Relative Risks of Diseases and Immunizations

Disease	Risks Associated with Disease	Reactions Following Immunization*
Diphtheria	Case fatality: 5 – 10% Complications include upper airway obstruction, pneumonia, heart failure, paralysis	Local reactions (redness, swelling and pain) are most common, increasing with age and the number of doses received. Up to 16% of children receiving a fifth doses at school entry will experience redness and swelling. Fever and irritability are less common.
Tetanus	Case fatality: 10% Severe spasms can cause fractures in the spine and long bones. Spasms in the larynx cause eating and breathing difficulties	Peripheral neuropathies rare: 0.5-1/100,000 doses Local reactions increasing with age and the number of doses given: 20%
Pertussis	Case fatality: about 1% in infants under six months. Pneumonia: 9.5% (17% in infants <6 mos. of age) Seizures: 1.4% Encephalopathy: 0.2%	Mild fever in 3-5% of vaccine recipients; Local reactions. Moderate to severe systemic events are reported rarely with acellular vaccines. Size and frequency of local reactions increases with age and the number of doses received.
Haemophilus *influenzae* type b	Meningitis: 50% Meningitis case fatality rate: 5% (10-15% of Hib meningitis survivors have permanent neurological sequelae and 15-20% have deafness.) Epiglottitis: 17% Pneumonia: 15% Arthritis: 8% Cellulitis: 6%	Mild fever: 2% Swelling, redness and pain at injection site: 5%-30%. Symptoms mild and usually resolve in 24 hours.
Polio	Aseptic meningitis: 1% of polio infections Paralytic polio: 1% (25% of these will have post-poliomyelitis syndrome) Mortality: 10% in paralytic polio infections (2-5% in children and 15-30% in adults)	Local discomfort: 5% No severe adverse events reported with IPV OPV associated with rare cases of paralytic polio in vaccine recipients or their contacts.

Adapted from Communicable Disease Control, Chapter II Immunization Program, December 2010

Disease	Risks Associated with Disease	Reactions Following Immunization
Measles	Febrile convulsions: 2% Pneumonia, diarrhea, otitis media: 10% Thrombocytopenia:1/300 cases Encephalitis: 1/1000 cases (case fatality: 10%; permanent sequelae: 25%) Death: 1/3000 cases Subacute sclerosing panencephalitis: 1/25,000 cases	Non-infectious rash: 5% Fever: 5-15%; 1 in 3000children may have febrile convulsions. Encephalitis:1 case per million doses Transient thrombocytopenia: 1 in 24,000 doses Measles vaccine is given in combination with mumps and rubella, as MMR.
Mumps	Parotitis: 30-40% Orchitis: 20-30% in post-pubertal males. Oophoritis: 5% in post-pubertal females. Deafness: 0.5-5.0 per 100,000 cases Encephalitis: 0.5%	Mumps vaccine given with measles and rubella as MMR. See reactions for measles. Parotitis has occurred following immunization.
Rubella	Acute arthralgias or arthritis:50% of adolescents and adults Encephalopathy: 1/6,000 cases Risk of Congenital Rubella Syndrome (CRS) with eye, ear, and brain damage is 85% in maternal infection in the first 10 weeks of pregnancy.	Rubella given with measles and mumps as MMR. See reactions for measles. Transient arthralgias and arthritis in seronegative post-pubertal females; frequency and severity increases with age.
Varicella	Secondary bacterial infections of skin lesions: 5-10% Low platelets: 1-2% Encephalitis:1/5000 cases Deaths per 100,000 cases: 30 in adults; 7 in infants, < 12 months of age; 1-1.5 in children1-19 years of age Complications more frequent in infants < 1 year and Individuals >15 years of age. Reactivation of varicella virus as Herpes Zoster (shingles) later in life:15% Congenital varicella syndrome: up to 25 of fetuses born to mothers infected at 13-20 weeks gestation.	Varicella-like rash at injection site Fever: 10-15% Pain and redness at injection site: 10-20%
Hepatitis B	Case fatality: 1-2% due to fulminant hepatitis Risk of chronicity: infants, 90-95%; children < 5, 20-50%; adults, 6-10%. Chronic carriers have an increased risk of hepatic cirrhosis and liver cancer.	Soreness at injection site, and fever no greater than 37.7°C

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Disease	Risks associated with Disease	Reactions following Immunization*
Pneumococcal Disease	Pneumococcal pneumonia is an important cause of death in infants and the elderly Mortality rate: 20% in individuals age 65 and older Most common cause of bacterial meningitis Bacteremia	Local reactions: conjugate vaccine, 10-20%; polysaccharide vaccine, 15-20% Fever: conjugate vaccine15-24%; Polysaccharide vaccine, 2% Irritability, drowsiness, restless sleep, decreased appetite, headache, malaise
Meningococcal Disease	Meningitis is the most common presentation of invasive disease. Meningococcal case fatality:5 10% Septicemia: 50-20% of cases. Pneumonia: 5-15% of cases Sequelae occur in up to 20% of survivors and include neurological damage, loss of hearing, loss of limbs from gangrene, and kidney damage.	Conjugate vaccines: ▪ Local reactions (redness, swelling, pain at injection site): up to 50% ▪ Irritability in up to 50% of infants ▪ Fever: up 9% when other vaccines given at the same time ▪ Headache and malaise: up to 10% of older children and adults ▪ Severe reactions: <0.01% ▪ Risk of GBS after conjugate quadrivalent vaccine continues to be monitored. Polysaccharide vaccine: ▪ Local reactions (pain, swelling, redness) up to 50% ▪ Fever: 5%, particularly in the young
Influenza	Viral and bacterial pneumonia. Death reported in 0.5-1 per 1000 cases: most deaths in persons ≥65 years of age. During epidemics, there may be increased mortality and morbidity among the elderly, the immunocompromised and those with chronic disease.	Local reactions (soreness at injection site): ≤ 7% of children < 3 years of age. Fever: ≤ 12% of children 1-5 years of age. Headache, malaise, myalgia: <1% Risk of GBS estimated to be 1 excess case per million doses of influenza vaccine.
Human Papillomavirus (HPV)	HPV types 16 and 18 cause 70% of cervical cancer HPV types 6and 14 cause 90% of genital warts HPV causes 36% of oropharyngeal cancer,24% of laryngeal cancer 24% of oral cancer , and	Injection site reactions: Pain 84%, swelling 25%, redness 25%, itching 3%. Systemic reactions: fever 10%, nausea 4%, dizziness 3% and diarrhea 1%.

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*****The percentages for reactions following immunization may vary with the specific vaccine used. Anaphylaxis is a rare complication of immunization: the estimated annual reported rate in Canada ranges from 0.4 to 1.8 reports per 1,000,000 doses of vaccine distributes.