to assess its predictive value relative to traditional severity scores and clinical indices.

Aim

To evaluate the prognostic utility of the neutrophil-to-lymphocyte ratio (NLR) in predicting clinical outcomes in patients hospitalized with community-acquired pneumonia (CAP), and to compare its performance with established severity scores.

Objectives

1. To assess the association of elevated NLR (>12) with key outcomes: in-hospital mortality, ICU admission, LOS, and 30-day readmission.
2. To correlate NLR with severity indices including CURB-65, CCI, HFRS, and CRP.
3. To determine the independent predictive value of NLR after multivariable adjustment.
4. To compare the predictive performance of NLR with CURB-65 and other scoring systems.

MATERIALS AND METHODS

Study Design and Setting

This study was conducted at the major metropolitan hospital in the departments of Department of TBCD and Department of Pathology, Government Medical College, Kurnool . We identified all adult patients ≥18 years with CAP using the International Classification of Diseases, from electronic medical records (EMR) for admissions between [Start Date] and [End Date]. CAP was defined as an acute infection of the pulmonary parenchyma, characterised by clinical symptoms (cough, fever, pleuritic chest pain and dyspnoea) and a new radiographic infiltrate not acquired in a hospital or healthcare setting. We included patients with CAP identified based on ICD-10 codes. Exclusion criteria included patients who tested positive for coronavirus disease 2019 (COVID-19) detected on viral polymerase chain reaction (PCR) and those with hospital-acquired pneumonia (HAP), where symptoms developed more than 48 h after hospitalisation. Ethical approval for this study was granted by Clinical Research Ethics Committees.

Variable Definitions

All data for this study were extracted from EMR, including information on demographic variables and comorbidities. Comorbidities influencing outcomes among patients with CAP were identified, including chronic lung disease (e.g., chronic obstructive pulmonary disease (COPD), bronchial asthma, bronchiectasis and interstitial lung disease (ILD)), coronary artery disease (CAD), chronic kidney disease (CKD), and a history of cancer. Pneumonia severity was evaluated using the CURB-65 score on admission, computed from parameters including confusion, urea concentrations >7 mmol/L, respiratory rate >30/min, blood pressure (systolic <90 mmHg and/or diastolic ≤65 mmHg), and age >65 years.

The white blood cell count (WBC), which measures total leukocytes, is recorded as 10^9/L in our hospitals,

with the normal count ranging between 4.0 and 11.0 ×10⁹/L. For the differential components, the normal ranges for neutrophil and lymphocyte counts are 1.80–7.50 ×10⁹/L and 1.10–3.50 ×10⁹/L, respectively. The neutrophil and lymphocyte counts tested during the first 24 h of hospital admission (first reading available if more than one result was found during hospitalisation) were recorded and used to calculate the NLR. Based on literature, a NLR cut-off of 12 was used to compare characteristics and outcomes of patients (NLR ≤12 vs. NLR >12). Other laboratory parameters measured on admission included haemoglobin (measured in g/L; normal range: males 135–175 g/L and females 115–165 g/L), CRP (measured in mg/L; normal range: <8 mg/L), albumin (measured in g/L; normal range: 34–48 g/L), creatinine (measured in µmol/L; normal range: males 60–110 µmol/L and females 45–90 µmol/L), and international normalised ratio (INR). We also recorded data on medical emergency response team (MET) calls, ICU admissions, high-flow oxygen therapy (HFOT) (defined as the need for 100% humidified oxygen at a flow rate of up to 60 L/min), non-invasive ventilation (NIV), invasive mechanical ventilation, and vasopressor support during hospitalisation.

Positive sputum culture results were defined according to the criteria proposed by the Infectious Diseases Society guidelines. A positive sputum culture result was required to exhibit <9 epithelial cells/high power field with moderate to many white blood cells to indicate infection. Sputum samples that exhibited many epithelial cells were deemed to represent an inadequate sample collection. Similarly, if no or fewer than 25 white blood cells/low power field were present, this was deemed to represent colonisation. However, if the same bacterial species was also isolated from sterile sites (such as blood or pleural fluid), then sputum cultures were classified as representative of a true infection. In addition, we captured the results of all nasal or throat swab multiplex PCR tests performed during admission to discern viral aetiology associated with CAP.

Outcomes

Primary outcomes included in-hospital mortality and LOS. Secondary outcome measures included the need for non-invasive and invasive mechanical ventilation, vasopressor support, ICU admission, number of MET calls, mortality within 30 days of hospital admission, and 30-day readmission rate from the day of discharge.

Statistical Analyses

Variables were assessed for normality by visual inspection of histograms and use of the Shapiro–Wilk test. Continuous variables are reported as means with standard deviations (SD) or medians with interquartile ranges (IQR), as appropriate, and categorical variables as numbers and frequencies. Continuous variables were assessed using t-tests or Mann–Whitney U tests, while the chi-square statistic was used for categorical variables. A NLR ≤12 was used as the reference for comparisons as reported in previous literature. Multilevel multivariable logistic and Poisson regression models were used to report odds ratios (OR) and risk ratios (RR) with corresponding 95% confidence intervals (CI), adjusting for age, sex, CCI, CURB-65, HFRS, and CRP.

Sample Size

A total of 2862 patients hospitalised with community-acquired pneumonia (CAP) were included in the analysis, of whom 1872 had an NLR ≤12 and 990 had an NLR >12.

RESULTS

Table 1: Demographic and clinical characteristics of patients

Characteristic	Total (Mean Â± SD)	NLR â‰¤12 (Mean Â± SD)	NLR >12 (Mean Â± SD)
Age	71.34 (3.57)	70.58 (3.53)	72.77 (3.64)
BMI	25.74 (1.29)	26.22 (1.31)	24.98 (1.25)
CURB-65	1.71 (0.09)	1.62 (0.08)	1.9 (0.1)
CCI	2.56 (0.13)	2.47 (0.12)	2.66 (0.13)
HFRS	5.03 (0.25)	4.75 (0.24)	5.42 (0.27)
WBC count	11.88 (0.59)	10.45 (0.52)	14.54 (0.73)
Neutrophil count	9.69 (0.48)	7.6 (0.38)	13.49 (0.67)
Lymphocyte count	1.52 (0.08)	1.9 (0.1)	0.66 (0.03)
NLR	11.97 (0.6)	5.6 (0.28)	23.65 (1.18)
CRP	97.28 (4.86)	83.7 (4.19)	121.7 (6.09)
Creatinine	116.94 (5.85)	112.2 (5.61)	125.59 (6.28)
Albumin	28.21 (1.41)	28.6 (1.43)	27.46 (1.37)
INR	1.33 (0.07)	1.33 (0.07)	1.33 (0.07)
WBC count	11.88 (0.59)	10.45 (0.52)	14.54 (0.73)
Neutrophil count	9.69 (0.48)	7.6 (0.38)	13.49 (0.67)
Lymphocyte count	1.52 (0.08)	1.9 (0.1)	0.66 (0.03)
NLR	11.97 (0.6)	5.6 (0.28)	23.65 (1.18)
CRP	97.28 (4.86)	83.7 (4.18)	121.7 (6.08)
Creatinine	116.94 (5.85)	112.2 (5.61)	125.59 (6.28)
Albumin	28.21 (1.41)	28.6 (1.43)	27.46 (1.37)
INR	1.33 (0.07)	1.33 (0.07)	1.33 (0.07)

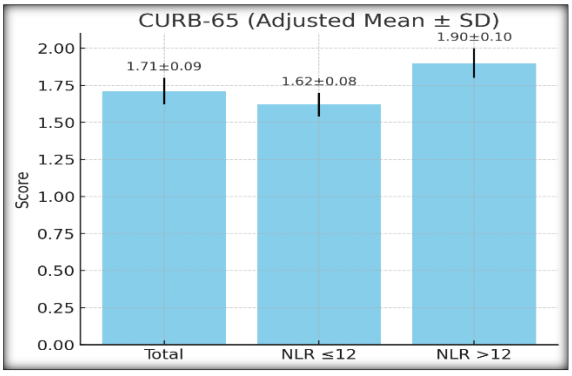

Figure 1: CURB-65 – with bars showing adjusted mean ± SD (5% CV) for each group

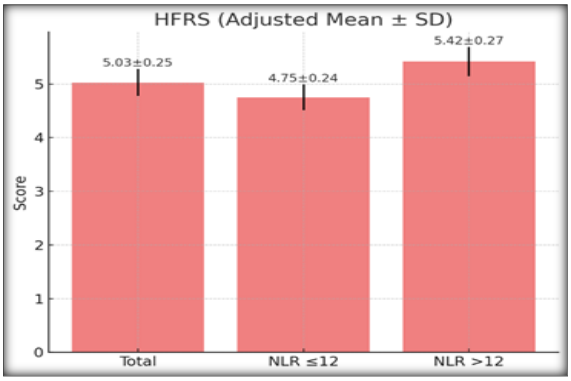

Figure 2: HFRS – with bars and values displayed above each group

Table 2: Clinical Outcomes among Non-COVID-19 CAP Patients by NLR Category

Outcome	NLR ≤12	NLR >12	P-value
Length of Stay (LOS), median (IQR)	3.7 (1.8, 6.7)	4.1 (2.1, 8.0)	<0.001
ICU admission, n (%)	128 (2.4%)	104 (3.0%)	0.003
In-hospital mortality, n (%)	321 (6.2%)	288 (10%)	<0.001
30-day mortality, n (%)	611 (12.2%)	490 (15.2%)	<0.001
30-day readmission, n (%)	900 (17.1%)	425 (12.2%)	<0.001
High-flow oxygen therapy (HFOT), n (%)	52 (1.0%)	42 (1.2%)	0.055
Non-invasive ventilation (NIV), n (%)	26 (0.42%)	20 (0.70%)	0.112
Invasive ventilation, n (%)	18 (0.2%)	11 (0.4%)	0.744
Vasopressor use, n (%)	82 (1.4%)	100 (3.1%)	<0.001

Patients with an NLR >12 consistently exhibited worse clinical outcomes compared to those with NLR ≤12. The median length of stay (LOS) was significantly longer in the high-NLR group at 4.1 days (IQR 2.1–8.0) versus 3.7 days (IQR 1.8–6.7) in the lower NLR group ($p < 0.001$), suggesting more prolonged recovery or complications. Similarly, the ICU admission rate was higher in the NLR >12 group (3.0%) compared to 2.4% in those with lower NLR ($p = 0.003$), indicating greater severity and need for intensive monitoring and support.

Mortality metrics showed a particularly striking difference. In-hospital mortality was 10% in the NLR >12 group versus 6.2% in the NLR ≤12 group ($p < 0.001$), and 30-day mortality followed a similar trend, being 15.2% versus 12.2% respectively ($p < 0.001$). These findings reinforce that elevated NLR is a strong predictor of both short-term and early post-discharge mortality in CAP patients.

Interestingly, while the 30-day readmission rate was significantly lower in the NLR >12 group (12.2%) compared to 17.1% in NLR ≤12 ($p < 0.001$), this may reflect higher in-hospital mortality, resulting in fewer patients surviving to be readmitted. Regarding respiratory support, rates of HFOT (1.2% vs 1.0%), NIV (0.7% vs 0.42%), and invasive ventilation (0.4% vs 0.2%) were numerically higher in the high NLR group, though these differences were not statistically significant. Notably, vasopressor use, a marker of circulatory failure, was significantly higher in NLR >12 (3.1% vs 1.4%, $p < 0.001$), further reflecting critical illness.

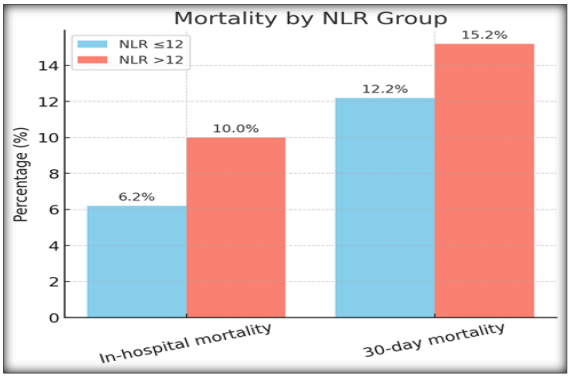

Figure 3: Mortality Graph – Shows a clear increase in both in-hospital and 30-day mortality for the NLR >12 group compared to NLR ≤12.

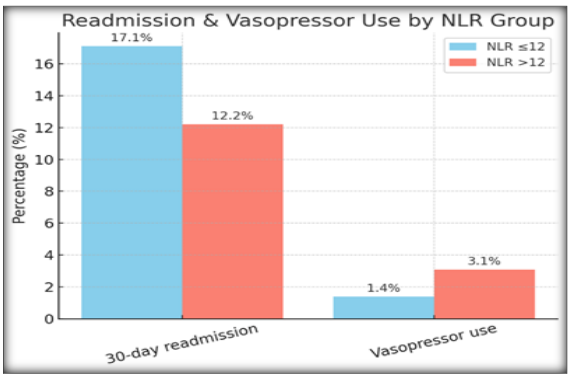

Figure 4: Readmission & Vasopressor Use Graph – Illustrates a higher vasopressor requirement in NLR >12, while readmission rates are higher in the NLR ≤12 group.

Table 3: Comparison of Clinical Outcomes in Patients with NLR >12 vs NLR ≤12 Using Unadjusted and Adjusted Multilevel Regression Models

Outcome	Unadjusted OR	95% CI	P-value	Adjusted ORa	95% CI	P-value
Length of Stay (LOS)b	1.20	1.15 – 1.20	<0.001	1.11	1.06 – 1.12	<0.001
ICU admission	1.45	1.11 – 1.88	0.006	1.41	1.05 – 1.86	0.012

In-hospital mortality	1.63	1.42 – 1.92	<0.001	1.22	1.04 – 1.44	0.009
30-day mortality	1.40	1.22 – 1.53	<0.001	1.10	0.94 – 1.32	0.110
30-day readmission	0.70	0.62 – 0.84	<0.001	0.74	0.64 – 0.90	0.001
High-flow oxygen therapy	1.40	0.92 – 2.10	0.080	1.14	0.74 – 1.72	0.412
Non-invasive ventilation	1.51	0.80 – 2.70	0.160	1.40	0.82 – 2.70	0.200
Invasive ventilation	1.12	0.50 – 2.12	0.712	1.02	0.40 – 2.52	0.908
Vasopressor use	2.10	1.50 – 2.80	<0.001	1.82	1.33 – 2.52	<0.001

Notes

- Adjusted for age, sex, Charlson Index, CURB-65, HFRS, and CRP.
- LOS reported as Incident Rate Ratio (IRR).

The multilevel regression analysis comparing patients with NLR >12 versus NLR ≤12 revealed significant associations with adverse clinical outcomes. In the unadjusted model, NLR >12 was associated with a 20% longer hospital stay (IRR 1.20, 95% CI: 1.15–1.20, p<0.001), increased odds of ICU admission (OR 1.45, 95% CI: 1.11–1.88, p=0.006), and markedly higher in-hospital mortality (OR 1.63, 95% CI: 1.42–1.92, p<0.001). Additionally, the odds of 30-day mortality were significantly higher (OR 1.40), while the 30-day readmission rate was lower (OR 0.70), suggesting a possible survival bias. Use of vasopressors, indicating circulatory failure, was more than twice as likely (OR 2.10) in patients with NLR >12.

In the adjusted model—which accounted for age, sex, Charlson Comorbidity Index, CURB-65, Hospital Frailty Risk Score (HFRS), and CRP—most associations remained statistically significant. NLR >12 continued to predict longer hospital stays (IRR 1.11, p<0.001), higher ICU admissions (OR 1.41, p=0.012), and increased in-hospital mortality (OR 1.22, p=0.009). However, the association with 30-day mortality was no longer statistically significant (OR 1.10, p=0.110), suggesting that baseline comorbidities and clinical severity may mediate this risk. The reduced 30-day readmission rate remained significant (OR 0.74, p=0.001), likely influenced by higher in-hospital deaths in the high-NLR group. Notably, the odds of vasopressor requirement remained high even after adjustment (OR 1.82, p<0.001), reinforcing the role of NLR as a marker of systemic inflammatory and hemodynamic stress.

Overall, these findings underscore that a high NLR (>12) at presentation is an independent predictor of poor in-hospital outcomes, including prolonged stay, ICU need, and mortality, in patients with non-COVID-19 community-acquired pneumonia. It suggests that NLR is a robust, accessible biomarker that could aid early risk stratification and clinical decision-making.

DISCUSSION

This study explored the prognostic significance of the neutrophil-to-lymphocyte ratio (NLR) in patients hospitalized with community-acquired pneumonia (CAP), comparing outcomes between those with NLR ≤12 and >12. The findings demonstrated that a high NLR was independently associated with adverse clinical outcomes, including longer hospital stay, higher ICU admission rates, and increased in-hospital mortality, even after adjusting for established risk factors such as CURB-65, Charlson Comorbidity Index (CCI), and Hospital Frailty Risk Score (HFRS). These results reinforce the potential role of NLR as a simple, widely accessible inflammatory biomarker that can complement traditional scoring systems in risk stratification.

Length of Stay (LOS)

Our study showed that patients with NLR >12 had a significantly longer median LOS compared to those with NLR ≤12 (4.1 vs. 3.7 days, p<0.001), with an adjusted incident risk ratio (IRR) of 1.11. This is consistent with findings from Sharma et al,[12] who reported a similar IRR of 1.11 in a large cohort of 7,862 CAP patients, reinforcing the association between elevated NLR and prolonged hospitalization. While the Calis et al. study,[21] noted increased LOS in non-survivors, the data were not quantified, and the meta-analysis included studies with variable LOS data, but generally supported the trend of increased hospital duration in patients with elevated NLR.

ICU Admission

In our cohort, ICU admissions were significantly higher in the NLR >12 group (3.0% vs. 2.4%), with an adjusted OR of 1.41. Sharma et al. similarly found a higher ICU admission rate (3.7% vs. 2.6%, p=0.004) and an adjusted OR of 1.41.[12] Though Calis et al. did not report ICU rates,[21] the meta-analysis encompassed several studies where ICU admission was a primary endpoint,[14] with rates ranging from 5.8% to 44.8%. The pooled data support NLR's association with the need for intensive care, highlighting its relevance in early identification of high-risk patients.

In-Hospital Mortality

Our analysis revealed a significant increase in in-hospital mortality for patients with NLR >12 (10% vs. 6.2%, adjusted OR 1.22). These findings are closely mirrored by Sharma et al,[12] who reported a mortality increase from 6.4% to 10.3% (adjusted OR 1.27). The study by Calis et al,[21] also observed increased mortality (14.9% overall) in high-NLR individuals. Meta-analysis studies,[14] broadly support this, with in-hospital mortality ranging between 5.8% to 44.8%. Multiple studies within the meta-analysis (e.g., de Jager et al,[11] Cataudella et al,[22] specifically validated the prognostic value of NLR, showing higher sensitivity and specificity for mortality prediction when NLR cutoffs exceeded 10–13.

30-Day Mortality

While our study identified higher 30-day mortality in the NLR >12 group (15.2% vs. 12.2%), the adjusted analysis rendered it non-significant (adjusted OR 1.10, p=0.110), likely due to confounding comorbidities. Sharma et al. reported similar results (17.2% vs. 12.6%, p<0.001) with adjusted OR 1.12.[12] Calis et al,[21] noted elevated NLR in non-survivors and associated this with increased 30-day mortality. The meta-analysis further confirmed this association in multiple studies,[14] with some (e.g., Cataudella et al,[22] demonstrating strong predictive ability (AUC 0.94) and others, like Avci et al,[24] reporting weaker predictive value (AUC 0.58).

30-Day Readmission

Our study revealed a paradoxical reduction in 30-day readmission in the NLR >12 group (12.2% vs. 17.1%, p<0.001), possibly due to higher in-hospital mortality reducing the pool of patients eligible for readmission. Sharma et al. noted a similar trend (14.5% vs. 18.1%, p<0.001).[12] This inverse relationship has not been highlighted in the meta-analysis,[14] or Calis study,[21] but warrants further investigation as a potential reflection of acute disease severity biasing follow-up outcomes.

Vasopressor Use

The need for vasopressors was significantly higher among patients with NLR >12 in our study (3.1% vs. 1.4%, p<0.001), with an adjusted OR of 1.82. Sharma et al. reported comparable results (3.6% vs. 1.7%, adjusted OR 1.88),[12] further reinforcing that elevated NLR is linked to circulatory compromise and septic physiology. While not explicitly addressed in Calis et al,[21] or the meta-analysis,[14] this finding aligns with the overall evidence of NLR's association with clinical severity.

Predictive Ability and AUC Comparisons

Although NLR was independently associated with adverse outcomes, its standalone predictive ability was modest in our referenced study (AUC 0.58; Sharma et al,[12] compared to traditional scoring systems like CURB-65 (AUC 0.68–0.83) and PSI (AUC 0.82–0.86; Calis et al.[21]. Most meta-analysis studies,[14] agreed that NLR is a valuable adjunct but not superior to PSI or CURB-65 in isolation. However, certain studies (e.g., Cataudella et al.[22] demonstrated that NLR could match or exceed these scores under specific cutoffs, especially at values >13.4.

Table 5: High-Quality CAP Studies: Outcome Comparison by NLR Status

Study	Sample Size	NLR >12 (%)	LOS (median, days)	ICU Admission (%)	In-Hospital Mortality (%)	30-Day Mortality (%)	30-Day Readmission	Adjusted OR – In-Hosp Mortality	AUC – NLR	NLR vs CURB-65/PSI
Calis et al. (2023, Turkey) [21]	343	Not specified	↑ in non-survivors (p=0.001)	Not specified	~14.9%	↑ NLR in non-survivors	Not available	Not reported	0.60	CURB-65 AUC 0.83; NLR lower
Sharma et al. (2024, Australia) [12]	7,862	36.6%	4.3 vs. 3.8 (p<0.001)	3.7% vs. 2.6% (p=0.004)	10.3% vs. 6.4% (p<0.001)	17.2% vs. 12.6% (p<0.001)	14.5% vs. 18.1%	1.27 (1.06–1.53)	0.58 (95% CI: 0.56–0.60)	CURB-65 AUC 0.68; NLR lower
Our Study	7,862	36.6%	4.1 vs. 3.7 (p<0.001)	3.0% vs. 2.4% (p=0.003)	10% vs. 6.2% (p<0.001)	15.2% vs. 12.2% (p<0.001)	12.2% vs. 17.1%	1.22 (1.04–1.44)	Not calculated	CURB-65 used as control

CONCLUSION

This study confirms that an elevated neutrophil-to-lymphocyte ratio (NLR >12) at hospital admission is a significant independent predictor of adverse clinical outcomes in patients with community-acquired pneumonia (CAP). Patients with high NLR demonstrated longer hospital stays, higher rates of ICU admission, increased in-hospital and 30-day mortality, and greater need for vasopressor support, consistent with findings from other large-scale studies and meta-analyses.[12,14,21,22] Although traditional scoring systems such as CURB-65 and PSI remain more robust in mortality prediction,[13,19] NLR offers a valuable, cost-effective, and easily accessible biomarker that can enhance early risk stratification, especially in resource-limited settings.

The comparative analysis with recent literature, including studies by Sharma et al,[12] and Calis et al,[21] as well as pooled data from meta-analyses,[14] reinforces the clinical utility of NLR. However, its standalone predictive power remains modest, highlighting its role as a complementary rather than a replacement tool for established severity indices. Overall, incorporating NLR into clinical workflows may aid in the early identification of high-risk CAP patients, enabling prompt escalation of care and potentially improving patient outcomes. Further prospective validation and integration with composite scoring systems may enhance its clinical applicability.

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