Deanna Tran, PharmD, BCACP
Assistant Professor
dtran@rx.umaryland.edu

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Disclosures

Deanna Tran declares no conflicts of interest, real or apparent, and no financial interest in any company, product, or service mentioned in this program, including grants, employment, gifts, stock holdings, and honoraria.

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Learning Objectives

At the end of the presentation, participants should be able to:

1. Correctly recognize the updated ACIP recommendations for the influenza vaccine.
2. Correctly identify the reconstitution method for the recombinant zoster vaccine.
3. Correctly identify the mechanism of action for Heplisav-B vaccine.

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Influenza

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Influenza Vaccine

- Vaccine information
  - 0.5mL dose (intradermal 0.1mL)
- Indication
  - Individuals ≥ 6 months
- Common side effects
  - Injection site reaction
  - Mild "flu-like" symptoms
- Contraindications
  - Severe allergic reaction from previous influenza vaccine

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Influenza Vaccines

- Vaccine type
  - Inactivated (IIV)
  - Live (LAIV)
- Strains
  - Trivalent (IIV3)
  - Quadrivalent (IIV4)
- Delivery method
  - Intramuscular
  - Intradermal (Fluzone Intradermal)
  - Intranasal (Flumist)
- High dose (Fluzone HD)
- Recombinant (Flublok, RIV/RIV3)
- Cell cultured (Flucelvax, ccIV4)
- Adjuvanted Inactivated (Fluad, aIIV3)

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Unique Influenza Vaccines

- Individuals 65+ year old
  - Fluzone High Dose (HD): 4 times the amount of antigen
  - Fluad: Adjuvant to increase body's immune response to vaccine
- Flumist
  - 2-49yo, quadrivalent, LAIV
  - Intranasal, preservative free
- Flublok
  - ≥ 18 years old, quadrivalent or trivalent
  - Protein-based, no egg products, preservative free
- Flucelvax
  - ≥ 4yo, quadrivalent
  - Animal-based, preservative free

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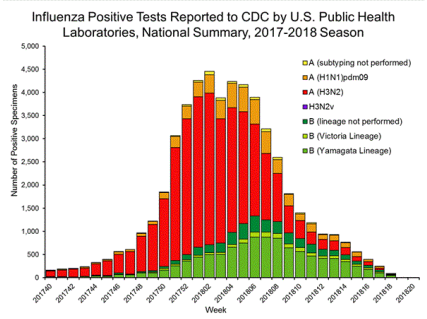
Flu Season 2017-2018



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Impact of No LAIV for Flu Seasons 2016-2018

- 2% decreased coverage in 5-12yo
- Overall influenza coverage did not change

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New Approvals

- Fluarix Quadrivalent
  - Jan 2018
  - Approved ≥ 6 months (previously 3+ years old)

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Influenza 2018-2019

- Trivalent
  - A/Michigan/45/2015 (H1N1 like virus)
  - **A/Singapore/INFIMH-16-0019/2016 (H3N2 like virus)**
  - **B/Colorado/06/2017 (Victoria lineage)**
- Quadrivalent
  - Addition of B/Phuket/3073/2013 (Yamagata lineage)

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LAIV Returns!

- ACIP recommends Intranasal LAIV4 for 2018-2019 flu season
  - A/Slovenia/2903/2015 (H1N1 like virus)
  - A/New Caledonia/71/2014 (H3N2 like virus)
  - B/Phuket/3073/2013 (Yamagata lineage)
  - B/Brisbane/60/2008 (Victoria lineage)
- ACIP continues to not have a preference for influenza vaccines
- New formulation not clinically tested

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Influenza Vaccine and Miscarriage

- Facts
  - Pregnant women are at high risk of serious flu complications including miscarriage
  - Flu vaccines have been given for decades to pregnant women with good safety records
  - Earlier studies of influenza vaccine did not indicate any increased risk of miscarriage

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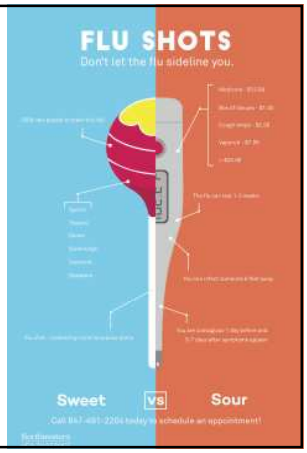
Influenza Vaccine and Miscarriage

- Case control study found that women vaccinated early in their pregnancy during the 2010-2011 season had an increased risk of spontaneous miscarriage 28 days after vaccination
  - Primarily during 1st trimester (when miscarriage risk is high)
  - Does not indicate causal relationship
  - Did not have an increased risk in 2011-2012
  - CDC currently evaluating 2012-2015 data
- Current recommendations still stand

Association of spontaneous abortion with receipt of inactivated influenza vaccine containing H1N1pdm09 in 2010-11 and 2011-12. Donahue JG, Kieke BA, King JP, et al. Vaccine. 2017;35(40): 5314-5322

Influenza Vaccine Summary

- Indication
  - Individuals ≥ 6 months (unless contraindicated)
  - No longer have egg allergy as a contraindication
- New vaccine strains and approvals
- LAIV will be available for 2018-2019 season
- Provide vaccine by October if possible



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Shingles

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Shingles

- Varicella-zoster virus
  - Remains dormant in cells
  - Reactivates as shingles
- Causes rash in dermatomes
- Complications
  - Postherpetic neuralgia (PHN)
  - Scarring
  - Bacterial infection
  - Ocular abnormalities, loss of vision

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Zostavax Vaccine (ZVL)

- Vaccine information
  - 0.65mL dose given subQ
  - Live vaccine
  - 1 lifetime dose
  - Requires reconstitution
- Indication
  - ACIP recommends ≥ 60 years old - One lifetime dose regardless of episode of zoster
  - FDA approved vaccine for adults ≥ 50 years old

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Zostavax Recommendations

- Common side effects
  - Injection site reaction
  - Headache
  - Rash
- Contraindications
  - Immunocompromised
  - Severe allergic reaction to gelatin, neomycin, or other vaccine components
  - Pregnant women

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Shingrix (RZV)

- Vaccine information
  - 0.5mL dose given IM
  - Inactivated vaccine
  - 2 doses (0, 2-6 months)
- Indication
  - ≥ 50 years old
- Common side effects
  - Injection site reaction (pain, redness, swelling)
  - Myalgia, headache, shivering, fever, stomach pain, nausea
- Contraindications
  - Severe allergic reaction to vaccine components

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Shingrix

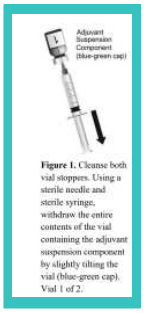

Figure 1. Cleanse both vial stoppers. Using a sterile needle and sterile syringe, withdraw the entire contents of the vial containing the adjuvant suspension component by slightly tilting the vial (blue-green cap). Vial 1 of 2.

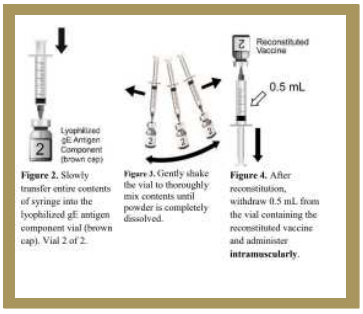

Figure 2. Slowly transfer entire contents of syringe into the lyophilized gE antigen component vial (brown cap). Vial 2 of 2.

Figure 3. Gently shake the vial to thoroughly mix contents until powder is completely dissolved.

Figure 4. After reconstitution, withdraw 0.5 mL from the vial containing the reconstituted vaccine and administer **intramuscularly**.

Photo from package insert

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Shingrix

- Storage:
  - Refrigerated (36-46◦F)
  - Once reconstituted, use immediately or store in refrigerator and used within 6 hours
- Supplied
  - 1 dose vials
  - 10 dose vials
- Pregnancy/lactation
  - No human data
  - No adverse effects on female rates for pregnancy and lactation

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Herpes Zoster Vaccine Comparison

	Zostavax (ZVL)	Shingrix (RZV)
Type of vaccine	Live	Inactivated
Route	Subcutaneous	Intramuscular
Storage	Frozen	Refrigerated
Dosing	0.65mL, 1 dose	0.5mL, 2 doses
Recommended population	≥ 60 year old	≥ 50 year old
Side effects	• Injection site reactions • Rash, headache • <0.9% of people experience grade 3 reactions	• Injection site reactions • Myalgia, headache, shivering, fever, stomach pain, nausea • 17% experience grade 3 reactions

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Herpes Zoster Vaccine Comparison

	Age	Zostavax (ZVL)	Shingrix (RZV)
VE - Shingles	50-59yo:	69%	96.6%
	60-69yo:	64%	97.4%
	70-79yo:	41%	91.3%
	≥ 80yo:	18%	91.3%
VE - PHN	50-59yo:	Not studied	100%
	60-69yo:	65.7%	100%
	70-79yo:	66.8%	93%
	≥ 80yo:	66.5%	71.2%
	Overall	66.5%	88.8%

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Shingrix

- Advantages
  - Increased access
  - Longer duration of protection: after 4 years - 85% VE for Shingrix vs 40% for Zostavax
  - Higher vaccine efficacy
  - Cost effective
- Disadvantages
  - Two doses - concerns of completing the series
  - New vaccine with possible unseen safety issues
  - VE data only available for 4 years
  - Higher incidence of local reactions

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Shingrix Resources

- *APhA*
  - *Pharmacist.com → Resources → Immunization center → Download Focus on Herpes Zoster:* https://www.pharmacist.com/sites/default/files/files/Focus_on_Herpes_Zoster_brochure.pdf
  - Comparison Chart Zostavax vs Shingrix: https://www.pharmacist.com/sites/default/files/files/2018ZosterVaccinesChartv9Final.pdf
- CDC's pages on herpes zoster
  - https://www.cdc.gov/shingles/vaccination.html
  - https://www.cdc.gov/vaccines/vpd/shingles/public/shingrix/index.html

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New ACIP Herpes Zoster Recommendations

- ACIP Recommendations
  - ACIP recommends RZV over ZVL
  - Revaccinate individuals who have received Zostavax
    - 8 weeks between vaccines
- Duration after shingles episode to vaccination remains unclear
  - After acute symptoms resolve
  - After 3 months or as long as 1 year
- Suggestions to reach patients for 2nd dose
  - Appointments/synchronous programs
  - Reminder systems

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Shingrix Shortage

- Shortage due to high level of demand
  - Ordering limits
  - Intermittent shipping delays through June 2018
  - No prioritization of patients are recommended at this time

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Herpes Zoster Vaccine Summary and Pearls

- Summary
  - Shingles vaccine is now recommended for individuals 50+ yo
  - RZV is a two dose series (0, 2-6 months)
  - Recommend RZV over ZVL
  - Revaccinate individuals who have received ZVL (8 weeks between vaccines)
- Pearls
  - RZV is given IM
  - Provide the correct VIS
  - It is refrigerated, not frozen

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Measles, Mumps, Rubella (MMR)

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Mumps

- Transmission: Saliva or mucus
- Incubation: 12-25 days
- Symptoms: fever, headache, myalgia, loss of appetite, parotitis
- Complications: orchitis, encephalitis, meningitis, mastitis, deafness

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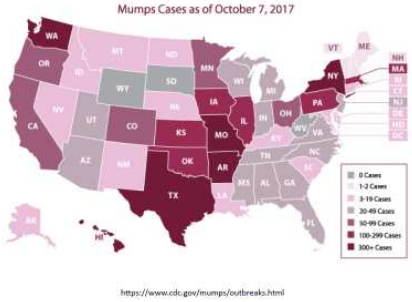
Mumps outbreak



https://www.cdc.gov/mumps/outbreaks.html

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MMR Vaccine

- Vaccine information
  - Measles, mumps, and rubella
  - MMR-II vaccine
  - 0.5mL dose given subQ
  - Live vaccine
  - 2 doses (12-15 months, 4-6yo)
- Indication:
  - Adults born after 1957 without documented evidence of immunity
  - HCP, college students, international travelers, women of childbearing age

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MMR Vaccine

- Common side effects:
  - Injection site reactions, fever, diarrhea, nausea
- Contraindications
  - Severe allergic reaction from previous vaccine
  - Anaphylactic reaction to neomycin, gelatin
  - Pregnancy
  - Immunocompromised

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New ACIP MMR Recommendations

- Recommend 1 additional dose of MMR during outbreaks
  - Will provide short term boost in antibodies
  - No serious adverse effects in giving 3rd dose
- Indicated for those who are in an area of outbreak:
  - Previously vaccinated with 2 doses → receive 3rd dose during an outbreak
  - Received less than 2 doses and considered at increased risk → should receive 1 dose

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Hepatitis A

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Hepatitis A

- Transmission: Fecal-oral route, contaminated food or water
- Incubation: 28 days
- Symptoms:
  - Children: Mostly asymptomatic
  - Adults: Fever, fatigue, loss of appetite, nausea, vomiting, dark urine, joint pain, jaundice
- Complications
  - Fulminant hepatitis
- Hep A outbreaks: 2500 reports of outbreaks from Jan 2017-April 2018

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Hepatitis A Vaccine

- Vaccine information
  - Havrix, Vaqta (and Twinrix – Hep A and Hep B) vaccines
  - 0.5mL dose for pediatrics; 1mL for adults given IM
  - Inactivated vaccine
  - 2 doses (0, 6 months)

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Hepatitis A Vaccine

- Adult indications
  - Sexual exposure (MSM)
  - Injection drug use
  - Travel to endemic HAV area, working with HAV patients/research, close contact with international adoptee from an endemic area, close contact with person receiving clotting factor concentrates
  - Chronic liver disease
- Common side effects: injection site reactions
- Contraindications: severe allergic reaction to previous dose

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New ACIP Hepatitis A Recommendations

- Post-exposure prophylaxis for Hep A
  - Prefer hepatitis A vaccine
    - Individuals 12 months – 40yo with no chronic conditions or contraindications to vaccine
  - Prefer immune globulin (IG)
    - Individuals ≤ 12 months old, individuals > 40yo
    - Immunocompromised
    - Chronic liver disease
- All those exposed to individual with hepatitis A should be vaccinated
  - Close personal contact
  - Childcare centers
  - Common-source exposure
- Upcoming change: IG dose now 5x the amount (0.1-0.2mL/kg)

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Hepatitis B

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Hepatitis B

- Transmission: Percutaneous or mucosal contact with blood or bodily fluids
- Incubation: 90 days
- Symptoms:
  - May be asymptomatic for children <5yos or immunosuppressed adults
  - Fever, fatigue, loss of appetite, nausea, vomiting, dark urine, joint pain, jaundice
- Complications
  - Fulminant hepatitis

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Hepatitis B Vaccine

- Vaccine information
  - Engerix-B, Recombivax-HB vaccines
  - 0.5mL dose for pediatrics; 1mL for adults given IM
  - Inactivated vaccine
  - 3 doses (0, 1, 6 months)
- Adult indication
  - Sexual exposure
  - Injection drug use
  - Healthcare workers
  - Traveling to endemic HBV area
  - Living with someone with chronic HBV, disabled persons in long term care facilities, correctional facilities
  - Chronic diseases: chronic liver disease (including HCV), HIV, diabetes (<60yo), hemodialysis patients

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Hepatitis B Vaccine

- Common side effects: injection site reactions
- Contraindications: severe allergic reaction to previous dose
- Status: lower supply of pediatric hepatitis B vaccine through 2018

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Heplisav-B (HepB-CpG)

- Became available in Jan 2018
- Combines HepB surface antigen with TLR9 agonist to enhance the immune response
- Improved protection compared to current Hepatitis B vaccines
  - 70.5%-90.2% (Engerix-B, Recombivax-HB) vs. 90%-100% (Heplisav-B)
  - Better response in patients with diabetes and kidney disease

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Heplisav-B (HepB-CpG)

- 0.5mL dose given IM
- Inactivated vaccine
- 2 doses (0, 1 month)
- Indicated for ≥ 18yo who are at risk
  - If series started with another HepB vaccine, may incorporate Heplisav-B, but must have 3 total HepB vaccine doses
- Common side effects
  - Injection site reactions
  - Fatigue
  - Headache
- Contraindications
  - Severe allergic reaction to previous dose

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Coming Up!

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Coming Up!

- Change to HPV recommendations
  - Oropharyngeal cancer rates increasing in males
- Malaria: Phase III
- TB: Phase I/II
- Dengue: Phase IV
- Pneumococcal infection: Phase I-IV, new combos and new valency

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Vaccine Administration

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Shoulder Injury Related to Vaccine Administration (SIRVA)

- Unintended injection of vaccine into underlying bursa or joint space of shoulder
- Symptoms:
  - Shoulder pain
  - Restricted range of motion
  - Onset <48 hours after vaccination
  - Symptoms last 1 week - years

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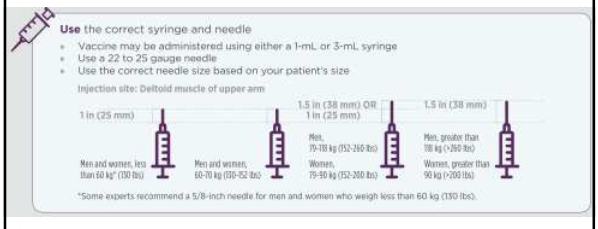
Injections



Picture from: https://www.cdc.gov/vaccines/hcp/infographics/call-the-shots.pdf

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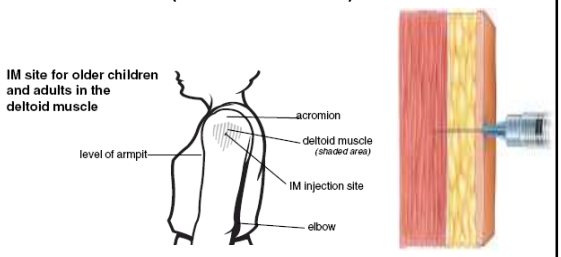
Intramuscular (IM) Injection Administration (Adult and Child)



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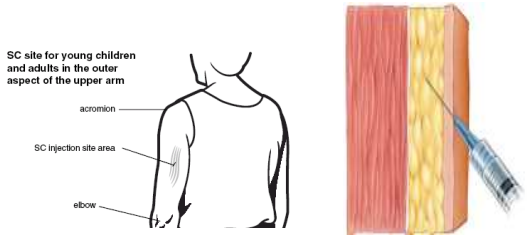
Subcutaneous injection administration (Adult and Child)



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THE VAXXERS
IMMUNITY WARS

Deanna Tran, PharmD, BCACP
Assistant Professor
dtran@rx.umaryland.edu

Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2018

In February 2018, the *Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2018* became effective, as recommended by the Advisory Committee on Immunization Practices (ACIP) and approved by the Centers for Disease Control and Prevention (CDC). The adult immunization schedule was also approved by the American College of Physicians, the American Academy of Family Physicians, the American College of Obstetricians and Gynecologists, and the American College of Nurse-Midwives.

CDC announced the availability of the 2018 adult immunization schedule in the *Morbidity and Mortality Weekly Report* (*MMWR*).[1] The schedule is published in its entirety in the *Annals of Internal Medicine*.[2]

The adult immunization schedule consists of figures that summarize routinely recommended vaccines for adults by age groups and medical conditions and other indications, footnotes for the figures, and a table of vaccine contraindications and precautions. Note the following when reviewing the adult immunization schedule:

- The figures in the adult immunization schedule should be reviewed with the accompanying footnotes.
- The figures and footnotes display indications for which vaccines, if not previously administered, should be administered unless noted otherwise.
- The table of contraindications and precautions identifies populations and situations for which vaccines should not be used or should be used with caution.
- When indicated, administer recommended vaccines to adults whose vaccination history is incomplete or unknown.
- Increased interval between doses of a multidose vaccine series does not diminish vaccine effectiveness; it is not necessary to restart the vaccine series or add doses to the series because of an extended interval between doses.
- Combination vaccines may be used when any component of the combination is indicated and when the other components of the combination are not contraindicated.
- The use of trade names in the adult immunization schedule is for identification purposes only and does not imply endorsement by the ACIP or CDC.

Special populations that need additional considerations include:

- Pregnant women. Pregnant women should receive the tetanus, diphtheria, and acellular pertussis vaccine (Tdap) during pregnancy and the influenza vaccine during or before pregnancy. Live vaccines (e.g., measles, mumps, and rubella vaccine [MMR]) are contraindicated.
- Asplenia. Adults with asplenia have specific vaccination recommendations because of their increased risk for infection by encapsulated bacteria. Anatomical or functional asplenia includes congenital or acquired asplenia, splenic dysfunction, sickle cell disease and other hemoglobinopathies, and splenectomy.
- Immunocompromising conditions. Adults with immunosuppression should generally avoid live vaccines. Inactivated vaccines (e.g., pneumococcal vaccines) are generally acceptable. High-level immunosuppression includes HIV infection with a CD4 cell count <200 cells/μL, receipt of daily corticosteroid therapy with ≥20 mg of prednisone or equivalent for ≥14 days, primary immunodeficiency disorder (e.g., severe combined immunodeficiency or complement component deficiency), and receipt of cancer chemotherapy. Other immunocompromising conditions and immunosuppressive medications to consider when vaccinating adults can be found in *IDSA Clinical Practice Guideline for Vaccination of the Immunocompromised Host*.[3] Additional information on vaccinating immunocompromised adults is in *General Best Practice Guidelines for Immunization*.[4]

Additional resources for health care providers include:

- Details on vaccines recommended for adults and complete ACIP statements at www.cdc.gov/vaccines/hcp/acip-recs/index.html
- Vaccine Information Statements that explain benefits and risks of vaccines at www.cdc.gov/vaccines/hcp/vis/index.html
- Information and resources on vaccinating pregnant women at www.cdc.gov/vaccines/adults/rec-vac/pregnant.html
- Information on travel vaccine requirements and recommendations at www.cdc.gov/travel/destinations/list
- CDC Vaccine Schedules App for immunization service providers to download at www.cdc.gov/vaccines/schedules/hcp/schedule-app.html
- Adult Vaccination Quiz for self-assessment of vaccination needs based on age, health conditions, and other indications at www2.cdc.gov/nip/adultimmsched/default.asp
- *Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger* at www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html

Report suspected cases of reportable vaccine-preventable diseases to the local or state health department, and report all clinically significant postvaccination events to the Vaccine Adverse Event Reporting System at www.vaers.hhs.gov or by telephone, 800-822-7967. All vaccines included in the adult immunization schedule except 23-valent pneumococcal polysaccharide and zoster vaccines are covered by the Vaccine Injury Compensation Program. Information on how to file a vaccine injury claim is available at www.hrsa.gov/vaccinecompensation or by telephone, 800-338-2382. Submit questions and comments to CDC through www.cdc.gov/cdc-info or by telephone, 800-CDC-INFO (800-232-4636), in English and Spanish, 8:00am–8:00pm ET, Monday–Friday, excluding holidays.

The following abbreviations are used for vaccines in the adult immunization schedule (in the order of their appearance):

IIV	inactivated influenza vaccine
RIV	recombinant influenza vaccine
Tdap	tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine
Td	tetanus and diphtheria toxoids
MMR	measles, mumps, and rubella vaccine
VAR	varicella vaccine
RZV	recombinant zoster vaccine
ZVL	zoster vaccine live
HPV vaccine	human papillomavirus vaccine
PCV13	13-valent pneumococcal conjugate vaccine
PPSV23	23-valent pneumococcal polysaccharide vaccine
HepA	hepatitis A vaccine
HepA-HepB	hepatitis A vaccine and hepatitis B vaccine
HepB	hepatitis B vaccine
MenACWY	serogroups A, C, W, and Y meningococcal vaccine
MenB	serogroup B meningococcal vaccine
Hib	*Haemophilus influenzae* type b vaccine

1. MMWR Morb Mortal Wkly Rep. 2018;66(5). Available at www.cdc.gov/mmwr/volumes/67/wr/mm6705e3.htm.
2. Ann Intern Med. 2018;168:210–220. Available at annals.org/aim/article/doi/10.7326/M17-3439.
3. Clin Infect Dis. 2014;58:e44-100. Available at www.idsociety.org/Templates/Content.aspx?id=32212256011.
4. ACIP. Available at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Figure 1. Recommended immunization schedule for adults aged 19 years or older by age group, United States, 2018

This figure should be reviewed with the accompanying footnotes. This figure and the footnotes describe indications for which vaccines, if not previously administered, should be administered unless noted otherwise.

Vaccine	19–21 years	22–26 years	27–49 years	50–64 years	≥65 years
Influenza[1]	1 dose annually				
Tdap[2] or Td[2]	1 dose Tdap, then Td booster every 10 yrs				
MMR[3]	1 or 2 doses depending on indication (if born in 1957 or later)				
VAR[4]	2 doses				
RZV[5] (preferred)				2 doses RZV (preferred)	
or				or	
ZVL[5]					1 dose ZVL
HPV–Female[6]	2 or 3 doses depending on age at series initiation				
HPV–Male[6]	2 or 3 doses depending on age at series initiation				
PCV13[7]	1 dose				
PPSV23[7]	1 or 2 doses depending on indication				1 dose
HepA[8]	2 or 3 doses depending on vaccine				
HepB[9]	3 doses				
MenACWY[10]	1 or 2 doses depending on indication, then booster every 5 yrs if risk remains				
MenB[10]	2 or 3 doses depending on vaccine				
Hib[11]	1 or 3 doses depending on indication				

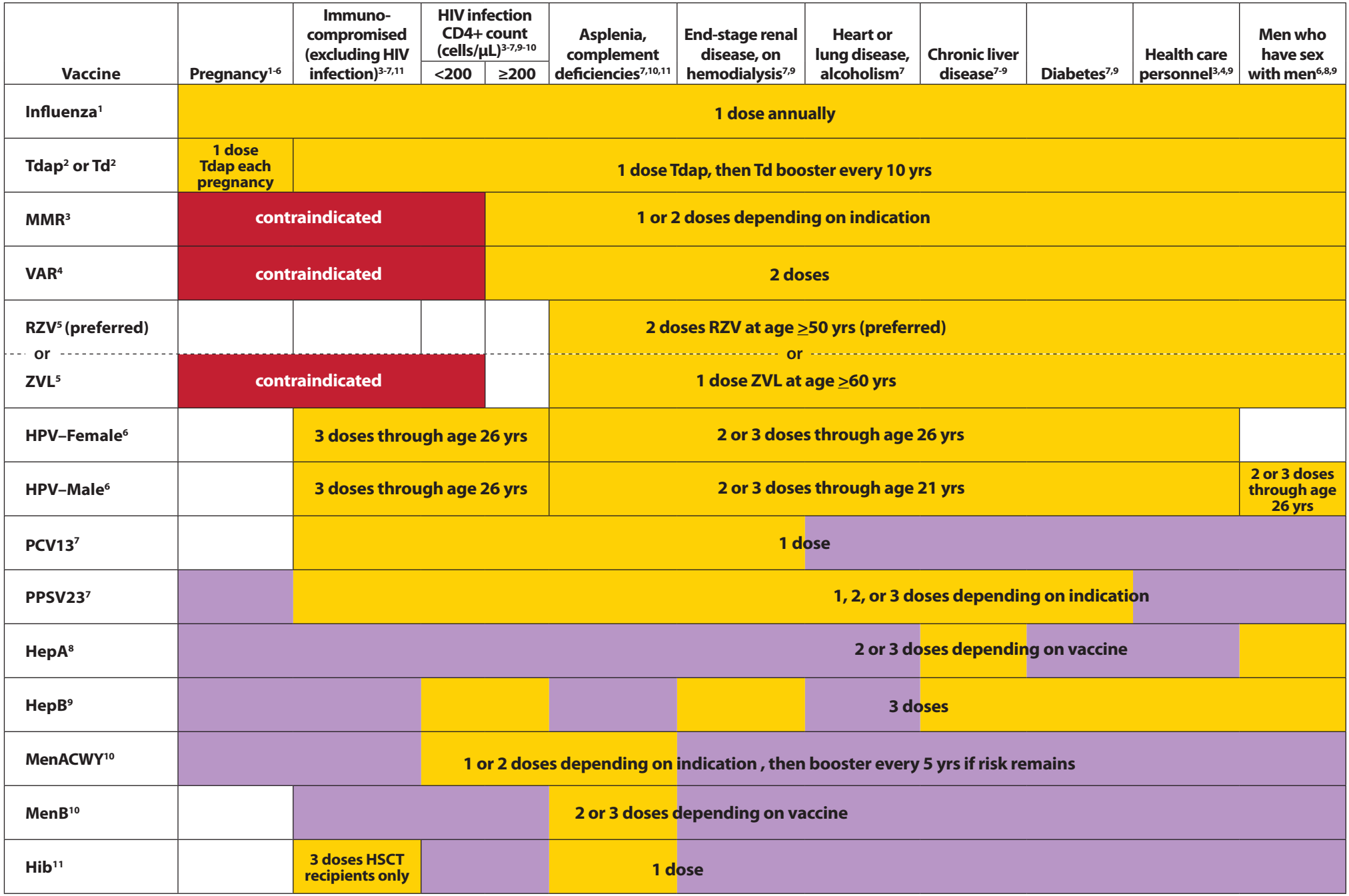
Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection

Recommended for adults with other indications

No recommendation

Figure 2. Recommended immunization schedule for adults aged 19 years or older by medical condition and other indications, United States, 2018

This figure should be reviewed with the accompanying footnotes. This figure and the footnotes describe indications for which vaccines, if not previously administered, should be administered unless noted otherwise.



Footnotes. Recommended immunization schedule for adults aged 19 years or older, United States, 2018

1. Influenza vaccination
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/flu.html

General information

- Administer 1 dose of age-appropriate inactivated influenza vaccine (IIV) or recombinant influenza vaccine (RIV) annually
- Live attenuated influenza vaccine (LAIV) is not recommended for the 2017–2018 influenza season
- A list of currently available influenza vaccines is available at www.cdc.gov/flu/protect/vaccine/vaccines.htm

Special populations

- Administer age-appropriate IIV or RIV to:
  - **Pregnant women**
  - Adults with **hives-only egg allergy**
  - Adults with **egg allergy other than hives** (e.g., angioedema or respiratory distress): Administer IIV or RIV in a medical setting under supervision of a health care provider who can recognize and manage severe allergic conditions

2. Tetanus, diphtheria, and pertussis vaccination
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/tdap-td.html

General information

- Administer to adults who previously did not receive a dose of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) as an adult or child (routinely recommended at age 11–12 years) 1 dose of Tdap, followed by a dose of tetanus and diphtheria toxoids (Td) booster every 10 years
- Information on the use of Tdap or Td as tetanus prophylaxis in wound management is available at www.cdc.gov/mmwr/preview/mmwrhtml/rr5517a1.htm

Special populations

- **Pregnant women**: Administer 1 dose of Tdap during each pregnancy, preferably in the early part of gestational weeks 27–36

3. Measles, mumps, and rubella vaccination
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mmr.html

General information

- Administer 1 dose of measles, mumps, and rubella vaccine (MMR) to adults with no evidence of immunity to measles, mumps, or rubella
- Evidence of immunity is:
  - Born before 1957 (except for health care personnel, see below)
  - Documentation of receipt of MMR
  - Laboratory evidence of immunity or disease
- Documentation of a health care provider-diagnosed disease without laboratory confirmation is not considered evidence of immunity

Special populations

- **Pregnant women and nonpregnant women of childbearing age** with no evidence of immunity to rubella: Administer 1 dose of MMR (if pregnant, administer MMR after pregnancy and before discharge from health care facility)
- **HIV infection and CD4 cell count ≥200 cells/μL for at least 6 months** and no evidence of immunity to measles, mumps, or rubella: Administer 2 doses of MMR at least 28 days apart
- **Students in postsecondary educational institutions, international travelers**, and **household contacts of immunocompromised persons**: Administer 2 doses of MMR at least 28 days apart (or 1 dose of MMR if previously administered 1 dose of MMR)
- **Health care personnel born in 1957 or later** with no evidence of immunity: Administer 2 doses of MMR at least 28 days apart for measles or mumps, or 1 dose of MMR for rubella (if born before 1957, consider MMR vaccination)
- Adults who **previously received ≤2 doses of mumps-containing vaccine and are identified by public health authority to be at increased risk for mumps in an outbreak**: Administer 1 dose of MMR
- MMR is contraindicated for pregnant women and adults with severe immunodeficiency

4. Varicella vaccination
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/varicella.html

General information

- Administer to adults without evidence of immunity to varicella 2 doses of varicella vaccine (VAR) 4–8 weeks apart if previously received no varicella-containing vaccine (if previously received 1 dose of varicella-containing vaccine, administer 1 dose of VAR at least 4 weeks after the first dose)
- Evidence of immunity to varicella is:
  - U.S.-born before 1980 (except for pregnant women and health care personnel, see below)
  - Documentation of receipt of 2 doses of varicella or varicella-containing vaccine at least 4 weeks apart
  - Diagnosis or verification of history of varicella or herpes zoster by a health care provider
  - Laboratory evidence of immunity or disease

Special populations

- Administer 2 doses of VAR 4–8 weeks apart if previously received no varicella-containing vaccine (if previously received 1 dose of varicella-containing vaccine, administer 1 dose of VAR at least 4 weeks after the first dose) to:
  - **Pregnant women without evidence of immunity**: Administer the first of the 2 doses or the second dose after pregnancy and before discharge from health care facility
  - **Health care personnel without evidence of immunity**
- Adults with **HIV infection and CD4 cell count ≥200 cells/μL**: May administer, based on individual clinical decision, 2 doses of VAR 3 months apart
- VAR is contraindicated for pregnant women and adults with severe immunodeficiency

5. Zoster vaccination
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/shingles.html

General information

- Administer 2 doses of recombinant zoster vaccine (RZV) 2–6 months apart to adults aged 50 years or older regardless of past episode of herpes zoster or receipt of zoster vaccine live (ZVL)
- Administer 2 doses of RZV 2–6 months apart to adults who previously received ZVL at least 2 months after ZVL
- For adults aged 60 years or older, administer either RZV or ZVL (RZV is preferred)

Special populations

- ZVL is contraindicated for pregnant women and adults with severe immunodeficiency

6. Human papillomavirus vaccination
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/hpv.html

General information

- Administer human papillomavirus (HPV) vaccine to **females through age 26 years** and **males through age 21 years** (males aged 22 through 26 years may be vaccinated based on individual clinical decision)
- The number of doses of HPV vaccine to be administered depends on age at initial HPV vaccination
  - **No previous dose of HPV vaccine**: Administer 3-dose series at 0, 1–2, and 6 months (minimum intervals: 4 weeks between doses 1 and 2, 12 weeks between doses 2 and 3, and 5 months between doses 1 and 3; repeat doses if given too soon)
  - **Aged 9–14 years at HPV vaccine series initiation and received 1 dose or 2 doses less than 5 months apart**: Administer 1 dose
  - **Aged 9–14 years at HPV vaccine series initiation and received 2 doses at least 5 months apart**: No additional dose is needed

Special populations

- Adults with **immunocompromising conditions (including HIV infection)** through age 26 years: Administer 3-dose series at 0, 1–2, and 6 months
- **Men who have sex with men** through age 26 years: Administer 2- or 3-dose series depending on age at initial vaccination (see above); if no history of HPV vaccine, administer 3-dose series at 0, 1–2, and 6 months
- **Pregnant women** through age 26 years: HPV vaccination is not recommended during pregnancy, but there is no evidence that the vaccine is harmful and no intervention needed for women who inadvertently receive HPV vaccine while pregnant; delay remaining doses until after pregnancy; pregnancy testing is not needed before vaccination

7. Pneumococcal vaccination
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/pneumo.html

General information

- Administer to immunocompetent adults aged 65 years or older 1 dose of 13-valent pneumococcal conjugate vaccine (PCV13), if not previously administered, followed by 1 dose of 23-valent pneumococcal polysaccharide vaccine (PPSV23) at least 1 year after PCV13; if PPSV23 was previously administered but not PCV13, administer PCV13 at least 1 year after PPSV23
- When both PCV13 and PPSV23 are indicated, administer PCV13 first (PCV13 and PPSV23 should not be administered during the same visit); additional information on vaccine timing is available at www.cdc.gov/vaccines/vpd/pneumo/downloads/pneumo-vaccine-timing.pdf

Special populations

- Administer to adults aged 19 through 64 years with the following chronic conditions 1 dose of PPSV23 (at age 65 years or older, administer 1 dose of PCV13, if not previously received, and another dose of PPSV23 at least 1 year after PCV13 and at least 5 years after PPSV23):
  - **Chronic heart disease** (excluding hypertension)
  - **Chronic lung disease**
  - **Chronic liver disease**
  - **Alcoholism**
  - **Diabetes mellitus**
  - **Cigarette smoking**
- Administer to adults aged 19 years or older with the following indications 1 dose of PCV13 followed by 1 dose of PPSV23 at least 8 weeks after PCV13, and a second dose of PPSV23 at least 5 years after the first dose of PPSV23 (if the most recent dose of PPSV23 was administered before age 65 years, at age 65 years or older, administer another dose of PPSV23 at least 5 years after the last dose of PPSV23):
  - **Immunodeficiency disorders (**including B- and T-lymphocyte deficiency, complement deficiencies, and phagocytic disorders)
  - **HIV infection**
  - **Anatomical or functional asplenia (**including sickle cell disease and other hemoglobinopathies)
  - **Chronic renal failure and nephrotic syndrome**
- Administer to adults aged 19 years or older with the following indications 1 dose of PCV13 followed by 1 dose of PPSV23 at least 8 weeks after PCV13 (if the dose of PPSV23 was administered before age 65 years, at age 65 years or older, administer another dose of PPSV23 at least 5 years after the last dose of PPSV23):
  - **Cerebrospinal fluid leak**
  - **Cochlear implant**

8. Hepatitis A vaccination

www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/hepa.html

General information

- Administer to adults who have a specific risk (see below), or lack a risk factor but want protection, 2-dose series of single antigen hepatitis A vaccine (HepA; Havrix at 0 and 6–12 months or Vaqta at 0 and 6–18 months; minimum interval: 6 months) or a 3-dose series of combined hepatitis A and hepatitis B vaccine (HepA-HepB) at 0, 1, and 6 months; minimum intervals: 4 weeks between first and second doses, 5 months between second and third doses

Special populations

- Administer HepA or HepA-HepB to adults with the following indications:
  - **Travel** to or work in countries with high or intermediate hepatitis A endemicity
  - **Men who have sex with men**
  - **Injection or noninjection drug use**
  - **Work with hepatitis A virus in a research laboratory or with nonhuman primates infected with hepatitis A virus**
  - **Clotting factor disorders**
  - **Chronic liver disease**
  - Close, personal **contact with an international adoptee** (e.g., household or regular babysitting) during the first 60 days after arrival in the United States from a country with high or intermediate endemicity (administer the first dose as soon as the adoption is planned)
  - Healthy adults **through age 40 years who have recently been exposed to hepatitis A virus**; adults older than age 40 years may receive HepA if hepatitis A immunoglobulin cannot be obtained

9. Hepatitis B vaccination

www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/hepb.html

General information

- Administer to adults who have a specific risk (see below), or lack a risk factor but want protection, 3-dose series of single antigen hepatitis B vaccine (HepB) or combined hepatitis A and hepatitis B vaccine (HepA-HepB) at 0, 1, and 6 months (minimum intervals: 4 weeks between doses 1 and 2 for HepB and HepA-HepB; between doses 2 and 3, 8 weeks for HepB and 5 months for HepA-HepB)

Special populations

- Administer HepB or HepA-HepB to adults with the following indications:
  - **Chronic liver disease** (e.g., hepatitis C infection, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, alanine aminotransferase [ALT] or aspartate aminotransferase [AST] level greater than twice the upper limit of normal)
  - **HIV infection**
  - **Percutaneous or mucosal risk of exposure to blood** (e.g., **household contacts** of hepatitis B surface antigen [HBsAg]-positive persons; adults younger than age 60 years with **diabetes mellitus** or aged 60 years or older with diabetes mellitus based on individual clinical decision; adults in predialysis care or receiving **hemodialysis or peritoneal dialysis**; recent or current **injection drug users**; **health care and public safety workers** at risk for exposure to blood or blood-contaminated body fluids)
  - **Sexual exposure risk** (e.g., sex partners of HBsAg-positive persons; sexually active persons not in a mutually monogamous relationship; persons seeking evaluation or treatment for a sexually transmitted infection; and **men who have sex with men** [MSM])
  - Receive care in **settings where a high proportion of adults have risks for hepatitis B infection** (e.g., facilities providing sexually transmitted disease treatment, drug-abuse treatment and prevention services, hemodialysis and end-stage renal disease programs, institutions for developmentally disabled persons, health care settings targeting services to injection drug users or MSM, HIV testing and treatment facilities, and correctional facilities)
  - **Travel** to countries with high or intermediate hepatitis B endemicity

10. Meningococcal vaccination

www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mening.html

Special populations: Serogroups A, C, W, and Y meningococcal vaccine (MenACWY)

- Administer 2 doses of MenACWY at least 8 weeks apart and revaccinate with 1 dose of MenACWY every 5 years, if the risk remains, to adults with the following indications:
  - **Anatomical or functional asplenia (**including sickle cell disease and other hemoglobinopathies)
  - **HIV infection**
  - **Persistent complement component deficiency**
  - **Eculizumab use**
- Administer 1 dose of MenACWY and revaccinate with 1 dose of MenACWY every 5 years, if the risk remains, to adults with the following indications:
  - **Travel to or live in countries where meningococcal disease is hyperendemic or epidemic**, including countries in the African meningitis belt or during the Hajj
  - At risk from a **meningococcal disease outbreak attributed to serogroup A, C, W, or Y**
  - **Microbiologists** routinely exposed to *Neisseria meningitidis*
  - **Military recruits**
  - **First-year college students who live in residential housing** (if they did not receive MenACWY at age 16 years or older)

General Information: Serogroup B meningococcal vaccine (MenB)

- May administer, based on individual clinical decision, to young adults and adolescents aged 16–23 years (preferred age is 16–18 years) who are not at increased risk 2-dose series of MenB-4C (Bexsero) at least 1 month apart or 2-dose series of MenB-FHbp (Trumenba) at least 6 months apart
- MenB-4C and MenB-FHbp are not interchangeable

Special populations: MenB

- Administer 2-dose series of MenB-4C at least 1 month apart or 3-dose series of MenB-FHbp at 0, 1–2, and 6 months to adults with the following indications:
  - **Anatomical or functional asplenia** (including sickle cell disease)
  - **Persistent complement component deficiency**
  - **Eculizumab use**
  - At risk from a **meningococcal disease outbreak attributed to serogroup B**
  - **Microbiologists** routinely exposed to *Neisseria meningitidis*

11. *Haemophilus influenzae* type b vaccination

www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/hib.html

Special populations

- Administer *Haemophilus influenzae* type b vaccine (Hib) to adults with the following indications:
  - **Anatomical or functional asplenia** (including sickle cell disease) or undergoing elective splenectomy: Administer 1 dose if not previously vaccinated (preferably at least 14 days before elective splenectomy)
  - **Hematopoietic stem cell transplant** (HSCT): Administer 3-dose series with doses 4 weeks apart starting 6 to 12 months after successful transplant regardless of Hib vaccination history

Table. Contraindications and precautions for vaccines recommended for adults aged 19 years or older*

The Advisory Committee on Immunization Practices (ACIP) recommendations and package inserts for vaccines provide information on contraindications and precautions related to vaccines. Contraindications are conditions that increase chances of a serious adverse reaction in vaccine recipients and the vaccine should not be administered when a contraindication is present. Precautions should be reviewed for potential risks and benefits for vaccine recipients.

Contraindications and precautions for vaccines routinely recommended for adults

Vaccine(s)	Contraindications	Precautions
All vaccines routinely recommended for adults	• Severe reaction, e.g., anaphylaxis, after a previous dose or to a vaccine component	• Moderate or severe acute illness with or without fever

Additional contraindications and precautions for vaccines routinely recommended for adults

Vaccine(s)	Additional Contraindications	Additional Precautions
IIV[1]		• History of Guillain-Barré syndrome within 6 weeks after previous influenza vaccination • Egg allergy other than hives, e.g., angioedema, respiratory distress, lightheadedness, or recurrent emesis; or required epinephrine or another emergency medical intervention (IIV may be administered in an inpatient or outpatient medical setting and under the supervision of a health care provider who is able to recognize and manage severe allergic conditions)
RIV[1]		• History of Guillain-Barré syndrome within 6 weeks after previous influenza vaccination
Tdap, Td	• For pertussis-containing vaccines: encephalopathy, e.g., coma, decreased level of consciousness, or prolonged seizures, not attributable to another identifiable cause within 7 days of administration of a previous dose of a vaccine containing tetanus or diphtheria toxoid or acellular pertussis	• Guillain-Barré syndrome within 6 weeks after a previous dose of tetanus toxoid-containing vaccine • History of Arthus-type hypersensitivity reactions after a previous dose of tetanus or diphtheria toxoid-containing vaccine. Defer vaccination until at least 10 years have elapsed since the last tetanus toxoid-containing vaccine • For pertussis-containing vaccine, progressive or unstable neurologic disorder, uncontrolled seizures, or progressive encephalopathy (until a treatment regimen has been established and the condition has stabilized)
MMR[2]	• Severe immunodeficiency, e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency or long-term immunosuppressive therapy[3], human immunodeficiency virus (HIV) infection with severe immunocompromise • Pregnancy	• Recent (within 11 months) receipt of antibody-containing blood product (specific interval depends on product)[4] • History of thrombocytopenia or thrombocytopenic purpura • Need for tuberculin skin testing[5]
VAR[2]	• Severe immunodeficiency, e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency or long-term immunosuppressive therapy[3], HIV infection with severe immunocompromise • Pregnancy	• Recent (within 11 months) receipt of antibody-containing blood product (specific interval depends on product)[4] • Receipt of specific antiviral drugs (acyclovir, famciclovir, or valacyclovir) 24 hours before vaccination (avoid use of these antiviral drugs for 14 days after vaccination)
ZVL[2]	• Severe immunodeficiency, e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency or long-term immunosuppressive therapy[3], HIV infection with severe immunocompromise • Pregnancy	• Receipt of specific antiviral drugs (acyclovir, famciclovir, or valacyclovir) 24 hours before vaccination (avoid use of these antiviral drugs for 14 days after vaccination)
HPV vaccine		• Pregnancy
PCV13	• Severe allergic reaction to any vaccine containing diphtheria toxoid	

1. For additional information on use of influenza vaccines among persons with egg allergy, see: CDC. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices—United States, 2016–17 influenza season. MMWR. 2016;65(RR-5):1–54. Available at www.cdc.gov/mmwr/volumes/65/rr/rr6505a1.htm.
2. MMR may be administered together with VAR or ZVL on the same day. If not administered on the same day, separate live vaccines by at least 28 days.
3. Immunosuppressive steroid dose is considered to be daily receipt of 20 mg or more prednisone or equivalent for 2 or more weeks. Vaccination should be deferred for at least 1 month after discontinuation of immunosuppressive steroid therapy. Providers should consult ACIP recommendations for complete information on the use of specific live vaccines among persons on immune-suppressing medications or with immune suppression because of other reasons.
4. Vaccine should be deferred for the appropriate interval if replacement immune globulin products are being administered. See: Best practices guidance of the Advisory Committee on Immunization Practices (ACIP). Available at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html.
5. Measles vaccination may temporarily suppress tuberculin reactivity. Measles-containing vaccine may be administered on the same day as tuberculin skin testing, or should be postponed for at least 4 weeks after vaccination.

* Adapted from: CDC. Table 6. Contraindications and precautions to commonly used vaccines. General recommendations on immunization: recommendations of the Advisory Committee on Immunization Practices. MMWR. 2011;60(No. RR-2):40–1 and from: Hamborsky J, Kroger A, Wolfe S, eds. Appendix A. Epidemiology and prevention of vaccine preventable diseases. 13th ed. Washington, DC: Public Health Foundation, 2015. Available at www.cdc.gov/vaccines/pubs/pinkbook/index.html.

Abbreviations of vaccines

IIV	inactivated influenza vaccine	VAR	varicella vaccine	HepA	hepatitis A vaccine
RIV	recombinant influenza vaccine	RZV	recombinant zoster vaccine	HepA-HepB	hepatitis A and hepatitis B vaccines
Tdap	tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine	ZVL	zoster vaccine live	HepB	hepatitis B vaccine
		HPV vaccine	human papillomavirus vaccine	MenACWY	serogroups A, C, W, and Y meningococcal vaccine
Td	tetanus and diphtheria toxoids	PCV13	13-valent pneumococcal conjugate vaccine	MenB	serogroup B meningococcal vaccine
MMR	measles, mumps, and rubella vaccine	PPSV23	23-valent pneumococcal polysaccharide vaccine	Hib	*Haemophilus influenzae* type b vaccine

TABLE 4-1. Contraindications and precautions[(a)] to commonly used vaccines

Vaccine	Contraindications	Precautions
DT, Td	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component	• GBS <6 weeks after previous dose of tetanus-toxoid–containing vaccine • History of Arthus-type hypersensitivity reactions after a previous dose of diphtheria-toxoid—containing or tetanus-toxoid–containing vaccine; 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
DTaP	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • Encephalopathy (e.g., coma, decreased level of consciousness, prolonged seizures), not attributable to another identifiable cause, within 7 days of administration of previous dose of DTP or DTaP	• Progressive neurologic disorder, including infantile spasms, uncontrolled epilepsy, progressive encephalopathy; defer DTaP until neurologic status clarified and stabilized • Temperature of ≥105°F (≥40.5°C) within 48 hours after vaccination with a previous dose of DTP or DTaP • Collapse or shock-like state (i.e., hypotonic hyporesponsive episode) within 48 hours after receiving a previous dose of DTP/DTaP • Seizure ≤3 days after receiving a previous dose of DTP/DTaP • Persistent, inconsolable crying lasting ≥3 hours within 48 hours after receiving a previous dose of DTP/DTaP • GBS <6 weeks after previous dose of tetanus-toxoid–containing vaccine • History of Arthus-type hypersensitivity reactions after a previous dose of diphtheria-toxoid–containing or tetanus-toxoid–containing vaccine; 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
Hepatitis A	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component	• Moderate or severe acute illness with or without fever
Hepatitis B	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • Hypersensitivity to yeast	• Moderate or severe acute illness with or without fever
Hib	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component Age <6 weeks	• Moderate or severe acute illness with or without fever
HPV	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component	• Pregnancy • Moderate or severe acute illness with or without fever

Vaccine	Contraindications	Precautions
IIV	• Severe allergic reaction (e.g., anaphylaxis) after previous dose of influenza vaccine or to vaccine component.	• GBS <6 weeks after a previous dose of influenza vaccine • Moderate or severe acute illness with or without fever • Egg allergy other than hives, e.g., angioedema, respiratory distress, lightheadedness, recurrent emesis; or required epinephrine or another emergency medical intervention (IIV may be administered in an inpatient or outpatient medical setting and under the supervision of a health care provider who is able to recognize and manage severe allergic conditions).
IPV	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component	• Pregnancy • Moderate or severe acute illness with or without fever
LAIV[(b)]	• Severe allergic reaction (e.g., anaphylaxis) after a vaccine component, including egg protein • Concomitant use of aspiring or aspirin-containing medication in children and adolescents	• GBS <6 weeks after a previous dose of influenza vaccine • Asthma in persons aged 5 years old or older • Medical conditions which might predispose to higher risk of complications attributable to influenza[(c)] • Moderate of severe acute illness with or without fever
MenACWY	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component	• Moderate or severe acute illness with or without fever
MMR[(d),(e)]	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • Pregnancy • Known severe immunodeficiency (e.g., from hematologic and solid tumors, receipt of chemotherapy, congenital immunodeficiency, long-term immunosuppressive therapy[(f)] or patients with HIV infection who are severely immunocompromised)	• Recent (≤11 months) receipt of antibody-containing blood product (specific interval depends on product) • History of thrombocytopenia or thrombocytopenic purpura • Need for tuberculin skin testing or interferon-gamma release assay (IGRA) testing[(g)] • Moderate or severe acute illness with or without fever
MPSV4	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component	• Moderate or severe acute illness with or without fever
PCV13	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose of PCV13 or any diphtheria-toxoid–containing vaccine or to a component of a vaccine (PCV13 or any diphtheria-toxoid–containing vaccine)	• Moderate or severe acute illness with or without fever

Vaccine	Contraindications	Precautions
PPSV23	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component	• Moderate or severe acute illness with or without fever
RIV	• Severe allergic reaction (e.g., anaphylaxis) to any component of the vaccine	• GBS <6 weeks after a previous dose of influenza vaccine • Moderate or severe acute illness with or without fever
Rotavirus	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • SCID • History of intussusception	• Altered immunocompetence other than SCID • Chronic gastrointestinal disease[h] • Spina bifida or bladder exstrophy[h] • Moderate or severe acute illness with or without fever
Tdap	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • Encephalopathy (e.g., coma, decreased level of consciousness, prolonged seizures), not attributable to another identifiable cause, within 7 days of administration of previous dose of DTP, DTaP, or Tdap	• GBS <6 weeks after a previous dose of tetanus-toxoid–containing vaccine • Progressive or unstable neurological disorder, uncontrolled seizures, or progressive encephalopathy until a treatment regimen has been established and the condition has stabilized • History of Arthus-type hypersensitivity reactions after a previous dose of diphtheria-toxoid—containing or tetanus-toxoid–containing vaccine; 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
Varicella[d],[e]	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • Known severe immunodeficiency (e.g., from hematologic and solid tumors, receipt of chemotherapy, congenital immunodeficiency, long-term immunosuppressive therapy[f] or patients with HIV infection who are severely immunocompromised)[e] • Pregnancy	• Recent (≤11 months) receipt of antibody-containing blood product (specific interval depends on product) • Moderate or severe acute illness with or without fever
Zoster (Zostavax)	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • Known severe immunodeficiency (e.g., from hematologic and solid tumors, receipt of chemotherapy, congenital immunodeficiency, long-term immunosuppressive therapy[f] or patients with HIV infection who are severely immunocompromised)[e] • Pregnancy	• Moderate or severe acute illness with or without fever

TABLE 1. Influenza vaccines — United States, 2016–17 influenza season (https://www.cdc.gov/flu/protect/vaccine/vaccines.htm)

Trade name	Manufacturer	Presentation	Age indication	Mercury (from thimerosal, μg/0.5 mL)	Latex	Route
Inactivated influenza vaccines, quadrivalent (IIV4s), standard-dose†						
Afluria Quadrivalent	Seqirus	0.5 mL prefilled syringe	≥5 years	NR	No	IM§
		5.0 mL multidose vial	≥5 years (by needle/syringe) 18 through 64 years (by jet injector)	24.5	No	IM
Fluarix Quadrivalent	GlaxoSmithKline	0.5 mL prefilled syringe	≥6 months	NR	No	IM
FluLaval Quadrivalent	ID Biomedical Corp. of Quebec (distributed by GlaxoSmithKline)	0.5 mL prefilled syringe	≥6 months	NR	No	IM
		5.0 mL multidose vial	≥6 months	<25	No	IM
Fluzone Quadrivalent	Sanofi Pasteur	0.25 mL prefilled syringe	6 through 35 months	NR	No	IM
		0.5 mL prefilled syringe	≥3 years	NR	No	IM
		0.5 mL single-dose vial	≥3 years	NR	No	IM
		5.0 mL multidose vial	≥6 months	25	No	IM
Inactivated influenza vaccine, quadrivalent (ccIIV4), standard-dose,† cell culture-based						
Flucelvax Quadrivalent	Seqirus	0.5 mL prefilled syringe	≥4 years	NR	No	IM
		5.0 mL multidose vial	≥4 years	25	No	IM

Trade name	Manufacturer	Presentation	Age indication	Mercury (from thimerosal, μg/0.5 mL)	Latex	Route
Inactivated influenza vaccine, quadrivalent (IIV4), standard-dose, intradermal[¶]						
Fluzone Intradermal Quadrivalent	Sanofi Pasteur	0.1 mL single-dose prefilled microinjection system	18 through 64 years	NR	No	ID**
Inactivated Influenza Vaccines, trivalent (IIV3s), standard-dose[†]						
Afluria	Seqirus	0.5 mL prefilled syringe	≥5 years	NR	No	IM
		5.0 mL multidose vial	≥5 years (by needle/syringe) 18 through 64 years (by jet injector)	24.5	No	IM
Fluvirin	Seqirus	0.5 mL prefilled syringe	≥4 years	≤1	Yes[††]	IM
		5.0 mL multidose vial	≥4 years	25	No	IM
Adjuvanted inactivated influenza vaccine, trivalent (aIIV3),[†] **standard-dose**						
Fluad	Seqirus	0.5 mL prefilled syringe	≥65 years	NR	Yes[††]	IM
Inactivated Influenza Vaccine, trivalent (IIV3), high-dose[§§]						
Fluzone High-Dose	Sanofi Pasteur	0.5 mL prefilled syringe	≥65 years	NR	No	IM
Recombinant Influenza Vaccine, quadrivalent (RIV4)[¶¶]						
Flublok Quadrivalent	Protein Sciences	0.5 mL prefilled syringe	≥18 years	NR	No	IM

Trade name	Manufacturer	Presentation	Age indication	Mercury (from thimerosal, μg/0.5 mL)	Latex	Route
Recombinant Influenza Vaccine, trivalent (RIV3)¶¶						
Flublok	Protein Sciences	0.5 mL single-dose vial	≥18 years	NR	No	IM
Live Attenuated Influenza Vaccine, quadrivalent (LAIV4)* (not recommended for use during the 2017–18 season)**						
FluMist Quadrivalent	MedImmune	0.2 mL single-dose prefilled intranasal sprayer	2 through 49 years	NR	No	NAS

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Prescribing Medications for Older Adults: The American Geriatrics Society (AGS) BEERS Criteria 2018 Updates

Nicole J. Brandt, PharmD, MBA, BCGP, BCPP , FASCP
Professor, Geriatric Pharmacotherapy, Pharmacy Practice and Science
University of Maryland School of Pharmacy
Executive Director, Peter Lamy Center Drug Therapy and Aging
Email: nbrandt@rx.umaryland.edu

Objectives

- At the end of this presentation, the participant should be able to:
  - ❑Recognize at least 3 updates in the 2018 AGS Beers Criteria
  - ❑Identify relevant evidence used to support updates to the AGS Beers Criteria
  - ❑Apply the risk/benefit discussion to a case to identify risk reduction opportunities for adverse drug events.

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What is the first word (or words) you think of when you think of medication safety?

Start the presentation to see live content. Still no live content? Install the app or get help at PollEv.com/app

What is the purpose of the Beers Criteria?

- To identify drugs to avoid in older adults:
  1) Independent of diagnosis
  2) Considering diagnosis
- To reduce adverse drug events and drug related problems and improve medication selection and medication use in older adults
- Designed for use in any clinical setting, also used as an educational, quality and research tool

Beers Criteria: History and Utilization

- **Original 1991** – Nursing home pts
- Updates
  - **1997** All elderly; adopted by CMS in 1999 for nursing home regulation
  - **2003** Era of generalization to Med D, NCQA, HEDIS
  - **2012** Further adoption into quality measures
  - **2015** Introduction DDI, Renal Dosage Tables , How to Use and Alternatives Papers
  - **2018** *Currently under review*

Intent of the AGS 2018 Beers Criteria

Goals:

- Improve care by ↓ exposure to PIMS
- Educational tool
- Quality measure
- Research tool

Prescribing measure vs. Quality measure

Overview: Tables

- **Table 2:** Drugs to avoid are
- **Table 3:** Drug-Syndrome Interactions that may exacerbate the disease or condition.
- **Table 4:** Drugs to be used with Caution in older adults
- **Table 5:** Non-anti-infective Drug-Drug Interactions that should be avoided in older adults including combined CNS-Drugs ¡
- **Table 6:** Non-Anti-Infective Medications That Should Be Avoided or Have Their Dosage Reduced with Varying Levels of Kidney Function in Older Adults.
- ***Additional Updated Tables*** for Anticholinergic and Antipsychotic Medications

7

Overview: Proposed Deletions

Table 2:

Removed: Ticlopidine, Guanabenz, Guanfacine, Methyldopa, Reserpine, Clonidine (>0.1mg/day), Meprobamate, Ergoloid mesylates & Pentazocine in

Reason for removal: Change in evidence, rarely used anymore, off the market, and/or drug-disease combinations that are not geriatric specific

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Overview: Proposed Deletions

- **Table 3:** Chronic seizures or epilepsy & Insomnia removed as conditions
- **Table 4:** Vasodilators in Caution
- **Table 5:** ACEIs as a Drug-Drug Interaction (changed to broader criteria)

CAVEAT: Deleting does not mean endorsement of use!

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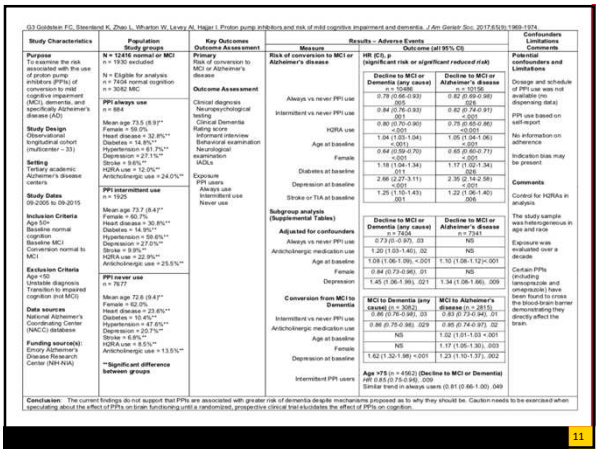
Proposed **Table 3:** Changes & Rationale

Medications to Avoid in Delirium and Dementia Changes:

- Evidence level for H2-receptor agonists in delirium to LOW (from moderate for all other delirium drugs)
- Removed H2-agonists avoid in dementia
- Avoid antipsychotics language:
  - "Avoid for behavioral problems of dementia and/or delirium. Only use if nonpharmacologic options have failed or not possible AND patient is a harm to self or others"

10



G3 Goldstein FC, Steenland K, Zhao L, Wharton W, Levey AI, Hajjar I. Proton pump inhibitors and risk of mild cognitive impairment and dementia. *J Am Geriatr Soc*. 2017;65(9):1969-1974.

Study Characteristics	Population Study groups	Key Outcomes Outcome Assessment	Results – Adverse Events Measure	Outcome (all 95% CI)	Confounders Limitations Comments
Purpose To examine the risk associated with the use of proton pump inhibitors (PPIs) of conversion to mild cognitive impairment (MCI), dementia, and specifically Alzheimer's disease (AD) **Study Design** Observational longitudinal cohort (multicenter – 33) **Setting** Tertiary academic Alzheimer's disease centers **Study Dates** 09-2005 to 09-2015 **Inclusion Criteria** Age 50+ Baseline normal cognition Baseline MCI Conversion normal to MCI **Exclusion Criteria** Age <50 Unstable diagnosis Transition to impaired cognition (not MCI) **Data sources** National Alzheimer's Coordinating Center (NACC) database **Funding source(s):** Emory Alzheimer's Disease Research Center (NIH-NIA)	**N = 12416 normal or MCI** n = 1930 excluded N = Eligible for analysis n = 7404 normal cognition n = 3082 MIC **PPI always use** n = 884 Mean age 73.5 (8.9)** Female = 59.0% Heart disease = 32.8%** Diabetes = 14.8%** Hypertension = 61.7%** Depression = 27.1%** Stroke = 9.6%** H2RA use = 12.0%** Anticholinergic use = 24.0%** **PPI intermittent use** n = 1925 Mean age 73.7 (8.4)** Female = 60.7% Heart disease = 30.8%** Diabetes = 14.9%** Hypertension = 59.6%** Depression = 27.0%** Stroke = 9.9%** H2RA use = 22.9%** Anticholinergic use = 25.5%** **PPI never use** n = 7677 Mean age 72.6 (9.4)** Female = 62.0% Heart disease = 23.6%** Diabetes = 10.4%** Hypertension = 47.6%** Depression = 20.7%** Stroke = 6.8%** H2RA use = 8.5%** Anticholinergic use = 13.5%** ****Significant difference between groups**	**Primary** Risk of conversion to MCI or Alzheimer's disease **Outcome Assessment** Clinical diagnosis Neuropsychological instruments Clinical Dementia Rating score Informant interview Behavioral examination Neurological examination IADLs Exposure PPI users Always use Intermittent use Never use	**Risk of conversion to MCI or Alzheimer's disease** Always vs never PPI use Intermittent vs never PPI use H2RA use Age at baseline Female Diabetes at baseline Depression at baseline Stroke or TIA at baseline **Subgroup analysis (Supplemental Tables)** **Adjusted for confounders** Always vs never PPI use Anticholinergic medication use Age at baseline Female Depression **Conversion from MCI to Dementia** Intermittent vs never PPI use Anticholinergic medication use Age at baseline Female Depression at baseline Intermittent PPI users	**HR (CI), p (significant risk or significant reduced risk)** **Decline to MCI or Dementia (any cause)** n = 10486 0.78 (0.66-0.93) .005 0.84 (0.76-0.93) .001 0.80 (0.70-0.90) <.001 1.04 (1.03-1.04) <.001 0.64 (0.59-0.70) <.001 1.18 (1.04-1.34) .011 2.66 (2.27-3.11) <.001 1.25 (1.10-1.43) .001 **Decline to MCI or Dementia (any cause)** n = 7404 0.73 (0 -0.97) .03 1.20 (1.03-1.40) .02 1.09 (1.06-1.09) <.001 0.84 (0.73-0.96) .01 1.45 (1.06-1.99) .021 **MCI to Dementia (any cause)** (n = 3082) 0.86 (0.76-0.98) .03 0.86 (0.75-0.98) .029 NS NS 1.62 (1.32-1.98) <.001 **Age >75** (n = 4562) **(Decline to MCI or Dementia)** HR 0.85 (0.75-0.96) .009 Similar trend in always users (0.81 (0.66-1.00) .049	**Decline to MCI or Alzheimer's disease** n = 10156 0.82 (0.69-0.98) .026 0.82 (0.74-0.97) <.001 0.75 (0.65-0.86) <0.001 1.05 (1.04-1.06) <.001 0.65 (0.60-0.71) <.001 1.17 (1.02-1.34) .027 2.35 (2.04-2.56) <.001 1.22 (1.06-1.40) .006 **Decline to MCI or Alzheimer's disease** n = 7341 NS NS 1.10 (1.08-1.12) <.001 NS 1.34 (1.06-1.66) .009 **MCI to Alzheimer's disease** (n = 2810) 0.83 (0.73-0.94) .01 0.85 (0.74-0.97) .02 1.02 (1.01-1.03 <.001 1.17 (1.05-1.30) .003 1.23 (1.10-1.37) .002	**Potential confounders and Limitations** Dosage and schedule of PPI use was not available (no dispensing data) PPI use based on self-report No information on adherence Indication bias may be present **Comments** Control for H2RAs in analysis The study sample was heterogeneous in age and race Exposure was evaluated over a decade Certain PPIs (including lansoprazole and omeprazole) have been found to cross the blood-brain barrier demonstrating they directly affect the brain.

Conclusion: The current findings do not support that PPIs are associated with greater risk of dementia despite mechanisms proposed as to why they should be. Caution needs to be exercised when speculating about the effect of PPIs on brain functioning until a randomized, prospective clinical trial elucidates the effect of PPIs on cognition.

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Proposed **Table 3:** Changes & Rationale

Medications to Avoid in History of Falls or Fractures Changes:

- Added SNRIs along with SSRIs, TCAs
  - AHRQ Systematic Review
- Level of evidence for Opioids to Moderate with all others staying Strong

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Proposed **Table 4:** Changes & Rationale

Adding:

- Dpp4-inhibitors in older adults with heart failure
- Dextromethorphan/Quinidine
- Trimethoprim-Sulfamethoxazole in patients on ACE or ARB with decreased CrCl*

Changing:

- Aspirin recommendation to use with caution from age <=80 to age<=70
  - based on evidence bleeding increase with age
- "Use dabigatran with caution in age >=75 or CrCL<30" to also include " use rivaroxaban with caution in age >=75"

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Proposed **Table 5:** Changes & Rationale

Changes:

✓Opioids/Benzos, Opioids/Gabanoids:

- due to overdose risk

✓Antiepileptics, Antidepressants, Antipsychotics, Benzos ALL avoid combination of ≥ 2 other CNS-active drugs:

- increases risk of falls-MINIMIZE number of CNS-active drugs

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Proposed **Table 5:** Changes & Rationale

Changes:

Old: Avoid concurrent use of ACE-Is with triamterene or amiloride

New: Avoid concurrent use of more than one of these: ACEIs, ARBs, aliskiren, potassium-sparing diuretics.

- Increases risk of hyperkalemia.
- Avoid routine use in those with CKD stage 3a or worse.

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Proposed **Table 5:** Changes & Rationale

Changes:

- ✓Phenytoin/ Trimethoprim-sulfamethoxazole; Theophylline/Cipro:
  - increased risk of toxicity
- ✓Warfarin/Cipro; Warfarin/Macrolides; and Warfarin/ Trimethoprim-sulfamethoxazole:
  - increased risk of bleeding. Avoid when possible and if used together monitor INR closely

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Case Vignettes: Application

Case Vignette Quiz 1

A 78 yr old man contacts your practice and states that since his hospitalization they started him on rivaroxaban for his Atrial Fibrillation. He was wondering will this interact with any of his medications causing an increased risk of bleeding.

Medication List: rivaroxaban 20mg daily; atorvastatin 20mg daily; amiodarone 200mg daily, vitamin D 2000IU daily, Lisinopril 20mg daily

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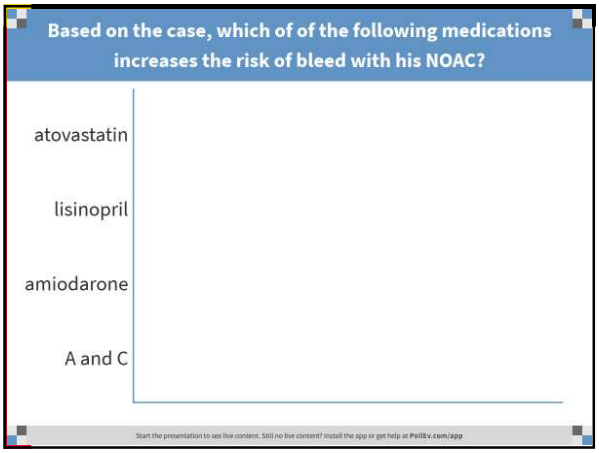
Which of the following increases the risk of bleeding with concurrent use of his NOAC?

A. Atorvastatin
B. Lisinopril
C. Amiodarone
D. A & C

19



JAMA | Original Investigation

Association Between Use of Non-Vitamin K Oral Anticoagulants With and Without Concurrent Medications and Risk of Major Bleeding in Nonvalvular Atrial Fibrillation

Shang-Hung Chang, MD, PhD; I-Jun Chou, MD; Yung-Hsin Yeh, MD; Meng-Jiun Chiou, MSc; Ming-Shien Wen, MD; Chi-Tai Kuo, MD; Lai-Chu See, PhD; Chang-Fu Kuo, MD, PhD

- **Key Findings:**
  - Concurrent use of the following had a significant increase in adjusted incidence rates per 1000 person-years of major bleeding :
  - **NOAC use alone**: 38.09 vs **Amiodarone:** 52.04 (difference, 13.94 [99% CI, 9.76-18.13]);
  - **NOAC use alone:** 102.77 vs **Fluconazole:** 241.92 (difference, 138.46 [99% CI, 80.96-195.97]);
  - **NOAC use alone**: 65.66 vs **Rifampin:** 103.14 (difference, 36.90 [99% CI, 1.59-72.22); and
  - **NOAC use alone:** 56.07 vs **phenytoin:** 108.52 for (difference, 52.31 [99% CI, 32.18-72.44];

P<.01 for all comparisons

JAMA. 2017;318(13):1250-1259. doi:10.1001/jama.2017.13883

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Case Vignette #2

A 72 yr old man comes to the pain management clinic and is complaining of a tingling pain in his feet. He has tried the various topical agents that you recommended but it is not working. He wants to start a trial of *Lyrica.*

Medication List: metformin 1gm twice daily; Lantus 50 units at bedtime; losartan 100mg daily; oxycodone 5mg every 6 hours as needed for breakthrough pain; Oxycontin 20mg every 12 hours for persistent back pain; zolpidem 5mg at bedtime for sleep; aspirin 81mg daily; MVI daily; glucosamine/chondroitin; fish oils capsules; senna prn; lidocaine 4% topical; b12 1000mcg daily

Would you start him on Lyrica to address his pain?

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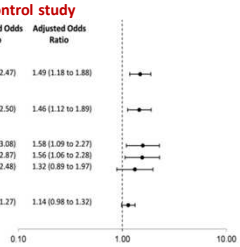
Gabapentin, opioids, and the risk of opioid- related death: A population-based nested case–control study

	No. Exposed Cases	No. Exposed Controls	Unadjusted Odds Ratio	Adjusted Odds Ratio
***Primary Analysis**:*				
Recent Gabapentin Use	155 (12.3%)	313 (6.8%)	1.99 (1.61 to 2.47)	1.49 (1.18 to 1.88)
Sensitivity Analysis: Overlapping Gabapentin Use*				
Gabapentin Overlapping Index	121 (9.6%)	240 (5.2%)	1.98 (1.56 to 2.50)	1.46 (1.12 to 1.89)
Secondary Analysis: Gabapentin Dose **				
High Dose	57 (4.5%)	101(2.2%)	2.20 (1.58 to 3.08)	1.58 (1.09 to 2.27)
Moderate Dose	57 (4.5%)	111 (2.4%)	2.05 (1.46 to 2.87)	1.56 (1.06 to 2.28)
Low Dose	41 (3.3%)	101 (2.2%)	1.70 (1.17 to 2.48)	1.32 (0.89 to 1.97)
Neutral Exposure†:				
Recent NSAID Use	480 (38.2%)	1647 (35.7%)	1.11 (0.98 to 1.27)	1.14 (0.98 to 1.32)



*1,256 cases and 4,619 controls; Reference Group: no gabapentin use
** Low dose: <900mg/day; moderate dose: 900-1799mg/day; high dose: ≥1800mg/day; Reference Group: no gabapentin use
† Reference Group: no NSAID use

Fig 2. Association between co-prescription with gabapentin and opioids and opioid overdose. Association between co-prescription of gabapentin and opioids and opioid overdose, adjusted for age, opioid dose, medication use in the prior 120 days (pregabalin, SSRIs, other antidepressants, benzodiazepines, other psychotropic drugs/CNS depressants, long-acting opioid, methadone/buprenorphine), number of drugs dispensed in the past 6 months, alcohol use disorder, chronic lung disease, diabetes, Charlson Comorbidity Index, number of opioid prescribers in the past 6 months, and number of pharmacies dispensing opioids in the past 6 months. Neutral exposure model (NSAIDs) is also adjusted for gabapentin use in prior 120 days. NSAID, nonsteroidal anti-inflammatory drug.

Gomes T, Juurlink DN, Antoniou T, Mamdani MM, Paterson JM, van den Brink W (2017) Gabapentin, opioids, and the risk of opioid-related death: A population-based nested case–control study. PLoS Med 14(10): e1002396. https://doi.org/10.1371/journal.pmed.1002396

Summary

- Polypharmacy, medication misadventures, as well as safety concerns continue to be a growing problem for older adults.
- We all must be vigilant to monitor patients on an ongoing basis to minimize negative outcomes.
- Explicit Criteria such as the Beers List helps with this public awareness.

AGS Beers Criteria Resources

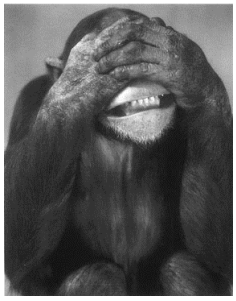
- AGS Updated Beers Criteria
- How-to-Use Article
- Alternative Medications List
- *Updated Beers Criteria* Pocket Card
- *Updated Beers Criteria* App

Available at: GeriatricsCareOnline.org

Public Education Resources for Patients & Caregivers

- *AGS Beers Criteria* Summary
- 10 Medications Older Adults Should Avoid
- Avoiding Overmedication and Harmful Drug Reactions
- What to Do and What to Ask Your Healthcare Provider if a Medication You Take is Listed in the *Beers Criteria*
- My Medication Diary - Printable Download
- Eldercare at Home: Using Medicines Safely - Illustrated PowerPoint Presentation

Questions ???



Nicole J. Brandt, PharmD, MBA, BCGP, BCPP,FASCP

Email:
nbrandt@rx.umaryland.edu

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Self Assessment Questions

2018 Beers Criteria Update

Which of the following can be considered when referring to medication safety in older adults?

A. Adverse Drug Events
B. AGS Beers Criteria
C. Potentially Inappropriate Medications
D. All of the Above

Which of the following increases the risk of bleeding with concurrent use of rivoroxaban?

A. Atorvastatin
B. Lisinopril
C. Amiodarone
D. A & C

Gabanoids have been associated with which of the following:

A. Increased alertness with driving
B. Increased risk of opioid overdose
C. Increased risk of myocardial infarctions
D. Increased risk of osteoporosis

Land Mark or Land Mine?
Concerns in Transitions of Care

Maryland Chapter ASCP
25th Annual Meeting
August 5, 2018

David H. Jones, RPh, FASCP
*dhj***Rx***Consulting*

Objectives

- Define 'transitions of care'
- Identify problems related to transitions of care
- Select appropriate options to address transition care plan needs and enhance the role of Pharmacy in the Transition Team.

Care

- Is always complex
- Is often uncoordinated
- Can be confusing to patients and family
- Could be delayed or even denied without effective coordination
- Might not be reimbursed

Transitions

Transitions of Care

- Involves patients moving between any and all health care practitioners or settings as their conditions and health care needs change during the course of chronic or acute illness.

  Care Transitions Program, University of Colorado Rev 2017
- The movement of a patient from one level of care to another.

  CMS, 2017
- Every change in a patient's condition involves a transition of some kind.

Fundamental Interactions

Transitions of Care

- Within any individual living or care setting
- Between any and all care settings
- Include all diagnoses and conditions
- Between all care providers
- Have many variables

Transitions = Money (Lost)

- Preventable readmissions cost $12,000,000,000 in annual healthcare
- 10% of hospital care costs come from preventable readmissions
- CMS denial of payment for readmissions
- In 2016, over 15% of all SNF to acute care readmissions were potentially preventable

Reasons to Pay Attention

- 36% of patients had medication errors at time of admission
- 85% of these based on patient's medication history

AmJHSP 2016

- Medication reconciliation reduces discharge medication errors
  - 90% to 47%, surgical
  - 57% to 33%, medical

Arch Int Medicine 2016 rev

Medicare Patients

- Nearly 20% are readmitted within 30 days
- More than1 in 3 is readmitted within 90 days

Robert Wood Johnson Foundation

- Continuity?
- Consistency?
- Additional risks, complications?
- Is 30, 60, 90 day concern enough?

What we have here is a failure to communicate!

- One study estimated that 80 percent of avoidable, serious medical errors involve miscommunication during the hand-off between medical providers.

Solet DJ, et al: Lost in translation, et seq. Joint Commission Center for Transforming Healthcare, Improving Transitions of Care, 2005

Success in Transition

- Transition requires coordination
- Care coordination works to ensure the patient's needs and preferences for health services and information sharing across people, functions, and sites are met over time.
- Coordination maximizes the value of services delivered to patients by facilitating beneficial, efficient, safe, and high-quality patient experiences and improved healthcare outcomes.

Adapted from American College of Cardiology presentation 2017

Essentials

- Multidisciplinary
  - Communication,
  - Collaboration, and
  - Coordination
- Must include effective education
  - Patient
  - Family
  - Other caregivers
- From admission through all transitions

Root Causes of Transition Breakdown

- Communication breakdowns
- Varying expectations
- Work environment or culture does not promote successful handoff
- Inadequate time
- Inadequate staffing at times of transition
- Lack of standardized procedures

More Icebergs to Avoid

- Patient education
  - Language of preference
  - Skill level
- Overall accountability
- Team follow up
- Payment?

More &Troubling Reasons

"Medication Adherence in America: A National Report Card"

- For those Americans over 40 with chronic medical conditions
  - Overall medication adherence and compliance = Graded as a C -
  - 30% = D or F
  - About 14% (or 10,000,000 patients) = F

NCPA, June 2013; updated 2017

Transitions of Care Success Goals

- Avoid preventable acute admissions
  - Staying healthy in place
- Reduce preventable readmissions
  - Especially 30-day time frame
- Avoid Emergency Department visits
- Reduce total health care costs
- Improve patient outcomes
- Increase patient satisfaction

Essential Items

- Ongoing coordination of care is basic for all providers
- Most of the populations we see daily are at higher risk
- Care coordination needs
  - Clinician, individual or practice
  - Patient and family
  - Age group
  - Patient expectations

How Ya Gonna Know?

- Directed patient and family follow up
- Phone calls
  - Documented
- Surveys
  - Timely
  - Monitored
  - Reaction

What To Do?

- Medication reconciliation
- Follow up monitoring and/or tests
- Reevaluation is routine
- Consistent communication and action
- Focused education
  - Patient
  - Family
  - All providers

Care Transition Sites

- Home
- Home care
- ILF, ALF
- Acute care hospital
- Rehabilitation
  - Acute
  - Long Term
- Transitional Care Units
- Long Term Care
- Hospice

Areas for Attention at Times of Transition

- Anticoagulation
- CHF
- COPD
- Dementia
- Diabetes
- Elderly
- MI
- Pneumonia
- Change of status
- Multiple health conditions
- Multiple Part D Drugs
- Excessive annual costs
- Medication Action Plan

Transitions Can Be Multiple and Complex

One patient history

Patient One Scenario

- 82 year old woman living at home
- Extended family with lots of support
- Fell on arising from dinner
- Fractured Hip
- Emergency Department via 911
- Transferred to orthopedic service at another hospital
- Hip plate and pinning; 3 days on acute care
- Comprehensive In-patient unit: 5 days
- Transitional Care Services: 10 days
- Back Home

Diagnoses

- Hypertension
- Diabetes
- Hypercholesterolemia
- Asthma
- Fibromyalgia
- Chronic Pain Syndrome
- Neuropathy
- Anxiety
- Osteoporosis

Patient Two Scenario

- 85 year old woman living at home
- Limited family support
- Fell on front concrete steps
- Ambulance to ED
- X-ray = hair line coccyx fracture
- Observation admission for 48 hours
- Transfer to rehab at SNF
- Quality of care issues
- Developed decubitus
- Developed c-diff
- Transferred to acute care

Diagnoses

- Hypertension
- Hypercholesterolemia
- Low level chronic pain

Modes for Transitions of Care

- Care Transitions Intervention (CTI)
- Transition Care Model (TCM)
- Better Outcomes for Older Adults through Safe Transitions (BOOST)
- Geriatric Resources for Assessment and Care of Elders (GRACE)
- Project RED (Re-Engineered Discharge)

Based on data from TJC website, accessed May 2018

Medication Management in Care Transitions (MMCT)

REACH (Einstein Healthcare Network)

- Reconciliation: Validation of discharge or changed medications
- Education: Patient-centered and timely
- Access: Availability and prior authorization
- Counseling: Comprehensive, including follow up after discharge
- Healthy Patients: THE Goal
  - Avoid ED visits & readmissions

Consensus Standards

- Accountability
- Communication
- Timely exchange of Information
- Respect the hub of coordination of care
  - Patient's personal pharmacist
  - Facility consultant pharmacist
- Fully involve patient and family
- Patient to have medical home or coordinating clinician
- Quality improvement

We Need to Act

An Action Statement

- "Pharmacists and pharmacy technicians can improve patient outcomes by providing a comprehensive approach to care transitions"
  Paul Abramowitz, CEO, ASHP October 2012
- Hospital Admissions
- Readmissions
- Adverse Drug Reactions
- Medication compliance and adherence
- Any change of status

Medication Therapy Management

- Five Essential Components
  - Medication therapy review
  - Personal medication record
  - Medication-related action plan
  - Intervention / referral
  - Documentation and follow –up

  Based on PPACA
- Comprehensive Medication Reconciliation

Medication Reconciliation

- Key process to improve patient care and outcomes
- Patient-centered safety process
- Requires interdisciplinary collaboration
- Must be based on culture of accountability
- Standardize, including effective communication
- Requires ongoing quality improvement

Adapted from APhA revised statement 2017

Medication Reconciliation

Complete and Current?

- Prescription Drugs
- OTCs
- Supplements
- Herbals
- Compounded products
- Sports/ Boost Drinks
- Alcohol

Roles in Transitions

- Communication
  - Information component of care team
  - Prescriber, pharmacist, nurse, patient and family
- Adverse Drug Reactions
  - Awareness
  - Prevention
  - Include drug interaction risk and duplicate therapy

Clinical Aspects for Attention

- Complete allergy/intolerance list
  - Current
  - Reaction experienced
  - Intolerance vs. true allergy
- Duplicate medication therapy
- Drugs without indications
- Indications without drugs
- Recent additions/ deletions from regimen

Cost/availability Aspects

- Non-formulary at facility
  - Can patient take own medication?
  - Did we ask?
- Insurance coverage
  - Co-pay
  - Deductable met
  - Patient cannot afford
- Prior authorization requirements
- Shortages/drug not available

Pharmacist Involvement

- Full medication history
  - Pharmacy Technician involvement
- Comprehensive medication reconciliation at all transitions
- In acute care, Rx to bedside prior to discharge
  - Technician to coordinate
- Follow up for compliance

LTC to Acute Care

- Is there a current history?
- Is there a review of the MAR?
- Was the patient compliant and adherent?
- When did the Consultant Pharmacist last review?
- Were any recommended changes made?

Standardize

- Transition plans
- Communication pathways
- Check lists
  - For your Team
  - For patient and family
- Appropriate patient forms

Follow Up

- Timely follow-up, support and coordination after the patient leaves a care setting
- Check for readmissions 30-60-90 day
- Do not wait for 30 days
- Some transitions may need 1 or 3 or 7 day follow up

We Can Do It

Patient One Scenario

- 82 year old woman living at home
- Extended family with lots of support
- Fell on arising from dinner
- Fractured Hip
- Emergency Department via 911
- Transferred to orthopedic service at another hospital
- Hip plate and pinning; 3 days on acute care
- Comprehensive In-patient unit: 5 days
- Transitional Care Services: 10 days
- Back Home

Patient Two Scenario

- 85 year old woman living at home
- Limited family support
- Fell on front concrete steps
- Ambulance to ED
- X-ray = hair line coccyx fracture
- Transfer to rehab at SNF
- Quality of care issues
- Developed decubitus
- Developed c-diff
- Transferred to acute care

Something Else

- 16 month old male
- Developed difficulty breathing
- Poor feeding
- To ED
- To nearest children's hospital
- Evaluated by cardiologist
- To pediatric ICU

More to Ponder

- Down Syndrome
- Congenital Heart Disease
- Lives in very remote rural area
- Need for
  - Immediate cardiac cath
  - Plan cardiac surgery
  - Pacemaker vs replacement valve
- Let's talk

Resources

- American Society of Consultant Pharmacists
  - www.ascp.com
- American Society of Health-System Pharmacists
  - www.ashp.org/resource-centers
- Agency for Healthcare Research and Quality
  - www.ahrq.gov /nhqrdr/measures
- The Joint Commission
  - www.jointcommission.org / Transitions 0f Care (toC) Portal
- CMS
  - www.CMS.gov/Readmissions and Care Transitions – the Partnership for Patients

Thank you

"Progress is impossible without change, and those who cannot change their minds cannot change anything."

G. B. Shaw

- Ready to go home?

Landmark or Landmine: Concerns in Transitions of Care
Self-Assessment Questions

1. Transition of care issues arise exclusively at the time of discharge from an acute care setting.
    a. True
    b. False

2. Transitions of care concerns exist at
    a. 7 days
    b. 30 days
    c. 60 days
    d. 90 days
    e. All the above
    f. And perhaps more

3. An essential focus for transition of care teamwork must include special concerns around diagnoses or conditions as such as... (Name at least 4)
    a. Anticoagulation
    b. CHF
    c. COPD
    d. Dementia
    e. Diabetes
    f. Age
    g. MI
    h. Recent lengthy surgery
    i. Complex medication regimen(s)

4. A pharmacist-based program is focused solely on prescriptions issues at the time of discharge from acute care.
    a. True
    b. False

Answers:

1. False
2. E or F
3. Select from list
4. 4. False