Massachusetts Department of Public Health
Division of Epidemiology and Immunization

Model Standing Orders

Emergency Treatment for Vaccine Reactions

Note: These model standing orders are current as of December 2010. They should be reviewed carefully against the most current recommendations and may be revised by the clinician signing them.

Because of possible hypersensitivity to vaccine components, people administering biologic products or serum should be prepared to recognize and treat allergic reactions, including anaphylaxis. The necessary medications, equipment, and staff competent to maintain the patency of the airway and to manage cardiovascular collapse, must be immediately available. Vaccine providers must be in close proximity to a telephone so that emergency medical personnel can be summoned immediately, if necessary.

All providers should be familiar with the facility/agency emergency plan and should be certified in cardio-pulmonary resuscitation (CPR). Whenever possible, patients should be observed for an allergic reaction for 15 to 20 minutes after receiving vaccine.

I. Medical Management of Non-Anaphylactic Vaccine Reactions

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 or antipruritic medication (See Medication Table 1 for dosing)
	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 hands and feet, nausea, light-headness, dizziness, weakness, or visual disturbances	• Have patient lie flat with legs elevated or sit with head between knees for 15 minutes • Loosen any tight clothing and maintain an open airway • Apply cool, damp cloths to patient's face and neck • Monitor vital signs every 10-15 minutes • Observe patient until asymptomatic • Notify attending clinician of incident • Provide patient with a telephone number of a provider or emergency facility to contact in case of emergency or deterioration of condition.
	Fall, without loss of consciousness	• Examine the patient to determine if injury is present before attempting to move patient. • Place patient flat on back with legs elevated for 15 minutes • Monitor vital signs every 10-15 minutes. • Observe patient until asymptomatic • Notify attending clinician of incident • When patient is sent home, make sure he/she has a telephone number of a

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		provider or emergency facility to contact in case of emergency or deterioration of condition.
	Loss of consciousness but has a steady pulse, normal blood pressure and respirations	• Examine the patient to determine if injury is present before attempting to move patient. • Place patient flat on back with legs elevated. • Have patient rest in a quiet area and observe for 30 minutes after regaining consciousness. • Notify attending clinician of incident. • Monitor vital signs every 10-15 minutes. • If patient regains consciousness within 3 minutes, observe for at least 30 minutes. If indicated, notify patient's primary care provider. • Provide patient with a telephone number of a provider or emergency facility to contact in case of emergency or deterioration of condition. • Contact patient 4-6 hours later to assess recovery. • **CALL 911** if patient remains unconscious for more than 3 minutes.
	Loss of consciousness with abnormal vital signs (e.g., decreased BP, decreased/increased/irregular pulse)	• Examine patient to determine if injury is present before attempting to move. • Place patient flat on back with legs elevated. • Notify attending clinician of incident (if you have not already done so). • Monitor vital signs every 10-15 minutes. • If vital signs remain abnormal or if patient remains unconscious for 3 minutes, **CALL 911.** • If patient regains consciousness within 3 minutes, observe for at least 30 minutes. If indicated, notify patient's primary care provider. • If patient is sent home, provide the patient with a telephone number of a provider or emergency facility to contact in case of emergency or deterioration of condition. • Contact patient 4-6 hours later to assess recovery.

* Syncope may occur after vaccination, particularly in adolescents and young adults. Personnel should be aware of presyncopal manifestations and take appropriate measures to prevent injuries if weakness, dizziness, or loss of consciousness occur. The relatively rapid onset of syncope in most cases suggests that having vaccinees sit or lie down for 15 minutes after immunization could avert many syncopal episodes and secondary injuries

II. Emergency Medical Protocol for Management of Anaphylactic Reactions

Signs and Symptoms of Anaphylactic Reaction

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 (tachycardia, tachapnea, hypotension; with clammy or cyanotic skin);
- abdominal cramping;
- cardiovascular collapse.

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A. Treatment for mild symptoms of anaphylaxis:

Signs and Symptoms of Mild Systemic Anaphylaxis
may include pruritus, erythema, mild hives, and angioedema.

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 and give acetaminophen or ibupropen and diphenhydramine or hydroxyzine (see Medication Table 1 below).
2) Notify attending clinician of incident.
3) If symptoms subside, transfer patient to an appropriate medical facility for observation for at least 4 hours.
4) Notify the patient's primary care provider.
5) If symptoms do not subside after appropriate administration of medications or become more generalized, activate the emergency medical system (e.g., call 911) and notify the on-call physician.
   a. This should be done by a second person, while the primary nurse assesses the airway, breathing, circulation, and level of consciousness of the patient.
   b. Continue with treatment outlined in Section B. *Treatment for More Severe or Potentially Life-threatening Systemic Anaphylaxis.*
6) Consider the use of oral corticosteroids, prednisone, in moderate to severe cases. If not available, refer to primary care or appropriate medical facility.

Table 1: Oral Medication for Treatment for Localized Reactions[1]

Medication	Child < 12 years of age	Adults ≥ 12 years of age
Acetaminophen analgesic, antipyretic, anti-inflammatory	15 mg/kg every 4-6 hours as needed	650 mg every 4-6 hours as needed
Ibuprofen analgesic, antipyretic, anti-inflammatory	5-10 mg/kg every 6-8 hours as needed	400 mg every 6-8 hours as needed
Diphenhydramine[2] antihistamine	1-2 mg/kg every 4-6 hours (100 mg, maximum single dose)	1-2 mg/kg every 4-6 hours (100 mg, max. single dose)
Hydroxyzine[2] antihistamine	0.5-1 mg/kg every 4-6 hours (100 mg, maximum single dose)	0.5-1 mg/kg every 4-6 hours (100 mg, max. single dose)

[1] If moderate to severe include oral corticosteroids (see Medication Table 2).

[2] **Note:** Diphenhydramine and Hydroxyzine can cause **drowsiness**. Inform patient, parent and family members. Advise to avoid driving or using heavy equipment while taking these medications.

B. Treatment for more severe or potentially life-threatening systemic anaphylaxis:

Symptoms of More Severe or Potentially Life-Threatening Systemic Anaphylaxis
may include generalized hives, itch-flush, swollen lips/tongue and/or uvula, wheezing, severe bronchospasm, laryngeal edema, gastrointestinal symptoms (crampy abdomen, pain or vomiting), shock, and cardiovascular collapse.

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If symptoms are more generalized, **call 911 immediately** and notify the attending clinician. This should be done by a second person, while the primary nurse assesses the airway, breathing, circulation, and level of consciousness of the patient.

1) Immediately institute airway maintenance of the airway and administer oxygen, if available. If patient is wheezing, has generalized hives or respiratory distress, have patient sit.
2) If patient has low blood pressure or pulse is weak, have patient lie down on back and elevate feet.
3) Administer aqueous epinephrine 1:1000 dilution (i.e., 1mg/mL) **intramuscularly** in a dose equivalent to 0.01 mL/kg of body weight as according to Medication Table 2 below. **Determining the dose by body weight is preferred over determining the dose by age, when possible.**

   Note: If using an Epipen®, it must **only** be administered in the anterolateral thigh in accordance with the package insert and instructions from the manufacturer.
4) Administer diphenhydramine orally or intramuscularly according to Medication Table 2 below.
5) Repeat dose of epinephrine every 10-20 minutes for up to 3 doses as long as symptoms are present and EMS has not arrived.
6) Use oral corticosteroids in all cases of moderate to severe anaphylaxis[*] (see Medication Table 3 below). If in a non-office setting, refer for treatment/prescription for steroids.
7) Monitor the patient closely until EMS arrives.
8) If cardiac and/or respiratory arrest occurs, start CPR.
9) Monitor blood pressure and pulse every 5 minutes.
10) Record vital signs, medications administered to patient, including the time, dosage, response, and the name of the medical personnel who administered the medication and other relevant clinical information.
11) Transfer patient to an appropriate medical facility for appropriate period of observation.*
12) Notify attending clinician of incident.
13) For more advanced management of severe reactions, see the 2009 Red Book, p. 65-67.

[*] If anaphylaxis is moderate to severe, use corticosteroids as outline in Medication Table 3 below. If in a non- office setting, refer for treatment/prescription for steroids. Biphasic and protracted anaphylaxis may be mitigated with early administration of oral corticosteroids. Patients should be observed even after remission of immediate symptoms. Although a specific period of observation has not been established, 4 hours would be reasonable for mild episodes and as long as 24 hours for severe episodes.

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Table 2: Medication Table for Anaphylactic Reactions

Age Group	Weight in kg/lbs[1] *Dose by body weight preferred*	Aqueous Epinephrine [2,3,4] 0.01 mL/kg/dose (1:1,000 dilution IM[5])	OR	EpiPen® 0.3mg[6] (1:1,000 dilution or EpiPen Jr® 0.15 (1:2,000 dilution)	AND	Diphenhydramine 12.5 mg/5 mL liquid; or 25 and 50 mg capsule or tab; or 50 mg/mL injectable[5]
1 - 6 mos	4-7 kg or 9-15 lb	0.05 mg (0.05mL)		EpiPen Jr® 0.15 mg		5 mg
7 - 18 mos	7-11 kg or 15-24 lb	0.1 mg (0.1 mL)		EpiPen Jr® 0.15 mg		10 mg
19 - 35 mos	11-14 kg or 24-31lb	0.15 mg (0.15 mL)		EpiPen Jr® 0.15 mg		15 mg
3 yrs	14-17 kg or 31-37 lb	0.15 mg (0.15 mL)		EpiPen Jr® 0.15 mg		20 mg
4 yrs	17-19 kg or 37-42 lb	0.2 mg (0.2 mL)		EpiPen Jr® 0.15 mg		20 mg
5 - 7 yrs	19-23 kg or 42-51 lb	0.2 mg (0.2 mL)		EpiPen Jr® 0.15 mg		30 mg
8 - 10 yrs	23-35 kg or 51-77 lb	0.3 mg (0.3 mL)		EpiPen® 0.3 mg		30 mg
11 - 12 yrs	35-45 kg or 77-99 lb	0.4 mg (0.4 mL)		EpiPen® 0.3 mg		40 mg
≥ 13 yrs	45+ kg or 99+ lbs	0.5 mg (0.5 mL)		EpiPen® 0.3 mg		50 -100 mg

[1] Determining dose by body weight is preferred.

[2]**Maximum dose for epinephrine is 0.5 mL**.

[3]Epinephrine can be injected into the same site at which the vaccine was administered to slow absorption.

[4] Epinephrine may be repeated every 10-20 minutes until symptoms subside, up to a maximum of 3 doses.

[5] See Table 4 below for recommended needle size.

[6] EpiPen must be administered into anterolateral thigh **only** in accordance with the package insert and instructions from the manufacturer.

Table 3: Corticosteroids for Anaphylactic Reactions

Corticosteroids	Dose
Hydrocortisone	IV: 100-200 mg, every 4-6 hr
Methylprednisolone	IV: 1.5-2mg/kg, every 4-6hr (60mg, maximum single dose)
Prednisone	Oral: 1.5-2 mg/kg single morning dose (60 mg, maximum single dose); for 24-48 hrs

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Table 4: Needle Length and Injection Site for IM Injection

Age and Gender/Weight	Needle Length	Injection Site
Newborn (Birth to 28 days)	5/8”	Anterolateral thigh
Infant (1-12 months)	1”	Anterolateral thigh
Toddler (1- 2 yrs of age)	1” – 1¼” 5/8” – 1”*	Anterolateral thigh (preferred) or Deltoid
Child/Adolescent (3 – 18 years of age)	5/8” – 1”* 1” – 1¼”	Deltoid (preferred) or Anterolateral thigh
Adults Aged > 19 years	**Needle Length**	**Injection Site**
Male and female < 60 kg (130 lbs)	1”	Deltoid
Female 60 – 90 kg (130 – 200)	1” – 1½”	Deltoid
Male 60 – 118 kg (130 – 260 lbs)	1½”	Deltoid
Female > 90 kg (200 lbs)	1½”	Deltoid
Male > 118 kg (260 lbs)	1½”	Deltoid

***** A 5/8” needle may be used **only** if the skin is stretched tight, subcutaneous tissue is not bunched, and injection is made at a 90-degree angle.

C. List of emergency equipment and supplies:

The following equipment and supplies should be readily available at every site at which immunization are administered:

1. Sphygmomanometer and stethoscope (child, adult and extra-large cuffs)
2. Emergency medications:
   a. Epinephrine 1:1000 (aqueous) for injection
   b. Epinephrine 1:1000 (aqueous) auto-injectors (EpiPen® and EpiPenJr®)
   c. Diphenhydramine hydrochloride (Benadryl) - PO (25 or 50mg tablets) and injectable (50 mg/mL solution).
3. Syringes: 1-3 cc, 22-25g, 1”, 11/2”, and 2” needles for epinephrine and diphenhydramine (Benadryl)
4. Oral airways (Pediatric and adult)
5. Alcohol wipes and bandaids
6. Wrist watch, with second hand
7. Cell phone or access to an on site phone
8. Paper and pen
9. Pediatric and adult pocket masks with one way valve.
10. Tourniquet
11. Tongue depressors
12. Flashlight with extra batteries

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D. Documentation of all adverse events

a. Document administration of all emergency medications according to established protocol, vital signs, and other relevant clinical information in patient's medical record.

b. Document all adverse event(s) in the patient's medical record,

c. Notify the patient's primary care provider or local board of health (if no such provider can be identified) of the adverse event(s),

d. Report adverse event(s) to the Vaccine Adverse Event Reporting System (VAERS) at 800-822-7967, or via the VAERS website: www.vaers.org.

e. Report administration errors to the Institute for Safe Medication Practices (ISMP) via the Medication Error Website Program (MERP) website: http://ismp.org

References:

American Academy of Pediatrics. Passive Immunization. Pickering LK, ed. Red Book. 2009 *Report of the Committee on Infectious Diseases.* 28th Ed. Elk Grove, IL:American Academy of Pediatrics; 2009: 65-67.

CDC. General recommendations on immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2006; 55 (No. RR-15):1-40.

CDC (2009) Epidemiology and Prevention of Vaccine-Preventable Diseases (The Pink Book). 11th ed. Department of Health and Human Services Atlanta, Georgia . Appendix D, Vaccine Administration. Available at: http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm

CDC. Use of standing orders programs to increase adult vaccination rates: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2000;49(No. RR-1):21-27.

Immunization Action Coalition: *Medical Management of Vaccine Reactions in Children and Teens.* http://www.immunize.org/catg.d/p3082a.pdf

Immunization Action Coalition: *Administering Vaccines: dose, route, site and needle size.* www.immunize.org/catg.d/p3046pdf

Immunization Action Coalition: *Suggested supplies checklist for pediatric and adult immunization clinic.* www.immunize.org/catg.d/p3046pdf

Wood et al. (2008) An Algorithm for treatment of patients With Hypersensitivity Reactions After Vaccines Pediatrics 122 e771-e777. Available at:

http://pediatrics.aappublications.org/cgi/reprint/122/3/e771.pdf

EpiPen® (Epinephrine) Auto-Injector 0.3/0.15mg, © 2009 Dey, L.P., Napa, CA. http://www.anaphylaxis.com/page/prescribing-information-and-patient-instructions

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