Grown-Up Shots: Selected Stories and Anecdotes About Vaccines for Adults

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Conflict(s) of interest?

- *(History of Vaccines* has received funding from several sources since its inception:
  - Bill & Melinda Gates Foundation
  - GlaxoSmithKline
  - Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc.
  - Pfizer Inc.
  - The Independence Foundation
  - Sanofi Pasteur
  - Read more at: [https://historyofvaccines.org/overview](https://historyofvaccines.org/overview)
- I do not have any personal investments in any pharmaceutical company
- Views and opinions may not necessarily reflect those of my employers, family, friends, academic affiliations, etc. (You know the deal.)
Vaccines for Children

What about adults?

![Photo by Humphrey Muleba on Unsplash]

Table 2: Recommended Adult Immunization Schedule by Medical Condition or Other Indication, United States, 2022

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Pregnancy</th>
<th>Immunocompromised (including HIV infection/AIDS)</th>
<th>HIV infection/AIDS</th>
<th>Hemophilia A or B</th>
<th>End-stage renal disease</th>
<th>Heart or lung disease</th>
<th>Chronic liver disease</th>
<th>Diabetes</th>
<th>Health care personnel</th>
<th>Men who have sex with men</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRNA or RSV4</td>
<td>Contraindicated</td>
<td>1 dose annually</td>
<td>Precuation</td>
<td></td>
<td></td>
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<tr>
<td>LAIV4</td>
<td></td>
<td></td>
<td>1 dose annually</td>
<td></td>
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<tr>
<td>RotaV</td>
<td>1 dose at age 15 years</td>
<td>1 dose Tdap, then Td or Tdap-booster every 10 years</td>
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<tr>
<td>MMR</td>
<td>Contraindicated</td>
<td>Contraindicated</td>
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<tr>
<td>VPR</td>
<td>Contraindicated</td>
<td>Contraindicated</td>
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<tr>
<td>RZV</td>
<td>2 doses at age &lt;19 years</td>
<td>2 doses at age ≥50 years</td>
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<tr>
<td>HPV</td>
<td>Not Recommended</td>
<td>3 doses through age 20 years</td>
<td>2 or 3 doses through age 26 years depending on age at initial vaccination or condition</td>
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<tr>
<td>Pneumococal PCV13, PCV20, PPV23</td>
<td>1 dose PCV15 followed by PCV23 or 1 dose PCV20 (see notes)</td>
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<tr>
<td>HepA</td>
<td></td>
<td></td>
<td>1 dose</td>
<td></td>
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<tr>
<td>HepB</td>
<td></td>
<td></td>
<td>2 or 3 doses depending on vaccine or condition</td>
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<tr>
<td>MenACWY</td>
<td></td>
<td></td>
<td>1 or 2 doses depending on indication, see notes for booster recommendations</td>
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</tr>
<tr>
<td>MCV4</td>
<td></td>
<td></td>
<td>2 or 3 doses depending on vaccine and indication, see notes for booster recommendations</td>
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<td></td>
</tr>
<tr>
<td>Hib</td>
<td></td>
<td></td>
<td>1 dose</td>
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</tr>
</tbody>
</table>

1. Prerequisite: Adult who meets age requirement, lack of documentation of vaccination or risk of infection.
2. Recommended vaccination for adults or risk of additional risk of disease or another indication.
3. Recommended vaccination based on shared clinical decision-making.
4. Prerequisite—vaccination might be indicated if benefit of protection outweighs risk of adverse reactions.
5. Contraindicated or not recommended—vaccine should not be administered.

*Note: This table is a representation of the recommended adult immunization schedule by medical condition or other indication as of 2022.*
Epidemiological Transitions: Measles/Rubella/Chickenpox

- You have a very young population (fat-bottomed population pyramid)
- You set a cut-off age for mass vaccine campaign instead of vaccinating everyone
- Everyone within the cut-off gets vaccinated and incidence of disease in that age cohort and subsequent cohorts is low
- But those above the cut-off remain at risk
- Result: Susceptible age distribution shifts upward
- Rubella: Shift into childbearing age means increased CRS risk
- This is happening now in developing nations
- China’s experience with measles

Shingles at a younger age?

- Before chickenpox vaccine, most of us got it
  - “Right of passage” that meant most got through it okay
  - Plenty of complications and deaths
- After chickenpox vaccine, levels in the community dropped
- Those who had disease have latent virus
  - If virus is activated, immune system fights it off
  - Immune system “boosted” through community exposure
- What if immune system has not “seen” varicella virus in a while?
  - Or if immune system is compromised?
- Shingles
  - Shifting to younger age groups because of less community boosting?
  - Because of more virus activation through stressors?
  - Something else?
Chain of infection: The Japan Experience

- 1962 to 1987: Most children were vaccinated against influenza (50-85%)
- 1988 to 1994: Requirement relaxed and then repealed
- 1994 onwards: Increased morbidity and mortality in... The grandparents!
- “The vaccination of Japanese children prevented about 37,000 to 49,000 deaths per year, or about 1 death for every 420 children vaccinated.”

https://bit.ly/3kKGw1Z

Cholera
Waldemar Haffkine Goes to India

Late 1800s

Image via the Wellcome Collection gallery (2018-06-06): https://wellcomecollection.org/works/zncvsfym CC BY
HPV: A Natural Experiment

- Early 80s: Link between HPV and cervical cancer
- First US vaccine licensed in 2006... Backlash almost immediate
  - "Compromise" vaccine only for cancer strains... So you'll still pay the consequence
  - Vaccine targeted at young females (males starting in 2015)
  - In US, states regulate requirements
- Texas
  - Gov. Perry mandates HPV vaccine but reverses course after political pressure
  - Texas now at or below average compared to national coverage
  - Rates of cervical cancer in Texas 9 per 100,000 (2019)
- Australia
  - National, cost-free required for females in 2007, males in 2013
  - Tied to social benefits ("no jab, no pay")
  - Rate of cervical cancer in Australia 4 per 100,000 (elimination threshold)
  - Projected to be <1 in 100,000 by 2060s if nothing changes
College kids? Meningitis!

- *Meningococcus* serogroup B most recently in the news
- Spread via respiratory droplets
  - Asplenic, complement deficient, +HIV highest risk
- High fatality rate, 4-20%
  - W-13%, C-12%, Y-11%, B-7%
- Treatment: Antibiotics, Supportive
- Prevention: Trumenba or Bexsero
  - Previous vaccines only covered serogroups A, C, Y & W

"Tumbler test" shows non-blanching rash

MENINGITIS VACCINATION

**Meningococcal Conjugate- ACWY**
- All 11-12yo *should get* with booster at 16-18yo
- If first year living on college campus and no prior immunization, give shot at any age
- Menactra, Menveo

**Meningococcal Serogroup B**
- *May give* 16-23yo
- *Should give* if asplenia or complement deficiency (or if outbreak)
- MenB-FHbp (Trumenba) 3 dose series
- MenB-4C (Bexsero) 2 dose series

[Vaccines not interchangeable - if start with one, complete series with same](https://www.cdc.gov/vaccines/schedules/hcp/imz/adult.html)

[Vaccines not interchangeable - if start with one, complete series with same](https://www.immunize.org/askexperts/experts_meningococcal_acwy.asp)
Vaccines for National Defense

- February 5, 1777: George Washington orders all troops to be variolated (inoculated with smallpox)
  - Up to 1% died (compared to up to 10% or higher in non-inoculated)
- Yellow Fever in Spanish-American War (Caribbean)
- Influenza in WWI
  - 1918 pandemic started in Kansas?
- Today
  - Vaccination depends on deployment

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Required for AFRICOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVID-19</td>
<td>Recommended vaccination per current CDC guidelines.</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>Required.</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Required.</td>
</tr>
<tr>
<td>Influenza, Northern Hemisphere (NH)</td>
<td>Required if you are residing in / traveling to a designated NH vaccine country by the WHO in 14 or more days from October through March.</td>
</tr>
<tr>
<td>Influenza, Southern Hemisphere (SH)</td>
<td>Required if you are residing in / traveling to a designated SH vaccine country by the WHO in 14 or more days from April through September.</td>
</tr>
<tr>
<td>Malaria</td>
<td>Required.</td>
</tr>
<tr>
<td>Measles</td>
<td>Required.</td>
</tr>
<tr>
<td>Meningococcal</td>
<td>Required.</td>
</tr>
<tr>
<td>Polio</td>
<td>Required.</td>
</tr>
<tr>
<td>Rabies</td>
<td>Required.</td>
</tr>
<tr>
<td>Tetanus</td>
<td>Required.</td>
</tr>
<tr>
<td>Typhoid</td>
<td>Required.</td>
</tr>
<tr>
<td>Yellow Fever</td>
<td>Required except for Comoros, Morocco and Tunisia. All yellow fever vaccinations must be documented on a CDC TDF. See information for Ascension Island.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vaccine</th>
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</tr>
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<td>Influenza, Northern Hemisphere (NH)</td>
<td>Required if you are residing in / traveling to a designated NH vaccine country by the WHO in 14 or more days from October through March.</td>
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</tr>
<tr>
<td>Yellow Fever</td>
<td>Required.</td>
</tr>
</tbody>
</table>

**USAFRICOM**

- Recommended vaccination per current CDC guidelines.
- Required for high risk conditions per AFRICOM.
- Required for high risk health conditions per CJTF.
- Required for personnel at high risk for exposure to high risk countries.
- Required for personnel at high risk for exposure to high risk countries.

**USINDOPACOM**

- Recommended for personnel at high risk for high risk countries.
- Required for personnel at high risk for exposure to high risk countries in the region.
- Required for personnel at high risk for exposure to high risk countries in the region.
- Required for personnel at high risk for exposure to high risk countries in the region.
- Required for personnel at high risk for exposure to high risk countries in the region.

**Yellow Fever**

- Required for entry into areas (USINDOPACOM countries per CDC Yellow Book) of the Americas, Africa, and Asia.
- Required for personnel in Special Operations Forces (SOF) or Special Forces (SFS) who travel to these areas.

**Influenza**

- Required for personnel at high risk for exposure to high risk countries.
- Required for personnel at high risk for exposure to high risk countries.
- Required for personnel at high risk for exposure to high risk countries.
- Required for personnel at high risk for exposure to high risk countries.

**Malaria**

- Required for personnel at high risk for exposure to high risk countries.
- Required for personnel at high risk for exposure to high risk countries.
- Required for personnel at high risk for exposure to high risk countries.
- Required for personnel at high risk for exposure to high risk countries.

**Measles**

- Required for personnel at high risk for exposure to high risk countries.
- Required for personnel at high risk for exposure to high risk countries.
- Required for personnel at high risk for exposure to high risk countries.
- Required for personnel at high risk for exposure to high risk countries.
Travelers, Refugees, and Immigrants

- Most countries in Latin America have childhood vaccination programs & refugees/immigrants from there are relatively young
  - Issue is documentation
  - General health, overcrowded settings, access to screening and care
- Travelers, refugees and immigrants from other parts of the world
  - Eastern Europe (Ukraine) and MDR-TB
  - Middle East and Cholera
  - Africa and Meningitis
  - Influenza
- Public Health surveillance and data on emerging infectious diseases

I lost my shot record subpackage

- Check with your state health department
  - Moved? Check will previous
  - International? Call embassy or consulate for guidance
- Check with school systems you’ve attended
- Check with previous healthcare providers
- Talk to a healthcare provider
  - Titers to determine immune status
  - Re-start series to get you all caught up
  - Start series of adults vaccines
Thank You!