

An epidemiological study to describe the burden of invasive infections caused by *Streptococcus pneumoniae* (pneumococcus) in children under 17 years of age

Invasive pneumococcal diseases (IPD) are rare. They mainly affect infants and young children and the elderly. They have been shown to cause serious diseases, clinically manifesting as meningitis, septic arthritis or sepsis. The most effective means of prevention is vaccination. The German Standing Vaccination Committee (STIKO) recommends vaccination for all infants from the age of 2 months, for people with certain underlying illnesses as well as for people aged 60 and over. Despite this recommendation, the immunization rate for children aged 24 months in Germany is only just under 75%.

Since 1997 the ESPED survey is an important tool for active surveillance of IPD in children and adolescents up to the age of 16 years in Germany. ESPED data allow to estimate the incidence of IPD in different pediatric age groups, describe the clinical manifestations and the involved bacterial serotypes. It aims to identify and investigate risk groups for IPD and changes in epidemiology over time.

Since the standard pneumococcal vaccination for infants was introduced in Germany in 2006, IPD caused by the serotypes included in the pneumococcal conjugate vaccines (PCV) have decreased significantly. The decline was not only seen in the age group of PCV-vaccinated infants and young children, but due to community effects also in all other age groups. In the following years there was an increase in pneumococcal disease caused by serotypes not included in the vaccine (replacement phenomenon). At the same time, higher-valent vaccines were developed. Surveillance of invasive pneumococcal diseases is important in order to be able to observe the further development of replacement and to evaluate the additional benefit of new vaccines.

The ESPED study provides valuable insights on the epidemiology of IPD for the past 25 years, enabling a continuous monitoring of the infant vaccination program, and gathering evidence to support the introduction of new vaccines that cover additional serotypes.

In the years 2013 to 2022, an average of 101 IPD cases per year were reported via ESPED, with the exception of the two COVID-19 pandemic years (2020 and 2021) with 63 and 53 cases. Between 2 and 10 deaths from IPD have been reported annually. Detailed results of the ESPED surveys are published in the ESPED Annual Report.

The study has been led since January 2019 by unit for vaccine-preventable diseases of the department of infectious diseases epidemiology at the Robert Koch Institute (RKI).