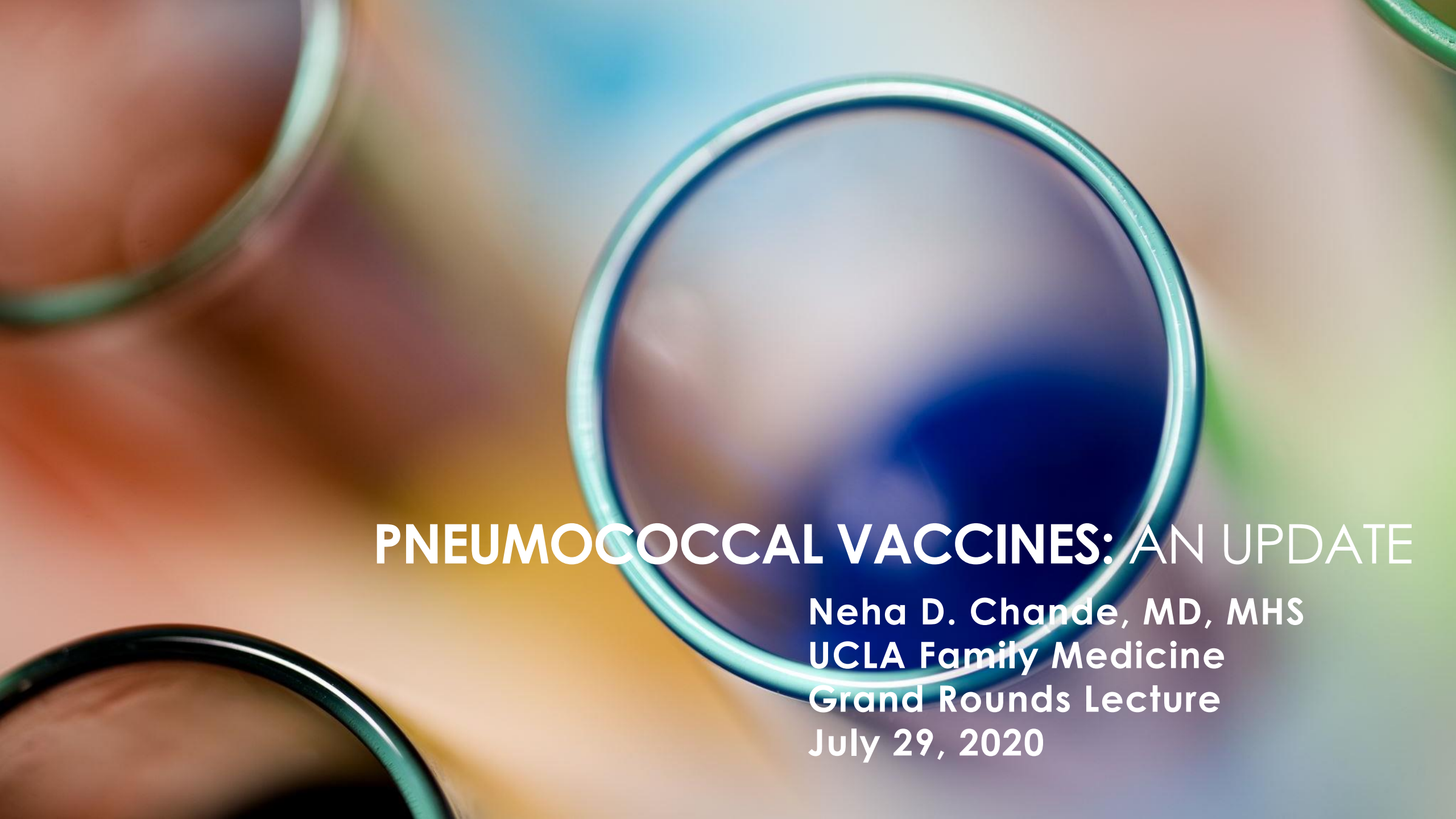


PNEUMOCOCCAL VACCINES: AN UPDATE

Neha D. Chande, MD, MHS
UCLA Family Medicine
Grand Rounds Lecture
July 29, 2020

Objectives

- Understand the health impact of pneumococcal infections and the importance of preventing these illnesses
- Identify the two different pneumococcal vaccines currently available in the US and recognize their differences
- Learn the indications for administering a pneumococcal vaccine
- Understand the timing of vaccine administration
- Learn about available resources for provider

BIOLOGY

Pneumococcus

- *Streptococcus pneumoniae* (pneumococcus) was first isolated in 1881
  - 92 known serotypes (as of 2011)
- Polysaccharide pneumococcal vaccine
  - First licensed in the US in 1977 (14 serotypes)
  - Current vaccine (PPSV-23) was introduced in 1983 (23 serotypes)
- Conjugate pneumococcal vaccine
  - First licensed in the US in 2000 (7 serotypes)
  - Current vaccine (PCV-13) was introduced in 2010 (13 serotypes)

CDC Pinkbook pp 279, 284

Pneumococcus

- Pneumococcal bacteria are typically encapsulated and these capsules contain polysaccharide chains
- Capsular polysaccharides
  - Basis of classification of different strains (ie the 92 known serotypes)
  - Induce production of protective antibodies that are type-specific (ie an antibody to one strain does not provide significant protection against other strains)
  - However, there is some cross-reactivity

CDC Pinkbook p. 279

Polysaccharide vs conjugate

- Polysaccharide vaccines
  - Induce production of protective antibodies **but**
  - Immune response is **T-cell independent**
    - Decreased memory
    - Antibodies skewed toward IgM rather than IgG
    - Cannot be boosted effectively
    - Not effective in children <2 y
- Conjugate vaccines
  - Polysaccharide is attached to another particle—usually a protein
  - Immune response is **T-cell dependent**
    - Increases immunogenicity of vaccine
    - Multiple boosters improve immunity—long lasting memory

CDC Pinkbook p. 7 (Chapter 1)

PNEUMOCOCCAL DISEASE

Otitis media

- One of the most common presentations of pneumococcal disease in children
- AOM accounts for 20 million pediatrician appts annually
  - Most common pediatric complaint overall
- Pneumococcus is frequent cause of otitis
  - Found in 28-55% of middle ear aspirates
- Generally mild course, but rarely, can lead to invasive disease
  - Mastoiditis, meningitis

CDC Pinkbook p 281

Pneumonia

- Most common presentation of pneumococcal disease in adults
- Accounts for about 1/3 of all cases of CAP
- Common complication of flu
- 400,000 hospitalizations/year
- 25-30% of patients develop bacteremia
- Case fatality rate (CFR)= 5-7%

CDC Pinkbook p 280

Bacteremia

- Most common form of invasive pneumococcal disease (IPD)
- 12,000 cases annually in the US
- In children, bacteremia w/o known source is the most common presentation of IPD
- CFR >20%, as high as 60% among elderly

CDC Pinkbook p 280

Meningitis

- Pneumococcus causes >50% of all cases of meningitis in the US annually
- 3000-6000 cases annually in the US
- CFR: 8% in children, 22% in adults
- High morbidity—survivors commonly have lasting neurologic deficits/dysfunction
  - More common than w/ other types of meningitis
  - Sequelae include: focal neuro deficits, cognitive impairment, hearing loss, developmental delay in children, epilepsy

CDC Pinkbook p 281, Lucas et al 2016

Invasive pneumococcal disease

- Invasive pneumococcal disease: bacteremia, meningitis
  - **Vaccination is primarily helpful in reducing the risk of IPD, NOT pneumonia (ie non-invasive disease)**
- PPSV-23 (Pneumovax)
  - Relatively low efficacy in protecting against pneumonia
  - 60-70% efficacy in protecting against IPD
- PCV-13 (Prevnar)
  - 45% efficacy in protecting against pneumonia
  - 90%+ efficacy in protecting against IPD in children
  - 75% efficacy in protecting against IPD in adults >65 y

CDC Pinkbook p. 286

ADMINISTERING VACCINES

Pediatric Patients

- Healthy children
  - Prevnar x4 doses: @2 mo, 4 mo, 6 mo, 12-15 mo
  - Children who start late or miss vaccines should still be caught up—timing and dosing depends on age: see vaccine schedule!
  - Chronic medical conditions: see ACIP vaccination schedule for specific details, but in general, similar guidelines for adults w/ chronic heart, lung, immunocompromising diseases, or similar conditions
  - At age 19 y, restart w/ adult recommendation

CDC Pinkbook p 287

Vaccination in Pregnancy

- Safe to administer either vaccine if needed
  - Depending on indication, wait at least 8 wks between doses

CDC Pinkbook p 287

Average/Low Risk Adults

- **No pneumococcal vaccination** needed if:
  - Ages 19-64 y **and**
  - No severe, chronic cardiac, pulmonary, endocrinological, severe neurological, immunocompromising, or similar conditions

Moderate Risk Adults

- Give **pneumovax only** if:
  - Ages 19-64 y, immunocompetent **and**
  - One or more of the following chronic conditions
    - Chronic heart disease (not HTN)
    - Chronic lung disease (including asthma)
    - Chronic kidney disease (CKD III-IV)
    - Chronic liver disease/failure
    - Diabetes
    - Tobacco use
    - Alcohol abuse

High Risk Adults

- Administer **Pneumovax + Prevnar** if:
  - Ages 19-64 y **and** Immunocompromised
    - Diseases: cancer, HIV, AIDS, inherited/other immunodeficiency, ESRD, nephrotic syndrome
    - Iatrogenic: chronic steroids (20 mg+ pred/day), biologics, chemo, RT, transplant
    - Anatomic: blood-brain barrier disruption (CSF leak, cochlear implant), asplenia (anatomic or functional)

  OR

  - Adults ≥ 65 years ("immune senescence")*

Pri-Med Presentation, Hopkins & Caskey, 5/2017

*Recent Changes to PCV-13 Recommendations

- Changes to PCV-13 recommendations for adults ≥65 y
  - **Generally healthy adults:** decision to administer PCV-13 should be based on shared decision-making between patient and doctor
    - Those who do not have immunocompromising conditions/potential for blood-brain barrier leak
  - **Adults w/ immunocompromising or related conditions:** PCV-13 should still be given
    - Immunocompromising conditions: cancer, HIV, AIDS, transplant, high-dose steroid use, biologic/immunotherapy, RT, chemo, asplenia, ESRD, etc
    - Potential for blood-brain barrier compromise: cochlear implant, CSF leak

CDC Pneumococcal Vaccine Recommendations, CDC/NCIRD, 11/2019

Shared Decision-Making

- When deciding to use PCV-13 in non-immunocompromised patients, keep in mind:
  - Safe, effective vaccine
  - Risk to adults ≥65 y of IPD much lower now since introduction of PCV to pediatric vaccine schedule
  - Consider administering to those patients who are at higher risk of exposure to PCV-13 strains

CDC Pneumococcal Vaccine Recommendations, CDC/NCIRD, 11/2019

Shared Decision-Making

- Elderly patients w/ potentially higher risk of exposure to PCV-13 strains
  - Living in SNFs or other long-term care facilities
  - Living in low-PCV-13 uptake communities (eg poor childhood vaccine coverage)
  - Traveling to countries w/ low-PCV-13 vaccination/access

CDC Pneumococcal Vaccine Recommendations, CDC/NCIRD, 11/2019

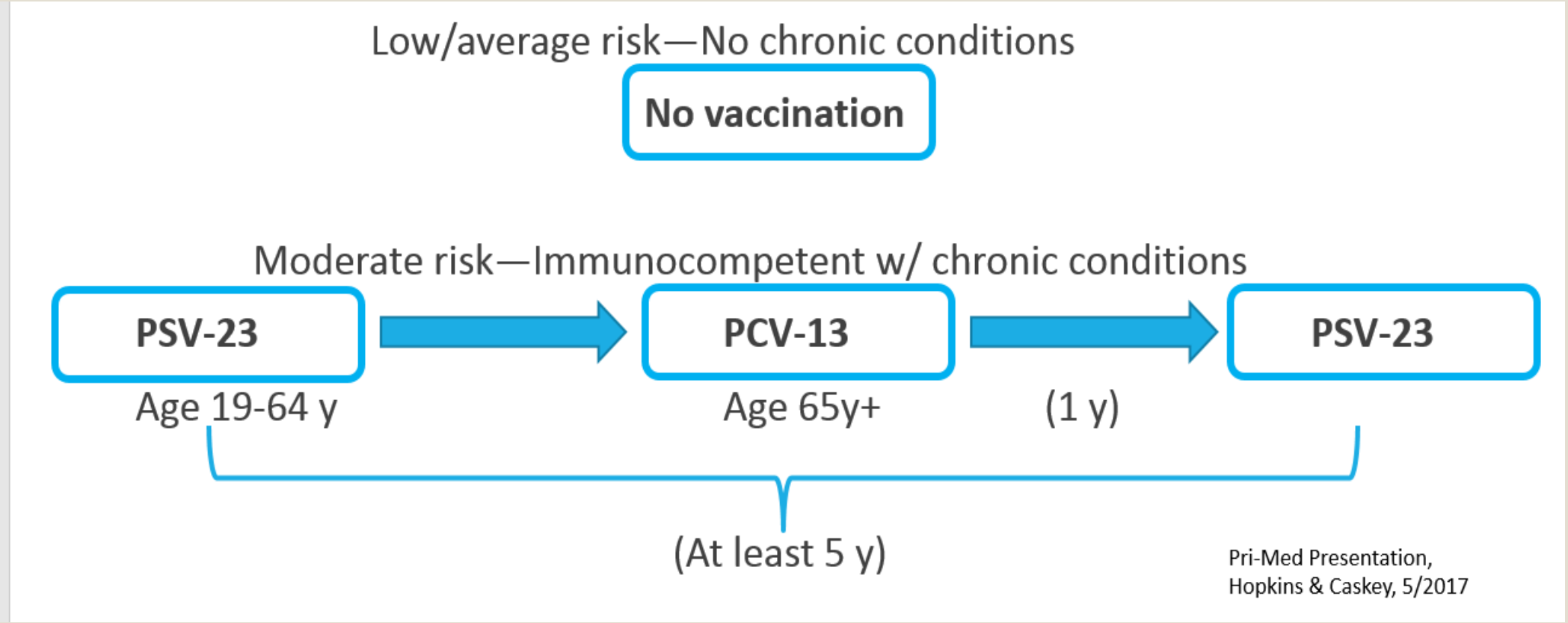
Shared Decision-Making

- Other considerations
  - IPD due to PCV-13 strains increases w/ age and certain chronic medical conditions
  - Effects of pediatric PCV-13 use had similar positive impacts in elderly patients w/ chronic medical conditions, **but** "the residual PCV burden remains higher in these groups"
  - So, consider offering PCV-13 to those adults ≥65 y w/ these conditions (eg DM, chronic heart disease, chronic lung disease, smokers, etc)

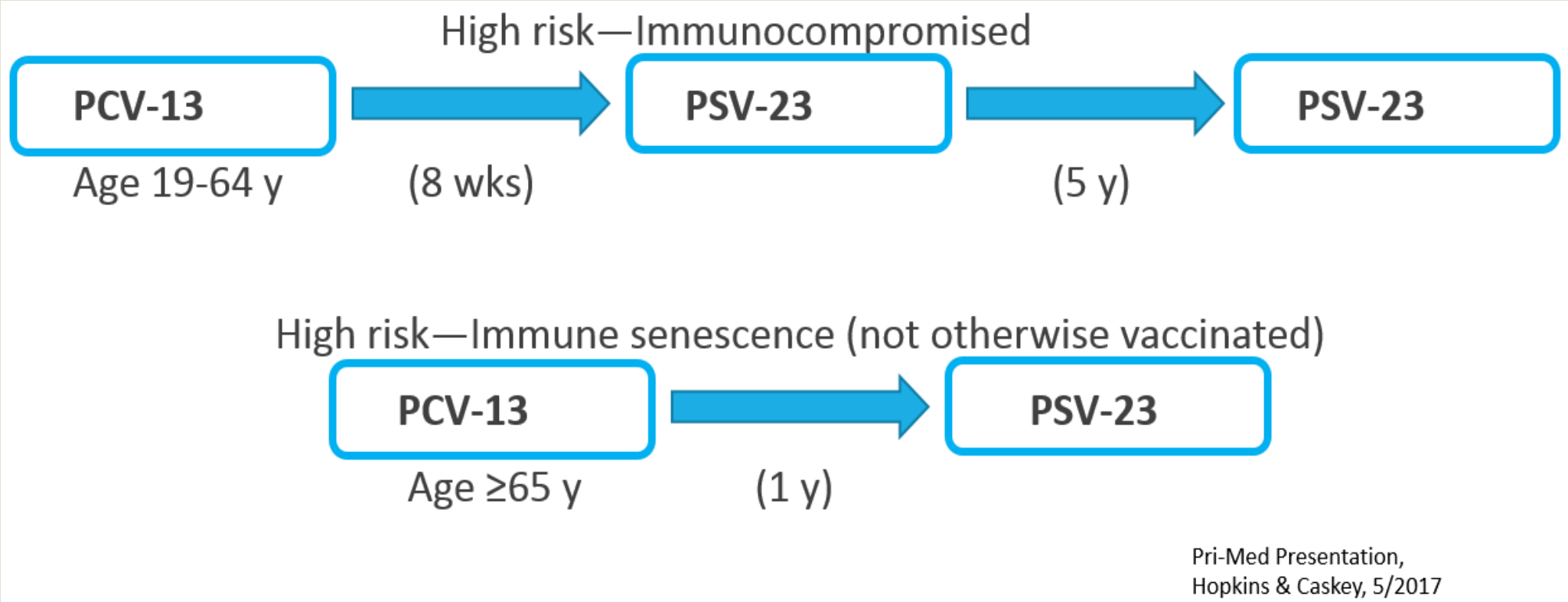
CDC Pneumococcal Vaccine Recommendations, CDC/NCIRD, 11/2019

VACCINATION TIMING

Vaccination Timing



Vaccination Timing



Pri-Med Presentation,
Hopkins & Caskey, 5/2017

Vaccination Timing

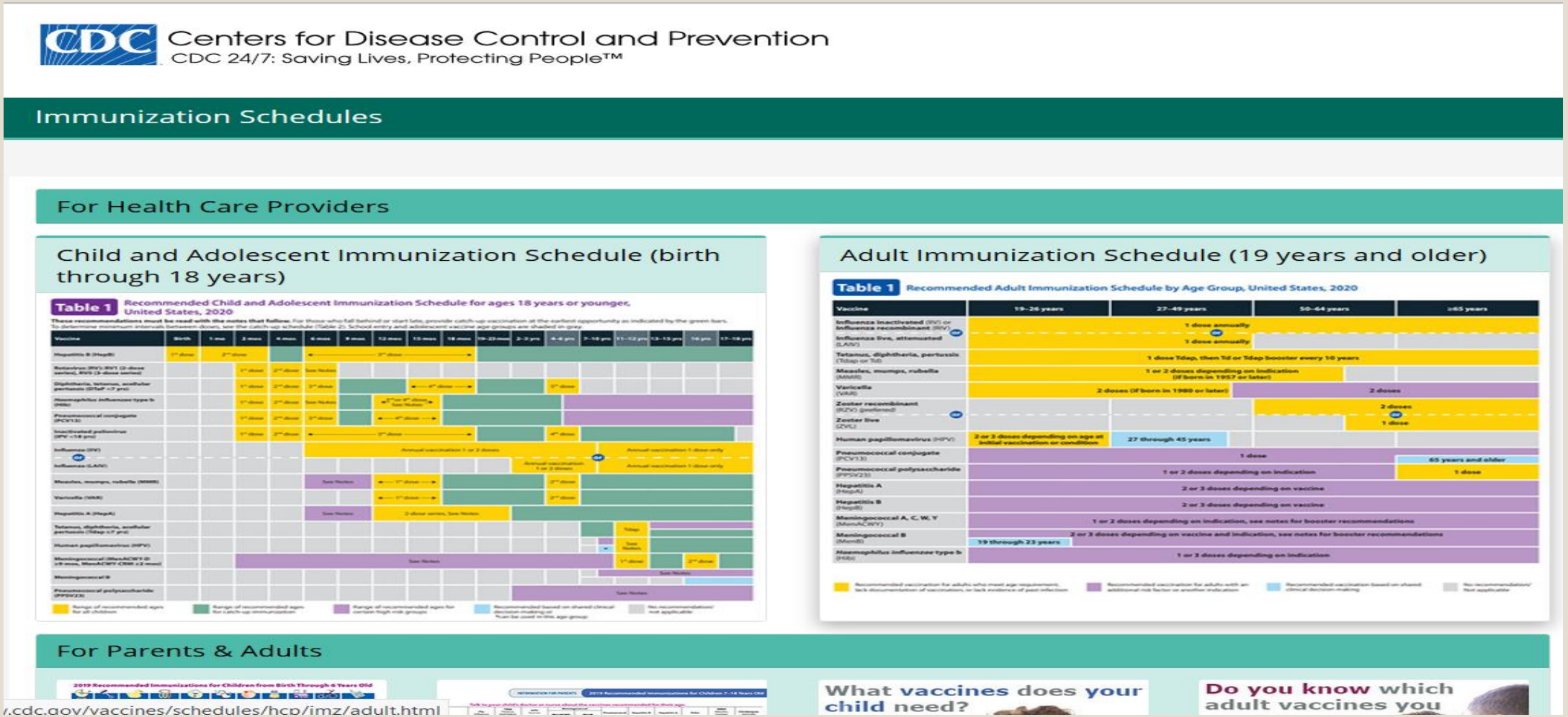
- Max lifetime adult pneumococcal vaccine doses (ie does not count pediatric doses)
  - PCV-13: 1
  - PPSV-23: 3 (x2 before age 64 y, x1 ≥65 y)
- Once you receive Prevnar as an adult, you never need to receive it again
- Wait at least 5 years between two doses of PPSV-23

Pri-Med Presentation,
Hopkins & Caskey, 5/2017

RESOURCES

Vaccine Schedules

https://www.cdc.gov/vaccines/schedules/index.html



The Pinkbook

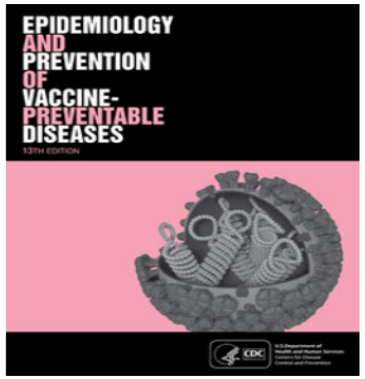
https://www.cdc.gov/vaccines/pubs/pinkbook/index.html

Epidemiology and Prevention of Vaccine–Preventable Diseases

The Pink Book: Course Textbook - 13th Edition (2015)

2017 SUPPLEMENT AVAILABLE

For 2017 updates to human papillomavirus, meningococcal disease, and pneumococcal disease, see the 13th Edition Supplement.



Printer friendly version [12 pages]

The 13th Edition Epidemiology and Prevention of Vaccine-Preventable Diseases, a.k.a. the "Pink Book," provides physicians, nurses, nurse practitioners, physician assistants, pharmacists, and others with the most comprehensive information on routinely used vaccines and the diseases they prevent.

Six appendices contain a wealth of reference materials including: vaccine minimum ages and intervals, current and discontinued vaccines, vaccine contents, foreign vaccine terms, and more.

To view online or download to print specific sections, see links below.

– Order a bound copy from the Public Health Foundation Learning Resource Center .

– Epidemiology and Prevention of Vaccine Preventable Diseases Webinar Series

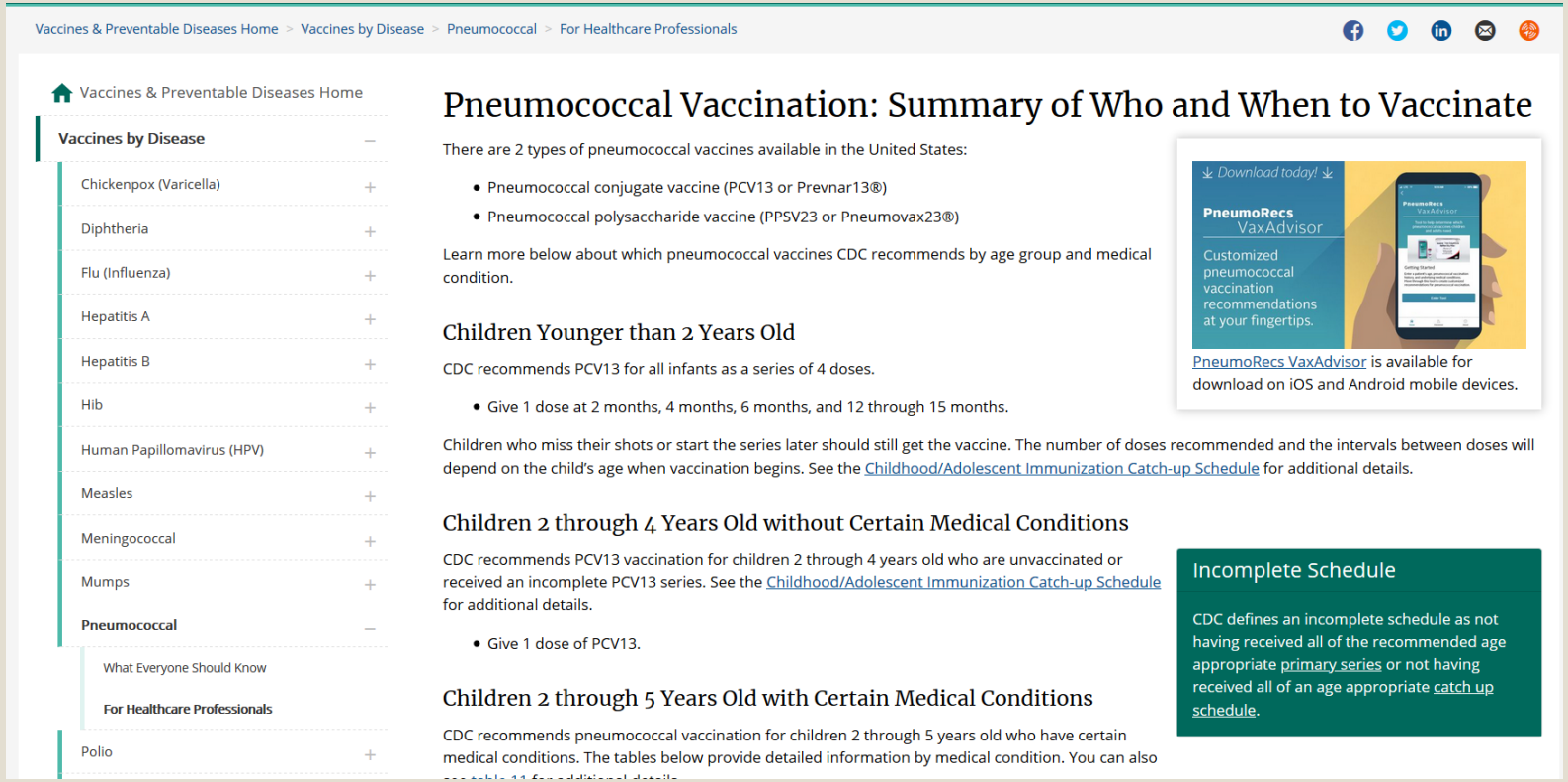
Chapters

Appendices

https://www.cdc.gov/vaccines/pubs/pinkbook/index.html

CDC Website

https://www.cdc.gov/vaccines/vpd/pneumo/hcp/who-when-to-vaccinate.html



CDC Pneumococcal Vaccine Recommendations

Call the CDC

- CDC hotline for vaccine questions
  - 800-CDC-INFO (800-232-4636)
  - M-F 8 am- 8 pm ET (?English only)
  - Email address/web form available through CDC website
  - https://wwwn.cdc.gov/dcs/ContactUs/Form?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcdc-info%2Frequestform.html

There's an App for That…

PneumoRecs VaxAdvisor Mobile App for Vaccine Providers

The ***PneumoRecs VaxAdvisor*** mobile app helps vaccination providers quickly and easily determine which pneumococcal vaccines a patient needs and when. The app incorporates recommendations for all ages so internists, family physicians, pediatricians, and pharmacists alike will find the tool beneficial.

Users simply:

- Enter a patient's age.
- Note if the patient has specific underlying medical conditions.
- Answer questions about the patient's pneumococcal vaccination history.

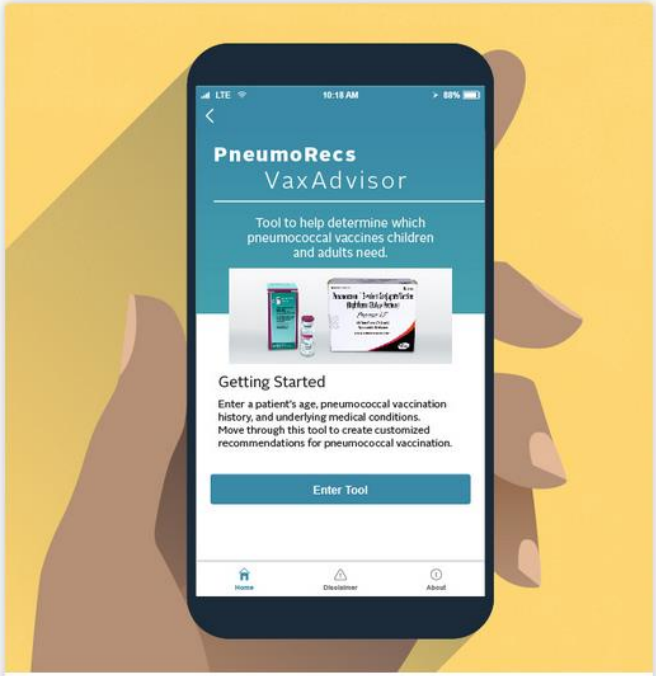
Then the app provides patient-specific guidance consistent with the immunization schedule recommended by the U.S. Advisory Committee on Immunization Practices (ACIP).

Download the App Today

Download PneumoRecs VaxAdvisor for free:

- iOS devices
- Android devices

Updates: CDC will release guideline changes and enhancements to the app itself through app updates.



PneumoRecs VaxAdvisor is available for download on iOS and Android mobile devices.

CDC Pneumococcal Vaccine Recommendations

Medicine + Public Health

*"The **benefits of vaccination extend beyond prevention of specific diseases in individuals.** They enable a rich, multifaceted harvest for societies and nations…Reducing child mortality…is a **moral obligation** for the international community as it is a **human right** for every individual to have the opportunity to live a healthier and fuller life…We conclude that a comprehensive vaccination programme is a cornerstone of good public health and **will reduce inequities and poverty.**"*

-WHO Bulletin, Andre FE, et al

THE END

Thank you for your attention!

Email anytime for questions: nchande@mednet.ucla.edu
(Ok to call/text too!)

Imgur.com, boredpanda.com

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