Vaccine Preventable Diseases

Dr Rose Fitzgerald

www.immunisation.ie
Vaccine Preventable Diseases – not just a thing of the past
Worldwide VPD Disease Burden

1.4 M (14%) deaths children < 5 yrs

WHO 2002

www.immunisation.ie
Nearly Forgotten Vaccine Preventable Diseases

- Small pox .....Gone
- Diphtheria
- Tetanus
- Polio

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Smallpox

In the 19th century
- killed one in three of those infected
- badly disfigured survivors

Somalia in 1977
- last naturally occurring case

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Polio

Afghanistan, Pakistan, Nigeria, Lao, Madagascar and Guinea

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Polio cases Ireland 1947 – 2004 (HPSC)
Progress in Polio Eradication, Estimated and Reported Polio Cases, 1985-2008

1988: WHA Resolution to Eradicate Polio

2000: Original Target Date for Interruption of Transmission
   Reported cases: 2,971
   Estimated cases: 3,500

1999: WHA Resolution to accelerate polio eradication activities

2008: Reported polio cases:
   1,730

Reported (light blue bars) and Estimated (dark blue bars)
Diphtheria

- Inflammatory exudate of upper respiratory tract
- Obstructive laryngotracheitis
- Myocarditis
- Ascending paralysis
- 7,321 cases in 2014

Courtesy of CDC

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Diphtheria global annual reported cases and DTP3 coverage, 1980-2014
Diphtheria Cases Ireland 1947 – 2006 (HPSC)

DTP vaccine, 1952/53

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Diphtheria Soviet Union and Newly Independent States 1965 – 1996 (CDC)
Neonatal and Maternal tetanus

In 2000

- Neonatal tetanus caused 14% (215,000) neonatal deaths worldwide
- Maternal tetanus responsible for 5% (30,000) deaths

www.immunisation.ie
Tetanus notifications Ireland, 1982-2007 (HPSC)
Haemophilus Influenzae B

- RTIs, Meningitis, Septicaemia, osteomyelitis, epiglottitis
- Vaccine since 1992

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Haemophilus influenzae type B
1997 - 2006 (HPSC)

Number of Cases

Year

Hib vaccine, 1992
Hib catch-up, 2005
Hib booster, 2006
Meningococcal Disease
Invasive Meningococcal Disease by serogroup Ireland 1999 – 2008 (HPSC)
Notification rates of invasive meningococcal disease (IMD) in Europe

Notification Rates per 100,000 population

Countries: Ireland, United Kingdom, Lithuania, Denmark, Spain, Malta, France, Austria, Netherlands, EU Total, Sweden, Norway, Poland, Slovenia, Portugal, Czech Republic, Slovak Republic, Finland, Greece, Germany, Hungary, Romania, Luxembourg, Estonia, Italy, Latvia, Bulgaria

EU Total and EEA Total are shown at the bottom of the graph.
Invasive Meningococcal Disease

- Ireland has the highest notification rates of invasive meningococcal disease in Europe
- 60 – 80 per year
- Predominately Serogroup B
Pertussis

- Catharrhal stage - 2-3 weeks
- Paroxysmal cough 2-3 months
- Whoop +/- vomiting
- Bronchopneumonia,
- Cerebral hypoxia
- Encephalopathy
- Waning immunity 10 – 12 years following vaccination

www.immunisation.ie
Pertussis Notifications Ireland 1948-2003

Number of Cases

Year

Pertussis vaccine introduced, 1952/53
Pertussis vaccine scare mid 1970s
DTaP 1996

77 cases in 2007, 104 cases in 2008

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Pertussis in Neonates

- Mostly those too young to be vaccinated
- Boostrix (Tdap) recommended for all women in pregnancy
- Available from coldchain

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Mumps

- Inflammation of salivary glands
- 40% asymptomatic
- Aseptic meningitis, encephalitis
- Transverse myelitis
- Sensori-neural deafness
- Pancreatitis
- Orchitis/Oophoritis
- Arthralgia, arthritis, cardiac

www.immunisation.ie
Notifications of Mumps, Ireland 1988-2006

The graph shows the number of notifications of mumps in Ireland from 1988 to 2006. There are two notable increases in notifications:

- MMR1, 1988: A significant increase in notifications following the introduction of MMR1 in 1988.
- MMR2, 1992: Another increase in notifications following the introduction of MMR2 in 1992.

The graph also includes a note on the website www.immunisation.ie for more information.
Measles

www.immunisation.ie
Global annual reported measles cases 1982-1997

Note: Reported cases only. Estimated actual cases are many times higher.
Source: WHO EPI Information System

© World Health Organization 1999
www.immunisation.ie
Notifications of Measles Ireland 1948-2006

Year | Number of Notifications
--- | ---
1948 | 0
1951 | 0
1954 | 0
1957 | 0
1960 | 0
1963 | 0
1966 | 0
1969 | 0
1972 | 0
1975 | 0
1978 | 0
1981 | 0
1984 | 0
1987 | 0
1990 | 0
1993 | 0
1996 | 0
1999 | 0
2002 | 0
2005 | 0

Measles Vaccine, 1985
MMR₁, 1988
MMR₂, 1992
MR, 1995

www.immunisation.ie
Measles Globally

• In 2014, there were 114,900 measles deaths globally.
• Measles vaccination resulted in a 79% drop in measles deaths between 2000 and 2014 worldwide.
• During 2000-2014, measles vaccination prevented an estimated 17.1 million deaths making measles vaccine one of the best buys in public health.

www.immunisation.ie
Measles Outbreak 2016

- Started from 1 imported case
- 43 cases notified from end April to beginning of September
- Mostly un-vaccinated
- 3 fully vaccinated
- Nosocomial spread a problem

www.immunisation.ie
Measles Outbreak Control

• Advice GPs, Paediatricians, Pre-schools
• Isolation, exclusion, notification
• Vaccination of contacts within 72 hours

• MMR x 2 for anyone from 12 months who hasn’t had 2 doses MMR

• MMR for children from 6/12 (will need a dose over 12/12)

www.immunisation.ie
Rubella

Number of Rubella Cases Notified in Republic of Ireland 1948-2003

2008 WHO estimated 110,000 cases CRS annually
127 countries (40% birth) routine vaccination
Ireland - 40 notifications in 2008, 2 confirmed

www.immunisation.ie
Human Papilloma Virus

- Programme since May 2010
- First year in secondary school
- 2 doses < 15 yrs
- Gardasil – quadrivalent vaccine (HPV types 6, 11, 16 and 18)
- Protects against 70% virus which cause cervical cancer
- National uptake of at least HPV stage 2 was 86.9% in 2014/2015

www.immunisation.ie
Hepatitis B

- Globally 2 Billion infected
- 360 million chronically infected
- 500,000 – 700,000 deaths annually

Hepatitis B notifications Ireland 1998 – 2008 (HPSC)
Hepatitis B Vaccine – At risk

Anti-HBs <10m IU/ml at 2 months
- a repeated course of vaccination, preferably with an alternative hepatitis B vaccine (protective anti-HBs titres in 50 to 100%)

If still no response
- a course of a double dose (2mls) of combined hepatitis A and B vaccine (Twinrix) at 0,1 and 6 months (protective anti-HBs response in >90%)

If still no response
- a single dose of Fendrix should be offered and anti-HBs checked 2 months later

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Pneumococcal Disease

- PCV7 introduced Sept. 2008, incl. catch up programme < 2 years
- In December 2010 changed to PCV13
- Since the introduction of PCV7 there has been a 91% decrease in the incidence of IPD in young children due to PCV7 serotypes
- PPV23 - indicated for ≥2 years

www.immunisation.ie
Varicella

• Live attenuated viral vaccine
• Two doses, at least 4 weeks apart
• Risk groups:
  • HCWs without definite history of varicella,
  • Laboratory staff who may be exposed
  • Immunocompromised patients
  • Close household contacts of immunocompromised patients
  • HIV infected children
  • Children in residential units for physical and intellectual disability.
  • Women of childbearing age without a history of varicella

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Zostavax

- Live attenuated viral vaccine indicated for prevention of zoster and zoster-related post-herpetic neuralgia in those aged >50 years
- One dose (0.65 ml) **subcutaneously**, preferably in the deltoid region
- Defer vaccination for 1212 after zoster has resolved for effective immune response
- Zoster vaccine may be given to a recent receipt of an antibody containing blood product

www.immunisation.ie
VPD Prevention & Control
Key Strategies

- Primary prevention - ensuring high population immunity
- Early diagnosis and rapid investigation
- Case management incl. infection control
- Notification to public health
- Management of close contacts (as appropriate)
- Strengthened surveillance

www.immunisation.ie
Vaccines - Now and in the Future

- Extended use of available vaccines
  - e.g. Hepatitis A and Hepatitis B, Influenza, Pneumococcal, Varicella-zoster

- New modes of vaccine delivery
  - Oral, inhaled

- Improved and safer vaccines
  - Recombinant, oral/inhaled

- New vaccines under development/research
  - SARS, Malaria, HIV, asthma, diabetes mellitus

www.immunisation.ie
Immunisation Uptake Mid West at 24 months
What would happen if we stopped vaccinating?

<table>
<thead>
<tr>
<th>Disease</th>
<th>Max. cases reported</th>
<th>Year max. reported</th>
<th>Reported cases in 2003</th>
<th>Percent decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheria</td>
<td>175,885</td>
<td>1920–1922</td>
<td>1</td>
<td>99.9%</td>
</tr>
<tr>
<td>Pertussis</td>
<td>147,271</td>
<td>1925</td>
<td>11,647</td>
<td>92.1%</td>
</tr>
<tr>
<td>Tetanus (lockjaw)</td>
<td>1,314</td>
<td>1926</td>
<td>20</td>
<td>98.5%</td>
</tr>
<tr>
<td>Polio (wild virus)</td>
<td>16,316</td>
<td>1951–1954</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Measles</td>
<td>503,282</td>
<td>1958–1962</td>
<td>56</td>
<td>99.9%</td>
</tr>
<tr>
<td>Mumps</td>
<td>152,209</td>
<td>1968</td>
<td>231</td>
<td>99.8%</td>
</tr>
<tr>
<td>Rubella</td>
<td>47,745</td>
<td>1968</td>
<td>7</td>
<td>99.9%</td>
</tr>
<tr>
<td>Hib</td>
<td>20,000</td>
<td>1985</td>
<td>259</td>
<td>98.7%</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>26,612*</td>
<td>1985</td>
<td>7,526</td>
<td>71.7%</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>59,606</td>
<td>1971</td>
<td>7,653</td>
<td>87.2%</td>
</tr>
</tbody>
</table>

*The estimated mean number of new infections in the 1980s was 259,000, although the reported number of cases is much lower.*

Source: [www.immunisation.ie](http://www.immunisation.ie)
DON'T STOP!
CLOSE THE IMMUNIZATION GAP
VACCINATION FOR ALL

World Health Organization
WWW.WHO.INT/CAMPAIGNS/IMMUNIZATION-WEEK/2015