Measles, Mumps, and Rubella

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Nurse Educator

Pink Book Webinar Series
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MEASLES, MUMPS, AND RUBELLA DISEASES
Measles

- Paramyxovirus
  - Nasopharynx is primary site of infection

- Incubation period is 10-12 days

- Prodrome is 2-4 days
  - 3 C’s – cough, coryza, and conjunctivitis
  - Stepwise increase in fever up to $103^\circ F - 105^\circ F$
  - Koplik spots

- Rash occurs 2-4 days after prodrome, 14 days after exposure, and persists 5-6 days
  - Begins on face and upper neck
  - Maculopapular, becomes confluent
  - Fades in order of appearance
Measles Complications

- Diarrhea 8%
- Otitis media 7%
- Pneumonia 6%
- Encephalitis 0.1%
- Seizures 0.6%-0.7%
- Death 0.2%

Based on 1985-1992 surveillance data
Mumps

- Paramyxovirus
  - Nasopharynx and regional lymph nodes are primary sites of infection then can spread to meninges and glands (salivary, pancreas, testes, ovaries)

- Incubation period is 12-25 days

- Prodrome is nonspecific
  - Myalgia
  - Anorexia
  - Malaise
  - Headache
  - Low-grade fever

- Parotitis in 9%-94%, typically occurs within 16-18 days

- Prevaccine era: 15%-27% of infections were asymptomatic
Mumps Complications

- **Orchitis**: 12%-66% in postpubertal males (prevaccine)
  - 3%-10% (postvaccine)
- **Pancreatitis**: 3.5% (prevaccine)
- **Unilateral deafness**: 1/20,000 (prevaccine)
- **Death**: 2/10,000 from 1966-1971
  - No deaths in recent U.S. outbreaks
Rubella

- Togavirus
- Incubation period is 14 days (range 12-23 days)
- Prodrome
  - Rare in children
  - Low-grade fever in adults
- Maculopapular rash 14-17 days after exposure
- Lymphadenopathy occurs before rash and lasts for several weeks
Rubella Complications

- Arthralgia or arthritis
  - Adult female – up to 70%
  - Children – rare

- Encephalitis
  - 1/6,000 cases

- Hemorrhagic manifestations (e.g., thrombocytopenic purpura)
  - 1/3,000 cases

- Orchitis, neuritis, progressive panencephalitis
  - Rare
  - No deaths in recent U.S. outbreaks
Congenital Rubella Syndrome

- Rubella infection may affect fetal organs
  - Deafness
  - Eye defects
  - Cardiac defects
  - Microcephaly
  - Mental retardation
  - Bone alterations
  - Liver and spleen damage

- May lead to fetal death or preterm delivery

- Severity of damage to fetus depends on gestational age

- Up to 85% of infants affected if infected during first trimester
# Epidemiology

<table>
<thead>
<tr>
<th></th>
<th>Measles</th>
<th>Mumps</th>
<th>Rubella</th>
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<tbody>
<tr>
<td><strong>Reservoir</strong></td>
<td>Human</td>
<td>Human</td>
<td>Human</td>
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<tr>
<td><strong>Transmission</strong></td>
<td>Respiratory Airborne</td>
<td>Airborne Direct contact with droplet or saliva</td>
<td>Respiratory</td>
</tr>
<tr>
<td><strong>Temporal Pattern</strong></td>
<td>Peaks in late winter/spring</td>
<td>Peaks in late winter/spring</td>
<td>Peaks in late winter/spring</td>
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<tr>
<td><strong>Communicability</strong></td>
<td>4 days before to 4 days after rash onset</td>
<td>Several days before and after onset of parotitis</td>
<td>7 days before to 5-7 days after rash onset</td>
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</tbody>
</table>
MEASLES, MUMPS, AND RUBELLA
BURDEN OF DISEASE IN THE UNITED STATES
Measles Cases by Year Since 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Reported Cases</th>
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<tbody>
<tr>
<td>2010</td>
<td>63</td>
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<tr>
<td>2011</td>
<td>220</td>
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<td>2012</td>
<td>55</td>
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<td>2013</td>
<td>187</td>
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<tr>
<td>2014</td>
<td>667</td>
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<tr>
<td>2015</td>
<td>188</td>
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<tr>
<td>2016*</td>
<td>70</td>
</tr>
<tr>
<td>2017**</td>
<td>118</td>
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</tbody>
</table>

- The majority of people who got measles were unvaccinated
- Measles is still common in many parts of the world including some countries in Europe, Asia, the Pacific, and Africa
- Travelers with measles continue to bring the disease into the U.S.

*Preliminary cases as of 12/31/2016
**Preliminary cases as of 08/12/2017

www.cdc.gov/measles/cases-outbreaks.html
Guidance for Health Care Personnel

- Be vigilant about measles
- Ensure patients are up to date on MMR vaccination
- Consider measles in patients with febrile rash illness and clinically compatible measles symptoms (cough, coryza, and conjunctivitis)
- Ask patients about:
  - Recent travel internationally
  - Recent travel to domestic venues frequented by international travelers
  - Recent contact with international travelers
  - History of measles in the community
- Promptly isolate patients with suspected measles

www.cdc.gov/measles/hcp/index.html
Reported Mumps Cases, United States, Vaccine Era, 1968-2016*

Source: National Notifiable Disease Surveillance System (passive surveillance); 2016 data is preliminary and subject to change
*AL, AK, AZ, AR, CA, CO, CT, DC, DE, FL, GA, HI, ID, IL, IN, IA, KS, KY, LA, ME, MD, MA, MI, MN, MS, MO, MT, NE, NM, NV, NH, NJ, NY, NC, ND, OH, OK, OR, PA, RI, SC, TN, TX, UT, VA, VT, WA, and WI

**Preliminary data reported to CDC. Mumps outbreaks are not reportable.

www.cdc.gov/mumps/outbreaks.html
Number of Rubella and Congenital Rubella Syndrome (CRS) Cases by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Rubella</th>
<th>CRS</th>
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<tbody>
<tr>
<td>2010</td>
<td>5</td>
<td>0</td>
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<td>2011</td>
<td>4</td>
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<td>2012</td>
<td>9</td>
<td>3</td>
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<td>2013</td>
<td>9</td>
<td>1</td>
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<td>2014</td>
<td>6</td>
<td>0</td>
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<td>2015</td>
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<td>2016</td>
<td>1</td>
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<td>2017</td>
<td>5</td>
<td>2</td>
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www.cdc.gov/mmwr/volumes/66/wr/mm6630md.htm?s_cid=mm6630md_w
http://apps.who.int/immunization_monitoring/globalsummary/incidences?c=USA
www.cdc.gov/globalhealth/immunization/infographic/stop_rubella.htm
MEASLES, MUMPS, AND RUBELLA
EVIDENCE OF IMMUNITY
## Acceptable Presumptive Evidence of Immunity

<table>
<thead>
<tr>
<th>Routine</th>
<th>Students (College/Post High School)</th>
<th>Health Care Personnel</th>
<th>International Travelers</th>
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<tbody>
<tr>
<td>(1) Documented age-appropriate vaccination with live measles-, mumps-, and rubella virus-containing vaccines, or</td>
<td>(1) Documented doses of live measles and mumps virus-containing vaccines; dose of rubella virus-containing vaccine, or</td>
<td>(1) Documented doses of live measles and mumps virus-containing vaccines; dose of rubella virus-containing vaccine, or</td>
<td>(1) Documented age-appropriate vaccination with live measles-, mumps-, and rubella virus-containing vaccines, or</td>
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<td>(2) Laboratory evidence of immunity, or</td>
<td>(2) Laboratory evidence of immunity, or</td>
<td>(2) Laboratory evidence of immunity, or</td>
<td>(2) Laboratory evidence of immunity, or</td>
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<td>(3) Laboratory confirmation of disease</td>
<td>(3) Laboratory confirmation of disease</td>
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<td>(4) Born before 1957 (except rubella for women of childbearing age who could become pregnant)</td>
<td>(4) Born before 1957 (except rubella for women of childbearing age who could become pregnant)</td>
<td>(4) Born before 1957 (except rubella for women of childbearing age who could become pregnant)</td>
<td>(4) Born before 1957 (except rubella for women of childbearing age who could become pregnant)</td>
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</tbody>
</table>
Serologic screening before vaccination is not necessary unless the health care facility considers it cost-effective.

Postvaccination serologic testing to verify immunity is not recommended:
- Documented age-appropriate vaccination supersedes the results of subsequent serologic testing.
- MMR vaccination for persons with 2 documented doses of measles- or mumps-containing vaccines or 1 dose of rubella-containing vaccine with a negative or equivocal measles is not recommended. These persons should be considered to have presumptive evidence of immunity.
- Exception: Women of childbearing age with 1 or 2 documented doses of rubella-containing vaccine and rubella-specific IgG levels that are not clearly positive should receive 1 additional dose of MMR vaccine (maximum of 3 doses) and do not need retesting.

www.cdc.gov/mmwr/pdf/rr/rr6204.pdf
MEASLES-, MUMPS-, AND RUBELLA-CONTAINING VACCINES
MMR Vaccine

- **Composition**: Live attenuated viruses
- **Efficacy**
  - Measles: 95% at 12 months, 98% at 15 months
  - Mumps: 88% (range 66%-95%) (2 doses)
  - Rubella: 95% or more (1 dose)
- **Duration of immunity**: Lifelong
- **Schedule**: 2 doses given subcutaneously (Subcut)
MMRV Vaccine

- **Composition**: Live attenuated measles, mumps, rubella, and varicella vaccines 7 to 8 times as much vaccine virus as monovalent varicella vaccine
- **Efficacy**: Inferred from that of MMR vaccine and varicella vaccine on the basis of noninferior immunogenicity
- **Duration of immunity**: Lifelong
- **Schedule**: 2 doses given subcutaneously (Subcut)
MEASLES-, MUMPS-, AND RUBELLA-CONTAINING VACCINES
VACCINATION SCHEDULES AND RECOMMENDATIONS FOR USE

www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mmr.html
MMR Recommendations for Children and Adolescents  
(Birth through 18 years)

- First dose at 12-15 months of age
  - Minimum age is 12 months
  - Doses given before 12 months of age are not counted as valid
    • Infants as young as 6 months should receive MMR before international travel*
    • Revaccinate at 12 months of age or older

- Second dose at 4-6 years of age
  - May be administered before age 4 years, provided at least 4 weeks (minimum interval) have elapsed since the first dose. (Ex: international travel)
  - Intended to produce measles and/or mumps immunity in persons who failed to respond to the first dose and may boost antibody titers in some persons who responded to the first dose
  - People who received 2 doses of MMR vaccine as children according to the U.S. vaccination schedule are considered protected for life

MMRV Vaccine

- First dose at 12-47 months of age
  - Minimum age is 12 months
  - Can be given as MMR and VAR separately or MMRV
    • Providers considering MMRV for the first dose should discuss benefits/risks of both options with parents or caregivers
    • Unless parent or caregiver expresses preference for MMRV, CDC recommends MMR and VAR separately
    • If first dose given at 48 months-12 years of age, MMRV is generally preferred

- Second dose at 15 months-12 years of age
  - MMRV generally preferred
  - May be given any time before 13th birthday at least 3 months (minimum interval) after the first dose
  - Not approved for use in persons 13 years of age and older

www.cdc.gov/mmwr/pdf/rr/rr5903.pdf
Figure 1. Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger—United States, 2017.

(For those who fall behind or start late, see the catch-up schedule (Figure 2).)

These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are shaded in gray.

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Birth</th>
<th>1 mo</th>
<th>2 mos</th>
<th>4 mos</th>
<th>6 mos</th>
<th>9 mos</th>
<th>12 mos</th>
<th>15 mos</th>
<th>18 mos</th>
<th>19-23 mos</th>
<th>2-3 yrs</th>
<th>4-6 yrs</th>
<th>7-10 yrs</th>
<th>11-12 yrs</th>
<th>13-15 yrs</th>
<th>16 yrs</th>
<th>17-18 yrs</th>
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</thead>
<tbody>
<tr>
<td>Hepatitis B (HepB)</td>
<td>1st</td>
<td>2nd</td>
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<tr>
<td>Rotavirus (RV) (2-dose series); RV5 (5-dose series)</td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
<td>4th</td>
<td>5th</td>
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<tr>
<td>Diphtheria, tetanus, &amp; acellular pertussis (DTaP)</td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
<td>4th</td>
<td>5th</td>
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<tr>
<td>Haemophilus influenza type b (Hib)</td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
<td>4th or 5th</td>
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<td>Pneumococcal conjugate (PCV13)</td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
<td>4th</td>
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<tr>
<td>Inactivated poliovirus (IPV; &lt;18 yrs)</td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
<td>4th</td>
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<tr>
<td>Influenza (IV)</td>
<td>Annual vaccination (IV) 1 or 2 doses</td>
<td>Annual vaccination (IV) 1 dose only</td>
<td>Annual vaccination (IV) 1 dose only</td>
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<tr>
<td>Measles, mumps, rubella (MMR)</td>
<td>See footnote 8</td>
<td>1st</td>
<td>2nd</td>
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<td>Varicella (VAR)</td>
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<td>1st</td>
<td>2nd</td>
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<tr>
<td>Hepatitis A (HepA)</td>
<td>1st</td>
<td>2nd</td>
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</tbody>
</table>
| Meningococcal (Hib-MenCY 
\(\geq 6\) weeks; MenACWY-D \(\geq 9\) mos; 
MenACWY-CRM \(\geq 2\) mos) | 1st | 2nd |       |        |        |        |        |        |        |           |         |         |          |           |           |        |           |
| Tetanus, diphtheria, & acellular pertussis (TDap; \(\geq 7\) yrs) |       | 1st | 2nd |       |        |        |        |        |        |           |         |         |          |           |           |        |           |
| Human papillomavirus (HPV) | See footnote 12 |       | 1st | 2nd |       |        |        |        |        |           |         |         |          |           |           |        |           |
| Meningococcal B (Meningococcal B (MCV44)) |       | 1st | 2nd |       |        |        |        |        |        |           |         |         |          |           |           |        |           |
| Pneumococcal polysaccharide (PPSV23) |       | 1st | 2nd |       |        |        |        |        |        |           |         |         |          |           |           |        |           |

Range of recommended ages for all children

Range of recommended ages for catch-up immunization

Range of recommended ages for certain high-risk groups

Range of recommended ages for non-high-risk groups that may receive vaccine, subject to individual clinical decision making

No recommendation

NOTE: The above recommendations must be read along with the footnotes of this schedule.
**Figure 3. Vaccines that might be indicated for children and adolescents aged 18 years or younger based on medical indications**

<table>
<thead>
<tr>
<th>VACCINE ▼</th>
<th>INDICATION ▼</th>
<th>Pregnancy</th>
<th>Immunocompromised status (excluding HIV infection)</th>
<th>HIV infection CD4+ count (cells/μl)</th>
<th>Kidney failure, end-stage renal disease, on hemodialysis</th>
<th>Heart disease, chronic lung disease</th>
<th>CSF leaks/cochlear implants</th>
<th>Asplenia and persistent complement component deficiencies</th>
<th>Chronic liver disease</th>
<th>Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis B¹</td>
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<tr>
<td>Rotavirus²</td>
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<tr>
<td>Diphtheria, tetanus, &amp; acellular pertussis³ (DTaP)</td>
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<tr>
<td><em>Haemophilus influenzae</em> type b⁴</td>
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<tr>
<td>Pneumococcal conjugate⁵</td>
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<td>Inactivated poliovirus⁶</td>
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<td>Influenza⁷</td>
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<tr>
<td>Measles, mumps, rubella⁸</td>
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<td>Varicella⁹</td>
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<td>Hepatitis A¹¹</td>
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<td>Meningococcal ACYW¹²</td>
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<tr>
<td>Tetanus, diphtheria, &amp; acellular pertussis¹² (Tdap)</td>
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<td>Human papillomavirus¹³</td>
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<td>Meningococcal B¹¹</td>
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<td>Pneumococcal polysaccharide³</td>
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</tbody>
</table>

*Severe Combined Immunodeficiency

**NOTE:** The above recommendations must be read along with the footnotes of this schedule.
MMR Recommendations Adults (19 Years of Age and Older)

- Adults born in 1957 or later without acceptable evidence of immunity to measles, mumps, or rubella should receive 1 dose of MMR unless they have a medical contraindication to the vaccine, e.g., pregnancy or severe immunodeficiency
  - Pregnant women without evidence of immunity to rubella should receive 1 dose of MMR upon completion or termination of pregnancy and before discharge from the health care facility

- A routine second dose of MMR vaccine at least 28 days after the first dose is recommended for adults who are:
  - College and post-high school students
  - Working in medical facilities
  - International travelers

- Adults born before 1957 are generally presumed immune to measles, mumps, and rubella (except rubella for women of childbearing age who could become pregnant)
MMR Recommendations Adults (19 Years of Age and Older)

- Adults without acceptable evidence of immunity to measles, mumps, or rubella who work in a health care facility should receive 2 doses of MMR
  - Personnel born before 1957 without acceptable evidence of immunity to measles, mumps, or rubella should be considered for vaccination with 2 doses of MMR for measles or mumps, or 1 dose for rubella
MMR Revaccination Indications

- Vaccinated before the first birthday
- Vaccinated with inactivated (killed) measles vaccine (KMV) or measles vaccine of unknown type from 1963 through 1967
- Vaccinated with immune globulin (IG) in addition to a further attenuated strain or vaccine of unknown type (Revaccination not necessary if IG given with Edmonston B vaccine)
- Vaccinated before 1979 with either inactivated mumps vaccine or mumps vaccine of unknown type who are at high risk for mumps infection (e.g., work in a health care facility) should be considered for revaccination with 2 doses of MMR

www.cdc.gov/mmwr/pdf/rr/rr6204.pdf
## Recommended Immunization Schedule for Adults Aged 19 Years or Older by Age Group, United States, 2017

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>19–21 years</th>
<th>22–26 years</th>
<th>27–59 years</th>
<th>60–64 years</th>
<th>≥ 65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza¹</td>
<td></td>
<td></td>
<td></td>
<td>1 dose annually</td>
<td></td>
</tr>
<tr>
<td>Td/Tdap²</td>
<td></td>
<td></td>
<td>Substitute Tdap for Td once, then Td booster every 10 yrs</td>
<td></td>
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</tr>
<tr>
<td>MMR³</td>
<td></td>
<td></td>
<td></td>
<td>1 or 2 doses depending on indication</td>
<td></td>
</tr>
<tr>
<td>VAR⁴</td>
<td></td>
<td></td>
<td></td>
<td>2 doses</td>
<td></td>
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<tr>
<td>HZV⁵</td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
<td></td>
</tr>
<tr>
<td>HPV–Female⁶</td>
<td></td>
<td>3 doses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPV–Male⁶</td>
<td></td>
<td></td>
<td>3 doses</td>
<td></td>
<td></td>
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<tr>
<td>PCV13⁷</td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
<td></td>
</tr>
<tr>
<td>PPSV23⁷</td>
<td></td>
<td></td>
<td>1 or 2 doses depending on indication</td>
<td>1 dose</td>
<td></td>
</tr>
<tr>
<td>HepA⁸</td>
<td></td>
<td></td>
<td>2 or 3 doses depending on vaccine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HepB⁹</td>
<td></td>
<td></td>
<td>3 doses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MenACWY or MPSV4¹⁰</td>
<td></td>
<td></td>
<td>1 or more doses depending on indication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MenB¹⁰</td>
<td></td>
<td></td>
<td>2 or 3 doses depending on vaccine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hib¹¹</td>
<td></td>
<td></td>
<td>1 or 3 doses depending on indication</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection.*

*Recommended for adults with additional medical conditions or other indications.*

*No recommendation.*
<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Pregnancy</th>
<th>Immuno-compromised (excluding HIV infection)</th>
<th>HIV infection (cells/µL)</th>
<th>Asplenia, persistent complement deficiencies</th>
<th>Kidney failure, end-stage renal disease, on hemodialysis</th>
<th>Heart or lung disease, chronic alcoholism</th>
<th>Chronic liver disease</th>
<th>Diabetes</th>
<th>Healthcare personnel</th>
<th>Men who have sex with men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>1 dose annually</td>
<td></td>
<td></td>
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<tr>
<td>Td/Tdap</td>
<td>1 dose Tdap each pregnancy</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>MMR</td>
<td>contraindicated</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>VAR</td>
<td>contraindicated</td>
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<td></td>
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<tr>
<td>HZV</td>
<td>contraindicated</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>HPV–Female</td>
<td>3 doses through age 26 yrs</td>
<td></td>
<td></td>
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<tr>
<td>HPV–Male</td>
<td>3 doses through age 26 yrs</td>
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<td></td>
<td></td>
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<tr>
<td>PCV13</td>
<td>1 dose</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PPSV23</td>
<td>1, 2, or 3 doses depending on indication</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>HepA</td>
<td>2 or 3 doses depending on vaccine</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>HepB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 doses</td>
</tr>
<tr>
<td>MenACWY or MPSV4</td>
<td>1 or more doses depending on indication</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>MenB</td>
<td>2 or 3 doses depending on vaccine</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Hib</td>
<td>3 doses post-HSCT recipients only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
</tr>
</tbody>
</table>

- **Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection**
- **Recommended for adults with additional medical conditions or other indications**
- **Contraindicated**
- **No recommendation**
Measles, Mumps, Rubella Postexposure Prophylaxis

- If given within 72 hours of exposure, MMR vaccine might protect or modify clinical course of measles (preferable to IG for persons ≥12 months if given within 72 hours of exposure)

- If administered within 6 days of exposure, IG can prevent or modify measles in persons who are nonimmune
  - Not indicated for persons who have received 1 dose of measles-containing vaccine at age ≥12 months, unless they are severely immunocompromised

- Postexposure MMR vaccination or IG not shown to prevent or alter the clinical severity of rubella or mumps and is not recommended

www.cdc.gov/mmwr/pdf/rr/rr6204.pdf
MMR and MMRV Contraindications and Precautions

- History of anaphylactic reaction to neomycin
- History of severe allergic reaction to any component of the vaccine
- Pregnancy
  - Ask if pregnant or likely to become so in next 4 weeks*
  - Exclude those who say "yes"
  - For others explain theoretical risks and then vaccinate
- Moderate or severe acute illness
- Recent blood product
- Personal or family (i.e., sibling or parent) history of seizures of any etiology
  - Should be vaccinated with separate MMR and varicella vaccines, not MMRV)

*ACIP off-label recommendation; Vaccine package insert states 3 months
MMR Vaccine Contraindications and Precautions

- Immunosuppression
  - HIV
    - Prevaccination HIV testing not recommended
    - MMR recommended for persons who do not have evidence of current severe immunosuppression
    - Revaccination recommended for persons with perinatal HIV infection who were vaccinated before establishment of effective antiretroviral therapy (ART) with 2 appropriately spaced doses of MMR vaccine once effective ART has been established
    - MMRV not for use in persons with HIV infection
  - Low-dose steroids – vaccinate anytime
  - Leukemia in remission without chemotherapy for 3 months – vaccinate
  - Hematopoietic cell transplant (HCT) recipient who is immunocompetent

www.cdc.gov/mmwr/pdf/rr/rr6204.pdf
Infectious Disease Society of America’s Guidelines: http://cid.oxfordjournals.org/content/58/3/e44.full
Tuberculin Skin Testing (TST)* or Tuberculosis Interferon-gamma Release-Assay (IGRA) and MMR or MMRV Vaccines

- Apply TST or IGRA at same visit as MMR or MMRV

- Delay TST or IGRA at least 4 weeks (28 days) if MMR or MMRV given first

- Apply TST first and administer MMR or MMRV when skin test read (least favored option because receipt of MMR or MMRV is delayed)

*Previously called PPD
MMR Vaccine Adverse Reactions

- Fever: 5%-15% (Measles)
- Rash, pruritis, purpura: 5% (Measles)
- Thrombocytopenia: 1/30,000-40,000 doses (Measles)
- Lymphadenopathy: Rare
- Allergic reactions (rash, pruritis, purpura): Rare
- Parotitis: Rare (Mumps)
- Deafness: Rare (Mumps)
- Encephalopathy: <1/1,000,000 doses (Measles)
MMR Vaccine and Arthropathy

- Acute joint symptoms 25% of susceptible women (Rubella)
- Frank arthritis-like signs and symptoms 10% of susceptible women (Rubella)
- Chronic or persistent symptoms Rare
- Population-based studies have not confirmed association
MMR Vaccine and Autism

From April to the end of May 2017, 65 confirmed cases of measles were reported to the Minnesota Department of Health.

“The committee concludes that the evidence favors rejection of a causal relationship between MMR vaccine and autism.” Institute of Medicine, 2004

www.cdc.gov/mmwr/volumes/66/wr/mm6627a1.htm?s_cid=mm6627a1_w
www.nap.edu/catalog/10997/immunization-safety-review-vaccines-and-autism
MMRV Vaccine Adverse Reactions

- Similar to MMR

- Higher risk for fever and febrile seizures 5-12 days after the first dose among children 12-23 months of age
  - 1 additional febrile seizure occurred 5-12 days after vaccination per 2,300-2,600 children compared to children who received first dose as MMR and varicella vaccine separately

- Fever of 102°F or higher
  - 22% of MMRV recipients
  - 15% with separate injections

- Increased risk of febrile seizures has not been observed following use of MMRV as the second dose in the MMR and varicella series
MMR AND MMRV STORAGE AND HANDLING
MMR Storage and Handling

- Store in the refrigerator between 2°C and 8°C (36°F and 46°F)
  - May also be stored in the freezer
  - Protect vaccine from light by keeping in the original packaging with the top on
- Store diluent at room temperature or refrigerate
- Discard if not used within 8 hours after reconstitution
  - Do not fill syringe with reconstituted vaccine until ready to administer
MMRV Storage and Handling

- Store in the freezer between -50°C and -15°C (-58°F and +5°F)
  - Do NOT use dry ice
  - Protect vaccine from light
  - Vaccine may be stored at refrigerator temperature (2°C and 8°C or between 36°F and 46°F) for up to 72 continuous hours after removal from freezer

- Store diluent at room temperature or refrigerate

- If not used immediately, the reconstituted vaccine may be stored at room temperature, protected from light, for up to 30 minutes
  - Do not freeze reconstituted vaccine

- Discard if not used within 30 minutes after reconstitution

- Do not fill syringe with reconstituted vaccine until ready to administer
VACCINE ADMINISTRATION
MMR and MMRV Administration

**Preparation**
- MMR-containing vaccines must be reconstituted BEFORE administering
- Use ONLY the diluent supplied by the manufacturer

**Route**
- Subcutaneous (subcut) injection
  - Needle gauge: 23 – 25 gauge
  - Needle length: 5/8 inch

**Site**
- Upper outer triceps of the arm or the thigh
MMRV and MMRV Administration Errors

- Wrong diluent used to reconstitute vaccine
- MMRV administered after the age of 12 years
- Always remember – Store vaccine according to the manufacturer’s recommendations and use a new needle and syringe for each patient.
  - In May 2017 in a rural village in South Sudan 15 children died from sepsis and toxicity after a measles vaccination campaign. Thirty-two others became ill with fever, diarrhea and vomiting. This occurred because the vaccine had been left unrefrigerated and one syringe was reused over the course of four days.