

## Vaccine Update for the Pharmacist

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### Faculty Disclosure

- Dr. Giroto has no actual or potential conflicts of interest associated with this presentation.

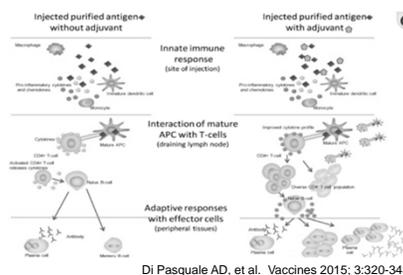
### Objectives

- Identify vaccines with non-aluminum adjuvants
- Discuss the pros and cons of the new non-aluminum adjuvants in vaccines
- Summarize updates to the immunization recommendations in 2018

### ADJUVANTS IN VACCINES

### Adjuvants

- Role: Added to improve the effectiveness of the vaccine response. Specifically different adjuvants can be used to affect the onset, strength, type, and duration of immune response as well as stability of the vaccine.



### NEW VACCINES CONTAINING NON-ALUMINUM ADJUVANTS

## Aluminum Adjuvants

- Utilized in vaccines since 1930's
- Most routinely utilized adjuvant
  - Included in many current vaccines: DT, DTaP, Td, Tdap, Hepatitis A, Hepatitis B (Recombivax & Engerix-B), Twinrix, HPV9, Meningococcal B (Bexsero, Trumenba), Pneumococcal (PCV13)
- Mechanism: Continued controversy...
  - Likely partially through stimulation of NLRP3 inflammasome producing interleukin 1 $\beta$ , also some evidence that localized cell death and release of uric acid plays a role
- Immune response: Primarily used to enhance antibody production

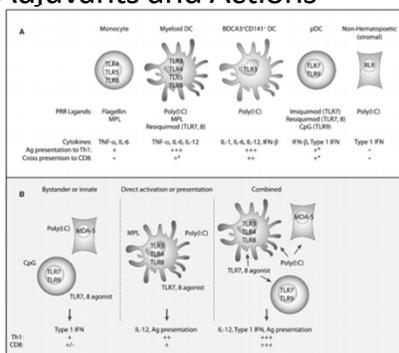
Coffman RL, et al. Vaccine Adjuvants: Immunity 2010;33:492-503.

## Non-Aluminum Adjuvants in Newer Vaccines

- Fluad contains MF59, an oil in water emulsion composed of squalene, a cholesterol precursor
- Shingrix contains ASO1<sub>B</sub>, which is a combined formulation of monophosphoryl lipid A (MPL) and QS-21 combined in liposomal formulation
- Hepilisav-B contains Cytoside phosphoguanine (CpG) 1018, a synthetic form of DNA that mimics bacterial and viral genetic material
- No longer produced due to lack of use, Cervarix contained ASO4, which contained MPL and aluminum salt

CDC. Adjuvants help vaccines work better. Available at: <https://www.cdc.gov/vaccinesafety/concerns/adjuvants.html>

## Adjuvants and Actions



Coffman RL, et al. Vaccine Adjuvants: Immunity 2010;33:492-503.

## MF59

- First used in 1997 in flu vaccine in Italy
- Approved in US, since 2016-2017 in Fluad, adjuvanted influenza vaccine in US
- Small particle size also allows for filter sterilization that allows for long term stability, 5+ years – used in pandemic vaccine stockpiles
- Mechanism: induces local inflammation (e.g. neutrophils, monocytes, macrophages) which leads to local recruitment and activation of dendritic cells as well as increased uptake of antigen by dendritic cells.
- Immune responses: induce fast priming of influenza antigen-specific CD4+ T-cell response and strong long-lasting antibody responses

## ASO1<sub>B</sub>

- A combination of MPL & QS-21 used in Shingrix
- Mechanisms:
  - MPL is detoxified natural glycolipid derived from the cell membranes of *Salmonella minnesota*. It is an agonist of Toll-like receptor 4 (TLR4). MPL provides direct activation of antigen-presenting cells that express TLR4 stimulating cytokine and co-stimulatory molecule production.
  - QS-21 is a molecule from Chilean bark that promotes antigen-specific antibody and stimulates cytotoxic CD8+ T cells. It also is known to have hemolytic activity, but this is eliminated through formulation in liposomes – such as that which was done in making the ASO1 formulation

## ASO1<sub>B</sub>

- A combination of MPL & QS-21 used in Shingrix
- Immune responses:
  - Use of multiple mechanisms to have a more potent and efficient response.
  - This combination results in a predominant interferon response that is primarily cell-mediated.

## CpG 1018

- Class B CpG, synthetic oligonucleotide that includes a motif that is active on mouse TLR9, and another part that is active on human and non-human primate TLR9.
- Mechanism: Stimulation of TLR9 in plasmacytoid dendritic cells (pDCs). Resulting in increased neutrophils, monocytes and expansion of pDCs.
- Immune response: Very strong and rapid antibody response

## CURRENT RECOMMENDATION FOR CO-ADMINISTRATION OF NON-ALUMINUM ADJUVANTED VACCINE

## 2018-2019 Influenza Recommendations

“The immunogenicity and safety of simultaneous or sequential administration of two novel adjuvant-containing vaccines has not been evaluated, and the ideal interval between such vaccines when given sequentially is not known. In the study of Shingrix and IIV4 discussed above, most reactogenicity symptoms resolved within 4 days. Given unknown but theoretical concerns of increased reactogenicity when administering two novel adjuvant-containing vaccines, and the availability of nonadjuvanted influenza vaccine options, selection of a nonadjuvanted influenza vaccine may be considered in situations where influenza vaccine and another vaccine containing a novel adjuvant are to be administered concomitantly. However, vaccination should not be delayed if a specific product is not available. Vaccines with newer adjuvants, like other vaccines, should be administered at separate sites from other vaccines that are given concomitantly”

Grohskopf LA, et al. MMWR 2018; 67(3): 1-20

## Learning Assessment

- A 60 year old is in the pharmacy to receive a flu shot and hepatitis B vaccine. Which of the following would be preferred per ACIP recommendations for non-aluminum adjuvanted vaccines?
  - Combining Fluvad with Engerix-B instead of Heplisav-B
  - Combining Shingrix with Heplisav-B instead of RecombivaxHB
  - Combining Shingrix with Fluvad instead of High-dose Fluzone

## 2018 VACCINE UPDATE

Shingrix  
Hepatitis B & Heplisav-B  
Hepatitis A

## SHINGRIX

## Shingrix



- Inactivated IM vaccine, administered 0.5 ml IM
- Two dose series, separated by 2 to 6 months
- FDA approved for prevention of herpes zoster in adults 50 years and older. It is not indicated for the prevention of primary varicella infection.

## Clinical Data for Shingrix

Outcome	Number of subjects (number of studies)	Comparison groups	Findings
Prevention of herpes zoster	50-59y: 7,017 (1) 60-69y: 4,307 (1) ≥70y: 16,596 (1)	2 dose RZV vs placebo	VE [95% CI] • 50-59y: 96.6% [89.6-99.3] • 60-69y: 97.4% [90.1-99.7] • ≥70y: 91.3% [86.8-94.5]
Prevention of post-herpetic neuralgia	≥50y: 27,916 (1) ≥70y: 16,596 (1)	2 dose RZV vs placebo	VE [95% CI] • ≥50y: 91.2% [75.9-97.7] • ≥70y: 88.8% [68.7-97.1]
Duration of protection against herpes zoster (up to 4 years post vaccination)	14,693 (1)	2 dose RZV vs placebo	VE remained about 85% in the first 4 years following vaccination

<https://www.cdc.gov/vaccines/acip/recs/grade/herpes-zoster.html>

## Adverse Effects of Shingrix

Adverse Reactions	Aged 50-59 Years All Grades / Grade 3**		Aged 60-69 Years All Grades / Grade 3**		Aged ≥70 Years All Grades / Grade 3**	
	SHINGRIX %	Placebo %	SHINGRIX %	Placebo %	SHINGRIX %	Placebo %
<b>Solicited Local Adverse Reactions</b>	n=1315	n=1312	n=1311	n=1305	n=2258	n=2263
Pain	88.4 / 10.3	14.4 / 0.5	82.8 / 6.9	11.1 / 0.5	69.2 / 4.0	8.8 / 0.2
Redness	38.7 / 2.8	1.2 / 0.0	38.4 / 2.6	1.6 / 0.0	37.7 / 3.1	1.2 / 0.0
Swelling	30.5 / 1.1	0.8 / 0.0	26.5 / 0.5	1.0 / 0.0	23.0 / 1.3	1.1 / 0.0
<b>Solicited General Adverse Events</b>	n=1315	n=1312	n=1309	n=1305	n=2252	n=2264
Myalgia	56.9 / 8.9	15.2 / 0.9	49.0 / 5.3	11.2 / 0.8	35.1 / 2.8	9.9 / 0.4
Fatigue	57.0 / 8.5	19.8 / 1.8	45.7 / 5.0	16.8 / 0.8	36.6 / 3.5	14.4 / 0.8
Headache	50.6 / 6.0	21.6 / 1.7	39.6 / 3.7	15.6 / 0.2	29.0 / 1.5	11.8 / 0.4
Shivering	35.8 / 6.8	7.4 / 0.2	30.3 / 4.5	5.7 / 0.3	19.5 / 2.2	4.9 / 0.3
Fever†	27.8 / 0.4	3.0 / 0.2	23.9 / 0.5	3.4 / 0.2	14.3 / 0.1	2.7 / 0.1
GI‡	24.3 / 2.1	10.7 / 0.7	16.7 / 0.9	8.7 / 0.6	13.5 / 1.2	7.6 / 0.4

The majority of reactions were mild to moderate (grade 1 or 2). Median duration of reactions was 2 to 3 days.<sup>1,4</sup>

\*Grade 3 pain defined as significant pain at rest; prevents normal everyday activities.  
 †Grade 3 redness and swelling defined as >100 mm in size.  
 ‡Grade 3 myalgia, fatigue, headache, shivering, and GI defined as preventing normal activity.  
 †Fever defined as >37.5°C/99.5°F for oral, axillary, or tympanic route, or >38°C/100.4°F for rectal route; grade 3 fever defined as >39.0°C/102.2°F.  
 ‡Gastrointestinal symptoms, including nausea, vomiting, diarrhea, and/or abdominal pain.

Shingrix Website

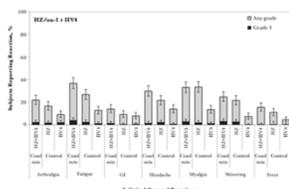
## Serious Adverse Effects - Shingrix

Serious adverse events	29,965 (8)	2 dose RZV vs placebo	No differences in serious adverse events between vaccinated and placebo groups. No serious adverse events related to vaccination found.
Reactogenicity (Grade 3 reaction)	10,590* (8)	2 dose RZV vs placebo	Grade 3 reactions more commonly reported in vaccinated populations compared to placebo. In phase III clinical trials (n=9,936): <ul style="list-style-type: none"> <li>• 16.5% of vaccine recipients reported any Grade 3 reaction compared to 3.1% of placebo recipients.</li> <li>• 9.4% of vaccine recipients reported Grade 3 injection-site reactions, compared to 0.3% of placebo recipients.</li> <li>• 10.8% of vaccine recipients reported Grade 3 systemic reactions, compared to 2.4% of placebo recipients.</li> </ul> Safety and immunogenicity studies reported similar reactogenicity rates among participants receiving RZV

<https://www.cdc.gov/vaccines/acip/recs/grade/herpes-zoster.html>

## Shingrix with Other Vaccines

- Co-administration of Shingrix with unadjuvanted IIV4 has been studied versus each vaccine separately (n= 413 combo, 414 control)
  - No evidence of decreased immunogenicity; No safety concerns were noted, although small increased rate of general adverse effects were seen in the co-administration group



Schwarz TF, et al. JID 2017;216:1352-1361

## ACIP Herpes Zoster Recommendations

- Recommended Shingrix for prevention of herpes zoster and related complications for:
  - Immunocompetent adults 50 years and older
  - Immunocompetent adults who previously received Zostavax
- Recommended Shingrix as the **preferred** vaccine over Zostavax for the prevention of herpes zoster and related complications

## Shingrix Important FAQs



- All healthy patients 50 years and older are recommended to get Shingrix
- This includes patients who have had shingles and patients that are uncertain if they have had chickenpox
- There is no maximum age for Shingrix
- If a patient had shingles in the past, should ensure that the rash has resolved before administering the Shingrix vaccine

<https://www.cdc.gov/vaccines/vpd/shingles/public/shingrix/index.html>

## Learning Assessment

- Mr Smith is a 55 year old man in your pharmacy today to receive his flu vaccine. He also inquires about Shingrix. Which of the following is correct regarding Shingrix?
  - A. Shingrix adverse effects are similar to other inactivated vaccines
  - B. Shingrix elicits a strong immunostimulatory response, due to its adjuvant, and as such often results in significant pain at the injection site as well as flu like symptoms for a few days after the vaccine is administered
  - C. ACIP does not recommend administering Shingrix with any flu vaccine

## HEPATITIS B VACCINATION UPDATES

## Hepatitis-B Recommendations for Adults

- Recommended for:
  - Persons at risk through sexual exposure
  - Persons with a history of current or recent injection drug use
  - Persons at risk for infection by percutaneous or mucosal exposure to blood
  - International travelers to countries with endemic Hepatitis B infection rates of at least 2%
  - **Persons with hepatitis C infection or other chronic liver disease as defined as cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, and an ALT or AST > 2 x ULN**
  - Persons with HIV infection
  - Incarcerated persons
  - Others seeking protection from Hepatitis B infection

Schille S, et al. MMWR Morb Mortal Wkly Rep. 2018;67:455-458.

## Hepatitis B Vaccine Recommendation Update

- Only patients who are part of specific groups are recommended to demonstrate seroprotection
  - Healthcare workers, hemodialysis patients, HIV infected patients, immunocompromised patients, sex partners of HBsAg-positive persons, **infants whose mothers hepatitis B status remains unknown indefinitely**
- Patients who demonstrate seroprotection (anti HBs  $\geq 10$  mIU/ml) 1-2 months post vaccination are considered seroprotected

## Hepatitis B Vaccine Recommendation Update

- Patients who were vaccinated as children and then become part of a group that should have testing performed have resulted in questions in recent years.
- Initial seroprotection (after completion of 3 doses)
  - 95% healthy infants (lower response for lower bw)
  - 95% adolescents (similar response for 2 or 3 dose schedule)
  - 90%+ healthy adults 18-40 years
  - 75% adults 60 years old
- 18 years after vaccination, percent with seroprotection
  - 16% of those vaccinated at < 1 year old
  - 74% of those vaccinated at  $\geq 1$  year old
- **88% of those who received 3 dose series, 30 years prior, demonstrated protective antibodies with a challenge dose of hepatitis B vaccine**

## Other Changes to the Hepatitis B Vaccination Recommendations

- Testing of HBsAg positive pregnant women for hepatitis B DNA
  - This is to identify patients who have HBV DNA > 200,000 IU/ml and are recommended by the American Association for the study of Liver Diseases to be treated for the Hepatitis B to further decrease transmission to the baby
- Universal hepatitis B vaccination of babies within 24 hours of birth if medically stable and  $\geq 2$  kg
  - Removed permissive language for delay of vaccine to post discharge
- Single dose revaccination for infants born to HBsAg positive women who initially did not show seroconversion

## Heplisav-B

- Yeast derived recombinant hepatitis B surface antigen (HBsAg) with CpG 1018 adjuvant
- Two dose schedule, separated by 1 month
- Available as single dose 0.5 mL vial of 20 mcg of HBsAg & 3000 mcg 1018 adjuvant. Does not contain preservatives
- Administration 0.5 ml IM deltoid

## Heplisav-B

Study & Type	Population	Seroprotection rate (anti-HBs $\geq 10$ mIU/ml) Heplisav-B vs EnderixB (Number Needed to Vaccinate)
RCT, Phase II Halperin, 2006	Healthy adults 18-28 yrs (n=99)	100% vs 90.2% (NNV 10)
RCT, Phase III Halperin 2012	Healthy adults 18-55 yrs (n=2415)	97.9% (97.9-98.7) vs 81.1% (77.7-84.4) (NNV 6)
RCT, Phase III Heyward 2013	Healthy adults 40-70 yrs (n=2452)	90.0% (88.2-91.8) vs 70.5% (65.5-75.2) (NNV 5)
RCT, Phase III Jackson 2017	Adults without HIV, or autoimmune dx 18-70 yrs	95.4% (94.8-96.0) vs 81.3% (79.6-82.8) (NNV 7)

<https://www.cdc.gov/vaccines/acip/recs/grade/hepb.html>

## Heplisav-B

Adverse Effects	Heplisav-B	Enderix
Mild		
• Any	45.6%	45.7%
• Injection-site related	<b>35.5%</b>	30.8%
• Systemic reaction	28.1%	30.1%
Serious		
• Any	5.4%	6.3%
• Considered related to vaccine	0.04%	0.1%
Cardiovascular adverse event	<b>0.27%*</b>	0.14%*

<https://www.cdc.gov/vaccines/acip/recs/grade/hepb.html>

## Hepatitis B Monovalent Vaccine Schedule

Brand	Dosing Schedule
Enderix-B	0, 1, and 6 months
Recombivax-HB	0, 1 and 6 months
Heplisav-B	0 and 1 month

## Heplisav-B Interchangeability with Other Hepatitis B Vaccines

- When feasible the same manufacturer's vaccine should be used to complete the full Hepatitis B series
- If prior manufacturer unknown or unavailable would need to complete longest hepatitis B vaccine series of 3 doses and intervals
  - Dose 1 & 2 separated by minimum of 4 weeks, Dose 2 & 3 separated by minimum of 8 weeks and Dose 1 & 3 separated by minimum of 16 weeks.
  - Any doses separated by less than minimum interval need repeating, **however any series that contain 2 doses of Heplisav-B separated by at least 4 weeks is valid.**

Schille S, et al. MMWR Morb Mortal Wkly Rep. 2018;67:455-458.

## Hepatitis B Post Vaccination Testing

- Patients whose testing is less than 10 mIU/ml are considered non-immune. These patients can either receive another series of an Hepatitis B vaccine or a single dose of Hepatitis B vaccine either followed 1-2 months later with repeat serologic testing
- More than 2 series are not generally recommended for patients, except those receiving hemodialysis
- Patients whose testing remains less than 10 mIU/ml are always considered non-immune. Some recommend obtaining full Hepatitis B panel in non-responders to ensure not infected.

Schille S, et al. MMWR Morb Mortal Wkly Rep. 2018;67:455-458.

## Hepatitis A

- 6500 patients reported to have hepatitis A disease in 10 states between January 2017 – October 2018
- 3800 hospitalizations
- ~ 70 deaths



<https://www.medscape.com/viewarticle/904005> www.cdc.gov

## Hepatitis A

### Advice to Public Health Officials

For the current U.S. outbreaks among people reporting drug use and/or homelessness and their contacts, CDC has encouraged state and local health departments to:

- Work with community partners to provide hepatitis A vaccine to people who use injection and non-injection drugs, people who are homeless, and others with established risk factors who are not yet immunized
- Consider hepatitis A vaccination for anyone with ongoing, close contact with people who use injection and non-injection drugs and/or people who are homeless and their contacts

CDC has provided [interim outbreak-specific guidance on hepatitis A vaccine administration](#).

Post exposure prophylaxis (PEP) is recommended for unvaccinated people who have been exposed to hepatitis A virus (HAV) in the last 2 weeks; those with evidence of previous vaccination do not require PEP.

PEP consists of:

- Hepatitis A vaccine for people aged 1-40 years
- Hepatitis A virus-specific immunoglobulin (IG) for people outside of this age range. If immunoglobulin is not available, hepatitis A vaccine can be substituted

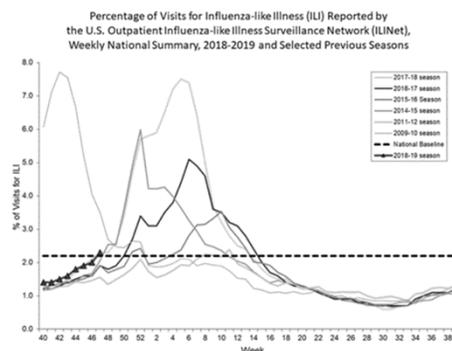
NOTE: CDC recommends that all children be vaccinated against hepatitis A at age 1 year. Parents or caregivers who are unsure if a child has been vaccinated should consult the child's health-care provider to confirm vaccination status.

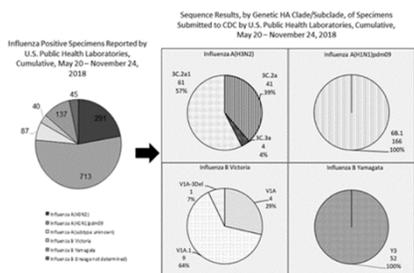
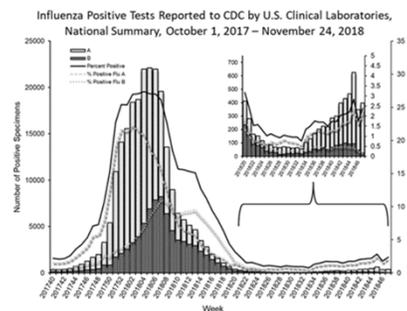
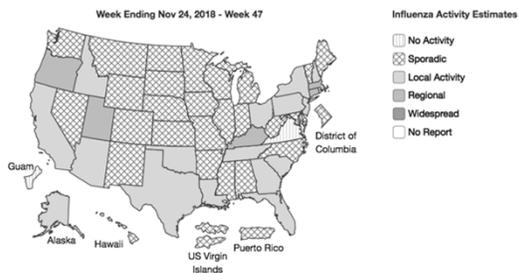
[www.cdc.gov](http://www.cdc.gov)

## Hepatitis A Vaccination Updates

- October 2018 ACIP Meeting voted to add hepatitis A recommendation routinely for patients that are homeless
- These recommendations have been adopted by the CDC Director and will become official once published in MMWR.

## INFLUENZA ACTIVITY & VACCINE UPDATE FOR 2018-2019 SEASON





## Influenza Vaccines Available 2018-2019 Season

- Quadrivalent inactivated:
  - Afluria Quadrivalent (5yrs+), Fluarix Quadrivalent (6 mos+), FluLaval Quadrivalent (6 mos+), Fluzone Quadrivalent (6 mos+), Flucelvax Quadrivalent (4yrs+)
- Quadrivalent recombinant inactivated:
  - Flublok Quadrivalent (18 yrs+)
- Trivalent inactivated:
  - Afluria (5 yrs+)
- Trivalent high-dose:
  - Fluzone high-dose (65 yrs+)
- Trivalent adjuvanted:
  - Flud (65 yrs+)

Grohskopf LA, et al. MMWR 2018; 67(3): 1-20

## Influenza Vaccine Components: Last Year vs This Year

- |   |   |
|---|---|
| <p><b>2017-2018</b></p> <ul style="list-style-type: none"> <li>• A/Michigan/45/2015 (H1N1)-pdm09-like virus</li> <li>• A/Hong Kong/4801/2014 (H3N2)-like virus</li> <li>• B/Brisbane/60/2008-like (Victoria lineage)</li> <li>• B/Phuket/3073/2013-like (Yamagata lineage)</li> </ul> | <p><b>2018-2019</b></p> <ul style="list-style-type: none"> <li>• A/Michigan/45/2015 (H1N1)-pdm09-like virus</li> <li>• A/Singapore/INFIMH-16-0019/2016 (H3N2)-like virus</li> <li>• B/Colorado/06/2017-like (Victoria lineage)</li> <li>• B/Phuket/3073/2013-like (Yamagata lineage)</li> </ul> |
|---|---|

Grohskopf LA, et al. MMWR 2018; 67(3): 1-20

## ACIP Vaccine Recommendations

- ALL patients ≥ 6 months old, without contraindications should receive an age approved influenza vaccine.
- No preferential recommendation is made for one influenza vaccine product over another, when multiple are recommended by age and underlying conditions.

Grohskopf LA, et al. MMWR 2018; 67(3): 1-20

## Flu Vaccination in Children

- If patient 6 months through 8 years old has NOT received at least 2 doses of seasonal influenza in prior years (i.e. before 7/1/2018) then they will require 2 doses separated by 28 days this season
- All children 9 years old and older as well as those who have received 2 doses of flu vaccine prior should receive a single dose this year.

Grohskopf LA, et al. MMWR 2018; 67(3): 1-20

## Flu Vaccination in Children, LAIV?

- LAIV had multiple years of poor response especially to Influenza A H1N1 strains (H3N2 effectiveness was similar to inactivated vaccines). Continued effectiveness against influenza B viruses.
- LAIV switched the H1N1 virus included in the vaccine, new virus has improved fitness in the intranasal epithelium which is hoped to improve effectiveness.
- Currently no clinical effectiveness data available for influenza A H1N1 as this strain did not circulate in 2017-2018.

Grohskopf LA, et al. MMWR 2018; 67(3): 1-20

## Flu Vaccination in Children – Which vaccine is recommended?

- Per ACIP, children 2 years and older without contraindications, can receive either inactivated or live-attenuated (LAIV4) influenza vaccine this year
  - Then state “ACIP will continue to review data concerning the effectiveness of LAIV4....Providers should be aware that the effectiveness of the updated LAIV4...against currently circulating influenza A(H1N1)pdm09-like viruses is not yet known.”
- Per AAP, only children who would otherwise NOT receive any influenza vaccine should be candidates for the LAIV4 this year.

Munoz-Rivas FM, et al. AAP News June 7, 2018.  
Grohskopf LA, et al. MMWR Weekly 2018; 67: 643-645.

## Flu Vaccination in Children – Which dose for which vaccine?

- Different brands of vaccine have different doses recommended for patients 6 months – 36 months of age
  - Fluzone Quadrivalent – 0.25 ml/dose
  - Fluarix Quadrivalent – 0.5 ml/dose
  - FluLaval Quadrivalent – 0.5 ml/dose

Grohskopf LA, et al. MMWR 2018; 67(3): 1-20

## Flu Recommendations in Pregnancy

- Pregnant women may receive any licensed, recommended, age-appropriate **inactivated** influenza vaccine
  - Flu vaccine reduced the risk of influenza associated acute respiratory infection by 50%
  - Recent PREVENT study reported flu vaccine effectiveness in pregnant women had 40% effectiveness being hospitalized for flu
  - Vaccination of pregnant women has been shown to reduce influenza related illness by 64% and hospitalization by 91% of baby in first 6 months of life

Shakib JH, et al. Pediatrics 2016;137:6.  
Thompson MG, et al. Clin Infect Dis Oct 11, 2018.  
Thompson MG, et al. Clin Infect Dis 2014; 58:449-57.  
Benzowitz I, et al. Clin Infect Dis 2010; 51:1355-61.

## Flu Recommendation in Elderly

- No specific recommendation for any one vaccine over another. No change in data from last year
- Generally, recommend one of the following if immediately available
  - Inactivated high-dose influenza vaccine,
  - Adjuvanted inactivated influenza,
  - Quadrivalent recombinant influenza vaccine

Grohskopf LA, et al. MMWR 2018; 67(3): 1-20

## Flu Recommendation in Egg Allergy

- Patients that have experienced only hives after exposure to egg should receive influenza vaccine. Any licensed, recommended, and age-appropriate influenza vaccine (i.e., any IIV, RIV4, or LAIV4) that is otherwise appropriate for the patient's may be used.
- Patients who report having had reactions to egg involving symptoms other than hives, such as angioedema, respiratory distress, lightheadedness, or recurrent emesis; or who required epinephrine or another emergency medical intervention, may similarly receive any licensed, recommended, and age-appropriate influenza vaccine (i.e., any IIV, RIV4, or LAIV4) that is otherwise appropriate for their health status. 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 reactions.

Grohskopf LA, et al. MMWR 2018; 67(3): 1-20

## LAIV REMINDERS...

## Intranasal Influenza Vaccine (LAIV)

### Intranasal administration (NAS) Live Attenuated Influenza Vaccine (LAIV)

- 1 FluMist (LAIV) is for intranasal administration only. Do not inject FluMist.
- 2 Remove rubber tip protector. Do not remove dose-divider clip at the other end of the sprayer.
- 3 With the patient in an upright position, place the tip just inside the nostril to ensure LAIV is delivered into the nose. The patient should breathe normally. 
- 4 With a single motion, depress plunger as rapidly as possible until the dose-divider clip prevents you from going further.
- 5 Pinch and remove the dose-divider clip from the plunger. 
- 6 Place the tip just inside the other nostril, and with a single motion, depress plunger as rapidly as possible to deliver the remaining vaccine. 
- 7 Dispose of the applicator in a sharps container.

- FDA approved for patients 2 - 49 years old
  - 0.1 ml in each nostril
- Not recommended for
  - Allergic reaction
  - Children < 5 years old with history of medically attended wheezing, or any patients with asthma, or who would otherwise be contraindicated to get a live vaccine (e.g. pregnant, immunocompromised)

## Learning Assessment

- You are verifying a prescription for a flu vaccine for a 8 month old baby. Which vaccine would a 0.25 ml dose be correct?
  - A. Fluarix Quadrivalent
  - B. FluLaval Quadrivalent
  - C. Fluzone Quadrivalent

## QUESTIONS?