



Predictors of intensive care unit admission in pediatric respiratory infections: the role of inflammatory indices and pathogenic profiles

Inflammatory indices and PICU admission

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Abstract

Aim: This study investigated clinical, laboratory, and respiratory pathogen-related factors associated with pediatric intensive care unit (PICU) admission among hospitalized children, emphasizing the role of inflammatory indices and the systemic immune-inflammation index (SII).

Methods: This retrospective study included children aged 1 month to 18 years hospitalized in the pediatric ward or PICU of Giresun University Women and Children Training and Research Hospital between January 2023 and March 2025. Eligible patients had at least one positive viral respiratory polymerase chain reaction (PCR) result. The primary outcome was PICU admission. We used multivariable binary logistic regression to evaluate associations between respiratory pathogens, clinical and laboratory parameters, and PICU admission.

Results: Among 835 patients, 291 (34.9%) required PICU admission. In the pathogen-based model, rhinovirus/enterovirus detection was independently associated with increased odds of PICU admission (adjusted odds ratio [aOR], 1.604), whereas adenovirus, respiratory syncytial virus (RSV), and influenza/parainfluenza were associated with lower odds. In the clinical/laboratory model ($n = 655$), higher SII values (aOR, 1.051 per 100,000-unit increase; 95% CI: 1.029–1.074), heart rate (aOR, 1.025 per beat/min increase; 95% CI: 1.015–1.035), and plateletcrit (aOR, 1.036 per 0.1% increase; 95% CI: 1.020–1.052) were independently associated with PICU admission, whereas higher albumin (aOR, 0.913; 95% CI: 0.876–0.951) and female sex (aOR, 0.667; 95% CI: 0.454–0.979) were inversely associated. SII discrimination was modest (area under the curve [AUC], 0.618).

Conclusion: Respiratory pathogen profile, SII, heart rate, plateletcrit, albumin, and sex were independently associated with PICU admission. These routinely available parameters may support early risk stratification when interpreted alongside clinical assessment.

Keywords

children, pediatric intensive care unit, respiratory pathogens, systemic immune-inflammation index

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Introduction

Acute respiratory tract infections are among the leading causes of pediatric hospitalization and remain a major indication for pediatric intensive care unit (PICU) admission. Although many infections are self-limited, some children progress to severe hypoxemia, respiratory distress, or respiratory failure, requiring advanced ventilatory support.^{1,2}

Multiplex polymerase chain reaction (PCR) panels allow rapid, simultaneous detection of multiple respiratory pathogens. However, identifying viral nucleic acid does not inherently establish acute disease causality or predict clinical severity, as asymptomatic carriage, prolonged shedding, and viral co-detections are common in children.^{3,4}

Consequently, molecular findings should be interpreted alongside bedside clinical findings and objective host response biomarkers. Complete blood count-derived inflammatory indices, including the neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR), and systemic immune-inflammation index (SII), may provide additional information on the host inflammatory response. Although these indices have been investigated in pediatric respiratory and infectious diseases, their diagnostic and prognostic performance has varied across different populations and clinical settings.^{5,6}

Plateletcrit, defined as the volume fraction of circulating blood occupied by platelets, may also reflect changes in platelet production, activation, and consumption during systemic inflammation. However, the combined contribution of respiratory pathogen profiles, clinical findings, routine biochemical parameters, inflammatory indices, and plateletcrit to PICU admission risk remains insufficiently defined. This study therefore investigated factors associated with PICU admission among children hospitalized with PCR-confirmed viral respiratory infections.

Materials and Methods

Study Design and Setting

This retrospective observational cohort study was conducted at Giresun University Women and Children Training and Research Hospital, Giresun, Türkiye, in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (Supplementary File S1). We identified pediatric patients hospitalized between January 2023 and March 2025 through the hospital electronic information management system.

Study Population

We reviewed medical records of patients aged 1 month to 18 years who underwent multiplex respiratory tract PCR testing upon admission. Patients admitted to a general pediatric ward or PICU with at least one positive viral respiratory PCR result were eligible (Figure 1). We excluded patients hospitalized primarily for non-respiratory conditions (e.g., febrile seizures, encephalitis, myocarditis), neonates, those with non-viral pathogens, and children with chronic comorbidities that could substantially alter baseline inflammatory indices (e.g., bronchopulmonary dysplasia, congenital heart disease, severe neuromuscular disorders).

Data Collection and Definitions

We extracted demographic data (age, sex), admission vital signs (SpO₂, heart rate, respiratory rate, blood pressure), laboratory findings, microbiological profiles, and outcomes from electronic records. The primary outcome was PICU admission.

Multiplex PCR identified rhinovirus/enterovirus, adenovirus, respiratory syncytial virus (RSV), influenza/parainfluenza, human metapneumovirus (hMPV), and severe acute respiratory syndrome

coronavirus 2 (SARS-CoV-2). We excluded bocavirus from pathogen models because of low case counts.

Admission laboratory parameters included complete blood count, plateletcrit (PCT), serum albumin, lactate dehydrogenase (LDH), and C-reactive protein (CRP). In this study, PCT refers exclusively to the hemogram-derived volume percentage occupied by platelets in blood, and not procalcitonin.

We calculated NLR as neutrophil count divided by lymphocyte count; PLR as platelet count divided by lymphocyte count; and SII as (Platelet count × neutrophil count)/Lymphocyte count. In multivariable logistic regression, SII was analyzed per 100,000-unit increase and plateletcrit per 0.1% increase to provide clinically interpretable effect estimates.

Ethical Approval

This study was approved by the Scientific Research Ethics Committee of Giresun Training and Research Hospital (Date: 06.08.2025, Decision No: 06.08.2025/16).

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, NY, USA). We assessed continuous variables for normality using the Shapiro-Wilk test and histograms. Non-normally distributed continuous variables are presented as median and interquartile range (IQR), and compared using the Mann-Whitney *U* test. Categorical variables are reported as frequencies and percentages and compared using the chi-square test or Fisher's exact test. Spearman rank correlation examined relationships between inflammatory markers and secondary clinical outcomes (high-flow nasal cannula [HFNC] duration, PICU length of stay).

Receiver operating characteristic (ROC) curves evaluated the discriminatory performance of NLR, PLR, and SII.

We determined the sample size based on the total consecutive eligible population during the 27-month study period rather than an a priori sample size calculation. In the complete-case clinical and laboratory multivariable model, 200 PICU admission events were available for nine predictor parameters, corresponding to approximately 22 outcome events per parameter. We constructed two multivariable binary logistic regression models using the enter method to identify independent predictors of PICU admission. Model 1 evaluated respiratory pathogens adjusting for age and sex. Model 2 evaluated clinical vital signs and laboratory indices (SII, rescaled plateletcrit, albumin, LDH, SpO₂, heart rate, respiratory rate) adjusting for age and sex (male as reference). Multicollinearity was formally evaluated via variance inflation factors (VIF range: 1.012–1.769). Missing data were handled via complete-case analysis (*n* = 655 for Model 2) without imputation. A two-sided *P* < .05 was considered statistically significant.

Reporting Guidelines

This study was reported in accordance with the STROBE statement.

Results

Study Population and Respiratory Pathogens

A total of 835 children were included; 544 patients (65.1%) were managed in the general pediatric ward, and 291 (34.9%) required PICU admission. Table 1, Panel A presents demographic characteristics, respiratory PCR findings, and clinical and laboratory parameters by PICU admission status.

Rhinovirus/enterovirus was the most frequently detected pathogen overall (*n* = 346) and was significantly more prevalent in PICU patients than ward patients (56.7% vs. 33.3%, *P* < .001). Conversely,

Table 1. Baseline Characteristics, Respiratory PCR Findings, and Clinical and Laboratory Parameters According to PICU Admission

Panel A. Baseline Characteristics and Respiratory PCR Findings According to PICU Admission			
Characteristics	No PICU admission (n = 544)	PICU admission (n = 291)	P value
Age, y	4 (1-7)	2 (1-6)	< .001
Sex, n (%)			
Female	257 (47.2)	110 (37.8)	.009
Male	287 (52.8)	181 (62.2)	.009
Detected virus, n (%)			
Rhinovirus/enterovirus,	181 (33.3)	165 (56.7)	< .001
Adenovirus	91 (16.7)	23 (7.9)	< .001
RSV	76(14.0)	28 (9.6)	.070
Human metapneumovirus	65 (11.9)	59 (20.3)	.001
Influenza/parainfluenza	228 (41.9)	39 (13.4)	< .001
SARS-CoV-2	53 (9.7)	26 (8.9)	.704
Panel B. Clinical and Laboratory Parameters According to PICU Admission			
Variable	No PICU admission (n = 415)	PICU admission (n = 192)	P value
CRP, mg/L	4.85 (1.03–16.65)	5.40 (1.50–19.13)	.424
Plateletcrit, %	2.33 (0.89– 3.09)	2.96 (2.13– 3.62)	< .001
Albumin, g/dl	42.7 (39.8–45.9)	42.1 (38.35–45.7)	.029
WBC, mm ³	8.240 (5.640–10.900)	11.015 (7.485–16.400)	< .001
Lymphocyte count, mm ³	3.180 (2.170–4.910)	3.025 (1.730–5.420)	.663
Neutrophil count, mm ³	3.070 (1.880–5.690)	5.980 (3.510–11.590)	< .001
Platelet count, mm ³	296.000 (221.000–392.000)	362.000 (266.000–459.000)	< .001
ALT, U/L	18 (13–34)	17 (11–26)	.107
AST, U/L	39 (29–55)	37.5 (25–46)	.007
CK, mg/dl	103 (53–152)	86 (41–123)	< .001
LDH, U/L	308 (264–367)	312 (266–370.5)	.797
SpO ₂ , %	98 (96–98)	97 (96–98)	.022
Heart rate, beats/min	110 (100–122)	120.5 (110–139)	< .001
Respiratory rate, breaths/min	28 (24–30)	28 (26–36)	< .001
NLR	1.02 (0.56–2.18)	1.97 (0.87–4.97)	< .001
PLR	92.20 (63.03–147.91)	105.22 (62.83–183.01)	.020
SII	270.000 (159.925–626.309)	653.388 (244.732–1.590.583)	< .001

Data are presented as median (interquartile range) or number (percentage), as appropriate. PICU, pediatric intensive care unit; RSV, respiratory syncytial virus; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; CRP, C-reactive protein; WBC, white blood cell count; ALT, alanine aminotransferase; AST, aspartate aminotransferase; CK, creatine kinase; LDH, lactate dehydrogenase; SpO₂, peripheral oxygen saturation; NLR, neutrophil-to-lymphocyte ratio; PLR, platelet-to-lymphocyte ratio; SII, systemic immune-inflammation index. Plateletcrit refers to the hemogram-derived plateletcrit parameter, not procalcitonin. The laboratory and vital-sign comparisons were based on patients with available data; 415 patients without PICU admission and 192 patients with PICU admission. Missing data were not imputed and were not interpreted as absence of the relevant clinical condition. The sample size differed between panels because demographic and microbiological data were available for the full cohort, whereas clinical and laboratory comparisons were based only on patients with complete data for the relevant variables.

adenovirus and influenza/parainfluenza were detected significantly less frequently in the PICU group. Human metapneumovirus was more frequent in PICU patients, whereas RSV and SARS-CoV-2 frequencies did not differ significantly on univariable comparisons (Table 1, Panel B).

In the pathogen-based multivariable model (n = 833; Nagelkerke R² of 0.196; Hosmer-Lemeshow P = .500), rhinovirus/enterovirus detection was independently associated with increased odds of PICU admission (aOR, 1.604, 95% CI: 1.074-2.393; P = .021). In contrast, adenovirus (aOR, 0.453, 95% CI: 0.265-0.775; P = .004), RSV (aOR, 0.531, 95% CI: 0.309-0.913; P = .022), and influenza/parainfluenza (aOR, 0.255, 95% CI:0.164-0.396; P < .001) were associated with lower odds of PICU admission. Younger age was also independently associated with PICU admission (aOR per year, 0.945, 95% CI:0.907-0.984; P = .006) (Table 2, Panel A).

Clinical and Laboratory Comparisons and ROC Analysis

PICU patients exhibited significantly higher baseline white blood cell count, neutrophil count, platelet count, plateletcrit, heart

rate, respiratory rate, NLR, PLR, and SII, along with significantly lower SpO₂ and serum albumin (all P < .05; Table 1, Panel B). CRP, lymphocyte count, alanine aminotransferase, and LDH did not differ significantly between groups. Median SII was markedly higher in PICU patients than in ward patients (653,388 [IQR: 244,732–1,590,583] vs. 270,000 [IQR: 159,925–626,309], P < .001). Median NLR was 1.97 (IQR, 0.87–4.97) in PICU patients and 1.02 (IQR, 0.56–2.18) in non-PICU patients (P < .001). PLR was also higher in PICU patients than in non-PICU patients: 105.22 (IQR, 62.83–183.01) versus 92.20 (IQR, 63.03–147.91; P = .020) (Table 1, Panel B).

ROC curve analysis demonstrated modest discriminatory performance for the inflammatory indices: SII had an area under the curve (AUC) of 0.618 (95% CI: 0.576-0.660; P < .001), NLR had an AUC of 0.591 (95% CI: 0.548-0.634; P < .001), and PLR had an AUC of 0.549 (95% CI: 0.507-0.592; P = .020) (Figure 2, Table 2, Panel C).

Table 2. Predictors and Diagnostic Performance for PICU Admission

Panel A. Pathogen-based multivariable logistic regression model			
Variable	Adjusted OR	95% CI	P value
Rhinovirus/enterovirus	1.604	1.074–2.393	.021
Adenovirus	.453	.265–0.775	.004
RSV	.531	.309–0.913	.022
Human metapneumovirus	1.542	.955–2.489	.076
Influenza/parainfluenza	.255	.164–0.396	< .001
SARS-CoV-2	.714	.408–1.250	.239
Age, per year	.945	.907–0.984	.006
Male sex	1.316	.963–1.797	.085

Model characteristics; n=833; Nagelkerke R²=0.196; Hosmer–Lemeshow test, $\chi^2=7.347$, df=8, P = .500.

Panel B. SII-centered clinical and laboratory multivariable logistic regression model			
SII, per 100.000-unit increase	1.051	1.029–1.074	< .001
SpO ₂ , per 1% increase	.917	.818–1.027	.131
Heart rate, per beat/min	1.025	1.015–1.035	< .001
Respiratory rate, per breath/min	1.029	.984–1.056	.280
Plateletcrit, per 0.1% increase	1.036	1.020–1.052	< .001
Albumin, per unit increase	.913	.876–0.951	< .001
LDH, per unit increase	1.000	.998–1.002	.989
Age, per year	.999	.949–1.051	.977
Sex (Female vs. Male)	.667	.454–0.979	.039

Model characteristics; n=655; Nagelkerke R²=0.278; Hosmer–Lemeshow test, $\chi^2= 6.739$, df=8, P = .565; Omnibus test, $\chi^2=143.620$, df=9, P < .001

OR, odds ratio; CI, confidence interval; SII, systemic immune-inflammation index; SpO₂, peripheral oxygen saturation; LDH, lactate dehydrogenase.

Plateletcrit was rescaled per 0.1% increase to provide clinically interpretable effect estimates. No relevant multicollinearity was identified (VIF range: 1.012–1.769)

Panel C. ROC analysis of inflammatory indicators			
Inflammatory index	AUC	95% CI	P value
SII	.618	.576–0.660	< .001
NLR	.591	.548–0.634	< .001
PLR	.549	.507–0.592	.020

ROC, receiver operating characteristic; AUC, area under the curve; SII, systemic immune-inflammation index; NLR, neutrophil-to-lymphocyte ratio; PLR, platelet-to-lymphocyte ratio.

Multivariable Clinical and Laboratory Predictors

In the complete-case clinical/laboratory model (n = 655; Nagelkerke R² of 0.278; Hosmer–Lemeshow P = .565), higher SII (aOR, 1.051 per 100,000-unit increase, 95% CI: 1.029–1.074; P < .001), higher heart rate (aOR, 1.025 per beat/min increase, 95% CI: 1.015–1.035; P < .001), and higher rescaled plateletcrit (aOR, 1.036 per 0.1% increase, 95% CI: 1.020–1.052; P < .001) were independently associated with increased odds of PICU admission. Conversely, higher serum albumin (aOR, 0.913 per g/L, 95% CI: 0.876–0.951; P < .001) and female sex (aOR, 0.667; 95% CI: 0.454–0.979; P = .039) were independently associated with lower odds (Table 2, Panel B).

Exploratory Subgroup Analysis

Among PICU patients receiving HFNC, exploratory correlations showed weak inverse correlations with HFNC duration and admission SII (rho = -0.165, P = .023), as well as NLR (rho = -0.193, P = .008). Similarly, PICU length of stay was weakly inversely correlated with admission SII (rho = -0.147, P = .043), NLR (rho = -0.176, P = .015), and serum albumin (rho = -0.162, P = .038).

Discussion

In this retrospective cohort of 835 children hospitalized with PCR-confirmed viral respiratory tract infections, intensive care unit admission was independently predicted by specific viral pathogen profiles, composite inflammatory markers, and routine physiological parameters. Rhinovirus/enterovirus detection, higher SII, elevated heart rate, and increased plateletcrit independently increased the odds of PICU admission, whereas higher serum albumin concentrations and female sex were associated with lower odds of critical care escalation.

The independent association between rhinovirus/enterovirus detection and increased PICU admission risk is consistent with accumulating evidence demonstrating that human rhinovirus is not merely an agent of the common cold, but a major driver of clinically significant lower respiratory tract disease in pediatric populations.^{7,8} Rhinovirus is particularly recognized as a potent trigger of acute lower airway hyperreactivity, severe bronchospasm, and status asthmaticus-like presentations in young children.^{3,8} In hospitalized pediatric cohorts, such rapid-onset acute airway obstruction and dynamic hyperinflation frequently necessitate prompt escalation to intensive care for continuous nebulization, non-invasive ventilation, or advanced monitoring. Nevertheless, clinicians must interpret molecular rhinovirus detection with caution; low-level viral shedding can persist for weeks after acute illness, and asymptomatic viral detection or co-detection with other respiratory viruses is common.^{9,10} Therefore, our findings indicate a relative association in hospitalized, symptomatic children rather than direct evidence that rhinovirus detection alone inherently

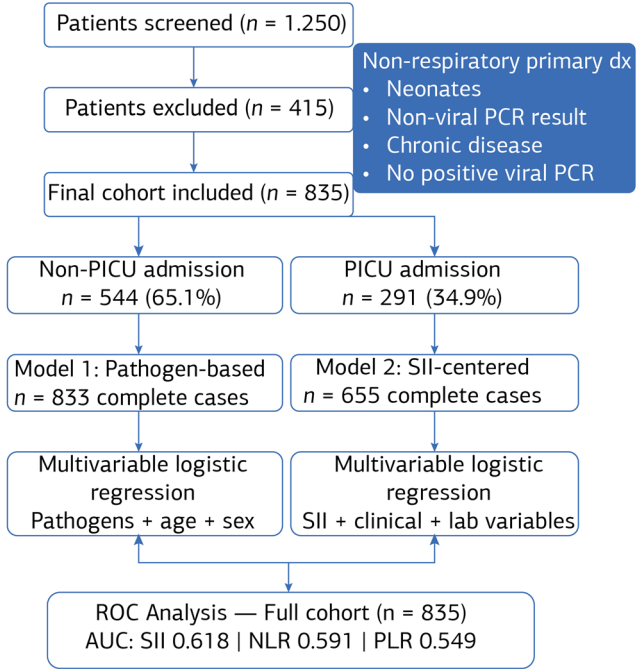


Figure 1. Study Flow Diagram

Abbreviations: PICU, pediatric intensive care unit; PCR, polymerase chain reaction; SII, systemic immune-inflammation index; NLR, neutrophil-to-lymphocyte ratio; PLR, platelet-to-lymphocyte ratio; dx, primary diagnosis.

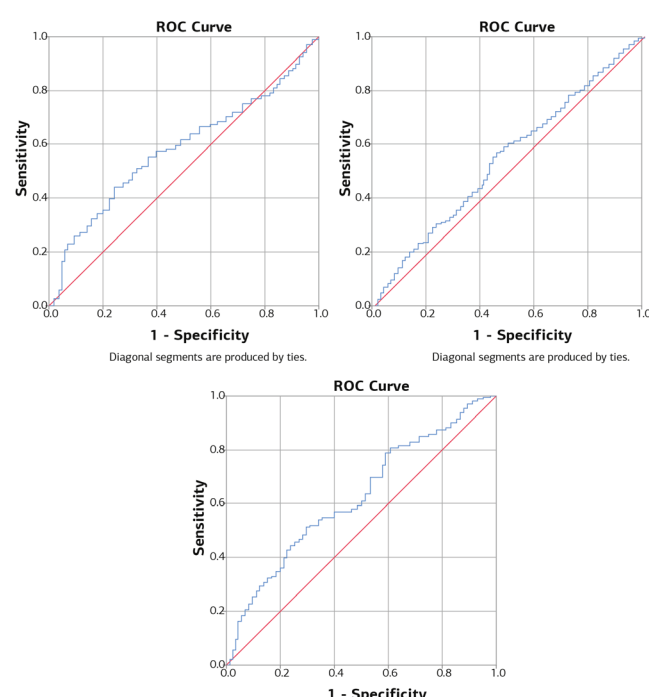


Figure 2. Receiver Operating Characteristic Curves of SII, NLR, and PLR for Predicting PICU Admission

Receiver operating characteristic curves of the systemic immune-inflammation index, neutrophil-to-lymphocyte ratio, and platelet-to-lymphocyte ratio for predicting pediatric intensive care unit admission. AUC, area under the curve; NLR, neutrophil-to-lymphocyte ratio; PLR, platelet-to-lymphocyte ratio; SII, systemic immune-inflammation index.

dictates disease severity.

Conversely, the inverse associations observed for RSV, adenovirus, and influenza/parainfluenza relative to rhinovirus/enterovirus do not indicate that these pathogens are inherently mild or protective. RSV and influenza viruses remain leading global causes of severe lower pediatric respiratory tract infection and PICU admission worldwide.^{1,2,11} Disease severity associated with RSV, influenza, parainfluenza, and adenovirus is heavily influenced by host vulnerability, age, comorbidities, disease phenotype, and local epidemiological patterns.^{12,13} In our study, these findings are largely attributable to the specific cohort composition and institutional admission dynamics. Specifically, excluding children with chronic underlying conditions (such as bronchopulmonary dysplasia, congenital heart disease, chronic neuromuscular disorders, and severe immunodeficiencies) naturally filtered out the most severe presentations of RSV and influenza that typically occur in medically complex children. Additionally, high seasonal ward admissions of previously healthy children with uncomplicated RSV or influenza for supportive care and hydration expanded the non-PICU denominator, resulting in lower adjusted odds for critical care escalation in our multivariable models.^{14,15}

A major finding of this study was the independent association between higher SII and PICU admission. SII combines platelet, neutrophil, and lymphocyte counts and may provide an accessible estimate of systemic inflammatory and immune-cell response, reflecting the combined contribution of relative neutrophilia, reactive thrombocytosis, and stress-induced lymphopenia. Pediatric studies have investigated SII, NLR, and PLR in bronchiolitis, pneumonia, and other infectious diseases, but reported associations vary by study population, blood sampling time, disease definition, and outcome examined.^{5,16,17}

Although SII was statistically associated with PICU admission, its

discriminatory performance was modest, with an AUC of 0.618, comparable to NLR and PLR. Consequently, SII should not be used as an isolated diagnostic test or as a single threshold for PICU referral. Its potential role is as a complementary marker interpreted alongside clinical examination, oxygenation status, heart rate, respiratory findings, and routine biochemical variables. This interpretation is consistent with pediatric bronchiolitis studies in which the value of blood count-derived inflammatory indices varied according to viral etiology and severity outcome.^{16,17}

Our exploratory subgroup analysis further revealed that although higher inflammatory indices were associated with the initial risk of PICU admission, SII and NLR were inversely correlated with HFNC duration and PICU length of stay, suggesting that the most acutely ill patients on admission did not necessarily experience the longest clinical recovery times. The inverse correlation between albumin and PICU length of stay similarly reinforces its role as a marker of systemic physiological reserve.

Heart rate was independently associated with PICU admission, although tachycardia is nonspecific and may reflect fever, respiratory effort, hypoxemia, or systemic stress; it is readily available at presentation and may contribute useful information within the broader clinical context. Albumin was inversely associated with PICU admission, likely reflecting decreased synthesis, increased catabolism, and capillary permeability during critical illness. Hypoalbuminemia has been associated with greater pediatric illness severity and poorer intensive care outcomes,^{18,19} suggesting that albumin reflects overall systemic illness severity and physiological reserve rather than an isolated determinant of PICU admission.

Plateletcrit remained independently associated with PICU admission after adjustment for the clinical and laboratory variables included in the model. Platelet-related parameters may change during viral infection because of alterations in platelet production, activation, and peripheral consumption. Although the role of plateletcrit in pediatric respiratory infections is not fully established, our findings—expressed per 0.1% increase to allow clinically interpretable estimation—suggest that it may provide additional information about disease severity when considered alongside other clinical and laboratory findings. These associations should nevertheless be interpreted cautiously, because plateletcrit may reflect the overall inflammatory response rather than represent an independent determinant of PICU admission. The available pediatric evidence regarding plateletcrit remains limited and heterogeneous, and further prospective studies are needed to determine whether it provides predictive information beyond conventional platelet count, SII, and established indicators of clinical severity.^{20,21}

In our cohort, sex was also associated with PICU admission, with girls having lower adjusted odds than boys. This finding should be interpreted cautiously, as sex-related differences may reflect variations in age distribution, host responses, disease phenotype, or other unmeasured characteristics of the study population. Larger, multicenter pediatric cohorts are needed to confirm this association before it can be considered clinically meaningful.

Limitations

Several limitations should be considered when interpreting these findings. The retrospective, single-center design limits causal inference and the external generalizability of the results to different healthcare settings. The study cohort was restricted to hospitalized children with at least one positive viral respiratory

PCR result; therefore, these findings cannot be extrapolated to outpatient populations or children with PCR-negative respiratory illness. In addition, the strict exclusion of children with significant chronic comorbidities (e.g., bronchopulmonary dysplasia, congenital heart disease, severe neuromuscular disorders) was necessary to examine baseline inflammatory responses in a relatively homogeneous population; however, this design may have filtered out the most severe RSV and influenza presentations that typically occur in medically complex children, limiting generalizability to this subgroup.

Furthermore, although respiratory PCR testing was performed at hospital admission, PCR positivity alone does not establish that the detected pathogen was the sole cause of the clinical presentation. Viral load and the presence of bacterial coinfection could not be fully characterized. We handled missing data using complete-case analysis without imputation; we did not interpret missing values as the absence of the relevant clinical condition, and excluding 180 patients from the multivariable laboratory model may have introduced selection bias. Despite these limitations, the study's strengths include a large, real-world cohort, standardized multiplex PCR-based pathogen profiling at admission, and the simultaneous evaluation of composite inflammatory indices alongside routine clinical parameters.

Conclusion

In conclusion, the respiratory pathogen profile, SII, heart rate, plateletcrit, albumin, and sex were independently associated with PICU admission among children hospitalized with viral respiratory infections. Specifically, rhinovirus/enterovirus detection and higher SII values were associated with an increased risk of critical illness. These variables are inexpensive and routinely available at hospital admission, potentially supporting early risk stratification. However, these markers should be interpreted as complementary elements of a multidimensional clinical assessment rather than independent determinants of intensive care need. Further prospective, multicenter studies are required to externally validate these findings and refine their clinical utility in pediatric practice.

Declarations

Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent

Informed consent was waived due to the retrospective nature of the study.

Data Availability

The datasets used and/or analyzed during the current study are not publicly available due to patient privacy reasons but are available from the corresponding author on reasonable request.

Conflict of Interest

The authors declare that they have no conflict of interest.

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Author Contributions (CRediT Taxonomy)

Conceptualization: H.A.A., H.Ö.K.
Methodology: H.A.A.
Software: H.A.A.
Validation: H.A.A., H.Ö.K.
Formal Analysis: H.A.A.
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Writing – Original Draft Preparation: H.A.A.
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Supervision: H.A.A.
Project Administration: H.A.A. All authors read and approved the final manuscript.

AI Usage Disclosure

The authors used an artificial intelligence-based language tool for language editing, improvement of readability, and formatting support. The authors reviewed and approved the final manuscript and take full responsibility for its content, interpretation, and conclusions.

Abbreviations

HFNC: High-flow nasal cannula
LDH: Lactate dehydrogenase
NLR: Neutrophil-to-lymphocyte ratio
PCR: Polymerase chain reaction
PCT: Plateletcrit
PICU: Pediatric intensive care unit
PLR: Platelet-to-lymphocyte ratio
RSV: Respiratory syncytial virus
SII: Systemic immune-inflammation index

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