**Measles, Mumps and Rubella (MMR) Vaccination**

Measles, mumps and rubella (MMR) vaccine is a freeze-dried preparation containing live attenuated measles, mumps and rubella viruses. It provides protection for approximately 90% of recipients for measles and mumps and over 95% for rubella.[1]

Two doses are given as part of the routine immunisation schedule but it is also important to identify special groups who need immunisation. It is also now an important vaccine in the control of outbreaks of measles.

All currently used live vaccines (BCG, rotavirus, live attenuated influenza vaccine, oral typhoid vaccine, yellow fever, varicella, zoster and MMR) and tuberculin (Mantoux) skin testing can be administered at any time before or after each other. There are three exceptions: MMR and yellow fever vaccines should have a minimum interval of 4 weeks; MMR and varicella (or zoster) vaccines should have a minimum of a 4 week interval if not given on the same day; tuberculin skin testing (Mantoux), where the test has already been initiated, MMR should be delayed until the skin test has been read, unless protection against measles is required urgently. If child has had recent MMR and requires a tuberculin test, a 4-week interval should be observed.

**Target population**[1]

All children should be given the first dose prior to school entry, unless contra-indicated. See separate article [Immunisation Schedule (UK)].

- The optimum age for the first dose is 12-13 months.
- A booster dose should be given between ages 3 years and 4 months to 5 years.
- If the child has missed the first dose, give two doses, three months apart. Give the vaccine irrespective of previous history of infection.
- If a dose of MMR is given before the child's first birthday, either because of travel to an endemic country or because of a local outbreak, this dose should be ignored and two further doses given at the recommended times (ie between 12 and 13 months of age and at 3 years and 4 months to 5 years of age).
- Check immunisation status when giving the school-leaving age immunisations (does not normally include MMR). Give an MMR booster if only one dose has been given previously and two doses, three months apart if no previous dose has been given.
- Where protection against measles is urgently required, the second dose can be given one month after the first.
- If the child is given the second dose less than three months after the first dose and at less than 18 months of age then the routine preschool dose (a third dose) should be given in order to ensure full protection.

**The catch-up campaign**

Between 25 April 2013 and 31 March 2014, there was an MMR catch-up campaign in England in response to local measles outbreaks. From 1 April 2014, patients aged between 16-18, who have no record of vaccination and who self-present to practices requesting vaccination, were offered the vaccine. There remains a catch-up programme in place in Wales as a result of severe outbreak of measles.

**Special groups**

Apart from the more routine vaccination of children as above, there are also target groups worthy of special mention. The immunisation can be given to individuals of any age. The decision on whether or not to vaccinate should take into account:

- Past immunisation history.
- The likelihood of an individual remaining susceptible.
- The future risk of exposure and disease.

These children should be specifically contacted rather than left to the routine recall procedure:

- Premature babies should be immunised after two months, irrespective of prematurity.
- HIV-positive individuals. Severely immunocompromised patients should not be given the vaccine but it is indicated for patients with mild-to-moderate immunosuppression. The degree of immunosuppression is estimated using the patient's age and CD4 count. A specialist should be involved in the decision to vaccinate.
- Women of childbearing age who are seronegative for rubella and who are not currently pregnant, should be given the vaccine.
- Other unimmunised groups:
  - Healthcare workers - should be given the vaccine for their own benefit and to protect vulnerable unimmunised patients and their own unimmunised partners.
  - Unimmunised seronegative postpartum women should be offered the vaccine a few days after delivery.
  - Children arriving from developing countries after school age of immunisation are particularly likely to require immunisation.

- During outbreaks of measles:
The vaccine should be given to susceptible children aged over 6 months in contact with a case, within three days of exposure.

These children should still have routine MMR at the usual age.

Note that MMR vaccination is not suitable for prophylaxis against mumps or rubella following exposure to either, as the antibody response is too slow.

Clinical Editor's comments (September 2017)
Dr Hayley Willacy recently read a paper from the New England Journal of Medicine dealing with MMR doses during outbreaks of mumps[2]. Mumps outbreaks may occur in high-density settings, even among populations who have had two MMR vaccinations. There is some evidence that a third MMR vaccination may help control such outbreaks. A retrospective cohort study of over 20,000 students evaluated the efficacy of a third MMR vaccination in controlling a mumps outbreak at the University of Iowa in 2015-2016. Three MMR vaccinations was associated with a reduced rate of mumps attacks during the outbreak compared to two MMR vaccinations (0.67% vs 1.45%, p <0.001).

Contra-indications[1]
- Acute illness (postpone until the condition has resolved) but note that minor illness without fever or systemic upset - eg, mild otitis media, upper respiratory tract infection (URTI) and diarrhoea - is not a contra-indication.
- Severe local or generalised reaction to a previous dose of MMR vaccine - when in doubt, seek specialist advice.
- Allergy to neomycin or gelatin.
- Untreated malignant disease or impaired immunity - eg, immunosuppression, steroids, radiotherapy, cytotoxic drugs or within six months of receiving such treatment. (Immunisation can still be possible in some circumstances depending on dosage and combination of drugs - check with the specialist treating the condition or the local community paediatrician.)
- Within three months of receiving blood products, such as immunoglobulin.
- If immediate protection against measles is required in someone who has recently received a blood product, MMR vaccine should still be given. To confer longer-term protection, MMR should then be repeated after three months.
- Pregnancy - but note that the Department of Health does not recommend termination, as studies failed to demonstrate a link between rubella immunisation in early pregnancy and fetal damage.

Note that the following are NOT contra-indications:
- Family history of any adverse reactions following immunisation.
- Previous history of infection with pertussis, measles, rubella or mumps.
- Contact with an infectious disease.
- Asthma, eczema, hay fever or rhinitis.
- Treatment with antibiotics or locally acting (eg, topical or inhaled) steroids.
- The child's mother being pregnant.
- The child being breast-fed.
- History of jaundice after birth.
- Being over the age recommended in the immunisation schedule.
- 'Replacement' corticosteroids.
- Allergy to eggs (recent research has found no link between allergy to dietary eggs and anaphylactic reactions to MMR vaccine).
- Neurological conditions are not a contra-indication although, if the condition is poorly controlled (eg, epilepsy), immunisation should be deferred.
- MMR should ideally be given at the same time as other live vaccines, such as BCG. However, if live vaccines cannot be administered simultaneously, a four-week interval is recommended.

Adverse reactions[1]
Adverse reactions are considerably less common after a second dose of MMR vaccine than after the first dose.

Common
- Fever or a rash may occur one week after immunisation. It lasts 2-3 days and is more common after the first immunisation than after the second.
- Parotid swelling occurs in 1% of children of all ages up to 4 years. It is most common at the third week, occasionally later.

Rare
- Febrile convulsion may occur on the 6th-11th day after immunisation. The incidence is 1 in 1,000 children. This is less than the incidence after an infection of measles. There is no evidence that epilepsy occurs more frequently after febrile convulsion caused by MMR than after any other febrile convulsion.
- Idiopathic thrombocytopenic purpura occurs in 1 in 24,000 children, usually within six weeks of the first dose. The child should undergo serological testing before the next dose is given. This is offered free by the Health Protection Agency (HPA) Virus Reference Laboratory.
- Arthropathy (arthralgia or arthritis) has also been reported to occur rarely after MMR immunisation, probably due to the rubella component. It occurs between 14 and 21 days after immunisation.
There is overwhelming evidence that there is no link between the MMR vaccine and autism or bowel disease. Some private clinics offer single vaccines but the Department of Health recommends that parents be discouraged from using them. One study identified four cases of anaphylaxis following single component measles or rubella vaccine.

Further reading & references
- MMR Action Plan; Public Health England, May 2013
- MMR the facts; Dept of Health
- Vaccination; NHS Choices

1. Immunisation against infectious disease - the Green Book (latest edition); Public Health England
4. PHE; Measles, mumps, rubella (MMR); use of combined vaccine instead of single vaccines, 2014.

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