Adult Immunizations and Vaccines:

What you need to know in 2023

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Objectives

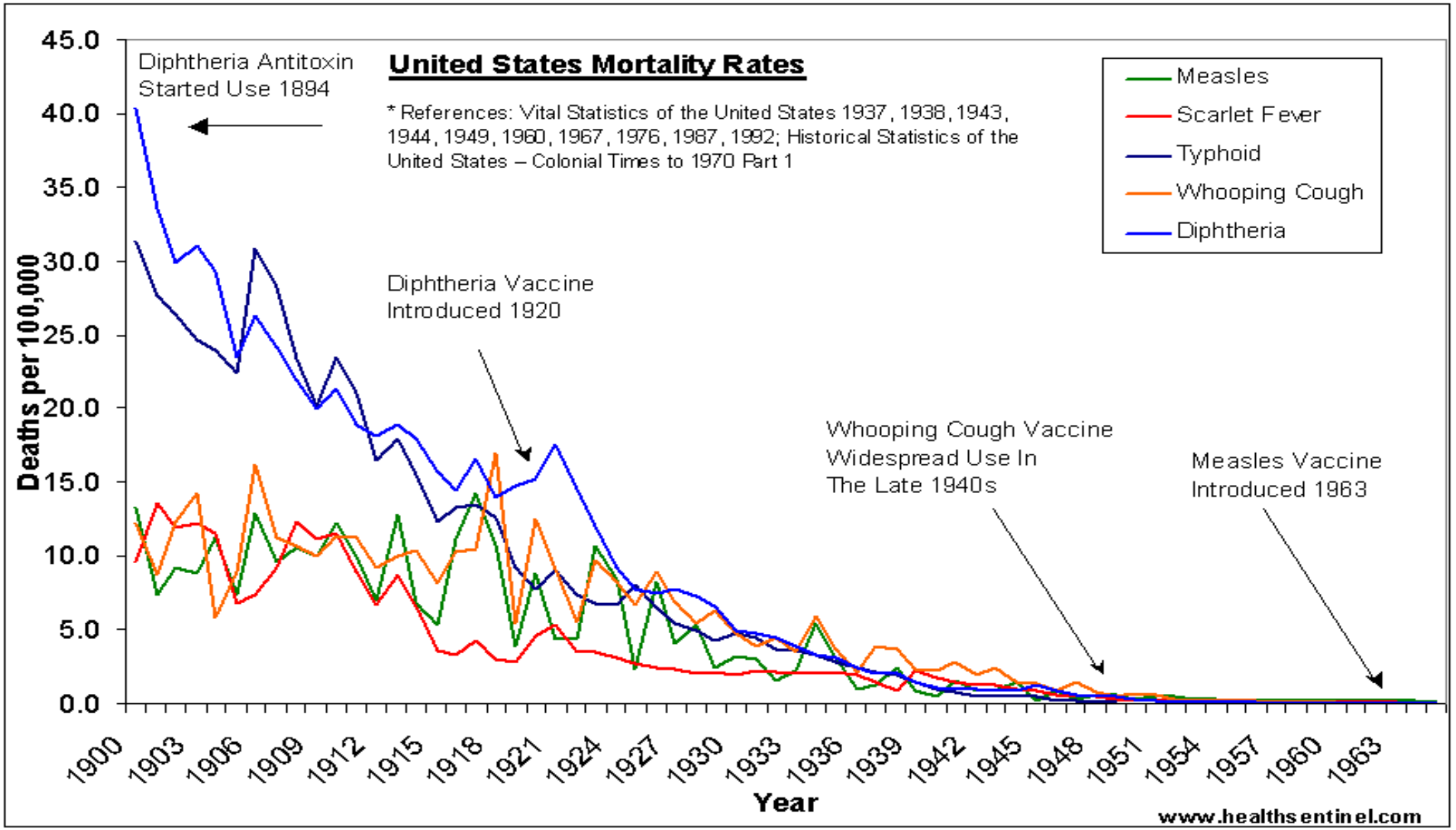
- To review and discuss latest guidelines regarding COVID and seasonal influenza vaccinations
- To review updated vaccination guidelines for routine adult vaccines
- Discussion regarding additional vaccine recommendations for certain higher risk travel abroad
- Take home points

Disclosures

- None

Vaccine Development Timeline Highlights

- 1400s-1700s (?200 BC) – stories from around the world regarding intentionally exposing healthy individuals to smallpox "varioloation"
  - 1721 – first smallpox vaccines in Europe brought by a woman who saw this practice in Turkey and asked that her daughters be vaccinated
  - 1774 – Benjamin Jesty first tested the hypothesis that cowpox vaccination could prevent smallpox disease
  - 1796 – 8yo James Phipps was successfully inoculated against smallpox by Edward Jenner
- 1885 Louis Pasteur – prevents rabies with post-exposure vaccine
- 1918-1919 – "Spanish Flu" kills 1:67 soldiers – first US government initiated vaccine campaign
  - 1945 first influenza vaccine is approved for military use, civilian use the year after
- 1952-1955 – Polio vaccine initiatives with Salk and Sabin vaccines
- 1967 – Smallpox eradication vaccine campaign
- 1971 – First combined MMR vaccines given (measles 1963, mumps 1967, rubella 1969)
- 1988 – Polio eradication campaign


United States Mortality Rates
* References: Vital Statistics of the United States 1937, 1938, 1943, 1944, 1949, 1960, 1967, 1976, 1987, 1992; Historical Statistics of the United States – Colonial Times to 1970 Part 1
Diphtheria Antitoxin Started Use 1894
Diphtheria Vaccine Introduced 1920
Whooping Cough Vaccine Widespread Use In The Late 1940s
Measles Vaccine Introduced 1963
Measles
Scarlet Fever
Typhoid
Whooping Cough
Diphtheria
Deaths per 100,000
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1900
1903
1906
1909
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1924
1927
1930
1933
1936
1939
1942
1945
1948
1951
1954
1957
1960
1963
Year
www.healthsentinel.com

Update on COVID Vaccines

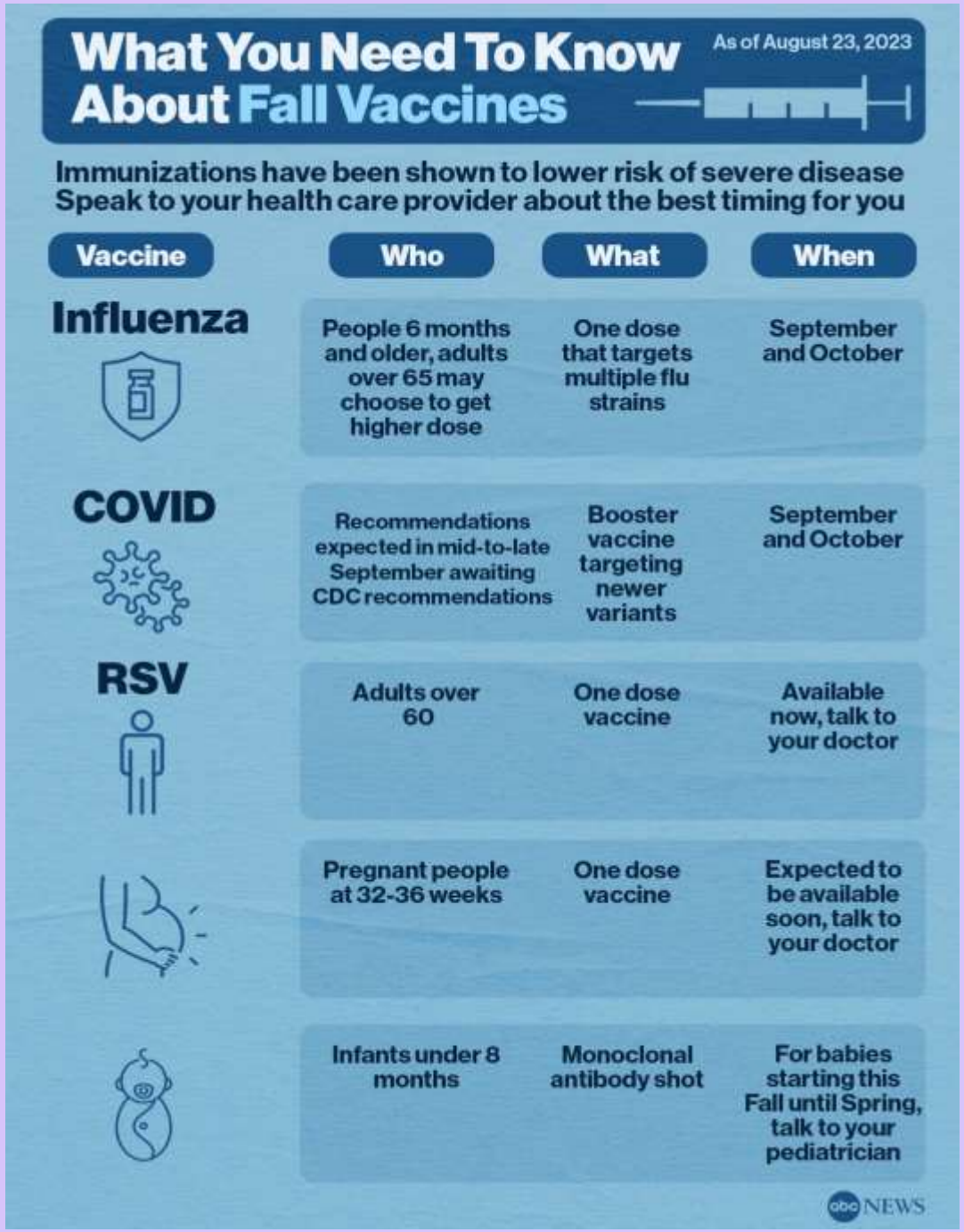
- New COVID booster vaccine – first of the annual seasonal vaccines?
  - Covers XBB variant (subvariant of Omicron)
  - Brought before the ACIP in September 2023
  - Available currently – Pfizer and Moderna
- If it has been >3mo since the last COVID vaccine (regardless of the number of vaccine doses previously) OK to give
- If an adult patient has never received a single COVID vaccine, ok for a "one and done" until next seasonal dose or additional booster driven by potential variants of concern

Seasonal Influenza Vaccine

- Influenza in 2020, 2021 was nearly non-existent with COVID mitigations in place
- Who should get a seasonal influenza vaccine?
- When is the best time to receive influenza vaccine?
  - September/October for most (until ?April/May)
  - July/August a consideration for pregnant patients in 3rd trimester
- Quadrivalent vaccines are the vaccines of choice
- High dose quadrivalent for >65yo
- Healthy non-pregnant patients between 2-49yo can receive LAIV4 (Flumist)
- ?Booster doses
  - Select patients, at least 5 weeks after first dose of vaccine

cdc.gov/flu

- Flu, COVID, and RSV vaccines can be given at the same appointment – no need to have a gap between doses



Hepatitis A Vaccine

- ACIP moved to recommend routine Hep A vaccines in all children 12-23mo regardless of risk in May 2006
  - Two dose vaccine series, given 6mo apart
- Adults with chronic liver disease, HBV/HCV, cirrhosis, NASH/NAFLD, EtOH liver disease, chronically elevated AST/ALT
- Pregnant patients at risk (travel, occupational risk, outbreaks)
- Vaccination during outbreaks as PEP
  - A single dose is 98% effective for 1-7.5 years
- Consideration for all international travelers, especially those who consume exotic/local foods

Hepatitis B Vaccine

- The ACIP recommended all children <19yo be administered Hep B vaccine in 1999
  - Previous recommendations for high risk individuals getting vaccinated in 1982 failed to have an impact
  - Now first dose universally given within 24 hours of birth
- **As of April 2022 – recommended for adults >19yo with risk factors and >60yo regardless of risk**
- Typically a 3 dose vaccine series given day 0, 1mo, 6+mo
- Checking titers to verify immunity

	HBsAg	Anti-HBs	Anti-HBc
Susceptible	Negative	Negative	Negative
Vaccinated	Negative	Positive	Negative
Past Infection	Negative	Positive	Positive
Acute Infection	Positive	Negative	IgM Positive
Chronic Infection	Positive	Negative	IgG Positive

Weekly / April 1, 2022 / 71(13);477–483

Tetanus Vaccines

- Td vaccine manufacturing was interrupted between December 2022 and May 2023 and supplies are extremely limited
- **Tdap is not only an acceptable alternative but should be preferentially used for all "tetanus shots" unless contraindication for acellular pertussis component**
- Infants/children have primary DTaP series (5 doses) followed by a Tdap booster at age 11-12yo
- **All pregnant patients should get a Tdap booster between 27 and 36 weeks in EVERY pregnancy**
- All adults should receive a dose of Tdap followed by a booster every 10 years or sooner if needed (injury, pregnancy, travel, etc.)
- Adults >65yo should receive Boostrix whenever possible as the preferred product
  - Booster vaccines with the birth of grandchildren sooner than 10 years

MMR Vaccine

- Standard childhood series with MMRV at 12-18mo and 4-6 years
- **Adults born in the US before ~1957 are presumed immune**
  - Titers and boosters for high risk, travel, etc.
  - 2 doses 28 days apart if no evidence of immunity
- **Adults born during or after ~1957-1965 without evidence of immunity should get at least 1 MMR booster**
  - Check titers in all patients born in this age group for documentation/preventative health maintenance
- Students attending college should have evidence of immunity or receive 2 doses of vaccine, 28 days apart
  - Consideration for 1x booster regardless?
- Single dose booster after high risk exposure/during outbreaks

https://www.cdc.gov/vaccines/vpd/mmr

What about Polio?

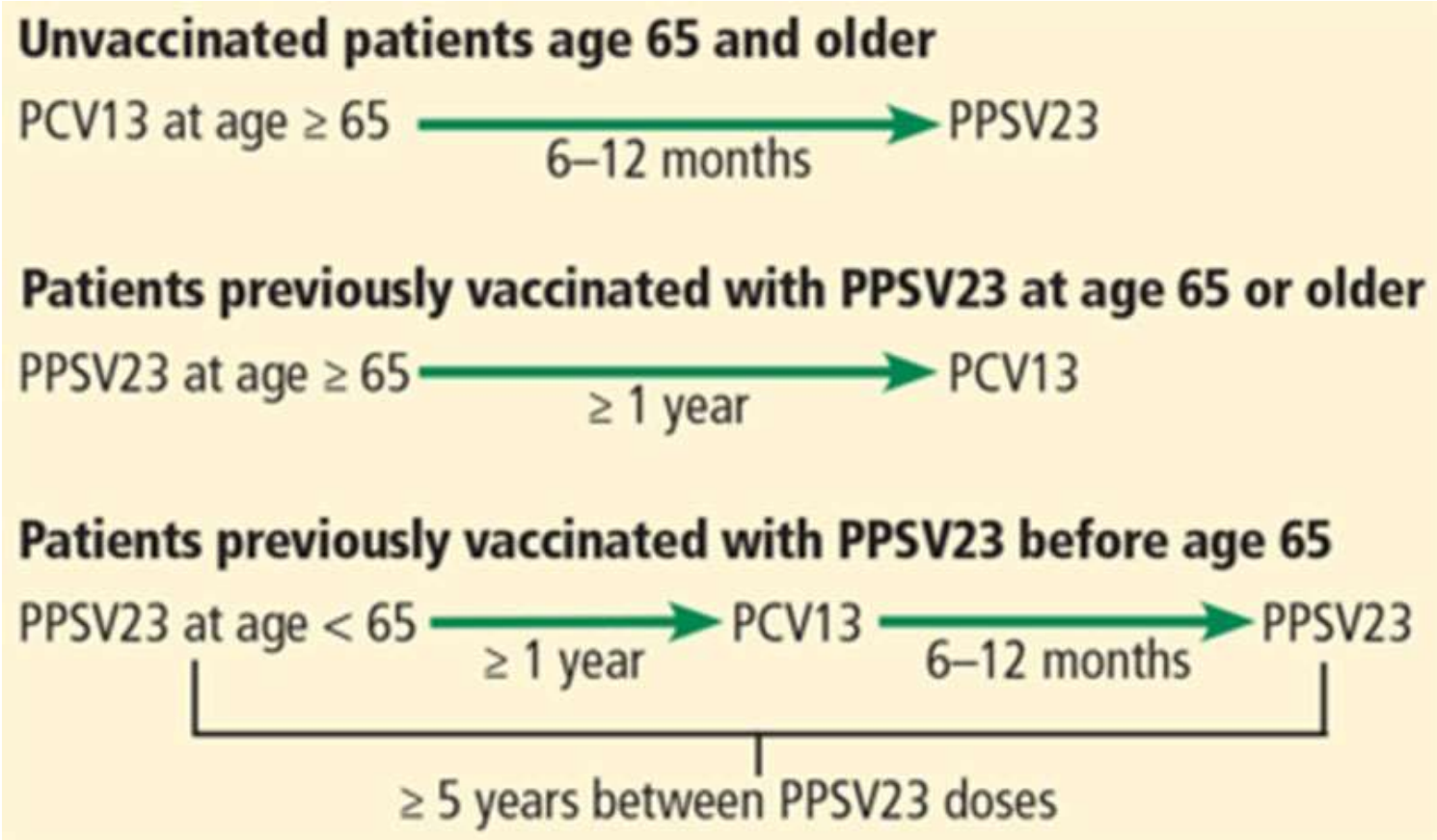
- Inactive Polio is the only vaccine that has been given in the US since 2000
  - Routine childhood vaccine consists of 4 total doses by age 6yo
- Unvaccinated adults should get 3 total doses of IPV
  - Two doses separated by 1-2mo, a 3rd dose 6-12mo later
- **Adults who have had a complete series of IPV vaccines but are at high risk due to travel or local outbreaks (ie Rockland County, NY in July 2022) CAN receive a single lifetime booster of IPV**
  - ESPECIALLY with travel to Nigeria, Pakistan, and Afghanistan

https://www.cdc.gov/vaccines/vpd/polio/hcp/index.html

Who needs Pneumococcal Vaccine?

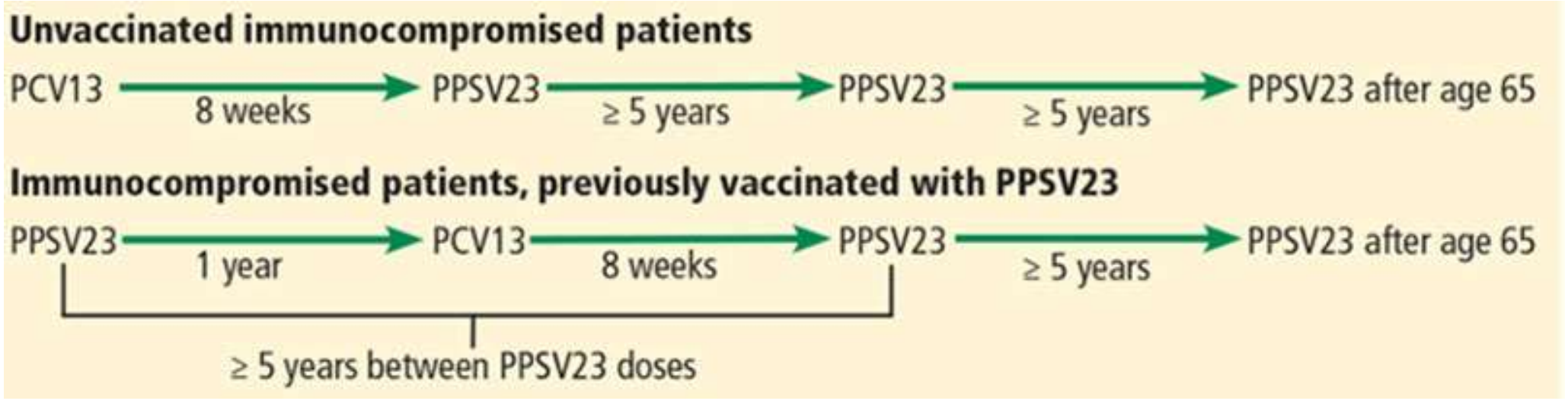
- Adults 65 years of age and older
- Adults 19 through 64yo with a chronic medical problem
  - Heart disease, lung disease, sickle cell disease, diabetes, alcoholism, cirrhosis, CSF leaks, cochlear implants, smokers with COPD/asthma
- Immunosuppressed patients
  - Hodgkin's disease, lymphoma or leukemia, ESRD, multiple myeloma, transplant patients, splenectomized patients, HIV/AIDS
- Patients on immunosuppressive agents
- LTAC/ECF patients

Previous Recommendations



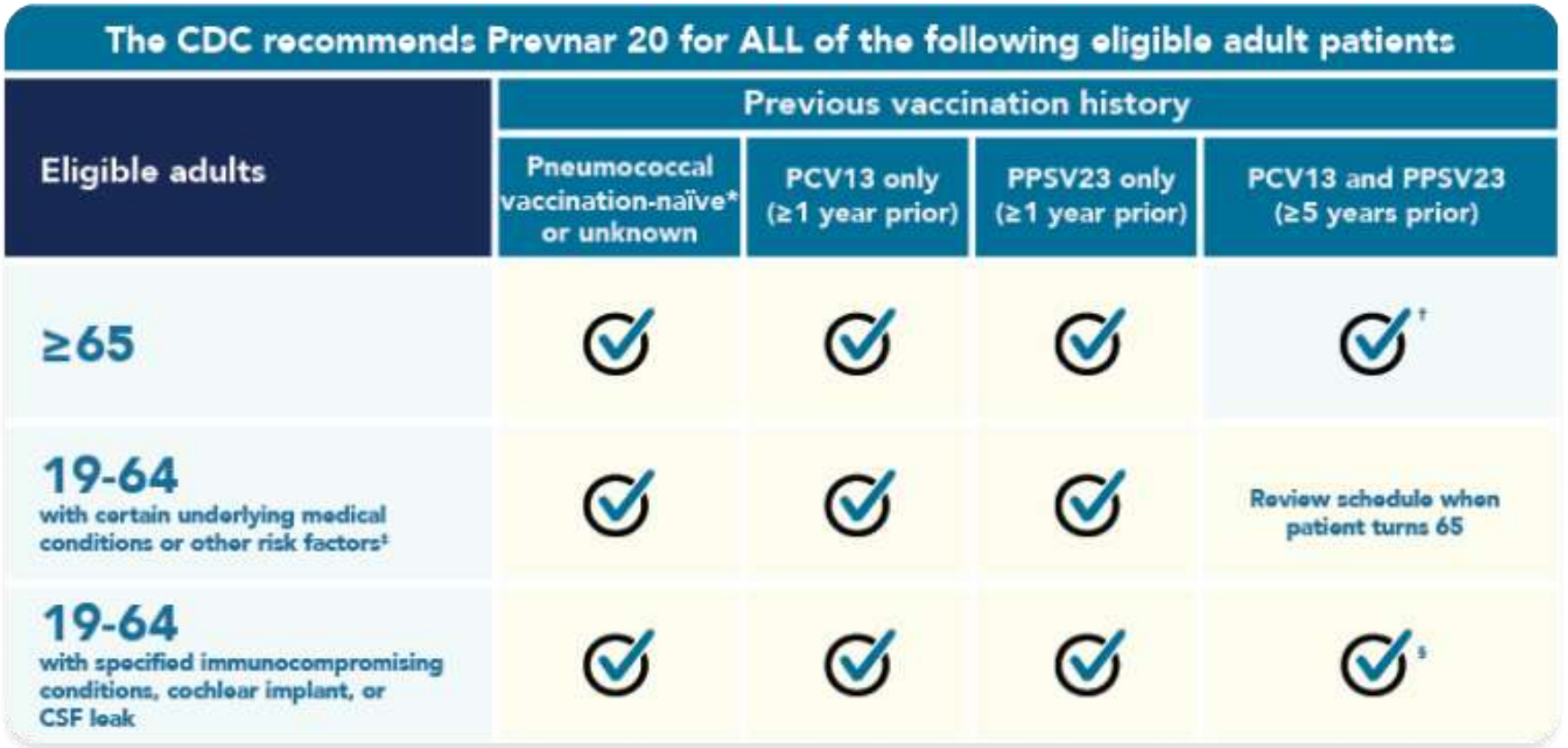
MMWR Morbid Mortal Wkly Rep 2012; 61:816-819

Previous Recommendations cont'd.



MMWR Morbid Mortal Wkly Rep 2012; 61:816-819

Current Pneumococcal Vaccine Recommendations



The CDC recommends Prevnar 20 for ALL of the following eligible adult patients				
Eligible adults	Previous vaccination history			
	Pneumococcal vaccination-naïve* or unknown	PCV13 only (≥1 year prior)	PPSV23 only (≥1 year prior)	PCV13 and PPSV23 (≥5 years prior)
≥65	✓	✓	✓	✓†
19-64 with certain underlying medical conditions or other risk factors‡	✓	✓	✓	Review schedule when patient turns 65
19-64 with specified immunocompromising conditions, cochlear implant, or CSF leak	✓	✓	✓	✓§

https://prevnar20adult.pfizerpro.com/acip-recommendations

HPV Vaccine

- HPV vaccine can be given as soon as age 9yo but should be given to most children aged 11-12yo
  - Two dose vaccine series through 15th birthday, at least 6mo apart
  - Three dose vaccine series if immunocompromised or HIV+
- ACIP recommends HPV vaccine for EVERYONE through age 26yo
  - 3 dose vaccine series at day 0, month 1-2, and month 6
- **HPV vaccine CAN be given to individuals 27-45yo on a case-by-case basis with shared clinical decision making per the ACIP as of June 2019**
  - 3 dose series, less efficacious in this age group, higher probability of lifetime exposure

https://www.cdc.gov/vaccines/acip/acip-scdm-faqs.html

Zoster Vaccine

- What if your patient hasn't had the chicken pox or cannot recall?
  - Check titers first if under 60yo, if not immune, give 2 vaccine varicella series
- Shingrix is the current zoster vaccine, replacing zostavax
  - Antigen based, killed vaccine
  - Two vaccine series in adults >50yo
    - Day 0, 2-6mo later
- **REVACCINATE all adults who have received Zostavax in the past with Shingrix**

Shingrix Vaccine Stats

Table 2. Efficacy of SHINGRIX on Incidence of Herpes Zoster Compared with Placebo in Study 1[a] (mTVC[b])

Age Group (Years)	SHINGRIX			Placebo			% Efficacy (95% CI)
	N	n	Incidence Rate of HZ per 1,000 Person-Years	N	n	Incidence Rate of HZ per 1,000 Person-Years	
Overall (≥50)[c]	7,344	6	0.3	7,415	210	9.1	97.2 (93.7, 99.0)
50 - 59	3,492	3	0.3	3,525	87	7.8	96.6 (89.6, 99.3)
60 - 69	2,141	2	0.3	2,166	75	10.8	97.4 (90.1, 99.7)
≥70	1,711	1	0.2	1,724	48	9.4	97.9 (87.9, 100.0)

N = Number of subjects included in each group; n = Number of subjects having at least 1 confirmed HZ episode; HZ = Herpes zoster; CI = Confidence Interval.

Meningococcal Vaccine

- Meningococcal conjugate (A,C,Y,W-135) vaccine given routinely at 11-12yo with a booster at 16yo
  - If at increased risk, boosters should be given every 5 years
  - **Adults with travel to high risk countries, starting college if not yet vaccinated, military recruits should be vaccinated x 1 dose of conjugate vaccine with boosters every 5 years administered if they remain high risk**
- Meningococcus B vaccine MAY also be given at 16-23 years of age
  - Compliment deficiency, asplenia, compliment inhibitors get a booster 1 year after the first dose and every 2-3 years thereafter

So Your Patient had a Bone Marrow Transplant?

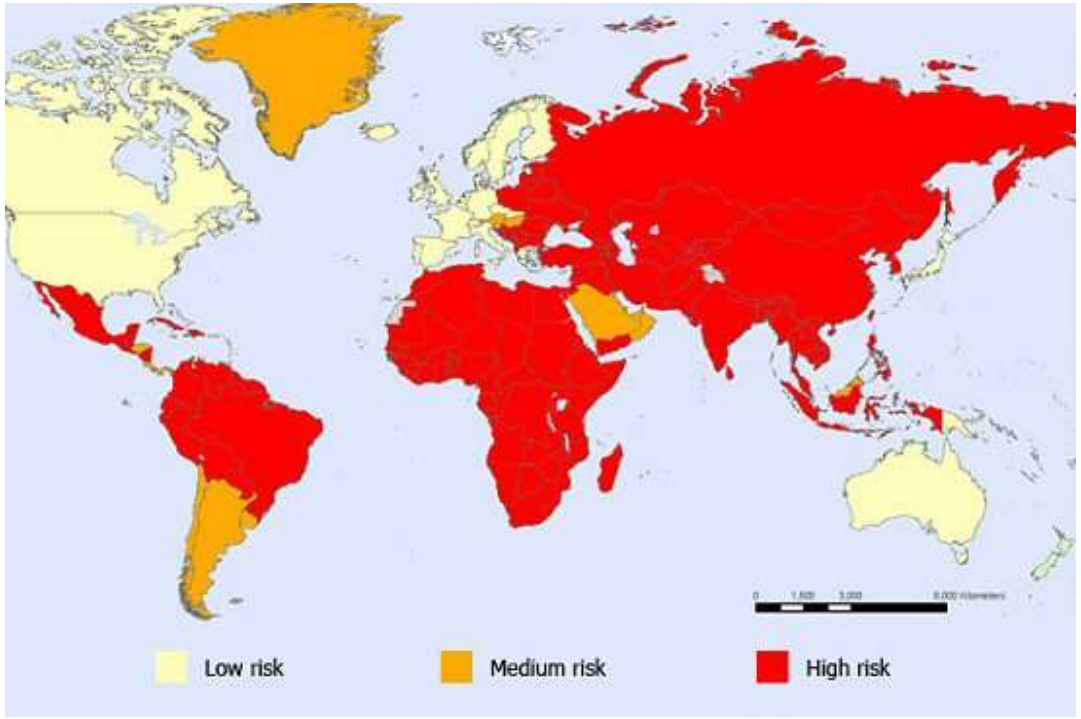
Vaccine	Time to Start Vaccination after Transplant	Number of Doses
Pneumococcal conjugate	6 months	3 (+1 as boost)
Haemophilus influenzae B conjugate	6 months	3
Polio (inactivated)	6 months	3
Hepatitis B	6 months	3
Diphtheria, acellular pertussis, and tetanus toxoids	6 months	3
Influenza (inactivated)	6 months	Yearly during flu season
Measles-mumps-rubella (live)	2 years[a]	1 for adults; 2 for children
Varicella virus (live)	2 years[a]	1 for adults; 2 for children

Adapted from Ariza-Heredia EJ, et al. Transpl Infect Dis. *2014;16:878–886.*

[a]*For seronegative patients who have received no immunosuppressive therapy for at least 6 months.*

Typhoid Vaccine

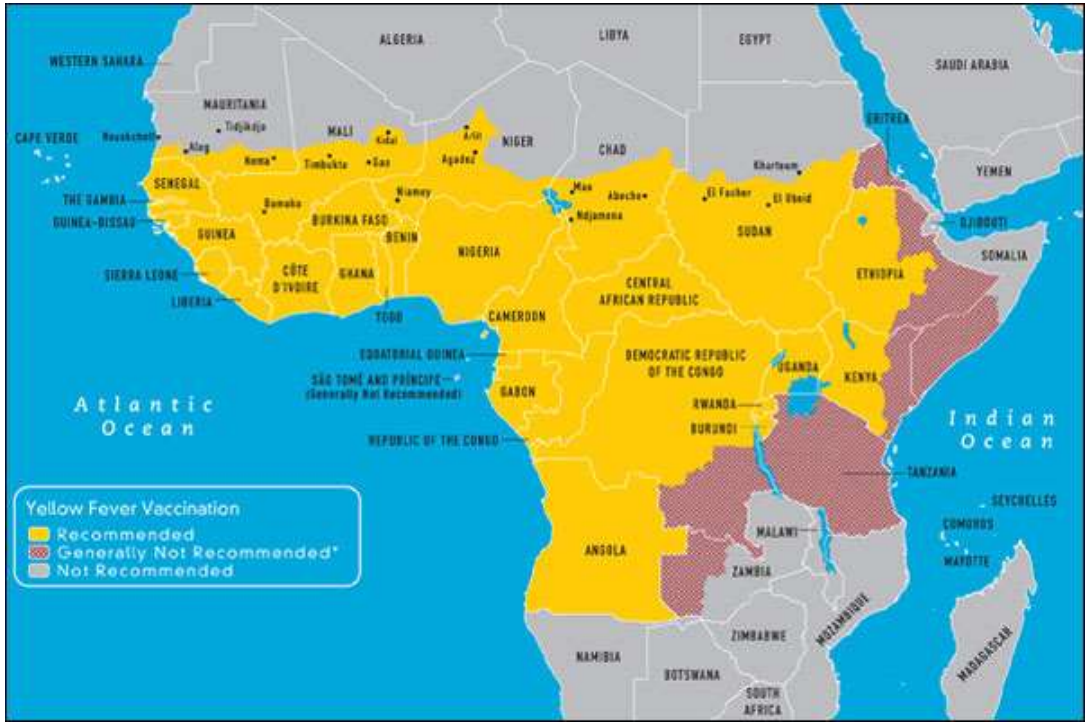
- Typhim IM (age 2yo+)
  - Injectable vaccine, good for 2 years
- Vivotif oral (age 6yo+)
  - Oral vaccine, live attenuated, good for 5 years (**available again)**
  - Should not be given to immunocompromised patients
  - Need at least 1-2 weeks before travel to complete doses
  - MUST be refrigerated



Yellow Fever Vaccine

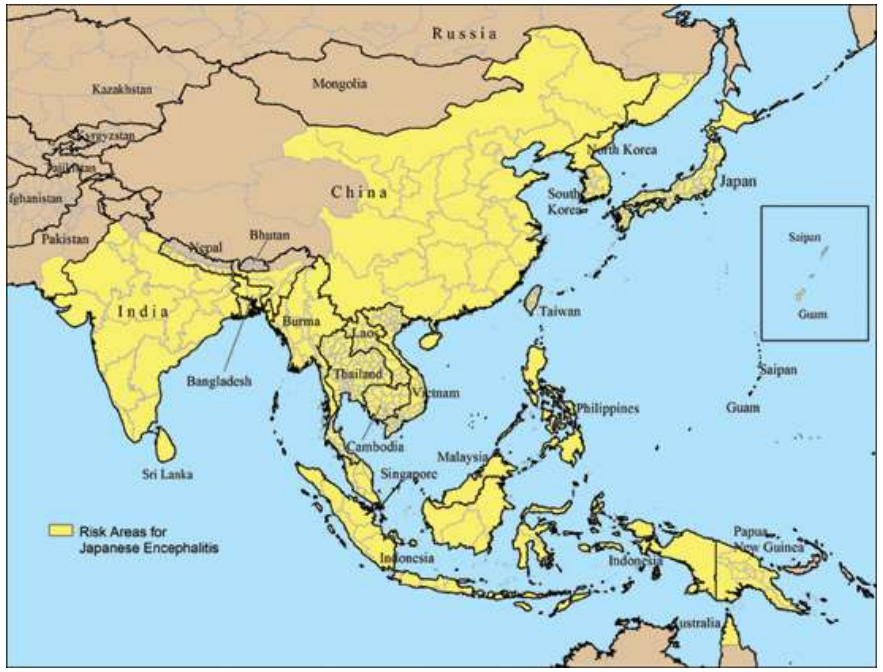
- Indicated for all individuals 9mo-60yr of age traveling to or through areas of active Yellow Fever Virus transmission
  - Live virus, should not be given to most immunocompromised individuals
  - Vaccine good for 10+ years
- Discuss risk/benefit of yellow fever vaccination with patients who are older than 60yo and provide a letter of exemption WITH a yellow fever stamp
- Should not be administered to those >65yo
- Needs to be given at least 10 days, preferably 2+ weeks prior to travel to have full effect

Yellow Fever Distribution

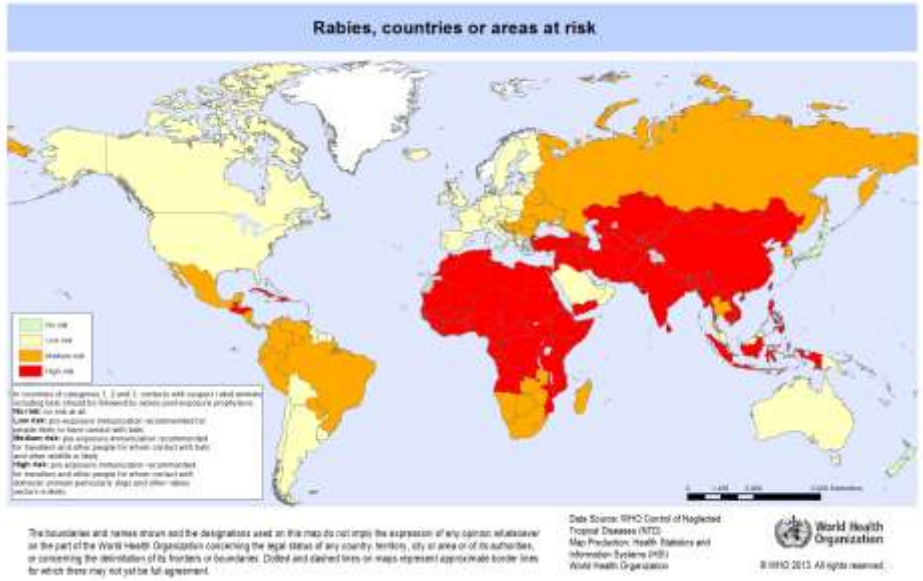


Japanese Encephalitis Vaccine

- Two vaccine series, given 28 days apart
- Indicated in all travelers to endemic areas who will be staying >1mo in these areas
- Indicated for travelers to endemic areas who will be staying <1mo but who will be staying outdoors, camping, spending significant time in the wilderness
- Very expensive vaccine!



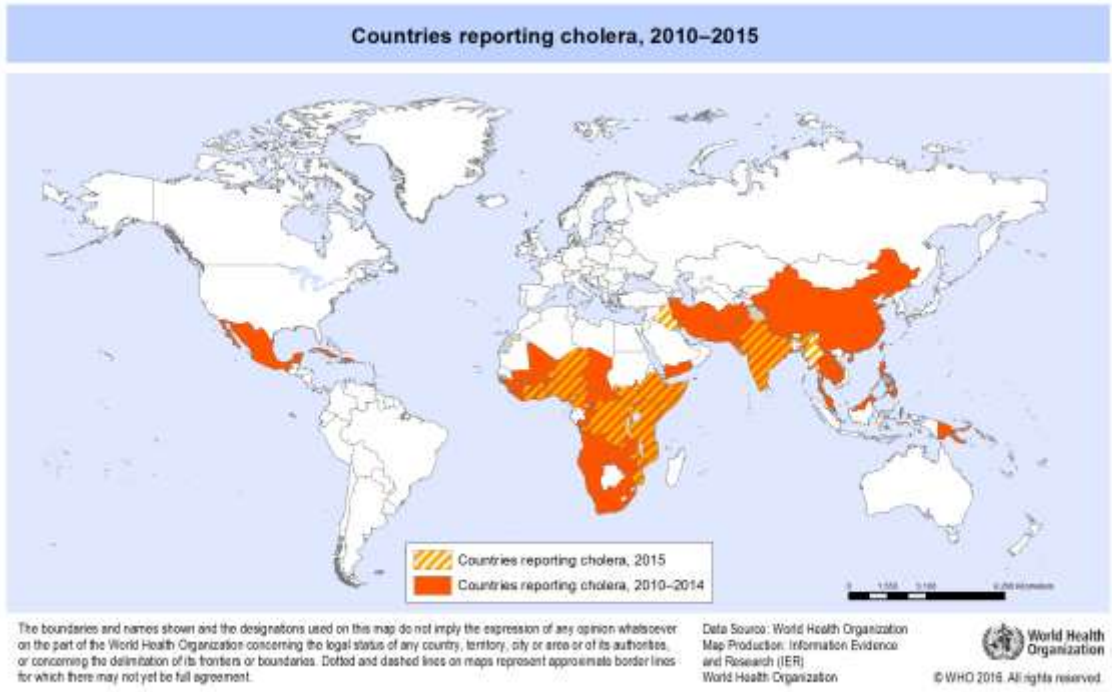
Rabies Vaccine



- Indicated in certain travelers to endemic areas who will be spending >1mo in these areas, working with wildlife, camping, etc.
- 3 vaccine series
  - Day 0
  - Day 7
  - Day 21 or 28
- Very expensive vaccine series!

Cholera Vaccine

- Vaxchora approved for adults 18-64yo traveling to endemic areas
- Live, attenuated vaccine – single oral liquid dose 10+ days prior to travel
- Expensive vaccine!
  - Only lasts ~1yr



Take Home Points

- A single dose of the latest COVID vaccine makes you “up to date” regardless of the number of previous vaccine doses
- Hepatitis A and B vaccines are standard in childhood now, time to catch adults up
- Consideration for Prevnar 20 as a “one and done” for nearly everyone at risk for pneumococcal disease
- Everyone gets Shingrix after age 50, catch up all patients who only had Zostavax
- Don’t forget about travel vaccines in those embarking on foreign travel abroad – especially adults born before the 1950s/1960s!