

2017 IMMUNIZATION REVIEW

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I HAVE NO RELEVANT FINANCIAL RELATIONSHIPS OR
COMMERCIAL INTERESTS WITH RESPECT TO THIS TOPIC

OBJECTIVES

Upon conclusion of the program, the participant should be able to:

- Discuss basic concepts of immunology
- Review recent immunization updates
- Review the CDC adult vaccination schedule
- Discuss immunization strategies for current practice sites

IMMUNOLOGY REVIEW

- Innate immunity
 - First-line barrier to infection
 - Present at birth
 - Includes phagocytic cells such as macrophages

ACQUIRED/ADAPTIVE IMMUNITY

- Passive immunity
 - Mother to child
- Cellular immunity
 - Mediated through T cells
- Humoral immunity
 - Mediated through B cells

CELLULAR IMMUNITY

- Starts within the Thymus
 - Helper T Cells
 - Receive and attach to antigens presented by macrophages
 - Releases cytokines to communicate with B cells to release antibody producing plasma cells
 - Help create a longer lasting immunity
 - Killer T Cells (Cytotoxic)
 - Search and destroy

HUMORAL IMMUNITY

- B cells
 - Turn into plasma cells
 - Produce anti-bodies
 - Memory cells
 - Plasma cells that remain in the circulation as a defense for future exposures

IMMUNITY THROUGH VACCINES

- Live attenuated vaccines
 - Attenuate: "procedures that weaken a pathogen to reduce the severity of disease"
 - Pathogen can still replicate which helps elicit a more pronounced immune response
 - Weakened pathogen usually doesn't cause disease
 - Contraindicated in immunocompromised patients

IMMUNITY THROUGH VACCINES

- Inactivated (or killed) vaccines
 - Can be fragments of viruses or bacteria
 - Can be whole viruses or bacteria
 - Antigens are recognized which elicits the immune response
 - Cannot cause disease
 - Do not produce as strong of an immune response
 - Ex. Yearly flu shots

IMMUNITY THROUGH VACCINES

- Polysaccharide vaccines
 - Activate B cell response (humoral) without T cell activation
 - Should not be used in children less than 2 years of age
 - Short duration of immunity (requires exogenous boosters)

IMMUNITY THROUGH VACCINES

- Conjugate polysaccharide vaccines
 - Activate Helper T cells (cellular immunity) which will activate B cells to produce memory cells
 - Can be used in children less than 2 years of age
 - Long lasting to life long immunity (no need for exogenous boosters)

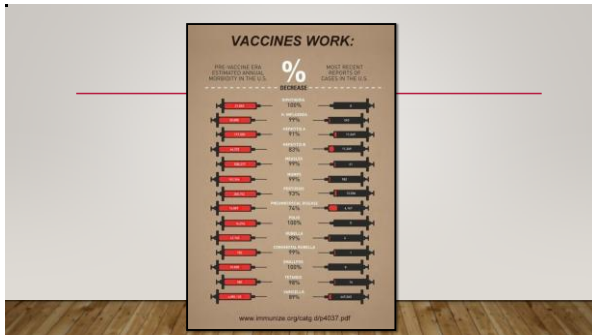
EXAMPLE: PNEUMOCOCCAL VACCINES

- Pneumovax
 - Pure polysaccharide
 - Humoral immunity
- Prevnar13
 - Conjugate polysaccharide
 - Cellular immunity

HOW HAVE IMMUNIZATIONS SHAPED THE WORLD?

- Prior to vaccines, almost everyone got measles and chickenpox
- 1921 diphtheria outbreak killed 15,000 Americans
- Rubella (German measles) was responsible for 2,000 infant deaths and 11,000 miscarriages between 1964 and 1965
- Small pox killed an estimated 300 million people in the 20th century





IS THE PROBLEM FIXED?

- Small pox has been eradicated
- Polio is no longer found in the US
 - Remains endemic in certain countries
- Answer: there is still room for improvement

The U.S. confirmed cases of polio in 1976, October 2015.

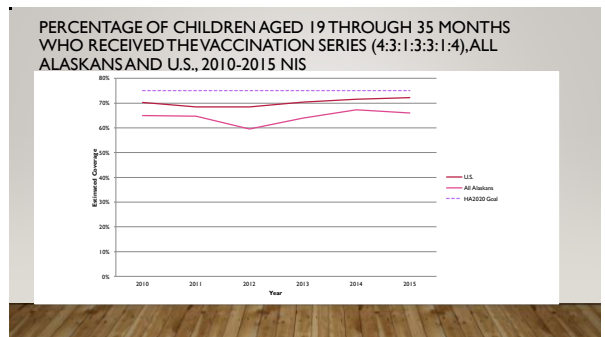
Legend:
 ■ Polio eliminated since 1988
 ■ Polio eliminated since 2012
 ■ Polio remains endemic

	Diphtheria		Pertussis		Tetanus		Polio		Varicella		Measles	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
(1950)	410	5796	120,718	1,118	486	336	33,300	1,904	164,114	122	319,124	468
(2010)	0	0	27,550	26	26	3	0	0	15,427	15	63	0

Preventable Diseases	USA Cumulative 2014	Alaska Cumulative 2014	USA Cumulative 2015	Alaska Cumulative 2015
Pertussis	22,547	61	13,004	92
Invasive Pneumococcal Disease (all ages)	10,511	59	10,503	74
H. influenzae	2,389	16	2,538	17
Hep B	2,054	3	1,972	3
Varicella	6,715	42	5,373	24

HEALTHY ALASKAN 2020

- #17: Increase the percentage of children ages 19-35 months who receive the ACIP (Advisory Committee on Immunization Practices) recommended vaccination series (2013 ACIP recommendation: 4 DTaP, 3 Polio, 1 MMR, 3 Hib, 3 Hepatitis B, 1 Varicella, 4 PCV)
 - 2010 baseline: 65%
 - 2014 data: 67.3%
 - 2020 Target: 75%



IMMUNIZATION UPDATES



2016-2017 UPDATES: INFLUENZA

- Egg allergies 2015-2016
 - Egg allergies are very common in children
 - Reactions leading to death are very rare
 - Update: no longer necessary to screen for egg allergies
 - One less barrier to getting immunized

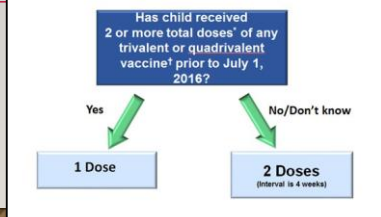
ACIP RECOMMENDATIONS FOR EGG ALLERGIES

- Persons with a history of egg allergy who have experienced only hives after exposure to egg should receive influenza vaccine
- Persons who have reactions other than hives may receive any licensed and recommended influenza vaccine
- The selected vaccine should be administered in an inpatient or outpatient medical setting (including but not necessarily limited to hospitals, clinics, health departments, and physician offices). Vaccine administration should be supervised by a health care provider who is able to recognize and manage severe allergic conditions.
- A previous severe allergic reaction to influenza vaccine is a contraindication to future receipt of the vaccine

INFLUENZA

- Children aged 6 months to 8 years that have not received ≥ 2 influenza immunizations (trivalent or quadravalent) prior to July 1, 2016, should receive two doses in the 2016-2017 flu season.
 - Doses should be given at least 4 weeks apart

Number of Seasonal Influenza Doses for Children 6 Months Through 8 Years of Age



INFLUENZA

- LAIV flu vaccine/Flumist not to be used in the 2016-2017 flu season
 - ACIP voted against the use of LAIV due to poor efficacy between 2013-2016

HPV UPDATE

- October 2016 update: ACIP now recommends only a 2 dose series of 9-valent Gardasil® 9 for children <15 years of age
 - Routine vaccines for children 11-12
 - FDA approved for 9 to 14 years of age
 - 2nd dose should be given at least 6 months apart
 - Patients aged 15 to 26 will continue to get the 3 dose series

MENINGITIS B

- Normally healthy individuals 16 to 23 years can get vaccinated if desired
 - ACIP recommends 2 dose series (zero and six months)
- Individuals 10 years of age and older that are at a high risk of MenB
 - Persistent complement component deficiencies
 - Sickle cell disease
 - Anatomic or functional asplenia
 - 3 dose series recommended for those at high risk (0, 1-2 months, and 6 months)

MENINGITIS B CONT...

- No preference between the two MenB vaccines
 - Complete series with same vaccines initially administered
- If a patient receives a dose less than six months from the first dose, then they should get a 3 dose series

Figure 1. Recommended immunization schedule for adults aged 19 years or older, by vaccine and age group¹

VACCINE	AGE GROUP	19-21 years	22-26 years	27-49 years	50-59 years	60-64 years	≥ 65 years
Influenza ²		1 dose annually					
Tetanus, diphtheria, pertussis (Td/Tdap) ³		Substitute Tdap for Td once, then Td booster every 10 yrs					
Varicella ⁴		2 doses					
Human papillomavirus (HPV) Female ⁵		3 doses					
Human papillomavirus (HPV) Male ⁵		3 doses					
Zoster ⁶						1 dose	
Measles, mumps, rubella (MMR) ⁷		1 or 2 doses depending on indication					
Pneumococcal 13-valent conjugate (PCV13) ⁸							1 dose
Pneumococcal 23-valent polysaccharide (PPSV23) ⁹		1 or 2 doses depending on indication					1 dose
Hepatitis A ¹⁰		2 or 3 doses depending on vaccine					
Hepatitis B ¹¹		3 doses					
Meningococcal 4-valent conjugate (MenACWY) or polysaccharide (MPSV4) ¹²		1 or more doses depending on indication					
Meningococcal B (MenB) ¹³		2 or 3 doses depending on vaccine					
Human papillomavirus type 9 (HPV) ¹⁴		1 or 3 doses depending on indication					

¹Report all clinically significant postvaccination reactions to the Vaccine Adverse Event Reporting System (VAERS). Reporting forms and instructions on filing a VAERS report are available at www.vaers.hhs.gov or by telephone, 800-822-7967. Information on how to file a Vaccine Injury Compensation Program claim is available at www.hhs.gov/vaccinecompensation or by telephone, 800-338-2383. To file a claim for vaccine injury, contact the U.S. Court of Federal Claims, 717 Madison Place, N.W., Washington, DC, 20005; telephone, 202-357-6040. Additional information about the vaccines in this schedule, event of available data, and contraindications for vaccination is also available at www.cdc.gov/vaccines or from the CDC, NIDCC Contact Center at 800-CDC-INFO (800-232-6246) in English and Spanish, 8:00 a.m. - 8:00 p.m. Eastern Time, Monday-Friday, excluding holidays.

Figure 2. Vaccines that might be indicated for adults aged 19 years or older based on medical and other indications¹

VACCINE	INDICATION	Pregnancy	Immune-compromising conditions (including HIV infection) ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100}	HIV infection (CD4 count < 200 /mm ³) ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100}	Men who have sex with men (MSM) ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100}	Kidney failure, end-stage renal disease, on hemodialysis ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100}	Heart disease, chronic lung disease, chronic alcoholism ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100}	Agglutinin and persistent complement component deficiencies ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100}	Chronic liver disease ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100}	Diabetes ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100}	Healthcare personnel ^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100}		
Influenza ²													
Tetanus, diphtheria, pertussis (Td/Tdap) ³													
Varicella ⁴		Contraindicated											
Human papillomavirus (HPV) Female ⁵			3 doses through age 26 yrs										
Human papillomavirus (HPV) Male ⁵			3 doses through age 26 yrs										
Zoster ⁶		Contraindicated											
Measles, mumps, rubella (MMR) ⁷		Contraindicated											
Pneumococcal 13-valent conjugate (PCV13) ⁸													
Pneumococcal polysaccharide (PPSV23) ⁹													
Hepatitis A ¹⁰													
Hepatitis B ¹¹													
Meningococcal 4-valent conjugate (MenACWY) or polysaccharide (MPSV4) ¹²													
Meningococcal B (MenB) ¹³													
Human papillomavirus type 9 (HPV) ¹⁴			3 doses post MCV2 recipients only										

¹Contraindicated for all persons unless otherwise noted. ²Recommended for all persons with risk factor (medical, occupational, lifestyle, or other indications). ³Recommended for persons with risk factor (medical, occupational, lifestyle, or other indications). ⁴No recommendation. ⁵Contraindicated.

CASE #1

- JB is a 44 y/o female with a past medical history of CAD and DM2. Her mother just got shingles, and she is afraid of getting them herself. She shows up at your pharmacy asking for the immunization. What do you do?

ZOSTAVAX®

- FDA approved for individuals 50 years and up
- ACIP recommends 60 and up
 - Estimated 50% effectiveness
 - Estimated 5-12 years of protection
 - No booster has been approved

CASE #2

- TS is a 62-year old male with a history of COPD. He previously smoked 2 packs of cigarettes a day, but has since quit. He received the PPSV23 immunization 3 years ago. He heard from his 65-year old friend that there is a pneumonia vaccine that will last longer than the PPSV23 that he received. He wants to know when he can get this PCV13 and if he will need to get another PPSV23 as well. What do you tell him?

PNEUMONIA VACCINES

- PPSV23
 - Adults ≥ 65 years of age
 - Ages 2 to 64 with the following:
 - Cigarette smokers ≥ 19 years of age
 - Chronic CVD (CHF)
 - Chronic pulmonary disease (COPD, asthma)
 - Diabetes mellitus
 - Alcoholism
 - Chronic liver disease
 - Candidate for or recipient of cochlear implant
 - CSF leak
 - Functional or anatomic asplenia (sickle cell disease, splenectomy)
 - Immunocompromised patients
 - Chronic renal failure or nephrotic syndrome
 - Solid organ transplantation

PNEUMONIA VACCINES CONT...

- PCV13
 - Infants 6 weeks to 15 months (4 doses)
 - Adults ≥ 65 years of age
 - Patients aged 19 to 64
 - Immunocompromising conditions, functional or anatomic asplenia, CSF leak, and cochlear implants

CASE #3

- RL is a 53 y/o male with a history of hypertension. He can't remember if he got a "tetanus shot" within the last 10 years. What would you recommend?

TDAPVSTD

- TDap
 - Boostrix (GSK)
 - 10 years and older
 - Adacel (Sanofi Pasteur)
 - 11 years to 64 years
- Td
 - Decavac (Sanofi Pasteur)

STRATEGIZE

- What are some reasons why people do not get immunized?
- How can you help increase immunization rates in your area?
- How can you implement immunization services into your daily routine?

APPLYING VACCINATION SERVICES AT YOUR CLINICAL SITE

- Where can I do this at?
 - Answer: Anywhere!

-
- Who do we screen for these services?

- Answer: Everyone!

-
- Why should I add this to my already busy schedule?

- Answer: Because you are a pharmacist

HOW DO I MAKE IT WORK?

- Start small
 - Patient population
 - Immunizations offered
 - Storage
 - Billing and reimbursement
 - State laws

COLD CHAIN

- Manufacturer → Distributor → Pharmacy → Patient
- Appropriate stand alone refrigerators and freezer units
 - Refrigerator temps: 2° C to 8° C (35° F to 46° F)
 - Freezer temps: -50° C to -15° C (-58° F to 5° F)

NOT CURRENTLY GIVING VACCINES OR UNABLE TO GIVE VACCINES

- Assess each patient for vaccination needs
- Educate patient on importance of vaccinations
- Schedule a day and time for the patient to get their needed vaccines
 - Local pharmacy, medical clinic, or public health department
- Follow up with patient
- Document

GIVING VACCINES OR PLANNING ON STARTING

- Assess each patient for vaccination needs
- Educate patient on importance of vaccinations
- Provide a list of needed vaccines to the patient
- Offer to check prices on needed immunization(s)
- Offer immunizations
- Document

DIFFUSING DOUBTS ABOUT VACCINES

- Myths about vaccines:
 - Vaccines cause autism
 - Flu shot causes the flu
 - I've never had the flu, so I don't need the flu shot
 - It's a conspiracy!

RESOURCES TO DEBUNK THE MYTHS

- <https://www.cdc.gov/flu/pdf/freeresources/general/no-excuses-flu-vaccine.pdf>
- http://www.medscape.com/viewarticle/873530?nid=111709_745&src=WNL_mdplsfeat_170103_mscpedit_phar&uac=164916MR&spon=30&implD=1266576&faf=1#vp_2
- <https://www.cdc.gov/flu/about/qa/misconceptions.htm>

SIDE EFFECTS/COMPLICATIONS

- Mild reactions
 - Site reactions
 - Sore arm
 - Runny nose
- Major reactions
 - Vasovagal Syncope
 - Allergic reactions/Anaphylaxis

VACCINES IN THE PIPELINE

- Infectious Disease
 - HIV (prevention)
 - Phase II trials
 - Cdiff (prevention)
 - Phase III trials
 - Dengue (prevention)
 - Dengvaxia® (Fast track) application submitted



PIPELINE: INFECTIOUS DISEASE CONT...

- Zika (prevention)
 - Phase I
- Ebola (prevention)
 - Phase III trials

VACCINES IN THE PIPELINE CONT...

- Addiction
 - Opioid
 - Only tested in mice with promising results
- Smoking cessation
 - Phase I

VACCINES IN THE PIPELINE CONT...

- Cancer
 - Source: 99 potential vaccines in the pipeline
 - <https://www.cancer.gov/about-cancer/causes-prevention/vaccines-fact-sheet#q4>
- Neurologic Disorders
 - Source: 10 in pipeline
 - Alzheimer's
 - Many in phase I or II

- Allergies
 - Source: 15 in pipeline
 - <http://www.phrma.org/sites/default/files/pdf/medicines-in-development-drug-list-vaccines.pdf>
- Inflammation and RA

ANY QUESTIONS?



QUESTION #1

- Which of the following disease states has a vaccine that received a new recommendation in 2016 to be a two dose series in patients 9-14 years of age?
 - a) Hepatitis B
 - b) HPV
 - c) Hepatitis A
 - d) Influenza

QUESTION #2

-
- What is the ACIP recommended age to receive Zoster vaccine?
 - a) 50
 - b) 65
 - c) 60
 - d) 55

QUESTION #3

-
- True or False: A patient with a history of hives that are induced by an exposure to eggs should not receive an influenza vaccine.