

# **Influenza Vaccines in children**



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# Influenza Vaccines

- Two types of influenza vaccines are available:
  - ✓ live attenuated influenza vaccine (LAIV),
  - ✓ **inactivated** influenza vaccines (IIVs),



# live attenuated influenza vaccine (LAIV)

- **Flumist Quadrivalent**, live attenuated influenza vaccine licensed for otherwise healthy persons **2–49 years** of age
- **Egg based**



# inactivated influenza vaccines

- **Fluzone**
- **Afluria**
- **Fluarix**
- **FluLaval**

- ✓ **Flublok**, recombinant vaccine licensed for people **18 years or older**
- ✓ **Flucelvax**, cell-based vaccine licensed for people **2 years** and older



# Influenza Vaccines

- All pediatric influenza vaccines that are **quadrivalent**, containing **2 influenza A strains** and **2 influenza B strains**.



# site of immunization

- For **adults and older children**, the recommended site of immunization is the **deltoid muscle**.
- For **infants and young children**, the preferred site is the **anterolateral aspect of the thigh**.





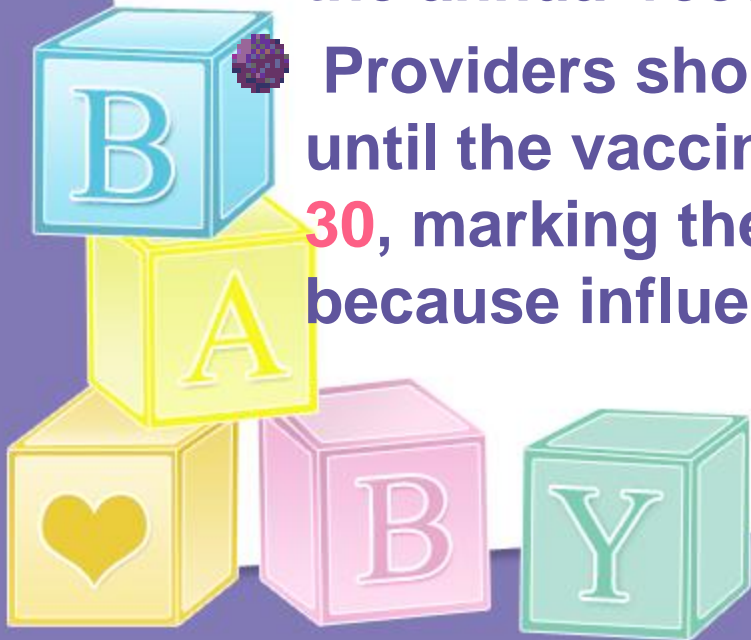
# AAP preference

- The AAP has **no preference** for any type of vaccine (**IIV** or **LAIV**) or formulation over the other
- No product is preferred over another for this age group.



# Who and when

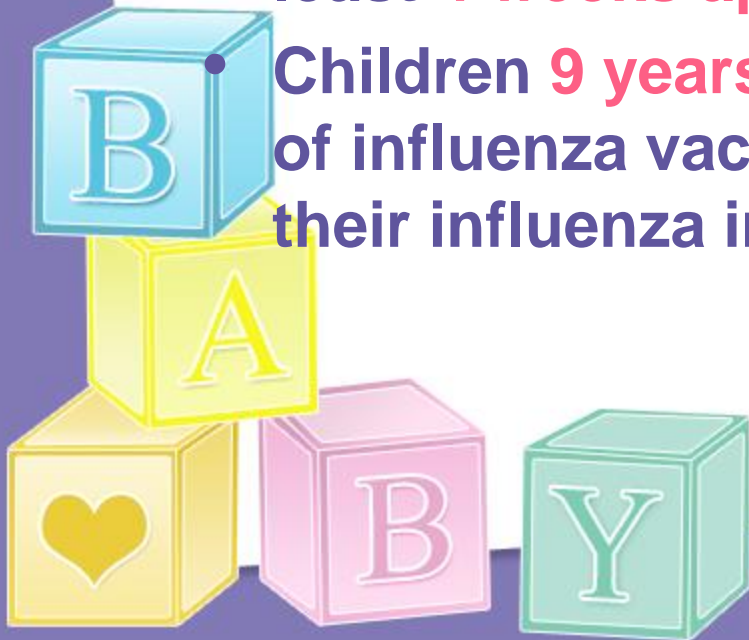
- All people **6 months and older** should receive influenza vaccine annually.
- Influenza vaccine should be administered **before the start of influenza season**, preferably **by end of October**, or at the time specified in the annual recommendations of the ACIP
- Providers should continue to offer vaccine until the vaccine expiration date (typically **June 30**, marking the end of the influenza season), because influenza circulation is unpredictable.





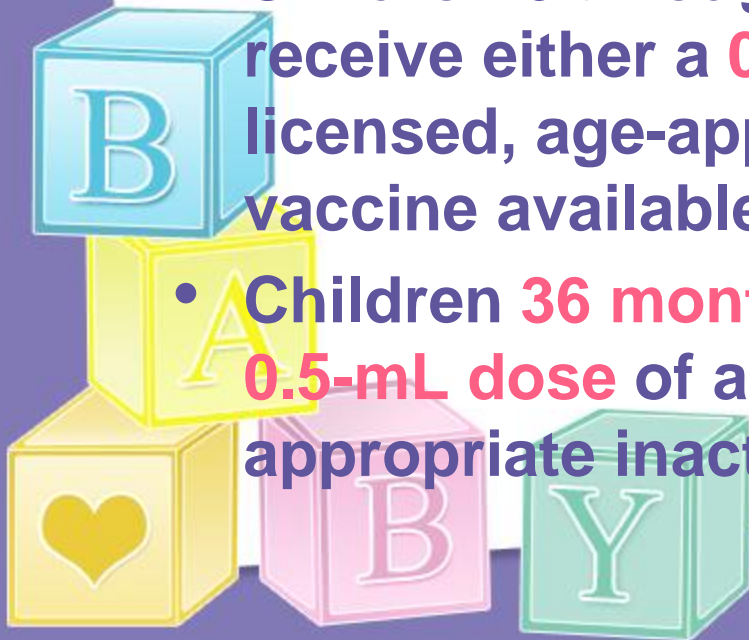
# Immunogenicity and Dosing in Children

- Children **6 months through 8 years** of age who are receiving the influenza vaccine **for the first time** or who have received **only 1 dose before** the upcoming influenza season should receive **2 doses** of influenza vaccine administered at least **4 weeks apart**.
- Children **9 years and older** require only 1 dose of influenza vaccine annually, regardless of their influenza immunization history.



# Immunogenicity and Dosing in Children

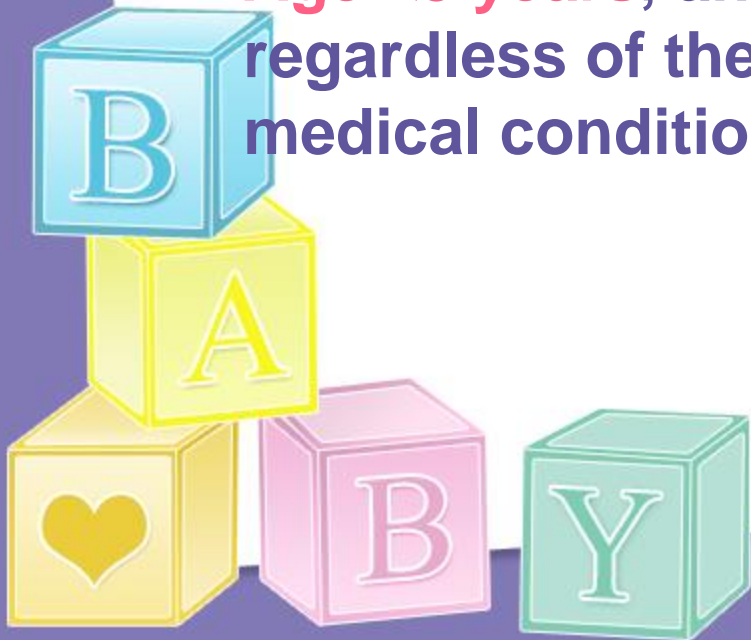
- For children requiring 2 doses, vaccination **should not be delayed** to obtain a specific product for either dose.
- **Protection** against disease is achieved **1 to 2 weeks after the second dose**.
- Children 6 through 35 months of age may receive either a **0.25-mL or 0.5-mL** dose of any licensed, age-appropriate inactivated influenza vaccine available .
- Children **36 months** and older should receive a **0.5-mL dose** of any available, licensed, age appropriate inactivated vaccine



# Recommendations for Influenza Immunization

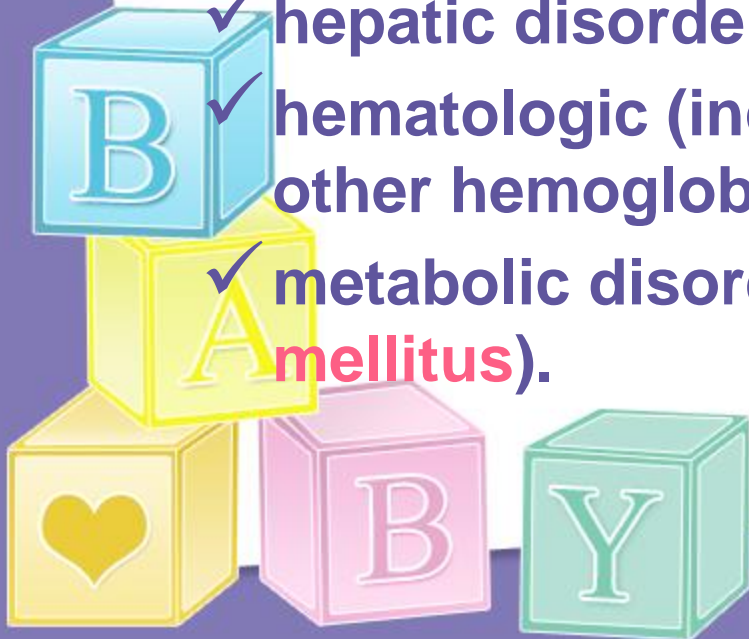
❁ **Particular efforts** should be on the vaccination of all children and adolescents with factors associated with an **elevated risk of complications from influenza**, including the following:

- ✓ **Age <5 years**, and especially **<2 years**, regardless of the presence of underlying medical conditions.



# Recommendations for Influenza Immunization

- ✓ Chronic pulmonary disease (including **asthma** and **cystic fibrosis**),
- ✓ hemodynamically significant cardiovascular disease (except **hypertension alone**),
- ✓ renal disorders
- ✓ hepatic disorders
- ✓ hematologic (including **sickle cell disease** and other hemoglobinopathies) disorders
- ✓ metabolic disorders (including **diabetes mellitus**).



# Recommendations for Influenza Immunization

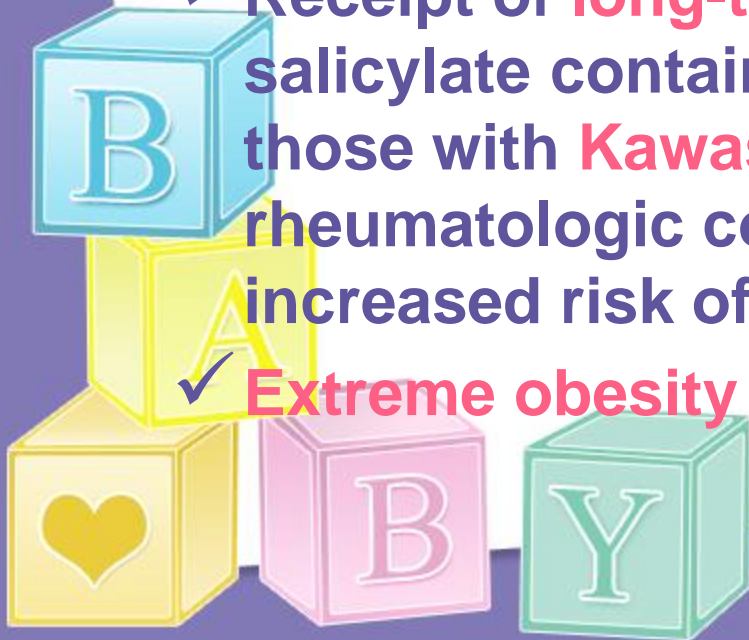
- ✓ **Immunosuppression** attributable to any cause, including that caused by **medications** or by **HIV** infection
- ✓ **Neurologic and neurodevelopment** conditions (including disorders of the **brain**, **spinal cord**, **peripheral nerve**, and **muscle** such as **cerebral palsy**, **epilepsy**, **stroke**, intellectual disability, moderate-to-severe developmental delay, muscular dystrophy, or spinal cord injury).





# Recommendations for Influenza Immunization

- ✓ Conditions that compromise respiratory **function or handling of secretions** (including **tracheostomy** and **mechanical ventilation**).
- ✓ Women who are **pregnant** or **postpartum** during the influenza season.
- ✓ Receipt of **long-term aspirin** therapy or salicylate containing medications (including those with **Kawasaki disease** and rheumatologic conditions) because of increased risk of Reye syndrome.
- ✓ **Extreme obesity**





# Special Considerations

- ✓ In children receiving immunosuppressive chemotherapy, influenza immunization may result in a less robust response than in immunocompetent children.
- ✓ The optimal time to immunize children with malignant neoplasms who must undergo chemotherapy is **more than 3 weeks after chemotherapy has been discontinued**, when the peripheral granulocyte and lymphocyte counts are greater than **1000/ $\mu$ L** ( $1.0 \times 10^9/L$ ).
- ✓ Children who no longer are receiving chemotherapy generally have **adequate rates of seroconversion**.



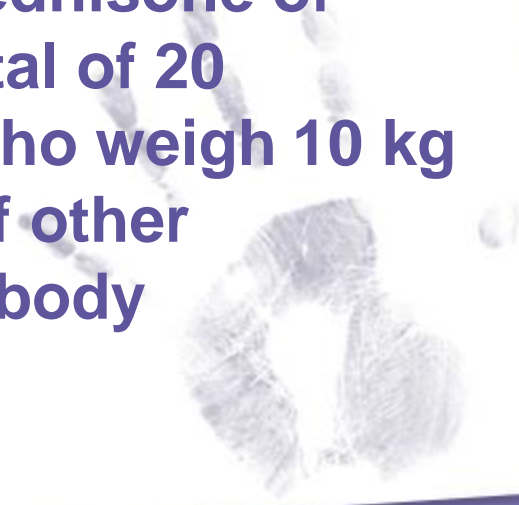
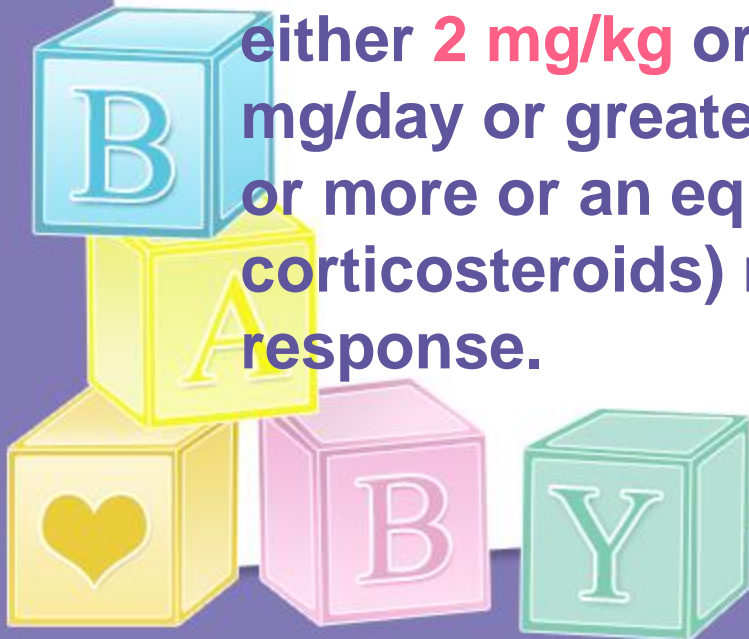
# Special Considerations

- ✓ Children with **hemodynamically unstable cardiac disease** are at high risk of **complications of influenza**.
- ✓ The **immune response** to and **safety** of IIV in these children are comparable to the immune response and safety in healthy children.



# Special Considerations

- Corticosteroids administered **daily for brief periods** or **every other day** seem to have a minimal effect on antibody response to influenza vaccine.
- Prolonged administration of high doses of corticosteroids (ie, a dose of prednisone of either **2 mg/kg** or greater or a total of 20 mg/day or greater for children who weigh 10 kg or more or an equivalent dose of other corticosteroids) may impair antibody response.



# Special Considerations

- Influenza immunization can be **deferred temporarily** during the time of receipt of **high-dose corticosteroids**, provided deferral does not compromise the likelihood of immunization before the start of **influenza season**



# Breastfeeding

- ❖ Breastfeeding **is not a contraindication** for influenza immunization.
- ❖ Special effort should be made to vaccinate all women who are breastfeeding during the influenza season if they were **not vaccinated during pregnancy**.



# Close Contacts of High-Risk Patients

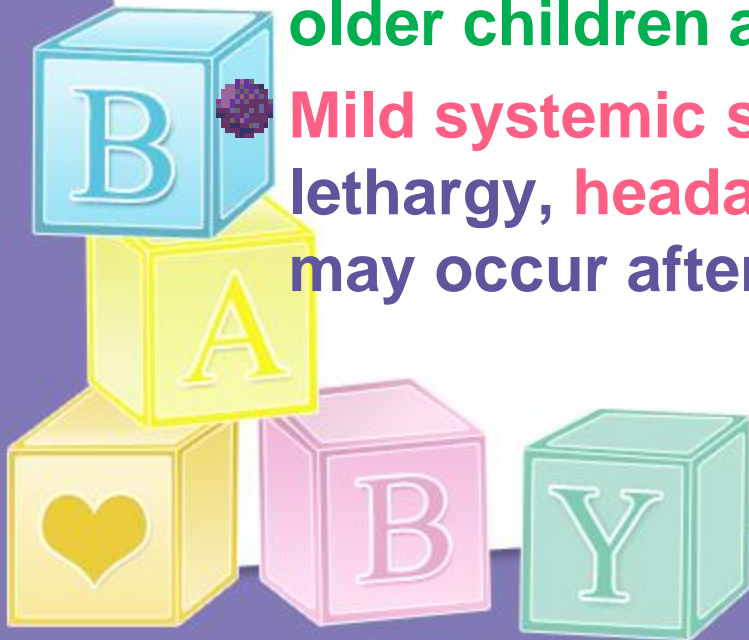
- Immunization of everyone who is in close contact with children **younger than 5 years** or children with **high-risk conditions** is an important strategy to ensure protection for these children who may not benefit from **adequate protection** from vaccination alone.





# Reactions, Adverse Effects IIV

- The **most common reactions** after IIV administration are local injection site **pain** and tenderness.
- Fever may occur **within 24 hours** after immunization in approximately **10% to 35%** of children **younger than 2 years** but **rarely in older children and adults**.
- **Mild systemic symptoms**, such as nausea, lethargy, **headache, muscle aches**, and chills, may occur after administration of IIV



# Reactions and Adverse Effects

## LAIV

- LAIV may result in **nasal congestion**, **rhinorrhea**, and **sore throat**, as well as **wheezing**, particularly in **younger children** and those with **underlying reactive airway disease**.



# Contraindications

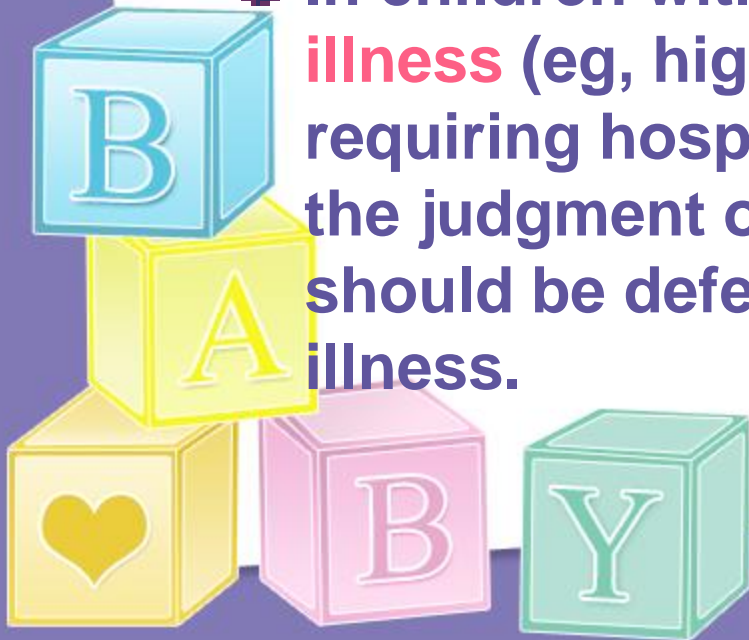
- ❖ **Anaphylaxis** after receipt of any influenza vaccine is a contraindication to influenza vaccination.
- ❖ Children who have had an **allergic reaction** after a previous dose of any influenza vaccine should be **evaluated by an allergist** to determine whether or not future receipt of the vaccine is appropriate.



# Contraindications

● **Minor illnesses, with or without fever**, are not contraindications to the use of influenza vaccines, including among children with **mild upper respiratory infection** symptoms or **allergic rhinitis**.

● In children with a **moderate to severe febrile illness** (eg, high fever, active infection, requiring hospitalization, etc), on the basis of the judgment of the clinician, vaccination should be deferred until resolution of the illness.

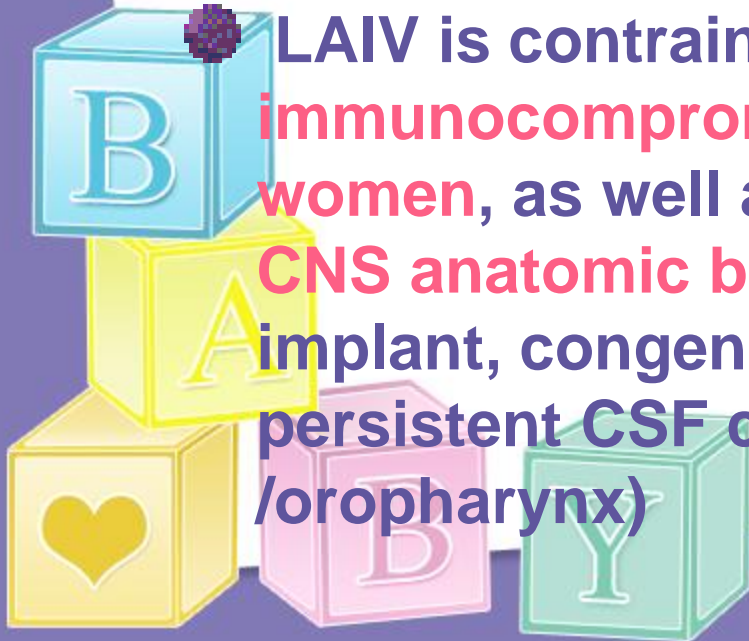


# Contraindications

## LAIV

● Similarly, children with an amount of **nasal congestion** that would notably impede vaccine delivery into the **nasopharyngeal mucosa** should have LAIV vaccination deferred until resolution, or should receive IIV, because nasal congestion would not impact its delivery.

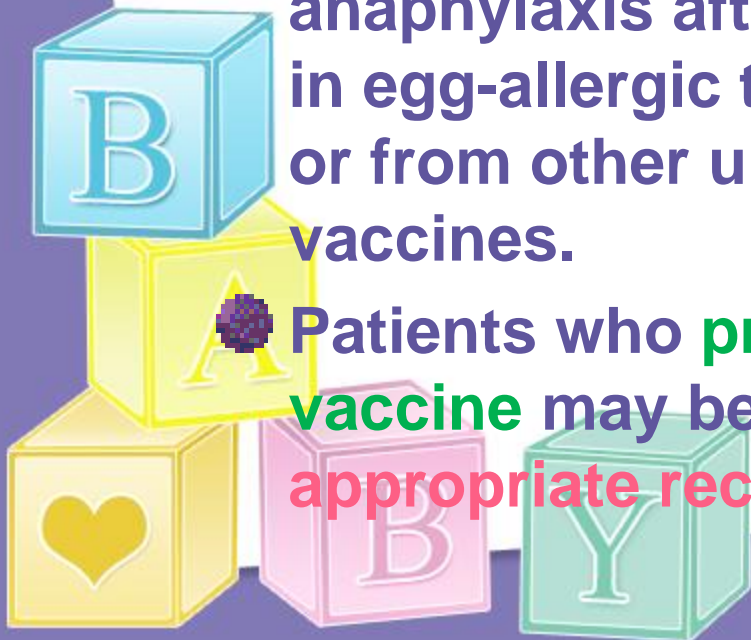
● LAIV is contraindicated in **immunocompromised hosts** and **pregnant women**, as well as in patients with **asplenia** or **CNS anatomic barrier defects** (eg, cochlear implant, congenital dysplasia of the inner ear, persistent CSF communication with naso-/oropharynx)





# Reactions, Adverse Effects, and Contraindications

- Although most influenza vaccines are **produced in eggs** and contain measurable amounts of **egg protein**, they are well tolerated by recipients with **egg allergy of any severity**.
- Special precautions for egg-allergic recipients of IIV or LAIV are not warranted, as the rate of anaphylaxis after administration is **no greater** in egg-allergic than non-egg allergic recipients or from other universally recommended vaccines.
- Patients who **prefer to receive a non-egg-based vaccine** may be vaccinated with an **age-appropriate recombinant or cell-based product**.





# Reactions, Adverse Effects, and Contraindications

- History of Guillain-Barré syndrome (GBS) following influenza vaccine is **considered a precaution** for the administration of influenza vaccines.
- Data on the risk of GBS following vaccination with seasonal influenza vaccine are **variable** and have been **inconsistent across seasons**.



# Reactions, Adverse Effects, and Contraindications

- GBS is **rare, especially in children**, and there is a **lack of evidence** on risk of GBS following influenza vaccine in children.
- The decision not to immunize should be thoughtfully balanced against the potential **morbidity and mortality** associated with influenza for that individual.



THANK YOU

