Medical Management of Vaccine Reactions in Children and Teens

All vaccines have the potential to cause an adverse reaction. In order to minimize adverse reactions, patients should be carefully screened for precautions and contraindications before vaccine is administered (see www.immunize.org/catg.d/p3072.pdf). Even with careful screening, reactions may occur. These reactions can vary from trivial and inconvenient (e.g., soreness, itching) to severe and life threatening (e.g., anaphylaxis). Vaccine providers should be familiar with identifying immediate-type allergic reactions, including anaphylaxis, and be competent in treating these events at the time of vaccine administration. Providers should also have a plan in place to contact emergency medical services immediately in the event of a severe acute vaccine reaction. Maintenance of the airway, oxygen administration, and intravenous normal saline might be necessary. The table below describes procedures to follow if various reactions occur.

REACTION	SYMPTOMS	MANAGEMENT
Localized	Soreness, redness, itching, or swelling at the injection site	Apply a cold compress to the injection site. Consider giving an analgesic (pain reliever) or antipruritic (anti-itch) medication.
	Slight bleeding	Apply an adhesive compress over the injection site.
	Continuous bleeding	Place thick layer of gauze pads over site and maintain direct and firm pressure; raise the bleeding injection site (e.g., arm) above the level of the patient's heart.
Psychological fright and syncope (fainting)	Fright before injection is given	Have patient sit or lie down for the vaccination.
	Extreme paleness, sweating, coldness of the hands and feet, nausea, lightheadedness, dizziness, weakness, or visual disturbances	Have patient lie flat or sit with head between knees for several minutes. Loosen any tight clothing and maintain an open airway. Apply cool, damp cloths to patient's face and neck.
	Fall, without loss of consciousness	Examine the patient to determine if injury is present before attempting to move the patient. Place patient flat on back with feet elevated.
	Loss of consciousness	Check the patient to determine if injury is present before attempting to move the patient. Place patient flat on back with feet elevated. Call 911 if patient does not recover immediately.
Anaphylaxis	Sudden or gradual onset of generalized itching, erythema (redness), or urticaria (hives); angioedema (swelling of the lips, face, or throat); severe bronchospasm (wheezing); shortness of breath; shock; abdominal cramping; or cardiovascular collapse	See "Emergency Medical Protocol for Management of Anaphylactic Reactions in Children and Teens" on the next page for detailed steps to follow in treating anaphylaxis.

CONTINUED ON NEXT PAGE ▶

Technical content reviewed by the Centers for Disease Control and Prevention

IMMUNIZATION ACTION COALITION Saint Paul, Minnesota • 651-647-9009 • www.immunize.org • www.vaccineinformation.org

www.immunize.org/catg.d/p3082a.pdf • Item #P3082a (7/16)

Needed medications for a community immunization clinic

FIRST-LINE medication

☐ **Epinephrine**, aqueous 1:1000 dilution, in ampules, vials of solution, or prefilled syringes, including epinephrine auto-injectors (e.g., EpiPen and Auvi-Q). If autoinjectors are stocked, at least three should be available (both pediatric and adult formulations).

Optional medication: H_1 antihistamines

☐ Diphenhydramine (e.g., Benadryl) oral (12.5 mg/5 mL liquid, 25 or 50 mg capsules/tablets) or injectable (50 mg/mL solution).

☐ Hydroxyzine (e.g., Atarax, Vistaril) oral (10 mg/5 mL or 25 mg/5 mL liquid, 10 mg or 25 mg tablets, or 25 mg capsules).

Suggested supplies for a community immunization clinic

☐ Syringes (1 and 3 cc) and needles (22 and 25 g, 1", 1½", and 2") for epinephrine, diphenhydramine, or hydroxyzine. For ampules, use filtered needles.

☐ Alcohol wipes

☐ Tourniquet*

☐ Pediatric and adult airways (small, medium, and large)

☐ Pediatric and adult size pocket masks with one-way valve

☐ Oxygen (if available)

☐ Stethoscope

☐ Sphygmomanometer (blood pressure measuring device) with child, adult, and extra-large cuffs

☐ Tongue depressors

☐ Flashlight with extra batteries (for examination of the mouth and throat)

☐ Wristwatch with a second hand or other timing device

☐ Cell phone or access to onsite phone

* Applied on the extremity above the injection site to slow systemic absorption of antigen and anaphylactic mediators.

Emergency medical protocol for management of anaphylactic reactions in children and teens

1 If itching and swelling are confined to the injection site where the vaccination was given, observe patient closely for the development of generalized symptoms.

2 If symptoms are generalized, activate the emergency medical system (EMS; e.g., call 911) and notify patient's physician. This should be done by a second person, while the primary healthcare professional assesses the airway, breathing, circulation, and level of consciousness of the patient. Vital signs should be monitored continuously.

3 **DRUG DOSING INFORMATION: The first-line and most important therapy in anaphylaxis is epinephrine. There are NO contraindications to epinephrine in the setting of anaphylaxis.**

- **a** **First-line treatment:** Administer aqueous **epinephrine** 1:1000 dilution (i.e., 1 mg/mL) intramuscularly; the standard dose is 0.01 mg/kg body weight, up to 0.5 mg maximum single dose in children and adolescents. See dosing chart on page 3.
- **b** **Optional treatment: H_1 antihistamines** for hives or itching, you may also administer **diphenhydramine** (either orally or by intramuscular injection; the standard dose is 1–2 mg/kg body weight, up to 50 mg maximum dose in children and adolescents*) or **hydroxyzine** (orally; the standard dose is 0.5–1 mg/kg/dose up to 50–100 mg maximum per day in children and adolescents). See dosing charts on page 3.

* According to AAP's *Red Book*, for children age ≥12 years, the diphenhydramine maximum single dose is 100 mg.

4 Monitor the patient closely until EMS arrives. Perform cardiopulmonary resuscitation (CPR), if necessary, and maintain airway. Keep patient in supine position (flat on back) unless he or she is having breathing difficulty. If breathing is difficult, patient's head may be elevated, provided blood pressure is adequate to prevent loss of consciousness. If blood pressure is low, elevate legs. Monitor blood pressure and pulse every 5 minutes.

5 If EMS has not arrived and symptoms are still present, repeat dose of epinephrine every 5–15 minutes for up to 3 doses, depending on patient's response.

6 Record the adverse event (e.g., hives, anaphylaxis) to the vaccine, all vital signs, medications administered to the patient, including the time, dosage, response, and the name of the medical personnel who administered the medication, and other relevant clinical information. Report the incident to the Vaccine Adverse Event Reporting System (VAERS).

7 Notify the patient's primary care physician.

CONTINUED ON NEXT PAGE ▶

These standing orders for the medical management of vaccine reactions in child and teenage patients shall remain in effect for patients of the _____ (NAME OF CLINIC) until rescinded or until _____ (DATE)

_____ (MEDICAL DIRECTOR'S SIGNATURE) _____ (DATE OF SIGNING)

For your convenience, approximate dosages based on weight and age are provided in the following charts. Please confirm that you are administering the correct dose for your patient.

First-Line Treatment: Epinephrine

Recommended dose is 0.01 mg/kg body weight up to 0.5 mg maximum dose. May be repeated every 5–15 minutes for a total of 3 doses.

	Age group	Range of weight (lb)	Range of weight (kg)*	Epinephrine Dose: 1 mg/mL injectable (1:1000 dilution); intramuscular Minimum dose: 0.05 mL	Epinephrine Dose: Epinephrine auto-injector, 0.15 mg or 0.3 mg
Infants and children	1–6 months	9–19 lb	4–8.5 kg	0.05 mL (or mg)	off label
	7–36 months	20–32 lb	9–14.5 kg	0.1 mL (or mg)	off label
	37–59 months	33–39 lb	15–17.5 kg	0.15 mL (or mg)	0.15 mg/dose
	5–7 years	40–56 lb	18–25.5 kg	0.2–0.25 mL (or mg)	0.15 mg/dose
	8–10 years	57–76 lb	26–34.5 kg	0.25–0.3 mL (or mg)	0.15 mg or 0.3 mg/dose
Teens	11–12 years	77–99 lb	35–45 kg	0.35–0.4 mL (or mg)	0.3 mg/dose
	13 years & older	100+ lb	46+ kg	0.5 mL (or mg) – max. dose	0.3 mg/dose

NOTE: If body weight is known, then dosing by weight is preferred. If weight is not known or not readily available, dosing by age is appropriate.

* *Rounded weight at the 50th percentile for each age range*

Optional Treatment: Diphenhydramine

▶ **commonly known as Benadryl**

Recommended dose is 1–2 mg/kg body weight every 4–6 hrs

	Age group	Range of weight (lb)	Range of weight (kg)*	Diphenhydramine Dose: Liquid: 12.5 mg/5 mL Tablets: 25 mg or 50 mg Injectable: 50 mg/mL (IV or IM)
Infants and children	7–36 months	20–32 lb	9–14.5 kg	10–15 mg/dose
	37–59 months	33–39 lb	15–17.5 kg	15–20 mg/dose
	5–7 years	40–56 lb	18–25.5 kg	20–25 mg/dose
	8–12 years	57–99 lb	26–45 kg	25–50 mg/dose†
Teens	13 years & older	100+ lb	46+ kg	50 mg/dose (up to 50 mg or 100 mg† single dose)

NOTE: If body weight is known, then dosing by weight is preferred. If weight is not known or not readily available, dosing by age is appropriate.

* *Rounded weight at the 50th percentile for each age range*

† According to AAP's *Red Book*, for children age ≥12 years, the diphenhydramine maximum single dose is 100 mg.

Optional Treatment: Hydroxyzine

▶ **commonly known as Atarax, Vistaril**

Recommended oral dose is 0.5–1 mg/kg body weight every 4–6 hrs

	Age group	Range of weight (lb)	Range of weight (kg)*	Hydroxyzine Dose: Liquid: 10 mg/5 mL or 25 mg/5 mL Tablets: 10 mg or 25 mg Capsules: 25 mg
Infants and children	7–36 months	20–32 lb	9–14.5 kg	5–7.5 mg/dose
	37–59 months	33–39 lb	15–17.5 kg	7.5–10 mg/dose
	5–7 years	40–56 lb	18–25.5 kg	10–12.5 mg/dose
	8–10 years	57–76 lb	26–34.5 kg	12.5–15 mg/dose
Teens	11–12 years	77–99 lb	35–45 kg	15–25 mg/dose
	13 years & older	100+ lb	46+ kg	25 mg/dose (50–100 mg, maximum per day)

NOTE: If body weight is known, then dosing by weight is preferred. If weight is not known or not readily available, dosing by age is appropriate.

* *Rounded weight at the 50th percentile for each age range*

REFERENCES

- Simons FE, Camargo CA. Anaphylaxis: Rapid recognition and treatment. In: UpToDate, Bochner BS (Ed). UpToDate: Waltham, MA, 2013.
- Charts adapted from American Academy of Pediatrics. *Red Book: 2012 Report of the Committee on Infectious Diseases. Pickering LK, ed. 29th ed. Elk* Grove Village, IL: American Academy of Pediatrics; 2012: pp. 67–69.
- Boyce JA, Assa'ad A, Burks AW, et al. Guidelines for the Diagnosis and Management of Food Allergy in the United States: Report of the NIAID-Sponsored Expert Panel. *Allergy Clin Immunol* 2010; 126(6): S1–S57.