4.1 Objectives

- To describe for each vaccine preventable disease
    - Epidemiology of disease and impact of vaccination
    - Mode of transmission
    - Incubation period
    - Period of infectivity
    - Clinical features
    - Vaccine schedule in Ireland.

The vaccine preventable diseases are subdivided into

- those included in the universal primary childhood immunisation schedule
- those for specific "at-risk" groups

4.2 Diseases included in the Primary Childhood Immunisation Programme

4.2.1 Diphtheria

Epidemiology of disease and impact of vaccination

Diphtheria is an infectious disease mainly affecting tonsils pharynx, nose and occasionally other mucous membranes or skin. It is caused by the bacteria *Corynebacterium diphtheriae* or *Corynebacterium ulcerans*. All age groups are vulnerable but disease is more serious in young infants and the elderly.

In Ireland, vaccination against diphtheria was introduced in 1952 (Figure 4.1) and incidence has declined dramatically. It is still important to vaccinate against diphtheria as it does occur in temperate climates mainly involving unimmunised children under five years of age. In 1990, an outbreak of diphtheria occurred in the Russian federation and spread to all countries of the former Soviet Union and Mongolia. A number of cases associated with this outbreak were reported in European countries also. Contributory factors to this outbreak included increased susceptibility of adults due to waning of vaccine-induced immunity, failure to fully vaccinate infants due to unwarranted contraindications and poor socioeconomic conditions. The epidemic peaked in 1997

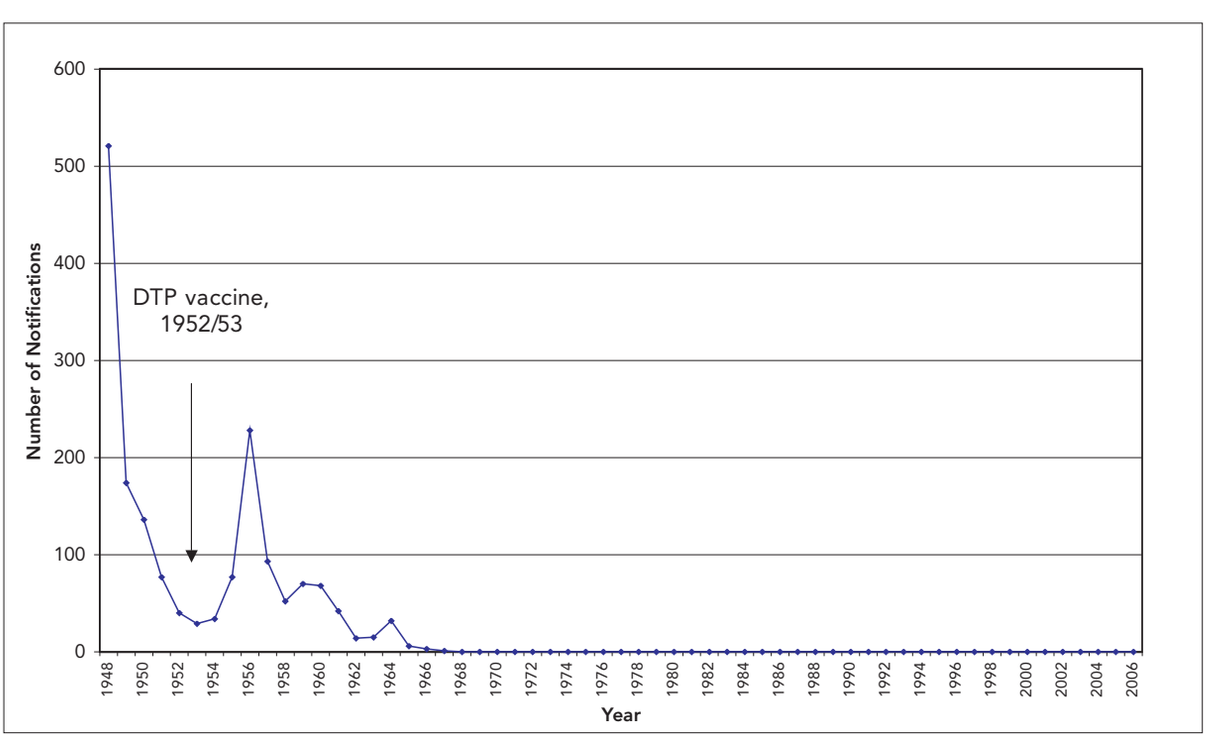

Figure 4.1: Number of notifications of diphtheria in Ireland by year of notification 1948-2006.

Source: Health Protection Surveillance Centre

and was responsible for 150,000 reported cases and 5,000 deaths. Control was established through mass vaccination programmes.

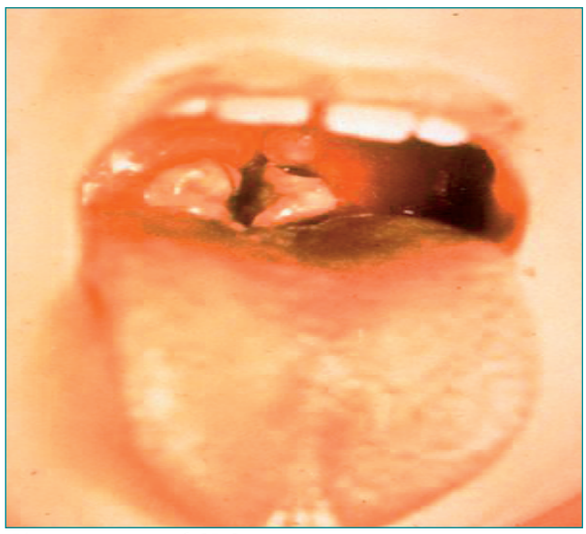

Photo courtesy of CDC

Clinical features

Early features include mild fever, swollen neck glands, anorexia, malaise, cough.

In classical respiratory diphtheria the patient has a sore throat, enlarged cervical lymph nodes and swelling of the neck- the bull neck appearance. The pharyngeal membrane is not always present, but if present is typically grey in colour, thick and difficult to remove and can lead to respiratory distress. Nasal diphtheria usually presents with a blood stained nasal discharge.

Transmission

Diphtheria is transmitted by droplet infection or by direct contact with discharges or secretions. The bacteria can infect the throat and sometimes the skin. The bacteria release a toxin that causes cardiac toxicity (myocarditis, heart block) and neurological damage. Death occurs in 5-10% of all cases.

Incubation period

The incubation period ranges between 2-5 days.

Period of infectivity

Those infected with untreated disease can be infectious for up to four weeks (rarely up to six months).

Vaccine schedule in Ireland

Diphtheria vaccine protects children by providing immunity to the toxin that causes the symptoms of the illness, rather than immunity to the bacteria itself. As it acts on the toxin, it is called a toxoid. Diphtheria vaccine is given as part of the routine childhood immunisation program, together with tetanus, whooping cough (pertussis), Haemophilus influenzae type B (Hib), hepatitis B, and inactivated polio (IPV) vaccines (referred to as the "6-in-1" vaccine). Vaccination is given at 2, 4 and 6 months of age. Booster vaccine doses are given at 4-5 years of age and again between 11-14 years of age.

4.2.2 Haemophilus influenzae

Epidemiology of disease and impact of vaccination

Haemophilus influenzae is a bacterial infection that can cause serious infection in humans, particularly in children, but also in individuals with weakened immune systems. There are a number of strains of *Haemophilus influenzae*. Haemophilus influenzae type b (Hib) is one of the most common types. Hib accounted for up to 95% of all strains that caused invasive illness prior to vaccine development. Healthy individuals can carry bacteria in their nose and throat without symptoms. The number of invasive Haemophilus influenzae cases reported in Ireland 1987-2006 are outlined in Figure 4.2. A vaccine against Hib was introduced into Ireland in 1992 and led to a decline in the number of invasive Hib cases notified. A booster dose of Hib was introduced in 2006.