INTERNATIONAL MULTI DISCIPLINARY JOURNAL FOR RESEARCH & DEVELOPMENT
eISSN 2394-6334 Impact factor: 8.854 Volume 13, issue 03 (2026)

MODERN APPROACHES TO THE SELECTION OF A MEDICATION COMPLEX FOR EMERGENCY THERAPY OF OBSTRUCTIVE SYNDROME IN RESPIRATORY DISEASES IN CHILDREN AND ADOLESCENTS

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Annotation

The article presents algorithms for providing emergency care in children with obstructive syndrome associated with lower respiratory tract diseases. It substantiates the need to include inhaled corticosteroids (budesonide) in the bronchodilator therapy complex for moderate and severe obstruction.

The results of clinical studies on the efficacy and safety of the drug in children with bronchial obstruction of varying severity show that the use of budesonide suspension (Pulmicort) for nebulizer therapy leads to faster relief of obstructive symptoms and normalization of the patient's condition.

Key Words

respiratory diseases in children, obstructive syndrome, therapy, respiratory system diseases, bronchitis in children, acute respiratory viral infections in children

Diseases of the lower respiratory tract in children, especially at an early age, are often accompanied by the development of obstructive syndrome. Recurrent bronchial obstruction is a risk factor for decreased lung function. Repeated episodes of respiratory diseases with lower airway obstruction lead to the formation or усиление bronchial hyperreactivity and create conditions for the development of recurrent and chronic bronchitis or bronchial asthma (BA). The search for optimal diagnostic and therapeutic algorithms that allow timely correction of impaired bronchial patency remains an important issue in pediatric and pulmonology practice.

Drugs forming the basis of bronchodilator therapy

It is well known that emergency care for children with bronchial obstructive syndrome is primarily based on short-acting bronchodilators. These drugs are prescribed for obstructive bronchitis, bronchiolitis, and exacerbations or threatened exacerbations of bronchial asthma. In pediatrics, several groups of bronchodilators are used to relieve acute bronchial obstruction: β2-agonists, anticholinergic drugs, and methylxanthines. Their use depends on their mechanisms of action.

The effect of β2-agonists is based on stimulation of adrenergic receptors. When administered by inhalation, they provide a rapid bronchodilatory effect (within 3–5 minutes). The method of delivery depends on the child's age, severity of the disease, and individual preferences. These drugs can be administered via metered-dose inhalers (MDIs), MDIs with spacers, or nebulizers. According to onset of action, β2-agonists are divided into short-acting (salbutamol, fenoterol) and long-acting (salmeterol). By duration, they are classified as short-acting (4–6 hours) and

long-acting (8–12 hours). For acute bronchial obstruction, short-acting β2-agonists or their combination with anticholinergics are used. Nebulizer delivery is considered the most effective. However, clinicians should remember the possibility of transient oxygen desaturation and paradoxical bronchospasm, requiring observation for 30–40 minutes after administration.

Anticholinergic drugs play an important role due to key pathogenetic mechanisms of bronchial obstruction: bronchial wall edema, mucus hypersecretion, and smooth muscle spasm. Ipratropium bromide, an M-cholinoreceptor blocker, reduces parasympathetic influence and provides bronchodilation. It has low lipid solubility and minimal systemic absorption, so its effect is mainly local. The bronchodilatory effect begins within 5–15 minutes, peaks at 1–1.5 hours, and lasts 6–8 hours. In young children with mild obstruction, it can be used as monotherapy.

During asthma exacerbations, ipratropium bromide is rarely used alone and is usually combined with β2-agonists. According to international recommendations (GINA) and Russian national guidelines, the fixed combination of fenoterol and ipratropium bromide (Berodual®) is a first-line therapy for exacerbations. The combination enhances bronchodilation while reducing side effects due to lower doses of β2-agonists.

In severe obstruction with respiratory insufficiency, systemic glucocorticosteroids are indicated. Inhaled corticosteroids, particularly budesonide (Pulmicort suspension), are also included early in therapy for moderate and severe cases. Systemic steroids are indicated when bronchodilators are insufficient, in severe or life-threatening exacerbations, or when steroids were previously required. Their effect begins after 4–6 hours and lasts 8–12 hours.

Budesonide in nebulizer therapy

Budesonide suspension (Pulmicort) is one of the most studied drugs for nebulizer therapy in children. More than 15 randomized controlled trials have demonstrated its efficacy and safety in children aged 3 months to 18 years with bronchial obstruction of varying severity. Its use leads to faster symptom relief and improved clinical outcomes.

Combination therapy (Pulmicort + Berodual + ambroxol) has shown greater effectiveness compared to monotherapy or dual combinations. Recommended initial doses are 1–2 mg twice daily for adults and children over 12 years, and 0.5–1 mg twice daily for children aged 3 months to 12 years, with subsequent reduction to maintenance doses.

Emergency care for asthma exacerbations

Bronchial asthma is one of the most common chronic diseases in childhood. Emergency care follows a standardized algorithm regardless of severity:

- eliminate or reduce exposure to triggers;
- assess clinical severity;
- review previous therapy;
- measure peak expiratory flow (if possible) and oxygen saturation;
- provide treatment according to severity;
- monitor symptoms and oxygenation;

- educate patients and caregivers on inhaler use.

For mild exacerbations, short-acting β2-agonists are used via inhalers with spacers. In young children, nebulized combination therapy is preferred. If ineffective, therapy should be escalated.

For moderate exacerbations, combined bronchodilators are first-line therapy. If symptoms persist, budesonide via nebulizer is added. Intravenous aminophylline may be used to enhance bronchodilation.

Severe exacerbations require hospitalization and combined therapy with bronchodilators, systemic steroids, and oxygen.

Management of obstructive syndrome in bronchitis and ARVI

Acute bronchitis is a common cause of bronchial obstruction in children. It is often associated with upper respiratory infections and presents with dyspnea, prolonged wheezing expiration, and characteristic auscultatory findings.

Treatment includes bronchodilators combined with anti-inflammatory or antimicrobial therapy depending on etiology. In mild cases, a combination of mucolytics and bronchodilators improves mucus clearance and airway patency.

A combined drug such as Ascoril (salbutamol, bromhexine, guaifenesin, racementhol) may be used as initial therapy. It provides bronchodilatory and expectorant effects. Early initiation (from the first day of illness) improves outcomes and shortens disease duration. Treatment typically lasts 7–10 days.

In moderate to severe obstruction in young children, inhaled combinations of bronchodilators and mucolytics are effective, with possible addition of inhaled corticosteroids. Ambroxol is often used as a starting mucolytic agent due to its additional antiviral and synergistic effects with antimicrobial therapy.

Conclusion

An algorithm-based approach to bronchodilator therapy at the prehospital stage, taking into account the clinical situation, diagnosis, and patient age, ensures high treatment effectiveness and improves the quality of medical care in children with obstructive respiratory diseases.

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