Comparison of Effects of Diseases and Vaccines

Effects of disease*		Side effects of vaccine
Pre-vaccine incidence	**Post-vaccine incidence**	
Diphtheria Symptoms result from local infection of the respiratory tract (which may lead to breathing difficulties) or of the skin or mucosal surfaces, or from dissemination of diphtheria toxin, which damages the heart and central nervous system. The case fatality was about 5% to 10%, with highest death rates occurring in the very young and the elderly.		DTaP/IPV/Hib vaccine: serious adverse events following immunization are rare. The most common adverse reactions are redness, swelling and pain at the injection site. Systemic reactions such as fever and irritability are less common. Redness and swelling greater than 3.5 cm diameter, with minimal pain, are more common in children receiving the fifth consecutive dose of vaccine at 4 to 6 years of age, and have been reported in up to 16% of children. In older persons receiving the Td booster, injection site reactions are reported by about 10% of recipients.
5-year period: 1925-1929 Avg. annual rate: 84.2 Peak annual no: 9,010 cases	5-year period: 2000-2004 Avg. annual rate: 0 Peak annual no: 1 case	
Tetanus Tetanus is an acute and often fatal disease caused by an extremely potent neurotoxin, characterized by generalized rigidity and convulsive spasms of skeletal muscles. The muscle stiffness usually involves the jaw (lockjaw) and neck, and then becomes generalized. Case fatality is about 10% but can be much higher. Risk is greatest for the very young or old.		See above side effects of DTaP/IPV/Hib vaccine.
5-year period: 1935-1939 Avg. annual rate: 0.13 Peak annual no: 25 cases	5-year period: 2000-2004 Avg. annual rate: 0.01 Peak annual no: 8 cases	
Pertussis (whooping cough) Pertussis is a highly communicable respiratory infection causing cough that may result in vomiting or gagging and affecting individuals of any age; severity is greatest among young infants. Each year 1-3 deaths occur in Canada, primarily in young infants. Complications include apnea, seizures, pneumonia and, rarely, death.		See above side effects of DTaP/IPV/Hib vaccine. Rate of reactions to acellular pertussis vaccine is less than with whole cell vaccine used prior to 1997.
5-year period: 1938-1942 Avg. annual rate: 156.0 Peak annual no: 19,878 cases	5-year period: 2000-2004 Avg. annual rate: 10.4 Peak annual no: 4,751 cases	
Poliomyelitis Greater than 90% of infections are inapparent or nonspecific. Flaccid paralysis occurs in less than 1% of infections; paralysis is characteristically asymmetric with fever present at onset. Among those paralyzed, about 5%-10% die. Polio has been eliminated from Canada.		See above side effects of DTaP/IPV/Hib vaccine. Vaccine used in Canada is IPV, so vaccine-associated polio is no longer a risk
5-year period: 1950-1954 Avg. annual rate: 17.3 Peak annual no: 1,584	5-year period: 2000-2004, Avg. annual rate: 0 Peak annual no: 0 cases	
Hib in children < 5 years of age Hib was the most common cause of childhood bacterial meningitis before introduction of Hib vaccines. About 55%-65% of children had meningitis, the remainder had epiglottitis, bacteremia, cellulitis, pneumonia or septic arthritis. Case fatality rate of meningitis is about 5%. Severe neurologic sequelae occur in 10%-15% of survivors and deafness in 15%-20% (severe in 3% to 7%).		See above side effects of DTaP/IPV/Hib. A local reaction at the site of injection, including pain, redness and swelling, occurs in 5% to 30% of immunized children. Symptoms are mild and usually resolve within 24 hours. A recent meta-analysis, which included 257,000 infants, reported no serious adverse events following Hib conjugate vaccine.
Invasive Hib < 5 years of age 5-year period: 1986-1990 Avg. annual rate: 22.7 Peak annual no: 526 cases	Invasive Hib < 5 years 5-year period: 2000-2004 Avg. annual rate: 0.9 Peak annual no: 17 cases	

*All rates are per 100,000 population.

Comparison of Effects of Diseases and Vaccines

Effects of disease*		Side effects of vaccine
Pre-vaccine incidence	**Post-vaccine incidence**	
Measles Complications such as bronchopneumonia and otitis media occur in about 10%. Encephalitis occurs in 1/1,000 cases (fatal in 15% and neurologic sequelae in 25%). Subacute sclerosing panencephalitis is a rare but fatal complication. Case fatality < 0.05%. With 2-dose schedule, indigenous measles has been eliminated in Canada.		Measles vaccine is given in combination with mumps and rubella (MMR). MMR vaccine: Malaise and fever, with or without a non-infectious rash in about 5%; up to 1% of recipients may develop parotitis, about 5% have swollen glands, stiff neck or joint pains. Transient arthralgias or arthritis may occur and are more common in post-pubertal females. About 1/30,000 develop transient thrombocytopenia, 1/1 million develop encephalitis.
5-year period: 1950-1954 Avg. annual rate: 369.1 Peak annual no: 61,370 cases	5-year period: 2000-2004 Avg. annual rate: 0.2 Peak annual no: 199 cases	
Mumps Acute parotitis develops in 40%, of which 25% are unilateral. Complications relatively frequent but permanent sequelae rare; 20%-30% of post-pubertal males develop orchitis, 5% of post-pubertal females develop oophoritis. Transient, but occasionally permanent, deafness occurs at a rate of 0.5 to 5.0 per 100,000 cases. Encephalitis is rare (< 1/50,000 cases). Occasionally, mumps causes infertility or deafness.		Mumps vaccine is given in combination with measles and rubella (MMR). See measles for MMR side effects
5-year period: 1950-1954 Avg. annual rate: 248.9 Peak annual no: 43,671 cases	5-year period: 2000-2004 Avg. annual rate: 0.3 Peak annual no: 202 cases	
Rubella Encephalitis occurs in 1/6,000 cases. Main goal is prevention of rubella infection in pregnancy and congenital rubella syndrome (CRS). Infections in the first 10 weeks of pregnancy have an 85% risk of leading to CRS. Can result in miscarriage, stillbirth and fetal malformations (congenital heart disease, cataracts, deafness and mental retardation).		Rubella vaccine is given in combination with mumps and measles (MMR). See measles for MMR side effects.
5-year period: 1950-1954 Avg. annual rate: 105.4 Peak annual no: 37,917 cases	5-year period: 2000-2004 Avg. annual rate: 0.1 Peak annual no: 29 cases	
Varicella Secondary bacterial infections (5%-10% of cases), low platelets (1%-2%), hospitalization (2-3 per 1,000 cases), cerebellar ataxia (1:4,000), encephalitis (1:5,000), invasive group A Streptococcal infection (5:100,000), shingles during childhood (68:100,000 person-years), congenital varicella (up to 2% of fetuses born to mothers infected at 13-20 wks' gestation). Case fatality highest among adults (30 deaths/100,000 cases), then infants < 1 year of age (7 deaths/100,000 cases), and then those 1 to 19 years (1-1.5 deaths/100,000 cases).		Local pain, swelling and mild fever in 10%-20% and varicella-like rash in 1%-5% of vaccinees. Shingles post-vaccine (2.6 per 100,000 doses). Serious adverse events are rare following immunization. No deaths or congenital varicella attributed to vaccination.
Estimated 350,000 cases per year in Canada.	Assessing the effect of immunization on disease incidence difficult because varicella infections are significantly under-reported in Canada	

*All rates are per 100,000 population.