Vaccines & Immunizations

Basics and Common Questions:

What Would Happen If We Stopped Vaccinations?

In the U.S., vaccination programs have eliminated or significantly reduced many vaccine-preventable diseases. However, these diseases still exist and can once again become common—and deadly—if vaccination coverage does not continue at high levels.

On this page (Figures and Statistics Updated 2003):

Introduction

In the U.S., vaccines have reduced or eliminated many infectious diseases that once routinely killed or harmed many infants, children, and adults. However, the viruses and bacteria that cause vaccine-preventable disease and death still exist and can be passed on to people who are not protected by vaccines. Vaccine-preventable diseases have many social and economic costs: sick children miss school and can cause parents to lose time from work. These diseases also result in doctor's visits, hospitalizations, and even premature deaths.

TOP

Polio

Stopping vaccination against polio will leave people susceptible to infection with the polio virus. Polio virus causes acute paralysis that can lead to permanent physical disability and even death. Before polio vaccine was available, 13,000 to 20,000 cases of paralytic polio were reported each year in the United States. These annual epidemics of polio often left thousands of victims--mostly children--in braces, crutches, wheelchairs, and iron lungs. The effects were life-long. UPDATED April 2007

In 1988 the World Health Assembly unanimously agreed to eradicate polio worldwide. As a result of global polio eradication efforts, the number of cases reported globally has decreased from more than 350,000 cases in 125 countries in 1988 to 2,000 cases of polio in 17 countries in 2006, and only four countries remain endemic (Afghanistan, India, Nigeria, Pakistan). To date polio has been eliminated from the Western hemisphere, and the European and Western Pacific regions. Stopping vaccination before eradication is achieved would result in a resurgence of the disease in the United States and worldwide.

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Measles

Before measles immunization was available, nearly everyone in the U.S. got measles. An average of 450 measles-associated deaths were reported each year between 1953 and 1963.

In the U.S., **up to 20 percent of persons with measles are hospitalized.** Seventeen percent of measles cases have had one or more complications, such as ear infections, pneumonia, or diarrhea. Pneumonia is present in about six percent of cases and accounts for most of the measles deaths. Although less common, some persons with measles develop encephalitis (swelling of the lining of the brain), resulting in brain damage.

As many as three of every 1,000 persons with measles will die in the U.S. In the developing world, the rate is much higher, with death occurring in about one of every 100 persons with measles.

Measles is one of the most infectious diseases in the world and is frequently imported into the U.S. In the period 1997-2000, most cases were associated with international visitors or U.S. residents who were exposed to the measles virus while traveling abroad. More than 90 percent of people who are not immune will get measles if they are exposed to the virus.

According to the World Health Organization (WHO), nearly 900,000 measles-related deaths occurred among persons in developing countries in 1999. In populations that are not immune to measles, measles spreads rapidly. **If vaccinations were stopped, each year about 2.7 million measles deaths worldwide could be expected.**

In the U.S., widespread use of measles vaccine has led to a greater than 99 percent reduction in measles compared with the pre-vaccine era. If we stopped immunization, measles would increase to pre-vaccine levels.

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Haemophilus Influenzae Type b (Hib) Meningitis

Before Hib vaccine became available, Hib was the most common cause of bacterial meningitis in U.S. infants and children. Before the vaccine was developed, there were approximately 20,000 invasive Hib cases annually. Approximately two-thirds of the 20,000 cases were meningitis, and one-third were other life-threatening invasive Hib diseases such as bacteria in the blood, pneumonia, or inflammation of the epiglottis. About one of every 200 U.S. children under 5 years of age got an invasive Hib disease. **Hib meningitis once killed 600 children each year and left many survivors with deafness, seizures, or mental retardation.**

Since introduction of conjugate Hib vaccine in December 1987, the incidence of Hib has declined by 98 percent. From 1994-1998, fewer than 10 fatal cases of invasive Hib disease were reported each year.

This preventable disease was a common, devastating illness as recently as 1990; now, most pediatricians just finishing training have never seen a case. If we were to stop immunization, we would likely soon return to the pre-vaccine numbers of invasive Hib disease cases and deaths.

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Pertussis (Whooping Cough)

Since the early 1980s, reported pertussis cases have been increasing, with peaks every 3-5 years; however, the number of reported cases remains much lower than levels seen in the pre-vaccine era. Compared with pertussis cases in other age groups, infants who are 6 months old or younger with pertussis experience the highest rate of hospitalization, pneumonia, seizures, encephalopathy (a degenerative disease of the brain) and death. From 2000 through 2008, 181 persons died from pertussis; 166 of these were less than six months old.

Before pertussis immunizations were available, nearly all children developed whooping cough. In the U.S., prior to pertussis immunization, between 150,000 and 260,000 cases of pertussis were reported each year, with up to 9,000 pertussis-related deaths.

Pertussis can be a severe illness, resulting in prolonged coughing spells that can last for many weeks. These spells can make it difficult for a person to eat, drink, and breathe. Because vomiting often occurs after a coughing spell, persons may lose weight and become dehydrated. In infants, **it can also cause pneumonia and lead to brain damage, seizures, and**

mental retardation.

The newer pertussis vaccine (acellular or DTaP) has been available for use in the United States since 1991 and has been recommended for exclusive use since 1998. These vaccines are effective and associated with fewer mild and moderate adverse reactions when compared with the older (whole-cell DTP) vaccines.

During the 1970s, widespread concerns about the safety of the older pertussis vaccine led to a rapid fall in immunization levels in the United Kingdom. More than 100,000 cases and 36 deaths due to pertussis were reported during an epidemic in the mid 1970s. In Japan, pertussis vaccination coverage fell from 80 percent in 1974 to 20 percent in 1979. An epidemic occurred in 1979, resulted in more than 13,000 cases and 41 deaths.

Pertussis cases occur throughout the world. If we stopped pertussis immunizations in the U.S., we would experience a massive resurgence of pertussis disease. **A study* found that, in eight countries where immunization coverage was reduced, incidence rates of pertussis surged to 10 to 100 times the rates in countries where vaccination rates were sustained.**

* Reference for study: Gangarosa EJ, et al. Impact of anti-vaccine movements on pertussis control: the untold story. *Lancet* 1998;351:356-61.

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Pneumococcal

Before pneumococcal conjugate vaccine became available for children, pneumococcus caused 63,000 cases of invasive pneumococcal disease and 6,100 deaths in the U.S. each year. Many children who developed pneumococcal meningitis also developed long-term complications such as deafness or seizures. Since the vaccine was introduced, the incidence of invasive pneumococcal disease in children has been reduced by 75%. Pneumococcal conjugate vaccine also reduces spread of pneumococcus from children to adults. In 2003 alone, there were 30,000 fewer cases of invasive pneumococcal disease caused by strains included in the vaccine, including 20,000 fewer cases in children and adults too old to receive the vaccine. If we were to stop immunization, we would likely soon return to the pre-vaccine numbers of invasive pneumococcal disease cases and deaths.

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Rubella (German Measles)

While rubella is usually mild in children and adults, up to 90 percent of infants born to mothers infected with rubella during the first trimester of pregnancy will develop **congenital rubella syndrome (CRS), resulting in heart defects, cataracts, mental retardation, and deafness.**

In 1964-1965, before rubella immunization was used routinely in the U.S., there was an epidemic of rubella that resulted in an estimated 20,000 infants born with CRS, with 2,100 neonatal deaths and 11,250 miscarriages. Of the 20,000 infants born with CRS, 11,600 were deaf, 3,580 were blind, and 1,800 were mentally retarded.

Due to the widespread use of rubella vaccine, only six CRS cases were provisionally reported in the U.S. in 2000. Because many developing countries do not include rubella in the childhood immunization schedule, many of these cases occurred in foreign-born adults. Since 1996, greater than 50 percent of the reported rubella cases have been among adults. Since 1999, there have been 40 pregnant women infected with rubella.

If we stopped rubella immunization, immunity to rubella would decline and rubella would once again return, resulting in pregnant women becoming infected with rubella and then giving birth to infants with CRS.

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Varicella (Chickenpox)

Prior to the licensing of the chickenpox vaccine in 1995, almost all persons in the United States had suffered from chickenpox by adulthood. Each year, the virus caused an estimated 4 million cases of chickenpox, 11,000 hospitalizations, and 100-150 deaths.

A highly contagious disease, chickenpox is usually mild but can be severe in some persons. Infants, adolescents and adults, pregnant women, and immunocompromised persons are at particular risk for serious complications including secondary bacterial infections, loss of fluids (dehydration), pneumonia, and central nervous system involvement. The availability of the chickenpox vaccine and its subsequent widespread use has had a major impact on reducing cases of chickenpox and related morbidity, hospitalizations, and deaths. In some areas, cases have decreased as much as 90% over prevaccination numbers.

In 2006, routine two-dose vaccination against chickenpox was recommended for all children, adolescents, and adults who do not have evidence of immunity to the disease. In addition to further reducing cases, this strategy will also decrease the risk for exposure to the virus for persons who are unable to be vaccinated because of illness or other conditions and who may develop severe disease. If vaccination against chickenpox were to stop, the disease would eventually return to prevaccination rates, with virtually all susceptible persons becoming infected with the virus at some point in their lives.

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Hepatitis B

More than 2 billion persons worldwide have been infected with the hepatitis B virus at some time in their lives. Of these, 350 million are life-long carriers of the disease and can transmit the virus to others. **One million of these people die each year from liver disease and liver cancer.**

National studies have shown that about 12.5 million Americans have been infected with hepatitis B virus at some point in their lifetime. One and one quarter million Americans are estimated to have chronic (long-lasting) infection, of whom 20 percent to 30 percent acquired their infection in childhood. Chronic hepatitis B virus infection increases a person's risk for chronic liver disease, cirrhosis, and liver cancer. About 5,000 persons will die each year from hepatitis B-related liver disease resulting in over $700 million in medical and work loss costs.

The number of new infections per year has declined from an average of 450,000 in the 1980s to about 80,000 in 1999. The greatest decline has occurred among children and adolescents due to routine hepatitis B vaccination.

Infants and children who become infected with hepatitis B virus are at highest risk of developing lifelong infection, which often leads to death from liver disease (cirrhosis) and liver cancer. **Approximately 25 percent of children who become infected with life-long hepatitis B virus would be expected to die of related liver disease as adults.**

CDC estimates that one-third of the life-long hepatitis B virus infections in the United States resulted from infections occurring in infants and young children. About 16,000 - 20,000 hepatitis B antigen infected women give birth each year in the United States. It is estimated that 12,000 children born to hepatitis B virus infected mothers were infected each year before implementation of infant immunization programs. In addition, approximately 33,000 children (10 years of age and younger) of mothers who are not infected with hepatitis B virus were infected each year before routine recommendation of childhood hepatitis B vaccination.

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Diphtheria

Diphtheria is a serious disease caused by a bacterium. This germ produces a

poisonous substance or toxin which frequently causes heart and nerve problems. The case fatality rate is 5 percent to 10 percent, with higher case-fatality rates (up to 20 percent) in the very young and the elderly.

In the 1920's, diphtheria was a major cause of illness and death for children in the U.S. In 1921, a total of 206,000 cases and 15,520 deaths were reported. With vaccine development in 1923, new cases of diphtheria began to fall in the U.S., until in 2001 only two cases were reported.

Although diphtheria is rare in the U.S., it appears that the bacteria continue to get passed among people. In 1996, 10 isolates of the bacteria were obtained from persons in an American Indian community in South Dakota, none of whom had classic diphtheria disease. There was one death reported in 2003 from clinical diphtheria in a 63 year old male who had never been vaccinated.

There are high rates of susceptibility among adults. Screening tests conducted since 1977 have shown that 41 percent to 84 percent of adults 60 and over lack protective levels of circulating antitoxin against diphtheria.

Although diphtheria is rare in the U.S., it is still a threat. Diphtheria is common in other parts of the world and with the increase in international travel, **diphtheria and other infectious diseases are only a plane ride away.** If we stopped immunization, the U.S. might experience a situation similar to the Newly Independent States of the former Soviet Union. With the breakdown of the public health services in this area, diphtheria epidemics began in 1990, fueled primarily by persons who were not properly vaccinated. From 1990-1999, more than 150,000 cases and 5,000 deaths were reported.

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Tetanus (Lockjaw)

Tetanus is a severe, often fatal disease. The bacteria that cause tetanus are widely distributed in soil and street dust, are found in the waste of many animals, and are very resistant to heat and germ-killing cleaners. From 1922-1926, there were an estimated 1,314 cases of tetanus per year in the U.S. In the late 1940's, the tetanus vaccine was introduced, and tetanus became a disease that was officially counted and tracked by public health officials. In 2000, only 41 cases of tetanus were reported in the U.S.

People who get tetanus suffer from stiffness and spasms of the muscles. The larynx (throat) can close causing breathing and eating difficulties, muscles spasms can cause fractures (breaks) of the spine and long bones, and some people go into a coma, and die. **Approximately 20 percent of reported cases end in death.**

Tetanus in the U.S. is primarily a disease of adults, but unvaccinated children and infants of unvaccinated mothers are also at risk for tetanus and neonatal tetanus, respectively. From 1995-1997, 33 percent of reported cases of tetanus occurred among persons 60 years of age or older and 60 percent occurred in patients greater than 40 years of age. The National Health Interview Survey found that in 1995, only 36 percent of adults 65 or older had received a tetanus vaccination during the preceding 10 years.

Worldwide, tetanus in newborn infants continues to be a huge problem. Every year **tetanus kills 300,000 newborns and 30,000 birth mothers who were not properly vaccinated.** Even though the number of reported cases is low, an increased number of tetanus cases in younger persons has been observed recently in the U.S. among intravenous drug users, particularly heroin users.

Tetanus is infectious, but not contagious, so unlike other vaccine-preventable diseases, immunization by members of the community will not protect others from the disease. Because tetanus bacteria are widespread in the environment, tetanus can only be prevented by immunization. If vaccination against tetanus were stopped, persons of all ages in the U.S. would be susceptible to this serious disease.

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Mumps

Before the mumps vaccine was introduced, mumps was a major cause of deafness in children, occurring in approximately 1 in 20,000 reported cases. Mumps is usually a mild viral disease. However, serious complications, such as inflammation of the brain (encephalitis) can occur rarely. Prior to mumps vaccine, mumps encephalitis was the leading cause of viral encephalitis in the United States, but is now rarely seen.

Serious side effects of mumps are more common among adults than children. Swelling of the testes is the most common side effect in males past the age of puberty, occurring in up to 37 percent of post-pubertal males who contract mumps. **An increase in miscarriages has been found among women who develop mumps during the first trimester of pregnancy.**

Before there was a vaccine against mumps, mumps was a very common disease in U.S. children, with as many as 300,000 cases reported every year. After vaccine licensure in 1967, reports of mumps decreased rapidly. In 1986 and 1987, there was a resurgence of mumps with 12,848 cases reported in 1987. Since 1989, the incidence of mumps has declined, with 266 reported cases in 2001. This recent decrease is probably due to the fact that children have received a second dose of mumps vaccine (part of the two-dose schedule for measles, mumps, rubella or MMR). Studies have shown that the effectiveness of mumps vaccine ranges from 73% to 91% after 1 dose and from 79% to 95% after 2 doses and that 2 doses are more effective than 1 dose.

We can not let our guard down against mumps. A 2006 outbreak among college students led to over 6500 cases and a 2009-10 outbreak in the tradition-observant Jewish community in 2 states led to over 3400 cases. Mumps is a communicable disease and while prolonged close contact among persons my facilitate transmission, maintenance of high 2-dose MMR vaccine coverage remains the most effective way to prevent and limit the size of mumps outbreaks.

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http://www.cdc.gov/vaccines/vac-gen/whatifstop.htm