MANIFESTATIONS OF THE EPIDEMIC PROCESS IN SCARLET FEVER

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The disease is widespread but is more common in regions with temperate and cold climates. One of the characteristic features of scarlet fever is the periodic rise and fall in incidence rates. In addition to 2–4-year intervals, there are also larger time gaps (40–50 years) followed by a significant increase in the number of cases.

In the early 1660s, T. Sydenham described scarlet fever as "an extremely insignificant ailment, barely worth mentioning." The clinical picture of scarlet fever at that time resembled that of the second half of the 20th century. However, just 15 years later, Sydenham encountered a severe form of scarlet fever and classified it alongside the plague in terms of severity. The 17th and 19th centuries were marked by alternating periods of mild and severe scarlet fever. Among well-known observations on this matter, F.F. Erisman noted: "There are periods of exclusively benign or only malignant epidemics of scarlet fever. The mortality rate in malignant epidemics is 13–18%, but it often rises to 25% and can reach even 30–40%."

Due to an imperfect registration system and underdeveloped, often inaccessible medical care for the population, the official statistics of Tsarist Russia did not reflect the true level of scarlet fever incidence. However, data from the 20th century is extensive. Over a 100-year period, three large cycles of incidence were identified. By the end of the century, incidence rates had declined. The vast majority of patients were children; in Moscow, an average of 7,039 cases were recorded annually from 1996 to 2007, or 461.7 per 100,000 people. No significant trend changes were found across Russia, where an average of 224.9 children per 100,000 were affected annually. Between 1996 and 2007, a total of 716,193 cases of scarlet fever were recorded in Russia, with 64,743 cases in 2007 alone (86,004 cases in Moscow, including 6,590 in that year).

In recent years, the decline in scarlet fever incidence in Moscow has been more pronounced than in Russia as a whole: the average annual growth rate (AGR) was –8% in Moscow and –3% across the country. The sharp decline in scarlet fever cases observed in the last third of the 20th century has been less pronounced over the past 20 years. Despite the persistent cyclicality characteristic of this form of Group A Streptococcus (GAS) infection, there has been some stabilization in the spread of scarlet fever. Over many years, the average incidence rates were 81.0 per 100,000 in Moscow and 41.1 per 100,000 in Russia. Among children aged 0–14 years in Moscow, the AGR was –6%, with an annual average incidence of 461.7 per 100,000

(compared to 0% and 224.9 per 100,000 in Russia). The vast majority of cases occurred in children—on average, 7,039 cases annually, or 461.7 per 100,000 population. No significant trend changes were found in Russia, where an average of 224.9 per 100,000 children were affected each year.

The overall level and dynamics of long-term and monthly scarlet fever incidence are primarily determined by the incidence among preschool-aged children attending organized groups. Each year, children attending daycare and other institutions contract scarlet fever 3–4 times more often than those raised at home. This difference is most pronounced in children under two years old (6–15 times higher), while among children aged 3–6 years, the discrepancy is less noticeable. These age groups also show the highest rates of asymptomatic bacterial carriage.

Children aged 3–6 years have had the highest average incidence rates of scarlet fever over many years, with 1,108.7 cases per 100,000 population. Among children in organized groups of this age, the incidence rate was even higher, reaching 1,290 cases per 100,000 population. High incidence rates were also recorded among organized children aged 1–2 years (817.6 per 100,000 population). In contrast, unorganized children aged 3–6 years had an incidence rate of 552.1, and unorganized children aged 1–2 years had an incidence rate of 167.9 per 100,000 population, which is 3.4 times lower than in preschool institutions (PSIs). Among schoolchildren, the incidence rate was 1.8 times lower than in preschool children and 2.8 times lower than in children aged 3–6 years.

In recent years, scarlet fever has been characterized by a low outbreak intensity. Among PSIs identified as infection hotspots, 85.6% of them reported only a single case of the disease. The primary contributors to scarlet fever incidence in organized children's groups in Moscow are children attending daycare centers (81.6%) and schools (18.4%).

Scarlet fever incidence can be classified as either year-round (sporadic) or epidemic. Epidemic outbreaks are marked by seasonal increases or isolated outbreaks. Seasonal incidence accounts for 50–80% of all registered cases within a year.

The monthly incidence of respiratory streptococcal infections follows a distinct autumn-winter-spring seasonality. The months with the lowest incidence are July and August, while the highest rates occur in November–December and March–April. Seasonal incidence is mainly determined by preschool children attending childcare facilities. Their incidence rates show two clear peaks: a spring peak (February–April) and an autumn-winter peak (November–December). Children aged 3–6 years attending organized groups exhibit a pronounced seasonal pattern, with increased incidence recorded from early September until the end of July. On average, 78.6% of cases occur during the seasonal incidence period, with this figure reaching 93% in some years. In contrast, the seasonal pattern is much less pronounced among

unorganized children under the age of 2, with only 8.4% of annual cases occurring during seasonal peaks.

Epidemiological Surveillance

Since scarlet fever is a "disease of organized groups," it is essential to monitor the incidence of angina and other manifestations of respiratory streptococcal infections daily in such groups. This helps to detect early signs of worsening epidemiological situations and predict cases of scarlet fever and rheumatism. Monitoring the strain structure and biological properties of the pathogen is crucial. The Group A Streptococcus population is highly heterogeneous and variable in terms of strain structure and its ability to cause rheumatism, glomerulonephritis, and severe toxic-septic forms of infection (such as necrotizing fasciitis, myositis, and toxic shock syndrome). Increases in incidence rates are usually associated with a shift in the predominant serovar (determined by M-protein structure). Immunological studies help assess the spread and infection rates of the pathogen in organized groups of children and adults.

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