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Vaccination for Paediatric Viral Diseases

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Australian Government
Department of Health and Ageing

National Immunisation Program Schedule

(VALID FROM 1 JULY 2007)

Age	Vaccine
Birth	• Hepatitis B (hepB) [a]
2 months	• Hepatitis B (hepB) [b] • Diphtheria, tetanus and acellular pertussis (DTPa) • *Haemophilus influenzae type b (Hib)* [c,d] • Inactivated poliomyelitis (IPV) • Pneumococcal conjugate (7vPCV) • Rotavirus
4 months	• Hepatitis B (hepB) [b] • Diphtheria, tetanus and acellular pertussis (DTPa) • *Haemophilus influenzae type b (Hib)* [c,d] • Inactivated poliomyelitis (IPV) • Pneumococcal conjugate (7vPCV) • Rotavirus
6 months	• Hepatitis B (hepB) [b] • Diphtheria, tetanus and acellular pertussis (DTPa) • *Haemophilus influenzae type b (Hib)* [c] • Inactivated poliomyelitis (IPV) • Pneumococcal conjugate (7vPCV) * • Rotavirus [i]
12 months	• Hepatitis B (hepB) [b] • *Haemophilus influenzae type b (Hib)* [d] • Measles, mumps and rubella (MMR) • Meningococcal C (MenCCV)
12-24 months	• Hepatitis A (Aboriginal and Torres Strait Islander children in high risk areas) [f]
18 months	• Varicella (VZV)
18-24 months	• Pneumococcal polysaccharide (23vPPV) (Aboriginal and Torres Strait Islander children in high risk areas) [g] • Hepatitis A (Aboriginal and Torres Strait Islander children in high risk areas)
4 years	• Diphtheria, tetanus and acellular pertussis (DTPa) • Measles, mumps and rubella (MMR) • Inactivated poliomyelitis (IPV)
10-13 years [h]	• Hepatitis B (hepB) • Varicella (VZV)
12-13 years [i]	• Human Papillomavirus (HPV)
15-17 years [i]	• Diphtheria, tetanus and acellular pertussis (dTpa)
15-49 years	• Influenza (Aboriginal and Torres Strait Islander people medically at-risk) • Pneumococcal polysaccharide (23vPPV) (Aboriginal and Torres Strait Islander people medically at-risk)
50 years and over	• Influenza (Aboriginal and Torres Strait Islander people) • Pneumococcal polysaccharide (23vPPV) (Aboriginal and Torres Strait Islander people)
65 years and over	• Influenza • Pneumococcal polysaccharide (23vPPV)

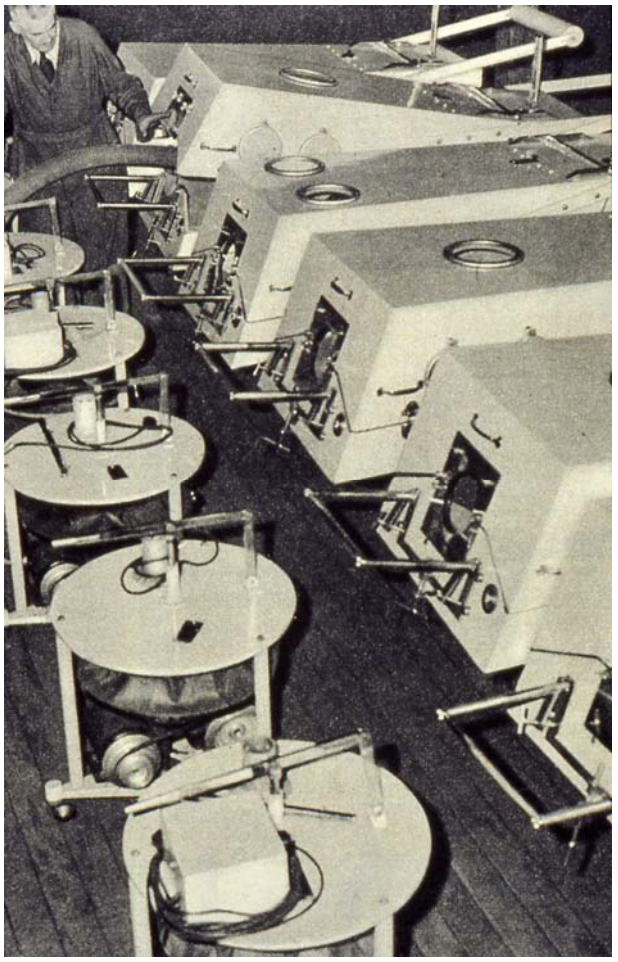
* Please refer to reverse for footnotes

IMMUNISATION

Poliomyelitis viurses

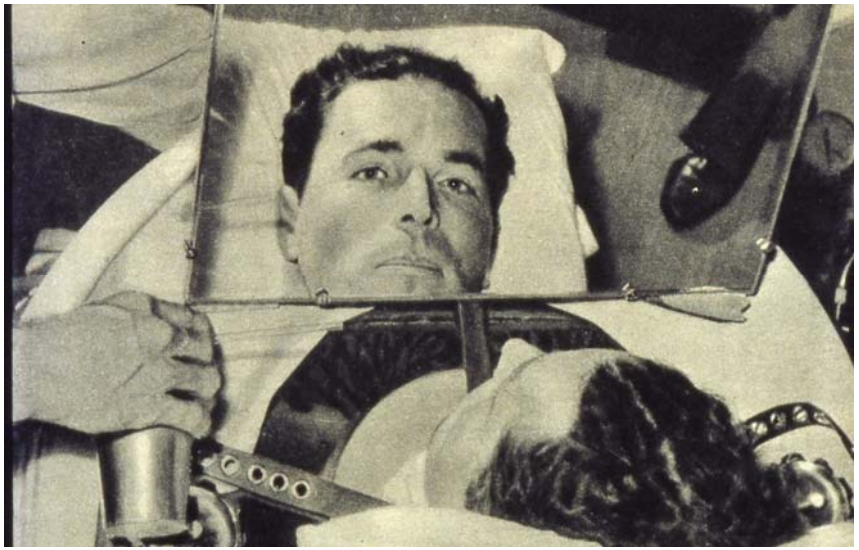
Polio

- Polio is three viruses 1, 2 and 3. No X-protection
- Presents as headache, GI disturbance, malaise and neck and back stiffness with or without paralysis – usually asymmetrical
- Paralysis – spinal (70%) bulbar (2%) bulbar-spinal (19%).



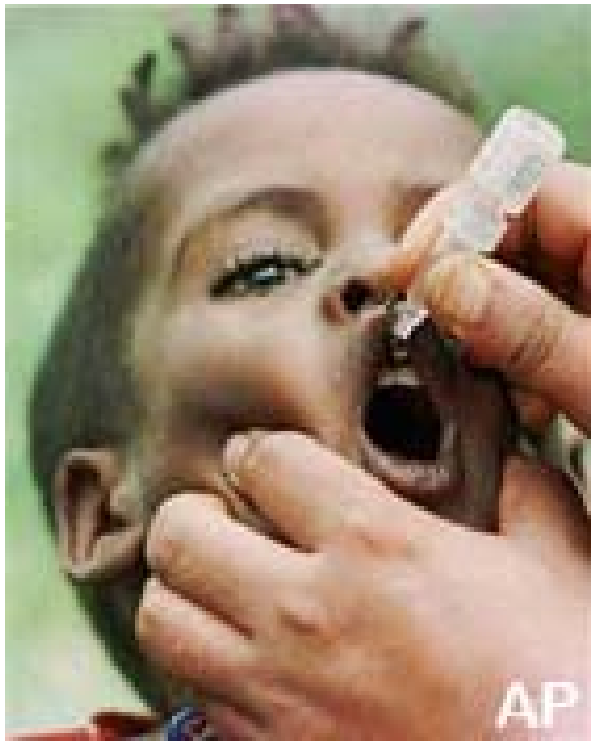
Polio

- Infection rate can reach 100%
- Asymptomatic : symptomatic infections 1000:1 children to 75:1 adults
- Other enteroviruses can cause AFP –Ent 71, 70 and Coxsackie A7



Polio Vaccine - OPV

- Live attenuated – contains polio 1,2 & 3
- Three doses to get 95% protection of population to all three viruses
- Infect and replicate in intestine causing mucosal and systemic immunity.



Polio Vaccine - OPV

- Mucosal immunity provides resistance to subsequent challenge with wild polio virus – reduces frequency of symptomless excretion of virus in the community and useful in controlling epidemics
- Incidence of AFP 1:2.4 million doses
- Immunodeficient people have prolonged replication and excrete OPV which can mutate back to virulent strains.

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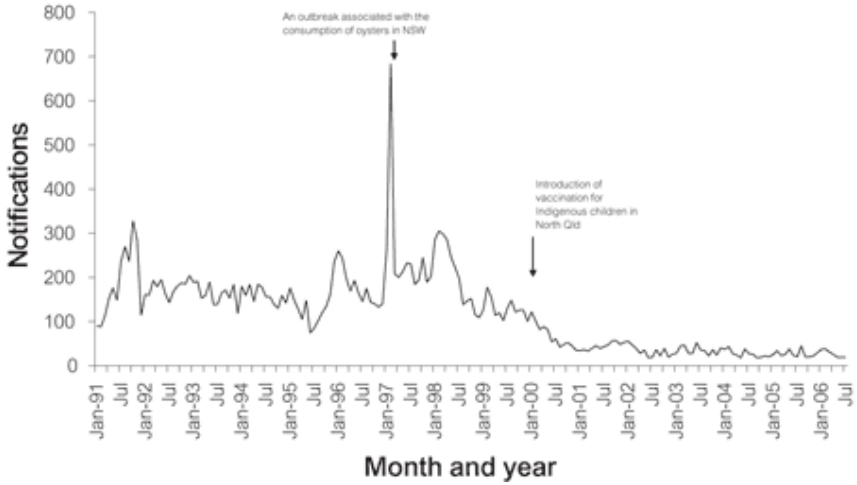
Polio Vaccine - IPV

- Australian polio peak 1938 with epidemics in 1956 and 1961-1962
- Last case 1977 but imported case 2007.
- Vaccine-associate acute paralysis (VAAP) in 1985 and 1995
- Due to rapid progress in global eradication IPV now used in Australia due to concern of VAAP with OPV.
- IPV cannot cause VAAP

Hepatitis A virus

Hepatitis A

- Infection of humans, no animal reservoir
- Transmitted by faecal-oral route
- Children – asymptomatic or mild disease
- Prodrome - fever, malaise, weakness, ANV – then jaundice. Complications rare but occasional fulminant hepatitis



Hepatitis A vaccine

- Vaccination of indigenous people in North Queensland has led to the virtual eradication of hepatitis A.
- Universal immunization would successfully control hepatitis A, although at present, high costs and limited availability of vaccines preclude such a recommendation.
- Normal human immunoglobulin can be given to close contacts within 2 weeks of exposure to prevent secondary cases.
- No evidence yet for use of HAV vaccine in prevention of secondary cases.

Hepatitis A vaccine

- Inactivated HAV from diploid cell cultures
- Only one serotype
- Highly immunogenic but antibody titres may be below detection limit of assays
- Almost universal seroconversion 4 weeks after vaccination
- Duration of immunity uncertain but any years.
- There is no evidence that boosters are required.

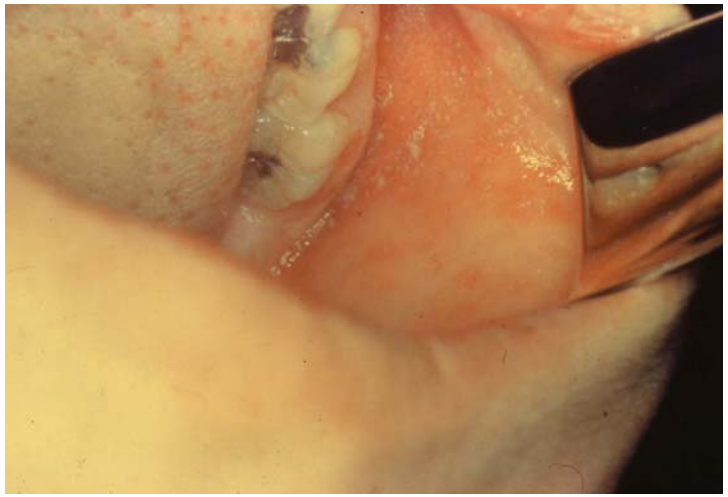
Measles virus

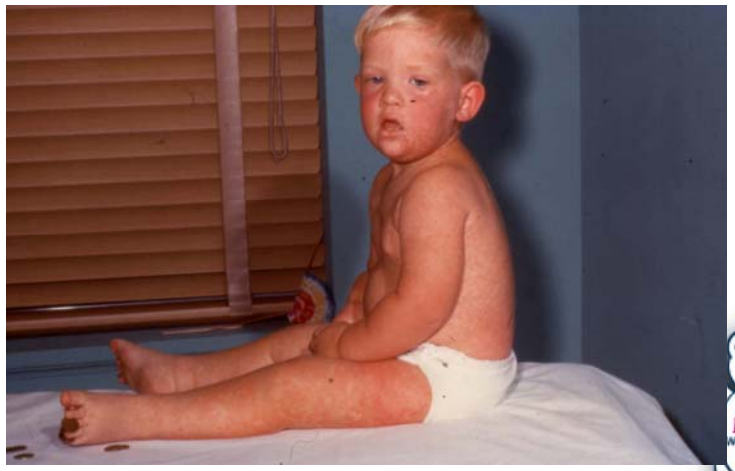
Measles

- Measles is a highly contagious viral disease, which affects mostly children.
- It is transmitted via droplets from the nose, mouth or throat of infected persons.

Measles

- Initial symptoms, which usually appear 8–12 days after infection, include high fever, rhinorrhea, conjunctival injection, and Koplics spots.
- Several days later, a rash develops, starting on the face and upper neck and gradually spreading downwards.
- There is no specific therapy.



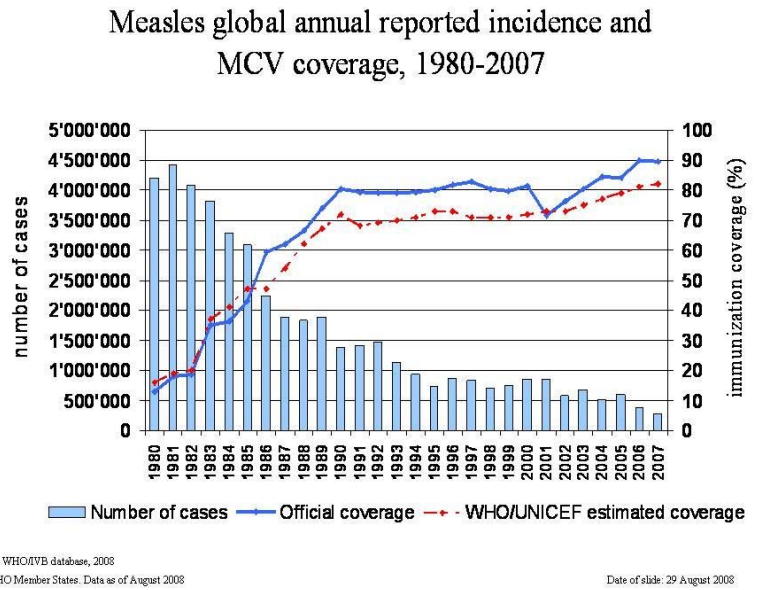


Measles complications

- Measles is a severe diseases
  - 1 in 10 patients develop otitis media
  - 1 in 20 develop pneumonia
  - 1 in 1,000 develop encephalitis
  - 1 in 100,000 develop SSPE

Measles Global Impact

- In developing countries, where malnutrition and vitamin A deficiency are prevalent, measles has been known to kill as many as one out of four people.
- It is the leading cause of blindness among African children.



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Measles vaccine

- MMR(V) live attenuated vaccine with 95% seroconversion rate after single dose
- Waning immunity with no endemic disease outbreaks in adolescents and young adults
- Now 2 dose schedule.
- MMR not transmissible to contacts
- NHIG (within 7 days) for post-exposure prophylaxis in high risk patients.

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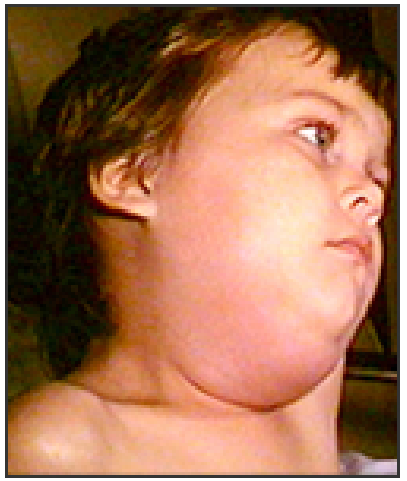
Mumps Virus

Mumps

- A viral infection of humans, primarily affecting the salivary glands.
  - mostly a mild childhood disease, peak incidence 5–9 years
  - complications such as meningitis and orchitis (20% of post-pubertal males)
  - encephalitis and permanent neurological sequelae are rare



Mumps

- Annual global incidence of mumps, in the absence of immunization, is 100–1000 cases/100 000 population
- Epidemic peaks every 2–5 years.
- Natural infection with this virus is thought to confer lifelong protection.

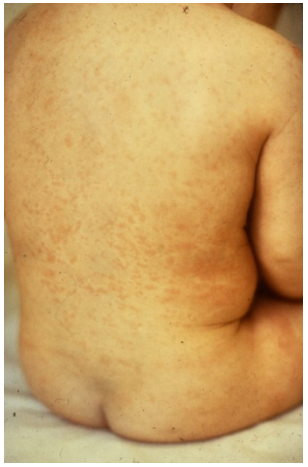
Mumps Vaccine

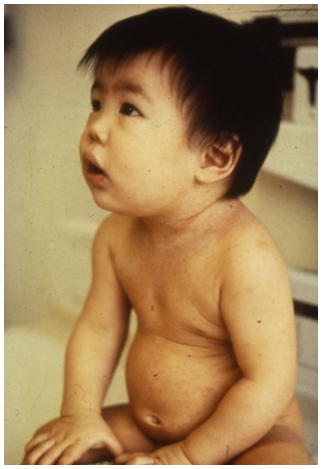
- MMR or MMRV – monovalent not available.
- RIT 4385 strain from Jeryl Lynn strain
- Seroconversion rate 96% after single dose
- Vaccine associated aseptic meningitis rare

Rubella virus

Rubella

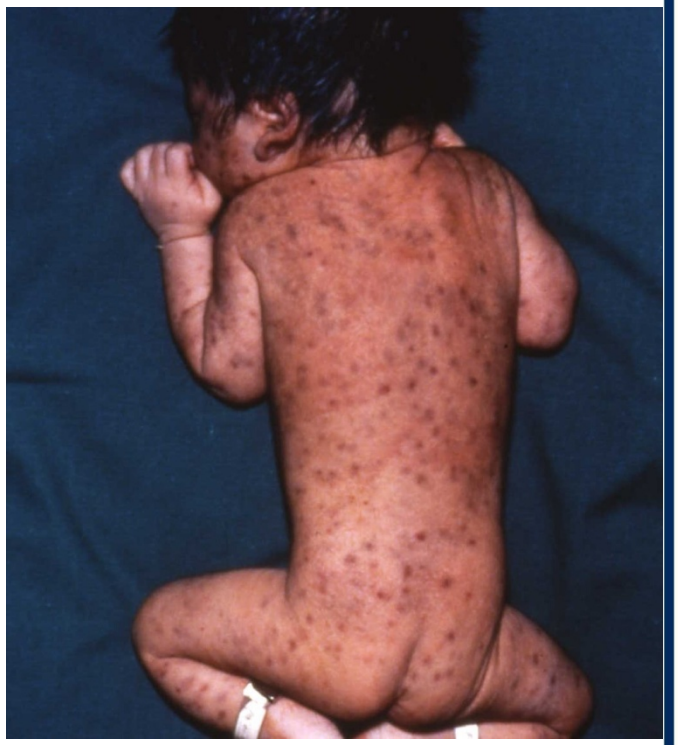
- Usually mild self-limiting illness
- Transient generalised, erythematous, maculopapular rash
- Post-auricular and sub-occipital lymphadenopathy
- Rarely neurological problems or thrombocytopenia
- 50% subclinical
- Worldwide distribution, person to person spread by droplet





Congenital Rubella

- Maternal infection at 8-10 weeks of pregnancy – 90% congenital infection with IUGR, intellectual disability hepatosplenomegaly, cardiac disease, cataracts, deafness, anaemia, blueberry muffin rash.



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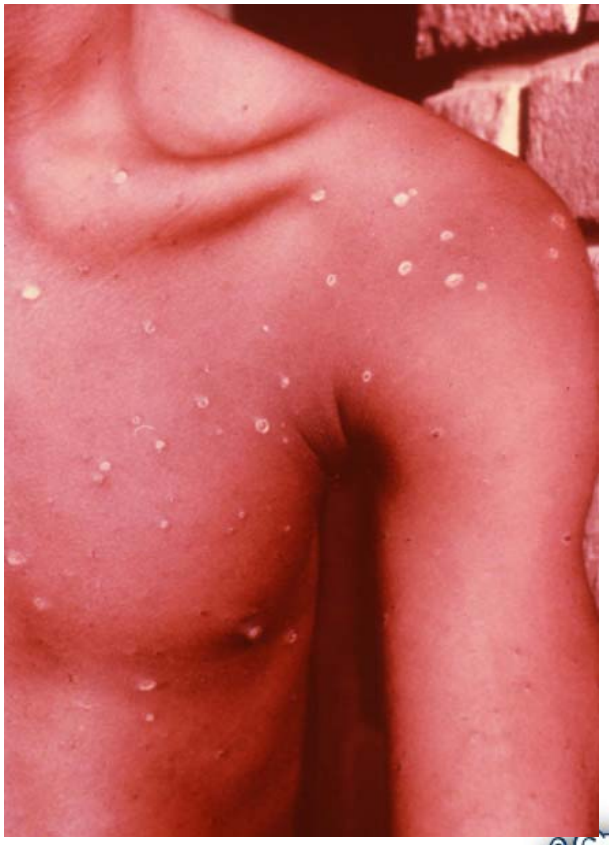
Rubella Vaccine

- MMR(V) or monovalent
- Antibody response in >95% of vaccinees
- Antibody persists >16 years in absence of endemic disease
- Protection against clinical rubella long-term after seroconversion
- Vaccination to prevent congenital rubella.
- Rubella re-infection can rarely cause congenital rubella.

Varicella zoster virus

Varicella zoster-chickenpox

- Highly contagious infection
- Airborne transmission
- Usually mild childhood disease
- Complications – acute bacterial infections, cerebellar ataxia, aseptic meningitis, transverse myelitis, encephalitis, thrombocytopenia.
- Severe disease in immunocompromised

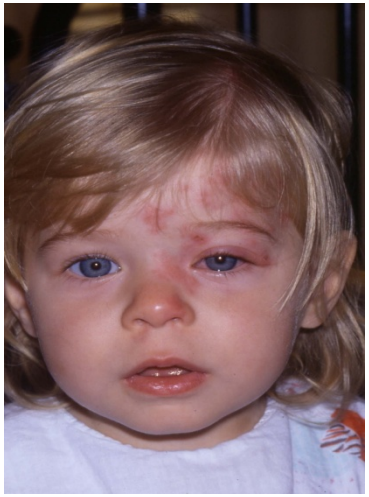


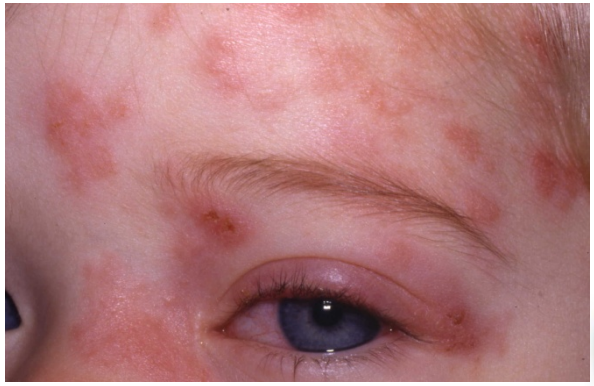
Varicella

- Annual cases approximate birth cohort
- In USA universal vaccination has resulted in a decline in disease by 85%, hospitalisations by 70-88%-mostly in 0-4 year olds.

Varicella zoster-shingles

- Reactivation of latent VZV due to waning cellular immunity – herpes zoster or shingles
- localised vesicular rash in dermatomal distribution
- More common in elderly but can occur at any age.
- Rare complications – disseminated disease, CNS and pulmonary involvement





Varicella vaccine

- Currently live attenuated monovalent vaccine – MMRV soon
- Derived from Oka VZV strain
- Currently one dose but two doses in children to prevent vaccine failure with break-through varicella (usually mild but can be contagious).
- People >14 years – 2 doses 1-2 months apart

Varicella vaccine

- 80-85% effective against disease and 95-98% effective against severe disease.
- Transmission to contacts very rare.
- Zoster after vaccination to both wild and vaccine strains
- Less common after vaccine than wild-type infection

VZIG

- Varicella zoster immune globulin available from Red Cross for post-exposure prophylaxis in high risk individuals
- Give within 96 hours of exposure
  - Newborns
  - T cell immunodeficiency
    - Cancer therapy
    - HIV
    - 1º immunodeficiency
    - High dose steroids

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Some Vaccine Myths

Myth 1

- Measles vaccine does not cause autism – now discredited

Myth 2

- Thiomersal is a mercury compound used to inhibit growth of bacterial and fungal contamination. It has been removed from all schedule vaccines for children <5 or contain trace amounts only.

Thank You

Questions?