# SCARLET FEVER IN PEDIATRICS: UPDATES ON DIAGNOSIS AND IMPACT OF POST-STREPTOCOCCAL COMPLICATIONS

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**Abstract:** Scarlet fever is a bacterial infection caused by *Streptococcus pyogenes* which predominantly affects school-age children. Although its prevalence has decreased over the years due to the advance of antibiotics, outbreaks still occur, requiring special attention regarding early diagnosis and the prevention of post-streptococcal complications, such as rheumatic fever and glomerulonephritis. The aim of this study is to review updates in the diagnosis of scarlet fever in pediatrics, emphasizing clinical and laboratory methods, as well as assessing the impact of post-streptococcal complications on children's health. This literature review addresses the diagnostic, epidemiological and therapeutic challenges of group A streptococcal (GAS) diseases, with a focus on scarlet fever, antimicrobial resistance, post-infectious complications and vaccine development. The analysis includes global trends, management strategies and scientific advances in dealing with these diseases. The clinical diagnosis of scarlet fever is based on the presence of fever, pharyngitis, a characteristic rash and classic signs such as strawberry tongue. Rapid tests for streptococcal antigen and oropharyngeal culture are essential laboratory tools for confirmation. Treatment with antibiotics, such as penicillin or amoxicillin, is effective in resolving the infection, but failure to start treatment early can lead to serious complications, including post-streptococcal glomerulonephritis and rheumatic fever, both of which have potential long-term impacts on cardiovascular and renal health. Therefore, scarlet fever remains a relevant concern in pediatrics due to the risk of post-streptococcal complications. Early diagnosis and appropriate management are key to preventing serious outcomes. Constant updates to clinical guidelines and access to rapid diagnostic tests are essential to improve care and reduce the impact of the disease in children.

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**Keywords:** Pediatrics; Exanthematous diseases; Scarlet fever.

## INTRODUCTION

Scarlet fever is an infectious disease of bacterial origin, caused by group A beta-hemolytic streptococcus (Streptococcus pyogenes). Historically, it has been considered a serious disease, with a high rate of complications and mortality, especially before the introduction of antibiotics. Although the advent of penicillin has significantly reduced fatal cases, scarlet fever still persists in many countries, including in seasonal outbreaks, especially among school-aged children (Steer et al., 2020).

The clinical picture of scarlet fever includes fever, pharyngitis and the classic red rash with a rough texture that spreads throughout the body. Early diagnosis is critical to prevent complications, and rapid antigen tests and oropharyngeal swab cultures are essential laboratory methods. Despite advances, the overlap of symptoms with other respiratory viruses in pediatrics can hinder accurate clinical identification (Hiltunen et al., 2021).

One of the greatest clinical challenges related to scarlet fever is in the management of post-streptococcal complications, such as rheumatic fever and acute glomerulonephritis. These conditions, although less frequent today, still represent an important public health problem, particularly in low-income regions with limited access to appropriate treatment (Carapetis et al., 2019). In addition, the role of epidemiological surveillance has proven crucial to map outbreaks, assess the evolution of bacterial strains, and investigate possible vaccine strategies, still in the experimental phase (Davies et al., 2022).

Another point of attention refers to the impact of post-streptococcal complications. Even with the widespread availability of antibiotics, rheumatic fever and glomerulonephritis still pose risks in vulnerable situations, especially in regions with limited access to medical care. This reinforces the need for preventive strategies and proper management of streptococcal infections (Carapetis et al., 2019).

Recent studies point to the need to reinforce preventive and therapeutic measures in pediatrics, in addition to training health professionals to identify early signs of the disease. These actions contribute to mitigating the impacts of scarlet fever on children's health and reducing the risk of serious complications that can affect children's development (Hiltunen et al., 2021).

The aim of this study is to review the updates in the diagnosis of scarlet fever in pediatrics, emphasizing clinical and laboratory methods, in addition to evaluating the impacts of post-streptococcal complications on children's health.

## MATERIALS AND METHODS

The present literature review addresses the diagnostic, epidemiological, and therapeutic challenges of group A streptococcal diseases (GAS), with a focus on scarlet fever, antimicrobial resistance, post-infectious complications, and vaccine development. The analysis includes global trends, management strategies, and scientific advances in the fight against these diseases.

Guiding Question:

What are the recent advances in the diagnosis, management and prevention of group A streptococcal diseases, especially scarlet fever and post-infectious complications?

Boolean Markers:

- "Group A Streptococcus" AND "Scarlet Fever"
- "Streptococcal Infections" AND "Complications"
- "Antibiotic Resistance" AND "Streptococcus"
- "Group A Streptococcus" AND "Vaccine"

Inclusion Criteria:

Articles published between 2019 and 2023;

Peer-reviewed studies addressing epidemiology, diagnosis,

treatment, complications and prevention of diseases caused by GAS;

Research on scarlet fever and antimicrobial resistance.

Exclusion Criteria:

Works published before 2019;

Articles without relevant clinical data or purely theoretical reviews.

## THEORETICAL FOUNDATION

Scarlet fever, an infectious disease caused by *Streptococcus pyogenes* (group A beta-hemolytic streptococcus), predominantly affects children between 5 and 15 years of age. Its classic clinical presentation includes high fever, sore throat, diffuse erythematous rash with a rough texture ("sanding skin"), and subsequent scaling. Although historically associated with high mortality rates, therapeutic advances and the introduction of antibiotics have made scarlet fever a manageable disease, as long as it is diagnosed and treated early (Berger et al., 2023).

The clinical diagnosis of scarlet fever can be challenging due to the overlap of symptoms with other rash diseases such as rubella and Kawasaki disease. Complementary tests, such as rapid tests for streptococcal antigens and microbiological cultures of oropharyngeal secretions, are essential to confirm infection. Recent studies indicate that the introduction of molecular biology techniques, such as polymerase chain reaction (PCR), has increased diagnostic accuracy, in addition to making it possible to identify resistant strains (Chen et al., 2022).

Therapeutic management is based on early administration of antibiotics, with penicillin being the gold standard treatment due to its proven efficacy and absence of resistance by *Streptococcus

pyogenes*. However, in patients allergic to penicillin, alternative options, such as macrolides (azithromycin) and cephalosporins, have been widely used (Walker et al., 2023). Adherence to complete antibiotic treatment is critical to prevent serious complications such as rheumatic fever and post-streptococcal glomerulonephritis (Panchalingam et al., 2023).

Autoimmune complications from streptococcal infection continue to be a major clinical challenge. Rheumatic fever, for example, can lead to permanent heart valve damage, while acute glomerulonephritis can result in kidney failure (Kumar et al., 2023). These complications are mediated by an exacerbated immune response against bacterial proteins that mimic host antigens, configuring a mechanism of molecular autoimmunity (Mahony and Kahn, 2023).

Another important aspect is the resurgence of scarlet fever outbreaks in some regions of the world, including countries in Europe and Asia, attributed to genetic mutations in bacterial strains and increased antimicrobial resistance (Zhang et al., 2023). This phenomenon highlights the importance of active epidemiological surveillance and public policies to prevent outbreaks, such as education campaigns on personal hygiene and control measures in school environments (Chen et al., 2022).

Advances in research on potential vaccines against *Streptococcus pyogenes* have generated promising results. Early-stage clinical trials indicate that immunization may confer protection not only against scarlet fever but also against other streptococcal infections, such as necrotizing fasciitis and strep throat. Although still under development, the possibility of an effective vaccine could revolutionize the clinical management of the disease and its complications (Walker et al., 2023).

The implementation of integrated health strategies, including early diagnosis, strict adherence to antibiotic treatment, and the promotion of preventive measures, remains critical to minimizing the impact of scarlet fever on the pediatric population. In addition, continuous training of health professionals and access to advanced diagnostics are essential to address emerging challenges in the management of this disease (Berger et al., 2023).

## CONCLUSION

It is therefore concluded that scarlet fever remains an important clinical and epidemiological challenge, especially in pediatric populations. Although advances in the use of antibiotics, such as penicillin, have revolutionized the treatment of this disease, the emergence of resistant strains and recent outbreaks in different regions of the world highlight the need for constant vigilance and updating of therapeutic strategies.

The adoption of advanced diagnostic techniques, including rapid tests and PCR, has been shown to be a crucial tool for the early identification of infection, ensuring more effective management and prevention of serious complications, such as rheumatic fever and post-streptococcal glomerulonephritis. In addition, health education and hygiene measures in schools and communities are essential pillars to contain transmission.

Research on vaccines against *Streptococcus pyogenes* points to a promising future in the control not only of scarlet fever, but of several diseases associated with this pathogen. The integration of scientific, clinical, and social efforts will be key to minimizing the impacts of the disease and ensuring a more efficient and comprehensive approach to its control.

In this way, scarlet fever reinforces the importance of a multidisciplinary approach that combines diagnostic, therapeutic and preventive advances, as well as robust public policies, ensuring quality care for affected children and mitigating their potential risks to public health.

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