4.11 MUMPS

4.11.1 Virology
Mumps is a paramyxovirus, genus *Rubulavirus*, with a single-stranded RNA genome. It is rapidly inactivated by heat, formalin, ether, chloroform and light.\(^1\)

4.11.2 Clinical features
Mumps is an acute viral illness with an incubation period of 12 to 25 days.\(^2\) Transmission is via respiratory secretions, including aerosol transmission, or by direct contact with saliva or possibly urine.\(^2\) Asymptomatic infection occurs in one-third of cases.\(^3\) Symptomatic disease ranges from mild upper respiratory symptoms to widespread systemic involvement.\(^3\) A high proportion of mumps infections involve non-specific symptoms including fever, headache, malaise, myalgia and anorexia.\(^4\) The characteristic bilateral, or occasionally unilateral, parotid swelling occurs in 60 to 70% of clinical cases.\(^4,5\) Maximum infectiousness occurs between 2 days before onset of illness and 4 days afterwards, but patients may be infectious from 7 days before parotid swelling to 9 days after.\(^2\) Meningeal symptoms and signs appear in approximately 10% of cases, but permanent neurologic sequelae are rare.\(^2\) Mumps encephalitis has been estimated to occur in 1–2 per 10 000 cases, with a case-fatality rate of around 1.0%.\(^6\) Deafness is relatively common in mumps meningoencephalitis, although permanent nerve deafness is rare (1 in 20 000 infections). Orchitis (usually unilateral) has been reported in up to 30% of clinical mumps cases in post-pubertal males, but subsequent sterility is rare.\(^6\) Symptomatic involvement of other glands and organs has been observed less frequently (pancreatitis, oophoritis, hepatitis, myocarditis, thyroiditis, mastitis).\(^1,4\)

Mumps infection during the first trimester of pregnancy may result in spontaneous abortion.\(^3,4\) Maternal infection is not associated with an increased risk of congenital malformation.\(^3,4\)

4.11.3 Epidemiology
Mumps is reported worldwide. Prior to universal vaccination, mumps was primarily a disease of childhood with the peak incidence in the 5–9 years age group. However, since 2000, peak rates have been reported in older adolescents and young adults, especially the 20–34 years age group.\(^7-10\) Between 2002 and 2004, mumps notifications were the lowest recorded in Australia, averaging 0.4 per 100 000.\(^11\) In 2005, notifications increased to 1.2 per 100 000, peaking at 2.7 per 100 000 in 2007, but have since declined to less than 1 per 100 000 since 2009.\(^10,11\) There have also been recent outbreaks of mumps in the United States and Europe, where the peak rates of disease have been in the 18–24 years age group.\(^12,15\)

Similar to measles, persons born in the late 1960s to mid-1980s (especially the 1978–1982 birth cohort) are recognised to be at a greater risk of mumps. Many missed being vaccinated or acquiring mumps infection as infants (when vaccine coverage was low and disease incidence was decreasing), and may also have missed catch-up vaccinations during their school years as part of either the Measles Control Campaign (which did not result in high coverage) or the Young Adult Measles Control Campaign (which did not result in high coverage).\(^16,17\) During outbreaks, mumps attack rates are lowest in persons who have received 2 doses of mumps-containing vaccines, as this provides optimal long-term protection.\(^5,17\) In Australia, over the 11-year period from 1996 to 2006, mumps was reported as the underlying cause of 5 deaths, all in adults aged over 80 years.\(^7,10\)

4.11.4 Vaccines
Monovalent mumps vaccine is not available in Australia. Mumps vaccination is provided using either measles-mumps-rubella (MMR) or measles-mumps-rubella-varicella (MMRV) vaccines. Two combination vaccines containing live attenuated measles, mumps, rubella and varicella viruses (MMRV) are registered in Australia.

Clinical trials of MMR vaccine indicate 95% mumps seroconversion after a single dose and up to 100% after a 2nd dose.\(^5\) However, outbreak investigations and post-marketing studies have reported 1-dose vaccine effectiveness to be between 60 and 90%.\(^13,18\) A Cochrane review reported 1-dose vaccine effectiveness to be between 69% and 81% for the vaccine containing the Jeryl Lynn mumps strain and between 70% and 75% for the vaccine containing the Urabe strain.\(^19\) While protection is greater in 2-dose vaccine recipients, recent outbreaks have reported mumps in 2-dose vaccine recipients, particularly young adults who received their vaccines more than 10 years previously.\(^14,15,20,21\)

Combination MMRV vaccines have been shown, in clinical trials, to produce similar rates of seroconversion to all four vaccine components compared with MMR vaccine and monovalent varicella vaccines administered concomitantly at separate injection sites.\(^22,25\)

Refer to further information on MMR and MMRV vaccines in 4.9 *Measles* and 4.22 *Varicella.*

---

**Combination measles–mumps–rubella (MMR) vaccines**
• **M-M-R II** – bioCSL Pty Ltd (live attenuated measles virus [Enders’ attenuated Edmonston strain], mumps virus [Jeryl Lynn B level strain] and rubella virus [Wistar RA 27/3 strain]). Lyophilised pellet in a monodose vial with separate diluent. Each 0.5 mL reconstituted dose contains ≥1000 tissue culture infectious dose 50% (TCID_{50}) of measles virus, ≥12 500 TCID_{50} of mumps virus, and ≥1000 TCID_{50} of rubella virus; 14.5 mg sorbitol; 1.9 mg sucrose; 14.5 mg hydrolysed porcine gelatin; ≤0.3 mg recombinant human albumin; <1 ppm fetal bovine serum; 25 µg neomycin.

• **Priorix** – GlaxoSmithKline Australia Pty Ltd (live attenuated measles virus [Schwarz strain], mumps virus [RIT 4385 strain, derived from the Jeryl Lynn strain] and rubella virus [Wistar RA 27/3 strain]). Lyophilised pellet in a monodose vial with a pre-filled diluent syringe. Each 0.5 mL reconstituted dose contains ≥10^{10} CCID_{50} of measles virus, ≥10^{14} CCID_{50} of mumps virus, and ≥10^{13} CCID_{50} of rubella virus; lactose; neomycin; sorbitol; mannitol.

### Combination measles-mumps-rubella-varicella (MMRV) vaccines

• **Priorix-tetra** – GlaxoSmithKline Australia Pty Ltd (live attenuated measles virus [Schwarz strain], mumps virus [RIT 4385 strain, derived from the Jeryl Lynn strain] and varicella-zoster virus [Oka strain]). Lyophilised powder in a monodose vial with a pre-filled diluent syringe. Each 0.5 mL reconstituted dose contains ≥10^{10} CCID_{50} of measles virus, ≥10^{14} CCID_{50} of mumps virus, ≥10^{13} plaque-forming units (PFU) of varicella-zoster virus; lactose; neomycin; sorbitol; mannitol.

• **ProQuad** – bioCSL Pty Ltd (live attenuated measles virus [Enders’ attenuated Edmonston strain], mumps virus [Jeryl Lynn B level strain], rubella virus [Wistar RA 27/3 strain] and varicella-zoster virus [Oka/Merck strain]). Lyophilised powder in a monodose vial with a pre-filled diluent syringe. Each 0.5 mL reconstituted dose contains ≥10^{10} TCID_{50} of measles virus, ≥10^{13} TCID_{50} of mumps virus, ≥10^{12} PFU of varicella-zoster virus; 20 mg sucrose; 11 mg hydrolysed porcine gelatin; 2.5 mg urea; 16 mg sorbitol; 0.38 mg monosodium L-glutamate; 0.25 mg recombinant human albumin; 5 µg neomycin; residual components of MRC-5 cells; 0.5 µg bovine serum albumin.

#### 4.11.5 Transport, storage and handling

Transport according to National vaccine storage guidelines: Strive for 5.26 Store at +2°C to +8°C. Do not freeze. Protect from light.

Both MMR and MMRV vaccines must be reconstituted by adding the entire contents of the diluent container to the vial containing the pellet and shaking until the pellet is completely dissolved.

Reconstituted Priorix (MMR), M-M-R II (MMR) and Priorix-tetra (MMRV) vaccines should be used as soon as practicable. If storage is necessary, hold at +2°C to +8°C for not more than 8 hours.

Reconstituted ProQuad (MMRV) vaccine should be used immediately. If storage is necessary, hold at +2°C to +8°C for not more than 2.5 hours or at +20°C to +25°C for not more than 1 hour.

#### 4.11.6 Dosage and administration

The dose of Priorix (MMR) vaccine for both children and adults is 0.5 mL to be given by either SC or IM injection.

The dose of M-M-R II (MMR) vaccine for both children and adults is 0.5 mL to be given by SC injection.

For children <14 years of age, the dose of MMRV vaccine is 0.5 mL to be given by SC injection. Priorix-tetra may also be given by IM injection.27

MMRV vaccines are not recommended for use in persons aged ≥14 years.

When 2 doses of MMR-containing vaccine are required the minimum interval between doses is 4 weeks.

#### Co-administration with other vaccines

MMR or MMRV vaccines can be given at the same time as other live attenuated parenteral vaccines (e.g. varicella, BCG, yellow fever) or other inactivated vaccines (including DTpa, hepatitis B, Hib, IPV, MenCCV, hepatitis A and pneumococcal conjugate vaccine),28 using separate syringes and injection sites. If MMR or MMRV vaccine is not given simultaneously with other live attenuated parenteral vaccines, they should be given at least 4 weeks apart.

If MMR vaccine is given at the same time as monovalent varicella vaccine (VV), they should be given using separate syringes and injection sites. MMR vaccine and monovalent VV should not be mixed together prior to injection.

Separate administration of measles, mumps or rubella vaccine is not available as an alternative to MMR vaccine, although a monovalent varicella vaccine is available (refer to 4.22 Varicella).
Interchangeability of MMR-containing vaccines

In general, the two brands of MMR vaccine can be considered interchangeable, that is, the 2nd MMR dose does not have to be of the same brand as the 1st. The same principle applies to the two available MMRV vaccines, although they are not routinely recommended in a 2-dose schedule.

4.11.7 Recommendations

Infants aged <12 months

MMR-containing vaccines are not routinely recommended for infants <12 months of age. However, MMR vaccine can be given to children from as early as 9 months of age in high-risk circumstances (refer to 4.9 Measles).

If MMR vaccine is given at <12 months of age, there is still a need for 2 vaccine doses to be administered at ≥12 months of age (refer to 4.9 Measles).

Children

Two doses of mumps-containing vaccine are recommended for all children. The 1st dose should be given at 12 months of age as MMR vaccine. MMRV vaccines are not recommended for use as the 1st dose of MMR-containing vaccine in children <4 years of age, due to a small but increased risk of fever and febrile seizures when given as the 1st MMR-containing vaccine dose in this age group (refer to Table 4.9.1 in 4.9 Measles and Table 4.22.1 in 4.22 Varicella). (Refer also to 4.9.11 Adverse events in 4.9 Measles and 4.22.11 Adverse events in 4.22 Varicella.)

The 2nd dose of mumps-containing vaccine is recommended to be given routinely at 18 months of age as MMRV vaccine. This is to commence from July 2013 once MMRV vaccine(s) are available under the NIP (refer to Table 4.9.1 in 4.9 Measles and Table 4.22.1 in 4.22 Varicella). The recommended age for administration of the 2nd dose of mumps-containing vaccine will be moved down from 4 years of age, to provide earlier 2-dose protection against measles, mumps and rubella, and to improve vaccine uptake (refer to 4.11.3 Epidemiology above).

If MMRV vaccine is inadvertently administered as dose 1 of MMR-containing vaccine, the dose does not need to be repeated (providing it was given at ≥12 months of age); however, parents/carers should be advised regarding the small but increased risk of fever and febrile seizures (compared with that expected following MMR vaccine).

Adults and adolescents

Two doses of mumps-containing vaccine are recommended for all non-immune adolescents and adults (refer to 4.9 Measles). All persons born during or since 1966 who are ≥18 months of age (or, until catch-up following the move of the 2nd NIP dose of measles-containing vaccine to 18 months of age is completed, are ≥4 years of age) should have documented evidence of 2 doses of MMR-containing vaccine (administered at least 4 weeks apart with both doses administered at ≥12 months of age) or have serological evidence of protection for measles, mumps and rubella.

It is recommended that all adolescents and young adults have their vaccination records reviewed to ensure they have received 2 doses of MMR vaccine (refer to 4.11.3 Epidemiology above).

MMRV vaccines are not recommended for use in persons ≥14 years of age, due to a lack of data on safety and immunogenicity/efficacy in this age group. If a dose of MMRV vaccine is inadvertently given to an older person, this dose does not need to be repeated.

For further information on the recommendations for MMR and MMRV vaccines, refer to 4.9 Measles and 4.22 Varicella.

Serological testing for immunity to mumps

Serological testing for immunity to mumps (and measles, rubella and varicella) is not recommended before or after routine administration of the 2-dose childhood schedule of these vaccines.

However, serological testing for mumps (and measles and rubella) can be performed in cases where a history of natural immunity or 2 doses of vaccine administration is uncertain (refer to ‘Adults and adolescents’ above). Serology is indicated in special situations, such as pre-pregnancy planning (refer also to 4.9 Measles, 4.18 Rubella and 4.22 Varicella). Serological tests to investigate immunity to mumps are generally sensitive at detecting antibody produced by both prior natural infection and vaccination, although sensitivity varies by assay and the clinical setting (e.g. time since vaccination). Interpretation of the results of serological testing may be enhanced by discussion with the laboratory that performed the test, ensuring that relevant clinical information is provided. An alternative to serological testing is presumptive administration of MMR vaccine dose(s). There is no known increase in adverse events from vaccinating those with pre-existing immunity to one or more of the vaccine components (refer to 4.11.11 Adverse events below).

4.11.8 Pregnancy and breastfeeding

MMR-containing vaccines are contraindicated in pregnant women. Pregnancy should be avoided for 28 days after vaccination.

MMR vaccines can be given to breastfeeding women. (Refer also to 4.18 Rubella.)

MMRV vaccines are not recommended for use in persons aged ≥14 years.

Refer also to 4.9 Measles, 4.18 Rubella, 4.22 Varicella and 3.3 Groups with special vaccination requirements, Table 3.3.1 Recommendations for vaccination in pregnancy for more information.

4.11.9 Contraindications

For information on contraindications to MMR and MMRV vaccines, refer to 4.9 Measles and 4.22 Varicella.

4.11.10 Precautions

For additional precautions related to MMR and MMRV vaccines, refer to 4.9 Measles and 4.22 Varicella.

Vaccination with other live attenuated parenteral vaccines

If MMR or MMRV vaccine is not given simultaneously with other live attenuated parenteral vaccines (e.g. varicella, BCG, yellow fever), the vaccines should be given at least 4 weeks apart.

4.11.11 Adverse events

Adverse events following administration of MMR-containing vaccines are generally mild and well tolerated. Adverse events are much less common after the 2nd dose of MMR or MMRV vaccine than after the 1st dose.

The most common adverse events following mumps vaccination are fever and parotitis. Parotitis occurs most commonly from 10 to 14 days after vaccination. The incidence varies by vaccine strain; in studies of the Jeryl Lynn vaccine strain, parotid and/or submandibular swelling occurred in 0.5 to 1.6% of recipients. An increased risk of aseptic meningitis has been observed after vaccination with the Urabe strain of mumps vaccine in some countries. However, the Urabe strain is not used in Australia. MMR and MMRV vaccines available in Australia contain a Jeryl Lynn-derived strain of mumps, which is not associated with an increased risk of aseptic meningitis.

Persons with egg allergy can be safely given MMR or MMRV vaccine (refer to 4.9.11 Adverse events in 4.9 Measles).

For further information on the adverse events associated with MMR and MMRV vaccines, refer to 4.9 Measles and 4.22 Varicella.

4.11.12 Public health management of mumps

Mumps is a notifiable disease in all states and territories in Australia.

Further instructions about the public health management of mumps, including management of cases of mumps and their contacts, should be obtained from state/territory public health authorities (refer to Appendix 1 Contact details for Australian, state and territory government health authorities and communicable disease control).

Mumps-containing vaccine does not provide protection if given after an individual has been exposed to mumps. However, if the exposure did not result in infection, the vaccine would induce protection against subsequent infection. Normal human immunoglobulin (NHIG) has been shown not to be of value in post-exposure prophylaxis for mumps.

4.11.13 Variations from product information

For information on MMR and MMRV vaccines, refer to 4.9 Measles and 4.22 Varicella.

References

A full reference list is available on the electronic Handbook or website www.immunise.health.gov.au.


