History and aims of immunisation
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Objectives

• To examine the history of immunisation

• To explain the aim of immunisation

• To develop an understanding of the role of the following agencies in relation to immunisation
  – The National Immunisation Advisory Committee (NIAC)
  – The Department of Health (DoH)
  – The Health Service Executive (HSE)
  – The National Immunisation Office (NIO)
  – The Health Protection Surveillance Centre (HPSC)

• To understand the importance of infectious disease surveillance in Ireland
Smallpox

Variola virus

Infected humans 10,000 years ago

Known in China 11th century BC

Inoculation described 6th century BC

1796 vaccinia virus isolated

Edward Jenner (1749 – 1823)
Smallpox

“More mites die from vaccination than from the disease they are supposed to be inoculated against”

George Bernard Shaw 1929
Smallpox

1977 Last reported case Somalia

1980 WHO declared eradication

CDC. Public Health Images Library (PHIL) id# 131. Source: CDC/Barbra Rice

www.immunisation.ie
Polio

Endemic for thousands of years

1955 Inactivated polio vaccine

1962 Live oral polio vaccine

www.immunisation.ie
Polio

Immunisation campaigns in Cuba and Eastern Europe

Wild polio virus eradicated in large areas

Basis for eradication

Photo courtesy of www.polioeradication.org

www.immunisation.ie
Districts with Cases Caused by Wild Polioviruses\(^1\), Previous 6 Months\(^2\)

<table>
<thead>
<tr>
<th>Status</th>
<th>Country</th>
<th>Onset of most recent WPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endemic</td>
<td>Pakistan, Afghanistan, Nigeria</td>
<td>27-Jul-14, 17-Jun-14, 27-May-14</td>
</tr>
<tr>
<td>Active outbreak</td>
<td>Cameroon, Somalia, Equatorial Guinea, Iraq</td>
<td>09-Jul-14, 03-Jun-14, 03-May-14, 07-Apr-14</td>
</tr>
</tbody>
</table>

\(^1\)Excludes cases caused by vaccine-derived polioviruses and viruses detected from environmental surveillance.  
\(^2\)Onset of paralyses 20 February – 19 August 2014

Data in WHO HQ as of 19 August 2014
Polio 2014

- 416 cases in 2013
- 212 (62%) in non endemic countries
- 146 cases to date in 2014
### Average USA Annual Morbidity Due to Vaccine Preventable Diseases in the 20th Century compared with Morbidity in 2004 (for pre-1990 vaccines)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Average number of cases per year in 20th century</th>
<th>Number of cases in 2004</th>
<th>Percentage decrease in number of deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallpox</td>
<td>48,164</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>175,885</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Polio</td>
<td>16,316</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Measles</td>
<td>503,282</td>
<td>37</td>
<td>99.99</td>
</tr>
<tr>
<td>Rubella</td>
<td>47,745</td>
<td>12</td>
<td>99.97</td>
</tr>
<tr>
<td>Mumps</td>
<td>152,209</td>
<td>236</td>
<td>99.84</td>
</tr>
<tr>
<td>Tetanus</td>
<td>1314</td>
<td>26</td>
<td>98.02</td>
</tr>
<tr>
<td>Pertussis</td>
<td>147,271</td>
<td>18,957</td>
<td>87.13</td>
</tr>
</tbody>
</table>

[www.immunisation.ie](http://www.immunisation.ie)
Aim of immunisation

• The aim of immunisation is the prevention of disease in individuals or groups.

• Examples
  – 1980 elimination of smallpox (WHO)
  – 1991-Elimination of polio from the Americas

• Achieved by
  – a comprehensive immunisation programme achieving the World Health Organisation target uptake of 95% for childhood vaccines and 75% for influenza vaccines
  – intensive surveillance of these diseases
Multidisciplinary components of an immunisation system

Effective Vaccination Programmes Delivered for clients

Financial Management

Clinical & Technical Linkages

DOHC

MB

HPSA

HIOA

Vaccine Manufacturers

RCPI Advisory Committee

Information Technology

GP/IM Team

Supply Chain Management

Procurement Strategies

Supply Management

Distribution System

Supply Chain Workers

Healthcare Workers

GP/IM Team

Target Cohorts

General Public

Education & Vaccine Promotion

PROTECT HEALTH IMMUNISE

Health Service Executive
The National Immunisation Advisory Committee (NIAC)

- Independent committee of the RCPI
- Variety of experts
- Advises the Department of Health and Children
- Produces the National Immunisation Guidelines for Ireland
  Based on
  - best evidence regarding the safety and efficacy of vaccines
  - the disease burden
  - pharmacoeconomic analyses
The Department of Health (DoH)

- Responsible for making policy decisions regarding the immunisation programme including changes to the current immunisation programme.

The Health Products Regulatory Authority (HPRA) (formerly the Irish Medicines Board)

- Regulatory body responsible for licensing of vaccines and ensuring their quality and safety and efficacy
- Responsible for monitoring and evaluation of adverse events following immunisation
HSE

• Responsible for the implementation of the primary childhood, school immunisation and seasonal influenza vaccination programmes
• Delivered by general practitioners (GPs), practice nurses, pharmacists, community health doctors and public health nurses and support staff
The National Immunisation Office (NIO)

Coordinating Unit

• Standardised implementation of all publicly funded immunisation programmes
• Protocols and immunisation training
• Information materials for the general public
• National immunisation website www.immunisation.ie
• Vaccine contracts and the HSE National Cold Chain delivery Service to provide vaccine deliveries to all GPs, hospitals and HSE clinics
• Development of a national IT database
  • Currently different IT systems modified with any changes to schedule
Health Protection Surveillance Centre (HPSC)

- Responsible for surveillance of vaccine preventable diseases
- Monitors immunisation uptake data from each HSE area and reports on uptake rates
Importance of surveillance - Hib catch up 2006

Source: HPSC
Impact of Hib campaign

Number of cases of Hib disease in fully vaccinated children 2004 - 2010

Source: HPSC

www.immunisation.ie
Importance of surveillance
Mumps notifications, in Ireland
2008-week 20  2009*

National Outbreak
Control Team convened
26/03/09

Source: HPSC
Mumps notifications 2008 and 2009

MMR campaign in senior cycle of 2nd level schools

Data were extracted from the Computerised Infectious Disease Reporting (CIDR) system on the 25/09/2009. 2009 data are provisional.
Vaccine uptake rate at 24 months 1999-2014

Target 95%

Source: HPSC
Quarter 1 2014 D3 immunisation uptake rates (%) by LHO, in those 24 months of age in Ireland and Dublin (source HPSC)
Quarter 1 2014 MMR immunisation uptake rates (%) by LHO, in those 24 months of age in Ireland and Dublin (source HPSC)
Economic benefits of immunisation

Cost of treating more than 10 million cases of various diseases annually

Cost of vaccinating 3.8 million children each year against those same diseases

Infectious Diseases in Children, August 2003, p.19,

www.immunisation.ie
Why Immunise?

• Immunisation is one of the most cost effective and safest of all health interventions

• Immunisation has saved more lives than any other public health intervention apart from the provision of clean water