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Yulo, PAL, Garcia, RDJ. Factors Associated with Severe Outcomes of Various Respiratory Infections Detected by Multiplex RT-PCR Respiratory Panel 2.1 among Pediatric Patients in a Tertiary Hospital: A Retrospective Cohort
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ORIGINAL ARTICLE

FACTORS ASSOCIATED WITH SEVERE OUTCOMES OF VARIOUS RESPIRATORY INFECTIONS DETECTED BY MULTIPLEX RT-PCR RESPIRATORY PANEL 2.1 AMONG PEDIATRIC PATIENTS IN A TERTIARY HOSPITAL: A RETROSPECTIVE COHORT STUDY

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ABSTRACT

Introduction: Respiratory infections are a leading cause of pediatric hospitalizations, particularly pneumonia. In Metro Manila, many cases lack identifiable causes, underscoring the need for advanced diagnostics. The RT-PCR Respiratory Panel 2.1 enables rapid pathogen detection, improving diagnosis and treatment. Examining demographic and clinical factors linked to severe outcomes provides valuable local insights.

Objective: This study aimed to identify and compare respiratory pathogens detected by the RT-PCR panel and determine demographic and clinical factors associated with severe outcomes in pediatric patients at a private tertiary hospital in the Philippines.

Design: A retrospective cohort study was conducted, analyzing pediatric patients (0–18 years) admitted for respiratory infections from August 2023 to August 2024. Descriptive statistics summarized patient characteristics, while regression analyses identified factors linked to mechanical ventilation, oxygen use, and prolonged hospital stays.

Results: Of 118 patients, 85.6% tested positive for respiratory pathogens, predominantly viral (RSV 23.7%, human rhinovirus/enterovirus 22.9%), with cases peaking in late 2023. Most patients had elevated WBC with neutrophilic predominance. Oxygen support was required in 22.9% of cases, primarily in infants under six months with RSV, who had a four-fold increased risk. Difficulty breathing was the strongest predictor of oxygen use, while the presence of neurological conditions (e.g., cerebral palsy, seizure disorders) were significantly associated with mechanical ventilation and prolonged hospital stays.

Conclusion: Seizure disorder, cerebral palsy, and younger age influenced severe outcomes. Pathogen-specific trends in demographics, clinical findings, and oxygen support needs may help guide physicians in recognizing illnesses caused by the most common viral respiratory pathogens identified by the RT-PCR Respiratory Panel 2.1.

KEYWORDS: *RT-PCR Respiratory Panel 2.1, respiratory pathogens, pediatric infections, pneumonia, mechanical ventilation use*

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INTRODUCTION

Respiratory infections are a significant health burden in the pediatric population, often leading to hospitalizations. The COVID-19 pandemic heightened awareness of respiratory health, encouraged prompt medical care, and promoted preventive measures like hand hygiene and mask-wearing. Despite these efforts, other viruses, such as influenza and respiratory syncytial virus (RSV), continue to pose significant health risks. RSV, in particular, is a leading cause of hospitalizations for conditions such as bronchiolitis and pneumonia.[1] An estimated 97% of deaths due to RSV infection occur in low- and middle-income countries[1], with RSV-related morbidity remaining particularly high in urban areas like Metro Manila.[2] The severity of RSV also strains healthcare systems by increasing hospital bed occupancy and resource demands. Risk factors such as prematurity, young age, and underlying medical conditions contribute to the heightened vulnerability of Filipino infants and children to severe RSV-associated illness.[1]

Pediatric respiratory infections are primarily viral, but specific viruses are not well-documented in local studies. In one local study of 496 childhood inpatient pneumonia cases from two private tertiary hospitals, 57% had no identifiable clinical or microbiologic etiology. The most commonly identified pathogens were Mycoplasma pneumoniae (11.9%) and Mycobacterium tuberculosis (5%). These findings highlight the need for more advanced diagnostic tools to improve etiologic identification in pediatric pneumonia.[3] Advanced diagnostic tools, such as the Respiratory Panel 2.1 (RP-2.1), using multiplex RT-PCR, allow for rapid and accurate detection of respiratory pathogens, enabling timely treatment and better understanding of illnesses. Identifying risk factors for severe outcomes, such as use of oxygen support and longer hospital stays, contributes essential local information and provides valuable guidance to Filipino pediatricians in managing respiratory illnesses.

The study aimed to identify and compare the respiratory pathogens detected by the RP-2.1 and determine the association between demographic and clinical profile factors, and the risk of severe outcomes among pediatric patients, aged 0 to 18, admitted for respiratory symptoms at a private, tertiary urban hospital, from August 2023 to August 2024.

Specifically, this study aimed to:

1. To describe and compare demographic, clinical, and laboratory factors associated with pathogen-specific infections;
2. To determine associations between pathogen-specific infections with certain predisposing factors;
3. To identify risk factors for severe outcomes associated with pathogen-specific demographic and clinical profiles.

METHODOLOGY

This retrospective, cohort study analyzed pediatric patients aged 0–18 years who were admitted to a private urban tertiary hospital with acute respiratory symptoms and tested using the RT-PCR RP-2.1 between August 2023 and August 2024. The final sample included only those with respiratory symptoms who were admitted and tested, excluding those who were tested without symptoms or were not admitted.

The study required a sample size of 242 pediatric patients, calculated to achieve a 5% significance level and 80% statistical power to detect a medium-sized effect (OR = 2).[4] After adjusting for the finite population (N = 90), the resulting sample size was 66.5 Operational definitions of terms are the following:

1. **Respiratory pathogens** refer to viral or bacterial organisms identified through the RP-2.1 testing that are known to cause respiratory infections. Viral pathogens include adenovirus, coronavirus 229E, coronavirus HKU1, coronavirus NL63, coronavirus OC43, SARS-CoV-2, human metapneumovirus, human rhinovirus/enterovirus, influenza A, influenza B, parainfluenza virus-1, parainfluenza virus-2, parainfluenza virus-3, parainfluenza virus-4, and Respiratory Syncytial Virus (RSV). Bacterial pathogens are *Bordetella parapertussis*, *Bordetella pertussis*, *Mycoplasma pneumoniae*, and *Chlamydia pneumoniae*.
2. **Co-infection** is defined as the simultaneous presence of two or more distinct pathogens in a patient, as determined by the results of the RP-2.1.
3. **Demographic attributes** include specific patient characteristics, including age (measured in months), sex (male or female), weight (measured in kilograms), and height (measured in centimeters).

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4. **Clinical profile factors** refer to various clinical presentations associated with specific respiratory pathogens. These include **symptoms**, either reported by the patient or observed during the course of illness, such as cough, fever, coryza, difficulty of breathing, vomiting, decreased appetite, diarrhea, headache, abdominal pain, eye redness, seizure, rash, sore throat, and ear pain. **Chest examination findings** refer to physical examination findings such as rales, wheezing, tachypnea, and chest retractions. The **use of oxygen support** is defined as any provision of supplemental oxygen during hospitalization, which may include nasal cannula, face mask, continuous positive airway pressure (CPAP), noninvasive positive pressure ventilation (NIPPV), or intubation. **Laboratory parameters upon admission** refer to initial diagnostic test results obtained at the time of hospital admission. These include a complete blood count (CBC) to assess white blood cell count (WBC), neutrophils, lymphocytes, and platelets, as well as inflammatory markers such as C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), and procalcitonin. **Diagnosis** reflects the clinical assessment made by the pediatrician, based on presenting symptoms, physical examination findings, and laboratory results. Diagnoses were classified as upper respiratory tract infections (e.g., sinusitis, pharyngitis, croup, common cold), lower respiratory tract infections (e.g., bronchiolitis, bronchitis, pneumonia), or other conditions, including dengue fever, bronchial asthma, cerebral palsy, acute gastroenteritis, acute gastritis, and seizures.
5. **Predisposing factors** are factors that may increase the risk of severe outcomes, including age under six months, presence of co-infections, and neurological impairments.
6. **Severe outcomes** are defined as requiring supplemental oxygen via nasal cannula or face mask, mechanical ventilation (including CPAP, NIPPV, or intubation), or prolonged hospitalization (length of stay more significant than the median for similar cases). These indicators reflect the need for advanced medical interventions or significant disease progression. Such criteria are commonly used in clinical studies and pediatric respiratory guidelines to assess illness severity and guide treatment strategies. [6,7]

The study was approved by the hospital's Institutional Review Board (IRB) in June 2024, and data collection was conducted in September 2024. Patient selection followed a convenience sampling approach. All RP-2.1 test results from the hospital's database during the study period were retrospectively reviewed. Patients were included if they met the inclusion criteria. From the eligible cases, relevant demographic, clinical, and laboratory data were extracted to allow for a comprehensive analysis of each patient's condition, while maintaining strict confidentiality. The research team completed Good Clinical Practice (GCP) training, and all collected data will be securely stored for three years before being permanently destroyed.

Descriptive statistics summarized the participants' characteristics, using frequency, proportion, median, range, mean, and standard deviation depending on data type. Statistical tests like the independent t-test, Mann-Whitney U test, Fisher's Exact test, and Chi-square test were used to compare groups.

To identify factors associated with mechanical ventilation use and supplemental oxygen requirement, univariate logistic regression analyses—including Firth's penalized logistic regression to account for sparse events—were first conducted to yield crude odds ratios (ORs) with 95% confidence intervals (CIs). All variables were then entered into multivariate models via backward stepwise selection; highly collinear predictors were removed to establish the final model. Because events per predictor remained low, Firth's penalized logistic regression was also applied in multivariate analyses. Adjusted ORs, 95% CIs, and p values for the final models are presented.

Hospital length of stay (LOS) was not normally distributed (skewed), so LOS was log-transformed prior to analysis (one patient with LOS = 0 days was excluded because log transformation is undefined at zero). Simple linear regression on log-LOS was first performed to assess univariate associations. All variables were entered into a multivariate linear model using backward stepwise selection, leading to a final model with the lowest AIC. Exponentiated β coefficients (with 95% CIs) are reported to reflect multiplicative effects on LOS.

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Missing data were handled via complete-case analysis. Variables with low to moderate missingness—height (8.47%) and pneumonia by CXR (10.17%)—were retained without imputation to avoid only a marginal reduction in sample size and because complete-case model fits remained stable. C-reactive protein (41.53% missing) was excluded from multivariate analyses because its inclusion would have resulted in a substantial loss of cases. Variables with very high missingness (ESR 92.37%, Procalcitonin 83.05%) were likewise excluded due to insufficient data. A summary of missingness per variable is provided in Annex A. The null hypothesis was rejected at a 0.05α-level of significance. Data analysis was conducted using R 4.2.2. Data import was handled with the readxl package, and descriptive summaries were generated using summarytools. Core statistical procedures—including generalized linear models—relied on the base stats package. Additional specialized methods were implemented via MASS and logistf for Firth's penalized logistic regression. Data visualization was performed in Python version 3.9, using pandas for data manipulation and matplotlib for figure generation.

RESULTS

A total of 118 pediatric patients were analyzed. Table 1 presents the distribution of respiratory pathogens detected using the RP-2.1. The majority of patients, 101 (85.6%), tested positive for at least one respiratory pathogen, while 17 patients (14.4%) had no detectable pathogens. Co-infections were identified in 15 cases (12.7%).

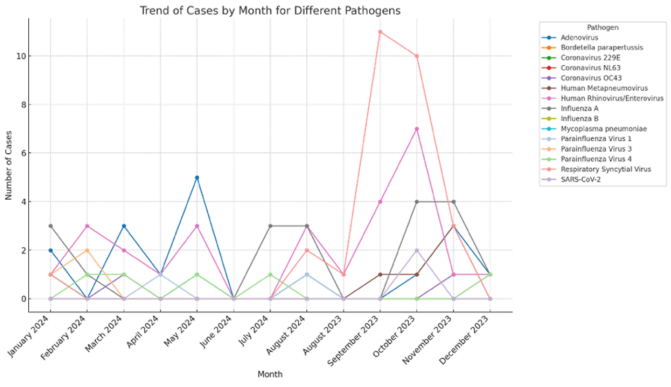
Viral infections predominated, with RSV being the most frequent in 28 patients (23.7%), followed by human rhinovirus/enterovirus (27 patients, 22.9%) and influenza A (19 patients, 16.1%). Adenovirus was detected in 16 patients (13.6%), while human metapneumovirus and parainfluenza virus-4 were each found in six patients (5.1%). Bacterial pathogens detected were *Mycoplasma pneumoniae* in three patients (2.5%) and *Bordetella parapertussis* in one (0.9%).

Table 1. Respiratory pathogens detected in RP-2.1 (n= 118)

	Frequency (%, 95% CI)
Negative respiratory panel	17 (14.41, 8.86 – 22.35)
Positive respiratory panel	101 (85.59, 77.65 – 91.14)
Viruses	
Respiratory Syncytial Virus	28 (23.73, 16.59 – 32.61)
Human Rhinovirus/Enterovirus	27 (22.88, 15.87 – 31.70)
Influenza A	19 (83.90, 10.21 – 24.26)
Adenovirus	16 (13.56, 8.19 – 21.38)
Human Metapneumovirus	6 (5.08, 2.08 – 11.20)
Parainfluenza Virus-4	6 (5.08, 2.08 – 11.20)
Coronavirus-OC43	3 (2.54, 0.66 – 7.81)
Parainfluenza Virus-3	3 (2.54, 0.66 – 7.81)
Influenza B	2 (1.69, 0.29 – 6.60)
SARS-CoV-2	2 (1.69, 0.29 – 6.60)
Parainfluenza Virus-1	2 (1.69, 0.29 – 6.60)
Coronavirus-229E	1 (0.85, 0.04 – 5.32)
Coronavirus-NL63	1 (0.85, 0.04 – 5.32)
Coronavirus-HKU1	0 (0, 0 – 3.93)
Parainfluenza Virus-2	0 (0, 0 – 3.93)
Bacteria	
Mycoplasma pneumoniae	3 (2.54, 0.66 – 7.81)
Bordetella parapertussis	1 (0.85, 0.04 – 5.32)
Bordetella pertussis	0 (0, 0 – 3.93)
Chlamydia pneumoniae	0 (0, 0 – 3.93)

Figure 1 summarizes seasonal trends for various respiratory pathogens. The highest case frequency occurred in the fourth quarter of 2023, with 46 cases, and the lowest in the second quarter of 2023, with 12 cases. Distinct quarterly patterns were observed among specific pathogens, with human rhinovirus/enterovirus being the most common in the first quarter of 2024 (six cases); adenovirus in the second quarter of 2024 (six cases); and RSV in the third and fourth quarters of 2023 (14 and 13 cases, respectively). An analysis of the monthly distribution revealed that the highest number of cases (25) was seen in October, primarily consisting of RSV (10 cases) and human rhinovirus/enterovirus (7 cases), with no cases reported in June.

Figure 1. Distribution of cases by month from August 2023 to August 2024



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This study showed considerable variation in demographic and clinical profile across the different pathogens, as shown in Annex B and Annex C. RSV-positive patients were significantly younger (12.5 months vs. 48 months), smaller (9.3kg vs. 16.5kg), and shorter (74cm vs. 104.8cm), with infants under six months identified as a critical predisposing factor for RSV infection (28.6% vs. 6.7%). Children with RSV infections were more likely to present with symptoms such as decreased appetite and difficulty breathing. On chest examination, findings included rales (75%), chest retractions (60.7%), wheezing and tachypnea (57.1% each), resulting in a significantly higher need for supplemental oxygen, particularly via nasal cannula (42.9%). Laboratory results upon admission showed significantly lower neutrophil percentages (40% vs. 64%), but higher lymphocyte percentages (46% vs. 26%), along with lower CRP (6.2 mg/L vs. 19.6 mg/L) and procalcitonin levels (0.1 ng/mL vs. 1 ng/mL) compared to RSV-negative patients.

Patients with adenovirus infections had a median age of 55 months and were predominantly male (81.3% vs. 48%). Unique symptoms were more common, such as eye redness (25% vs. 2.9%) and sore throat (18.7% vs. 2.9%), while respiratory symptoms such as cough, difficulty breathing, rales, tachypnea, and chest retractions were less frequent, compared to other infections. Adenovirus-infected patients were more likely to remain on room air (100% vs. 71.6%) and were less likely to require supplemental oxygen (0% vs. 27.4%). Adenovirus was more frequently linked to a diagnosis of sinusitis (31.2% vs. 7.8%). Laboratory findings showed elevated WBC counts (14.4 × 10^9/L), higher neutrophil percentages (66.5% vs. 55%), lower lymphocyte percentages (21% vs. 33%), and significantly elevated CRP levels (57.4 mg/L) upon admission, indicating a notable inflammatory response.

Human rhinovirus/enterovirus infections occurred in children at a mean age of 24 months, and commonly presented with cough, coryza, and fever, with the common cold being the most frequent diagnosis. Human rhinovirus/enterovirus was also associated with dilated cardiomyopathy and conjunctivitis. These patients were significantly more likely to have co-infections (55.6% vs. 4.4%), most commonly with RSV (33%). Laboratory findings upon admission showed elevated WBC counts (14 vs. 9.6) and platelet counts (193,000–665,000 vs. 81,000–789,000), compared to those without the virus. Despite these findings, the length of hospital stay was significantly shorter for patients with human rhinovirus/enterovirus infections (1–7 days vs. 0–32 days).

Patients infected with influenza A were significantly older, heavier, and taller than those without the infection (60 months vs. 24 months, 19.2 kg vs. 12 kg, and 109.5 cm vs. 93 cm, respectively). They were less likely to present with respiratory symptoms, such as difficulty breathing (14.3% vs. 45.4%), rales (28.6% vs. 64%), and chest retractions (9.5% vs. 35%), making a diagnosis of the common cold more likely. Other symptoms, such as diarrhea, headache, and seizures, were more frequently observed in influenza A patients. Among 19 influenza A cases, three (15.8%) were associated with neurological conditions, including viral encephalitis, benign febrile convulsions, and West syndrome. Laboratory findings upon admission revealed significantly lower WBC counts (6.5 vs. 11.2) and platelet counts (270,500 vs. 342,000), compared to those without influenza.

Parainfluenza infections were less likely to present with coryza (7% vs. 95%) but were significantly associated with other chest examination findings, such as stridor. Additionally, parainfluenza infections were significantly associated with co-infections, particularly with human rhinovirus/enterovirus, and were most likely to present with croup.

Human metapneumovirus infections predominantly affected older children (56.7 months). All patients presented with cough, coryza, and fever (100% each), while 50% exhibited rales and wheezing on chest examination. Most patients (83.3%) remained on room air, but one case required intubation and mechanical ventilation. Among the six cases, two had dengue fever, one had benign febrile convulsions, one had Crohn's disease, and one had West syndrome with respiratory failure. Additionally, patients with human metapneumovirus had significantly elevated CRP (54.2 mg/L) levels.

Patients infected with bacteria (including three cases of *Mycoplasma pneumoniae* and one case of *Bordetella parapertussis*) were significantly more likely to be female (100% vs. 45.6%) and taller (152 cm vs. 96.5 cm). *Mycoplasma pneumoniae* primarily affected the oldest patients (164 months), while *Bordetella parapertussis* affected younger patients (12 months). All patients presented with cough and fever, but *Mycoplasma pneumoniae* cases were significantly more likely to

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experience abdominal pain (50% vs. 5.2%). Rales were present in 100% of *Bordetella parapertussis* cases and 66.7% of *Mycoplasma pneumoniae* cases. The most common diagnosis was pneumonia, with all cases showing radiographic evidence of this. Additionally, patients with *Mycoplasma pneumoniae* had lower WBC counts upon admission, compared to those who tested negative (5.5 vs. 10.4).

Most patients were discharged in stable condition; however, one patient without a detected pathogen expired during hospitalization.

Predisposing factors that may have influenced specific outcome measures, such as the need for oxygen support, use of mechanical ventilation, and length of hospital stay, were analyzed. The majority of patients (75.4%, n=89) did not require oxygen support. Oxygen via nasal cannula or face mask was needed by 28 patients (23.7%). CPAP was utilized by five patients (4.2%), while one patient (0.9%) received NIPPV. Additionally, three patients (2.5%) were intubated and mechanically ventilated: one tested positive for RSV, another for human metapneumovirus, and one had no detectable pathogen.

Table 2 highlights factors associated with the need for supplemental oxygen in 118 patients, with 28 (23.7%) requiring it. These patients were younger (median age: 12.5 vs. 48 months) and had lower weights and heights. Additionally, being under six months of age was associated with a nearly fourfold increase in the need for oxygen support. Difficulty breathing was the strongest predictor for oxygen use, present in 96.4% of cases, along with other respiratory signs like rales, wheezing, tachypnea, chest retractions, and lower oxygen saturation (median: 90% vs. 97%). For laboratory findings, patients with elevated lymphocytes were significantly associated with supplemental oxygen use. The diagnoses of pneumonia and neurological impairments, especially cerebral palsy, were associated with higher oxygen needs. Overall, complex clinical presentations with severe respiratory symptoms and specific comorbidities were significant indicators for an increased need for supplemental oxygen use.

Table 2.1 displays adjusted odds ratios (aORs) from multivariate logistic regression for factors associated with the need for supplemental oxygen. Among symptoms, the presence of coryza was associated with markedly increased odds of oxygen requirement, whereas decreased appetite conferred lower odds. Chest examination findings on admission showed a trend toward higher odds with wheezing and a strong association with chest retraction. Of the predisposing factors, neither age under six months nor neurological impairment reached statistical significance. In laboratory parameters, higher WBC count showed a borderline inverse association, while neutrophil percentage was not significant. Finally, the diagnosis of common cold trended toward reduced odds of oxygen need.

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Table 2. Factors associated with the need for supplemental oxygen (n= 118)

	Supplemental oxygen (n = 28)	No supplemental oxygen (n = 90)	Crude Odds Ratio (95% CI)	p-value
	Mean ± SD; Median (Range); Frequency (%)			
Age, months	12.50 (0.56-180)	48 (0.49-216)	0.99 (0.98-1.003)	.249
Sex				
Male	15 (53.57)	47 (52.22)	Reference	-
Female	13 (46.43)	43 (47.78)	0.95 (0.40-2.22)	.901
Weight, kg	10.05 (3.395-41.75)	15.80 (1.06-82)	0.95 (0.90-0.99)	**.049**
Height, cm [n=108]	[n=22] 84.25 ± 31.79	[n=86] 99.07 ± 29.26	0.98 (0.96-0.99)	**.044**
Symptoms				
Cough	28 (100)	88 (97.78)	1.61 (0.13-224.64)	.749
Fever	25 (89.29)	83 (92.22)	0.70 (0.18-3.44)	.628
Coryza	26 (92.86)	76 (84.44)	2.39 (0.61-15.90)	.269
Difficulty of breathing	27 (96.43)	20 (22.22)	94.50 (18.37-1738.17)	**<.001**
Vomiting	5 (17.86)	35 (38.89)	0.34 (0.11-0.92)	**.046**
Decreased appetite	4 (14.29)	31 (34.44)	0.32 (0.09-0.91)	**.049**
Diarrhea	2 (7.14)	14 (15.56)	0.42 (0.06-1.63)	269
Headache	0	9 (10)	0.15 (0.001-1.25)	.089
Abdominal pain	0	8 (8.89)	0.17 (0.001-1.44)	.122
Eye redness	1 (3.57)	6 (6.67)	0.52 (0.03-3.22)	.551
Seizure	3 (10.71)	4 (4.44)	2.58 (0.48-12.46)	.234
Rash	0	6 (6.67)	0.23 (0.002-2.03)	.223
Sore throat	0	6 (6.67)	0.23 (0.002-2.03)	.223
Ear pain	0	4 (4.44)	0.34 (0.003-3.31)	.409
Others	2 (7.14)	8 (8.89)	0.92 (0.17-3.58)	.906
Chest examination findings				
Rales	26 (92.86)	42 (46.67)	14.86 (4.10-95.69)	**<.001**
Wheezing	21 (75)	27 (30)	7 (2.77-19.60)	**<.001**
Tachypnea	23 (82.14)	16 (17.78)	21.28 (7.52-71.40)	**<.001**
Chest retraction	24 (85.71)	12 (13.33)	39 (12.63-151.70)	**<.001**
Others	3 (10.71)	1 (1.11)	10.68 (1.30-221.10)	**.044**
Presence of co-infections				
Co-infection with Rhinovirus/Enterovirus	1 (3.57)	14 (15.56)	0.20 (0.01-1.07)	.130
Co-infection with RSV	2 (7.14)	4 (4.44)	1.65 (0.22-8.98)	.574
Predisposing factors				
Age under six months	7 (25)	7 (7.78)	3.95 (1.23-12.79)	**.019**
Presence of co-infections	2 (7.14)	17 (18.89)	0.33 (0.05-1.26)	.156
Neurologically impairment	6 (21.43)	0	52.29 (5.83-6914.21)	**<.001**
Laboratory parameters				
Complete blood count	[n=28]	[n=87]		
WBC count, $\times 10^9$/L [n=115]	10.15 (5.51-38.17)	10.20 (4-29.90)	1 (0.92-1.07)	.933
Neutrophils, % [n=115]	52 (13-85)	61 (18-88)	0.98 (0.96-1.002)	.082
Lymphocytes, % [n=115]	39.50 (10-78)	28 (5-74)	1.03 (1.002-1.05)	**.038**
Platelet count, $\times 10^9$/L [n=115]	356,000 ± 158,196.50	338,035 ± 108,431.9	1 (0.99-1)	.497
Markers of infection/ inflammation				
CRP, mg/L [n=69]	[n=21] 17.14 (0.28-238.89)	[n=48] 12.85 (0.13-166.49)	1 (0.98-1.01)	.543
ESR, mm/hr [n=9]	-	[n=9] 43 (21-99)	-	-
Procalcitonin, ng/mL [n=20]	[n=10] 0.94 (0.02-14.03)	[n=10] 0.38 (0-13.14)	1.06 (0.84-1.41)	.634
Oxygen saturation, %	90 (72-100)	97 (92-100)	0.45 (0.32-0.59)	**<.001**
Pneumonia by CXR [n=106]	[n=27] 20 (74.07)	[n=79] 39 (49.37)	2.93 (1.16-8.19)	**.029**
Diagnosis				
Upper respiratory tract infection				
Sinusitis	0	13 (14.44)	0.10 (0.001-0.80)	**.025**
Pharyngitis	1 (3.57)	4 (4.44)	1.05 (0.10-5.99)	.961
Croup	1 (3.57)	2 (2.22)	1.93 (0.17-15.15)	.546
Common cold	0	28 (31.11)	0.04 (0.0003-0.29)	**<.001**
Lower respiratory tract infection				
Bronchiolitis	5 (17.86)	7 (7.78)	2.58 (0.71-8.85)	.134
Bronchitis	0	3 (3.33)	0.44 (0.003-4.72)	.553
Pneumonia	22 (78.57)	46 (51.11)	3.51 (1.37-10.26)	**.013**
Dengue fever	0	6 (6.67)	0.23 (0.002-2.03)	.223
Bronchial asthma	0	5 (5.56)	0.27 (0.002-2.53)	.302
Cerebral palsy	4 (14.29)	0	33.24 (3.37-4462.68)	**.001**
Acute gastroenteritis	0	3 (3.33)	0.44 (0.003-4.72)	.553
Seizure	1 (3.75)	1 (1.11)	3.25 (0.26-41.31)	.327
Acute gastritis	0	2 (2.22)	0.62 (0.004-7.93)	.749
Others	12 (42.86)	19 (21.11)	2.80 (1.13-6.95)	**.025**

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Table 2.1. Factors associated with the need for supplemental oxygen – multivariate analysis

	Adjusted Odds Ratio (95% CI)	p-value
Symptoms		
Coryza	18.98 (1.36- 24071.84)	**.025**
Decreased appetite	0.08 (0.008-0.47)	**.003**
Chest P.E. findings upon admission		
Wheezing	3.51 (0.84-17.38)	.085
Chest retraction	23.17 (5.46-141.42)	**<.001**
Pre-disposing factor		
Age < 6 months of age	2.63 (0.38-19.39)	.326
Neurologically impaired	16.56 (0.79-7132.32)	.074
Laboratory parameters		
WBC count, $\times 10^9$/L	0.87 (0.71-1.0004)	.051
Neutrophils, %	0.99 (0.96-1.05)	.987
Diagnosis		
Common cold	0.09 (0.001-1.04)	.055

Note: Multivariate models were built by backward stepwise selection, excluding highly collinear predictors. Firth's penalized logistic regression was used to address sparse events.

Table 3 outlines the factors associated with mechanical ventilation (MV) use among 118 patients, with five (4.2%) requiring MV. These patients were significantly older (median age: 132 vs. 36 months) and had difficulty of breathing. Chest findings like wheezing, tachypnea, and chest retractions were strongly linked to MV use, as were lower oxygen saturation levels on admission (median: 84% vs. 97%). Neurological impairments were a major predictor, with 80% of MV patients having such conditions, including cerebral palsy and seizure disorders. All patients requiring MV had complex medical conditions, including myocarditis, sepsis, Trisomy-21, hypoxemia-related kidney injury, West syndrome, and cerebral palsy, which significantly increased their risk.

Table 3.1 summarizes adjusted odds ratios (aORs) from the multivariate Firth logistic regression model for factors associated with mechanical ventilation use. Female sex was associated with higher but nonsignificant odds compared with males. Among predisposing factors, age under six months showed elevated but nonsignificant odds, whereas neurological impairment was a strong predictor of mechanical ventilation.

Table 3.1. Factors associated with mechanical ventilation use – multivariate analysis

	Adjusted Odds Ratio (95% CI)	p-value
Sex		
Male	Reference	-
Female	2.53 (0.18-344.76)	.519
Pre-disposing factor		
Age < 6 months of age	16.33 (0.55-2734.32)	.105
Neurologically impaired	465.30 (29.15-97406.04)	**<.001**
Platelet count, $\times 10^9$/L	1 (0.99-1)	.799
Diagnosis		
Croup	0.15 (0.001-4.96)	.285
Bronchiolitis	0.57 (0.003-14.16)	.738

Note: Multivariate models were built by backward stepwise selection, excluding highly collinear predictors. Firth's penalized logistic regression was used to address sparse events.

Table 4 highlights factors associated with longer hospital stays among 118 patients. The median length of hospital stay was four days (range: 0 to 32 days). Patients with *Mycoplasma pneumoniae* had the longest mean duration, at 5.7 days, while a case of coronavirus-NL63 had the shortest stay at one day. Neurological conditions, such as seizures (6.4 days longer), cerebral palsy (11.9 days longer), along with other complex medical conditions like myocarditis, sepsis, and Trisomy-21, all seen in one patient (9.4 days longer), were the strongest predictors of extended stays. Respiratory symptoms, including rales (1.7 days longer), tachypnea (1.6 days longer), and chest retractions (1.5 days longer), also contributed to longer hospitalizations. Higher WBC counts and lower oxygen levels were linked to increased hospital stay durations. Specifically, each unit increase in WBC count was linked to a 0.15-day rise in the LOS. Additionally, lower oxygen levels were significantly related to longer hospitalizations, with each percentage decrease in oxygen saturation corresponding to a 0.44-day increase in stay duration.

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Table 3. Factors associated with the need for supplemental oxygen (n= 118)

	With MV use (n = 5)	Without MV use (n = 113)	Crude Odds Ratio (95% CI)	p-value
	Mean ± SD; Median (Range); Frequency (%)			
Age, months	132 (1-180)	36 (0.49-216)	1.02 (1.001-1.03)	**.029**
Sex				
Male	3 (60)	59 (52.21)	Reference	-
Female	2 (40)	54 (47.79)	0.73 (0.09-4.55)	.734
Weight, kg	31.20 (3.75-41.75)	13 (1.06-82)	1.03 (0.97-1.08)	.242
Height, cm [n=108]	[n=5] 113.90 ± 46.62	[n=103] 95.19 ± 29.28	1.02 (0.99-1.05)	.185
Symptoms				
Cough	5 (100)	111 (98.23)	0.25 (0.02-35.62)	.450
Fever	5 (100)	103 (91.15)	1.12 (0.11-150.30)	.941
Coryza	5 (100)	97 (85.84)	1.86 (0.20-248.67)	.654
Difficulty of breathing	5 (100)	42 (37.17)	18.51 (2.02-2452.08)	**.006**
Vomiting	0	40 (35.40)	0.16 (0.001-1.52)	.127
Decreased appetite	0	35 (30.97)	0.20 (0.001-1.85)	.185
Diarrhea	0	16 (14.16)	0.54 (0.004-5.12)	.654
Headache	0	9 (7.96)	1 (0.01-10.02)	>.999
Abdominal pain	0	8 (7.08)	1.13 (0.01-11.46)	.938
Eye redness	0	7 (6.19)	1.29 (0.01-13.36)	.871
Seizure	1 (20)	6 (5.31)	5.51 (0.50-36.46)	.140
Rash	0	6 (5.31)	1.50 (0.01-15.94)	.800
Sore throat	0	6 (5.31)	1.50 (0.01-15.94)	.800
Ear pain	0	4 (3.54)	2.21 (0.02-25.48)	.640
Others	0	10 (8.85)	0.90 (0.01-8.87)	.941
Chest examination findings				
Rales	5 (100)	63 (55.75)	8.75 (0.96-1158.55)	.056
Wheezing	5 (100)	43 (38.05)	17.83 (1.94-2362)	**.007**
Tachypnea	5 (100)	34 (30.09)	25.35 (2.75-3362.08)	**.002**
Chest retraction	5 (100)	31 (27.43)	28.81 (3.12-3823.44)	**.001**
Others	1 (20)	3 (2.65)	10.52 (0.89-83.58)	.060
Presence of co-infections				
Co-infection with Rhinovirus/Enterovirus	0	15 (13.27)	0.58 (0.004-5.53)	.695
Co-infection with RSV	0	6 (5.31)	1.50 (0.01-15.94)	.800
Predisposing factors				
Age under six months	1 (20)	13 (11.50)	1.92 (0.09-14.30)	.572
Presence of co-infections	0	19 (16.81)	0.44 (0.003-4.15)	.542
Neurologically impairment	4 (80)	2 (1.77)	222 (22.24-5761.88)	**<.001**
Laboratory parameters				
Complete blood count	[n=5]	[n=110]		
WBC count, $\times 10^9$/L [n=115]	13 (8.30-38.17)	10.15 (4-29.90)	1.10 (0.97-1.24)	.092
Neutrophils, % [n=115]	69 (33-84)	59.50 (13-88)	1.01 (0.96-1.07)	.664
Lymphocytes, % [n=115]	26 (14-55)	29.50 (5-78)	0.99 (0.94-1.04)	.838
Platelet count, $\times 10^9$/L [n=115]	202,00 (106,000-601,000)	335,500 (81,000-789,000)	0.99 (0.99-1)	.432
Markers of infection/ inflammation				
CRP, mg/L [n=69]	[n=3] 22.36 (11.91-42.62)	[n=66] 14.21 (0.13-238.89)	0.99 (0.95-1.02)	.722
ESR, mm/hr [n=9]	-	[n=9] 43 (21-99)	-	-
Procalcitonin, ng/mL [n=20]	[n=4] 1.71 (0.02-14.03)	[n=16] 0.41 (0-13.14)	1.14 (0.88-1.49)	.268
Oxygen saturation, %	84 (72-90)	97 (85-100)	0.62 (0.39-0.79)	**.004**
Pneumonia by CXR [n=106]	[n=5] 3 (60)	[n=101] 56 (55.45)	1.21 (0.19-9.45)	.842
Diagnosis				
Upper respiratory tract infection				
Sinusitis	0	13 (11.50)	0.68 (0.01-6.54)	.785
Pharyngitis	0	5 (4.42)	1.79 (0.01-19.66)	.723
Croup	0	3 (2.65)	2.87 (0.02-35.82)	.550
Common cold	0	28 (24.78)	0.27 (0.002-2.53)	.302
Lower respiratory tract infection				
Bronchiolitis	0	12 (10.62)	0.74 (0.01-7.18)	.834
Bronchitis	0	3 (2.65)	2.87 (0.02-35.82)	.550
Pneumonia	4 (80)	64 (56.64)	2.30 (0.41-23.50)	.360
Dengue fever	0	6 (5.31)	1.50 (0.01-15.94)	.800
Bronchial asthma	0	5 (4.42)	1.79 (0.01-19.66)	.723
Cerebral palsy	3 (60)	1 (0.88)	168 (15.03-4502.36)	**<.001**
Acute gastroenteritis	0	3 (2.65)	2.87 (0.02-35.82)	.550
Seizure	1 (20)	1 (0.88)	25 (1.78-361.29)	**.021**
Acute gastritis	0	2 (1.77)	4.05 (0.03-58.85)	.500
Others	5 (100)	26 (23.01)	36.32 (3.91-4826.71)	**.001**

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Table 4. Factors associated with the length of hospital stay (n= 118)

	Crude Beta Coefficient (95% CI)	p-value
Age, months	0.01 (-0.01 – 0.02)	.213
Sex		
Male	Reference	-
Female	-0.11 (-1.49 – 1.26)	.873
Weight, kg	0.02 (-0.04 – 0.07)	.546
Height, cm [n=108]	0.01 (-0.02 – 0.03)	.684
Symptoms		
Cough	0.24 (-5.08 – 5.57)	.929
Fever	1.02 (-1.44 – 3.49)	.412
Coryza	0.35 (-1.66 – 2.35)	.733
Difficulty of breathing	1.16 (-0.23 – 2.55)	.100
Vomiting	-0.13 (-1.58 – 1.32)	.857
Decreased appetite	-0.66 (-2.16 – 0.84)	.384
Diarrhea	0.09 (-1.92 – 2.10)	.932
Headache	0.22 (-2.37 – 2.81)	.864
Abdominal pain	-0.66 (-3.39 – 2.08)	.635
Eye redness	-0.86 (-3.77 – 2.05)	.559
Seizure	6.43 (3.77 – 9.09)	**<.001**
Rash	-0.07 (-3.20 – 3.06)	.963
Sore throat	0.10 (-3.03 – 3.23)	.949
Ear pain	-1.28 (-5.07 – 2.51)	.505
Others	1.82 (-0.63 – 4.26)	.144
Chest examination findings		
Rales	1.73 (0.38 – 3.09)	**.013**
Wheezing	1.08 (-0.31 – 2.46)	.127
Tachypnea	1.56 (0.13 – 2.99)	**.033**
Chest retraction	1.50 (0.03 – 2.96)	**.046**
Others	0.53 (-3.27 – 4.33)	.782
Presence of co-infections		
Co-infection with Rhinovirus/Enterovirus	-1.04 (-3.09 – 1.02)	.320
Co-infection with RSV	-0.95 (-4.08 – 2.17)	.547
Predisposing factors		
Age under six months	1.03 (-1.09 – 3.15)	.339
Presence of co-infections	-1.16 (-3.02 – 0.70)	.218
Neurologically impairment	9.41 (6.80 – 12.02)	**<.001**
Laboratory parameters		
Complete blood count		
WBC count, $\times 10^9$/L [n=115]	0.15 (0.04 – 0.27)	**.008**
Neutrophils, % [n=115]	0.02 (-0.02 – 0.05)	.354
Lymphocytes, % [n=115]	-0.01 (-0.05 – 0.03)	.591
Platelet count, $\times 10^9$/L [n=115]	-0.76 (-2.59 – 1.07)	.412
Markers of infection/ inflammation		
CRP, mg/L [n=69]	-0.004 (-0.03 – 0.02)	.708
ESR, mm/hr [n=9]	-0.05 (-0.21 – 0.11)	.494
Procalcitonin, ng/mL [n=20]	0.14 (-0.77 – 1.06)	.747
Oxygen saturation, %	-0.44 (-0.57 – -0.31)	**<.001**
Pneumonia by CXR [n=106]	0.47 (-1.05 – 1.99)	.545
Diagnosis		
Upper respiratory tract infection		
Sinusitis	0.77 (-1.42 – 2.96)	.487
Pharyngitis	-0.67 (-4.08 – 2.75)	.700
Croup	-0.93 (-5.29 – 3.44)	.675
Common cold	-1.25 (-2.85 – 0.35)	.125
Lower respiratory tract infection		
Bronchiolitis	-0.82 (-3.09 – 1.45)	.475
Bronchitis	3.86 (-0.45 – 8.17)	.079
Pneumonia	0.72 (-0.66 – 2.11)	.303
Dengue fever	-0.95 (-4.08 – 2.17)	.547
Bronchial asthma	0.17 (-3.24 – 3.58)	.922
Cerebral palsy	11.92 (8.81 – 15.02)	**<.001**
Acute gastroenteritis	-0.59 (-4.95 – 3.78)	.791
Seizure	8.41 (3.31 – 13.50)	**.001**
Acute gastritis	-0.75 (-6.07 – 4.57)	.781
Others	3.57 (2.15 – 4.99)	**<.001**

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DISCUSSION

This study underscored the predominance of viral pathogens in pediatric respiratory infections, with RSV and human rhinovirus/enterovirus being the leading causes of pneumonia. A local study reported that 57% of pneumonia cases had no identifiable clinical or microbiological cause, suggesting that many undetermined cases may have been viral.[3]

Most respiratory pathogens were detected in late 2023, aligning with patterns observed in the Philippines, where viral activity typically peaks from September to December, especially during the cooler months of October and November.[8] This seasonal increase is likely influenced by cooler, humid conditions that support viral stability, as well as indoor gatherings, particularly in schools, which facilitate transmission.[9] In contrast, fewer respiratory infections were reported in the second quarter of 2023, especially in June, likely due to increased outdoor activity during the summer break, which reduces viral transmission.

Most patients (95.8%) in this study experienced mild illness with favorable outcomes, although a small proportion (4.2%) required intensive care.

Age emerged as a critical determinant in the severity of respiratory infections, with younger children exhibiting a higher risk for severe symptoms, such as difficulty in breathing and necessitating supplemental oxygen. Specifically, infants under six months of age were associated with a nearly four-fold increase in the need for oxygen support. Conversely, patients requiring mechanical ventilation were significantly older. Of the five patients who needed mechanical ventilation, four (80%) had neurological impairments, including cerebral palsy, seizure disorder, West syndrome, and Trisomy-21 with choreoathetosis, with ages of 15, 13, 11, and 2 years. This association explains why older age was significantly associated with a higher risk of requiring mechanical ventilation.

Weight and height also emerged as significant predictors, with children requiring supplemental oxygen being smaller in both dimensions, whereas those necessitating mechanical ventilation tended to be larger and heavier, consistent with earlier observations that intubated patients were typically older and had underlying neurological impairments. This increased risk may be due to factors such as impaired respiratory function, compromised immune systems, higher rates of comorbidities, limited mobility, higher risks of aspiration, and difficulty in clearing secretions.[10]

Several clinical symptoms and physical examination findings were predictive of oxygen use and severe respiratory distress. Difficulty of breathing, rales, tachypnea, and chest retractions were strong indicators of the need for oxygen support, as these symptoms often reflect significant airway obstruction or lung involvement, leading to impaired gas exchange.[11] Wheezing and rales, in particular, were common among those needing supplemental oxygen and mechanical ventilation, with all ventilated patients having these symptoms. The high prevalence of these findings may be attributed to bronchial hyperreactivity and inflammation, typically seen in severe respiratory infections, which further compromise respiratory function.[12]

Laboratory findings in this study highlighted the pathogen-specific patterns in respiratory infections. Elevated WBC upon admission was noted in many viruses, like adenovirus, human rhinovirus/enterovirus, parainfluenza-1, and coronavirus-OC43. A study by Gambaduro, et al., found that a temporary increase in the WBC count was often seen early in the course of viral infections, due to the immune response's initial cytokine and chemokine release, which mobilizes immune cells. This rise typically subsides as the immune system transitions to antibody production.[13]

The median neutrophil percentage upon admission was higher than that of lymphocytes in infections caused by adenovirus, coronavirus-229E, coronavirus-NL63, coronavirus-OC43, human metapneumovirus, human rhinovirus/enterovirus, influenza A and B, parainfluenza-1, -3 and -4; and *Mycoplasma pneumoniae*, contrasting with the traditional teaching that there is a lymphocytic predominance in viral infections. Neutrophilia may reflect the early cytokine and chemokine response, as mentioned above, but if this persists, it may be due to complications like a secondary bacterial pneumonia,[14] which could not be definitively excluded in this study, due to the respiratory panel's limited bacterial coverage.

This study found that co-infections involving human rhinovirus/enterovirus and parainfluenza virus were linked to severe symptoms, like croup. However, most co-infections did not appear to increase the risk of severe outcomes, such as oxygen use or prolonged hospitalization. This variability in disease severity aligns

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with findings from a systematic review by Elboukari, et al., which emphasized the impact of specific pathogen combinations.[15,16]

The median hospital stay was four days. Neurological conditions, including seizures and cerebral palsy, were the strongest predictors of extended stays, since patients with underlying neurological conditions experienced more severe manifestations of respiratory illnesses, necessitating longer hospitalization.[10] This is consistent with a study by Boel, et al., which found that patients with neurological impairments, such as cerebral palsy, are at greater risk of experiencing a more severe or prolonged infection, and were more likely to require intensive care unit admission.[10] Longer hospital stay was also associated with severe respiratory symptoms and findings, such as rales, tachypnea, chest retractions, elevated WBC counts, and low oxygen saturation. However, factors like sex, weight, and common diagnoses such as pneumonia or bronchiolitis, were not significantly linked to longer hospital stay. This indicates that infection severity was a primary factor for extended hospital stays, often outweighing the specific diagnosis.

The study identified several significant characteristics of common respiratory pathogens. The most common pathogen was RSV, which peaked in the cooler months of September and October. The median age of affected patients was 12.5 months, with younger, smaller children, especially those under 6 months, being more susceptible. During RSV infection, infants are more prone to severe symptoms due to underdeveloped airways and immune responses, leading to higher morbidity.[17,18] RSV was most frequently associated with difficulty in breathing and decreased appetite, and exhibited the highest prevalence of rales, wheezing, tachypnea, and chest retractions, among respiratory viruses. These findings are likely due to RSV's propensity to cause bronchiolitis, leading to significant airway obstruction and increased work of breathing.[17] As a result, patients commonly required supplemental oxygen, typically through a nasal cannula or face mask. Laboratory findings on admission revealed a lymphocytic predominance, typical of viral infections. RSV infections were associated with lower CRP and procalcitonin levels, suggesting a milder inflammatory response.[19] Higdon, et al., indicated that elevated CRP and procalcitonin levels during RSV infection may signal the presence of bacterial superinfection, which may help in the assessment for this complication.[19] Despite significant respiratory distress and supplemental oxygen use, the average hospital stay for RSV patients was only four days, with most discharged without complications, indicating that RSV-infected patients looked quite ill on admission, but recovered quickly.

Human rhinovirus/enterovirus was the next most common pathogen, with a bimodal distribution throughout the year corresponding to the school season, when children are in close contact with schoolmates, amplifying community outbreaks. These infections were significantly associated with co-infections, particularly with RSV. The median age of affected patients was 24 months. Symptoms typically included cough, fever, and coryza, while some (55.6%) presented with rales, though this was insignificant. The majority of patients (74.1%) did not require supplemental oxygen. Laboratory findings on admission showed elevated WBC with neutrophilic predominance, and high platelet counts, Additionally, the length of hospital stay was significantly shorter for these patients.

Adenovirus infections were more sporadic, with clusters observed from March to May 2024 and October to December 2023. The median age of patients was 55 months, with males more frequently affected. Adenovirus commonly presented with more distinct symptoms, such as eye redness and sore throat, rather than typical respiratory symptoms. Consequently, these patients were less likely to require supplemental oxygen, remaining on room air, with sinusitis being the most common diagnosis. Laboratory findings on admission included a high WBC, with a neutrophilic predominance and a high CRP level, indicating a neutrophil-driven immune response, consistent with other studies.[14,20] A study by Appenzeller, et al., indicated that in children with adenovirus, CRP levels can be significantly high, even without secondary bacterial infections, reflecting an immediate inflammatory response similar to invasive bacterial infection. However, these levels do not correlate with illness severity or duration.[21]

Influenza A and B patients were significantly older, with a median age of 60–72 months, and were heavier and taller, compared to those without these infections. These patients were less likely to present with difficulty of breathing, rales, or chest retractions, with a diagnosis of the common cold more often seen (62.3%). As a result, they were less likely to require supplemental oxygen. A

study by Ascough, et al., showed that antibodies generated by influenza infections provide long-lasting protection.[22] Laboratory findings showed significantly lower WBC and platelet counts, with a neutrophilic predominance.

Mycoplasma pneumoniae infections primarily affected older, taller children, with a median age of 164 months, and were more common in females, although we only had three patients with this infection. A study by Youn, et al., indicated that *Mycoplasma pneumoniae* infections were more common in older children due to greater exposure in school settings, where close contact promotes transmission. Additionally, their more mature immune response allows for a prolonged and targeted response that is required for symptomatic infection.[23] These patients presented more frequently with abdominal pain, in addition to cough, fever, and coryza, likely due to the organism's capacity to cause atypical pneumonia with extra-pulmonary symptoms.[24] Rales were noted in all patients, and chest X-rays confirmed pneumonia, though all remained on room air. WBC counts were lower with a neutrophilic predominance, while CRP levels were elevated. *Mycoplasma pneumoniae* cases had the longest hospital stay, suggesting that atypical bacterial infections lead to more prolonged courses.[24]

CONCLUSION

This study of 118 pediatric patients identified key findings related to respiratory infections. Most patients (85.6%) tested positive for at least one pathogen, with viral infections being predominant, especially RSV (23.7%) and human rhinovirus/enterovirus (22.9%). Co-infections were identified, most commonly involving RSV and human rhinovirus/enterovirus. RSV infections primarily affected younger patients, particularly those under six months, and were linked to more severe respiratory symptoms and increased need for supplemental oxygen, but patients recovered quickly. Adenovirus infections were more frequent in males, less associated with severe symptoms, and often led to a sinusitis diagnosis. Human rhinovirus/enterovirus was linked to higher co-infection rates and shorter hospital stays, while influenza A mainly affected older children and caused less respiratory distress. *Mycoplasma pneumoniae* infections were associated with abdominal pain and longer hospital stays.

Viral pathogens peaked in the latter part of the year, reflecting seasonal trends. Laboratory findings showed elevated WBC with neutrophilic predominance upon admission for most infections.

The study also highlighted factors influencing severe outcomes. Difficulty of breathing was the strongest predictor for supplemental oxygen use, while neurological impairments, such as cerebral palsy and seizure disorder, were the major predictors of mechanical ventilation and longer hospital stays. These findings underscore the diverse clinical presentations of pediatric respiratory infections.

This study's one-year duration and small sample size for certain organisms limit the generalizability of the findings. A longer study duration with a larger sample size would provide a better understanding of trends in viral infections and any potential year-to-year differences. This study did not investigate the role of antibiotics in viral infections, such as their impact on illness duration, use of oxygen support, or length of hospital stay. Future research could explore how antibiotics affect outcomes in viral infections. Additionally, factors that predispose patients to admission to the intensive care unit (ICU) were not investigated. Although co-infections were examined, the study may not have fully accounted for potential interactions between different pathogens, which future research could explore to provide valuable insights into illness severity.

CONFLICT OF INTEREST

None declared.

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ANNEX A
Proportion of missing data per variable

Variable	N missing	% missing
Height	10	8.47%
WBC	3	2.54%
Neutrophils	3	2.54%
Lymphocytes	3	2.54%
Platelet count	3	2.54%
C-reactive protein	49	41.53%
Erythrocyte sedimentation rate	109	92.37%
Procalcitonin	98	83.05%
Pneumonia by CXR	12	10.17%

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ANNEX B
Demographic and clinical profile of each pathogen

	Adenovirus	Coronavirus 229E	Coronavirus NL63	Coronavirus OC43	SARS-CoV-2	Human Metapneumovirus	Human rhinovirus/ Enterovirus	Influenza A	Influenza B	Parainfluenza Virus 1	Parainfluenza Virus 3	Parainfluenza Virus 4	Respiratory Syncytial Virus	Bordetella parapertussis	Mycoplasma pneumoniae
	(n = 16)	(n = 1)	(n = 1)	(n = 3)	(n = 2)	(n = 6)	(n = 27)	(n = 19)	(n = 2)	(n = 2)	(n = 3)	(n = 6)	(n = 28)	(n = 1)	(n = 3)
						Mean ± SD; Median (Range); Frequency (%)									
Age, months	55.31 ± 33.03	72	24	24 (10-24)	16 (15-17)	56.67 ± 59.35	24 (1-108)	60 (10-168)	72 (60-84)	41.50 (11-72)	9 ± 13	37 ±33.59	12.50 (0.56-120)	12	164 ± 54.11
Sex															
Male	13 (81.25)	0	1 (100)	1 (33.33)	1 (50)	2 (33.3)	11 (40.74)	11 (57.89)	1 (50)	2 (100)	2 (66.67)	4 (66.67)	11 (39.29)	0	0
Female	3 (18.75)	1 (100)	0	2 (66.67)	1 (50)	4 (66.67)	16 (59.26)	8 (42.11)	1 (50)	0	1 (33.33)	2 (33.33)	17 (60.71)	1 (100)	3 (100)
Weight, kg	17.40 (8.50-56)	23	22.5	13.67 ± 4.16	9.75 (9-10.50)	20.45 ± 14.81	13.67 ± 6.35	19.20 (7.60-56.50)	24.65 (18.30-31)	12.50 (8-17)	7.20 ± 4.39	12.30 ± 4.88	9.53 ± 4.54	1.06	45.73 ± 1.18
Height, cm	105.09 ± 21.84	102	-	78 ± 17.35	82 (80-84)	100.10 ± 31.76	90.32 ± 22.71	109.10 ± 29.47	115.50 (104-127)	95.50 (76-115)	58.50 ± 7.86	87.50 ± 29.29	74.80 ± 23.89	78	155.30 ± 7.02
Symptoms															
Cough	14 (87.50)	1 (100)	1 (100)	3 (100)	2 (100)	6 (100)	27 (100)	19 (100)	2 (100)	2 (100)	3 (100)	6 (100)	28 (100)	1 (100)	3 (100)
Fever	14 (97.50)	0	1 (100)	3 (100)	2 (100)	6 (100)	23 (85.19)	18 (94.74)	2 (100)	1 (50)	3 (100)	5 (83.33)	26 (92.86)	1 (100)	3 (100)
Coryza	13 (81.25)	1 (100)	0	3 (100)	1 (50)	6 (100)	26 (96.30)	16 (84.21)	2 (100)	1 (50)	3 (100)	3 (50)	27 (96.43)	0	2 (66.67)
Difficulty of breathing	0	0	1 (100)	0	2 (100)	1 (16.67)	14 (51.85)	3 (15.79)	0	1 (50)	2 (66.67)	3 (50)	18 (64.29)	0	0
Vomiting	7 (43.75)	1 (100)	0	0	0	2 (33.33)	10 (37.04)	7 (36.84)	1 (50)	1 (50)	0	2 (33.33)	7 (25)	0	1 (33.33)
Decreased appetite	6 (37.50)	1 (100)	0	0	1 (50)	2 (33.33)	7 (25.93)	5 (26.32)	2 (100)	1 (50)	2 (66.67)	0	14 (50)	0	0
Diarrhea	3 (18.75)	0	1 (33.33)	0	0	0	0	5 (26.32)	0	0	0	3 (50)	3 (10.71)	0	0
Headache	2 (12.50)	0	0	0	0	0	1 (3.70)	3 (15.79)	0	0	0	0	1 (3.57)	0	1 (33.33)
Abdominal pain	0	0	0	0	0	0	0	1 (5.26)	1 (50)	0	0	0	0	0	2 (66.67)
Eye redness	4 (25)	0	0	1 (33.33)	0	0	1 (3.70)	0	0	0	0	1 (16.67)	1 (3.57)	0	0
Seizure	0	0	0	1 (33.33)	0	1 (16.67)	0	2 (10.53)	0	0	0	1 (16.67)	1 (3.57)	0	0
Rash	2 (12.50)	0	0	1 (33.33)	0	1 (16.67)	2 (7.41)	1 (5.26)	0	0	0	1 (16.67)	0	0	0
Sore throat	3 (18.75)	0	0	0	0	0	1 (3.70)	1 (5.26)	0	1 (50)	0	0	0	0	1 (33.33)
Ear pain	1 (6.25)	0	0	0	0	0	0	1 (5.26)	1 (50)	1 (50)	0	0	0	0	0
Others	1 (6.25)	0	0	0	0	1 (16.67)	2 (7.41)	4 (21.05)	0	0	1 (33.33)	0	1 (3.57)	0	0
Chest P.E. findings upon admission															
Crackles	3 (18.75)	1 (100)	1 (100)	1 (33.33)	2 (100)	3 (50)	15 (55.56)	5 (26.32)	1 (50)	0	3 (100)	5 (83.33)	21 (75)	1 (100)	2 (66.67)
Wheezing	3 (18.75)	1 (100)	1 (100)	0	1 (50)	3 (50)	12 (44.44)	7 (36.84)	0	1 (50)	1 (33.33)	4 (66.67)	16 (57.14)	0	0
Tachypnea	0	0	0	0	1 (50)	1 (16.67)	9 (33.33)	4 (21.05)	0	1 (50)	2 (66.67)	1 (16.67)	16 (57.14)	0	0
Chest retraction	0	0	0	0	2 (100)	1 (16.67)	10 (37.04)	2 (10.53)	0	1 (50)	2 (66.67)	2 (33.33)	17 (60.71)	0	0
Others	0	0	0	0	0	0	1 (3.70)	0	0	1 (50)	0	1 (16.67)	2 (7.14)	0	0
Presence of co-infections															
Co-infection with Rhinovirus/Enterovirus	3 (18.75)	1 (100)	0	0	0	1 (16.67)	15 (55.56)	1 (5.26)	0	1 (50)	2 (66.67)	1 (16.67)	5 (17.86)	0	0
Co-infection with RSV	0	0	0	0	1 (50)	0	5 (18.52)	0	0	0	0	0	6 (21.43)	0	0
Pre-disposing factor															
Age under six months	0	0	0	0	1 (50)	1 (16.67)	4 (14.81)	0	0	0	2 (66.67)	0	8 (28.57)	0	0
Presence of co-infections	4 (25)	1 (100)	0	1 (33.33)	1 (50)	2 (33.33)	15 (55.56)	3 (15.76)	0	1 (50)	2 (66.67)	2 (33.33)	6 (21.43)	0	0
Neurological impairment	0	0	0	0	0	1 (16.67)	0	1 (5.26)	0	0	0	1 (16.67)	0	0	0
Oxygen support															
Room air	16 (100)	1 (100)	1 (100)	3 (100)	1 (50)	5 (83.33)	20 (74.07)	17 (89.47)	2 (100)	2 (100)	2 (66.67)	5 (83.33)	16 (57.14)	1 (100)	3 (100)
Nasal cannula or face mask	0	0	0	0	1 (50)	1 (16.67)	7 (25.93)	2 (10.53)	0	0	1 (33.33)	1 (16.67)	12 (42.86)	0	0
CPAP	0	0	0	0	0	1 (16.67)	0	0	0	0	0	0	1 (3.57)	0	0
NIPPV	0	0	0	0	0	1 (16.67)	0	0	0	0	0	0	0	0	0
Intubated	0	0	0	0	0	1 (16.67)	0	0	0	0	0	0	0	0	0

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	Adenovirus	Coronavirus 229E	Coronavirus NL63	Coronavirus OC43	SARS-CoV-2	Human Metapneumovirus	Human rhinovirus/ Enterovirus	Influenza A	Influenza B	Parainfluenza Virus 1	Parainfluenza Virus 3	Parainfluenza Virus 4	Respiratory Syncytial Virus	Bordetella parapertussis	Mycoplasma pneumoniae
	(n = 16)	(n = 1)	(n = 1)	(n = 3)	(n = 2)	(n = 6)	(n = 27)	(n = 19)	(n = 2)	(n = 2)	(n = 3)	(n = 6)	(n = 28)	(n = 1)	(n = 3)
	Mean ± SD; Median (Range); Frequency (%)														
Laboratory parameters															
Complete blood count															
WBC count, $\times 10^9$/L	14.39 ± 7.30	18.5	12.5	14.97 ± 7.50	10 (7.70-12.30)	10.47 ± 2.86	14.44 ± 5.39	7.51 ± 2.87	4.90 (4-5.80)	14.76 (6.31-23.20)	11.95 ± 10.11	12.91 ± 3.11	9.40 (4.21-23.80)	-	5.33 ± 0.55
Neutrophils, %	65.38 ± 17.24	72	53	50.33 ± 17.79	19 (16-22)	64 ± 19.06	59.68 ± 21.43	58.83 ± 14.87	57.50 (53-62)	50.50 (35-66)	52.67 ± 21.73	52 ± 24.84	41.70 ± 15.97		67 ± 5.29
Lymphocytes, %	21 (9-69)	26	39	34.33 ± 11.02	73.50 (69-78)	28.17 ± 17.78	27 (7-75)	30.83 ± 14.28	33.50 (28-39)	38 (21-55)	36.67 ± 16.07	37.17 ± 20.33	47.41 ± 15.00	-	22.67 ± 4.51
Platelet count, $\times 10^9$/L	336,000 (199,000-476,000)	592,000	334,000	428,000 ± 106,784.80	360,000 (282,000-438,000)	277,333 ± 138,660.30	382,320 ± 114,885	274,000 (81,000-789,000)	242,000 (227,000-257,000)	374,000 (265,000-483,000)	293,333 ± 87,134	438,500 ± 104,230	367,111 ± 118,982.70	-	245,000 ± 68,242.22
Markers of infection/ inflammation	[n=8]					[n=4]	[n=15]	[n=7]		[n=1]	[n=1]		[n=23]	-	[n=1]
CRP mg/L	57.35 ± 58.24	-	-	76.91 ± 41.47	0.22 (0.13-0.31)	54.17 ± 12.57	11.78 (0.22-238.89)	13.92 (1.07-65.41)	6.09 (4.23-7.95)	6.45	10.56	48.25 ± 64.12	6.23 (0.22-62.64)		34.42 (19.13-49.71)
ESR, mm/hr	[n=2] 54 (43-65)	-	-	[n=1] 75	-	-	[n=1] 65	[n=1] 18	[n=1] 21	-	-	[n=2] 54.50 (34-75)	[n=1] 28	- -	[n=1] 99
Procalcitonin, ng/mL	[n=2] 1.64 (0.72-2.56)	-	-	[n=1] 13.14	-	[n=1] 2.17	[n=3] 1.65 ± 2.17	[n=3] 0.42 ± 0.03	-	-	[n=1] 0.64	[n=1] 0.36	[n=6] 0.16 ± 0.10	-	-
Oxygen saturation, %	97 (97-99)	98	97	98 (98-98)	96.50 (96-97)	97 (84-99)	97 (85-99)	97 (85-99)	97 (97-97)	98 (98-98)	92 (92-97)	96.33 ± 4.41	96 (86-100)	96	97 (97-97)
Pneumonia by CXR	[n=13] 6 (46.15)	1 (100)	0	[n=1] 0	2 (100)	5 (83.33)	[n=26] 15 (57.6)	5 (31.25)	[n=1] 1 (100)	[n=1] 0	[n=2] 2 (100)	[n=5] 3 (60)	[n=27] 14 (51.85)	1 (100)	3 (100)
Diagnosis															
Upper respiratory tract infection															
Sinusitis	5 (31.25)	0	0	1 (33.33)	0	0	3 (11.11)	3 (15.79)	0	0	0	0	1 (3.57)	0	0
Pharyngitis	2 (12.50)	0	0	0	0	0	1 (3.70)	0	0	1 (50)	0	0	1 (3.57)	0	1 (33.33)
Croup	0	0	1 (100)	0	0	0	1 (3.70)	0	0	1 (50)	0	1 (16.67)	0	0	0
Common cold	7 (43.75)	0	0	2 (66.67)	0	1 (16.67)	5 (18.52)	12 (63.16)	0	1 (50)	0	1 (16.67)	1 (3.57)	0	0
Lower respiratory tract infection											0				
Bronchiolitis	1 (6.25)	0	0	0	0	0	2 (7.41)	0	0	0	0	1 (16.67)	10 (35.71)	0	0
Bronchitis	0	0	0	0	0	0	0	1 (5.26)	0	0	0	1 (16.67)	10 (35.71)	0	0
Pneumonia	5 (31.25)	1 (100)	0	1 (33.33)	2 (100)	5 (83.33)	18 (66.67)	6 (31.58)	2 (100)	0	3 (100)	3 (50)	15 (53.57)	1 (100)	3 (100)
Dengue fever	0	0	0	0	0	2 (33.33)	1 (3.70)	2 (10.53)	0	0	0	0	1 (3.57)	0	1 (33.33)
Bronchial asthma	0	1 (100)	0	0	0	0	2 (7.41)	0	0	0	0	2 (33.33)	0	0	0
Cerebral palsy	0	0	0	0	0	0	0	0	0	0	0	1 (16.67)	0	0	0
Acute gastroenteritis	1 (6.25)	0	0	0	0	0	1 (3.70)	1 (5.26)	0	0	0	0	1 (3.57)	0	0
Seizure	0	0	0	0	0	0	0	0	0	0	0	0	1 (3.57)	0	0
Acute gastritis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1 (33.33)
Others	4 (25)	0	0	2 (66.67)	0	3 (50)	2 (7.41)	6 (31.58)	1 (50)	0	1 (33.33)	1 (16.67)	6 (21.43)	0	1 (33.33)
Length of hospital stay, days	4 (0-5)	6	1	3 (3-5)	4 (3-5)	5.17 ± 3.37	3 (1-7)	3.63 ± 1.77	3 (2-4)	2.50 (1-4)	3 (3-8)	4.67 ± 2.34	4 (1-19)	4	5.67 ± 2.08
Disposition															
Discharge	16 (100)	1 (100)	1 (100)	3 (100)	2 (100)	6 (100)	27 (100)	19 (100)	2 (100)	2 (100)	3 (100)	6 (100)	28 (100)	1 (100)	3 (100)
Expired	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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ANNEX C

p-values for individual comparisons of presence versus absence of common respiratory pathogens

	Adenovirus (n = 16)	Human Metapneumovirus (n = 6)	Human Rhinovirus/ Enterovirus (n = 27)	Influenza (n = 21)	Parainfluenza Virus (n = 11)	Respiratory Syncytial Virus (n = 28)	Bacteria (n = 4)
Age, months	.121§	.782§	.271§	**.005**§	.181§	**<.001**§	.050§
Sex	**.028**†	.421‡	.238†	.822†	.275†	.164†	**.049**‡
Weight, kg	.056§	.713§	.338§	**.008**§	.076§	**<.001**§	.131§
Height, cm [n=108]	.107*	.735*	.282*	**.025***	.089*	**<.001***	**.036**§
Symptoms							
Cough	**.017**‡	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡
Fever	.624‡	>.999‡	.234‡	.689‡	.235‡	>.999‡	>.999‡
Coryza	.454‡	>.999‡	.115‡	>.999‡	**.042**‡	.113‡	.088‡
Difficulty of breathing	**<.001**‡	.400‡	.219†	**.017**†	.342‡	**.005**†	.150‡
Vomiting	.541†	>.999‡	.872†	.846†	.748‡	.363†	>.999‡
Decreased appetite	.557‡	>.999‡	.807†	.886†	>.999‡	**.014**†	.317‡
Diarrhea	.454‡	>.999‡	**.021**‡	.159‡	.170‡	.759‡	>.999‡
Headache	.351‡	>.999‡	.683‡	.199‡	>.999‡	.684‡	.275‡
Abdominal pain	.596‡	>.999‡	.196‡	.631‡	>.999‡	.196‡	**.023**‡
Eye redness	**.006**‡	>.999‡	>.999‡	.350‡	.505‡	>.999‡	>.999‡
Seizure	.591‡	.313‡	.349‡	.606‡	.505‡	>.999‡	>.999‡
Rash	.187‡	.274‡	.619‡	>.999‡	.452‡	.333‡	>.999‡
Sore throat	**.032**‡	>.999‡	>.999‡	>.999‡	.452‡	.333‡	.191‡
Ear pain	.446‡	>.999‡	.573‡	.145‡	.328‡	.571‡	>.999‡
Others	>.999‡	.419‡	>.999‡	.076‡	>.999‡	.448‡	>.999‡
Chest examination findings							
Rales	**.002**†	.697‡	.979†	**.006**†	.351‡	.056†	.636‡
Wheezing	.100†	.686‡	.818†	.610†	.351‡	.070†	.145‡
Tachypnea	**.001**‡	.662‡	>.999†	.212†	>.999‡	**.004**†	.301‡
Chest retraction	**.003**‡	.666‡	.548†	**.041**†	.307‡	**<.001**†	.312‡
Others	>.999‡	>.999‡	>.999‡	>.999‡	**.043**‡	.238‡	>.999‡
Presence of co-infections							
Co-infection with Rhinovirus/Enterovirus	.427‡	.566‡	-	.303‡	**.033**‡	.345‡	>.999‡
Co-infection with RSV	>.999‡	>.999‡	**.002**‡	.589‡	>.999‡	-	>.999‡
Predisposing factors							
Age under six months	.211‡	.540‡	.735‡	.072‡	.618‡	**.004**‡	>.999‡
Presence of co-infections	.288‡	.248‡	**<.001**‡	>.999‡	**.016**‡	.387‡	>.999‡
Neurological impairment	>.999‡	.274‡	.334‡	>.999‡	.452‡	.333‡	>.999‡
Oxygen support							
Room air	**.011**‡	>.999‡	>.999†	.137‡	>.999‡	**.020**†	.571‡
Nasal cannula or face mask	**.021**‡	>.999‡	.867†	.153‡	>.999‡	**.009**†	.572‡
CPAP	>.999‡	.233‡	.588‡	.584‡	>.999‡	>.999‡	>.999‡
NIPPV	>.999‡	.051‡	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡
Intubated	>.999‡	.146‡	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡
Laboratory parameters							
Complete blood count							
WBC count, $\times 10^9$/L [n=115]	.087§	.900§	**.001**§	**<.001**§	.424§	.096§	**.014**§
Neutrophils, % [n=115]	**.039**§	.349§	.250§	.822§	.470§	**<.001**§	.375§
Lymphocytes, % [n=115]	**.021**§	.554§	.363§	.712§	.419§	**<.001**§	.317§
Platelet count, $\times 10^9$/L [n=115]	.913§	.202§	**.039**§	**.002**§	.229§	.119§	.082§
Markers of infection/ inflammation							
CRP, mg/L [n=69]	.190§	**.048**§	.517§	.392§	.888§	**.008**§	.411§
ESR, mm/hr [n=9]	.770§	-	.699§	.143§	>.999§	.245§	.121§
Procalcitonin, ng/mL [n=20]	.314§	-	.791§	.874§	.900§	**.002**§	-
Oxygen saturation, %	.087§	.975§	.360§	.496§	.527§	.073§	.682§
Pneumonia by CXR [n=106]	.661†	.224‡	.990†	.115†	>.999‡	.813†	.128‡
Diagnosis							
Upper respiratory tract infection							
Sinusitis	**.016**‡	>.999‡	>.999‡	.700‡	.608‡	.297‡	>.999‡
Pharyngitis	.135‡	>.999‡	>.999‡	.584‡	.392‡	>.999‡	.161‡
Croup	>.999‡	>.999‡	.545‡	>.999‡	**.023**‡	>.999‡	>.999‡
Common cold	.058‡	>.999‡	.640†	**<.001**‡	>.999‡	**.009**†	.571‡
Lower respiratory tract infection							
Bronchiolitis	>.999‡	>.999‡	.713‡	.121‡	>.999‡	**<.001**‡	>.999‡
Bronchitis	>.999‡	>.999‡	>.999‡	.448‡	.256‡	.560‡	>.999‡
Pneumonia	**.043**†	.240‡	.389†	.079†	>.999‡	.781†	.136‡
Dengue fever	>.999‡	**.030**‡	>.999‡	.289‡	>.999‡	>.999‡	.191‡
Bronchial asthma	>.999‡	>.999‡	.322‡	.584‡	.068‡	.337‡	>.999‡
Cerebral palsy	>.999‡	>.999‡	.573‡	>.999‡	.328‡	.571‡	>.999‡
Acute gastroenteritis	.357‡	>.999‡	.545‡	.448f	>.999‡	.560‡	>.999‡
Seizure	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡	.420‡	>.999‡
Acute gastritis	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡	.067‡
Others	>.999‡	.185‡	**.022**†	.422‡	.726‡	.674†	>.999‡
Length of hospital stay, days	.675§	.348§	**.009**§	.822§	.478§	.436§	.115§
Disposition	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡

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ANNEX C

Supplementary Table Non-significant p-values for individual comparisons of presence versus absence of common respiratory pathogens

	Adenovirus (n = 16)	Human Metapneumovirus (n = 6)	Human Rhinovirus/ Enterovirus (n = 27)	Influenza (n = 21)	Parainfluenza Virus (n = 11)	Respiratory Syncytial Virus (n = 28)	Bacteria (n = 4)
Symptoms							
Fever	.624‡	>.999‡	.234‡	.689‡	.235‡	>.999‡	>.999‡
Vomiting	.541†	>.999‡	.872†	.846†	.748‡	.363†	>.999‡
Headache	.351‡	>.999‡	.683‡	.199‡	>.999‡	.684‡	.275‡
Seizure	.591‡	.313‡	.349‡	.606‡	.505‡	>.999‡	>.999‡
Rash	.187‡	.274‡	.619‡	>.999‡	.452‡	.333‡	>.999‡
Ear pain	.446‡	>.999‡	.573‡	.145‡	.328‡	.571‡	>.999‡
Others	>.999‡	.419‡	>.999‡	.076‡	>.999‡	.448‡	>.999‡
Chest examination findings							
Wheezing	.100†	.686‡	.818†	.610†	.351‡	.070†	.145‡
Oxygen support							
CPAP	>.999‡	.233‡	.588‡	.584‡	>.999‡	>.999‡	>.999‡
NIPPV	>.999‡	.051‡	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡
Intubated	>.999‡	.146‡	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡
Oxygen saturation, %	.087§	.975§	.360§	.496§	.527§	.073§	.682§
Pneumonia by CXR [n=106]	.661†	.224‡	.990†	.115†	>.999‡	.813†	.128‡
Diagnosis							
Upper respiratory tract infection							
Pharyngitis	.135‡	>.999‡	>.999‡	.584‡	.392‡	>.999‡	.161‡
Lower respiratory tract infection							
Bronchitis	>.999‡	>.999‡	>.999‡	.448‡	.256‡	.560‡	>.999‡
Bronchial asthma	>.999‡	>.999‡	.322‡	.584‡	.068‡	.337‡	>.999‡
Cerebral palsy	>.999‡	>.999‡	.573‡	>.999‡	.328‡	.571‡	>.999‡
Acute gastroenteritis	.357‡	>.999‡	.545‡	.448f	>.999‡	.560‡	>.999‡
Seizure	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡	.420‡	>.999‡
Acute gastritis	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡	.067‡
Disposition	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡	>.999‡

Statistical tests used: *–Independent T-test; §–Mann-Whitney U test; †–Chi-square test; ‡–Fisher's exact test.