Make Immunization Practices Great Again
Updating and Expanding Pharmacy-Based Immunization Services

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Financial Disclosures

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Objectives

- Examine recent outbreaks of vaccine-preventable disease and apply recommendations to patients during times of outbreaks;
- Discuss the process to establish a pharmacy-based Vaccines for Children Program;
- Discuss recently updated recommendations regarding shingles vaccination;
- Apply current Advisory Committee on Immunization Practices (ACIP) recommendations to adolescent and adult patients regarding specific immunizations.
- Identify the appropriate routine immunizations indicated for an adult patient based on age and medical conditions according to the evidence-based recommendations by the Centers for Disease Control and Prevention
- Evaluate strategies to identify patients at increased risk for vaccine-preventable disease.

Achievements in Public Health

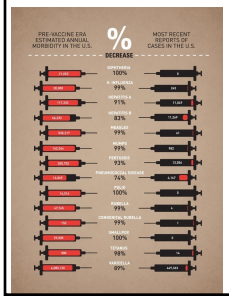
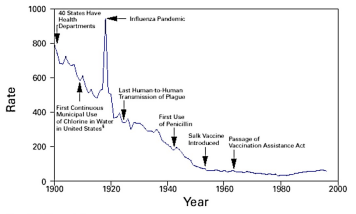
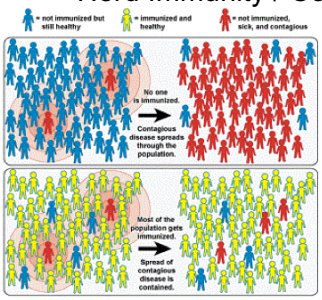


FIGURE 1. Crude death rate* for infectious diseases — United States, 1900–1996†



*Per 100,000 population per year.
†Adapted from Armstrong GL, Conn LA, Pinner RW. Trends in infectious disease mortality in the United States during the 20th century. JAMA 1999;281:61-6.
§American Water Works Association. Water chlorination principles and practices: AWWA manual M20. Denver, Colorado: American Water Works Association, 1973.
CDC. *MMWR*. 1999;48(29):621-9.

Herd Immunity / Community Immunity



https://www.theguardian.com/society/ng-interactive/2015/feb/05/-sp-watch-how-measles-outbreak-spreads-when-kids-get-vaccinated

Recent Outbreaks of disease

- Hepatitis A
- Mumps
- Measles

The Kentucky Derby May Finally Make People Care About Hepatitis A

For outbreaks of vaccine preventable disease, first look at routine immunization recommendations

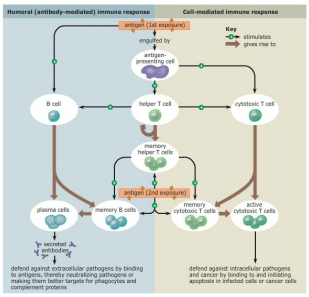
- Adults need 2 documented doses of MMR vaccine
- All people wanting to be protected against HAV

If needed, CDC / local health department will issue official guidance

Principles of Immunology for Vaccinations

- Vaccines MUST cause an immune response to be effective
- Live vs Inactivated
- Adjuvants
  - An adjuvant is an ingredient of a vaccine that helps create a stronger immune response in the patient's body. *In other words, adjuvants help vaccines work better.* Some vaccines made from weakened or dead germs contain naturally occurring adjuvants and help the body produce a strong protective immune response.
  - However, most vaccines developed today include just small components of germs, such as their proteins, rather than the entire virus or bacteria. These vaccines often must be made with adjuvants to ensure the body produces an immune response strong enough to protect the patient from the germ he or she is being vaccinated against.
- T-cell vs Cell Mediated

Humoral vs. Cell-mediated Immunity



Age-Based Immunization Schedule

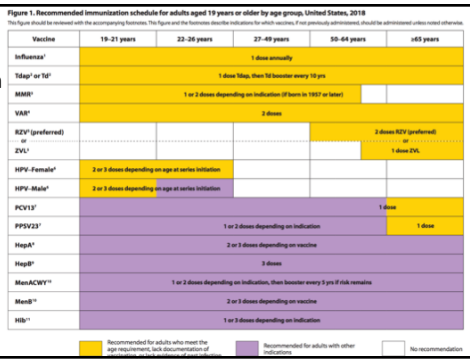


Figure 1. Recommended immunization schedule for adults aged 19 years or older by age group, United States, 2018

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.

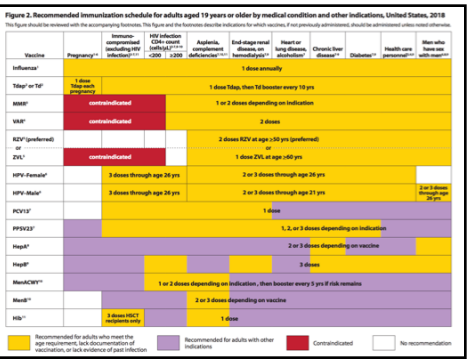
Vaccine	19–21 years	22–26 years	27–49 years	50–64 years	≥65 years
Influenza[1]	1 dose annually				
Tdap[2] or Td[2]	1 dose Tdap, then Td booster every 10 yrs				
MMR[3]	1 or 2 doses depending on indication (if born in 1957 or later)				
VAR[4]	2 doses				
RZV[5] (preferred)				2 doses RZV (preferred)	
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 prior infection

Recommended for adults with other indications

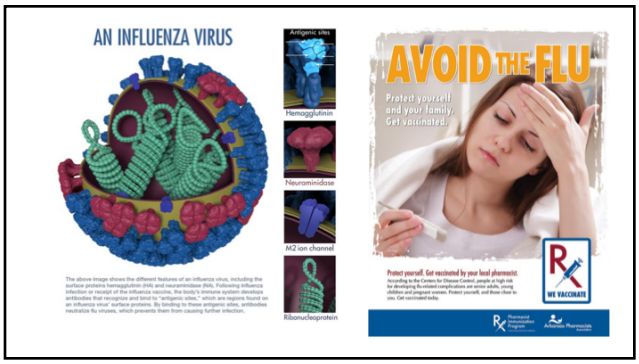
No recommendation

Disease-Based Immunization Schedule

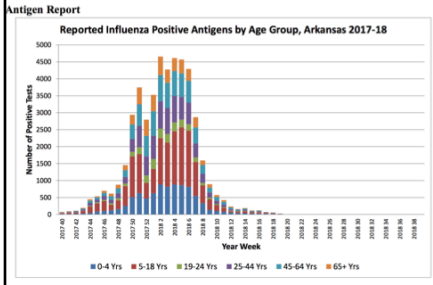


New Vaccines and Recommendations

- Influenza Vaccine Recommendations for 2018-2019
- Recombinant Zoster Vaccine (Shingrix ©)
- Hepatitis B Vaccine with Novel Adjuvant (Heplisav-B©)

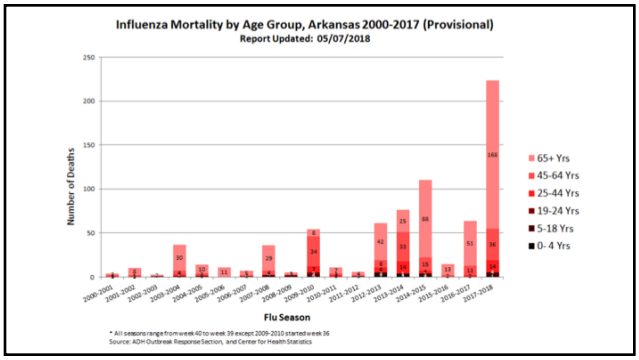


Arkansas 2017-2018 Influenza Season Statistics



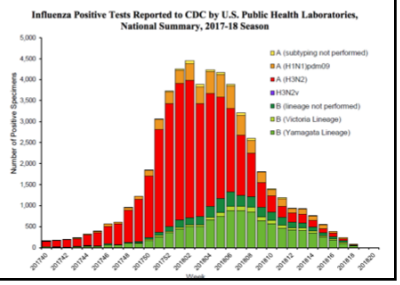
- 62% influenza A, 38% influenza B*
- 223 influenza-related deaths for 2017-2018 season
  - Includes 5 pediatric deaths

* Among total flu antigen tests that can distinguish between influenza A and B virus types,

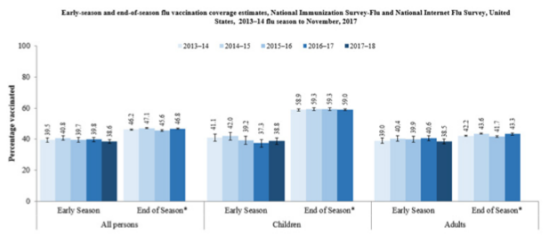


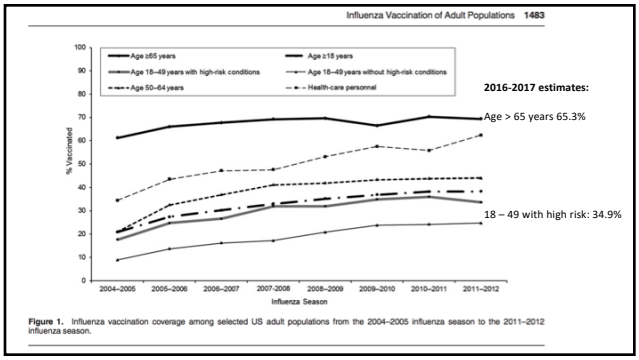
United States 2017-2018 Influenza Season Statistics

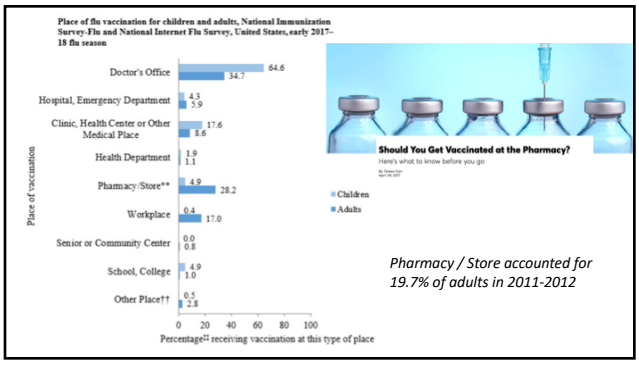
- H3N2 predominate strain
- 165 pediatric deaths
- 45.6% flu vaccination rate for US from early estimates of 2017-2018 season



Flu Vaccination coverage estimates







Pharmacy / Store accounted for 19.7% of adults in 2011-2012

2017-18 Flu Vaccine Effectiveness February 2018

- Interim Estimates of flu VE were 36% (95% confidence interval [CI] = 27%–44%).
  - 25% (CI = 13% to 36%) against illness caused by influenza A(H3N2) virus,
  - 67% (CI = 54%–76%) against A(H1N1)pdm09 viruses
  - 42% (CI = 25%–56%) against influenza B viruses.
- Most (69%) influenza infections were caused by A(H3N2) viruses.
- Early VE estimates underscore the need for ongoing influenza prevention and treatment measures. CDC continues to recommend influenza vaccination because the vaccine can still prevent some infections with currently circulating influenza viruses, which are expected to continue circulating for several weeks.
- ***Even with current vaccine effectiveness estimates, vaccination will still prevent influenza illness, including thousands of hospitalizations and deaths.***

Cell Cultured Flu Vaccine May Provide More Protection

- The viruses have to adapt to grow in eggs; sometimes the mutations they acquire occur at critical locations on the virus. This seems to happen most often with H3N2 viruses, which cause the worst seasonal flu outbreaks.
  - The H3N2 component of the vaccine trains the recipient's immune system to be on the lookout for the wrong invaders. Instead of being on guard against a man in a trench coat, the resulting antibodies are looking for a man in a windbreaker.
- It's thought that viruses grown in cell culture don't acquire as many mutations, so influenza researchers have been eager to see if this vaccine is more effective.
- *FluBlok©, is made in insect cells; it is made by Sanofi Pasteur. Experts are also eager to see if FluBlok© worked better this flu season, but generating that data will be difficult. The vaccine is more expensive than other brands and little of it is used.*

Flu vaccine grown without eggs provided measurably better protection this season, FDA says

- Influenza vaccine made in cell culture in the United States may have worked **about 20 percent better this flu season than the standard vaccines made in eggs**,
  - *Food and Drug Administration Commissioner Scott Gottlieb*

Influenza Strains for 2018-2019

- A/Michigan/45/2015 (H1N1)pdm09-like virus.
- A/Singapore/INFIMH-16-0019/2016 (H3N2)-like virus, *which is a change from the 2017-2018 vaccine.*
- B/Colorado/06/2017-like virus (B/Victoria/2/87 lineage), *which is a change from this season's vaccine.*
- B/Phuket/3073/2013-like virus (B/Yamagata/16/88 lineage) as the second influenza B strain in the quadrivalent vaccine.

ACIP Reinstates Flu Mist for 2018 – 2019 Flu Season

- Based on data from observational studies showing lower than expected effectiveness of FluMist Quadrivalent from 2013 through 2016, on June 22, 2016, the Advisory Committee on Immunization Practices (ACIP), an advisory committee to the Centers for Disease Control and Prevention (CDC), voted to recommend that FluMist Quadrivalent should not be used during the 2016-2017 influenza season.
  - *Vote to prefer inactivated flu vaccine over LAIV failed*
- CDC research from prior studies of live attenuated influenza vaccine showed that effectiveness of LAIV was 45% against influenza A and B, with 25% protection against influenza A (H1N1)pdm09 compared with unvaccinated children.
- CDC researchers also found that while inactivated influenza vaccine was "better" in all age groups against influenza A(H1N1)pdm09, compared with LAIV, there was no statistically significant difference in protection between the two vaccines for influenza A (H3N2) and influenza B viruses.

ACIP and CDC do not express a preference for any particular vaccine product

"Senior Flu Shot"

- Indicated for patients 65 years of age and older
- trivalent
- Adverse effects are more common
- manufactured using an egg-based process (like most flu vaccines),


ClinicalTrials.gov

FLUAD vs. Fluzone High-Dose Study

The safety and scientific validity of this study is the responsibility of the study sponsor and investigators. Listing a study does not mean it has been evaluated by the U.S. Federal Government. Know the risks and potential benefits of clinical studies and talk to your health care provider before participating. Read our disclaimer for details.

Sponsor:
Duke University

Collaborators:
Centers for Disease Control and Prevention
Boston Medical Center

FluAd

- Standard-dose, three-component (trivalent) inactivated flu vaccine that contains an adjuvant.
- MF59 is an oil-in-water emulsion of squalene oil. Squalene, a naturally occurring substance found in humans, animals and plants, is highly purified for the vaccine manufacturing process.

Fluzone HD

- Four times as much flu virus antigen
- A study published in the New England Journal of Medicine indicated that the high-dose vaccine was 24.2% more effective in preventing flu in adults 65 years of age and older relative to a standard-dose vaccine.
- A separate study published in The Lancet Respiratory Medicine reported that Fluzone High-dose was associated with a lower risk of hospital admissions compared with standard-dose Fluzone for people aged 65 years or older, especially those living in long-term care facilities.

Upcoming ACIP Meeting June 20, 2018

- Influenza Vaccines Introduction VE update
- 2017-2018 influenza season vaccine safety update
- Narcolepsy following adjuvanted monovalent pandemic H1N1 influenza vaccines: Results of the SOMNIA study
- 2018-19 recommendations

Shingles Disease Information

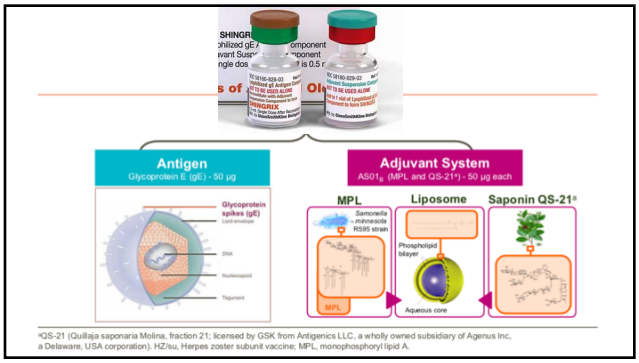
- Reactivation of latent varicella zoster virus (VZV).
- Approximately one million cases occur each year in the United States
- The incidence increases with age, from five cases per 1,000 population in adults aged 50–59 years to 11 cases per 1,000 population in persons aged ≥80 years (*2*).
- Postherpetic neuralgia, commonly defined as persistent pain for at least 90 days following the resolution of the herpes zoster rash, is the most common complication and occurs in 10%–13% of herpes zoster cases in persons aged >50 years (*3*,*4*).
- Among persons with herpes zoster, the risk for developing postherpetic neuralgia also increases with age (*3*–*5*).

Zoster Vaccine Live (ZVL)

- Zoster Vaccine Live (ZVL) (Zostavax, Merck and Co., Inc., Whitehouse Station, New Jersey), a 1-dose live attenuated strain of VZV, is licensed for the prevention of herpes zoster in immunocompetent adults aged ≥50 years and is recommended by the ACIP for use in immunocompetent adults aged ≥60 years
- 33% of adults aged ≥60 years reported receipt of the vaccine (CDC, provisional unpublished data)

Recombinant Zoster Vaccine (RZV)

- Give two doses of RZV 2 to 6 months apart to adults age **50 years and older with competent immune systems regardless of a history of herpes zoster or receipt of the zoster vaccine live** (ZVL; *Zostavax*, Merck & Co).
- Give two doses of RZV 2 to 6 months apart to previous recipients of ZVL at least 2 months after ZVL.
- For persons age 60 years and older, administer RZV or ZVL, with RZV the preferred option.



Aso1$_B$ Adjuvant

- Squalene-based immunological adjuvant
- Used in GSK's A/H1N1 pandemic flu vaccin Pandemrix as well as H5N1 (not available commercially but included in the US governments' US National Stockpile)
- ***This adjuvant system promotes strong CD4+ T-cell and humoral immune response against recombinant proteins.***

ZOE-50 and Zoe-70

- Phase III data in ZOE-50 and ZOE-70 published in the New England Journal of Medicine in April 2015 and September 2016 ZOE-50 showed HZ/Su vaccine to have an efficacy of 97.2% against herpes zoster in adults who were 50 years of age and older
  - ZOE-70 showed showed HZ/Su vaccine to have an efficacy of 89.8% against herpes zoster in adults who were 70 years of age and older. Vaccine was 88% effective against postherpetic neuralgia
  - Mean follow up was 3.2 years
- Being studies in patients who have previously been vaccinated with Zostavax
- Studying Shingrix in patient with compromised immune systems such as solid and hematological canters, hematopoietic stem cell, renal transplant recipients and patient with HIV

Shingles Vaccines Effectiveness Comparison

Age	ZVL Effectiveness	RZV Effectiveness
50 to 59 years old	69.8%	96.6%
60 to 69 years old	64%	97.4%
70 to 79 years old	41%	90%
Over 80 years old	18%	89.1%

- ZVL and PHN
  - 39% reduction in PHN in vaccinated patients who developed shingles (SPS)
  - 73% reduction in PHN in vaccinated patients who developed shingles (ZEST)
- RZV and PHN
  - Vaccine efficacy against PHN was 88.8% (Zoe-70)

Stats complied from Zoster Efficacy and Safety Trail (ZEST), and the Shingles Prevention Study (SPS), Zoe – 50, and Zoe - 70

Updated Shingles Vaccine Recommendations

- October 25, 2017, the Advisory Committee on Immunization Practices (ACIP) recommended the recombinant zoster vaccine (RZV) for use in immunocompetent adults aged ≥50 years.
  - 2 doses 0.5 ml each intramuscular, 2 to 6 months apart
- ACIP Recommendations:
  - 1) RZV is recommended for immunocompetent adults aged ≥50 years (14 voted in favor, 1 opposed*),
  - 2) RZV is recommended for immunocompetent adults previously vaccinated with ZVL (12 voted in favor, 3 opposed), and
  - 3) RZV is preferred over ZVL (8 voted in favor, 7 opposed).

https://www.cdc.gov/mmwr/volumes/67/wr/mm6703a5.htm

Clinical Guidelines for RSZ

- **General use**. RZV may be used in adults aged ≥50 years, **irrespective of prior receipt of varicella vaccine or ZVL**, and does not require screening for a history of chickenpox (varicella).
- ZVL remains a recommended vaccine for prevention of herpes zoster in immunocompetent adults aged ≥60 years. Care should be taken not to confuse ZVL, which is stored in the freezer and administered subcutaneously, with RZV, which is stored in the refrigerator and administered intramuscularly.
- **Dosing schedule.** Following the first dose of RZV, the second dose should be given 2–6 months later.
  - The vaccine series need not be restarted if more than 6 months have elapsed since the first dose; however, the efficacy of alternative dosing regimens has not been evaluated, data regarding the safety of alternative regimens are limited
  - If the second dose of RZV is given less than 4 weeks after the first, the second dose should be repeated. Two doses of the vaccine are necessary regardless of prior history of herpes zoster or prior receipt of ZVL.
- **Timing of RZV for persons previously vaccinated with ZVL**. Age and time since receipt of ZVL may be considered to determine when to vaccinate with RZV.
  - Studies examined the safety and immunogenicity of RZV vaccination administered ≥5 years after ZVL; shorter intervals have not been studied. However, there are no data or theoretical concerns to indicate that RZV would be less safe or less effective when administered at an interval of <5 years. Clinical trials indicated lower efficacy of ZVL in adults aged ≥70 years; therefore, a shorter interval may be considered based on the recipient's age when ZVL was administered. Based on expert opinion, RZV should not be given <2 months after receipt of ZVL.

Coadministration

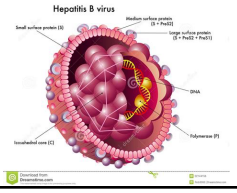
- **Coadministration with other vaccines.** CDC's general best practice guidelines for immunization advise that recombinant and adjuvanted vaccines, such as RZV, can be administered concomitantly, at different anatomic sites, with other adult vaccines (*31*).
  - Concomitant administration of RZV with Fluarix Quadrivalent (influenza vaccine) (QIV) has been studied, and there was no evidence for interference in the immune response to either vaccine or safety concerns
  - Evaluation of coadministration with 23-valent pneumococcal polysaccharide vaccine (PPSV23, Pneumovax23) and tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine, adsorbed (Tdap, Boostrix) is ongoing.
  - The safety and efficacy of administration of two adjuvanted vaccines (e.g., RZV and adjuvanted influenza vaccine [Fluad]), either concomitantly or at other intervals, have not been evaluated.
- **Counseling for reactogenicity.** Before vaccination, providers should counsel RZV recipients about expected systemic and local reactogenicity. Reactions to the first dose did not strongly predict reactions to the second dose; vaccine recipients should be encouraged to complete the series even if they experienced a grade 1–3 reaction to the first dose of RZV. The impact of prophylactic analgesics in conjunction with RZV has not been studied.

Special Populations

- **Persons with a history of herpes zoster**. Herpes zoster can recur. Adults with a history of herpes zoster should receive RZV. If a patient is experiencing an episode of herpes zoster, vaccination should be delayed until the acute stage of the illness is over and symptoms abate. Studies of safety and immunogenicity of RZV in this population are ongoing.
- **Persons with chronic medical conditions.** Adults with chronic medical conditions (e.g., chronic renal failure, diabetes mellitus, rheumatoid arthritis, and chronic pulmonary disease) should receive RZV.
- **Immunocompromised persons**. As with ZVL, the ACIP recommends the use of RZV in persons taking low-dose immunosuppressive therapy (e.g., <20 mg/day of prednisone or equivalent or using inhaled or topical steroids) and persons anticipating immunosuppression or who have recovered from an immunocompromising illness (*6*).
  - Whereas RZV is licensed for all persons aged ≥50 years, immunocompromised persons and those on moderate to high doses of immunosuppressive therapy were excluded from the efficacy studies (ZOE-50 and ZOE-70), and thus, ACIP has not made recommendations regarding the use of RZV in these patients; this topic is anticipated to be discussed at upcoming ACIP meetings as additional data become available.
- **Persons known to be VZV negative**. Screening for a history of varicella (either verbally or via laboratory serology) before vaccination for herpes zoster is not recommended. However, in persons known to be VZV negative via serologic testing, ACIP guidelines for varicella vaccination should be followed. RZV has not been evaluated in persons who are VZV seronegative and the vaccine is not indicated for the prevention of chickenpox (varicella).

Hepatitis B Virus (HBV)

- Transmitted via blood or sexual contact
- Increases risk for cirrhosis and liver cancer
- Highly infectious and can remain viable on surfaces for up to 7 days



Hepatitis B Vaccine Recommendations for Adults

- 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 HBsAgpositive 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

Hepatitis B and Diabetes

- Hepatitis B virus (HBV) causes acute and chronic infection of the liver leading to substantial morbidity and mortality.
- In the United States, since 1996, a total of 29 outbreaks of HBV infection in one or multiple long-term–care (LTC) facilities, including nursing homes and assisted-living facilities, were reported to CDC; of these, 25 involved adults with diabetes receiving assisted blood glucose monitoring (*1;* CDC, unpublished data, 2011).
- These outbreaks prompted the Hepatitis Vaccines Work Group of the Advisory Committee on Immunization Practices (ACIP) to evaluate the risk for HBV infection among all adults with diagnosed diabetes. The Work Group reviewed HBV infection–related morbidity and mortality and the effectiveness of implementing infection prevention and control measures.
- Based on the Work Group findings, on October 25, 2011, ACIP recommended that all previously unvaccinated adults aged 19 through 59 years with diabetes mellitus (type 1 and type 2) be vaccinated against hepatitis B as soon as possible after a diagnosis of diabetes is made
- Data on the risk for hepatitis B among adults aged ≥60 years are less robust. Therefore, ACIP recommended that unvaccinated adults aged ≥60 years with diabetes may be vaccinated at the discretion of the treating clinician after assessing their risk and the likelihood of an adequate immune response to vaccination (recommendation category B).

Recommended doses of currently licensed formulations of hepatitis B vaccine, by age group and vaccine type

Age Group		Single-antigen vaccine				Combination vaccine			
		Recombivax HB		Engerix-B		Pediarix†		Twinrix§	
		Dose (µg)¶	Vol(mL)	Dose (µg)¶	Vol(mL)	Dose (µg)¶	Vol (mL)	Dose (µg)¶	Vol (mL)
Infants (<1 yr)		5	0.5	10	0.5	10	0.5	NA**	NA
Children (1–10 yrs)		5	0.5	10	0.5	10†	0.5	NA	NA
Adolescents	11–15 yrs	10††	1.0	NA	NA	NA	NA	NA	NA
	11–19 yrs	5	0.5	10	0.5	NA	NA	NA	NA
Adults (≥20 yrs)		10	1.0	20	1.0	NA	NA	20§	1.0
Hemodialysis patients and other immuno-compromised persons	<20 yrs§§	5	0.5	10	0.5	NA	NA	NA	NA
	≥20 yrs	40¶¶	1.0	40***	2.0	NA	NA	NA	NA

† Combined hepatitis B, diphtheria, tetanus, acellular pertussis adsorbed, inactivated poliovirus vaccine. This vaccine cannot be administered at birth, before age 6 weeks, or at age >7 years.

§ Combined Hepatitis A and Hepatitis B vaccine. This vaccine is recommended for persons aged ≥18 years who are at increased risk for both hepatitis B virus and Hepatitis A virus infections.

¶ Recombinant hepatitis B surface antigen protein dose.

** Not applicable.

†† Adult formulation administered on a 2-dose schedule.

§§ Higher doses might be more immunogenic, but no specific recommendations have been made.

¶¶ Dialysis formulation administered on a 3-dose schedule at 0, 1, and 6 months.

*** Two 1.0-mL doses administered at one site, on a 4-dose schedule at 0, 1, 2, and 6 months.

https://www.cdc.gov/hepatitis/hbv/hbvfaq.htm#vaccFAQ

Hepatitis B Vaccine Formulations

Formulation	Age	Dose	Series	Special Considerations
Recombivax HD 5 mcg / 0.5 ml	Birth through 19 years of age	0.5 ml	0, 1, & 6 months	Adolescent 2 dose series (0 and 4 – 6 months)
Recombivax HB 10 mcg / ml	20 years and older	1 ml	0, 1, & 6 months	
Recombivax HB Dialysis Formulation 20 mcg /0.5 ml	Birth through 19 years of age	0.5 ml	0, 1, & 6 months	Pediatric dialysis patients
Recombivax HB Dialysis Formulation 40 mcg / ml	20 years and older	1 ml	0, 1, & 6 months	Dialysis patients
Engerix-B 10 mcg / ml	Birth through 19 years of age	0.5 ml	0, 1, & 6 months	
Engerix-B 20 mcg / ml	20 years and older	1 ml	0, 1, & 6 months	
Engerix-B 20 mcg / ml or 40 mcg / 2 ml	20 years and older	2 ml	0, 1, 2, & 6 months	2 ml
Twinrix (720 ELISA Units of inactivated HAV and 20 mcg of recombinant HBsAg)	18 years and older	1 ml	0, 1, & 6 months	Accelerated series: 0, 7, 21 to 30 days with booster at 12 months
HBsAg (Heplisav)	18 years and older	0.5 ml	0 & 1 month	2 doses

Heplisav-B (HepB-CpG)

- Yeast-derived vaccine prepared with a novel adjuvant, administered as a 2-dose
- series (0, 1 month) for use in persons aged ≥ 18 years.
- Contraindication: allergy to yeast or vaccine components
- The most common local reaction was injection site pain (23% - 39%). The most common systemic reactions were fatigue (11% - 17%) and headache (8% - 17%).
- Seroprotective antibody to hepatitis B surface antigen (anti-HBs) levels were achieved in 90.0%–100.0% of subjects receiving HepB-CpG (Dynavax Technologies Corporation), compared with 70.5%–90.2% of subjects receiving Engerix-B (GlaxoSmithKline Biologicals). The benefits of protection with 2 doses administered over 1 month make HepB-CpG an important option for prevention of HBV.
  - ACIP's systematic review included data from four randomized controlled trials that assessed HBV infection prevention and six randomized controlled trials that assessed adverse events in adults who received the vaccine. Significantly more (90.0% - 100.0%) participants who received HepB-CpG achieved seroprotective antibody to hepatitis B surface antigen (anti-HBs) levels compared with those who received the *Engerix-B* (GlaxoSmithKline Biologicals) vaccine (70.5% - 90.2%).
- HepB-CpG contains yeast-derived recombinant HepB surface antigen (HBsAg) and is prepared by combining purified HBsAg with small synthetic immunostimulatory cytidine-phosphate-guanosine oligodeoxynucleotide (CpG-ODN) motifs (1018 adjuvant).
  - The 1018 adjuvant binds to Toll-like receptor 9 to stimulate a directed immune response to HBsAg (*1*).

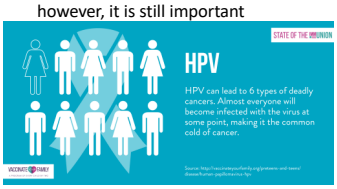
Engerix and Recombivax use an aluminum adjuvant

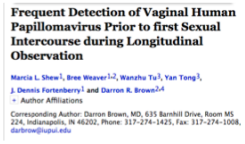
Special considerations for Heplisav

- **Interchangeability and dosing schedule.** Data are limited on the safety and immunogenicity effects when HepB-CpG is interchanged with HepB vaccines from other manufacturers. When feasible, the same manufacturer's vaccines should be used to complete the series (*10*). However, vaccination should not be deferred when the manufacturer of the previously administered vaccine is unknown or when the vaccine from the same manufacturer is unavailable (*10*).
- **Postvaccination serologic testing**. To assess response to vaccination and the need for revaccination, postvaccination serologic testing 1–2 months after the final dose of vaccine is recommended for certain persons following vaccination (e.g., hemodialysis patients, HIV-infected and other immunocompromised persons, health care personnel, and sex partners of HBsAg-positive persons) (*2*).
  - Administration of more than two complete HepB vaccine series is generally not recommended, except for hemodialysis patients
  - HepB-CpG may be used for revaccination following an initial HepB vaccine series that consisted of doses of HepB-CpG or doses from a different manufacturer
- HepB-CpG may also be used to revaccinate new health care personnel (including the challenge dose) initially vaccinated with a vaccine from a different manufacturer in the distant past who have anti-HBs <10 mIU/mL upon hire or matriculation

Talking to Patients / Parents about HPV Vaccination

- Study shows that HPV was detected in 46% of females prior to first vaginal sex
- Vaccine protects against cancer!
- HPV vaccine is not included in the vaccine requirements for school, however, it is still important




Frequent Detection of Vaginal Human Papillomavirus Prior to first Sexual Intercourse during Longitudinal Observation

Marcia L. Shew[1], Bree Weaver[1,2], Wanzhu Tu[3], Yan Tong[3], J. Dennis Fortenberry[1] and Darron R. Brown[2,4]

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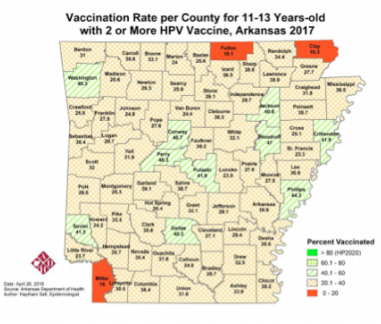
HPV Vaccine

- Routine HPV vaccination at age 11 or 12 years, can be given starting at age 9 years.
  - Females through age 26 years and for males through age 21 years
  - Males 22 to 26 who are at high risk of HPV infection
- HPV 9 covers types 6, 11, 16*, 18*, 31, 33, 45, 52, & 58
- No recommendation to revaccinate anyone who had already received HPV 4
- Duration of protection has been show in studies to last 10 years, however there is no evidence of protection decreasing over time.

**The majority of all HPV-associated cancers are caused by HPV 16 or 18, and in each formulation of the HPV vaccine*

Current HPV vaccination recommendations

- Initiating vaccination before the **15th** birthday, the recommended immunization schedule is **2 doses of HPV vaccine.**
  - 0, 6-12 month schedule
- Initiating vaccination on or **after the 15th** birthday, the recommended immunization schedule is **3 doses of HPV vaccine**.
  - 0, 1-2, 6 month schedule
- *For patients without immunocompromising conditions, the number of recommended doses is based on age at administration of the first dose.*



Healthy People 2020 goal is 80%

Vaccines for Children Program

- The Vaccines For Children (VFC) program is a federally funded program that provides vaccines at **no cost to** children who might not otherwise be vaccinated because of inability to pay.
- CDC buys vaccines at a discount and distributes them to grantees—i.e., state health departments and certain local and territorial public health agencies—which in turn distribute them at no charge to those private physicians' offices and public health clinics registered as VFC providers.
- Children who are **eligible*** for VFC vaccines are entitled to receive those vaccines recommended by the Advisory Committee on Immunization Practices (ACIP)

VFC Eligibility

Federally Vaccine-eligible Children (VFC eligible)

1. Are an American Indian or Alaska Native;
2. Are enrolled in Medicaid;
3. Have no health insurance;
4. Are underinsured: A child who has health insurance, but the coverage does not include vaccines; a child whose insurance covers only selected vaccines (VFC-eligible for noncovered vaccines only).
   - Underinsured children are eligible to receive VFC vaccine only through a Federally Qualified Health Center (FQHC), or Rural Health Clinic (RHC) or under an approved deputization agreement.

State Vaccine-eligible Children (SCHIP)

- In addition, to the extent that my state designates additional categories of children as "state vaccine-eligible", I will screen for such eligibility as listed in the addendum to this agreement and will administer state-funded doses (including 317 funded doses) to such children.

Children aged 0 through 18 years that do not meet one or more of the eligibility federal vaccine categories (VFC eligible), are not eligible to receive VFC-purchased vaccine.

Other Requirements of VFC Providers

For pharmacies, urgent care, or school located vaccine clinics, I agree to:

a) Vaccinate all "walk-in" VFC-eligible children and
b) Will not refuse to vaccinate VFC-eligible children based on a parent's inability to pay the administration fee.

Note: "Walk-in" refers to any VFC eligible child who presents requesting a vaccine; not just established patients. "Walk-in" does not mean that a provider must serve VFC patients without an appointment. If a provider's office policy is for all patients to make an appointment to receive immunizations then the policy would apply to VFC patients as well.

Establishing a Pharmacy-Based VFC Program

- Enroll facility and pharmacists with Arkansas WebIZ
- VFC Provider Agreement
- VFC Provider Profile
- *Vaccine Storage Requirements*
- Eligibility verification process
- Site Visit
- Reimbursement
  - Must have a Medicare mass immunization provider ID number (PTAN)
  - Update pharmacy provider profile with AR Medicaid
  - $9.56 for admin fee

Vaccine Storage and Handling Requirements

- Fridge AND separate freezer for storage of vaccines
  - Dorm-style refrigerators or combination units with a single external door are not used for vaccine storage.
  - Check the unit doors to ensure they seal properly, are closed and, if possible, locked.
  - "DO NOT UNPLUG" signs are placed next to electrical outlets and circuit breaker.
  - Safety outlet covers or plug covers are placed where possible.
  - Maintenance and janitorial personnel are advised not to unplug refrigerator/freezer units.
  - Plug unit directly into the outlet. Do not use extension cords or power strips or GFI device.
- Digital data logger and back up for fridge and freezer
  - Use certified, calibrated thermometers to monitor temperatures and record twice daily (beginning and end of clinic/office day) for each unit containing VFC vaccine. Certificates of calibration must be made available to the VFC Representative upon request. It is also recommended to check and document the min/max temperatures of the storage unit each morning.
- Vaccine Management Plan

Online Training

Primary and Back-Up Vaccine Coordinators complete at least one of the online training modules

1. Module: Vaccines for Children (VFC)-2015
2. Module: Vaccine Storage and Handling-2015
3. Module: Keys to Storing and Handling Your Vaccine Supply-2015

CEs are provided at no charge by the CDC

Arkansas Pharmacists Association's Pharmacist Immunization Program Protocol

- Intended for pharmacists who have been unsuccessful in finding a local physician to sign immunization protocol
- Must be APA member
- In good standing with AR Board of Pharmacy
- Report all doses given pursuant to protocol to Arkansas Immunization Information System (WebIZ)
- Recommend and administer immunizations per the ACIP / CDC guidelines

Updates to Immunization Protocol

- Includes all adult immunizations (18 years and older) plus influenza for kids down to age 7
  - All 13 adult immunizations
- Pharmacist now attest that their pharmacist license, authority to administer, and CPR for healthcare providers (BLS) is current

Clinical Information from Arkansas Department of Health

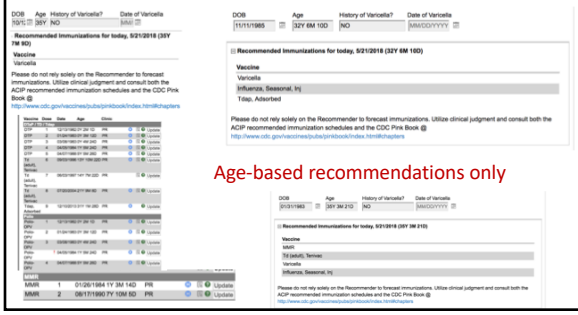
- Great need to offer HPV immunizations from pharmacists to young adults / college age adults (age 18-26) for those who missed the series as a teenager.
- MMR (measles, mumps and rubella) immunization is added to the protocol this year and is needed in the adult population. During the mumps outbreak in Arkansas last year, ADH estimated that greater than 95% of children were caught up on the MMR vaccine during the outbreak but only an **estimated 40% of adults were fully vaccinated to prevent mumps** (MMR vaccine).
- Flumist (influenza nasal), MMR (measles, mumps and rubella), Varicella (chicken pox) and Zostavax (shingles live) vaccine are all LIVE vaccines and it is important that all patients are offered the universal consent and screening form to identify potential contraindications for live vaccines (pregnancy, immunocompromised, etc.)
- Even though Zostavax is a live vaccine, we expect Zostavax to be used less and less because the new CDC ACIP guidelines prefer Shingrix instead of Zostavax.
- ACIP and CDC are reinstating Flumist nasal spray vaccine, also a live vaccine, for the 2018-2019 season. https://www.medpagetoday.com/meetingcoverage/acip/71298.
- Prevnar-13 vaccine is recommended for all adults in addition to Pneumovax and to certain high-risk patient populations under age 65.
- The Hepatitis B immunization series is recommended for most patients with diabetes, especially if younger than 60 years old

Arkansas Immunization Information System

- Online database of immunizations received by Arkansans
- Helps keep track of immunizations given and vaccine inventory
- ***Required by law to report any vaccine given to any person 21 years of age or younger***
- Voluntary reporting for any vaccine given to any person 22 years of age or older
- Application for access to registry can be found at www.arrx.org/immunizations
- Webinars to train pharmacists on the registry are available

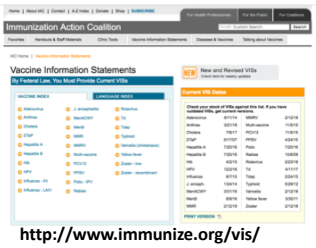
****Important **** Note that **WebIZ** (Arkansas Department of Health Immunization online immunization registry-IIS) documentation for all vaccines for all ages is a requirement of the protocol.

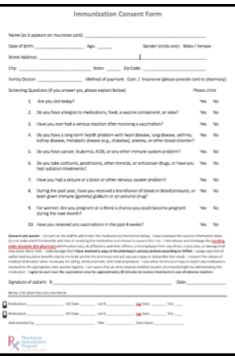
Screenshot from AR WebIZ Immunization Recommender



Age-based recommendations only

VIS and Universal Immunization Consent Form





http://www.immunize.org/vis/

Emergency Medications

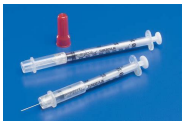
While treating an adverse effect following immunizations/vaccines, the aforementioned pharmacist(s) is authorized to administer the following medication pending the arrival of emergency medical services:

Medications authorized to use and administer according to the Protocol for Management of Severe Allergic/Anaphylactic Reactions:

Medication Class	Medication	Dose	Route
Allergy Medications	Epinephrine	0.15-0.5 mg *(using a 1 mg/mL epinephrine solution)**	IM *(preferred)* SubQ
Allergy Medications	Epinephrine auto-injector 0.3 mg	0.3 mg for patient weight >30 kg (>66 pounds)*	IM
Allergy Medications	Epinephrine auto-injector 0.15 mg	0.15 mg for patient weight 15-30 kg (33-66 pounds)*	IM
Allergy Medications	diphenhydramine	50 mg X 1 dose	IM or PO

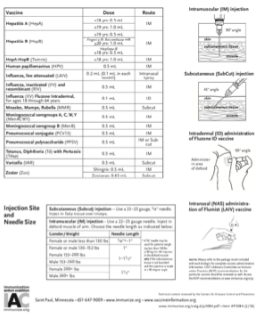
***Epinephrine**: If EMS has not arrived, and anaphylactic symptoms are still present, repeat dose of epinephrine every 5 to 15 minutes, depending on patient's response.

Needle Selection



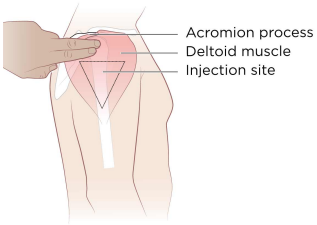
OSHA ***requires*** employers to provide safety needles / syringes to be used when giving injections

Administering Vaccines to Adults: Dose, Route, Site, and Needle Size



Shoulder Injury Related to Vaccine Administration (SIRVA)

- Shoulder pain and limited range of motion after vaccination administration, caused by injury to the musculoskeletal structures of the shoulder, such as tendons, ligaments, and bursae
- Occurs when given too high on the shoulder
- Different from pain following a vaccination which usually subsides on its own

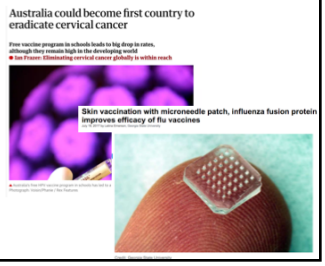


Pharmacists should sit down when administering I.M. vaccines, said Stephan L. Foster, PharmD, FAPhA, APhA liaison to the CDC Advisory Committee on Immunization Practice. "Don't stand over the patient. Make sure you're at the same level, or the needle can go in at the wrong angle."

Pharmacy Today *SIRVA Prevention from Immunization Administration in the Arm*

Immunizations Potential Future Achievements in Public Health

Vaccines on the Horizon
- Breast cancer
- Universal flu vaccine
- Malaria
- Tuberculosis
- AIDS
- Alzheimer's disease
- Autoimmune disease such as multiple sclerosis, rheumatoid arthritis, and lupus


Australia could become first country to eradicate cervical cancer

Free vaccine program in schools leads to big drop in rates, although they remain high in the developing world

Ian Frazer: Eliminating cervical cancer globally is within reach

Skin vaccination with microneedle patch, influenza fusion protein improves efficacy of flu vaccines

Immunization Case

Family of 4 come into pharmacy asking about immunizations for their 18 year old who is about to start college.

Family members:

- Mom: 52 years of age, healthy, no immunization history
- Dad: 55 years of age, pharmacist, diabetes, no immunization history
- Son: 12 years of age, childhood immunizations, but none since his check up for 5th grade