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RESPIRATORY VIRAL INFECTIONS IN YOUNG CHILDREN: CLINICAL FEATURES AND MANAGEMENT STRATEGIES

Zamira Mahmudjanovna Khashimova
Assistant of the Department of Pediatrics, Faculty

of Postgraduate Medical Education,

Andijan State Medical Institute

Abstract: Relevance. Respiratory viral infections are among the leading causes of morbidity in young children, with high hospitalization and complication rates. Respiratory syncytial virus, influenza, parainfluenza, adenoviruses, and metapneumovirus are the most significant pathogens.
Objective. To analyze the clinical features of respiratory viral infections in young children and to define modern management strategies.
Materials and Methods. A total of 150 children aged 1 month to 3 years hospitalized with acute respiratory viral infections were examined. Clinical manifestations, laboratory and instrumental data, and the effectiveness of therapeutic approaches were evaluated.
Results. The most common symptoms were cough (92%), fever (81%), dyspnea (34%), and wheezing (27%). Complications such as bronchiolitis and pneumonia were observed in 18% of cases. Combined therapy (inhalations, oxygen support, antiviral drugs) reduced the average hospital stay to 6.2 ± 1.4 days.
Conclusions. Respiratory viral infections in young children are characterized by a high rate of complications and require a comprehensive diagnostic and therapeutic approach. Incorporating modern respiratory support methods and rational antiviral therapy improves patient outcomes and reduces the risk of adverse events.
Keywords: respiratory viral infections, airways, young children, bronchiolitis, pneumonia, antiviral therapy.

Introduction

Respiratory viral infections occupy a leading position in the morbidity structure of young children and remain one of the most pressing issues in modern pediatrics. According to national studies, acute respiratory viral infections (ARVI) account for up to 70–80% of all infectious diseases in children during the first three years of life, determining high rates of hospitalization and complications [1,2]. The most significant pathogens include respiratory syncytial virus (RSV), influenza and parainfluenza viruses, adenoviruses, and metapneumovirus, which are associated with severe disease courses and a high risk of bronchiolitis and pneumonia [4,5].
The clinical features of respiratory viral infections in young children are characterized by pronounced variability of symptoms, ranging from catarrhal manifestations to severe respiratory failure. According to Shamrin and Urvantseva [6], bronchiolitis in infants during the first months of life often presents with hypoxemia and requires oxygen therapy. Belan and Samodova [7] emphasize the role of etiological factors and pathogenetic mechanisms related to the immaturity of the child's immune system. Modern diagnostic methods, including molecular assays and rapid tests, have significantly improved the accuracy of viral agent detection [8].
International studies confirm the global significance of the problem. Hall et al. [14] reported that RSV is the leading cause of hospitalization among children under 2 years of age in the United States. Shi and colleagues [15] demonstrated that more than 33 million cases of RSV-associated acute lower respiratory tract infections are registered annually worldwide in children under 5 years of age, with approximately 3 million requiring inpatient treatment. Similar findings were

presented by Nair et al. [16], highlighting the considerable burden of influenza infections in young children on healthcare systems.

Current approaches to patient management include combined therapy: inhalation, oxygen supplementation, antiviral agents, and immunomodulators [19,20]. Prevention remains a crucial direction, encompassing influenza vaccination and promising developments of RSV vaccines [11,12].

Respiratory viral infections in young children represent a multifactorial challenge requiring a comprehensive approach to diagnosis, treatment, and prevention. The comparison of national and international data enables the development of modern patient management strategies aimed at reducing complication rates and improving disease outcomes.

Materials and Methods

This prospective study was conducted at the Pediatric Infectious Diseases Department and the Pulmonology Center between 2023 and 2025. A total of 150 young children, aged from one month to three years, hospitalized with a diagnosis of acute respiratory viral infections, were included. Inclusion criteria comprised the presence of clinical signs of acute respiratory infection, laboratory-confirmed viral etiology, and age under three years. Exclusion criteria were severe congenital malformations of the respiratory or cardiovascular system, chronic lung diseases such as cystic fibrosis or bronchopulmonary dysplasia, immunodeficiency states, as well as parental refusal to participate.

The diagnostic protocol included clinical examination with assessment of symptoms (cough, fever, respiratory rate, presence of dyspnea), and laboratory investigations using PCR assays to detect respiratory syncytial virus, influenza and parainfluenza viruses, adenoviruses, and metapneumovirus, in accordance with current recommendations for molecular diagnostics [8,10,11]. Instrumental methods comprised chest radiography in suspected pneumonia, pulse oximetry for evaluation of oxygen saturation, and spirometry in children older than two years, consistent with international protocols for functional assessment of the respiratory system [12,13]. In a subset of patients, echocardiography and electrocardiography were performed to exclude concomitant cardiac complications, as recommended in clinical guidelines for comprehensive diagnostics [14,15].

The treatment protocol included standard therapeutic regimens comprising inhalations with saline solution, oxygen supplementation in cases of hypoxemia, antiviral agents (oseltamivir for influenza, ribavirin for severe forms of RSV infection), as well as symptomatic therapy with antipyretics and mucolytics. These approaches are consistent with current international recommendations for the management of viral bronchiolitis and acute respiratory tract infections [16,19,20]. Statistical data analysis was performed using SPSS v.26 and Microsoft Excel XP. Student's t-test was applied to compare mean values, while the χ^2 test was used for the analysis of frequency distributions. Pearson's correlation analysis was employed to identify associations between clinical and laboratory parameters. Differences were considered statistically significant at $p < 0.05$, in accordance with the standards of biostatistical analysis [3,17,18].

Results

A total of 150 young children (aged 1 month to 3 years) hospitalized with acute respiratory viral infections were examined. Among them, 82 (54.7%) were boys and 68 (45.3%) were girls. The mean age was 14.2 ± 6.8 months. The most common symptoms observed were cough (92%), fever (81%), dyspnea (34%), and wheezing (27%). Complications such as bronchiolitis and pneumonia were noted in 18% of patients. The mean duration of hospitalization was 6.2 ± 1.4 days (Table 1).

Table 1.

Main clinical manifestations of respiratory viral infections

in young children (n = 150)

Symptom	Absolute number	% of total
Cough	138	92.0%
Fever	122	81.3%
Dyspnea	51	34.0%
Wheezing	41	27.3%
Rhinorrhea (nasal discharge)	97	64.7%
Decreased appetite	89	59.3%
Sleep disturbances	72	48.0%

The leading symptoms were cough and fever; however, one-third of the children presented with respiratory insufficiency requiring oxygen therapy.

According to PCR diagnostics, respiratory syncytial virus (RSV) was most frequently detected, in 43 children (28.7%). Influenza viruses A and B were identified in 31 children (20.7%), adenoviruses in 26 (17.3%), parainfluenza viruses in 21 (14.0%), and metapneumovirus in 18 (12.0%). Mixed infections were observed in 11 cases (7.3%) (Table 2).

Table 2.
Etiological structure of respiratory viral infections in young children (n = 150)

Pathogen	Absolute number	% of total
Respiratory syncytial virus (RSV)	43	28.7%
Influenza A and B	31	20.7%
Adenoviruses	26	17.3%
Parainfluenza viruses	21	14.0%
Metapneumovirus	18	12.0%
Mixed infections	11	7.3%

These data confirm the leading role of RSV in the development of severe respiratory infections in young children, consistent with the findings of international studies [14,15,16].

Complications developed in 27 children (18.0%): bronchiolitis in 19 (12.7%) and pneumonia in 8 (5.3%). In most cases, complications were observed in children younger than 12 months, underscoring the importance of age as a risk factor.

The use of combined therapy (inhalations, oxygen supplementation, antiviral agents) reduced the mean duration of hospitalization to 6.2 ± 1.4 days, whereas in children with complications it was 8.5 ± 2.1 days. No fatal outcomes were recorded in the study group.

Thus, the results demonstrated that respiratory viral infections in young children are characterized by a high frequency of complications, predominantly bronchiolitis and pneumonia, with respiratory syncytial virus being the leading etiological agent.

Discussion. The obtained results confirm the leading role of respiratory viral infections in the morbidity structure of young children. The high frequency of cough (92%) and fever (81%) is consistent with national studies, where these symptoms are identified as key clinical markers of acute respiratory viral infections [1,2,4,5]. The presence of dyspnea and wheezing in one-third of patients underscores the importance of respiratory insufficiency as a complicating factor, as previously noted by Shamrin and Urvantseva [6].

The etiological structure of the identified infections demonstrated the predominance of respiratory syncytial virus (28.7%), which fully corresponds to international data. Hall et al. [14] and Shi et al. [15] highlight RSV as the primary cause of hospitalization in children under two years of age and as a global public health concern. Similar findings were reported by Nair et al. [16], emphasizing the role of influenza viruses in the development of severe disease forms in young children.

The complication rate (18%), represented by bronchiolitis and pneumonia, is in line with international reports, which indicate that children under one year of age are at significantly higher risk of bronchiolitis [20]. National literature also emphasizes the role of age and associated factors (such as anemia and prematurity) in shaping unfavorable disease outcomes [7,9].

The use of combined therapy, including inhalations, oxygen supplementation, and antiviral agents, reduced the mean duration of hospitalization to 6.2 days, which is comparable to international findings on the management of viral bronchiolitis [19,20]. It is noteworthy that in children with complications, the length of hospital stay increased to 8.5 days, confirming the necessity of early diagnosis and timely intervention.

Comparison of national and international data demonstrates that respiratory viral infections in young children represent a universal problem, though with regional specificities. In Central Asian countries, including Uzbekistan, limited access to modern molecular diagnostics and antiviral therapy remains a significant factor, necessitating adaptation of international protocols to local conditions.

The study results confirm the need for a comprehensive approach to the management of children with respiratory viral infections, encompassing early diagnosis, the use of modern methods of respiratory support, and rational antiviral therapy. Comparison with the literature [11,12,13,14,15,16,19,20] suggests that integration of international recommendations into national protocols may enhance treatment effectiveness and reduce the risk of complications.

Conclusion

The conducted study demonstrated that respiratory viral infections in young children remain one of the leading causes of hospitalization and complicated disease courses in pediatric practice. The most frequent clinical manifestations were cough and fever; however, one-third of patients exhibited signs of respiratory insufficiency requiring oxygen therapy. The etiological structure of infections revealed the predominance of respiratory syncytial virus, confirming its key role in the development of severe forms of bronchiolitis and pneumonia.

The complication rate was 18%, mainly bronchiolitis and pneumonia, with the highest risk observed in children younger than 12 months. The use of combined therapy, including inhalations, oxygen supplementation, and antiviral agents, reduced the duration of hospitalization and lowered the risk of adverse outcomes.

Comparison of the obtained data with national and international studies confirms the universal nature of the problem and the necessity of a comprehensive approach to its resolution. Incorporation of modern methods of molecular diagnostics, respiratory support, and rational antiviral therapy into national protocols may improve patient management and reduce the burden on healthcare systems.

Respiratory viral infections in young children require particular attention from clinicians and healthcare policymakers. The development and implementation of regionally adapted strategies for diagnosis, treatment, and prevention will improve disease outcomes and reduce infant morbidity and mortality.

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