POLICY STATEMENT Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

Recommendations for Prevention and Control of Influenza in Children, 2022–2023

COMMITTEE ON INFECTIOUS DISEASES

abstract

This statement updates the recommendations of the American Academy of Pediatrics for the routine use of influenza vaccine and antiviral medications in the prevention and treatment of influenza in children during the 2022–2023 influenza season. A detailed review of the evidence supporting these recommendations is published in the accompanying technical report (http://www.pediatrics.org/cgi/doi/10.1542/peds.2022-059275). The American Academy of Pediatrics recommends annual influenza vaccination of all children without medical contraindications starting at 6 months of age. Influenza vaccination is an important strategy for protecting children and the broader community, as well as reducing the overall burden of respiratory illnesses when other viruses, including severe acute respiratory syndrome-coronavirus 2, are cocirculating. Any licensed influenza vaccine appropriate for age and health status can be administered, ideally as soon as possible in the season, without preference for one product or formulation over another.

Antiviral treatment of influenza with any US Food and Drug Administration-approved, age-appropriate influenza antiviral medication is recommended for children with suspected or confirmed influenza who are hospitalized, have severe or progressive disease, or have underlying conditions that increase their risk of complications of influenza, regardless of duration of illness. Antiviral treatment should be initiated as soon as possible. Antiviral treatment may be considered in the outpatient setting for symptomatic children with suspected or confirmed influenza disease who are not at high risk for influenza complications, if treatment can be initiated within 48 hours of illness onset, and for children with suspected or confirmed influenza disease whose siblings or household contacts either are younger than 6 months or have a high-risk condition that predisposes them to complications of influenza. Antiviral chemoprophylaxis is recommended for the prevention of influenza virus infection as an adjunct to vaccination in certain individuals, especially exposed children who are at high risk for influenza complications but have not yet been immunized or who lack a sufficient immune response.

DOI: https://doi.org/10.1542/peds.2022-059274

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

FINANCIAL/CONFLICT OF INTEREST DISCLOSURES: Dr Bryant receives honoraria from WebMed and receives a stipend from the American Society of Nephrology.

COMPANION PAPER: A companion to this article can be found online at www.pediatrics.org/cgi/doi/10.1542/peds.2022-059275.

To cite: AAP Committee on Infectious Diseases. Recommendations for Prevention and Control of Influenza in Children, 2022–2023. *Pediatrics*. 2022;150(4):e2022059274

INTRODUCTION

Children consistently have the highest attack rates of influenza in the community during seasonal influenza epidemics. Children, especially those younger than 5 years and those with certain underlying medical conditions, can experience substantial morbidity, including severe or fatal complications, from influenza virus infection.[1] School-aged children bear a large influenza disease burden and are more likely to seek influenza-related medical care compared with healthy adults.[1,2] Children also play a pivotal role in the transmission of influenza virus infection to household and other close contacts.[1,2] Thus, reducing influenza virus transmission among children decreases the burden of childhood influenza and transmission of influenza virus to household contacts and community members of all ages.[1,2] Influenza vaccination is particularly important to reduce the burden of respiratory illnesses and preserve the capacity of the health care infrastructure when other viruses, including severe acute respiratory syndrome-coronavirus, are cocirculating. The American Academy of Pediatrics (AAP) recommends routine influenza vaccination and antiviral agents for the prevention and treatment of influenza in children, respectively. Unfortunately, influenza vaccination coverage lagged during the 2021–2022 season. Through April 9, 2022, only 53.3% of children 6 months through 17 years had been vaccinated, and coverage levels were 8.1 percentage points lower for non-Hispanic Black children compared with non-Hispanic white children.[3] Efforts to increase influenza vaccination, including strategies to decrease health disparities, address influenza vaccine hesitancy, and increase influenza vaccine coverage, are urgently needed.

This policy statement summarizes updates and recommendations for the 2022–2023 influenza season. An accompanying technical report provides further detail regarding recent influenza seasons, influenza vaccine effectiveness, detailed discussion of inactivated and live attenuated influenza vaccines, influenza vaccination coverage, timing of vaccination, duration of protection, and vaccine delivery strategies.[4]

UPDATES FOR THE 2022–2023 INFLUENZA SEASON

1. The composition of the influenza vaccines for the 2022–2023 season has been updated (Table 1). The recommended influenza A (H3N2) and influenza B Victoria lineage components of the vaccine are new for this season. The influenza A (H1N1) pmd09 and influenza B Yamagata lineage components are unchanged from the previous season.[5,6]
2. The vaccine formulations available for children are unchanged from last season (Table 2), except the age indication for the cell culture-based inactivated influenza vaccine (IIV) Flucelvax Quadrivalent has been lowered to 6 months and older (previously indicated for 2 years and older), providing one more option for young children.[7]
3. Evidence-based strategies for increasing influenza vaccine uptake are highlighted (Table 3).
4. The age indication for the neuraminidase inhibitor peramivir has been lowered to 6 months of age.
5. The age indication for the cap-endonuclease inhibitor baloxavir has been lowered to 5 years for the treatment of acute uncomplicated influenza in otherwise healthy children who have been symptomatic for no more than 48 hours and for chemoprophylaxis of influenza following contact with someone with influenza.[8]

HIGH-RISK GROUPS IN PEDIATRICS

Children younger than 5 years, especially those younger than 2 years, and children with certain underlying medical conditions are at increased risk of hospitalization and complications attributable to influenza (Table 4).[4] Although universal influenza vaccination is recommended for everyone starting at 6 months, emphasis should be placed on ensuring that high-risk and medically vulnerable children and their household contacts and caregivers receive annual influenza vaccine (Table 3). Additionally, increased efforts are needed to eliminate barriers to immunization in all persons experiencing higher rates of adverse outcomes from influenza. In one cross-sectional study spanning 10 influenza seasons, Black, Hispanic, and American Indian/Alaska Native people had higher rates of influenza-associated hospitalizations and ICU admissions,

TABLE 1 Quadrivalent Influenza Vaccine Composition for the 2022–2023 Season

	Specific Strain
Influenza A	
H1N1	A/Victoria/2570/2019 (H1N1) pdm09-like virus; (egg-based)[a]
	A/Wisconsin/588/2019 (H1N1) pdm09-like virus; (cell culture-based or recombinant)[a]
H3N2	A/Darwin/9/2021 (H3N2)-like virus; (egg-based)[b] A/Darwin/6/2021 (H3N2)-like virus; (cell culture-based or recombinant)[b]
Influenza B	
Victoria	B/Austria/1359417/2021-like virus; (B/Victoria lineage)[b]
Yamagata	B/Phuket/3073/2013-like virus (B/Yamagata lineage)[a]

Trivalent vaccines (not available in United States) do not include the B/Yamagata component.
[a] Unchanged this season.
[b] New this season.

TABLE 2 Recommended Seasonal Influenza Vaccines for Different Age Groups: United States, 2022–2023 Influenza Season

Vaccine	Trade Name (Manufacturer)	Age Group	Presentation and Hemagglutinin Antigen Content (IIVs and RIV4) or Virus Count (LAIV4) Per Dose for Each Antigen	Thimerosal Mercury Content[a] (μg Hg Per 0.5-mL Dose)	CPT Code
Quadrivalent standard dose: egg-based vaccines					
IIV4	Afluria quadrivalent *(Seqirus)*	6–35 mo	0.25-mL prefilled syringe[b] (7.5 μg per 0.25 mL)	0	90685
		≥36 mo	0.5-mL prefilled syringe (15 μg per 0.5 mL)	0	90686
		≥6 mo[c]	5.0-mL multidose vial[d] (15 μg per 0.5 mL)	24.5	90687
IIV4	Fluarix quadrivalent (*GlaxoSmithKline)*	≥6 mo	0.5-mL prefilled syringe (15 μg per 0.5 mL)	0	90686
IIV4	FluLaval quadrivalent (*GlaxoSmithKline)*	≥6 mo	0.5-mL prefilled syringe (15 μg per 0.5 mL)	0	90686
IIV4	Fluzone quadrivalent (*Sanofi Pasteur)*	≥6 mo	0.5-mL prefilled syringe (15 μg per 0.5 mL) (0.25 mL prefilled syringe no longer available[e])	0	90686
		≥6 mo	0.5-mL single-dose vial[e,f] (15 μg per 0.5 mL)	0	90686
		≥6 mo	5.0-mL multidose vial[d,e] (15 μg per 0.5 mL)	25	90687
Quadrivalent standard dose: cell culture-based vaccines					
ccIIV4	Flucelvax quadrivalent (*Seqirus)*	≥6 mo	0.5-mL prefilled syringe (15 μg per 0.5 mL)	0	90674
		≥6 mo	5.0-mL multidose vial[d] (15 μg per 0.5 mL)	25	90756
Quadrivalent standard dose: egg-based with adjuvant vaccines					
aIIV4 MF-59 adjuvanted	Fluad quadrivalent (*Seqirus)*[g]	≥65 y	0.5-mL prefilled syringe (15 μg per 0.5 mL)	0	90653
Quadrivalent high dose: egg-based vaccine					
IIV4	Fluzone high-dose (*Sanofi Pasteur)*[g]	≥65 y	0.7-mL prefilled syringe (60 μg per 0.7 mL)	0	90662
Recombinant vaccine					
RIV4	Flublok quadrivalent (*Sanofi Pasteur)*	≥18 y	0.5-mL prefilled syringe (45 μg per 0.5 mL)	0	90682
Live attenuated vaccine: egg-based vaccine					
LAIV4	FluMist quadrivalent (*AstraZeneca)*	2–49 y	0.2-mL prefilled intranasal sprayer (virus dose: 10 6.5–7.5 FFU per 0.2 mL)	0	90672

Data sources: Centers for Disease Control and Prevention. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices, United States, 2022–2023 influenza season. *MMWR Recomm Rep.* 2022; in press. Implementation guidance on supply, pricing, payment, *Current Procedural Terminology* coding, and liability issues can be found at www.aapredbook.org/implementation. aIIV4, quadrivalent adjuvanted inactivated influenza vaccine; ccIIV4, quadrivalent cell culture-based inactivated influenza vaccine; CPT, *Current Procedural Terminology;* FFU, fluorescent focus unit; LAIV4, quadrivalent live attenuated influenza vaccine; RIV4, quadrivalent recombinant influenza vaccine.

[a] See thimerosol-containing vaccines in the technical report.[4]

[b] The 0.25-mL prefilled syringes are not expected to be available for the 2022-2023 season. For children aged 6 through 35 months, a 0.25-mL dose must be obtained from a multidose vial.

[c] The dose is 0.25 mL for children 6 through 35 months of age and a 0.5-mL product for children 3 years and older.

[d] For vaccines that include a multidose vial presentation, the maximum number of doses withdrawn should not exceed the number specified in the package insert (eg, 10 doses for Fluzone, 20 doses for Afluria). Residual product should be discarded.

[e] A total of 0.25 mL drawn from a single or multidose vial is an acceptable dose for children 6 to 35 months of age.

[f] Single-dose vials should be used for only 1 dose (0.25 mL or 0.5 mL). Residual product remaining in the vial should be discarded.

[g] Not approved for use in children.

and disparities were highest in children ≤4 years of age.[9] Influenza-associated, in-hospital deaths were 3- to 4-fold higher in Black, Hispanic, and Asian/Pacific Islander children compared with white children.[9] This higher fatality rate may be attributable to already existing causes for disparities such as inequities in health care system access or other social determinants of health.

SEASONAL INFLUENZA VACCINES

The seasonal influenza vaccines licensed for children and adults for

TABLE 3 Strategies for Increasing Childhood Influenza Vaccination

	Strategy
Provider/care team	Offer presumptive, strong influenza vaccine recommendation.
	Bundle recommendation for influenza vaccine with recommendations for other needed vaccines.
	Use consistent messaging across care team members.
	Identify influenza vaccine champion(s).
Practice/health systems	Review influenza vaccination status at all visits.
	Bundle influenza vaccine with other needed vaccines.
	Vaccinate at all visit types (eg, well child, acute care visits).
	Vaccinate in all health care settings (eg, hospital, emergency department, subspecialty practice).
	Increase access to influenza vaccine (eg, expanded hours, vaccine-only clinic).
	Provide evidence-based information to patients and families (eg, office-based educational handout).
	Send influenza vaccine reminder/recall messages.
	Use standing orders for influenza vaccine.
	Implement influenza vaccine provider prompts/clinical decision support.
	Perform audits or share feedback reports.
	Integrate electronic health record with regional or state immunization information system.
Community/public health	Partner with stakeholders to support vaccine initiatives within the community, including school-based programs and pharmacies.
	Engage with communities affected by health disparities to develop tailored strategies that promote trust, encourage dialogue, and increase access to preventive services.

the 2022–2023 season are shown in Table 2. More than one product may be appropriate for a given patient, and there is no preference for one product over another. Thus, influenza vaccination should not be delayed to obtain a specific product.

All 2022–2023 seasonal influenza vaccines are quadrivalent and contain the same influenza strains as recommended by the World Health Organization and the US Food and Drug Administration Vaccines and Related Biological Products Advisory Committee for the Northern Hemisphere (Table 1).[5,6] The influenza A (H3N2) and influenza B Victoria lineage vaccine components for the 2022–2023 season are different from those in the previous season, whereas the influenza A (H1N1) and influenza B Yamagata lineage components are unchanged. Different, but antigenically-related, influenza A strains are included in this season's egg-based and cell-based or recombinant vaccines. They are matched to the strains expected to circulate in the 2022–2023 season.

INFLUENZA VACCINE RECOMMENDATIONS

1. The AAP recommends influenza vaccination of everyone 6 months and older, including children and adolescents, during the 2022–2023 influenza season.
2. The AAP recommends any licensed influenza vaccine product appropriate for age and health status and does not prefer one product over another, including IIV or live attenuated influenza vaccine (LAIV). Providers may administer whichever product is appropriate and readily available to capture all opportunities for influenza vaccination and achieve the highest possible coverage this season. An IIV or recombinant influenza vaccine (RIV) (if age-eligible) is the appropriate choice for some persons, including those who are immunocompromised.
3. The number of influenza vaccine doses recommended for children remains unchanged in the 2022–2023 influenza season and depends on the child's age at first dose administration and influenza vaccination history (Fig 1). Children 6 months through 8 years of age who are receiving influenza vaccine for the first time or who received only 1 dose before July 1, 2022, or whose vaccination status is unknown should receive 2 doses of influenza vaccine at least 4 weeks apart. Doses given up to 4 days before the minimum suggested interval should be regarded as acceptable. All other children should receive 1 dose this season.
4. The total number of full doses appropriate for age should be administered. If a child is inadvertently vaccinated with a formulation only approved for older children or adults, the dose should be counted as valid. If a lower dose than recommended is inadvertently administered to a child 36 months or older (eg, 0.25 mL), an additional 0.25-mL dose should be administered to provide a full dose of 0.5 mL as soon as possible. A 0.5 mL dose of any IIV should not be split into 2 separate 0.25-mL doses.
5. When a child requires 2 doses of vaccine in a given season, the doses do not need to be the same brand. A child may receive a combination of IIV and LAIV if appropriate for age and health status.

TABLE 4 High-Risk Groups for Influenza Complications

Category	Description
Demographic characteristics	Children <5 y, especially those <2 y[a]
	Residents of a chronic care facility or nursing home
Underlying condition or treatment with common examples[b]	
Chronic pulmonary disease	Asthma
	Cystic fibrosis
	Compromised respiratory function (eg, requiring mechanical ventilation, tracheostomy)
Cardiovascular disease	Hemodynamically significant conditions (excluding hypertension alone)
Kidney disease	Chronic kidney disease, including end-stage kidney disease
	Dialysis
Hepatic disease	Chronic liver disease
	Cirrhosis[11,12]
Hematologic disease	Sickle cell disease
	Other hemoglobinopathies
Metabolic disorders	Diabetes mellitus
Neurologic and neurodevelopmental conditions	Cerebral palsy
Epilepsy	
	Stroke
	Intellectual developmental disorder
	Moderate to severe developmental delay
	Muscular dystrophy
	Spinal cord injury
Extreme obesity	BMI ≥40 for adults[c]
Immunosuppression	Receipt of immuncompromising medications
	Congenital or acquired immune deficiency, including HIV
	Asplenia
Receiving treatment with aspirin or salicylate-containing therapies[d]	
Pregnancy and up to 2 wk' postpartum	

Source: Adapted from Centers for Disease Control and Prevention. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices, United States, 2022–2023 influenza season. *MMWR Recomm Rep.* 2022; in press.

[a] Regardless of the presence of underlying medical conditions.

[b] List of examples is not exhaustive.

[c] Not well defined in children but could consider BMI ≥99% for age.

[d] Applies to children and adolescents aged <19 years who may be at increased risk of Reye syndrome.

6. Influenza vaccine should be offered as soon as it becomes available, especially to children who require 2 doses, with the recommended dose(s) ideally received by the end of October. This differs from the Advisory Committee on Immunization Practices recommendation that most adults, particularly those ≥65 years, not be immunized in July and August because of a concern about waning immunity. Influenza vaccination efforts should continue throughout the season.
7. IIV (or RIV if age-appropriate) may be administered simultaneously with or at any time before or after other inactivated or live vaccines. LAIV may be administered simultaneously with other live or inactivated vaccines. If not administered simultaneously, ≥4 weeks should pass between the administration of LAIV and other nonoral live vaccines. A 4-day grace period is permitted.
8. Current guidance indicates that influenza vaccine can be administered simultaneously with or at any time before or after coronavirus disease 2019 vaccine administration. Providers should review the latest information regarding coadministration from the AAP, as well as the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices (https://www.cdc.gov/vaccines/covid-19/clinical-considerations/interim-considerations-us.html#recommendations).
9. Pregnant individuals may receive IIV (or RIV if age-appropriate) at any time during pregnancy to protect themselves and their infants. Those who do not receive it during pregnancy should receive influenza vaccine before hospital discharge. Influenza vaccination during breastfeeding is safe for mothers and their infants.
10. Efforts should be made to promote influenza vaccination of all children, especially those in high-risk groups (Table 4) and their contacts, unless contraindicated (Table 5). To promote influenza vaccination in communities affected by health disparities, it is important to include the community members in the development of culturally relevant strategies. Evidence-based strategies for increasing influenza vaccine uptake are presented in Table 3.
11. Increasing access and reducing barriers to immunizations in schools, pharmacies, and other nontraditional settings could improve immunization rates, although immunization in the medical home is optimal for the youngest children. A visit for influenza vaccine is an opportunity to give necessary well care, preventive screening, anticipatory guidance, and other important childhood vaccinations.

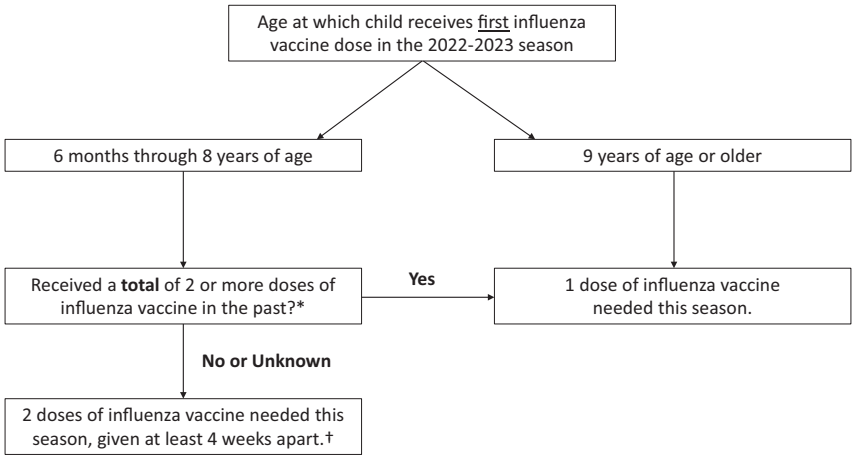

FIGURE 1

Number of 2022–2023 seasonal influenza vaccine doses recommended for children based on age and previous vaccination history. *The 2 doses need not have been received during the same season or consecutive seasons. †Administer 2 doses based on age at receipt of the first dose of influenza vaccine during the season. Children who receive the first dose before their ninth birthday should receive 2 doses, even if they turn 9 years old during the same season.

When immunization takes place in a nontraditional setting, communication with the medical home or recording in an immunization strategy is strongly encouraged.

12. The AAP supports mandatory influenza vaccination of health care personnel as a crucial element in preventing influenza and reducing health care-associated influenza virus infections.

INFLUENZA VACCINE CONTRAINDICATIONS AND PRECAUTIONS

Contraindications and precautions for the use of influenza vaccines are described in Table 5, and further details are provided in the technical report.[4] Key points include:

1. Product-specific contraindications must be considered when selecting the type of influenza vaccine to administer.[10]
2. Although a history of severe allergic reaction (eg, anaphylaxis) to any influenza vaccine is generally a contraindication to future receipt of influenza vaccines, children who have had a severe allergic reaction after influenza vaccination should be evaluated by an allergist to help identify the vaccine component responsible for the reaction and to determine whether future vaccine receipt is appropriate. Children who are allergic to gelatin (very rare) should receive IIV (or RIV if age-appropriate) instead of LAIV.
3. Children with egg allergy can receive any influenza vaccine without any additional precautions beyond those recommended for all vaccines.
4. Children with acute moderate or severe illness, including coronavirus disease 2019, may receive influenza vaccine as soon as their acute illness has improved; children with mild illness, including a low-grade fever, can still be vaccinated.

INFLUENZA TREATMENT RECOMMENDATIONS

Antiviral medications available for the treatment and prophylaxis of influenza in children are described in Table 6. Key points include:

1. Antiviral medications are important adjunct in the control of influenza but are not a substitute for influenza vaccination. Providers should promptly identify patients suspected of having influenza for timely initiation of antiviral treatment, when indicated and based on shared decision-making between the provider and child's caregiver, to reduce morbidity and mortality. Potential benefits and harms of antiviral treatment are summarized in the technical report (http://www.pediatrics.org/cgi/doi/10.1542/peds.2022-059275; see section "Rationale for Influenza Treatment in Children").
2. Although best results are observed when the child is treated within 48 hours of symptom onset, antiviral therapy should still be considered beyond 48 hours in certain cases (see below).
3. Antiviral treatment should be offered as early as possible to the following individuals, regardless of influenza vaccination status and duration of symptoms:

TABLE 5 Influenza Vaccine Contraindications and Precautions

Vaccine	Contraindication	Precaution	Provider Discretion	Not Contraindication
IIV[a]	• Anaphylaxis or severe allergic reaction to previous influenza vaccination	• Moderate to severe illness, including COVID-19		• Minor illness, with or without fever
		• History of GBS within 6 wk of previous influenza vaccination		• Egg allergy
LAIV	• Anaphylaxis or severe allergic reaction to previous influenza vaccination	• Moderate to severe illness, including COVID-19	• Defer to resolution of symptoms or use IIV if a patient has nasal congestion that could impede vaccine delivery	• Minor illness, with or without fever
	• Allergy to gelatin	• History of GBS within 6 wk of previous influenza vaccination		• Egg allergy
	• Age 2–4 y with diagnosis of asthma or history of wheezing in last 12 mo	• Diagnosis of asthma and age ≥5 y		
	• Cochlear implants	• Certain underlying chronic conditions that might predispose to complications after influenza (eg, chronic pulmonary disease, cardiovascular disease, renal, hepatic, neurologic, hematologic, or metabolic disorders)		
	• Active cerebrospinal fluid leaks			
	• Immunosuppression because of any cause, including			
	• Primary or acquired immunodeficiency, including HIV			
	• Immunosuppressive or immunomodulatory therapy			
	• Anatomic or functional asplenia			
	• Close contacts or caregivers of severely immunocompromised individuals			
	• On aspirin or salicylate-containing medications			
	• Receiving or recently received influenza antiviral medication[b]			
	• Currently pregnant			

COVID-19, coronavirus disease 2019; GBS, Guillain-Barre syndrome.

[a] Egg-based IIVs for children include Afluria quadrivalent, Fluarix quadrivalent, FluLaval quadrivalent, and Fluzone quadrivalent. Flucelvax quadrivalent is a cell culture-based IIV for children.

[b] Within 48 hours (oseltamivir, zanamivir), 5 days (peramivir), or 17 days (baloxavir) of stopping influenza antiviral therapy.

- Any child hospitalized with suspected or confirmed influenza disease;
- Any child with severe, complicated, or progressive influenza disease, regardless of health care setting (ie, inpatient or outpatient); and
- Any child with suspected or confirmed influenza disease of any severity if they are at high risk for influenza complications, regardless of health care setting (ie, inpatient or outpatient) (Table 4).

4. Treatment may be considered for the following individuals in the outpatient setting:
   - Any child with suspected or confirmed influenza disease who is not at high risk for influenza complications, if treatment can be initiated within 48 hours of illness onset; and
   - Any child with suspected or confirmed influenza disease whose siblings or household contacts are either younger than 6 months or at high risk for influenza complications (Table 4).

TABLE 6 Recommended Dosage and Schedule of Influenza Antiviral Medications for Treatment and Chemoprophylaxis in Children for the 2022–2023 Influenza Season: United States

Medication	Treatment		Chemoprophylaxis		Common Adverse Events
	Dosage	Duration	Dosage	Duration	
Oseltamivir[a,b]					
Adults	75 mg, twice daily	5 d	75 mg, once daily	7 d	
Children ≥12 mo					
≤15 kg	30 mg, twice daily	5 d	30 mg, once daily	7 d	Nausea
>15 kg–23 kg	45 mg, twice daily	5 d	45 mg, once daily	7 d	Vomiting
>23 kg–40 kg	60 mg, twice daily	5 d	60 mg, once daily	7 d	Headache
>40 kg	75 mg, twice daily	5 d	75 mg, once daily	7 d	Skin reactions
					Diarrhea (children aged <1 y)
Infants 9–11 mo[c]	3.5 mg/kg per dose, twice daily	5 d	3.5 mg/kg per dose, once daily	7 d	
Term infants 0–8 mo[c]	3.0 mg/kg per dose, twice daily	5 d	3–8 mo: 3.0 mg/kg per dose, once daily	7 d	
Preterm infants[d]					
<38 wk' PMA	1.0 mg/kg per dose, twice daily	5 d	3–8 mo: 3.0 mg/kg per dose, once daily	7 d	
38–40 wk' PMA	1.5 mg/kg per dose, twice daily	5 d	3–8 mo: 3.0 mg/kg per dose, once daily	7 d	
>40 wk' PMA	3.0 mg/kg per dose, twice daily	5 d	3–8 mo: 3.0 mg/kg per dose, once daily	7 d	
Zanamivir[b,e]					
Adults	10 mg (2 5-mg inhalations), twice daily	5 d	10 mg (2 5-mg inhalations), once daily	7 d[b]	Bronchospasm
Children	≥7 y: 10 mg (2 5-mg inhalations), twice daily	5 d	≥5 y: 10 mg (2 5-mg inhalations), once daily	7 d[b]	Skin reactions
Peramivir[f]					
Adults	1 600 mg dose via intravenous infusion, given over 15–30 min	N/A	Not recommended		
Children					Diarrhea
6 mo–12 y	1 12 mg/kg dose (600 mg maximum) via intravenous infusion over 15–30 min	N/A	Not recommended		Skin reactions
13–17 y	One 600 mg dose, via intravenous infusion over 15–30 min	N/A	Not recommended		
Baloxavir[g]					
Individuals ≥5 y					
<20 kg	2 mg/kg as single dose, orally	N/A	2 mg/kg as single dose, orally	N/A	Nausea, vomiting, diarrhea
20 kg–<80 kg	One 40-mg dose, orally	N/A	One 40-mg dose, orally	N/A	
≥80 kg	One 80-mg dose, orally	N/A	One 80-mg dose, orally	N/A	

Sources: 2018 Infectious Diseases Society of America Guidelines and https://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm. N/A, not applicable; PMA, postmentrual age.

[a] Oseltamivir is administered orally without regard to meals, although administration with meals may improve gastrointestinal tolerability. Oseltamivir is available as Tamiflu in 30-mg, 45-mg, and 75-mg capsules, and as a powder for oral suspension that is reconstituted to provide a final concentration of 6 mg/mL. For the 6-mg/mL suspension, a 30-mg dose is given with 5 mL of oral suspension, a 45-mg dose is given with 7.5 mL oral suspension, a 60-mg dose is given with 10 mL oral suspension, and a 75-mg dose is given with 12.5 mL oral suspension. If the commercially manufactured oral suspension is not available, a suspension can be compounded by retail pharmacies (final concentration also 6 mg/mL) on the basis of instructions contained in the package label. In patients with renal insufficiency, the dose should be adjusted on the basis of creatinine clearance. For treatment of patients with creatinine clearance 10–30 mL per minute: 75 mg, once daily, for 5 days. For chemoprophylaxis of patients with creatinine clearance 10–30 mL per minute: 30 mg, once daily, for 10 days after exposure or 75 mg, once every other day, for 10 days after exposure (5 doses). See https://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm and Infectious Diseases Society of America Guidelines.[13] These recommendations differ from the package insert for oseltamivir: https://www.accessdata.fda.gov/drugsatfda_docs/label/2012/021087s062lbl.pdf.

[b] The Centers for Disease Control and Prevention recommends routine chemoprophylaxis with oseltamivir or zanamivir for 7 days after last known exposure; minimum of 14 days and continuing for 7 days after last known exposure if part of institutional outbreak (https://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm). This differs from the package insert for zanamivir, which recommends prophylaxis for 10 days in community settings and 28 days in community outbreaks (https://www.accessdata.fda.gov/drugsatfda_docs/label/2010/021036s025lbl.pdf).

[c] Approved by the US Food and Drug Administration for children as young as 2 weeks. Given preliminary pharmacokinetic data and limited safety data, oseltamivir can be used to treat influenza in both term and preterm infants from birth because benefits of therapy are likely to outweigh possible risks of treatment. Oseltamivir is not recommended for chemoprophylaxis for infants aged <3 months because of limited safety and efficacy data in this age group. Of note, the Centers for Disease Control and Prevention recommends a 3.0 mg/kg/dose, twice daily, for all infants aged <12 months; the Infectious Diseases Society of America guidelines[11] include both AAP and Centers for Disease Control and Prevention recommendations.

[d] Oseltamivir dosing for preterm infants. The weight-based dosing recommendation for preterm infants is lower than for term infants. Preterm infants may have lower clearance of oseltamivir because of immature renal function, and doses recommended for full-term infants may lead to very high drug concentrations in this age group. Limited data from

the National Institute of Allergy and Infectious Diseases Collaborative Antiviral Study Group provides the basis for dosing preterm infants using their postmenstrual age (gestational age, plus chronologic age). For extremely preterm infants (aged <28 weeks), please consult a pediatric infectious disease physician.

[e] Zanamivir is administered by inhalation using a proprietary "Diskhaler" device distributed together with the medication. Zanamivir is a dry powder, not an aerosol, and should not be administered using nebulizers, ventilators, or other devices typically used for administering medications in aerosolized solutions. Zanamivir is not recommended for people with chronic respiratory diseases, such as asthma or chronic obstructive pulmonary disease, which increase the risk of bronchospasm.

[f] Peramivir requires dose adjustment in patients with renal insufficiency. For treatment of pediatric patients 6 months to 12 years of age: 2 mg/kg if creatinine clearance 10–29 mL per minute; 4 mg/kg if creatinine clearance is 20 to 49 mL per minute. For treatment of adolescents 13 and older, 100 mg if creatinine clearance 10–29 mL per minute; 200 mg if creatinine clearance is 20 to 49 mL per minute (https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/206426s004lbl.pdf).

[g] Oral baloxavir marboxil is approved by the US Food and Drug Administration for treatment of acute uncomplicated influenza within 2 days of illness. Baloxavir marboxil is not recommended as monotherapy for treatment of influenza in individuals who are severely immunocompromised, pregnant, or breastfeeding.

INFLUENZA CHEMOPROPHYLAXIS RECOMMENDATIONS

Antiviral chemoprophylaxis is recommended after known or suspected influenza exposure in the following situations:

- Any child at high risk for influenza complications for whom influenza vaccine is contraindicated or has not yet been administered this season;
- Any child at high risk for influenza complications who received influenza vaccine in the past 2 weeks (ie, optimal immunity may not yet be achieved);
- Any child at high risk for influenza complications who has been vaccinated but may not have mounted a sufficient immune response (ie, because of immunosuppression);
- Any child at high risk for influenza complications, as well as family members and close contacts, including health care personnel, when influenza virus strains circulating in the community are not well matched with those of the seasonal influenza vaccine per the Centers for Disease Control and Prevention (https://www.cdc.gov/flu/vaccines-work/effectiveness-studies.htm);
- Family members and close contacts who are unvaccinated and are likely to have ongoing, close exposure to:
    - unvaccinated children at high risk for influenza complications; or
    - unvaccinated infants and toddlers who are younger than 24 months;
- Family members and close contacts who are at high risk for influenza complications; and
- Unvaccinated staff and children in a closed institutional setting with children at high risk for influenza complications (eg, extended-care facilities), to control influenza outbreaks.

National Institutes of Health Melinda Wharton, MD, MPH, Centers for Disease Control and PreventionCharles R. Woods, Jr., MD, MS, FAAP, Pediatric Infectious Diseases Society

STAFF

Jennifer M. Frantz, MPH

ACKNOWLEDGMENTS

The Committee on Infectious Diseases gratefully acknowledges Kristina A. Bryant, MD, FAAP, and Annika M. Hofstetter, MD, PhD, MPH, FAAP, for their leadership in drafting the policy statement and technical report; and Juan D. Chaparro, MD, MS, FAAP, and Jeremy J. Michel, MD, MHS, FAAP, for their significant contributions in providing input on the initial drafts on behalf of the AAP Partnership for Policy Initiative.

ABBREVIATIONS

AAP: American Academy of Pediatrics
IIV: inactivated influenza vaccine
LAIV: live attenuated influenza vaccine
RIV: recombinant influenza vaccine

REFERENCES

1. Grohskopf LA, Alyanak E, Broder KR, et al. Prevention and control of influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices, United States, 2022-2023 influenza season. *MMWR Morb Mortal Wkly Rep*. 2022, in press
2. Shope TR, Walker BH, Aird LD, Southward L, McCown JS, Martin JM. Pandemic influenza preparedness among child care center directors in 2008 and 2016. *Pediatrics*. 2017;139(6): e20163690
3. Centers for Disease Control and Prevention. Weekly flu vaccination dashboard. Available at: https://www.cdc.gov/flu/fluvaxview/dashboard/vaccination-dashboard.html. Accessed July 8, 2022
4. American Academy of Pediatrics, Committee on Infectious Diseases. Technical report. Recommendations for prevention and control of influenza in children, 2022–2023. *Pediatrics*. 2022; 150(4):e2022059275
5. World Health Organization. Recommended composition of influenza virus vaccines for use in the 2022–2023 northern hemisphere influenza season. Available at: https://www.who.int/publications/m/item/recommended-composition-of-influenza-virus-vaccines-for-use-in-the-2022-2023-northern-hemisphere-influenza-season. Accessed March 31, 2022
6. United States Food and Drug Administration. Vaccines and Related Biological Products Advisory Committee March 3, 2022, meeting announcement. Available at: https://www.fda.gov/advisory-committees/advisory-committee-calendar/vaccines-and-related-biological-products-advisory-committee-march-3-2022-meeting-announcement. Accessed March 31, 2022
7. Food and Drug Administration. Clinical review: Flucelvax quadrivalent. Silver Spring, MD: US Department of Health and Human Services, Food and Drug Administration; 2021
8. US Food and Drug Administration. Baloxavir package insert. Available at: https://www.gene.com/download/pdf/xofluza_prescribing.pdf. Accessed August 22, 2022
9. O'Halloran AC, Holstein R, Cummings C, et al. Rates of influenza-associated hospitalization, intensive care unit admission, and in-hospital death by race and ethnicity in the United States from 2009 to 2019. *JAMA Netw Open*. 2021;4(8): e2121880
10. United States Food and Drug Administration. Vaccines licensed for use in the United States. Available at: https://www.fda.gov/vaccines-blood-biologics/vaccines/vaccines-licensed-use-united-states. Accessed April 4, 2022
11. Schütte A, Ciesek S, Wedemeyer H, Lange CM. Influenza virus infection as precipitating event of acute-on-chronic liver failure. *J Hepatol*. 2019;70(4): 797–799
12. Premkumar M, Devurgowda D, Dudha S, et al. A/H1N1/09 influenza is associated with high mortality in liver cirrhosis. *J Clin Exp Hepatol*. 2019;9(2): 162–170
13. Uyeki TM, Bernstein HH, Bradley JS, et al. Clinical practice guidelines by the Infectious Diseases Society of America (IDSA): 2018 update diagnosis, treatment, chemoprophylaxis and institutional outbreak management of seasonal influenza. *Clin Infect Dis*. 2019;68(6):e1–e47