

# Outbreak Investigation of Scarlet Fever in a Kindergarten

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Scarlet fever is a clinical syndrome characterized by a typical rash accompanied with pharyngitis due to *Streptococcus pyogenes* (group A streptococcus, GAS). Scarlet fever has generally been considered a common, benign disease that occurs in childhood; however, historically, there have been dramatic changes in the character of the disease. During the early 19th century, after a lethal outbreak was reported in Dublin in 1831, clusters of severe cases throughout Europe and the United States were reported with case fatality rates of  $\geq 30\%$  [1, 2]. Scarlet fever continued to be a severe disease for more than half a century until the character of the disease changed again. Since then, severe cases are uncommon and case fatality rates dropped to  $\leq 1\%$ . Due to the fact that *S. pyogenes* can occasionally cause severe life-threatening diseases and scarlet fever is also a highly communicable disease, scarlet fever is a notifiable disease in many countries, including Korea. Scarlet fever is classified among the National Notifiable Infectious Diseases (NNIDs) as group 3, and requires continuous surveillance and the establishment of control measures against possible outbreaks due to the risk of intermittent epidemics [3].

Rye S. et al. reported an interesting outbreak which occurred in a kindergarten [4]. The outbreak affected 21 among a total of

158 children, with a total attack rate of 13.3%. Among all cases, 45.1% were in the same class, conferring a relative risk of 14.12. A carriage study was also conducted and 5.3% (6/114) of asymptomatic children were colonized with *S. pyogenes*. During the outbreak, household transmission was also reported among siblings of the patients. After reinforcing isolation measures to refrain from attending kindergarten and engaging in social activities for 24 hours after initiating appropriate antibiotic treatment, providing education on personal hygiene, performing environmental disinfection, and monitoring symptomatic cases daily, the outbreak subsided after approximately one month.

In this study, a carriage study was conducted during the outbreak, revealing a carriage rate of 5.3%. All children with *S. pyogenes* pharyngeal carriage were asymptomatic and none were treated with antibiotics. Identification of children with carriage and providing them with treatment may help control an outbreak; however, for scarlet fever, sampling is generally not recommended and indications for testing contacts vary according to circumstances. In schools and childcare centers, the prevalence of pharyngeal carriage in healthy children can be as high as 25% in the absence of streptococcal disease out-

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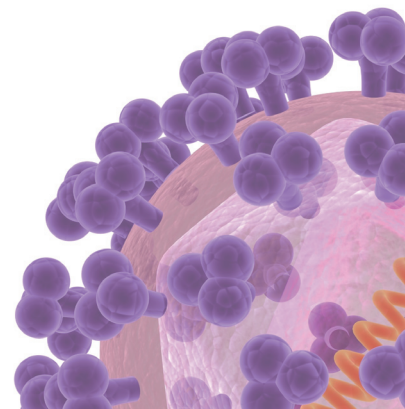
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break [5]. However, testing for the carriage of *S. pyogenes* may be considered in outbreaks that include invasive diseases or when the contacts are at an increased risk of developing sequelae of GAS infections, such as acute rheumatic fever or acute glomerulonephritis. In these cases, treatment is recommended for contact cases with positive results.

Although the outbreak was successfully controlled with multiple infection control measures, this article leaves us with some questions regarding whether this outbreak was inevitable, and whether there are means to prevent future outbreaks of scarlet fever among children.

Scarlet fever is a notifiable disease in Korea and all probable and confirmed cases are reported to the local public health office, however cases are reported individually and information on the child care centers or schools the children attend is not collected. Reporting clusters of scarlet fever within educational institutions is also voluntary. When children are diagnosed at different hospitals, it may also be difficult for medical personnel to acknowledge ongoing outbreaks. Thus, in many cases, outbreaks may be recognized with great delay. There should be further methods for public health authorities to acknowledge clusters of cases in the community for prompt interventions in outbreak control.

The most important means for controlling scarlet fever are prompt identification and treatment of infections. Children with scarlet fever should also not return to child care or school until at least 24 hours after initiating appropriate antimicrobial therapy. Parents should be educated to notify teachers when their child has been diagnosed with scarlet fever. Child-care staff should also inform parents and children about cases within the institution, especially when two or more cases occur within a classroom. Notifying parents when children show symptoms at school or kindergarten during outbreaks is important, as these measures are crucial for early recognition and appropriate diagnosis and treatment in further cases. For these steps to be applicable, educational material on communicable diseases in children should be developed and provided to schools and childcare centers by public healthcare au-

thorities.

This report describes that multidisciplinary infection control measures with the guidance of the local public health department were effective and led to successful control of an outbreak of scarlet fever in a kindergarten in Korea. The next step is the development of policies and methods to accelerate recognition by the public health authorities of outbreaks in the community, and the development and provision of practical guidelines and education for child care centers or schools regarding outbreak control measures.

## Conflicts of Interest

No conflicts of interest.

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