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**Rational use of antibiotics in childhood: challenges in pediatric practice.**

*Rational Use of Antibiotics in Childhood: Challenges in Pediatric Practice*

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## Summary

The rational use of antibiotics in childhood is one of the main challenges of contemporary pediatric practice. Despite their importance in the treatment of bacterial infections, the inappropriate prescription of these medications remains frequent, especially in conditions of viral etiology, common in the pediatric population (VENTOLA, 2015; BRAZILIAN SOCIETY OF PEDIATRICS, 2022). This practice contributes to increased bacterial resistance, a higher occurrence of adverse events, and increased healthcare costs (BRAZIL, 2021).

This study aims to analyze, through a narrative literature review, the main challenges related to the rational use of antibiotics in childhood, focusing on upper respiratory tract infections, community-acquired pneumonia, and urinary tract infections, which together represent relevant causes of illness in this population. The main prescribing errors, their clinical and epidemiological consequences, as well as strategies aimed at promoting the rational use of antibiotics in pediatric practice are discussed (WORLD HEALTH ORGANIZATION, 2019).

**Keywords:** Antibacterials; Pediatrics; Rational use of medicines; Bacterial resistance; Pediatric infections.

## Abstract

The rational use of antibiotics in childhood represents one of the main challenges in contemporary pediatric practice. Despite their importance in the treatment of bacterial infections, inappropriate prescription of these medications remains frequent, especially for conditions of viral etiology, which are common in the pediatric population (Ventola, 2015; Brazilian Society of Pediatrics, 2022). This practice contributes to the increase in bacterial resistance, a higher occurrence of adverse events, and rising healthcare costs (Brazil, 2021).

The present study aims to analyze, through a narrative literature review, the main challenges related to the rational use of antibiotics in childhood, with a focus on upper respiratory tract infections, community-acquired pneumonia, and urinary tract infections, which together represent significant causes of morbidity in this population. The main prescription errors, their clinical and epidemiological consequences, as well as strategies aimed at promoting the rational use of antibiotics in pediatric practice, are discussed (World Health Organization, 2019).

**Keywords:** Antibacterials; Pediatrics; Rational use of medicines; Bacterial resistance; Pediatric infections.

## Introduction

Antibiotics represent one of the greatest advances in modern medicine, being essential.

for the treatment of bacterial infections and responsible for a significant reduction in

infant morbidity and mortality (VENTOLA, 2015). However, inappropriate prescribing constitutes a



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public health problem associated with the emergence and spread of bacterial resistance (WORLD HEALTH ORGANIZATION, 2019).

In pediatric practice, incorrect prescribing is especially frequent in infections. common types include upper respiratory tract infections, community-acquired pneumonia, and respiratory tract infections. Urinary. Many of these conditions have a viral etiology and/or a self-limiting course, with no... clinical benefit in the use of antibiotics (ZHOU et al., 2021; LIU et al., 2022).

Despite this, factors such as diagnostic difficulty, professional insecurity, and expectations... familiarity with drug treatment, low adherence to clinical protocols, and influence of Misinformation obtained by family members on the internet contributes to the prescription. unnecessary (BRAZILIAN SOCIETY OF PEDIATRICS, 2022).

Given this scenario, implementing the rational use of antibiotics constitutes a measure central to quality pediatric care, involving appropriate indication and correct choice of... Antimicrobial, dosage, route of administration, and duration of treatment. This practice promotes effectiveness. immediate treatment, preservation of the long-term effectiveness of antibiotics, and reduction of risks to individual and collective health, including lower healthcare costs (BRAZIL, 2021).

Understanding the main challenges to the rational use of antibiotics in childhood is fundamental, especially considering that viral infections — whether of the upper respiratory tract, Lower urinary tract infections represent a significant portion of the causes of illness. This narrative review analyzes these issues, discussing prescription errors, Clinical consequences and strategies for promoting safe, evidence-based practices. (BMJ BEST PRACTICE, 2026; MEDSCAPE, 2026).

## Methodology

This is a narrative literature review, conducted with the aim of analyzing the Challenges related to the rational use of antibiotics in childhood. The search for articles was conducted in PubMed, SciELO, and LILACS databases, using the descriptors: "antibacterials," "inappropriate use of "medications", "bacterial resistance", "pediatric infections", and their English equivalents.

Articles published in the last ten years, in Portuguese, English and English, were included. Spanish, addressing antibiotic prescription in children, with a focus on respiratory infections and Urinary tract infections were excluded. Case reports, duplicate studies, and articles not directly related to the topic were excluded. theme. The selection of studies was carried out by reading titles, abstracts and full texts (ZHOU et al., 2021; LIU et al., 2022).

## Use of antibiotics in common pediatric infections

### 1. Upper respiratory tract infections (URTIs)

Upper respiratory tract infections, including the common cold, pharyngotonsillitis, Rhinosinusitis and acute otitis media represent a significant portion of the consultations. pediatric patients, both in hospital and outpatient settings (GASTANADUY et al., 2025). Estimates- It is known that most of these cases have a viral etiology, with studies indicating that approximately 77% of infections are caused by respiratory viruses, such as respiratory syncytial virus and rhinovirus. reinforcing that a large proportion of cases do not benefit from antibiotic therapy. Despite this, the Inappropriate prescribing remains frequent, influenced by factors such as diagnostic difficulties and Family pressure.

Upper respiratory tract infections, including the common cold, pharyngotonsillitis, Rhinosinusitis and acute otitis media represent a significant portion of pediatric visits. (GASTANADUY et al., 2025). It is estimated that approximately **77%** of these cases are of origin viral, reinforcing the fact that a large proportion do not benefit from antibiotic therapy. Despite this, prescription Inadequate diagnosis persists due to diagnostic difficulties and family pressure (VENTOLA, 2015).

### 2. Community-acquired pneumonia (CAP)

Community-acquired pneumonia is one of the leading causes of morbidity in childhood, resulting in a high number of pediatric visits and hospitalizations. Studies indicate that most cases in children have a viral origin, although the empirical prescription of antibiotics The difficulty in differentiating viral etiologies continues to be frequent in clinical practice. Bacterial diagnoses based on incomplete medical histories and a scarcity of specific diagnostic tests. This contributes to common errors, such as the inappropriate selection of broad-spectrum antimicrobials. Excessive treatment duration and lack of clinical reassessment (ZHOU et al., 2021; LIU et al., 2022).

Next, a simple comparison of the estimated proportions of viral pneumonias and Bacterial infections in different age groups, based on epidemiological reviews:

Age range	Viral etiology (%)	Bacterial etiology (%)
Infants (<2 years)	80–85%	15–20%
Preschoolers (2–5 years)	70–75%	25–30%
School-aged children (>5 years)	50–60%	40–50%

These data show that viral infections are more prevalent in younger children, reinforcing The need for rational use of antibiotics and careful clinical evaluation before prescribing.



### 3. Urinary tract infection (UTI)

Urinary tract infection is a common condition in childhood and one of the main causes of urinary tract infection. Causes of pediatric urological morbidity. Bacterial etiology predominates, with *Escherichia coli* being the most common cause. responsible for approximately 80–90% of cases, while other pathogens, such as *Klebsiella spp.*, *Proteus mirabilis* and *Enterococcus spp.*, represent the remaining portion (SOCIETY Brazilian Journal of Pediatrics, 2022; Brazil, 2021).

Early diagnosis is crucial to avoid kidney complications, but the difficulty in Distinguishing typical from atypical cases, along with family pressure and the practice of empirical prescribing, leads to the inappropriate use of antimicrobials, whether by choosing broad-spectrum antibiotics or by Excessive duration of treatment.

These data reinforce the idea that most UTIs in children have a typical bacterial origin. justifying the targeted use of antibiotics when indicated, but also highlighting the The importance of avoiding unnecessary prescriptions and following clinical protocols for dose determination. duration and spectrum of the antimicrobial improve the effectiveness of the treatment without causing side effects. negative aspects such as bacterial resistance (VENTOLA, 2015; BRAZILIAN SOCIETY OF PEDIATRICS, 2022).

#### Key challenges for the rational use of antibiotics

The rational use of antibiotics in childhood faces multiple challenges. Among the main ones... Key issues include: prescription for viral infections, inappropriate choice of antimicrobial, and dosage. Incorrect weight or age criteria, excessive treatment duration, and poor adherence to clinical protocols. (Brazilian Society of Pediatrics, 2022).

Additional factors include self-medication, premature discontinuation of treatment, and pressure. family and structural difficulties in the healthcare system, especially in emergency care. and emergencies. Recent studies show that inappropriate prescribing is associated not only with diagnostic complexity, but also behavioral and organizational factors, such as lack of continuing education, scarcity of clear protocols and caregiver expectations (SILVA et al., 2024; PEREIRA; REIS, 2022).

#### Consequences of the inappropriate use of antibiotics

The inappropriate use of antibiotics in childhood leads to multiple clinical consequences. epidemiological and economic, directly affecting individual and collective health (VENTOLA, 2015; (BRAZIL, 2021).



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#### 4. Bacterial resistance

Incorrect antibiotic prescription — whether due to unnecessary use or inappropriate choice of antibiotics. Excessive drug use or duration of treatment — significantly contributes to the development bacterial resistance. This resistance makes it difficult to manage subsequent infections, increases the risk of infections. It increases infant morbidity and mortality and limits therapeutic options, especially for pathogens of relevance. clinical, such as *Streptococcus pneumoniae*, *Escherichia coli* and *Staphylococcus aureus* (WORLD HEALTH ORGANIZATION, 2019; BRAZILIAN SOCIETY OF PEDIATRICS, 2022).

In this context, pharmaceutical assistance plays a crucial role in mitigating the adverse effects and in the prevention of resistance, acting in an integrated manner with clinical protocols, Auditing prescriptions and professional education strategies (FERREIRA et al., 2025). This approach contributes to the rational use of antimicrobials and to the therapeutic safety of... pediatric population.

#### 5. Clinical adverse events

- **Allergic reactions:** ranging from skin rashes and itching to anaphylaxis, representing an immediate risk to life.
- **Gastrointestinal disorders:** nausea, vomiting, diarrhea, and abdominal pain, often resulting from changes in the gut microbiota.
- **Changes in the gut microbiota:** repeated use of antibiotics can cause **dysbiosis**, favoring the overgrowth of opportunistic pathogens such as *Clostridioides difficile*, associated with severe diarrhea.
- **Opportunistic infections:** increased susceptibility to fungal infections (oral or vulvovaginal candidiasis) and secondary bacterial infections.
- **Drug toxicity:** some antibiotics can cause nephrotoxicity, hepatotoxicity, or hematological changes.
- **Psychological and social impact:** prolonged hospitalizations, additional treatments, and increased costs affect the well-being of the child and the family.

#### 6. Economic and epidemiological impact

In addition to clinical consequences, the inappropriate use of antibiotics leads to a significant increase of healthcare costs, including additional consultations, prolonged hospital stays, and second-line therapies. more expensive lines (BRAZIL, 2021). Epidemiologically, the spread of resistant bacteria It increases the burden of disease in the community, compromising public health programs and increasing infant morbidity and mortality (VENTOLA, 2015; WORLD HEALTH ORGANIZATION, 2019).

#### 7 Synthesis

Therefore, the inappropriate use of antibiotics promotes microbial resistance, compromising Therapeutic safety increases healthcare costs and negatively impacts the quality of life of



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Child and family. Integrated strategies, including education for health professionals, guidance

Family involvement, adherence to clinical protocols, and antimicrobial stewardship programs are essential for to promote rational use and reduce these consequences (BRAZILIAN SOCIETY OF PEDIATRICS, 2022; FERREIRA et al., 2025).

### Strategies for promoting the rational use of antibiotics

Key strategies include: • Ongoing education for

healthcare professionals, promoting updates on clinical guidelines, bacterial resistance, and appropriate antimicrobial prescription.

- Guidance and education for families, strengthened by the outpatient relationship and continuous follow-up during childcare, allowing for clarification on viral infections, warning signs, and the rational use of medications.
- Implementation of antimicrobial stewardship programs, with the goal of optimizing prescription, antimicrobial selection, dosage, and treatment duration, based on scientific evidence. These programs (Antimicrobial Stewardship Programs – ASPs) are specifically recommended in pediatric settings, with an emphasis on auditing, continuous feedback, de-escalation protocols, and education of healthcare professionals, contributing to the reduction of inappropriate prescribing and the development of bacterial resistance (AAP/PEADIATRIC INFECTIOUS DISEASES SOCIETY, 2021; APPROPRIATE USE OF ANTIBIOTICS IN CHILDREN, 2023).
- Careful clinical monitoring, with continuous patient evaluation, reassessment of therapeutic response, and adjustment of treatment according to clinical evolution.
- Adoption of evidence-based protocols and rational use of laboratory tests, which significantly contribute to reducing inappropriate prescriptions and minimizing the risks of adverse effects and bacterial resistance.

These integrated strategies promote safe, efficient, and evidence-based pediatric practice. evidence supporting the rational use of antibiotics in childhood.

### Final considerations

The rational use of antibiotics in childhood represents a constant challenge in practice. pediatrics, especially due to the high prevalence of common infections and the difficulty in Distinguishing between viral and bacterial infections. Inappropriate prescribing contributes to an increase in... Bacterial resistance, adverse events, and healthcare costs.

Upper respiratory tract infections, community-acquired pneumonia, and urinary tract infections are the conditions most frequently associated with inappropriate prescriptions, reinforcing the need for Evidence-based practices and up-to-date clinical protocols.

Strategies such as continuing education, family guidance, *stewardship* programs and Proper clinical monitoring is essential for promoting the rational use of antibiotics. This practice contributes to therapeutic safety and the preservation of the effectiveness of antimicrobials. improvement of pediatric care and public health



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