

INVASIVE INFECTION CAUSED BY *STREPTOCOCCUS PNEUMONIAE* (PNEUMOCOCCI)

Objectives:

To determine the absolute incidence of invasive pneumococcal disease up to the age of 16 in Germany. The causative pathogen strain in each case is to be identified and characterized in more detail. In addition, clinical information, including anamnestic data on a possible underlying disease of the patient, should help to identify risk groups.

Study directors:

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Cooperation partners:

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Start of study: 01/2019 (01/1997)

Background:

Invasive pneumococcal disease (IPD) occurs frequently in young children and older people and can sometimes take a very severe course, manifesting clinically as meningitis, septic arthritis, or sepsis. Residual effects are not uncommon. STIKO recommends vaccination for these groups of people. A 13-valent or 15-valent pneumococcal conjugate vaccine (PCV) is currently used for general infant vaccination, while a 20-valent PCV is recommended for the vaccination of people aged 60 and older. After the introduction of infant vaccination (2006), there was a significant decrease in IPD caused by the serotypes contained in the vaccine in the age group of vaccinated infants, but also in all other age groups. However, in the following years, there was an increase in diseases caused by pneumococci with serotypes not contained in the vaccine (replacement phenomenon). Initially, this negative effect was balanced by an increasing vaccination rate and the positive effects of herd protection.

However, once the increase in the incidence of serotypes not contained in the vaccine exceeds the maximum reduction in IPD incidence of serotypes contained in the vaccine, the peak benefit of the vaccination program has been exceeded. In Germany, 96% of 2-year-olds are vaccinated with at least 2 doses. With an annual birth cohort of approximately 750,000 children and 3 vaccine doses, the individual and societal costs of this vaccination program are very high. It is essential to closely monitor the epidemiology of IPD in order to continuously evaluate the benefits of the vaccination program and the potential additional benefits of new vaccines that cover more serotypes. IPD has been notifiable in Germany since 2020. Active surveillance of IPD in children and adolescents based on ESPED data, which has been in place since 1997, enables the estimation of incidence for different pediatric age groups, manifestations, and causative serotypes, as well as the collection of clinical parameters.

Questions:

- 1) How is the epidemiology of IPD in children changing over time?
- 2) What risk factors for IPD can be identified on the part of the patient?
- 3) Which serotypes of *Streptococcus pneumoniae* are isolated in children in Germany as the cause of invasive IPD? Is the replacement phenomenon increasing? Which serotypes are responsible for this?
- 4) In which serotypes/patient groups do vaccine breakthroughs occur?

Case definition:

Cultivation of a *Streptococcus pneumoniae* strain from **physiologically sterile body tissue** such as blood, cerebrospinal fluid, or tissue puncture (e.g., empyema) in children up to the age of 16.

Logistics:

Please report all patients according to the above case definition. After reporting, you will receive a short questionnaire to record the most important clinical parameters.

We also ask you to preserve approximately 0.5 ml of serum. In the rare cases where the disease was caused by a "vaccine serotype" and the child was properly vaccinated, the NRZ will contact you to determine the antibody titer against the vaccine serotypes and to assess the possibility of an immune deficiency. Since patients may already have been discharged by the time the serotype results are available, we recommend storing serum as a precautionary measure.

Literature:

Weinberger et al. Invasive pneumococcal disease in children under 16 years of age: Incomplete rebound in incidence after the maximum effect of PCV13 in 2012/13 in Germany. Vaccine Volume 36, Issue 4, January 25, 2018, Pages 572-577