OREGON STATE PUBLIC HEALTH DIVISION, DHS
IMMUNIZATION PROGRAM

MEASLES, MUMPS AND RUBELLA
Live Virus Vaccine
AND
MEASLES, MUMPS, RUBELLA and VARICELLA
Live Virus Vaccine

Revisions as of 4/07:

- Updated Section III.C (p.3) to better define recommendations for use and acceptable evidence of immunity.
- On page 4 the recommended 1st and 2nd doses of MMR are now 12-15 months and 4-6 years respectively.
- The recommended minimum age of children <13 years for the 2nd dose of MMRV (ProQuad®) changed to 15 months. (p. 5).
- Footnote 1 and 5 updated in the Section IV.B schedule to reflect the most current ACIP recommendations for MMRV (ProQuad®).
- Updated the definition of Mumps immunity In Section IX. (p.13) to reflect the most recent ACIP recommendation published in June of 2006.

I. ORDER:

1. Screen for contraindications.
2. Provide the current Vaccine Information Statement (VIS), answering any questions.
3. Obtain a signed Vaccine Administration Record (VAR).
4. Give 0.5 ml of any MMR-containing vaccine **subcutaneously**.
    a. May give simultaneously with all routine adult and childhood vaccines according to age and immunization status of recipient.
    b. If not given simultaneously with another live virus vaccine, give at least 28 days apart.
    c. If a PPD tuberculin skin test is not given simultaneously with a MMR-containing vaccine, delay PPD for at least 4 weeks.

Signature Health Officer or Medical Provider Date

II. LICENSED VACCINE

A. LICENSED COMBINATION MMR VACCINE			
Product Name	**Vaccine Components**	**Acceptable Age Range**	**Thimerosal**
M-M-R® II[1] (Merck)	Measles[2] Mumps[3] Rubella[4]	≥12 months	No
B. LICENSED COMBINATION MMR AND VARICELLA (MMRV) VACCINE			
ProQuad®[6,7] (Merck)	Measles[2] Mumps[3] Rubella[4] Varicella[5]	12 months–12 years	No

[1] Each dose contains approximately 25 mcg of neomycin. The product contains no preservative. Sorbitol and hydrolyzed gelatin are added as stabilizers.

[2] M-M-R® II contains a sterile, lyophilized preparation of ATTENUVAX®, a more attenuated line of measles virus, derived from Enders' attenuated Edmonston strain and grown in cell cultures of chick embryo.

[3] MUMPSVAX®, the Jeryl Lynn strain of mumps virus, is grown in cell cultures of chick embryo.

[4] MERUVAX®, the Wistar RA 27/3 strain of live attenuated rubella virus, is grown in human diploid cell culture.

[5] Oka/Merck strain of varicella-zoster virus propagated in MRC-5 cells.

[6] MMRV vaccine must be stored frozen at an average temperature ≤ 5°F (≤ 15°C) and the diluent should be stored separately at room temperature.

[7] MMRV, like Varicella vaccine, must be given within 30 minutes of reconstitution.

III. MMR RECOMMENDATIONS FOR USE

A. All persons ≥1 year of age without medical contraindications (e.g., pregnancy), who do not have acceptable evidence of immunity to measles, mumps, and rubella should be vaccinated with MMR

B. Acceptable evidence of immunity is as follows.

- Healthcare provider-diagnosed disease
- Laboratory evidence of immunity (protective antibody titers); or
- Documentation of adequate vaccination, as follows.
  - Pre-school children: **1 dose**
  - Children in grades K–12: **2 doses**
  - Women of childbearing age: **2 doses**
  - Healthcare workers
    - Born before 1957: **1 dose**
    - Born during or after 1957; **2 doses**
      - Students at post-high-school educational institutions: **2 doses**
      - Persons who plan to travel internationally: **2 doses**
      - All other adults: **1 dose**
- During an outbreak, a 2nd dose of vaccine should be considered for all healthcare workers and persons in groups affected by the outbreak and whose only evidence of immunity is documentation of a single dose of vaccine.
- Post-partum women who do not have evidence of immunity to rubella should receive MMR vaccine upon completion or termination of pregnancy.

C. Measles Vaccine Indications for Revaccination.[1]

- Vaccination before the first birthday;
- Vaccination with killed measles vaccine,
- Vaccination with killed measles vaccine followed by live vaccine less than 4 months after the last dose of killed measles vaccine.
- Vaccination before 1968 with an unknown type of vaccine.
- Vaccination with IG in addition to a vaccine of unknown type. (Revaccination not necessary if IG was given with Edmonston B vaccine.)

[1]The following groups should be considered unvaccinated and should receive at least one dose of a measles-containing vaccine.

IV. A. VACCINE SCHEDULE FOR MMR

Dose and Route: 0.5ml SC			
DOSE	**MINIMUM AGE[1,2]**	**MINIMUM SPACING[1,2]**	**RECOMMENDED AGE**
1	12 months[3]	Not applicable	12–15 months
2	13 months[4]	28 days	4–6 years [5,6]

[1] For retrospective checking, doses that violate the minimum spacing or age by 4 or fewer days do not need to be repeated. However, live parenteral vaccines that are not administered simultaneously should be separated by at least 28 days.

[2] When an invalid dose needs to be repeated, the repeat dose should be spaced after the invalid dose by at least 28 days.

[3] May give as young as 6 months of age during a measles outbreak. Children vaccinated prior to one year of age should be revaccinated at 12–15 months and should receive a third dose at school entry or at least 28 days after the second dose.

[4] Accept MMR #2 at any age as long as MMR #1 was given on or after the first birthday and MMR #2 was given at least 28 days later.

[5] The second dose should be completed by the 11–12 year old well-child visit.

[6] OARs require that a second measles-containing vaccine be administered before school entry unless a valid medical or religious exemption is in place. See the March, 2004 *Immunization Law Handbook for Schools, Preschools, Head Starts and Certified Day Care Providers* for specific requirements.

IV. B. VACCINE SCHEDULE FOR COMBINATION MEASLES, MUMPS, RUBELLA AND VARICELLA VACCINE (MMRV)[1,2]

Dose and Route: 0.5 ml SC			
Dose	**Recommended Minimum Age**	**Recommended Minimum Spacing**	**Recommended Age[3,4]**
1	12 months		12 -15 months
2[3,4]	15 months[5]	3 months from dose #1 to dose #2[5]	4 - 6 years

[1]This measles, mumps, and rubella–containing vaccine can be administered to children 12months–12 years of age as the first or second dose of the two dose MMR series recommended as part of the routine childhood immunization schedule. MMRV (ProQuad®) is not licensed for persons ≥13 years of age.

[2]MMRV is not recommended or approved for individuals with HIV infection.

[3]For those children 12 months–12 years of age, for whom additional protection from varicella disease is desired in response to an outbreak, a second dose of MMRV may be administered if at least 28 days has elapsed since receiving the first dose of a varicella–containing vaccine.

[4]MMRV may be used in children 12 months–12 years of age if a second dose of measles, mumps and rubella vaccine is to be administered and if no MMR is available at the time the second dose of MMR is indicated.

[5] Although 15 months is the recommended minimum age for the 2nd dose (allowing for a 3 month interval between dose one and two), if the second dose is administered at least 28 days following the first dose, the second dose is considered valid and does not need to be repeated.

V. CONTRAINDICATIONS and PRECAUTIONS

A. Allergies to vaccine components:
Do not give a MMR or MMRV to any person with a history of anaphylactic reaction (hives, swelling of the mouth or throat, difficulty breathing, hypotension, or shock) to the vaccine or a component of the vaccine, e.g., gelatin or neomycin. (Contact dermatitis reaction to neomycin is not a contraindication).

- A history of penicillin allergy is not a contraindication to a MMR-containing vaccine.
- MMR-containing vaccine may be given to egg-allergic children and adults without prior routine skin testing or use of special protocols.

B. Pregnant Women

- Do not vaccinate pregnant women with a MMR-containing vaccine.
- Non-pregnant women being vaccinated should avoid becoming pregnant for 4 weeks following each dose of MMR-containing vaccine.
- Breastfeeding is not a contraindication to MMR-containing vaccine for the woman or the breast-feeding child.
- Close contact with a pregnant woman is not a contraindication to MMR-containing vaccination of the contact.

C. Defer MMR-containing vaccination during moderate or severe acute illness.

D. MMR-containing vaccine is not recommended for persons who have untreated active tuberculosis.

- A TB skin test may be given before or on the same day as an MMR-containing vaccine.
- If TB skin test is needed after live virus vaccine is given, wait ≥ 4 weeks to place a PPD skin test. MMR or MMRV may temporarily suppress reactivity to TB test, resulting in false negative results.

V. CONTRAINDICATIONS AND PRECAUTIONS – cont.

E. **Persons with a history of thrombocytopenia or low platelet counts at time of injection may be at increased risk for clinically significant thrombocytopenia following a MMR-containing vaccine**. If a patient experiences an episode of thrombocytopenia within 6 weeks after receiving an MMR-containing vaccine, consult with client's physician before giving subsequent doses. Serologic testing for measles and varicella immunity may be prudent prior to administration of either vaccine.

F. **Immune globulin (IG) and MMR-containing vaccines should not be administered simultaneously.**

1. If IG is given before MMR or MMRV, consult the table in Sect. VI for the appropriate interval.
2. If MMR is given first, wait at least 2 weeks before giving IG.
3. If a varicella-containing vaccine is given first, wait at least 3 weeks before giving IG.
4. Should MMR need to be administered post-partum to a woman who is also receiving a post-partum dose of Rho (D) immune globulin, the woman should be tested 3 months later to ensure seroconversion for measles and rubella.

G. Do not give a MMR-containing vaccine to individuals with immunosuppression due to:

- Leukemia[1]
- Lymphoma or generalized malignancy
- HIV infection or AIDS[2]
- Immunosuppressive therapy (e.g., large daily doses of steroids)[3,4]
- Congenital immunodeficiency

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[1] MMR-containing vaccine may be considered for persons with leukemia in remission if at least 3 months have passed since termination of chemotherapy (Consult with patient's oncologist).

[2] MMR vaccine is recommended for all asymptomatic HIV-infected persons, and should be considered for symptomatic persons who are not severely immunosuppressed. Consult with patient's physician and CD4 T-lymphocyte table on p. 142 of the "Pink Book," 9th Edition before giving MMRV to a HIV-infected child.

[3] A large dose of corticosteroids is considered equivalent to prednisone ≥2 mg/kg/day or ≥20 mg/day either given daily or every other day for a minimum of 14 days. Treatment with <2 mg/kg/day, alternate-day, topical, replacement, or aerosolized steroid preparations is not a contraindication to an MMR-containing vaccine.

[4] MMR-containing vaccines should be avoided for at least 1 month after cessation of high-dose RX.

VI. Suggested intervals between administration of immune globulin preparations for various indications and vaccines containing live-measles virus*

Indications	Dose (mg IgG/kg body weight)	Interval (months) before measles vaccination
Tetanus prophylaxis (TIG)	250 units (10 mg IgG/kg) IM	3
Hepatitis A prophylaxis (IG):		
-Contact prophylaxis	0.02 ml/kg (3.3 mg IgG/kg) IM	3
-International travel	0.06 ml/kg (10 mg IgG/kg) IM	3
Hepatitis B prophylaxis (HBIG)	0.06 ml/kg (10 mg IgG/kg) IM	3
Rabies prophylaxis (HRIG)	20 IU/kg (22 mg IgG/kg) IM	4
Varicella prophylaxis (VariZIG)	125 units/10 kg (20-40 mg IgG/kg) IM (max. 625 units)	5
Measles prophylaxis (IG):		
-Standard (i.e., non-immunocompromised) contact	0.25 ml/kg (40 mg IgG/kg) IM	5
-Immunocompromised contact	0.50 ml/kg (80 mg IgG/kg) IM	6
Blood transfusion:		
-Red blood cells (RBCs), washed	10 ml/kg (negligible IgG/kg) IV	0
-RBCs, adenine-saline added	10 ml/kg (10 mg IgG/kg) IV	3
-Packed RBCs (Hct 65%)≠	10 ml/kg (60 mg IgG/kg) IV	6
-Whole blood (Hct 35%-50%)≠	10 ml/kg (80-100 mg IgG/kg) IV	6
-Plasma/platelet products	10 ml/kg (160 mg IgG/kg) IV	7
Replacement therapy for immune deficiencies¶	300-400 mg/kg IV (as IGIV)	8
Respiratory syncytial virus prophylaxis	750 mg/kg IV (as RSV-IGIV)	9
Immune thrombocytopenic purpura(ITP)	400 mg/kg IV (as IGIV) 1000 mg/kg IV (as IGIV)	8 10
Kawasaki disease	2 g/kg IV (as IGIV)	11

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Adapted from: *MMWR* 2/8/02, Vol. 51 (RR-2), pg.7

* This table is not intended for determining the correct indications and dosage for the use of immune globulin preparations. Unvaccinated persons may not be fully protected against measles during the entire suggested time interval, and additional doses of immune globulin and/or measles vaccine may be indicated after measles exposure. The concentration of measles antibody in a particular immune globulin preparation can vary by lot. The rate of antibody clearance after receipt of an immune globulin preparation can vary.
≠ Assumes a serum IgG concentration of 16 mg/ml.
¶ Measles vaccination is recommended for HIV-infected children who do not have evidence of severe immunosuppression, but is contraindicated for patients who have congenital disorders of the immune system.
Abbreviations: HBIG=hepatitis B immune globulin; Hct=hematocrit; HRIG=human rabies; immune globulin; IG=serum immune globulin; IGIV=immune globulin, intravenous; IM=intramuscular; IV=intravenous, RBCs=red blood cells; RSV-IGIV=respiratory syncytial virus immune globulin intravenous; TIG=tetanus immune globulin; VZIG=varicella zoster immune globulin.

VII. SIDE EFFECTS AND ADVERSE EVENTS

This table represents vaccine-related injection-site and systemic adverse events reported 0–42 days post-vaccination in 12–23 month old children who received 1 dose of ProQuad® or MMRII and Varivax® vaccine.

	MMRII® and VARIVAX®	ProQuad®
	N=2038	N= 4497
Adverse Events	%	%
Injection Site[1]		
Pain/tenderness	26.7	22.0
Erythema[2]	15.8	14.4
Swelling[2]	9.8	8.4
Ecchymosis	2.3	1.5
Rash	1.5	2.3
Systemic		
Fever ≥ 102°F (≥ 38.9°C)	14.9	21.5
Irritability	6.7	6.7
Measles-like rash	2.1	3.0
Varicella-like rash	2.2	2.1
Rash (not otherwise specified)	1.4	1.6
Upper respiratory infection	1.1	1.3
Diarrhea	1.3	1.2

[1] Injection-site adverse reactions for MMRII® and VARIVAX® are based on occurrence with either of the vaccines administered.
[2] Injection-site adverse events solicited only from days 0–4 post-vaccination.

Source: ProQuad® Package insert 2005; p.8

VIII. OTHER CONSIDERATIONS

A. For unvaccinated persons who work within medical facilities, serologic screening need not be done before vaccinating for measles, mumps and rubella unless the medical facility considers it cost-effective.

B. Healthcare workers who are susceptible and working in public agencies that use state-supplied vaccine may receive MMR vaccine on-site (2 doses at least 28 days apart). Healthcare workers from private agencies will need to purchase vaccine at their own expense.

C. Healthcare students born after January 1,1957 with no history of disease, no history of immunization, or a negative serology for measles should receive a two-dose series of MMR vaccine.

D. A documented history of laboratory-confirmed disease is not a contraindication to administering MMR, unless the individual is immune to all three viruses.

E. Vaccination of internationally adopted children: The simplest approach to resolving concerns regarding MMR immunization is to revaccinate with one or two doses of MMR depending on the child's age. Alternatively, serologic testing for IgG antibody to vaccine viruses indicated on the vaccine record can be considered. Consult CDC. General Recommendations on Immunization, MMWR 2006; 55 (RR-15) p.34 for further clarification regarding serologic follow-up.

F. Tuberculin (TB) skin testing
   1. TB skin test should be given before or on the same day as MMR administration.
   2. If a TB skin test is needed after MMR has been given, wait at least 4 weeks to place a TB skin test. Measles vaccination may temporarily suppress tuberculin reactivity, thereby giving false-negative skin test results.

Continued on next page

VIII. OTHER CONSIDERATIONS, cont

G. Chemotherapy patients who have not received chemotherapy for at least three months may receive live virus vaccine. Provider approval required.

H. International Travel
   1. International travelers ≥12 months of age and born on or after January 1, 1957, should have 2 doses of live measles vaccine.
   2. The first dose of MMR (state-supplied vaccine) may be given to anyone 12–18 years of age, and a second dose at least 28 days later.
   3. International travelers not meeting the criteria listed above are not eligible for publicly purchased MMR. Refer to private resources for vaccine.

I. Persons who lack evidence of immunity to any of the three viruses in MMR are eligible for MMR. Give 2 doses at least 28 days apart.

J. For someone with a history of fainting with injections, a 15-minute observational period is recommended post immunization.

K. After reconstitution, MMR vaccine must be stored at refrigerator temperature and protected from light. If reconstituted vaccine is not used within 8 hours, it must be discarded.

L. MMRV, like varicella, must be protected from light and administered within 30 minutes of reconstitution.

IX. IMMUNITY

For Routine Purposes, Persons who meet the criteria below are considered Immune to Measles, Mumps, or Rubella, respectively.

MEASLES	MUMPS[1]	RUBELLA
1. Born prior to 1957 (except for health care workers who should consider at least 1 measles-containing dose); **OR** 2. Met CONFIRMED case definition for disease as described in the OSPH *Investigative Guidelines*; **OR** 3. Has measles antibody titer indicating immunity; **OR** 4. Has had two doses of live measles-containing vaccine (documented by month and year of each dose) on or after the first birthday, with a minimum of 28 days between the first and second dose; **OR** 5. Has a history of two doses, with no available month and year for the first dose, but documentation of the month and year of the second dose <u>during or after</u> December 1989.	1. Born prior to 1957 (except for health care workers who should consider at least 1 mumps-containing dose); **OR** 2. Met confirmed case definition for disease by report of a health professional; **OR** 3. Has mumps antibody titer indicating immunity; **OR** 4. If born ≥1957, without evidence of disease or a positive antibody titer, these persons need documentation of 2 doses of mumps-containing vaccine: a) All school-aged children (i.e., K–12) b) The following <u>high risk adults</u>: • Those who work in healthcare facilities • international travelers • students at post-high school educational institutions	1. Born prior to 1957 [i.e. women of childbearing age who could become pregnant]; **OR** 2. Met case definition for disease as listed in the *Investigative Guidelines* (OHS), as reported by a health professional;* **OR** 3. Has rubella antibody titer indicating immunity; **OR** 4. Has had one dose of rubella-containing vaccine (documented by month and year) received on or after the first birthday. *Clinically diagnosed rubella is unreliable and should not be used to assess immune status.

[1]Adapted from: CDC. Updated Recommendations of the Advisory Committee on Immunization Practices For the Control and Elimination of Mumps. MMWR 2006; 55, 629–30.

X. SPECIAL CONSIDERATIONS

A. Protection of Contacts and Outbreak Control:

1. See the *Investigative Guidelines* (OSPH) for measles, mumps and rubella. (http://www.dhs.state.or.us/publichealth/odpe/guideln/index.cfm)

2. Although mumps vaccine may not provide post-exposure protection, it may protect against subsequent exposures.

4. There is no evidence of increased risk for vaccine-associated adverse events if mumps vaccine is given while disease is incubating.

B. IG has not been of any value after exposure to either mumps or rubella. Such use is not recommended.

C. Exclusion of susceptibles in schools or day-care settings:

1. Local public health authorities should consider this option.

2. In the case of mumps, exclude susceptibles for 26 days after the onset of parotitis in the last case at the facility.

D. More specific guidelines for acceptable evidence of immunity in persons who work in healthcare facilities, international travelers, and students at post-high school educational institutions can be found in under the heading, “Vaccination of Adults” in:
Measles in *Epidemiology and Prevention of Vaccine-Preventable Diseases* (“Pink Book”). Atkinson W, Hamborsky J, Wolfe S, eds. 9th ed. Washington, DC: Public Health Foundation, 2006: 136–7.

XI. ADVERSE EVENTS REPORTING

Adverse events following immunization should be reported by public providers to the Oregon State Public Health Immunization Program, using a Vaccine Adverse Events Reporting System form (VAERS), according to state guidelines. Private providers report all adverse events directly to VAERS. VAERS phone number: (800) 822-7967, and the website address is www.vaers.org

Table 2. Events reportable to VAERS:
Vaccine Injury Table

Vaccine	Illness, disability, injury or condition covered	Time period until first symptom
Vaccines containing measles, mumps, or rubella (e.g., MMR, MMRV, MR, M, R)	1. Anaphylaxis or anaphylactic shock	4 hours
	2. Encephalopathy (or encephalitis)	5–15 days (not less than 5 and not more than 15 days)
	3. Any acute complication sequela (including death)	Not applicable
Vaccines containing rubella virus (e.g., MMR, MMRV, MR, R)	1. Chronic arthritis	7–42 days
	2. Any acute complication sequela (including death)	Not applicable
Vaccines containing measles virus (e.g., MMR, MMRV, MR, M)	1. Thrombocytopenic purpura	7–30 days
	2. Vaccine-strain measles viral infection in an immunodeficient recipient	0–6 months
	3. Any acute complication sequela (including death)	Not applicable

Source: www.hrsa.gov/osp/vicp/table.htm

XII. REFERENCES

1. Recommended Adult Immunization Schedule-United States for October 2005-September 2006. MMWR 54 (40). Available at: www.cdc.gov/nip/recs/adult-schedule.pdf.
2. Measles. In: Pickering LK, ed. *Red Book: 2003 Report of the Committee on Infectious Diseases*. 26th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003: 419-29.
3. Measles. In: *Epidemiology and Prevention of Vaccine-Preventable Diseases* ("Pink Book"). Atkinson W, Hamborsky J, Wolfe S, eds.10. Washington, DC: Public Health Foundation, 2007: 129-48. Available at:http://www.cdc.gov/nip/publications/pink/default.htm
4. CDC.Licensure of a Combined Live Attenuated Measles, Mumps, Rubella, and Varicella Vaccine. MMWR 2005; 54 (47): 1212-14.
5. CDC. Updated Recommendations of the Advisory Committee on Immunization Practices for the Control and Elimination of Mumps. MMWR 2006; 55 (22); 629–30.
6. Measles, Mumps, and Rubella Vaccine Use and Strategies for Elimination of Measles, Rubella, and Congenital Rubella Syndrome and control of Mumps; MMWR 1998; 47 (RR-8).
7. *Immunization Law Handbook, for Schools, Preschools, Head Starts, and Certified Day Care Providers*. 9th ed. March 2004.
8. ProQuad® package insert, 10/05.

For more information or to clarify any part of the above order, consult with your health officer or Oregon State Public Health Immunization Program at (971) 673-0300.

To download this order visit our website at
http://oregon.gov/dhs/ph/imm/provider/stdgordr.shtml
To request this material in an alternate format (e.g., braille), please call (971) 673-0300.