Update from the Centers for Disease Control and Prevention (CDC) 
Advisory Committee on Immunization Practices (ACIP)

Measles, Mumps, and Rubella (MMR) Vaccine During a Mumps Outbreak

1. New ACIP recommendation for MMR vaccine during a mumps outbreaks
   a. **New off-label recommendation**: Persons previously vaccinated with 2 doses of a mumps virus–
      containing vaccine identified by public health authorities as part of a group at increased risk for
      acquiring mumps because of an outbreak should receive a third dose of MMR vaccine to improve
      protection against mumps disease and related complications
         i. Measles, mumps, rubella, and varicella (MMRV) vaccine also may be used for the third
            dose in children aged <13 years

2. Public health authorities will define groups at increased risk of mumps during an outbreak
   a. Increased risk for acquiring mumps is determined based on evidence that transmission occurred and
      the likelihood of intense or frequent transmission in settings with groups who have close contact with a
      mumps patient
   b. Public health authorities communicate the groups identified at increased risk and recommendations for
      vaccination to health care providers and affected institutions
   c. Persons in the groups at increased risk for mumps should:
      i. Receive a third dose of MMR if previously vaccinated with 2 doses of mumps-containing
         vaccine
      ii. Receive an additional dose of MMR if they have <2 doses of mumps virus–containing
          vaccine, evidence of presumptive immunity other than documented MMR vaccine, or
          unknown vaccination status
   d. An additional dose is not recommended for people who received ≥3 doses of MMR before the outbreak

3. Mumps vaccine references
      vaccine in persons at increased risk for mumps during an outbreak. MMWR 2018;67:33–8.
   b. CDC guidance for public health authorities on use of a 3rd dose of MMR vaccine during mumps
      outbreaks. Available at: [https://www.cdc.gov/mumps/health-departments/MMR3.html](https://www.cdc.gov/mumps/health-departments/MMR3.html)
   c. McLean HQ, et al. Prevention of measles, rubella, congenital rubella syndrome, and mumps,
Hepatitis A Vaccines

1. Hepatitis A vaccine recommendations for pre-exposure prophylaxis
   a. All children at age 12–23 months
   b. Persons at increased risk of exposure or severe disease (i.e., injection and non-injection drug users, men who have sex with men, persons with chronic liver disease, persons with clotting factor disorders, persons who anticipate close personal contact with an international adoptee, international travelers, persons who work with nonhuman primates).
   c. In October 2018, ACIP approved the recommendation for use of hepatitis A vaccine in persons experiencing homelessness.

2. New ACIP recommendations for hepatitis A vaccine for infants traveling outside the U.S.
   a. Off-label recommendation: One dose of hepatitis A vaccine should be administered to infants age 6–11 months traveling outside the United States.
   b. Infants should then start the full 2 dose series of hepatitis A vaccine at ≥12 months of age.

3. New ACIP recommendations for hepatitis A post-exposure prophylaxis (PEP)
   a. Hepatitis A vaccine should be administered for PEP for all persons aged ≥12 months.
   b. In addition to hepatitis A vaccine, immunoglobulin may be administered to persons aged >40 years depending on the provider’s risk assessment (e.g., patient age, immune status and underlying medical conditions, risk of transmission, and IG availability).

4. Hepatitis A vaccine and immune globulin (Ig) for international travel and PEP

<table>
<thead>
<tr>
<th>Age/condition</th>
<th>International travel</th>
<th>Postexposure prophylaxis (PEP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaccine contraindication</td>
<td>Ig</td>
<td>Ig</td>
</tr>
<tr>
<td>&lt;6 mos</td>
<td>Ig</td>
<td>Ig</td>
</tr>
<tr>
<td>6–11 mos</td>
<td>Vaccine*</td>
<td>Ig</td>
</tr>
<tr>
<td>12 mos–40 yrs</td>
<td>Vaccine</td>
<td>Vaccine</td>
</tr>
<tr>
<td>&gt;40 yrs</td>
<td>Vaccine (and Ig)†</td>
<td>Vaccine (and Ig)†</td>
</tr>
<tr>
<td>Immunocompromised or chronic liver disease</td>
<td>Vaccine (and Ig)†</td>
<td>Vaccine and Ig</td>
</tr>
</tbody>
</table>

*Off-label use; this dose should not be counted toward the routine 2-dose series, which should be initiated at age 12 months.
†Based on provider risk assessment and availability of vaccine or Ig.

5. Hepatitis A vaccine references
Hepatitis B Vaccines

1. **New ACIP recommendations for hepatitis B vaccine for infants**
   a. Hepatitis B vaccination within 24 hours of birth for all medically stable infants ≥2,000 gms
   b. Removed permissive language for delaying the birth dose until after hospital discharge
   c. Postvaccination serologic testing for infants whose mother’s HBsAg status will remain unknown
   d. Option of single-dose revaccination and retesting for infants born to HBsAg-positive or HBsAg-unknown women and who did not respond to the initial vaccine series

2. **Post vaccination testing for infants born to HBsAg-positive or HBsAg-unknown mothers**
   a. Perform testing at age 9–12 months after completion of vaccination
   b. If anti-HBs ≥10 mIU/mL, the infant is protected
   c. **New recommendation**: If anti-HBs <10 mIU/mL, revaccinate with 1 dose and retest in 1–2 mos
      i. If anti-HBs remains <10 mIU/mL following 1st extra dose, give 2 additional doses and retest 1–2 months after the final dose
   d. Infants with anti-HBs <10 mIU/mL also may be revaccinated with 3 doses and retested 1–2 months after the final dose
   e. No additional vaccine recommended for infants with anti-HBs <10 mIU/mL following two complete series of hepatitis B vaccine
   f. HBsAg-positive infants should be referred for follow-up care

3. **Hepatitis B vaccine and immune globulin products available in the United States**

<table>
<thead>
<tr>
<th>Product</th>
<th>Manufacturer</th>
<th>Antigen/antibody</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recombivax HB</td>
<td>Merck</td>
<td>HBsAg</td>
<td>Birth and up</td>
</tr>
<tr>
<td>Engerix-B</td>
<td>GSK</td>
<td>HBsAg</td>
<td>Birth and up</td>
</tr>
<tr>
<td>Pediarix</td>
<td>GSK</td>
<td>HBsAg, DTaP, IPV</td>
<td>6 wks–6 yrs</td>
</tr>
<tr>
<td>Twinrix</td>
<td>GSK</td>
<td>HBsAg, HAV</td>
<td>≥18 yrs</td>
</tr>
<tr>
<td>Heplisav-B</td>
<td>Dynavax</td>
<td>HBsAg</td>
<td>≥18 yrs</td>
</tr>
<tr>
<td>HepaGam B</td>
<td>Cangene</td>
<td>Anti-HBsAg</td>
<td>Birth and up</td>
</tr>
<tr>
<td>Nabi-HB</td>
<td>Biotest</td>
<td>Anti-HBsAg</td>
<td>Birth and up</td>
</tr>
</tbody>
</table>

*Source: Schillie S. MMWR Recomm Rep 2018; Schillie S. MMWR 2018.*

**Abbreviations:** HBsAg = hepatitis B surface antigen; DTaP = diphtheria and tetanus toxoids and acellular pertussis vaccine; IPV = inactivated poliovirus vaccine; HAV = inactivated hepatitis A virus vaccine.
4. Hepatitis B vaccine schedules for infants

<table>
<thead>
<tr>
<th>Birthweight</th>
<th>Maternal HBsAg</th>
<th>First dose</th>
<th>Subsequent doses*</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥2,000 gms</td>
<td>Positive</td>
<td>Birth (≤12 hrs) with HBIG</td>
<td>1–2 mos, 6 mos</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>Birth (≤12 hrs)</td>
<td>1–2 mos, 6 mos</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>Birth (≤24 hrs)</td>
<td>1–2 mos, 6–18 mos</td>
</tr>
<tr>
<td>&lt;2,000 gms</td>
<td>Positive</td>
<td>Birth (≤12 hrs) with HBIG</td>
<td>1 mo, 2–3 mos, 6 mos</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>Birth (≤12 hrs) with HBIG</td>
<td>1 mo, 2–3 mos, 6 mos</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>Discharge or age 1 month</td>
<td>2 mos, 6–18 mos</td>
</tr>
</tbody>
</table>

*Administer additional dose if use Pediarix after the birth dose

5. Other new ACIP recommendations for hepatitis B vaccine
   a. Test HBsAg-positive pregnant women for hepatitis B virus DNA
      i. American Association for the Study of Liver Diseases (AASLD) recommends maternal antiviral therapy if hepatitis B viral DNA >200,000 IU/mL to prevent perinatal transmission
   b. Routine hepatitis B vaccination for persons with chronic liver disease (e.g., cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, and ALT or AST >2 times normal, hepatitis C virus infection)
   c. Heplisav-B may be used in adults aged ≥18 years recommended for hepatitis B vaccination

6. Hepatitis B vaccine references
# Diphtheria, Tetanus, and Pertussis Vaccines

1. **ACIP recommendations for prevention and control of diphtheria, tetanus, and pertussis**
   
   a. In April 2018, ACIP published a compilation of all previous recommendations for diphtheria, tetanus, and pertussis vaccines.
   
   b. Publication contains no new recommendations and replaces all previous reports.

2. **ACIP recommendations for diphtheria, tetanus, and pertussis vaccines**

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Age/Indication</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTaP</td>
<td>2 mos–6 yrs</td>
<td>Primary series at 2, 4, and 6 mos</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Booster doses at 15–18 mos and 4–6 yrs</td>
</tr>
<tr>
<td>Tdap</td>
<td>7–10 yrs</td>
<td>Not routinely recommended</td>
</tr>
<tr>
<td></td>
<td>11–12 yrs</td>
<td>One dose</td>
</tr>
<tr>
<td></td>
<td>≥13 yrs</td>
<td>One dose if no previous Tdap</td>
</tr>
<tr>
<td>Pregnant woman*</td>
<td></td>
<td>One dose each pregnancy at 27–36 wks gestation</td>
</tr>
<tr>
<td>Td</td>
<td>Adults</td>
<td>One dose every 10 years</td>
</tr>
</tbody>
</table>

*Source: Liang JL. MMWR Recomm Rep 2018.*

**Abbreviations:** DTaP = diphtheria and tetanus toxoids and acellular pertussis vaccine; Tdap = tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine; Td = tetanus and diphtheria toxoids vaccine.

*Off-label use

3. **Diphtheria, tetanus, and pertussis vaccines approved for use in children aged <7 years**

<table>
<thead>
<tr>
<th>Type</th>
<th>Trade name</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTaP</td>
<td>Infanrix</td>
<td>GSK</td>
</tr>
<tr>
<td>DTaP</td>
<td>Daptacel</td>
<td>Sanofi</td>
</tr>
<tr>
<td>DTaP-IPV</td>
<td>Kinrix</td>
<td>GSK</td>
</tr>
<tr>
<td>DTaP-IPV</td>
<td>Quadracel</td>
<td>Sanofi</td>
</tr>
<tr>
<td>DTaP-IPV-HepB*</td>
<td>Pediarix</td>
<td>GSK</td>
</tr>
<tr>
<td>DTaP-IPV-Hib†</td>
<td>Pentacel</td>
<td>Sanofi</td>
</tr>
<tr>
<td>DT</td>
<td>No trade name</td>
<td>Sanofi</td>
</tr>
</tbody>
</table>

*Source: Liang JL. MMWR Recomm Rep 2018.*

* Approved through age 6 years
† Approved through age 4 years.
4. Diphtheria, tetanus, and pertussis vaccines approved for use in persons aged ≥7 years

<table>
<thead>
<tr>
<th>Type</th>
<th>Trade name</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tdap*</td>
<td>Boostrix</td>
<td>GSK</td>
</tr>
<tr>
<td>Tdap*</td>
<td>Adacel</td>
<td>Sanofi</td>
</tr>
<tr>
<td>Td</td>
<td>No trade name</td>
<td>MassBiologics</td>
</tr>
<tr>
<td>Td</td>
<td>Tenivac</td>
<td>Sanofi</td>
</tr>
</tbody>
</table>

* Approved for persons ages ≥10 years

5. Tetanus prophylaxis for routine wound management

<table>
<thead>
<tr>
<th>Previous doses tetanus containing vaccines</th>
<th>Clean and minor wound</th>
<th>All other wounds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DTaP, Tdap, or Td*</td>
<td>TIG</td>
</tr>
<tr>
<td>&lt;3</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>≥3</td>
<td>No§</td>
<td>No</td>
</tr>
</tbody>
</table>

Abbreviations: DTaP = diphtheria and tetanus toxoids and acellular pertussis vaccine; Tdap = tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine; Td = tetanus and diphtheria toxoids vaccine; TIG = tetanus immune globulin.
* DTaP is recommended for children aged <7 years. Tdap is preferred to Td for persons aged ≥11 years who have not previously received Tdap. Persons aged ≥7 years who are not fully immunized against pertussis, tetanus or diphtheria should receive one dose of Tdap for wound management and as part of the catch-up series.
† All persons with HIV or immunodeficiency receive TIG regardless of previous tetanus doses.
§ Yes, if >10 years since last tetanus vaccination.
¶ Yes, if >5 years since last tetanus vaccine.

6. Diphtheria, tetanus, and pertussis vaccine references
Herpes Zoster Vaccines

1. Newly licensed herpes zoster vaccine
   a. Recombinant Zoster Vaccine (RZV) [Shingrix, GSK]
      i. Recombinant glycoprotein E with a novel adjuvant (AS01B)
      ii. Two 0.5 mL doses administered intramuscularly at 2–6 mos apart
      iii. In October 2017, FDA licensed for use in adults aged ≥50 years
   b. Zoster Vaccine Live (ZVL) [Zostavax, Merck]
      i. Live attenuated varicella zoster virus
      ii. One 0.65 mL dose administered subcutaneously
      iii. In 2006, licensed for use in adults aged ≥60 yrs; in 2011, licensed for adults aged ≥50 years
      iv. ACIP recommends for use in immunocompetent adults aged ≥60 yrs

2. Herpes zoster vaccine efficacy at approximately 3 years post vaccination

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Age group</th>
<th>Herpes zoster</th>
<th>Postherpetic neuralgia</th>
</tr>
</thead>
<tbody>
<tr>
<td>RZV</td>
<td>50–59 yrs</td>
<td>97% (90–99%)</td>
<td>91% (76–98%)*</td>
</tr>
<tr>
<td></td>
<td>60–69 yrs</td>
<td>97% (90–100%)</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>≥70 yrs</td>
<td>91% (87–95%)</td>
<td>89% (69–97%)</td>
</tr>
<tr>
<td>ZVL</td>
<td>50–59 yrs</td>
<td>70% (54–81%)</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>60–69 yrs</td>
<td>64% (56–71%)</td>
<td>66% (20–87%)</td>
</tr>
<tr>
<td></td>
<td>≥70 yrs</td>
<td>38% (25–48%)</td>
<td>67% (43–81%)</td>
</tr>
</tbody>
</table>

Source: Dooling KL. MMWR 2018.
* Estimated efficacy for adults aged ≥50 years

Abbreviations: RZV = Recombinant Zoster Vaccine (Shingrix); ZVL = Zoster Vaccine Live (Zostavax)

3. New ACIP recommendations for herpes zoster vaccines
   a. Recombinant zoster vaccine (RZV) is recommended for prevention of herpes zoster and related complications for immunocompetent adults aged ≥50 years
   b. RZV is recommended for the prevention of herpes zoster and related complications for immunocompetent adults who previously received zoster vaccine live (ZVL)
   c. RZV is preferred over ZVL for the prevention of herpes zoster and related complications

4. Herpes zoster vaccine references
ACIP recommended immunization schedules for 2019

Influenza Vaccine References and Resources

Additional ACIP References and Resources
1. CDC ACIP website: https://www.cdc.gov/vaccines/acip/index.html
2. FDA vaccines website: www.fda.gov/BiologicsBloodVaccines/Vaccines/default.htm
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