

Clinical Pathways

Clinical Pathway: Anaphylaxis

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What is a Clinical Pathway?



An evidence-based guideline that decreases unnecessary variation and helps promote safe, effective, and consistent patient care.

Objectives of Pathway



- To standardize the approach for patients with anaphylaxis
- To improve the recognition of anaphylaxis and early administration of intramuscular epinephrine
- To improve the safety of patients who develop anaphylaxis
- To improve documentation in patient chart of allergic reactions, including details of the specific reaction and severity of reaction

Why is Pathway Necessary?



- Anaphylaxis is a life threatening condition that requires rapid assessment and treatment
- A clinical pathway can empower early administration of epinephrine when anaphylaxis is suspected
- It can also ensure adherence to the American Academy of Allergy, Asthma and Immunology guideline for management of anaphylaxis

Background



- Anaphylaxis is a multisystem emergency and can progress to a life threatening condition
- Anaphylaxis requires prompt recognition and treatment
- Delayed treatment with epinephrine is associated with increased risk for fatality
- Leading causes of anaphylaxis are medications, foods, Hymenoptera (i.e. bees, wasps, hornets) stings

Background: Signs and Symptoms Anaphylaxis ¹



Table II-1
Signs and symptoms of anaphylaxis

System	Symptoms	System	Symptoms
Skin	Flushing, local or generalized	Cardiovascular	Chest pain, eg, substernal, tachycardia, bradycardia, palpitations, arrhythmias, hypotension, feeling faint, urinary or fecal incontinence, shock, cardiac arrest
	Localized itching of skin or mucosa (local areas, eg, palms, genitalia, and/or palate) or generalized itching Urticaria Angioedema of skin or mucosa (eg, lips or tongue) morbilliform rash pilar erection Conjunctival itching, redness, tearing, and/or swelling Nasal itching, congestion, rhinorrhea, sneezing		
Respiratory	Throat itching and tightness Dysphonia, hoarseness, stridor Coughing Increased respiratory rate Shortness of breath Wheezing Chest tightness Cyanosis Respiratory arrest	Central nervous system	Aura of impending doom Uneasiness Sudden behavioral change (eg, irritability) Dizziness Headache (eg, throbbing) Altered mental state Tunnel vision Confusion Seizure
	Abdominal pain (eg, cramping) Nausea Vomiting Diarrhea Dysphagia	Other	Metallic taste in mouth Uterine cramping and/or bleeding

Table I-1
Signs and symptoms of anaphylaxis^a

Signs and symptoms	Percentage ^b
Cutaneous	
Urticaria and angioedema	62–90
Flushing	45–55
Pruritus without rash	2–5
Respiratory	
Dyspnea, wheeze	45–50
Upper airway angioedema	50–60
Rhinitis	15–20
Hypotension, dizziness, syncope, diaphoresis	30–35
Abdominal	
Nausea, vomiting, diarrhea, abdominal pain	25–30
Miscellaneous	
Headache	5–8
Substernal pain	4–5
Seizure	1–2

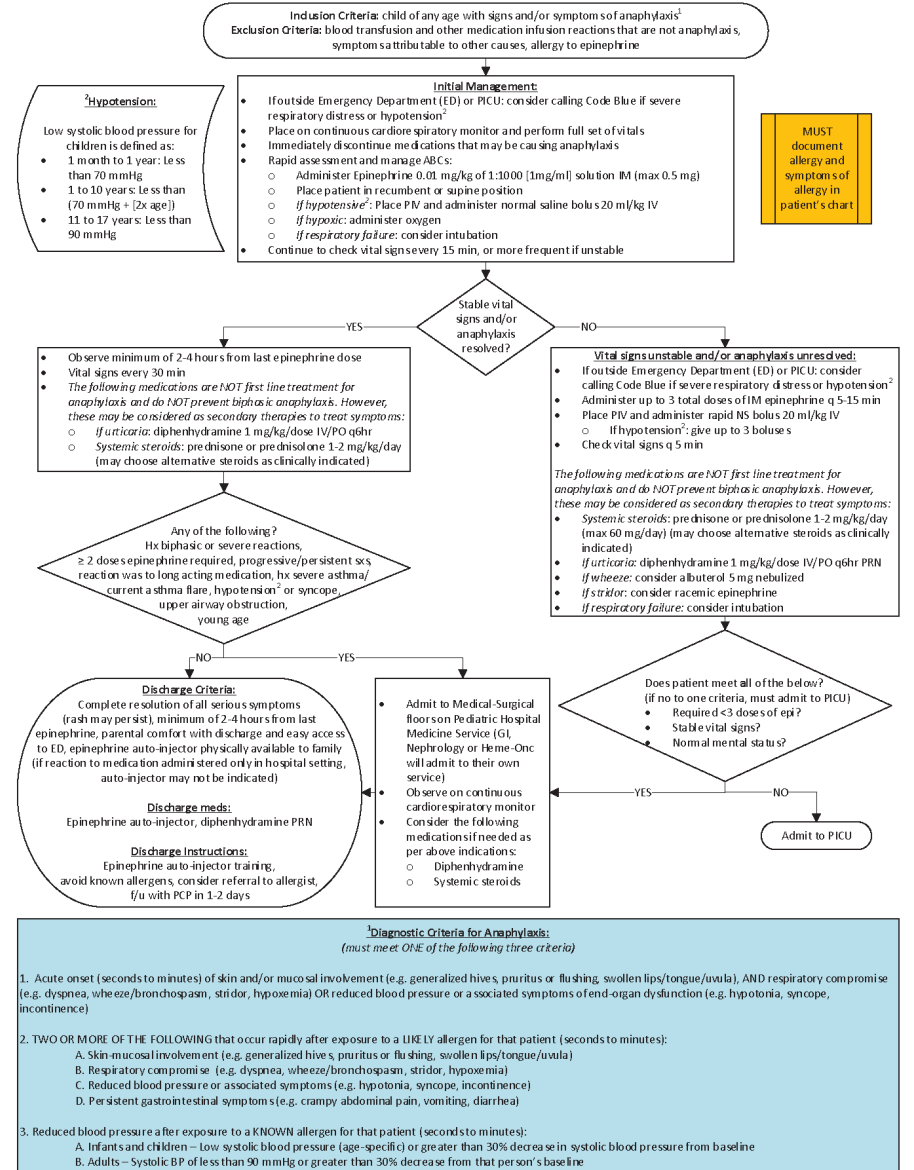
^aData were derived from the following references: Lieberman P, Nicklas R, Oppenheimer J, et al. The diagnosis and management of anaphylaxis practice parameter: 2010 update. *J Allergy Clin Immunol.* 2010;126:477–480; Wood R, Camargo CA, Lieberman P, et al. Anaphylaxis in America: results from a national physician survey. *Ann Allergy Asthma Immunol.* 2012;109 (suppl):A20; and Boyle J, Camargo CA, Lieberman P, et al. Anaphylaxis in America: results from a national telephone survey. *J Allergy Clin Immunol.* 2012;129 (suppl):AB132.

^bPercentages are approximations.

CLINICAL PATHWAY: Anaphylaxis

THIS PATHWAY
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This is the Anaphylaxis Clinical Pathway.
We will be reviewing each component in the following slides.



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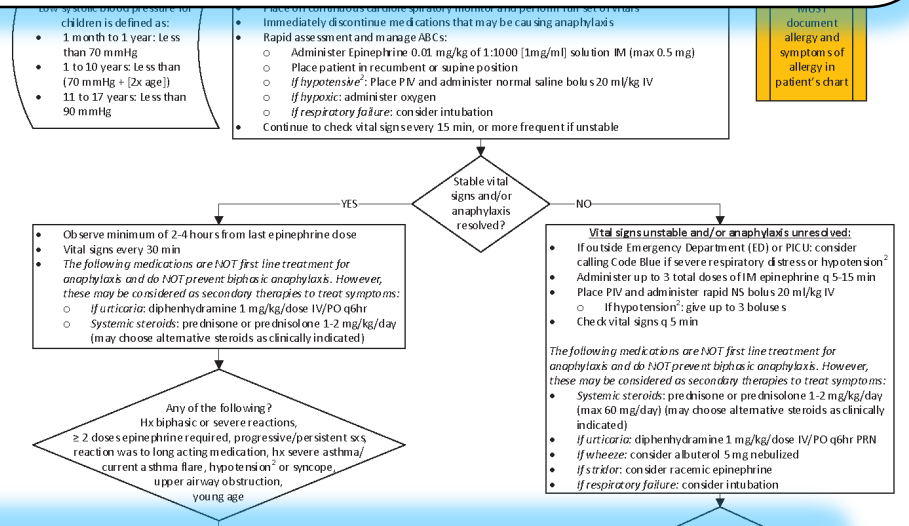
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- Inclusion criteria: Anyone with anaphylaxis should be treated per pathway
- The diagnostic criteria for anaphylaxis are from National Institute of Allergy, Immunology, and Infectious Diseases/Food Allergy and Anaphylaxis Network

Inclusion Criteria: child of any age with signs and/or symptoms of anaphylaxis¹
Exclusion Criteria: blood transfusion and other medication infusion reactions that are not anaphylaxis, symptoms attributable to other causes, allergy to epinephrine



¹Diagnostic Criteria for Anaphylaxis:
(must meet ONE of the following three criteria)

1. Acute onset (seconds to minutes) of skin and/or mucosal involvement (e.g. generalized hives, pruritus or flushing, swollen lips/tongue/uvula), AND respiratory compromise (e.g. dyspnea, wheeze/bronchospasm, stridor, hypoxemia) OR reduced blood pressure or associated symptoms of end-organ dysfunction (e.g. hypotonia, syncope, incontinence)
2. TWO OR MORE OF THE FOLLOWING that occur rapidly after exposure to a LIKELY allergen for that patient (seconds to minutes):
 - A. Skin-mucosal involvement (e.g. generalized hives, pruritus or flushing, swollen lips/tongue/uvula)
 - B. Respiratory compromise (e.g. dyspnea, wheeze/bronchospasm, stridor, hypoxemia)
 - C. Reduced blood pressure or associated symptoms (e.g. hypotonia, syncope, incontinence)
 - D. Persistent gastrointestinal symptoms (e.g. crampy abdominal pain, vomiting, diarrhea)
3. Reduced blood pressure after exposure to a KNOWN allergen for that patient (seconds to minutes):
 - A. Infants and children – Low systolic blood pressure (age-specific) or greater than 30% decrease in systolic blood pressure from baseline
 - B. Adults – Systolic BP of less than 90 mmHg or greater than 30% decrease from that person’s baseline

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Inclusion Criteria: child of any age with signs and/or symptoms of anaphylaxis¹
Exclusion Criteria: blood transfusion and other medication infusion reactions that are not anaphylaxis.

²Hypotension:
Low systolic blood pressure for children is defined as:

- 1 month to 1 year: Less than 70 mmHg
- 1 to 10 years: Less than (70 mmHg + [2x age])
- 11 to 17 years: Less than 90 mmHg

- Initial Management:**
- If outside Emergency Department (ED) or PICU: consider calling Code Blue if severe respiratory distress or hypotension²
 - Place on continuous cardiorespiratory monitor and perform full set of vitals
 - Immediately discontinue medications that may be causing anaphylaxis
 - Rapid assessment and manage ABCs:
 - Administer Epinephrine 0.01 mg/kg of 1:1000 [1mg/ml] solution IM (max 0.5 mg)
 - Place patient in recumbent or supine position
 - *If hypotensive²:* Place PIV and administer normal saline bolus 20 ml/kg IV
 - *If hypoxic:* administer oxygen
 - *If respiratory failure:* consider intubation
 - Continue to check vital signs every 15 min, or more frequent if unstable

MUST document allergy and symptoms of allergy in patient's chart

Initial Management:

- Rapid assessment and management of ABCs are key
- Do NOT delay administration of IM epinephrine, as this is the definitive first line treatment for anaphylaxis

The following medications are NOT first line treatment for anaphylaxis and do NOT prevent biphasic anaphylaxis. However, these may be considered as secondary therapies to treat symptoms:

- *If urticaria:* diphenhydramine 1 mg/kg/dose IV/PO q6hr
- *Systemic steroids:* prednisone or prednisolone 1-2 mg/kg/day (may choose alternative steroids as clinically indicated)

In ED or PICU: consider calling Code Blue if severe respiratory distress or hypotension²

- Administer up to 3 total doses of IM epinephrine q 5-15 min
- Place PIV and administer rapid NS bolus 20 ml/kg IV
 - If hypotension²: give up to 3 boluses
- Check vital signs q 5 min

The following medications are NOT first line treatment for anaphylaxis and do NOT prevent biphasic anaphylaxis. However, these may be considered as secondary therapies to treat symptoms:

- *Systemic steroids:* prednisone or prednisolone 1-2 mg/kg/day (max 60 mg/day) (may choose alternative steroids as clinically indicated)
- *If urticaria:* diphenhydramine 1 mg/kg/dose IV/PO q6hr PRN
- *If wheeze:* consider albuterol 5 mg nebulized
- *If stridor:* consider racemic epinephrine
- *If respiratory failure:* consider intubation

Any of the following?
Hx biphasic or severe reactions,
≥ 2 doses epinephrine required, progressive/persistent sx
reaction vs to long acting medication, Hx severe asthma/
current asthma flare, hypotension² or syncope,
upper airway obstruction,
young age

Discharge Criteria:
Complete resolution of all serious symptoms (rash may persist), minimum of 2-4 hours from last epinephrine, parental comfort with discharge and easy access to ED, epinephrine auto-injector physically available to family (if reaction to medication administered only in hospital setting, auto-injector may not be indicated)

Discharge meds:
Epinephrine auto-injector, diphenhydramine PRN

Discharge Instructions:
Epinephrine auto-injector training, avoid known allergens, consider referral to allergist, f/u with PCP in 1-2 days

- Admit to Medical-Surgical floor on Pediatric Hospital Medicine Service (GI, Nephrology or Heme-Onc will admit to their own service)
- Observe on continuous cardiorespiratory monitor
- Consider the following medications if needed as per above indications:
 - Diphenhydramine
 - Systemic steroids

Does patient meet all of the below? (if no to one criteria, must admit to PICU)

- Required < 3 doses of epi?
- Stable vital signs?
- Normal mental status?

YES → Discharge
NO → Admit to PICU

¹Diagnostic Criteria for Anaphylaxis:
(must meet ONE of the following three criteria)

1. Acute onset (seconds to minutes) of skin and/or mucosal involvement (e.g. generalized hives, pruritus or flushing, swollen lips/tongue/uvula), AND respiratory compromise (e.g. dyspnea, wheeze/bronchospasm, stridor, hypoxemia) OR reduced blood pressure or a associated symptoms of end-organ dysfunction (e.g. hypotonia, syncope, incontinence)
2. TWO OR MORE OF THE FOLLOWING that occur rapidly after exposure to a LIKELY allergen for that patient (seconds to minutes):
 - A. Skin-mucosal involvement (e.g. generalized hives, pruritus or flushing, swollen lips/tongue/uvula)
 - B. Respiratory compromise (e.g. dyspnea, wheeze/bronchospasm, stridor, hypoxemia)
 - C. Reduced blood pressure or associated symptoms (e.g. hypotonia, syncope, incontinence)
 - D. Persistent gastrointestinal symptoms (e.g. crampy abdominal pain, vomiting, diarrhea)
3. Reduced blood pressure after exposure to a KNOWN allergen for that patient (seconds to minutes):
 - A. Infants and children – low systolic blood pressure (age-specific) or greater than 30% decrease in systolic blood pressure from baseline
 - B. Adults – Systolic BP of less than 90 mmHg or greater than 30% decrease from that person's baseline

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It is VERY important to document any allergic reaction in the patient chart.

Document allergen AND allergic reaction associated with the exposure

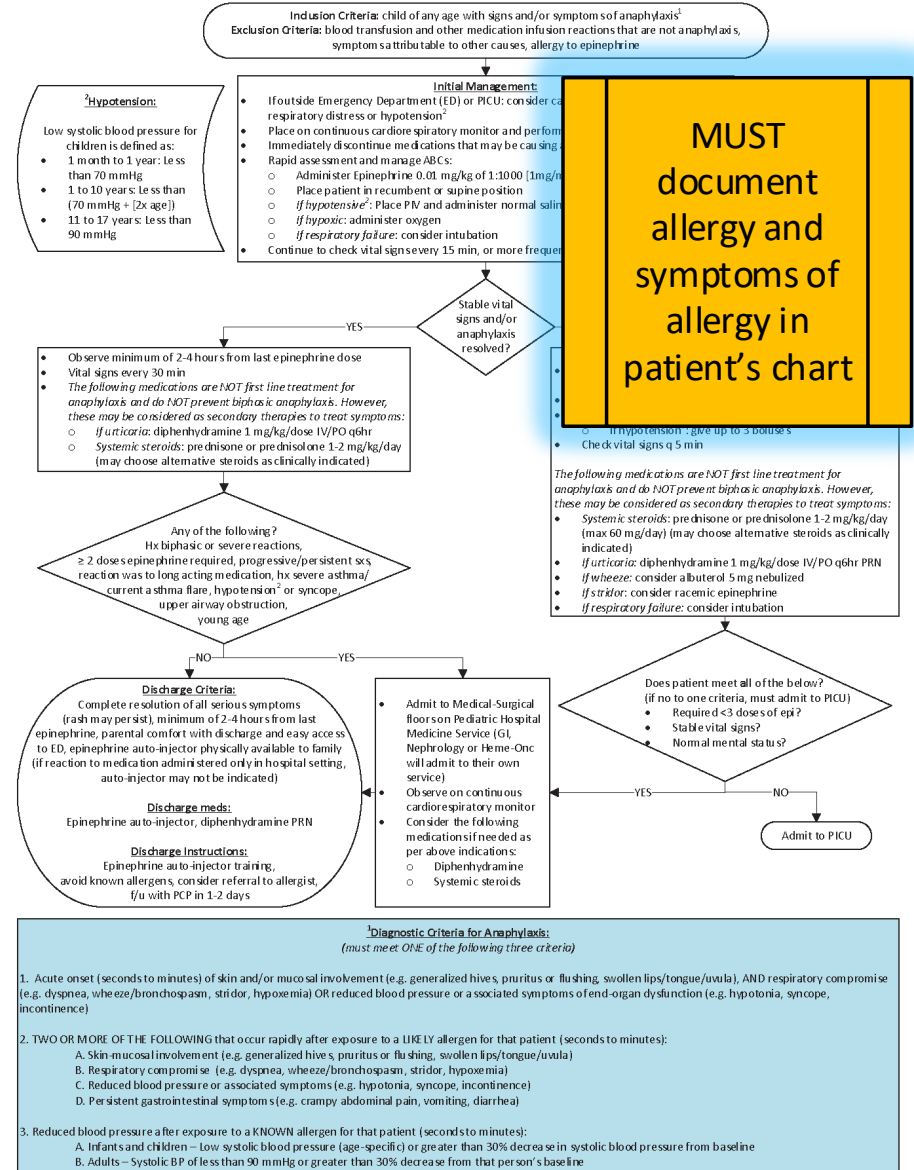
Table I-2
Essential features of history in the evaluation of a patient who has experienced an episode of anaphylaxis

A	Detailed history of ingestants (foods/drugs) taken within 6 h before the event
B	Activity in which the patient was engaged at the time of the event
C	Location of the event (home, school, work, indoors/outdoors)
D	Exposure to heat or cold
E	Any related sting or bite
F	Time of day or night
G	Duration of event
H	Recurrence of symptoms after initial resolution
I	Exact nature of symptoms (eg, if cutaneous, determine whether flush, pruritus, urticaria, or angioedema)
J	In a woman, the relation between the event and her menstrual cycle
K	Was medical care given and what treatments were administered
L	How long before recovery occurred and was there a recurrence of symptoms after a symptom-free period

From Liberman P, Nicklas RA, Randolph C, et al. Anaphylaxis - a practice parameter update 2015. *Ann Allergy Asthma Immunol.* 2015 Nov;115(5):341-84.

CLINICAL PATHWAY:
Anaphylaxis

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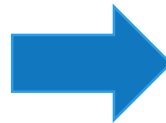
Document detailed history of allergic reaction



- MUST add allergy and specific allergic reaction to the patient chart in EPIC using the “Allergies/Contraindications” tab



- For an allergic reaction that occurs to a medication given while at Connecticut Children’s:



- Document under allergies as above
- Consider documenting by using SmartPhrase “.MEDREACTION” in event note to document details of reaction

My Note Sensitive Tag Warning

Type: Service:

Date of Service:

Cosign Required

Summary:

Medication Reaction Event Note

Medication: ***
Dose: ***
Date of Reaction: ***
Time of Reaction: ***
Signs and symptoms: ***
CT-CAE Grade: ***
Anaphylaxis (Y/N): ***
Interventions: ***wa
Infusion resumed (Y/N): ***
Infusion start time: ***
First dose (Y/N): ***

Allergies/Contraindications

Add a new agent Full Search

Choose Columns Show: Deleted Expired

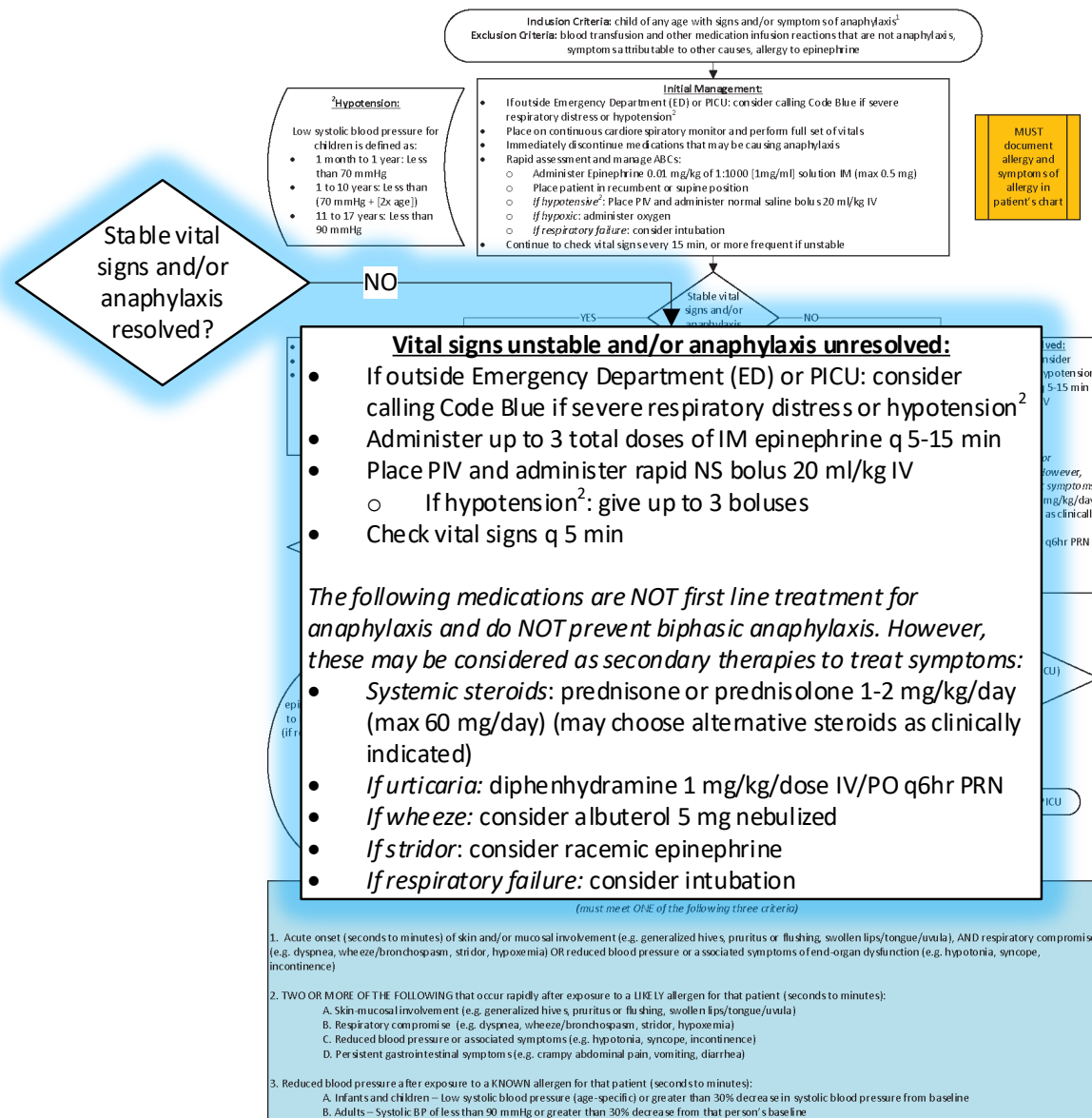
Reaction	Severity	Updated
Allergies		
Peanut		
Agent: Peanut		
Reactions: Anaphylaxis	Severity: High	Noted: 1/12/2022
Reaction Type: Food Allergy		
Comments: Stridor, hypotension, vomiting, hives		
<input type="button" value="Accept"/> <input type="button" value="Cancel"/>		
Amoxicillin	Nausea And Vomiting	Low
Noted: 6/4/2016 <input type="button" value="Past Updates"/>		

Management Continued (UNSTABLE PATIENT OR ANAPHYLAXIS UNRESOLVED):

- Must determine if symptoms/signs of anaphylaxis resolve and patient is stable or if requires repeated doses of IM
- If *unstable* at any point AND outside the Emergency Department, consider calling Code Blue if severe respiratory distress or hypotension while addressing these issues
- See next slide to learn about secondary therapies

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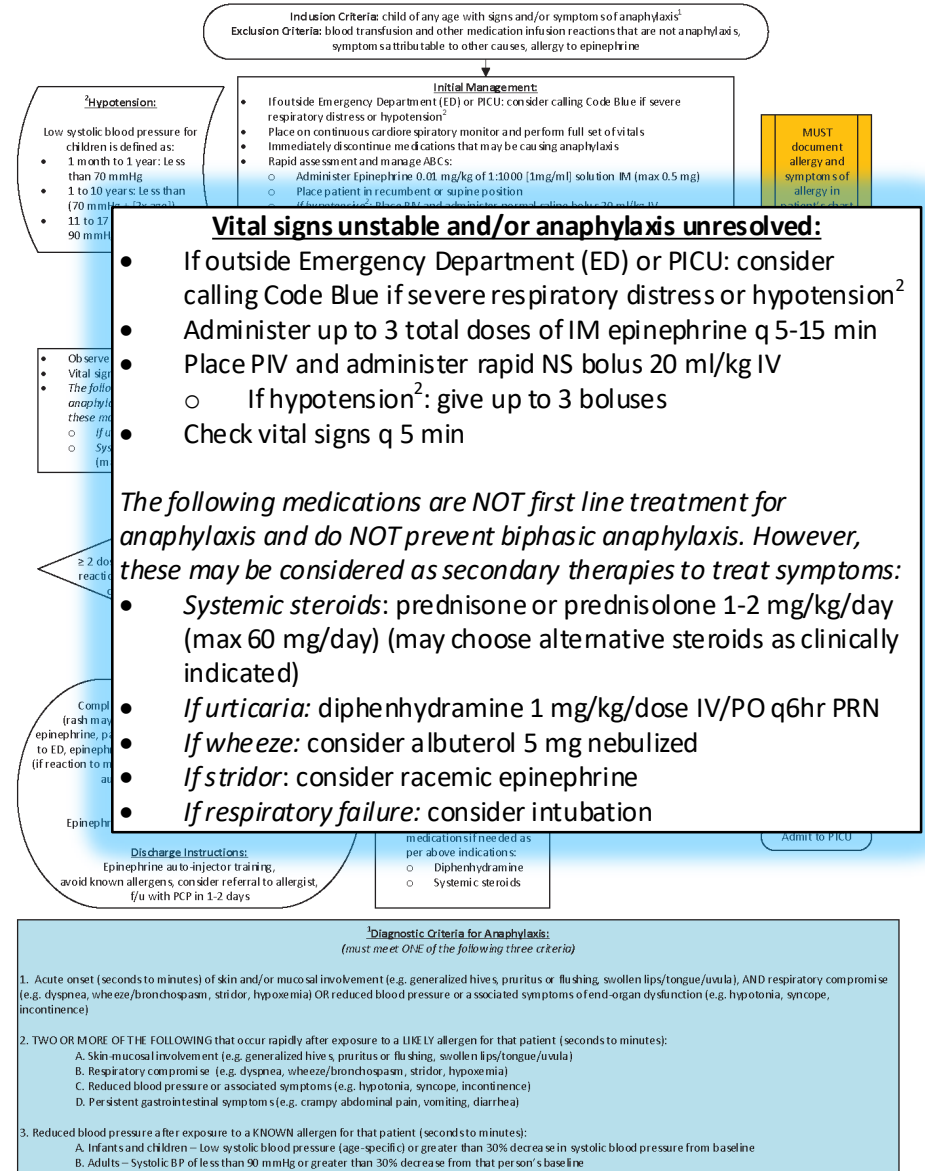
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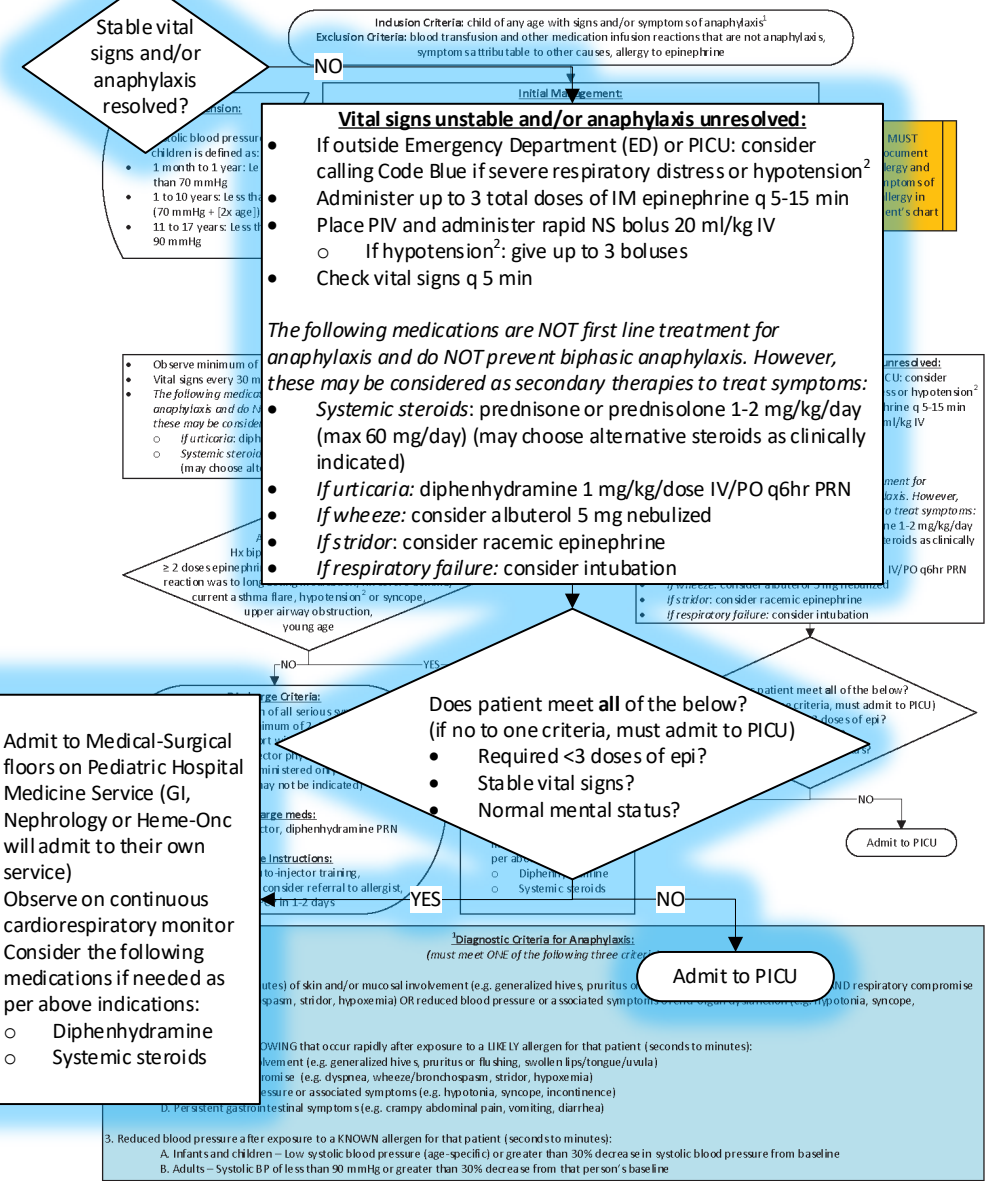
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Adjunctive or Second Line Therapies ¹⁻⁶ :

- They do NOT prevent or treat upper airway obstruction or hypotension! IM epinephrine is the first line treatment
- Antihistamines, H1 and H2 blockers, are second line, because there is no evidence to support their use in first line management of anaphylaxis – may be used symptomatically to treat pruritus/hives. These do NOT prevent biphasic or prolonged reactions
- Literature review demonstrates that systemic corticosteroids do NOT prevent biphasic or prolonged reactions. Again, may be used for symptom control/comfort in dose of 1-2 mg/kg/day
- Patients with complete resolution of symptoms after treatment with epinephrine do NOT require prescription for antihistamines or corticosteroids





Select Appropriate Disposition:

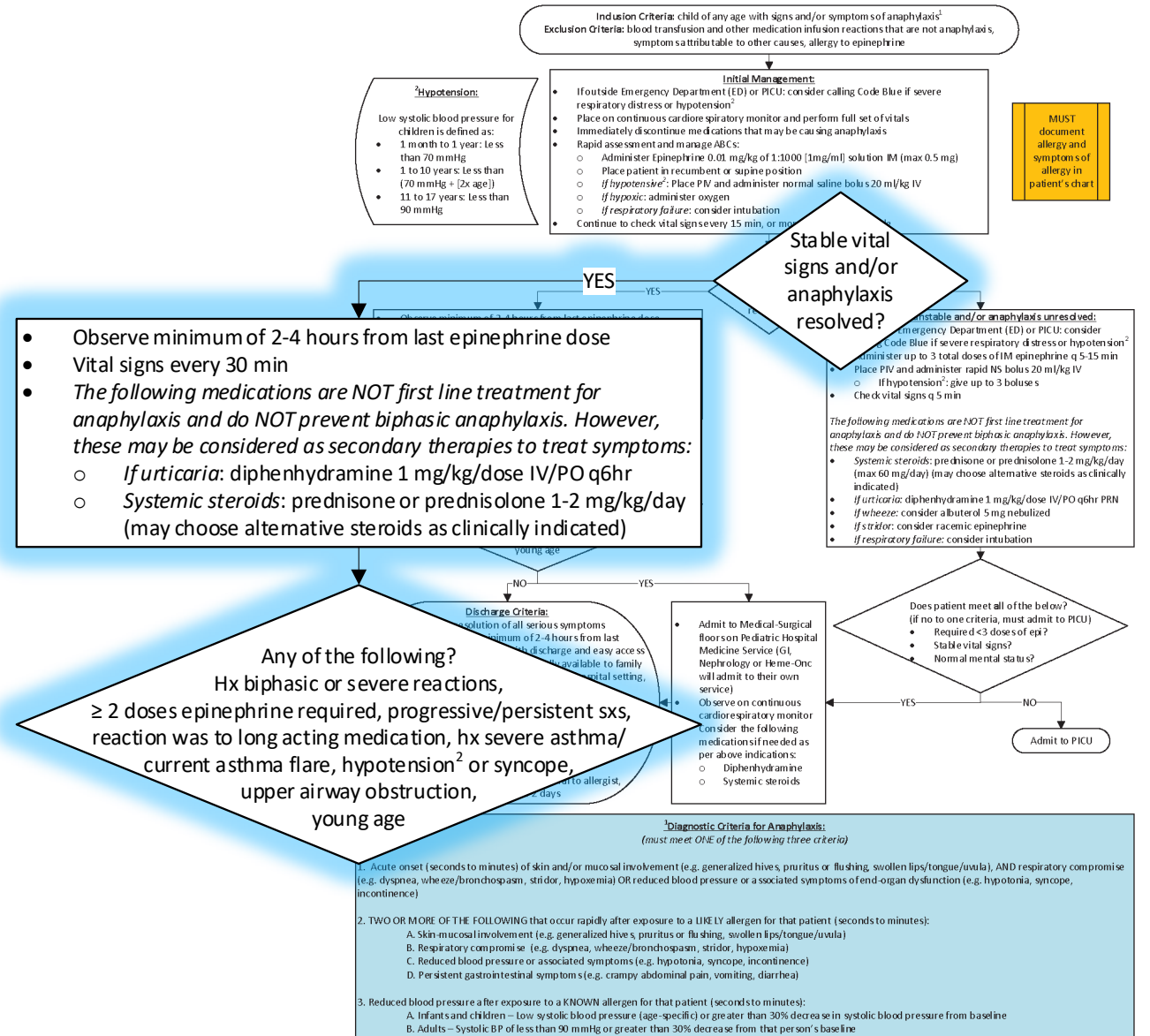
- If patient meets ALL of the following criteria, admit to the Medical-Surgical floors:
 - Required <3 doses of epi?
 - Stable vital signs?
 - Normal mental status?
 - If patient does NOT meet ALL criteria, admit to the Pediatric Intensive Care Unit (PICU)
- * Of note, the following subspecialty services will admit patients to their own service: Gastroenterology, Nephrology, Hematology Oncology. Otherwise, admit to Pediatric Hospital Medicine.*

Management Continued (STABLE PATIENT):

- If patient has *stable vital signs and/or anaphylaxis resolved*, observe for 2-4 hours from last epinephrine dose
- If NO risk factors, may discharge home
- Risk factors:
 - History biphasic or severe reactions
 - ≥ 2 doses epinephrine required
 - Progressive/persistent symptoms
 - Reaction was to long acting medication
 - History of severe asthma/current asthma flare
 - Hypotension or syncope
 - Upper airway obstruction
 - Young age

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Discharge Criteria:

- Complete resolution of all serious symptoms (rash may persist)
- Minimum of 2-4 hours from last epinephrine
- Parental comfort with discharge and easy access to ED
- Epinephrine auto-injector physically available to family (if reaction to medication administered only in hospital setting, auto-injector may not be indicated)

Discharge meds:

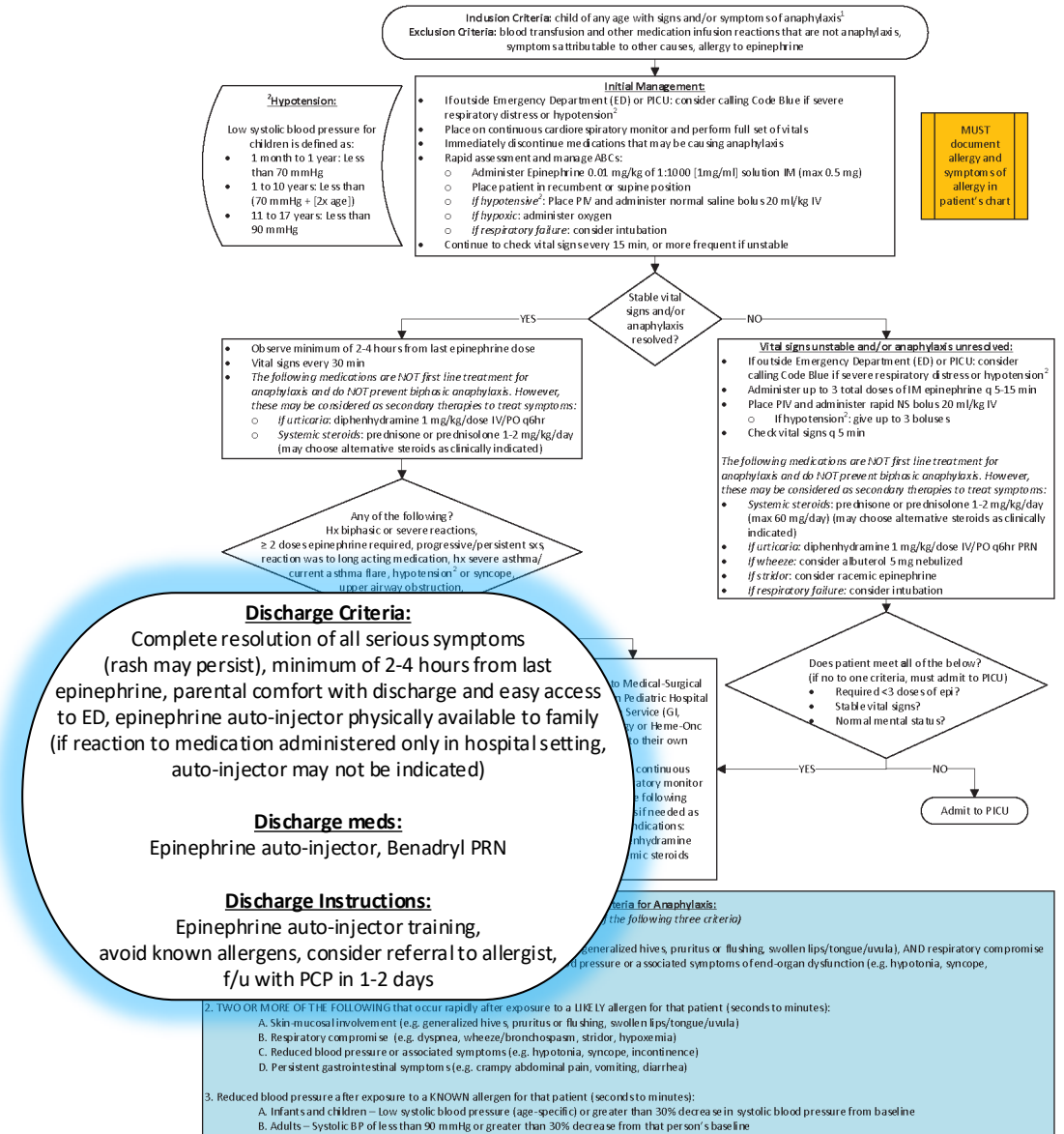
- Epinephrine auto-injector (consider dispensing at least 2)
- Diphenhydramine PRN pruritic rash

Discharge Instructions:

- Epinephrine auto-injector training
- Avoid known allergens
- Consider referral to allergist,
- F/u with PCP in 1-2 days

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Review of Key Points



- This clinical pathway serves to standardize management of anaphylaxis across the institution (ED, inpatient, clinics, etc.) and across different triggers (medications, food, environmental, etc.)
- Anaphylaxis requires rapid assessment and treatment
- The primary treatment for anaphylaxis is rapid administration of IM epinephrine
- Secondary therapies may be used for symptomatic management, but they do NOT prevent or treat upper airway obstruction or hypotension and they do NOT prevent biphasic or prolonged reactions
- Documentation of allergic reactions, including details of the specific reaction and severity should occur in a standardized manner

Quality Metrics



- Percentage of patients with utilization of pathway order set
- Time from reaction (if in a clinic or hospitalized) or time from arrival to ED to administration of epinephrine (if not already given prior to arrival)
- Percentage of patients on pathway with documentation of allergy AND reaction in chart
- Number of patients discharged from the ED who return within 72 hours and 7 days

Pathway Contacts



- Hematology/Oncology
 - Katie Lord, BSN, Natalie Bezler, MD
- Hospital Medicine
 - Ilana Waynik, MD
- Emergency Medicine
 - Eric Hoppa, MD

References



1. Campbell RL, Li J, Nicklas RA, Sadosty AT. Emergency department diagnosis and treatment of anaphylaxis: a practice parameter. *Ann Allergy Asthma Immunol*. 2014 Dec;113(6):599-608.
2. Choo KJ, Simons E, Sheikh A. Glucocorticoids for the treatment of anaphylaxis: Cochrane systematic review. *Allergy*. 2010 Oct;65(10):1205-11.
3. Lieberman P. Biphasic anaphylactic reactions. *Ann Allergy Asthma Immunol*. 2005 Sep;95(3):217-26.
4. Liberman P, Nicklas RA, Randolph C, et al. Anaphylaxis - a practice parameter update 2015. *Ann Allergy Asthma Immunol*. 2015 Nov;115(5):341-84.
5. Shaker MS, et al. Anaphylaxis – a 2020 practice parameter update, systematic review, and Grading of Recommendations, Assessment, Development and Evaluation (GRADE) analysis. *J Allergy Clin Immunol*. 2020 April;145(4):1082-1123.
6. Sheikh A, Ten Broeck V, Brown SG, Simons FE. H1-antihistamines for the treatment of anaphylaxis: Cochrane systematic review. *Allergy*. 2007 Aug;62(2):830-7.

Thank You!



About Connecticut Children's Clinical Pathways Program

The Clinical Pathways Program at Connecticut Children's aims to improve the quality of care our patients receive, across both ambulatory and acute care settings. We have implemented a standardized process for clinical pathway development and maintenance to ensure meaningful improvements to patient care as well as systematic continual improvement. Development of a clinical pathway includes a multidisciplinary team, which may include doctors, advanced practitioners, nurses, pharmacists, other specialists, and even patients/families. Each clinical pathway has a flow algorithm, an educational module for end-user education, associated order set(s) in the electronic medical record, and quality metrics that are evaluated regularly to measure the pathway's effectiveness. Additionally, clinical pathways are reviewed annually and updated to ensure alignment with the most up to date evidence. These pathways serve as a guide for providers and do not replace clinical judgment.