VACCINE PREVENTABLE DISEASES

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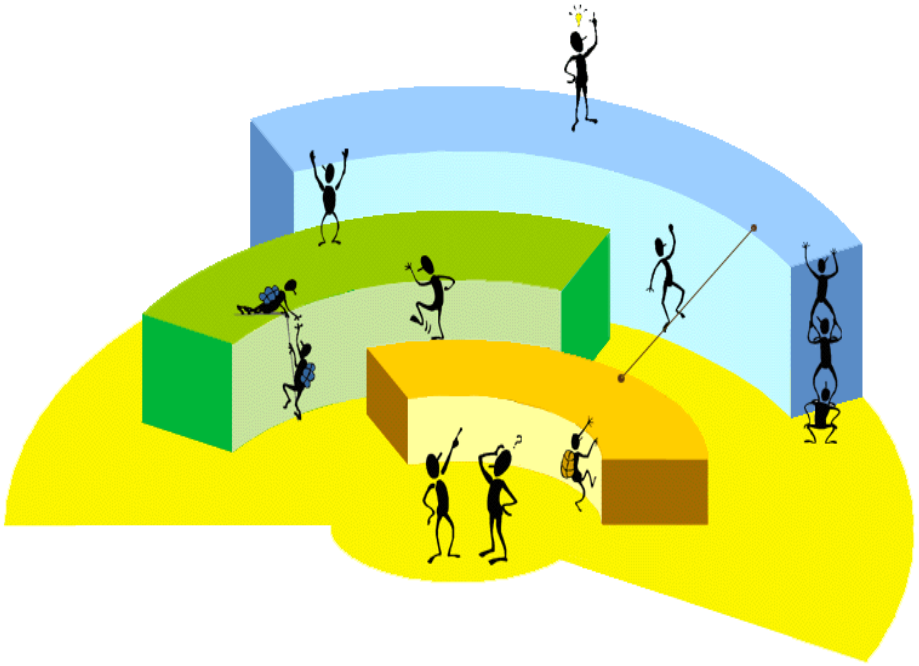
Objectives

To describe each vaccine preventable disease

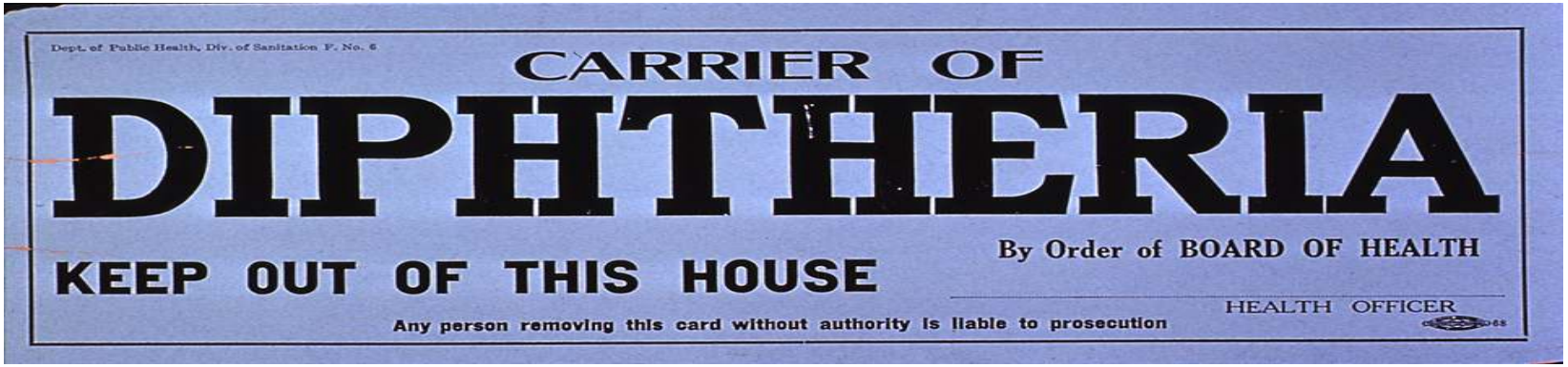
- Mode of transmission
- Incubation period
- Period of infectivity
- Clinical features



Diseases for which vaccination is routinely recommended

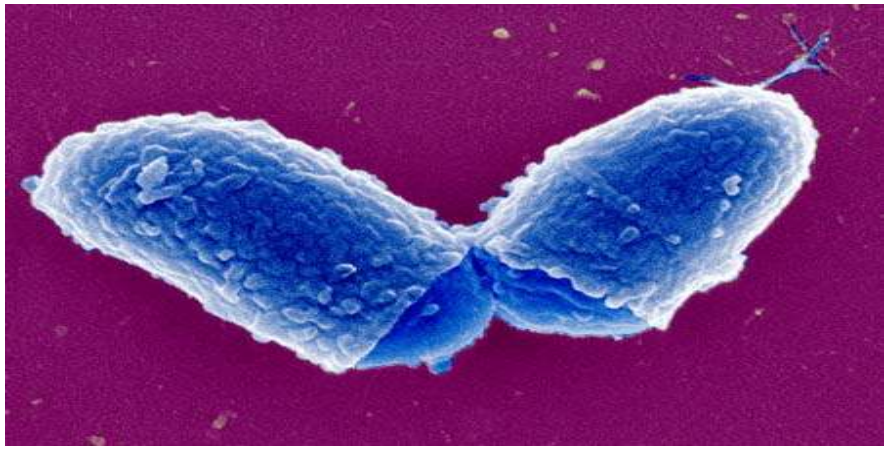
- Diphtheria
- Haemophilus Influenza
- Hepatitis A
- Hepatitis B
- Herpes zoster
- Human papillomavirus
- Influenza
- Measles
- Meningococcal disease
- Mumps
- Pertussis
- Pneumococcal disease
- Polio
- Rotavirus
- Rubella
- Tetanus
- Varicella

Diphtheria


Dept. of Public Health, Div. of Sanitation F. No. 6
CARRIER OF
DIPHTHERIA
KEEP OUT OF THIS HOUSE
By Order of BOARD OF HEALTH
HEALTH OFFICER
Any person removing this card without authority is liable to prosecution

Diphtheria

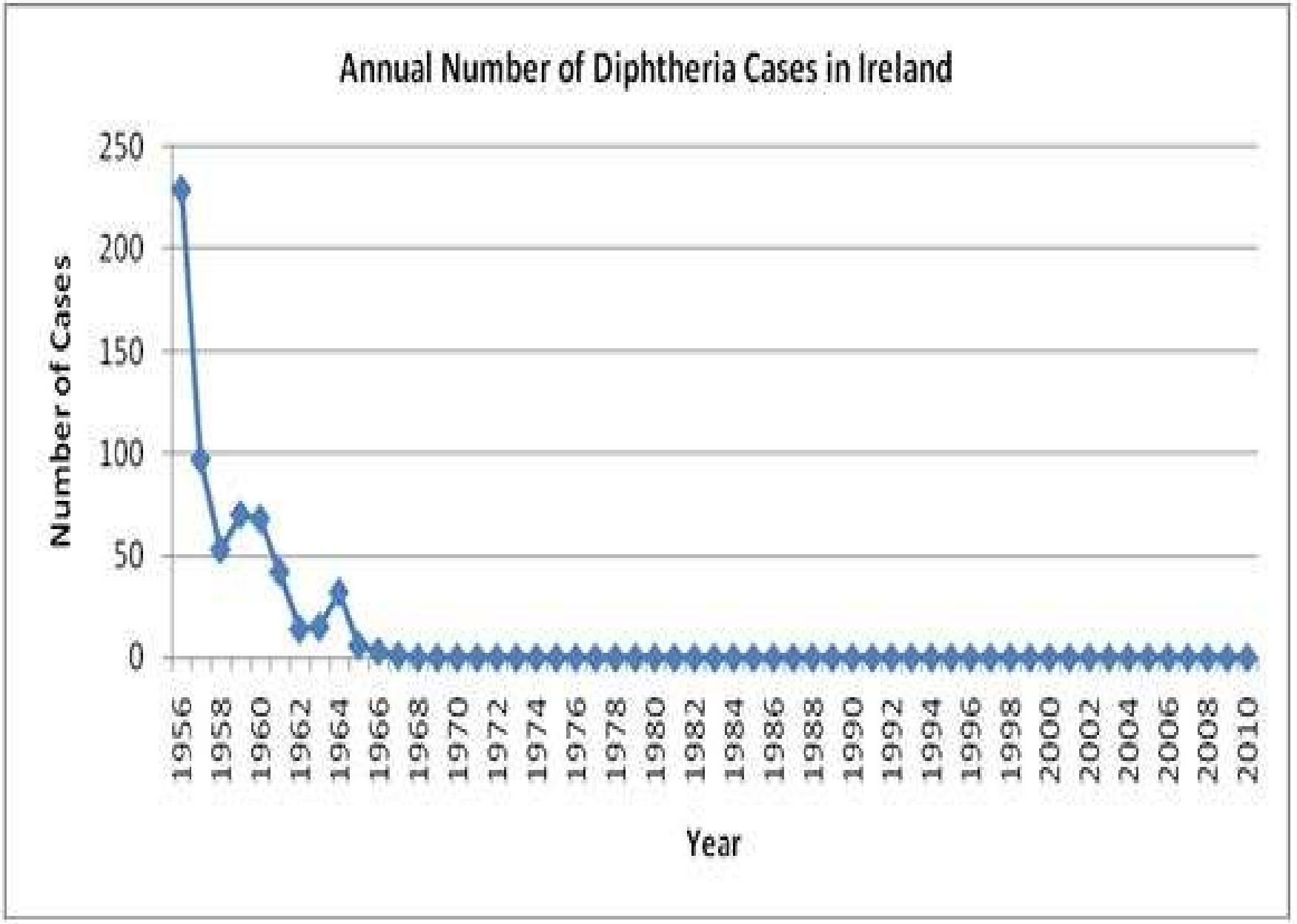
- Bacterial infection – *Corynebacterium diphtheriae or Corynebacterium ulcerans*
- *All age groups affected*
- Transmitted by droplet infection/ secretions
- Period of infectivity can be up to 4 weeks if left untreated.



Diphtheria clinical features

- Incubation period is 2-5 days
- Early features – fever, cervical nodes, malaise
- Later - sore throat, bull-neck appearance
- Pharyngeal membrane - - respiratory distress
- Nasal diphtheria – blood stained discharge
- Severe – toxin released – myocarditis, heart block

Diphtheria clinical features


Annual Number of Diphtheria Cases in Ireland
Number of Cases
250
200
150
100
50
0
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Year

Haemophilus influenza type b

Haemophilus influenza

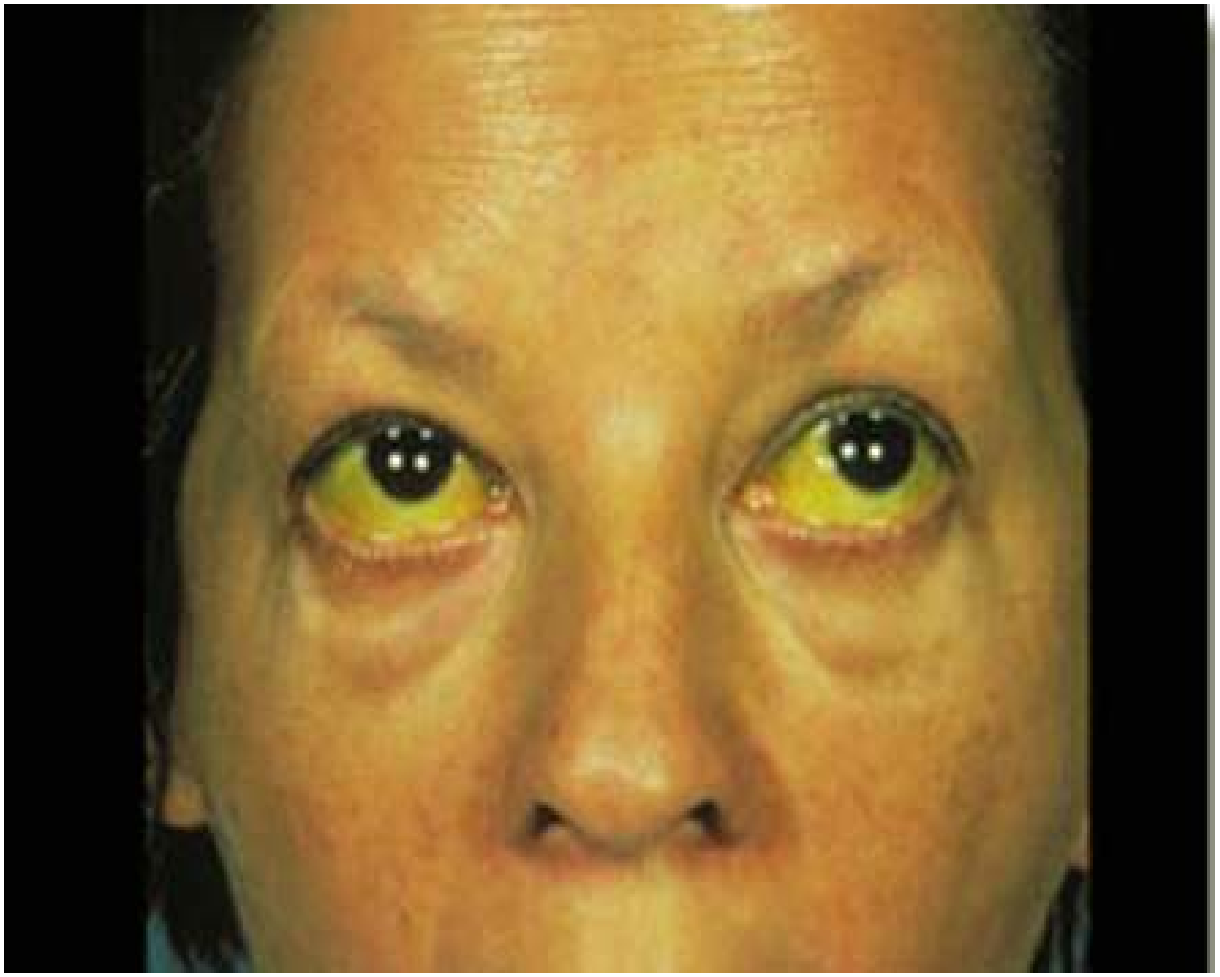
- Severe bacterial infection
- 6 different serotypes – type b most common
- Colonises nasopharynx
- Can invade bloodstream
- Most likely to affect young children and immunocompromised
- Transmitted via resp droplets

Haemophilus influenza clinical features

- Incubation period 1-4 days
- Meningitis common – fever, vomiting, lethargy, meningeal irritation
- Other presentations – Epiglottitis, pneumonia, septic arthritis, cellulitus, pericarditis, empyema, osteomyelitis
- Complications – deafness, convulsions, intellectual impairment, death

Hepatitis A

Hepatitis A



Hepatitis A

- RNA Virus transmitted by faecal oral route
- Mean incubation period is 28 days
- Prodromal illness – fever, anorexia/ nausea, abd pain
- Acute cholestatic jaundice
- Severity increases with age
- Diagnostic test is Hepatitis A IgM
- Illness usually resolved in 2 months

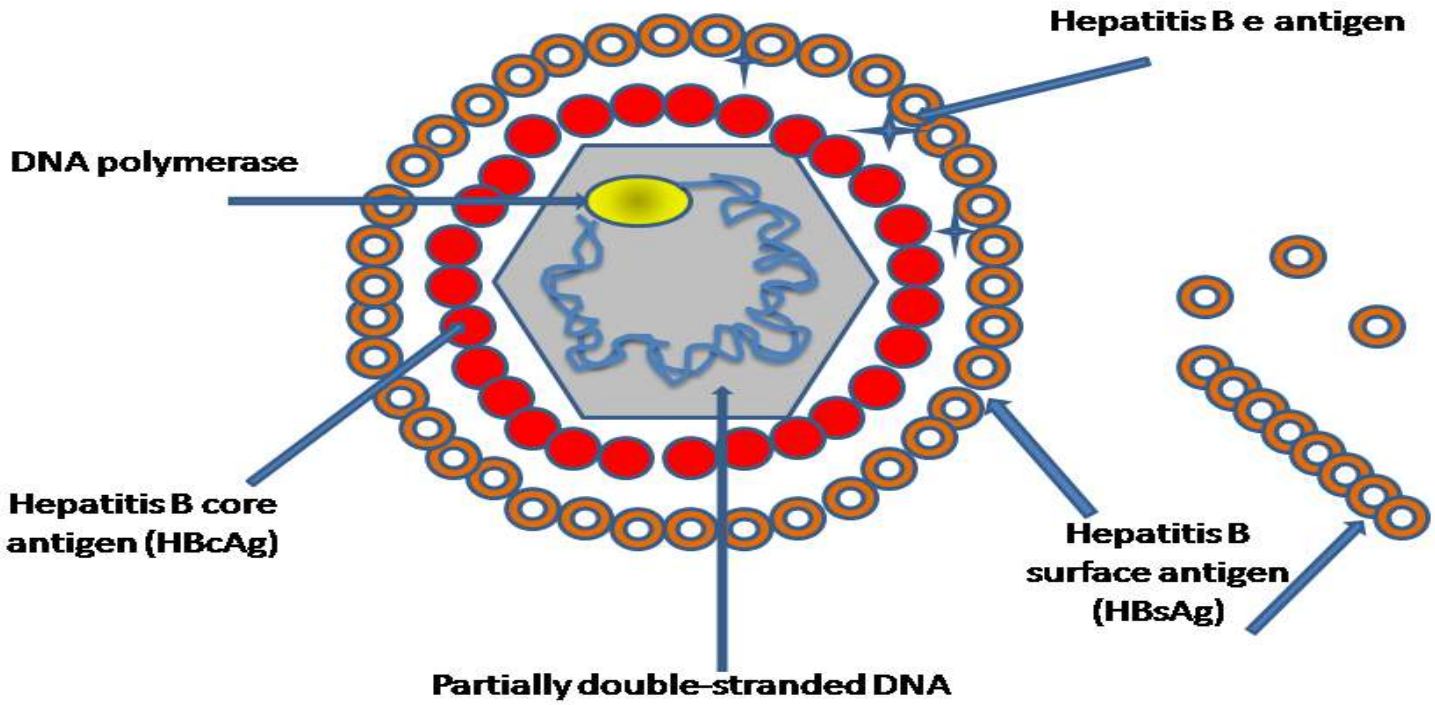
Hepatitis A

- Generally supportive care

  1% develop fulminant hepatitis

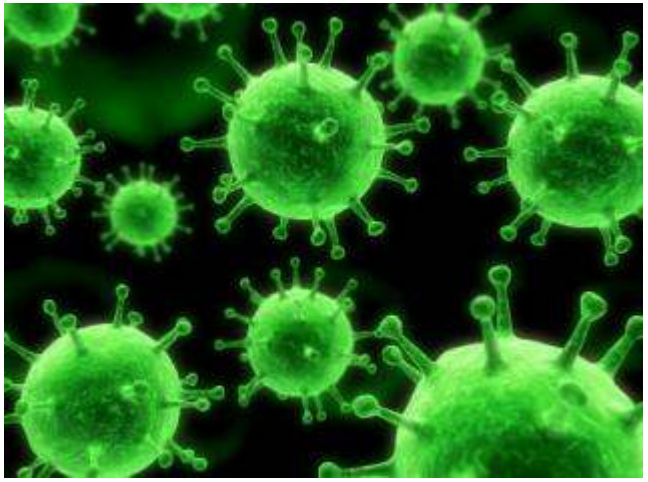
  Infection is self limiting and does not become chronic
- Individuals remain infectious for 2 weeks after jaundice develops - Most are infectious for 2 weeks *before* jaundice develops
- Vaccinate close contacts or those at risk
- Infection leads to life long immunity

Hepatitis B


Hepatitis B e antigen
DNA polymerase
Hepatitis B core antigen (HBcAg)
Hepatitis B surface antigen (HBsAg)
Partially double-stranded DNA

Hepatitis B

- Highly infectious viral illness (HBV)
- DNA virus found in blood, tissue, body fluids
- Infectious 1 week before
  onset of symptoms & remain so during acute course.
- Replicates in the liver
- Acute or chronic infection
- Humans only known host



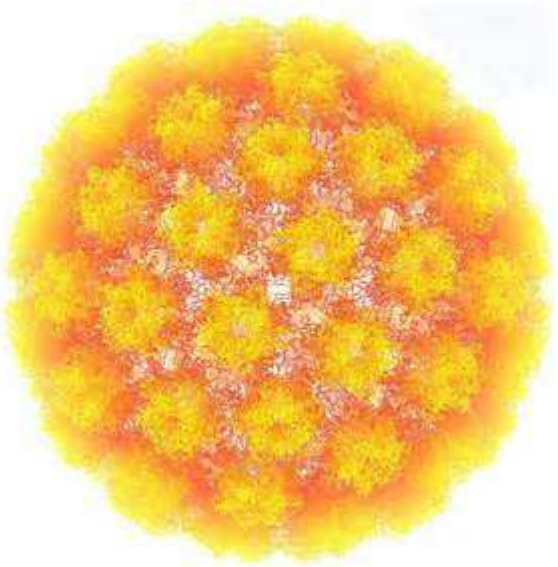
Hepatitis B – clinical features

- Incubation period 40-160 days
- Acute infection similar to Hepatitis A - may be more prolonged or severe
- 5-10% with acute Hepatitis B become chronically infected
- 10-50% of chronically infected develop liver cirrhosis - premature death in 50%, 10% of cirrhotics develop liver cancer
- Monitored with 6/12 LFT's and USS

HBV - Chronic infection

- Persistent HBsAg > 6 months
- Risk decreases with age
- Infants infected at birth – 90% become chronic
- Children infected aged 1-5 years : 30-50% become chronic

Human Papillomavirus (HPV)



HPV Infection

- Viral infection – usually sexually transmitted
- Many subtypes – 6,11 genital warts, 16,18 cervical carcinoma
- Infection occurs at basal epithelium
- Most resolve spontaneously
- Persistent infection most important risk factor for cervical cancer precursor lesions

HPV

Transmission

- Vaginal, oral, anal sex
- Genital contact with infected person
- Non sexual transmission from mother to baby in period immediately before and after birth

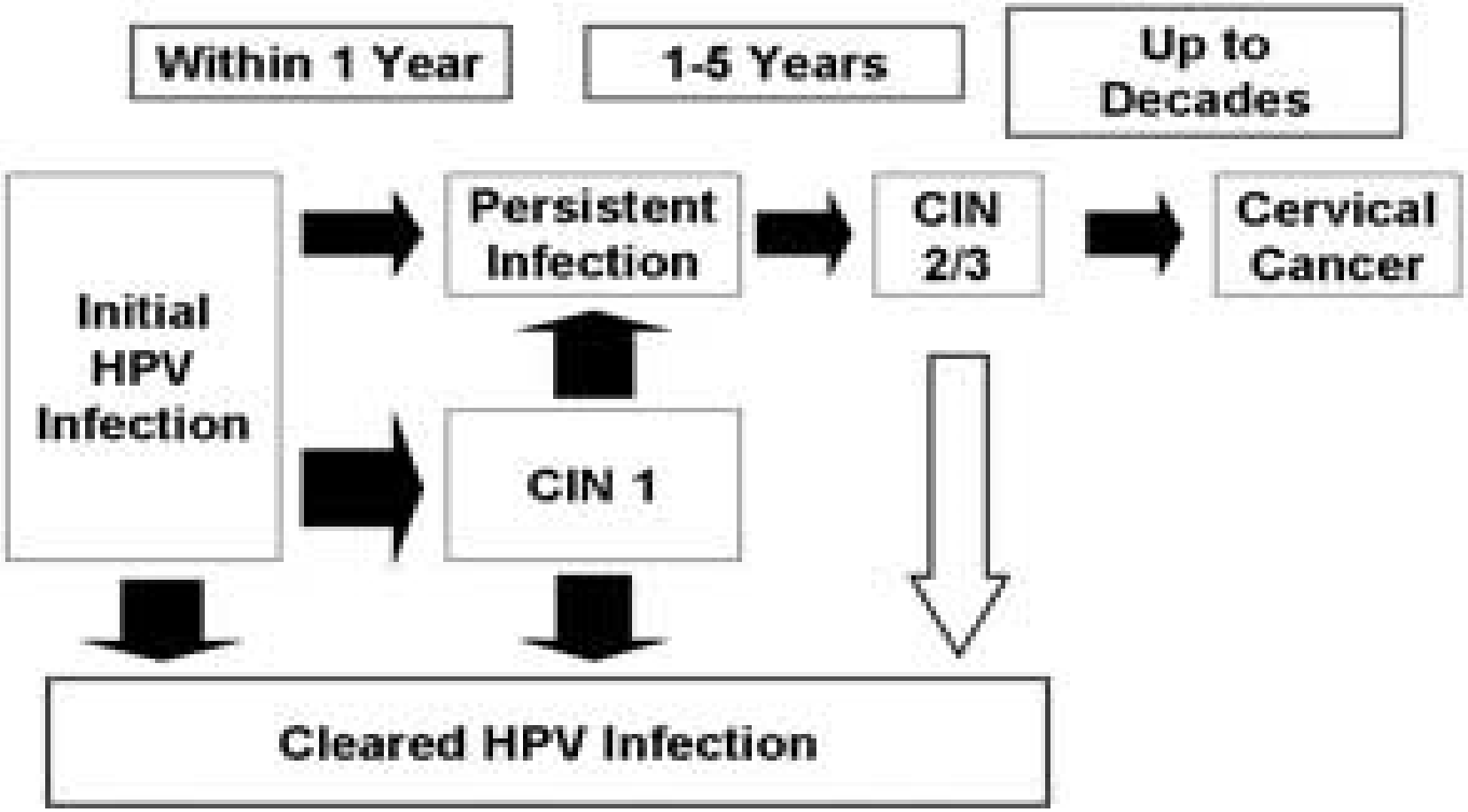
Risk factors

- Young age (<25 years)
- Multiple sexual partners (especially male partner)
- Early age at first sex (16 years or younger)

HPV – Clinical features

- 50-80% of women infected at least once during lifetime
- Most are asymptomatic
- Clinical manifestations – anogenital warts, cervical cancer precursors (CIN), Cancers e.g. cervical, anal, vaginal, vulval, penile and some head and neck cancers.

HPV infection – natural history



Influenza

Influenza

- Highly infectious virus!
- Infectious for 1 day before to 5 days after onset
- Virus attaches to & penetrates resp epithelium in airways
- Replicates and destroys host cells

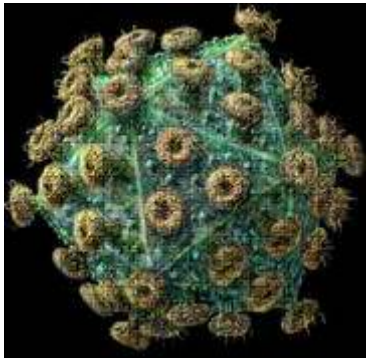
- 3 types determined by nuclear material A, B, C
- Subtypes of type A determined by haemagglutinin (H1, H2, H3) and neuraminidase (N1, N2)

Respiratory transmission

Influenza – clinical features

- Incubation period 1-3 days
- Abrupt onset of fever, myalgia, sore throat, dry cough, headache.
- Diagnosis – clinical and laboratory
- Complications – pneumonia, Reye syndrome, Myocarditis, Death (elderly, chronic medical conditions)
- Annual vaccination of high risk groups

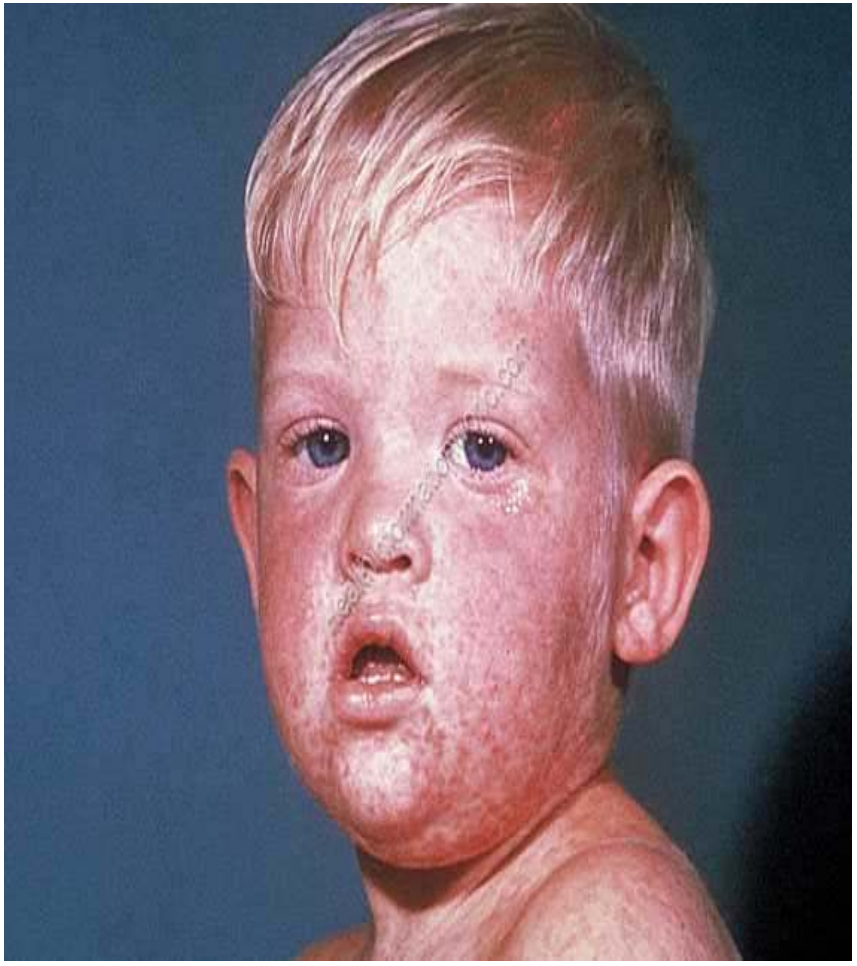
Measles



Measles

- Highly infectious viral illness
- Caused by the Morbillivirus
- Most common in 1-4 year olds
- Infectious for 4 days before and 4 days after onset of rash.
- Respiratory/ airborne transmission

Measles – clinical features



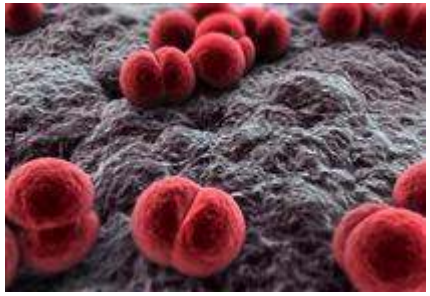
Measles – clinical features

- Incubation period: 10-12 days
- Prodrome - stepwise increase in fever, cough, coryza, conjunctivitis, koplik spots on buccal mucosa
- Measles illness – 2-4 days after prodrome (14/7 post exposure), rash progresses down from face/ head, lasts 4-7 days, fades in order of appearance.

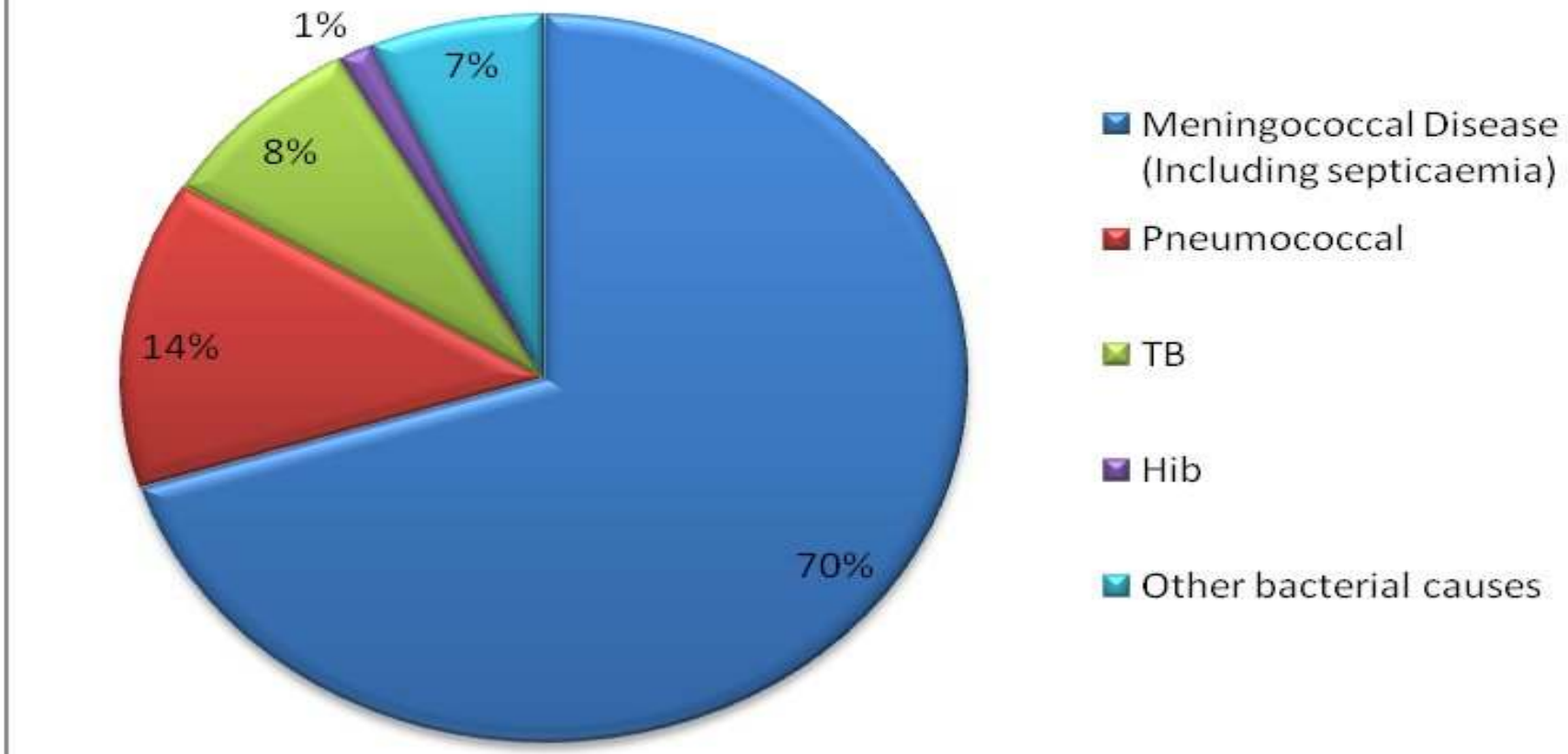
Measles - complications

• Otitis media	1 in 20
• Pneumonia	1 in 25
• Convulsions	1 in 200
• Diarrhoea	1 in 6
• Meningitis/encephalitis	1 in 1000
• Late onset SSPE	1 in 8000
• Death	1 in 2000

Meningococcal disease



Causes of bacterial meningitis in the UK and Republic of Ireland 2009



Meningococcal disease

- Severe acute bacterial infection – *Neisseria meningitidis – type B & C most common here*
- *Colonises nasopharynx, may invade bloodstream*
- *Populations affected – young children & adults, immunocompromised*
- *Transmitted by resp droplets usually to close contacts approx 7 days before illness onset*

Invasive Meningococcal Disease (IMD)

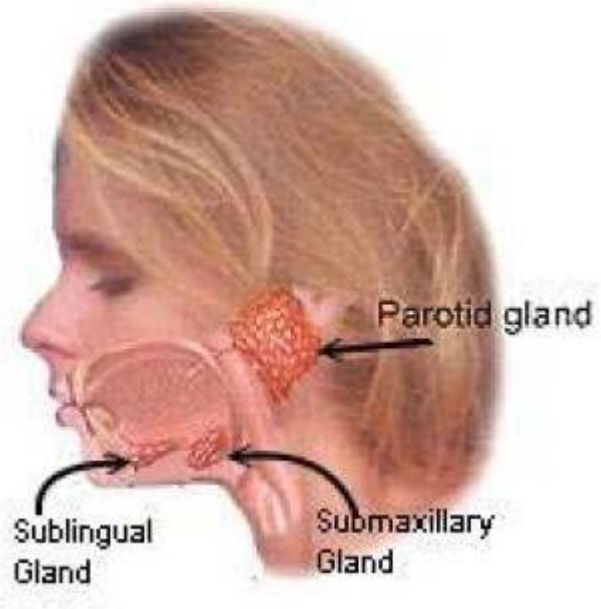
- Incubation period 3-4 days
- Meningitis most common presentation - fever, headache, neck stiffness, photophobia
- Meningococcaemia – bacteraemia +/- meningitis, fever, petechiae, hypotension, circulatory collapse, coma, multi-organ failure
- 10% will die, 15% of survivors will have longterm sequelae – deafness, mental retardation, limb loss

Meningococcal rash

IMD in Ireland

- Ireland has high endemicity rates for IMD
- Serogroups B and C predominated before Men C vaccine
- Men C introduced in 2000 – (3 doses given at 2,4,6 months) followed by marked decline in Men C disease.

Mumps



Mumps

- Acute viral illness – Paromyxovirus
- Respiratory transmission
- Replication in nasopharynx and regional nodes
- Incubation period: 14-18 days
- Infectious for 3 days before and 4 days after onset

Mumps- clinical features

- Prodrome – myalgia, malaise, headache, fever
- Swelling of salivary glands – parotitis 30-40%
- Asymptomatic infection – 30%
- Most severe if adults
- Resolution in 10 days

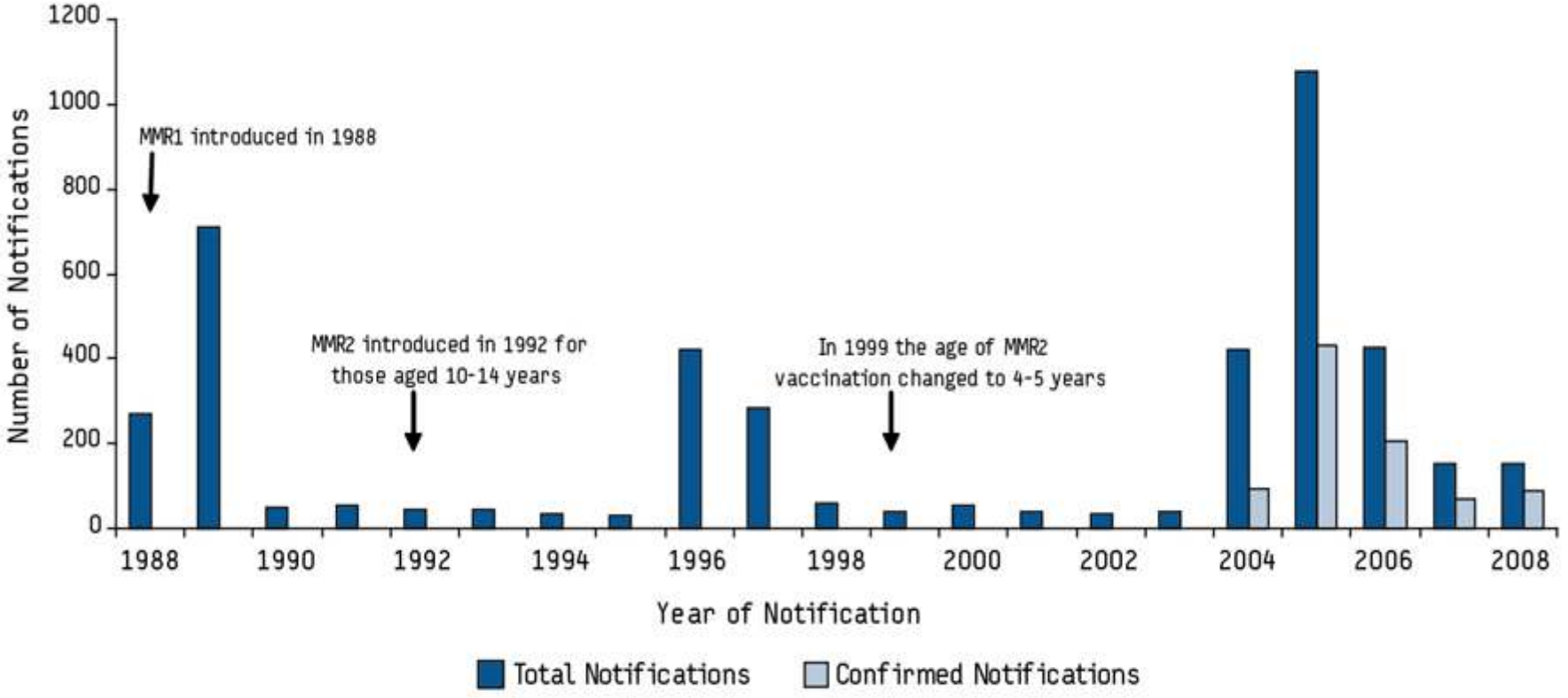
Mumps - complications

- Pancreatitis 1 in 25
- Oophoritis 1 in 20
- Orchitis 25-40%
- Meningitis Up to 15%
- Encephalitis 0.02-0.3%
- Deafness 1 in 20,000
- Nephritis, cardiac abnormalities, death - rare

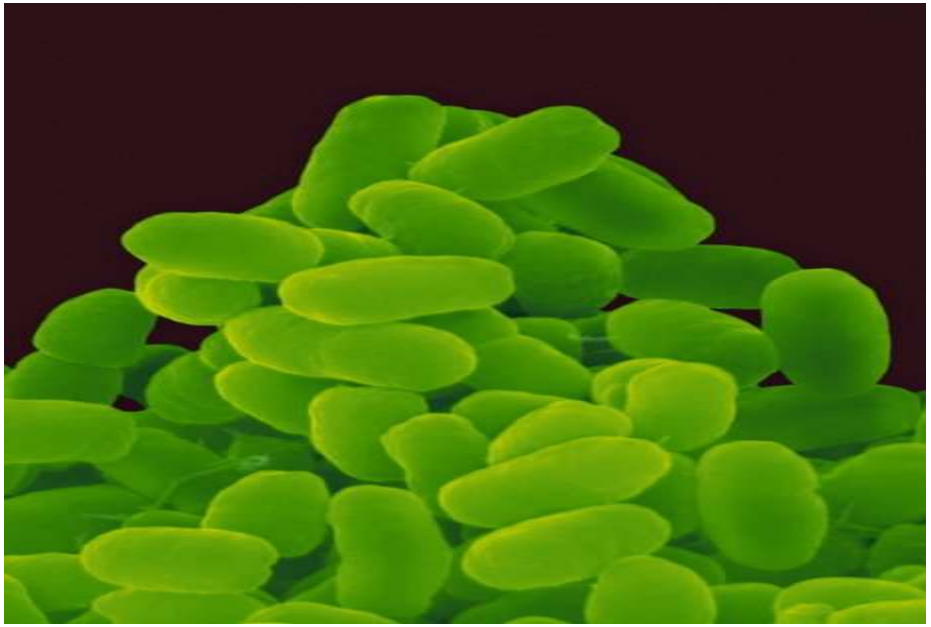
Mumps

FIGURE 2

Mumps notifications by year and year of introduction of MMR vaccine in Ireland
(Prior to 2004, case classifications were not assigned to mumps notifications; therefore the number of confirmed mumps notifications is not known).



Pertussis



Pertussis

- Bacterial respiratory infection - Bordatella pertussis
- Highly contagious
- Toxin mediated pathogenesis – interference with secretions
- Most severe in children under 1 year
- Frequently undiagnosed in adults – milder illness

Pertussis – clinical features

- Insidious onset – URTI – non specific cough
- Often atypical presentation in teens/ adults
- Fever minimal throughout illness
- Incubation period 6-20 days

Stages of Pertussis disease

- **Catarrhal stage** – 1 to 2 weeks: runny nose, sneezing, mild temperature
- **Paroxysmal cough stage** – 1 to 6 weeks: paroxysms of coughing, inspiratory whoop
- **Convalescence stage** – weeks to months: gradual recovery over 2-3 weeks (up to 3 months)

Pertussis - complications

- Pneumonia 5.2%
- Seizures 0.8%
- Encephalopathy 0.1%
- Hospitalisation 20%
- Death 0.2%

Notifications Pertussis, Ireland 1948-2009

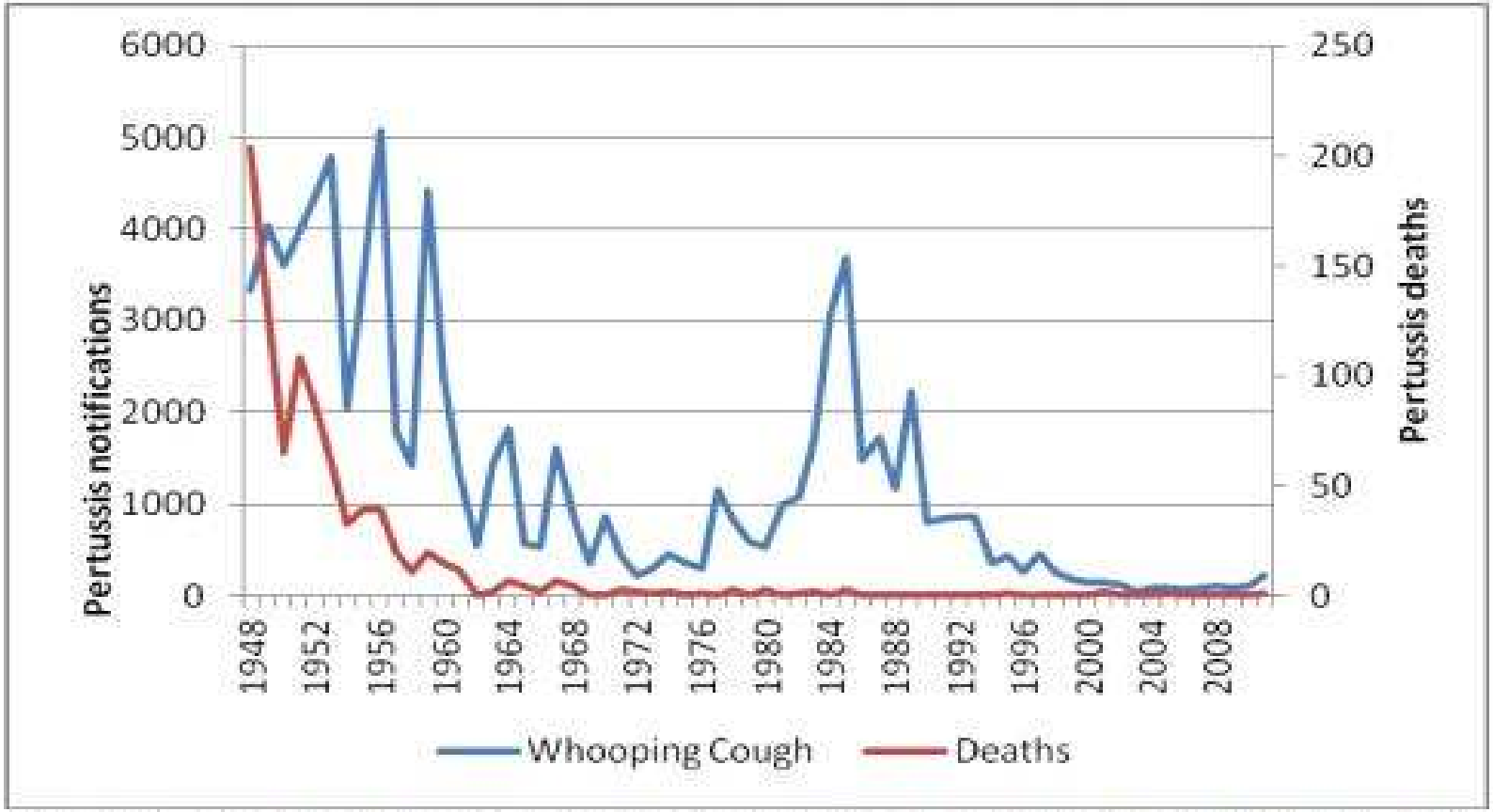
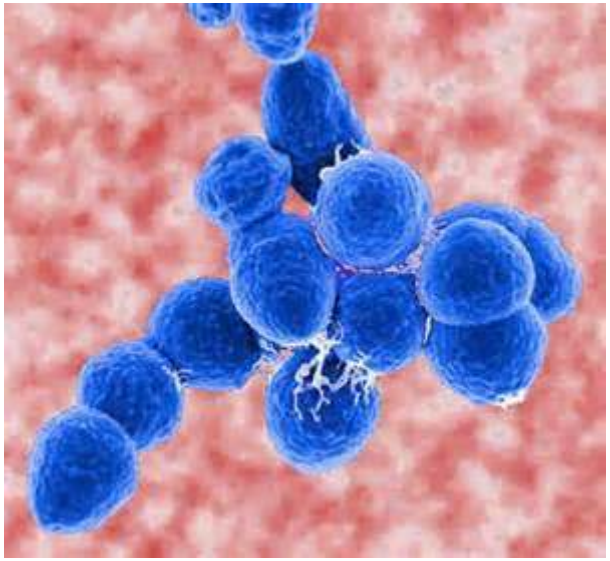


Figure 1. Number of pertussis cases and deaths notified 1948-2011*, Ireland

**2011 provisional data*

Pneumococcal Disease



Pneumococcal Disease

- Bacterial infection – Streptococcus pneumoniae
- 90 known serotypes
- Carriage common worldwide – 10% adults, 50% children
- Invasive disease (IPD) causes most severe problems
- Transmission via droplet infection
- Patient infectious as long as viable organisms remain in secretions – 48 hours with antibiotics

Pneumococcal clinical features

- Incubation period 1-3 days
- Abrupt onset pneumonia
- Bacteraemia – most common presentation – meningitis < 5 years (30-80% case fatality ratio)
- Common cause of acute Otitis media

Poliomyelitis (Polio)

Poliomyelitis

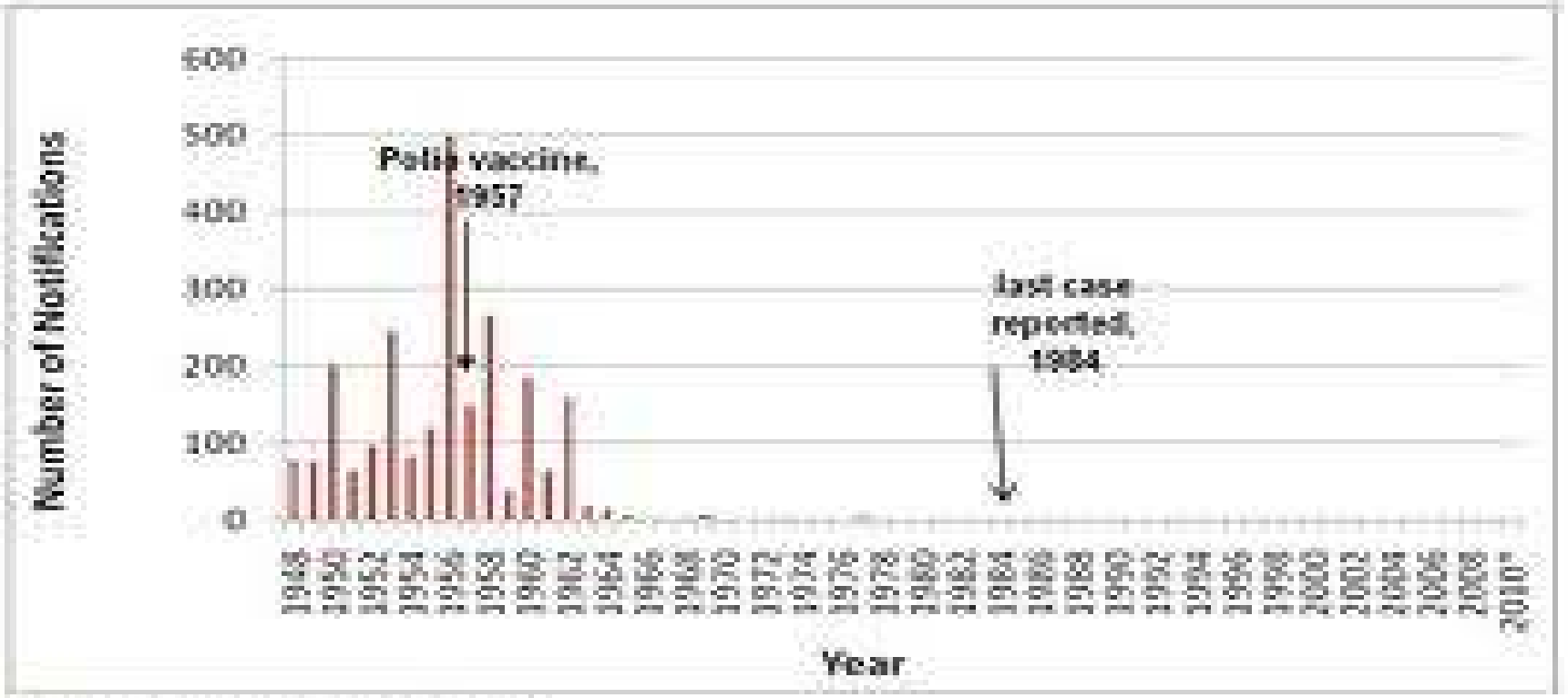
- Acute viral illness – enterovirus, 3 subtypes
- Entry via mouth
- Replicates in pharynx, GIT, Local lymphatics
- Haem spread to lymphatics and CNS – destroys motor neurons
- Virus present in stool x 3-6 weeks
- Infectious x 7-10 days before and after onset

Polio – clinical features

- Incubation period: 6 to 20 days (range 3-35/7)
- 95% are asymptomatic initially
- Fever, fatigue, loose stools, sore throat, GI upset, headache, vomiting
- Aseptic meningitis
- Paralysis – bulbar, facial, limbs

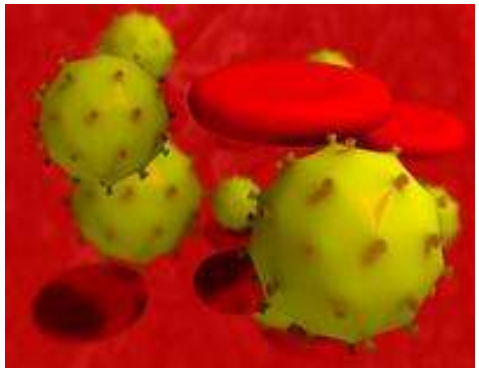
Polio - epidemiology

Figure 1. Polio notifications, Ireland 1948-2010 (as of 14/10/2010)



*2010 data as of 15/10/2010

Rotavirus



Rotavirus infection

- Viral infection – most common cause of severe diarrhoeal disease in children
- Faecal-oral route
- Replicates in small intestinal epithelium
- Isotonic diarrhoea
- Re-infection at any age
- Vaccination not currently recommended as part of routine schedule

Rotavirus – clinical features

- Incubation period: 1-3 days
- Variable presentation: Asymptomatic to severe diarrhoea with fever and vomiting
- Usually resolves within 3-7 days
- Laboratory diagnosis to confirm

Rotavirus - complications

- Severe diarrhoea
- Dehydration
- Electrolyte imbalance
- Metabolic acidosis
- Immunodeficient children – severe or persistent disease

Rubella

Rubella

- Acute viral illness – one antigenic type
- Respiratory transmission
- Replicates in nasopharynx and regional nodes
- Viraemia for 5-7 days after infection
- Placenta and foetus infected during viraemia

Rubella – clinical features

- Incubation period: 14-21 days
- Symptoms often mild – 50% subclinical
- Prodrome 1-5 days after exposure - low fever, malaise, conjunctivitis, URTI
- Maculopapular rash 14-17 days after exposure
- Rash usually first sign in children – lasts 3/7
- Lymphadenopathy present x weeks after

Rubella - complications

- Arthralgia or arthritis (adult females mainly)
- Thrombocytopenic purpura: 1 in 3000 cases
- Encephalitis: 1 in 6000 cases
- Neuritis: rare
- Orchitis: rare

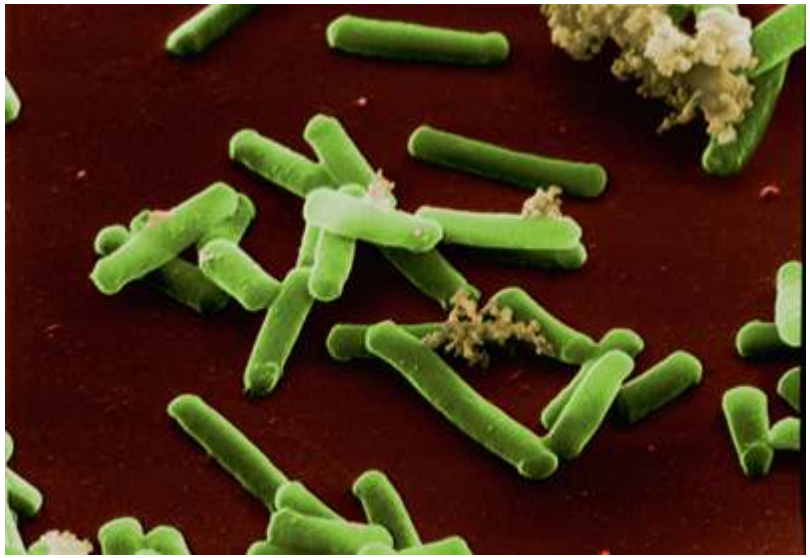
Congenital Rubella Syndrome (CRS)

- Foetal damage depends on gestational age at time of infection
- 1st 10 weeks – 90% foetuses affected
- 11-16 weeks – 10-20%
- Rare after 20/40
- Infection may affect all organs
- May lead to foetal death or premature delivery

CRS - Description

- Deafness
- Cataracts
- Heart defects
- Microcephaly
- Bone alterations
- Liver and spleen damage

Tetanus



Tetanus

- Acute often fatal bacterial disease – *Clostridium tetani exotoxin*
- *Spores contaminate wounds*
- *Not contagious*
- *Soil and animal/ human intestines act as resevoir*
- *All ages susceptible*
- *High risk groups – elderly non-vaccinated, IVDU*

Tetanus – clinical features

- Incubation period: 8 days (range 3-12 days)
- 2 types – local (rare), cephalic (rare), generalised (80%)
- Initial presentation – “lockjaw” (50%)
- Neck stiffness, dysphagia, muscle rigidity, spasms, sweating, fever
- Complete recovery may take months

Tetanus - complications

- Fractures
- Hypertension
- Laryngospasm
- Pulmonary embolism
- Aspiration
- Death

Tuberculosis

Tuberculosis (TB)

- Bacterial infection – *Mycobacterium tuberculosis*, less common – M. bovis, M. africanuum, M. canettii
- Infection of lungs or other organs
- Long incubation period: 3-12 weeks
- Produces chronic disease with risk of reactivation
- Without treatment is often fatal

Tuberculosis

- Transmission via airborne droplet spread
- Infectious as long as bacilli are demonstrable on direct sputum stain
- BCG vaccine most effective against TB meningitis and miliary TB
- Dramatic decline in TB in past 40 years

TB- clinical features

- Symptoms most likely in 1st 2 years after infection but may be years later
- Lungs – cough, haemoptysis, chest pain
- Laryngeal TB – hoarseness
- Constitutional symptoms – fatigue, night sweats, weight loss