I have no financial conflicts of interest to disclose.
I will discuss the following off-label recommendations:

- Tdap for pregnant women
- HepA vaccine for infants 6-11 months
- MMR vaccine for infants 6-11 months (possibly)

These are published ACIP recommendations.
Describe recent changes to the pediatric, adolescent and adult immunization schedules.

Provide information about ongoing and relevant vaccine-preventable outbreaks.

Discuss current issues and challenges related to vaccination
Staying up-to-date

▪ Subscribe to Got Your Shots e-news: www.health.state.mn.us/vaccines
▪ Subscribe to IAC Express: www.immunize.org/express
▪ Obtain the most recent immunization schedules
  ▪ Web – MDH or CDC
  ▪ Subscribe to MMWR: www.cdc.gov/mmwr
  ▪ There’s an app for that: “CDC vaccine schedule”
# 2019 Immunization Schedules

## Recommended Child and Adolescent Immunization Schedule

### For ages 18 years or younger

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Dose</th>
<th>Age Range</th>
<th>Administered at</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes

**Recommended Adult Immunization Schedule**

**United States**

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Dose</th>
<th>Age Range</th>
<th>Administered at</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Special Situations

**Allergic Reactions to Eggs**

- **Egg allergy**
- **Egg allergy**
- **Egg allergy**

**Immunocompromised Patients**

- **Immunocompromised patients**
- **Immunocompromised patients**
- **Immunocompromised patients**

**Immunocompromised Patients with HIV/AIDS**

- **Immunocompromised patients with HIV/AIDS**
- **Immunocompromised patients with HIV/AIDS**
- **Immunocompromised patients with HIV/AIDS**

**Immunocompromised Patients with Cancer**

- **Immunocompromised patients with Cancer**
- **Immunocompromised patients with Cancer**
- **Immunocompromised patients with Cancer**

**Immunocompromised Patients with Autoimmune Diseases**

- **Immunocompromised patients with Autoimmune Diseases**
- **Immunocompromised patients with Autoimmune Diseases**
- **Immunocompromised patients with Autoimmune Diseases**

**Immunocompromised Patients with Transplant Recipients**

- **Immunocompromised patients with Transplant Recipients**
- **Immunocompromised patients with Transplant Recipients**
- **Immunocompromised patients with Transplant Recipients**

**Immunocompromised Patients with Multi-Morbidity**

- **Immunocompromised patients with Multi-Morbidity**
- **Immunocompromised patients with Multi-Morbidity**
- **Immunocompromised patients with Multi-Morbidity**

**Immunocompromised Patients with Chronic Diseases**

- **Immunocompromised patients with Chronic Diseases**
- **Immunocompromised patients with Chronic Diseases**
- **Immunocompromised patients with Chronic Diseases**

**Immunocompromised Patients with Immunosuppressive Therapy**

- **Immunocompromised patients with Immunosuppressive Therapy**
- **Immunocompromised patients with Immunosuppressive Therapy**
- **Immunocompromised patients with Immunosuppressive Therapy**

**Immunocompromised Patients with Chronic Medical Conditions**

- **Immunocompromised patients with Chronic Medical Conditions**
- **Immunocompromised patients with Chronic Medical Conditions**
- **Immunocompromised patients with Chronic Medical Conditions**

**Immunocompromised Patients with Medications**

- **Immunocompromised patients with Medications**
- **Immunocompromised patients with Medications**
- **Immunocompromised patients with Medications**

**Immunocompromised Patients with Other Conditions**

- **Immunocompromised patients with Other Conditions**
- **Immunocompromised patients with Other Conditions**
- **Immunocompromised patients with Other Conditions**

**Immunocompromised Patients with Special Needs**

- **Immunocompromised patients with Special Needs**
- **Immunocompromised patients with Special Needs**
- **Immunocompromised patients with Special Needs**

**Immunocompromised Patients with Immunodeficiency Syndromes**

- **Immunocompromised patients with Immunodeficiency Syndromes**
- **Immunocompromised patients with Immunodeficiency Syndromes**
- **Immunocompromised patients with Immunodeficiency Syndromes**

**Immunocompromised Patients with Immunodeficiency Diseases**

- **Immunocompromised patients with Immunodeficiency Diseases**
- **Immunocompromised patients with Immunodeficiency Diseases**
- **Immunocompromised patients with Immunodeficiency Diseases**

**Immunocompromised Patients with Immunodeficiency Disorders**

- **Immunocompromised patients with Immunodeficiency Disorders**
- **Immunocompromised patients with Immunodeficiency Disorders**
- **Immunocompromised patients with Immunodeficiency Disorders**

**Immunocompromised Patients with Immunodeficiency Syndromes and Disorders**

- **Immunocompromised patients with Immunodeficiency Syndromes and Disorders**
- **Immunocompromised patients with Immunodeficiency Syndromes and Disorders**
- **Immunocompromised patients with Immunodeficiency Syndromes and Disorders**

**Immunocompromised Patients with Immunodeficiency Diseases and Disorders**

- **Immunocompromised patients with Immunodeficiency Diseases and Disorders**
- **Immunocompromised patients with Immunodeficiency Diseases and Disorders**
- **Immunocompromised patients with Immunodeficiency Diseases and Disorders**

**Immunocompromised Patients with Immunodeficiency Syndromes, Disorders, and Diseases**

- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases**

**Immunocompromised Patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions**

- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions**

**Immunocompromised Patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions**

- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions**

**Immunocompromised Patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions**

- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions**

**Immunocompromised Patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions**

- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions**

**Immunocompromised Patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions**

- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions**

**Immunocompromised Patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions**

- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions**

**Immunocompromised Patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions**

- **Immunocompromised patients with Immunodeficiency Syndromes, Disorders, and Diseases and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions and Other Conditions**
- **Immunocompromised patients with Immunodeficiency Syndromes, Disord
A missed opportunity to prevent cancer!

HPV Vaccine
Missing the Opportunity to Prevent Cancer

Minnesota vaccination coverage among adolescents age 13 through 17 years, Minnesota Immunization Information Connection (MIIC) data, July 2018

*HPV Series Completion: 3 or more doses of HPV vaccine, or 2 or more doses of HPV vaccine when the first dose was initiated prior to age 15 years and there were at least five months minus 4 days between the first and second doses.
Overall HPV Cancers Are Increasing in Minnesota

Oropharyngeal cancer rates in males doubled between 1988 – 2015

Cervical cancer rates decreased 39% from 1988 – 2015
Many Cancers Could Be Prevented by HPV Vaccination

### Minnesota HPV cancer cases per year by cancer site and HPV type,
**Minnesota Cancer Reporting System (MCRS), 2011 – 2015**

<table>
<thead>
<tr>
<th>Cancer site</th>
<th>Average number of cancers where HPV is often found (HPV-associated cancers)</th>
<th>Number (%) of cancers probably caused by HPV types that can be prevented by HPV vaccine*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>643</td>
<td>470 (73%)</td>
</tr>
<tr>
<td>Cancer site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oropharynx</td>
<td>283</td>
<td>187 (66%)</td>
</tr>
<tr>
<td>Cervix</td>
<td>148</td>
<td>120 (81%)</td>
</tr>
<tr>
<td>Anus</td>
<td>86</td>
<td>75 (87%)</td>
</tr>
<tr>
<td>Vulva</td>
<td>77</td>
<td>49 (63%)</td>
</tr>
<tr>
<td>Penis</td>
<td>29</td>
<td>16 (57%)</td>
</tr>
<tr>
<td>Vagina</td>
<td>12</td>
<td>9 (73%)</td>
</tr>
<tr>
<td>Rectum</td>
<td>8</td>
<td>7 (87%)</td>
</tr>
</tbody>
</table>

*HPV types 16/18/31/33/45/52/58 are covered in the 9-valent HPV vaccine.
HPV VACCINE: Long-Lasting Cancer Protection

Vaccination prevents over 90% of cancers caused by HPV

HPV stands for human papillomavirus

It can be passed with no signs or symptoms.

HPV is so common that nearly everyone gets it at some point.

It dramatically increases the risk of serious cancer, in both men and women.

In Minnesota

The HPV vaccination rate is just 39%

44% of girls completed their HPV vaccination series in 2018.

36% of boys completed their HPV vaccination series in 2018.

Most Common Cancers Caused by HPV

- Cervical cancer occurred in 148 women per year.
- Throat cancer occurred in 283 people per year.
FDA approved Gardasil 9 for persons 27-45 years of age
  - This is not an ACIP recommendation!

ACIP is considering:
  - Cost effectiveness data
  - Individual-based recommendation (Category B)
  - Harmonizing catch-up ages
  - Possible vote in June
Tetanus, diphtheria, pertussis
Administer 1 dose of Tdap **during each** pregnancy, preferably in the early part of gestational weeks 27-36.

- Infants are at the highest risk for hospitalization and death from pertussis
- Routine vaccination begins at 2 mos, but the infant is not protected until dose 3, which is scheduled at 6 months
- Maternal antibodies against pertussis are transferred to the infant
- Recommendation made in 2012, but MN coverage hovers around 50%
Diphtheria, Tetanus, Pertussis Vaccination Recommendations from ACIP

- Published April 27, 2018
- Compiled multiple recommendations
- Clarified adolescent vaccination
  - Give Tdap at 11-12 years regardless of previous receipt of Tdap

https://www.cdc.gov/mmwr/volumes/67/rr/pdfs/rr6702a1-H.pdf
Updated precautions to pertussis-containing vaccines

- The following are no longer precautions:
  - Collapse or shock-like state after receiving DTP/DTaP
  - Seizure ≤3 days after receiving DTP/DTaP
  - Persistent, inconsolable crying lasting ≥3 hours within 48 hours after DTP/DTaP

- Reflect VEARS data on acellular vaccines

- Remaining Precautions:
  - Progressive or unstable neurologic disorder; defer DTaP until neurologic status clarified and stabilized
  - Guillain-Barré syndrome <6 weeks after previous dose of tetanus toxoid–containing vaccine
  - History of Arthus-type hypersensitivity reactions after a previous dose of tetanus or diphtheria toxoid–containing vaccines; defer vaccination until at least 10 years have elapsed since the last tetanus toxoid–containing vaccine
  - Moderate or severe acute illness with or without fever
Sanofi’s Adacel Tdap vaccine was recently licensed for a repeat dose.

Current ACIP Recommendations for Tdap in adolescents and adults in the United States remain the same:

- Single dose of Tdap at 11-12 years
- Booster dose of Td every 10 years
- Single Tdap can replace decennial Td booster dose
- Tdap during every pregnancy (off-label recommendation)
Previous Work Group and ACIP discussions (2013-2014):  
- Increase in pertussis expected to continue  
- First Tdap vaccination has high initial VE, but substantial waning of protection within 2-4 years  
- Second Tdap is safe and immunogenic  
- Reduction of disease burden would likely be limited with second Tdap (evaluated at 16 and 21 years of age)  
- Given cost of Tdap compared with Td, specific revaccination strategies were not likely to be cost-effective  
- Conclusion: Data did not support recommendation for second Tdap
Future Questions for ACIP

- Should the current recommendation that non-pregnant adults receive a single lifetime dose of Tdap and Td boosters every 10 years be changed to allow any Td-containing vaccine (Tdap or Td) to be used for the decennial Td booster in adults?

- Should any Td-containing vaccine (Tdap or Td) be allowed for use for tetanus prophylaxis in the setting of wound management?
Herpes Zoster (HZ)
Shingrix Basics

- Inactivated, adjuvanted recombinant zoster vaccine recommended for immunocompetent adults 50 years and older
  - Shingrix is given as a 2-dose series, 2 to 6 months apart (0, 2-6 months).
  - Shingrix is preferentially recommended over Zostavax for its higher efficacy and longer duration of protection.
  - People who previously received Zostavax are recommended to get Shingrix.
Increased demand, decreased supply

- Shingrix is popular
  - Many more people are recommended to receive it, and two doses are required for protection
- Allocations continue in 2019
- Prioritize completing 2-dose series
- Have system in place to recall patients for second dose 2-6 months following 1st dose
Hepatitis Vaccination

HBV, picture source: http://cellulenumeriealtro.blogspot.com/2015/10/storia-del-vaccino-contro-lepatite-b.html

HAV, picture source: omicsonline.org
National Outbreaks of Hepatitis A

- 18 states involved in the national outbreaks
  - Over 15,900 cases
  - Over 8,800 hospitalizations
  - 157 deaths
  - Only two states have declared their outbreak over – California & Utah

- Risk factors similar between states
- Unusual risk groups for hepatitis A
- Extremely complicated to address
• The following groups are at highest risk for acquiring hepatitis A or having serious complications from illness with hepatitis A. These are priority groups for vaccination for outbreak prevention:
  • People who use drugs (injection or non-injection)
  • People experiencing unstable housing or homelessness
  • Men who have sex with men (MSM)
  • People who are, or were recently, incarcerated
  • People with chronic liver disease, including cirrhosis, hepatitis B, or hepatitis C

• One dose of single-antigen hepatitis A vaccine provides up to 95% seroprotection in healthy individuals for up to 11 years.
October 2018, ACIP: voted to recommend homelessness as a risk indication for hepatitis A vaccination

Routine Vaccination:
- Children 12-23 months
- Increased risk for HepA: Chronic liver disease, clotting factor disorders, MSM, recreational drug use, travel to endemic areas, occupational
- Anyone who wants protection against Hep A
Hep A Vaccination for Infants Traveling Internationally

- Hep A vaccine should be administered to infants aged 6-11 months when protection is recommended
  - Previously IG was recommended
  - MMR vaccine recommended for all infants 6-11 months traveling internationally
    - IG and MMR cannot be administered at the same time
- The travel-related dose for infants aged 6-11 months should not be counted toward the routine 2 dose series
Post-exposure prophylaxis (within 2 weeks of exposure) among unvaccinated persons
- Hepatitis A to immunocompetent persons 1 year and older
- Persons 40 years and older may receive immune globulin (IG) based on clinician’s risk assessment
- Immunocompromised persons and those with chronic liver disease should receive both hepatitis A and IG
New product: Heplisav-B

- Option for persons 18 years and older
- Higher serologic response among persons 40-70 years, Type II diabetes and chronic kidney disease compared to Engerix-B

- Give IM
- 2-dose series: 0, 1 month
- May be interchanged with other hepB products, see guidance

- Safety: mild and severe adverse effects similar
  - Cardiac events not statistically different
  - Data continues to accumulate
Influenza
Influenza Vaccine 2019-2020

- A/Brisbane/02/2018 (H1N1)pdm09-like virus (updated)
- A/Kansas/14/2017 (H3N2)-like virus (updated)
- B/Colorado/06/2017-like (Victoria lineage) virus
- Quadrivalent: B/Phuket/3073/2013-like (Yamagata lineage) virus

- FluZone 0.5 ml now approved down to 6 months
  - Joins FluLaval and Fluarix
- AAP no longer expresses a preference for IIV
- More to come in June
Measles is still common in many parts of the world. [Watch Video](https://youtu.be/mv9LILA8s5M)
Update on National Outbreaks

- As of April 19: 626 cases in 22 states
  - Linked to mostly unvaccinated travelers who brought measles back from other countries
  - Spread occurs in communities that have pockets of unvaccinated people
Action Steps

- Keep vaccinating
  - Routine and Catch-up
- Re-examine “in-progress” children
  - Vaccinate or provide legal exemption forms
  - Inform parents of exclusion measures taken during an outbreak
- Educate on the severity of measles
  - Over 20 children were hospitalized during the 2017 outbreak
Thank you.

Jennifer Heath
jennifer.heath@state.mn.us
651-201-5591