



Q & A: Pneumococcal Disease

1. What is the [pneumococcus](#)?

Streptococcus pneumoniae, or pneumococcus, is a [bacteria](#) that comes in 90 varieties or [serotypes](#). Each serotype has a slightly different polysaccharide capsule that initially protects the bacteria from a person's immune system. Pneumococcus is commonly found in the [nasopharynx](#), the lining of the nose and throat, of healthy children and, to lesser extent, healthy adults.



2. What diseases does the pneumococcus cause?

Many times pneumococcus can be found in a person's nasopharynx without any signs of disease. These persons are called carriers. However, sometimes, with certain, more invasive pneumococcal serotypes, the bacteria invades the body via the respiratory tract to cause infections such as otitis media, sinusitis or [pneumonia](#). Other times pneumococcus can spread by entering the bloodstream ([bacteremia](#)) and may cause [sepsis](#) or a more distal infection such as pneumonia, [meningitis](#), bone or joint infections.

3. How do you get a [pneumococcal disease](#)?

The pneumococcus is spread person to person by contact with respiratory droplets containing the bacteria, such as through coughing or sneezing. Any person carrying the pneumococcus in their nasopharynx and some persons with disease can spread pneumococcus. Not everyone exposed to contaminated respiratory droplets will develop disease. Some exposed persons will become carriers of the pneumococcus, and some will progress to develop pneumococcal disease.

4. Who is most at risk for acquiring a pneumococcal disease?

Young children, particularly infants, and persons over the age of 65 years are the most vulnerable in a population for acquiring pneumococcal disease.¹ In children this is due to their immature immune response to the pneumococcal polysaccharide capsule. The elderly may suffer from multiple illnesses that compromise their immune response to pneumococcus as well. Other persons also at greater risk for pneumococcal disease are those who have a weakened immune system as a result of such conditions as undernutrition, AIDS or sickle cell anemia. For example, persons with HIV infection have a 20 to 40-fold higher risk of acquiring pneumococcal disease than HIV negative persons.²

5. How common is pneumococcal disease?

¹ US Data 1999: CDC. ABCs Report Emerging Infections Program Network, *Streptococcus pneumoniae*, 1999 accessed at <http://www.cdc.gov/ncidod/dbmd/abc/survreports/spneu99.pdf>.

² Mofenson LM, Oleske J, Serchuck L et al. *MMWR Recomm Rep*. 2004; 53(RR-14): 1-92.

Across the world, at any given time, over 50% of children under 3 years carry pneumococcus in their nasopharynx.³ Pneumonia is the most common serious type of pneumococcal disease, and pneumococcus is the leading cause of severe pneumonia among children in the developing world.⁴ Pneumococcus is also a major cause of bacterial meningitis and the leading cause of non-epidemic meningitis in Africa.⁵ Sepsis is a severe illness caused by infection of the bloodstream and the body's resulting inflammatory response.⁶ Pneumococcus has been found to be an important bacterial cause of sepsis particularly in young children. While otitis media is not as serious an infection, it is very common among young children, and 30-50% of all cases of otitis media are attributed to pneumococcus.⁷ Thus pneumococcal [carriage](#) and disease are very common in young children.

6. How is pneumococcal disease diagnosed?

The under-diagnosis of pneumococcal disease is common. In most developing countries, pneumococcal disease is diagnosed only based on clinical symptoms. X-rays can help diagnose a pneumonia but may be too expensive or unavailable in many resource-poor areas. Even growth of the bacteria in culture media can be very limited based on the site of the infection, the laboratory equipment available and training of staff in the proper handling of specimens. Other, more sensitive diagnostic tests are available, but the cost and special training needed to run such tests limit their use in developing countries.

7. How is pneumococcal disease treated?

The treatment for pneumococcal disease is prompt, appropriate [antibiotic](#) therapy. The type of antibiotic, the route of administration (for example oral or intravenous) and the duration of treatment depend on the age of the child, the site of pneumococcal disease and the local patterns of [antimicrobial resistance](#). Pneumococcal bacteria are increasingly becoming more resistant to common antibiotics, such as penicillin, thus making it harder and more costly to treat these infections.⁸

8. Are there any long-term consequences of having a pneumococcal disease?

Pneumococcal disease kills up to one percent of all children born in high mortality areas of the world.⁹ The WHO estimates that about up to 1 million children under the age of five years worldwide die each year from pneumococcal disease.¹⁰ These deaths are probably an underestimate as it counts mainly those who die from pneumococcal pneumonia. While pneumococcal meningitis is not as common as pneumococcal pneumonia, about 45% of those who develop this meningitis in developing countries die from the disease.¹¹ About two-thirds of those who survive pneumococcal meningitis are left with lifelong disabilities such as hearing loss, mental retardation, movement problems and seizures.¹²

³ Bogaert D, de Groot R and Hermans PWM. Lancet Inf Dis 2004; 4: 144-154.

⁴ UNICEF. Pneumonia: the Forgotten Killer of Children 2006.

⁵ Peltola H. Clin Inf Dis 2001; 32: 64-75.

⁶ Medline Plus. Sepsis. Accessed at <http://www.nlm.nih.gov/medlineplus/ency/article/000666.htm> on 2/22/08.

⁷ Durbin WJ. Peds in Review 2004; 25(12): 418-423

⁸ Hoban DJ, Doern GV, et al. CID 2001; 32 (Supple 2): S81-93

⁹ PneumoADIP. GAVI's PneumoADIP Surveillance and Research Report.

¹⁰ WHO Position Paper. Weekly Epidemiological Record, No. 12, 2007; 82:93-104.

¹¹ Peltola H. Clin Inf D 2001; 32: 64-75.

¹² Goetghebuer T, West TE, et al. Trop Med Int Health 2000; 5(3): 207-213.

9. How can pneumococcal disease be prevented?

There are safe, effective [vaccines](#) against pneumococcal disease. In 2000 a [pneumococcal conjugate vaccine](#) was licensed and has been used safely in over 60 countries to prevent a significant proportion of pneumococcal disease in those under five years of age.¹³ The [conjugate vaccine](#) has shown to prevent about 88% of [invasive pneumococcal disease](#) in children.¹⁴ Routine use of pneumococcal conjugate vaccines in developing countries could help save 5.4 million children's lives by 2030.¹⁵ The [pneumococcal polysaccharide vaccine](#) protects against 23 serotypes and is important in preventing disease in the elderly who are at higher risk of dying from pneumococcal disease.

10. What is the economic burden of pneumococcal disease?

Because pneumococcus is a very common bacterial cause of infection in young children, the economic burden of disease is very high. Young children who have a serious pneumococcal infection need medical attention. There are direct medical costs for such things as the clinic visit or hospital stay, diagnostic tests and medications. There are non-medical direct costs to the family for transport to the healthcare facility and food while hospitalized. There are also productivity costs as a family member must stay with the child in the hospital and thus cannot work to earn money or procure food for the rest of the family left at home. For all these reasons, introduction of the pneumococcal conjugate vaccine into poor countries would be highly cost effective.¹⁶

¹³ Pneumococcal Awareness Council of Experts. Pneumococcal Disease Fact Sheet. Accessed at <http://sabin.org/programs/pace/disease.html> on 2/15/08.

¹⁴ Lucero MG, Dulalia VE, et al. *Cochrane Database of Systematic Reviews* 2004, Issue 4. Art. No.: CD004977. DOI: 10.1002/14651858.CD004977.

¹⁵ PneumoADIP. Accessed at <http://www.preventpneumo.org/> on 3/3/08.

¹⁶ Sinha A, Levine O, et al. *Lancet* 2007; 369: 389-396.