Diagnosis and Management of Anaphylaxis

Anaphylactic Reaction present?

Two or more of the following that occur after exposure to a likely allergen for that patient: (occurring within minutes to hours of exposure):

a. Involvement of the skin or mucosal tissue
b. Respiratory compromise
c. Reduced BP or associated symptoms
d. Persistent GI tract symptoms

OR Acute onset of A AND either B or C even without known exposure

OR Reduced BP after exposure to a known allergy trigger

If at any time anaphylaxis recurs, give IM EPINEPHrine IMMEDIATELY!

Assess ABCs

EPINEPHrine (1mg/1mL) IM

Remove trigger, if possible

Good clinical response?

Yes

Risk factors for biphasic reaction or fatal anaphylaxis?

Yes

Consider prolonged observation3

Symptoms Resolved
No Biphastic Reaction
No Other Indication for Admission?

No

Risk factors for biphasic reaction or fatal anaphylaxis?

No

Good clinical response?

Yes

Hypotension/Shock Present?

Yes

Maintain supine position*
IV fluids: 0.9% NaCl
Vasopressors
- Consider EPINEPHrine IV
- Second line: Dopamine
Glucagon if patient on beta-blocker
Consider glucocorticoid**
Antihistamine for symptom control**

No

ADMIT

No

Repeat IM EPINEPHrine q5-15 minutes
Airway/O2/IV/cardiac monitor
Albuterol if bronchospasm present6

No

EpiPen/EpiPen Jr. Twinpack Rx
- Instructions on EpiPen use – how and when to use3
- If pediatric, ensure correct discharge dose
Follow up with PCP +/- allergist

Asymptomatic Observation Period2

- In most patients consider up to 3-4 hours
- If quick resolution, good transportation, strong support available if discharged, can consider discharge in 1 hour

Disposition decision

If Discharge:

No

Yes

Consider second line therapy
- H1 & H2 antihistamines**
- Glucocorticoid**
- Albuterol

No

No Biphasic Reaction
No Other Indication for Admission?

This guideline was ratified by the emergency department faculty at Maine Medical Center in October 2021. It reflects our expert opinion and is not necessarily applicable to all institutions. It is intended to be a reference for clinicians caring for patients and is not intended to replace providers’ clinical judgment. Produced by Kate Zimmerman, DO, & Russell Behmer, MD

Preferred Epinephrine route: IM>IV>IOinhaled, sublingual, endotracheal3

Epinephrine (1:1000) IM: 0.01 mg/kg per dose
Adult max per dose: 0.5 mg
Child1 max per dose: 0.5 mg

Epinephrine (1:10,000 to 1:100,000 dilution5) IV ( Never give 1:1000 IV)
**Should only be considered during cardiac arrest or to profoundly hypotensive patients who have failed to respond to IV volume replacement and several IM doses of epinephrine.
Adult: 1 - 10 mcg/min
Child: 0.1 – 10 mcg/kg/min

Albuterol: 2.5-5 mg in 3mL NaCl

Glucagon: given IV over 5 minutes (follow with 5-15 mcg/min infusion)3
Adult: 1-5 mg
Child: 20-30 mcg/kg; max dose 1 mg

H1-antihistamine Diphenhydramine q6h
All Ages: 1 mg/kg; max per dose 50 mg IV
H2-antihistamine: No clear evidence for one medication or dosage3
Glucocorticoid: Some evidence for methylprednisolone 1-2mg/kg IV, but no clear benefit of one glucocorticoid vs another or one dosage vs another3

*Supine position unless respiratory distress w/o hypotension (upright) or pregnant (left side)3
**Glucocorticoids have reduced length of hospitalization in pediatric patients3, and antihistamines can help with itching, but neither have been shown to reduce risk for biphasic reaction and are not routinely recommended4

Risk factors for biphasic reaction:
- Multiple epi doses
- Prior biphasic rxn or severe anaphylaxis
- Hypotension on presentation
- Severe wheezing
- Mast cell disease
- Wide pulse pressure
- Drug trigger if pediatric

Risk factors for fatal anaphylaxis if discharged2:
- Lack of access to EMS
- Lack of access to epi
- Poor self-management (includes some adolescents)
- Cardiovascular comorbidity
- Asthma

Drug Doses3

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If at any time anaphylaxis recurs, give IM EPINEPHrine IMMEDIATELY!
Diagnosis and Management of Anaphylaxis

Definition of Anaphylactic Reaction:
Anaphylactic Reaction present (should capture more than 95% of cases of anaphylaxis): Must fulfill one of the following criteria (occurring within minutes to hours of exposure):

1. Acute onset of an illness with involvement of the skin, mucosal tissue, or both (80% of cases). AND AT LEAST 1 OF THE FOLLOWING:
   a. Respiratory compromise
   b. Reduced BP or associated symptoms of end-organ dysfunction
2. Two or more of the following that occur rapidly after exposure to a likely allergen for that patient:
   a. Involvement of the skin or mucosal tissue (may be absent in 20% of children with food or insect sting allergy)
   b. Respiratory compromise
   c. Reduced BP or associated symptoms
   d. Persistent GI tract symptoms
3. Reduced BP after exposure to known allergen for that patient:
   a. Infants and children: low systolic BP or >30% decrease in systolic BP
   b. Adults: systolic BP <90 mmHg or > 30% decrease from that person’s baseline.

<table>
<thead>
<tr>
<th>Weight</th>
<th>IM Epinephrine (1:1000) AutoInjector Doses in Children</th>
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<tbody>
<tr>
<td>&gt;60kg</td>
<td>0.5mg if available; if not, 0.3 mg (EpiPen)</td>
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<tr>
<td>30-60kg</td>
<td>0.3mg (EpiPen)</td>
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<tr>
<td>15-29kg</td>
<td>0.15 mg (EpiPen Jr.)</td>
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<tr>
<td>7.5-14kg</td>
<td>0.1 mg if available</td>
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Of note, the above represent manufacturer label recommendations. In-hospital suggested anaphylaxis dosing would be 0.01mg/kg. So for a patient weighing 28kg prescribed the EpiPen Jr (0.15mg), they would only receive about 53% of their recommended dose. Some recommend giving 0.3mg dosing to patients from 25kg-60kg, and giving 0.15mg dosing to all patients over 7.5kg, especially if these patients have had a history of severe anaphylaxis. Ultimately, there is not definitive evidence supporting one dosing strategy vs another.

References & Recommended Readings:


Guideline Evidence

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<tr>
<th>Guideline Topic:</th>
<th>Diagnosis and Management of Anaphylaxis</th>
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<tr>
<td>Author:</td>
<td>Kate D. Zimmerman, DO &amp; Russell Behmer, MD</td>
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<td>Date of Creation:</td>
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<td>Databases:</td>
<td>Ovid, PubMed, Cochrane Database, National Guidelines Clearinghouse</td>
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<tr>
<td>Key Guidelines (Dates)</td>
<td>NIAID/FAAN 2005; EAACI 2014</td>
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<tr>
<th>#</th>
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<tr>
<td>1</td>
<td><strong>Definition of Anaphylaxis</strong></td>
<td>NIAID/FAAN 2005¹</td>
<td>Panel Consensus</td>
<td>IV (Agency for Healthcare Policy and Research Classification)</td>
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<tr>
<td></td>
<td>1) Sampson HA et al. Second symposium on the definition and management of</td>
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<td></td>
<td>anaphylaxis: summary report – Second National Institute of Allergy and</td>
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<td></td>
<td>Infectious Disease/Food Allergy and Anaphylaxis Network Symposium. J Allergy</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Clin Immunol 2006;¹117:391-7. (NIAID/FAAN)</td>
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<td></td>
<td>2)Lieberman, P et al. The diagnosis and management of anaphylaxis: An</td>
<td>JTFFP²</td>
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<td></td>
<td>Joint Task Force on Practice Parameters (JTFPP)</td>
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<tr>
<td></td>
<td>Fernández Rivas, A. F. Santos, et al. “Anaphylaxis: Guidelines from the</td>
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<tr>
<td></td>
<td>European Academy of Allergy and Clinical Immunology.” Allergy 69, no. 8 (2014):</td>
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<tr>
<td></td>
<td>1026–45. [<a href="https://doi.org/10.1111/all.12437">https://doi.org/10.1111/all.12437</a>. (EAACI)]</td>
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## Diagnosis and Management of Anaphylaxis

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<td>Observation period (due to risk of biphasic reaction).</td>
<td>JTFPP 2005; NIAID/FAAN 2005; Liu X et al; Lee S et al.12</td>
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<td>Pediatric Anaphylaxis Management.</td>
<td>Farbman K13</td>
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