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CONTEMPORARY CHALLENGES OF ACUTE RESPIRATORY INFECTIONS IN PEDIATRIC

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Background: Acute respiratory infections (ARIs) remain one of the leading causes of morbidity and hospitalization among children globally. The heterogeneity of viral and bacterial pathogens involved, compounded by evolving epidemiological trends post-COVID-19, presents significant diagnostic and therapeutic challenges, especially in low- and middle-income countries (LMICs).
Objective: This study aimed to analyze the clinical and epidemiological features of pediatric patients with ARIs of uncertain etiology and to evaluate the role of rapid antigen testing for SARS-CoV-2 in the initial diagnostic algorithm.
Methods: A total of 70 children aged between 2 months and 14 years, hospitalized with acute respiratory symptoms at the Zangiota-1 City Specialized Infectious Disease Hospital between January and May 2024, were enrolled in a prospective observational study. Detailed clinical data were collected, and all patients underwent rapid antigen testing for COVID-19 using oropharyngeal and nasopharyngeal swabs at admission.
Results: Fever (>37.0°C) and cough were the most prevalent clinical symptoms, occurring in 90% and 84.2% of patients, respectively. None of the children tested positive for SARS-CoV-2 using rapid antigen testing. The majority of patients presented within the first 48 hours of symptom onset.
Conclusion: Rapid antigen testing for SARS-CoV-2 remains a critical diagnostic tool in pediatric patients presenting with nonspecific ARI symptoms. Integration of such diagnostics into frontline clinical workflows in LMICs facilitates early differential diagnosis, reduces the inappropriate use of antibiotics, and enhances outbreak preparedness and response.
Keywords: Acute respiratory infections, SARS-CoV-2, pediatrics, rapid diagnostics, low- and middle-income countries, Uzbekistan

Introduction

Acute respiratory infections (ARIs) continue to represent a major public health burden, accounting for a significant proportion of morbidity and mortality among children under the age of five, particularly in resource-constrained settings. ARIs are typically caused by a spectrum of viral and bacterial pathogens, including respiratory syncytial

virus (RSV), influenza viruses, parainfluenza viruses, adenoviruses, and Streptococcus pneumoniae. The overlap in clinical manifestations—such as fever, cough, rhinorrhea, and respiratory distress—poses a considerable challenge for accurate diagnosis, timely treatment, and infection control.

The emergence of SARS-CoV-2 has further complicated the clinical landscape, as COVID-19 shares many symptoms with other common respiratory infections. Post-pandemic, the need for sensitive and rapid diagnostic tools has intensified to distinguish between SARS-CoV-2 and other etiologies, especially to avoid misdiagnosis and prevent the spread of infection.

This study was designed to analyze pediatric ARIs of unknown etiology in a clinical hospital setting in Uzbekistan and to evaluate the utility of point-of-care rapid antigen tests for SARS-CoV-2 in supporting differential diagnosis.

Materials and Methods

A prospective observational study was conducted from January 12 to May 24, 2024, involving pediatric patients admitted to the Zangiota-1 City Specialized Infectious Disease Hospital in Tashkent, Uzbekistan. Inclusion criteria comprised children aged from 2 months to 14 years with signs and symptoms of acute respiratory infection (onset <5 days), including fever, cough, sore throat, and nasal congestion, in the absence of a confirmed etiology.

Clinical Assessment

Upon admission, all patients underwent thorough clinical examination, and detailed patient histories were obtained from caregivers. Vital signs, symptom duration, comorbidities, vaccination status, and potential COVID-19 exposure were recorded. Laboratory testing was performed based on clinical indications.

Rapid Antigen Testing

All patients were subjected to rapid antigen testing for SARS-CoV-2 using combined nasopharyngeal and oropharyngeal swabs. The testing was carried out using lateral flow immunoassays approved by the Uzbek Ministry of Health. Tests were performed within 30 minutes of sample collection, and results were interpreted in accordance with manufacturer instructions.

Data Analysis

Descriptive statistical methods were applied to summarize clinical and diagnostic findings. Results were expressed in absolute numbers and percentages. Ethical approval for the study was granted by the Institutional Review Board of the Research Institute of Virology.

Results

A total of 70 pediatric patients met the inclusion criteria. The age distribution ranged

from 2 months to 14 years, with a median age of 4.6 years. Slightly more than half of the cohort (54%) were male. All patients presented within the first 72 hours of symptom onset.

Clinical Presentation

The most common presenting symptoms were fever >37°C in 90% (n=63), followed by persistent cough in 84.2% (n=59). Other symptoms included nasal discharge (38.5%), sore throat (24.2%), wheezing (11.4%), and vomiting (7.1%). None of the patients required mechanical ventilation or intensive care during hospitalization.

Diagnostic Testing

Rapid antigen tests for SARS-CoV-2 yielded negative results in all cases. This finding was significant given the high clinical suspicion of viral etiology and underlines the need for broader respiratory viral panels to further characterize causative pathogens. No bacterial coinfections were confirmed through routine microbiological cultures due to infrastructure limitations.

Discussion

The negative SARS-CoV-2 results in all enrolled patients suggest a predominance of other respiratory viruses not captured by the available diagnostics, such as RSV, rhinoviruses, or seasonal influenza. Given the limitations in molecular testing infrastructure, rapid antigen testing serves as a critical triage tool for excluding COVID-19, especially in children presenting with nonspecific symptoms.

The high prevalence of fever and cough reflects classical presentations of viral ARIs. Early testing not only assists in narrowing the differential diagnosis but also prevents unnecessary antimicrobial prescribing—a critical step in combating antimicrobial resistance (AMR).

In LMICs such as Uzbekistan, where advanced multiplex PCR-based diagnostics are not routinely available in all facilities, the strategic use of cost-effective point-of-care diagnostics is indispensable. Additionally, the use of rapid testing strengthens infection prevention and control measures in hospital settings.

Our findings further advocate for the incorporation of algorithmic diagnostic pathways supported by antigen testing at the point of first contact, particularly in pediatric populations with high ARI incidence.

Conclusion

Rapid antigen testing for SARS-CoV-2 represents an essential component of the diagnostic toolkit for pediatric ARIs, especially in post-pandemic clinical settings. Although none of the children in this study tested positive for SARS-CoV-2, the exclusion of COVID-19 allowed for more accurate clinical decision-making and therapeutic planning. Broader diagnostic capabilities, including multiplex testing for

common respiratory viruses, are urgently needed in LMICs to improve patient outcomes and guide antimicrobial stewardship.

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