

Children's Hospital and Health System
Patient Care Treatment Guideline
CW Urgent Care

Subject: Anaphylaxis

Purpose: To recognize and initiate emergent treatment for signs and symptoms of anaphylaxis.

Definitions: Anaphylaxis is a severe, life threatening, multisystem allergic reaction which is rapid in onset, usually non anticipated, and which may quickly lead to death. Anaphylaxis is often under recognized and under treated, as it can present without obvious signs and symptoms, vary in its presentation, and can appear very similar to other conditions. However, it is extremely important to recognize and treat as it can lead to respiratory and cardiac arrest within minutes. It is also important to recognize as quickly into the anaphylactic process as possible due to the fact the patient is most responsive to treatment in the early phases of anaphylaxis than in later phases of the process.

Biphasic Anaphylaxis: A recurrence of symptoms that develop following the resolution of the initial anaphylaxis episode with no additional exposure to the trigger. This occurs in up to 21% of adults and 15% of children. It typically occurs within 12 hours of the resolution of the original anaphylaxis process. However, it can develop up to 72 hours later. The only way to decrease the likelihood of a biphasic reaction is by giving IM epinephrine as soon as possible after onset of anaphylaxis signs/symptoms.

Etiology: Anaphylaxis is an IgE mediated hypersensitivity reaction that occurs when a sensitizing antigen elicits an IgE antibody response in a susceptible individual. The antigen-specific IgE antibodies then bind to mast cells and basophils. Subsequent exposure to the sensitizing antigen results in cross linking of the cell bound IgE, resulting in mast cell and basophil degranulation, which in turn releases histamine, tryptase, and newly generated leukotrienes, prostaglandins, and platelet activating factor. These are all responsible for the signs and symptoms of an IgE mediated anaphylaxis reaction. These signs and symptoms appear rapidly but can take up to 2 hours after the allergen exposure. The onset of symptoms will be more rapid if the allergen had been injected or administered by IV. Anaphylaxis may also be a non IgE mediated reaction. This occurs when the sensitizing allergen triggers activation of the complement system. This form of anaphylaxis is much less common.

Common Causes of Anaphylaxis:

- Foods (30% of all cases)
 - Peanuts, tree nuts, egg, seafood, fish, cow's milk, and wheat
- Insect venom (26% of all cases)
 - Bees and wasps
- Medications (13% of all cases)

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- NSAIDS and beta-lactam antibiotics most common medications
 - PCNs account for 14% of anaphylactic medication reactions, however cause 75% of all fatal anaphylactic episodes
- Radiocontrast and neuromuscular blockers
- Natural rubber latex

Less Common Causes of Anaphylaxis:

- Exercise
- Semen
- Food Additives: Monosodium Glutamate and Metabiosulfate
- Hormone changes
- Topical medications
- Transfusions

Differential Diagnosis

- Acute asthma exacerbation
- Vasovagal syncope
- Panic/anxiety attack
- Acute generalized urticaria/angioedema
- Food poisoning
- Caustic ingestion
- Foreign body aspiration
- Hypoglycemia
- Seizure disorder

Guideline

Subjective Data/History

- **Assess for risk factors for fatal anaphylaxis including:**
 - Failure to give IM epinephrine
 - Age:
 - Infants highest risk age group due to atypical presentation including persistent vomiting, drowsiness, fussiness, persistent crying
 - Adolescents
 - Geriatrics
 - Pregnancy
 - Comorbid Conditions:
 - Asthma
 - Chronic respiratory diseases
 - Cardiovascular diseases

Supersedes: NONE

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- Allergic Rhinitis
- Eczema
- Mastocytosis
- Depression
- Cognitive dysfunction
- Medications: beta and alpha adrenergic blockers, ACE inhibitors, psychotropic medications, drugs of abuse, alcohol, NSAIDS, diuretics, angiotensin receptor blockers, and calcium channel blockers
- Cofactors: exercise, acute infection, emotional stress, and premenstrual status

Objective Data / Physical Exam

Not everyone presents in the same way. Some signs and symptoms may have resolved prior to arrival, especially the skin and mucosal changes. Always inquire about the presence of all possible symptoms that may be yet occurring or may have resolved prior to arrival.

Common Signs and Symptoms of Anaphylaxis:

- Skin/mucosa: ($\geq 80\%$ of all anaphylaxis reactions)
 - Generalized urticaria
 - Itching or flushing
 - Swollen lips, tongue, uvula
 - Periorbital edema
 - Conjunctival swelling
 - Throat tightness/itching
 - Perioral tingling
- Respiratory: ($\geq 70\%$ anaphylaxis reactions)
 - Dyspnea/shortness of breath
 - Cough
 - Wheeze
 - Stridor
 - Profuse rhinorrhea
 - Nasal congestion
 - Voice changes
 - Cyanosis
 - Hypoxemia
- GI: (45% of anaphylaxis reactions)
 - Nausea
 - Vomiting
 - Diarrhea
 - Abdominal pain

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- Cardiovascular: (45% of anaphylaxis reactions)
 - Hypotonia/collapse
 - Syncope
 - Confusion
 - Dizziness
 - Tachycardia
 - Hypotension
- Miscellaneous:
 - Incontinence
 - Substernal pain
 - Headache
 - Seizure

Diagnostic Studies (See Appendix A: Criteria & Treatment of Anaphylaxis in Urgent Care)

The diagnosis of anaphylaxis is a clinical diagnosis that does not need diagnostic tests to confirm the diagnosis. Tryptase levels are usually elevated during an anaphylaxis reaction. However, we do not obtain this level in Urgent Care as it takes several days for the result to return.

- Diagnostic criterion have been validated by the World Allergy Organization. Meeting any one of the following criterion is diagnostic of anaphylaxis.
 - Sensitivity: 97%
 - Specificity: 98%
 - Negative Predictive Value: 98%
 - Positive Predictive Value: 67%

Treatment: (See Appendix A: Criteria & Treatment of Anaphylaxis in Urgent Care)

- **If anaphylaxis is suspected, the first priority is rapid administration of IM epinephrine.**
 - Patient < 25kg, give IM epinephrine 0.15mg (EpiPen Jr)
 - Patient ≥ 25kg, give IM epinephrine 0.3mg (EpiPen)
 - **If no epinephrine auto injector is available for use, draw up epinephrine 1:1000 (1mg/ml) concentration into a syringe 0.15mg (0.15ml) or 0.3mg (0.3ml) based on the dose desired.**
- Anaphylaxis is a rapidly progressing process and is very unpredictable.
- It does have a potential to resolve quickly on its own, however it is much more likely to become biphasic and protracted or rapidly progress to respiratory and cardiovascular compromise and death if IM epinephrine is not given or is delayed.

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- Keep in mind that the administration of epinephrine is at times appropriate even in cases that do not fully meet any of the 3 Criterion.
- There is no absolute contraindication to the use of epinephrine for the use of anaphylaxis.
- IM epinephrine may be administered every 5-15 minutes as needed for either no response or for an inadequate response. There is no maximum dosing.
- Epinephrine can be given through the clothes. Do not delay giving epinephrine in order to undress the patient.
- A possible complication from using an auto injector is a laceration at the injection site. This occurs when the auto injector is kept in the muscle longer than 3 seconds and/or the child moves during the injection process. Make sure the auto injector is not held in place for longer than 3 seconds. Make sure the limb that the injection is being given into is securely immobilized.
- Place the patient in Trendelenburg position to prevent the possibility of empty ventricle syndrome due to anaphylaxis.

Family Education

- Side effects of IM epinephrine: pallor, tremor, anxiety, palpitations, dizziness, or headache.
- Patients with mild to moderate anaphylaxis that responds promptly to IM epinephrine should be observed in the emergency room once signs and symptoms have resolved.
- Patients with severe anaphylaxis may be admitted to the hospital.
- All patients discharged to home from the emergency room or inpatient hospital with the diagnosis of anaphylaxis, should be discharged with a prescription for an epinephrine auto injector as well as a CW Asthma/Allergy referral.

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This guideline is designed to serve as a reference for clinical practice and does not represent an exclusive course of treatment nor does it serve as a standard of medical care. Providers should apply their professional judgment to the management of individual patient conditions and circumstances. Children's Hospital and Health System (CHHS) does not make any representation with respect to any sort of industry recognized standard of care for the particular subject matter of this clinical guideline. Additionally, CHHS form documents are subject to change, revision, alteration, and/or revocation without notice.

Supersedes: NONE

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References

- Atanaskovic-Markovic, M., Gomes, E., Cernadas, J., duToit, G., Kidon, M., ... Caubet, J. (2019). Diagnosis and management of drug-induced anaphylaxis in children: an EAACI position paper. *Pediatric Allergy and Immunology*, 30(3), 269-276.
- Blackman, A., Anvari, S., & Anagnostou, A. (2018). Treatment of anaphylaxis: Are we doing it right? *The Journal of Allergy and Clinical Immunology*, 141(2), AB155.
- Brown-Whitehorn, T., Everly, E., Law, C., Mihalko, M., Saltzman, R., Simon, G., . . . Caraher, C. (2019). *Anaphylaxis Clinical Pathway - Outpatient Specialty Care and Primary Care*. Retrieved August 12, 2020, from <https://www.chop.edu/clinical-pathway/anaphylaxis-outpatient-clinical-pathway>
- Campbell, R., & Kelso, J. (2019). Anaphylaxis: Emergency treatment. *UpToDate*. Retrieved from <http://www.uptodate.com>
- Castilano, A., Sternard, B., Cummings, E., Shi, R., Arnold, T., & Bahna, S. (2018). Pitfalls in anaphylaxis diagnosis and management at a university emergency department. *Allergy and Asthma Proceedings*, 39(4), 316-321.
- Cristiano, L., Hiestand, B., Gower, W., Gilbert, K., Caldwell, J., ... Winslow, J. (2016). Prehospital administration of epinephrine in pediatric anaphylaxis - A statewide perspective. *Journal of Allergy and Clinical Immunology*, 137(2).
- Greenhawt, M., Gupta, R., Meadows, J., Pistiner, M., Spergel, J., ... Liberman, P. (2018). Guiding principles for the recognition, diagnosis, and management of infants with anaphylaxis: An expert panel consensus. *Journal of Allergy and Clinical Immunology: In Practice*, 7(4), 1148-1156.

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Kelso, J. (2018). Anaphylaxis: Confirming the diagnosis and determining the cause(s).

UpToDate. Retrieved from <http://www.uptodate.com>

Kemp, S. (2019). Pathophysiology of anaphylaxis. *UpToDate*. Retrieved from

<http://www.uptodate.com>

Lee, J., Braun-Whitehorn, T., Sarouhas, T., Rodio, B., Zielinski, L., ... Lavelle, J. (2020).

ED Pathway for Evaluation/Treatment of Children with Anaphylaxis. *Children's Hospital of Philadelphia*. Retrieved from <https://www.chop.edu/clinical-pathway/anaphylaxis-emergent-care-clinical-pathway>

Lee, J., Rodio, B., Lavelle, J., Lewis, M., English, R., ... Brown-Whitehorn, T. (2018).

Improving anaphylaxis care: The impact of a clinical pathway. *Pediatrics*, 141(5).

Sicherer, S. (2019). Anaphylaxis in infants. *UpToDate*. Retrieved from

<http://www.uptodate.com>

Sicherer, S., Simons, F., & Immunology, S. (2017, March 01). Epinephrine for First-aid Management of Anaphylaxis. Retrieved August 12, 2020, from

<https://pediatrics.aappublications.org/content/139/3/e20164006>

Tallar, M., Gallagher, J., & Steinberg, J. (2016). Proceedings from Medical College of

Wisconsin: Department of Allergy and Clinical Immunology: Urgent Care

Meeting: *Anaphylaxis in Pediatric Urgent Care Settings*, Milwaukee, WI.

Treatment information also provided by David Vyles, DO, Emergency Medicine, and

Sara Lowe, Pediatric Nurse Practitioner, Asthma, Allergy and Immunology,

Children's Wisconsin (personal communications, August 2020).

Appendix A: Criteria & Treatment of Anaphylaxis in Urgent Care

Diagnostic Criteria:

- Have been validated by the World Allergy Organization
- Meeting any one of the following criterion is diagnostic of anaphylaxis

Criteria 1

Acute onset of symptoms (minutes to several hours) involving **SKIN AND MUCOSAL CHANGES**, along with at least **ONE** of the following:

- Respiratory changes
- Cardiovascular changes

Criteria 2

TWO OR MORE of the following symptoms or signs that occur **SUDDENLY (minutes to several hours) AFTER EXPOSURE** to a likely trigger:

- **skin or mucosa**
 - generalized hives, itching or flushing
 - swollen lip, tongue or uvula
 - throat tightness or itching
- **respiratory**
 - shortness of breath
 - wheezing
 - coughing or hacking
 - stridor
 - low oxygen saturation
 - cyanosis (turning blue)
- **symptoms of organ dysfunction**
 - decreased muscle tone
 - incontinence of stool or urine
 - confusion
 - loss of consciousness
 - greater than 30% decrease of systolic blood pressure
- **gastrointestinal**
 - crampy abdominal or uterine pain
 - nausea and/or vomiting
 - diarrhea

Criteria 3

Reduced blood pressure (minutes to several hours) after exposure to a known allergen.

Patient meets
criteria for
anaphylaxis

Treatment:

- **Administer IM epinephrine**
 - Patient < 25kg (55 pounds), give IM epinephrine 0.15mg (EpiPen Jr)
 - Patient ≥ 25kg (55 pounds), give IM epinephrine 0.3mg (EpiPen)
 - If no epinephrine auto injector is available for use, draw up epinephrine 1:1000 (1mg/ml) into a syringe 0.15mg (0.15ml) or 0.3mg (0.3ml) based on the dose desired.
 - Site: middle lateral (outer) thigh, alternate site: deltoid if age ≥ 1 year
 - Wrap hand around device removing thumb from top
 - After injection, hold in place for 3 seconds (EpiPen) or as required by device. Needle/syringe can be removed after injection is complete.
 - If no improvement, repeat IM epinephrine every 5-15 minutes, alternating administration sites, no max dose
 - Obtain and monitor vital signs (BP, P, RR, pulse ox)
 - Call 911 for ALS transfer
 - Lie patient down with feet elevated. Avoid moving the patient as much as possible.
 - Avoid inciting allergen.
- If respiratory or cardiovascular symptoms:**
- Administer oxygen
 - Emergency response as needed
 - Consider albuterol, ipratropium
- If tolerating oral medications, can use clinical judgment:**
- Cetirizine: does not replace first line epinephrine
 - Decadron: does not replace first line epinephrine, insufficient evidence for or against, max dose 16mg
 - Consider IM Decadron if not tolerating oral medications, does not replace first line epinephrine, insufficient evidence for or against, max dose 16mg