Anaphylactic Reactions

Objectives (1 of 2)

At the conclusion of this presentation, the participant shall be able to:

- Describe the pathophysiology of an allergic reaction and an anaphylactic reaction
- Define allergens and antigens
- List the routs an allergen can enter the body
- List and describe the signs/symptoms of an allergic reaction and an anaphylactic reaction

Objectives (2 of 2)

- List and describe the signs/symptoms of an allergic reaction and an anaphylactic reaction
- Describe the appropriate assessment for patients suffering allergic reactions
- Describe the treatment for allergic reactions as indicated by the SPEMS Protocols at the participant's certification level
- List and describe the dosages, routes, and indications for epinephrine according to the SPEMS Protocols

Introduction

- An **allergic reaction** is a hypersensitivity reaction.
  - Normally a local condition that only affects one area of body (skin is most common)
- An **anaphylactic reaction** (anaphylaxis) is a severe, life-threatening allergic reaction.
  - A delay in treatment can result in death.
  - A systemic condition that affects body systems (respiratory, cardiac, etc.)

Allergic and Anaphylactic Reactions (1 of 2)

- The immune system responds to foreign substances called **antigens**.
- **Allergens** are a type of antigen that can provoke a reaction in some people.
- The response of the immune system upon exposure to an antigen is to produce **antibodies**.
- This immune response typically occurs with little or no allergic reaction.

Allergic and Anaphylactic Reactions (2 of 2)

- The body can produce immunoglobulin E (IgE) in response to allergens which can trigger an immune system response
- An excessive immune system response to an allergen is called an **allergic reaction**.
- Occasionally there is a severe, life-threatening **anaphylactic reaction**.

Pathophysiology of an Allergic Reaction

- An excessive response to an allergen is an allergic reaction.
- A severe, systemic immune response to an allergen is called an anaphylactic reaction.
- Chemicals released by the body in anaphylaxis cause airway swelling, bronchoconstriction, and vasodilation.
- Again, most allergic reactions are NOT life threats and do not require Epinephrine

KEY POINT!!

- Not all allergic reactions result in anaphylaxis.
- Allergic reactions and anaphylaxis are NOT treated the same
- Careful but rapid assessment MUST be performed to determine if there is a life threat!

Routes of Allergen Entry Into the Body

Allergens may enter the body through:

- Injection: by punctures through skin
  - Bites, stings, needles, etc.
  - Usually most rapid onset and most severe
- Ingestion: by swallowing
  - Most common route
- Inhalation: through the lungs
- Contact (absorption): through the skin

Common Types of Allergens (1 of 2)

- Insects:
  - From bees, vespids (yellow jacket, wasp, hornet) and stinging ants (fire ants)
- Foods
  - Seafood allergies are common
- Pollen
  - From blooming plants, flowers, etc.
- Medications
  - Aspirin, penicillin, sulfa drugs are very common

Common Types of Allergens (2 of 2)

- Plants
  - Poison ivy and poison oak
- Weather conditions
  - Dust, moisture, etc
- Latex
- Many other substances such as glue, hair dye, blood, etc.

Assessment Based Approach to Anaphylactic Reactions

Scene Size Up

- Anaphylactic reaction is often apparent because of the characteristic signs and symptoms.
- In the scene size-up, be aware of dangers, such as wasps and bees.
  - Protect yourself first
- The type of setting and medications at the scene can provide clues.

Primary Assessment (1 of 5)

- General impression may be malaise, general discomfort, or sense of impending doom.
- Mental status may be alert to unresponsive.
- High risk of airway obstruction.
- Stridor/crowing indicate upper airway swelling.
- Wheezing may be prominent.

Primary Assessment (2 of 5)

- Airway adjuncts will not bypass laryngeal edema.
  - AirQ-3 airway will NOT prevent the airway from swelling shut
  - Intubation or cricothyrotomy may be required in extreme cases
- Positive pressure ventilation may needed.
- Administer oxygen as indicated.
- Ventilations may be difficult from increased airway resistance.

Primary Assessment (3 of 5)

- The pulse may be weak and rapid.
- There may be edema, and the skin may be red and warm or cyanotic.
- Hives and itching are characteristic.

Localized Angioedema to the Tongue from an Anaphylactic Reaction

Hives (Urticaria) from an Allergic Reaction to a Penicillin-Derivative Drug

Hives from a Food Allergy

(© Edward T. Dickinson, M D)

Primary Assessment (4 of 5)

Signs and symptoms include:

- Rhinitis: (runny, itchy, stuffy nose)
- Tachycardia
- Pruritus (itching)
- Faintness
- Urticaria (Hives)

Primary Assessment (5 of 5)

Signs and symptoms include (cont'd):

- Edema: may include skin, face, lips, or tongue
- Warm, flushed or pale skin
- Agitation or anxiousness

Secondary Assessment (1 of 7)

- For the history of the present illness, use OPQRST
  - Time is critical—generally, the more quickly the reaction develops, the more severe it will be.
- SAMPLE
  - History of previous reactions?
    - If so, how severe?
  - Prescribed Epi auto injector?

Secondary Assessment (2 of 7)

Determine the following:

- Are signs and symptoms consistent with anaphylaxis?
- Are signs and symptoms mild, moderate, or severe?
  - Hypotensive? Dyspnea present?
- Are signs and symptoms getting worse or better?

Secondary Assessment (3 of 7)

Determine the following (cont'd):

- Any other medications taken?
- What medications is the patient taking? Any new medications?
- Does the patient have other illnesses?

Secondary Assessment (4 of 7)

Determine the following (cont'd):

- When did the patient last eat or drink? What did he recently eat or drink?
- Activities prior to onset of the reaction?
- Was the patient exposed to anything that could have caused the reaction?

Secondary Assessment (5 of 7)

Physical Exam: Look at the Following:

- Skin for itching, rashes, flushing, swelling of face, lips, neck
- Respiratory System for dyspnea, wheezing, stridor, crowing, tachypnea
- Cardiovascular System for tachycardia, hypotension, irregular pulse, absent radial pulses

Secondary Assessment (6 of 7)

Physical Exam: Look at the Following (cont'd):

- Central Nervous System for anxiety, light-headedness, AMS, seizures, headache
- Gastrointestinal & Genitourinary Systems for N/V/D, abdominal cramping, incontinence
- Generalized Signs and Symptoms for itchy watery eyes, running nose, weakness, feeling of impending doom

Secondary Assessment (7 of 7)

Obtain baseline vital signs:

- Hypotension may be present if reaction is severe
- Respirations may be fast and labored.
- Wheezing may be heard without a stethoscope.
- The pulse may be rapid and weak.

Emergency Medical Care (1 of 4)

- Distinguish between a systemic and a local reaction.
  - Local reactions rarely require significant treatment
  - Systemic reaction may be life threatening
- Treatment depends on this distinction.

Emergency Medical Care (2 of 4)

Two key categories of signs and symptoms:

- Airway and respiratory compromise
- Shock (Hypotension)

Indicators of a Severe Systemic Anaphylactic Reaction

- Acute onset (minutes to several hours) with involvement of skin, mucosal tissue, or both (hives, itching, flushing, redness, edema to face, lips, and tongue)
- **AND**
- Signs or symptoms of respiratory distress (e.g., dyspnea, wheezing, stridor, and S p O_2 <94%)
- **AND/OR**
- Signs or symptoms of poor perfusion or hypotension

Emergency Medical Care (3 of 4)

- Maintain a patent airway; airway adjuncts may not be effective.
- Suction secretions.
- Administer oxygen
- Be prepared to provide positive pressure ventilation.

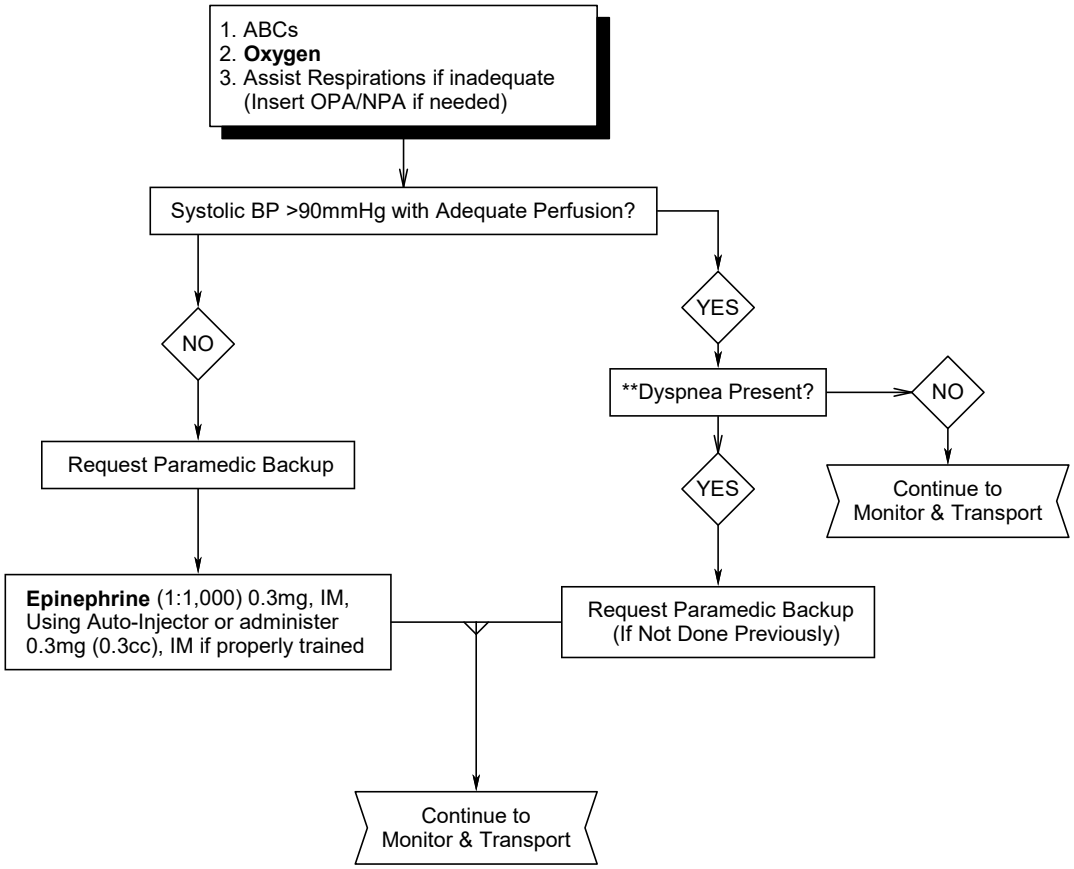
Emergency Medical Care (4 of 4)

- If BLS, consider requesting ALS.
  - If airway swells to the point of total obstruction, the patient my suffocate
  - Paramedics can intubate or perform a cricothyrotomy
- Consider epinephrine according to protocol.
- Consider Benadryl according to protocol
- Initiate rapid transport early; especially if the reaction is systemic.

Review of SPEMS
Allergic Reaction Protocols

ALLERGIC REACTION*

ECA



*Request Paramedic Backup
For All Pt's With Bee Stings

If severe dyspnea is present that is not relieved by **Oxygen and **Epinephrine** not previously given consider contacting medical control for use of **Epinephrine** (1:1,000) 0.3mg (0.3cc) **IM** if properly trained.

PEDIATRIC DOSE

- **Epinephrine**, 0.15mg, IM, Using Auto-Injector or
- **Epinephrine**, (1:1,000), 0.01mg/kg to a max of 0.15mg (0.15cc) IM, if properly trained

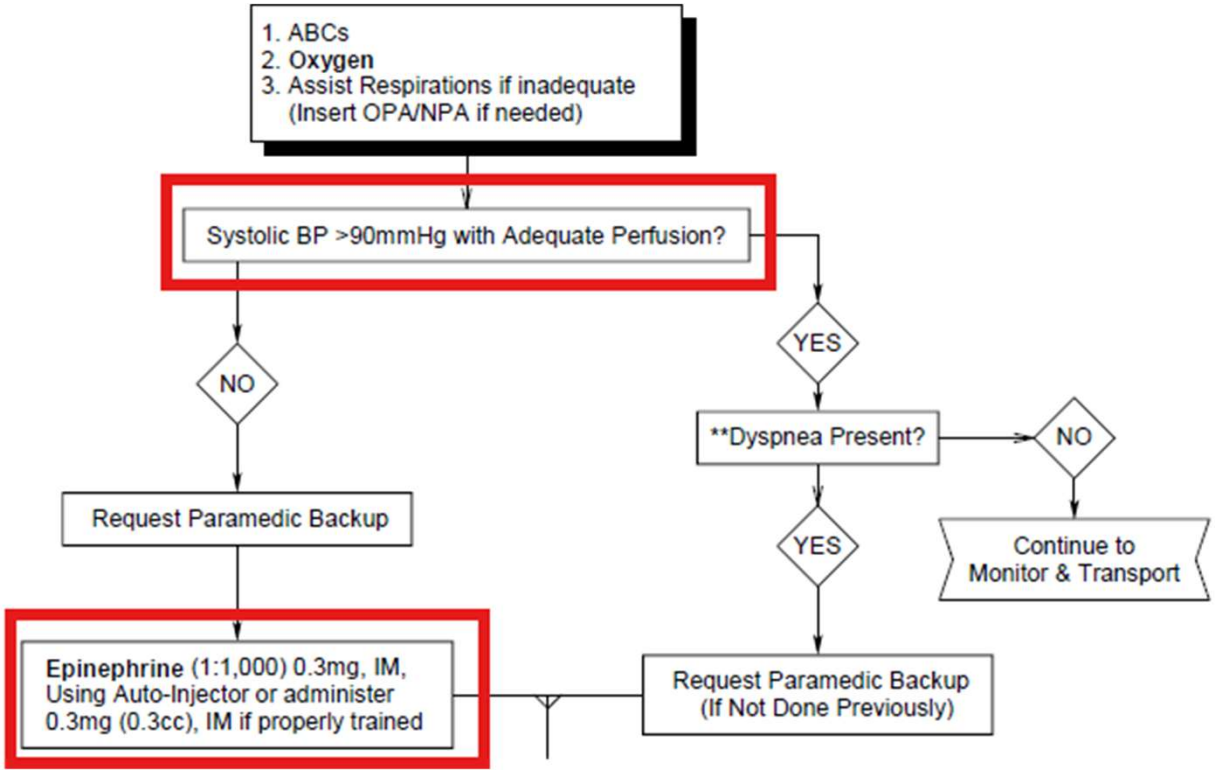
IF PATIENT'S CONDITION IS UNSTABLE OR DETERIORATES DURING TRANSPORT, REQUEST ASSISTANCE FROM RECEIVING AREA'S ADVANCED LIFE SUPPORT SERVICE.

Key Points on SPEMS ECA Protocol (1 of 2)

- Apply Oxygen IMMEDIATELY
  - Don’t wait to load or complete assessment
- Contact Paramedic Backup if hypotensive or dyspnea is present
- ECA’s must use Epi Auto-Injectors unless properly trained (and documented) on IM injections

Key Points on SPEMS ECA Protocol (1 of 2)

- Systolic BP MUST be below 90mmHg before Epinephrine can be administered without orders



ALLERGIC REACTION*

EMT-Basic

*Request Paramedic Backup For All Pt's With Bee Stings

If minor reaction, consider **Benadryl**, 50mg PO if patient is conscious and able to follow commands.

Highest certified crewmember must maintain control of patient care and document the call on the PCR

1. ABCs
2. **Oxygen**
3. Assist Respirations if inadequate (Insert OPA/NPA if needed)
4. If appropriate consider Air-Qsp3G Airway

Systolic BP >90mmHg with Adequate Perfusion?

NO

Request Paramedic Backup

Epinephrine (1:1,000) 0.3mg, IM, Using Auto-Injector or administer 0.3mg (0.3cc), IM, if properly trained

YES

Dyspnea Present?

NO → Continue to Monitor & Transport

YES

** **Duo-Neb** (0.5mg Ipratropium Bromide with 3mg Albuterol) via nebulizer. may be repeated as needed if improvement noted.

***Signs & Symptoms Relieved?

YES → Continue to Treat, Monitor & Transport

NO

1. **Xopenex** (optional), if available 1.25mg/3cc, HHN, repeat as needed
2. If **Xopenex** not available, repeat **Duo-Neb** (0.5mg Ipratropium Bromide with 3mg Albuterol) via HHN as needed
3. Request Paramedic Backup (If Not Done Previously)

Continue to Treat, Monitor & Transport

Generally, **Duo-Neb should be utilized as the first line drug. However, if the patient has had previous success with **Xopenex**, **Xopenex** may be administered, if available, before **Duo-Neb**

***If dyspnea not relieved and **Epinephrine** not previously given, contact medical control for use of **Epinephrine** (1:1,000) 0.3mg (0.3cc) IM, if properly trained.

PEDIATRIC DOSE

- **Epinephrine**, 0.15mg, IM, Using Auto-Injector or
- **Epinephrine**, (1:1,000), 0.01mg/kg to a max of 0.15mg (0.15cc)IM, if properly trained
- **Duo-Neb** (0.5mg Ipratropium Bromide with 3mg Albuterol), by nebulizer, dose and frequency same as adult
- **Liquid Children's Benadryl**, 1mg/kg to a max of 50mg. Patient must have a GCS of 15
- **Xopenex (optional)** 1.25mg by Nebulizer, dose and frequency same as adult

Key Points on SPEMS EMT Protocol (1 of 3)

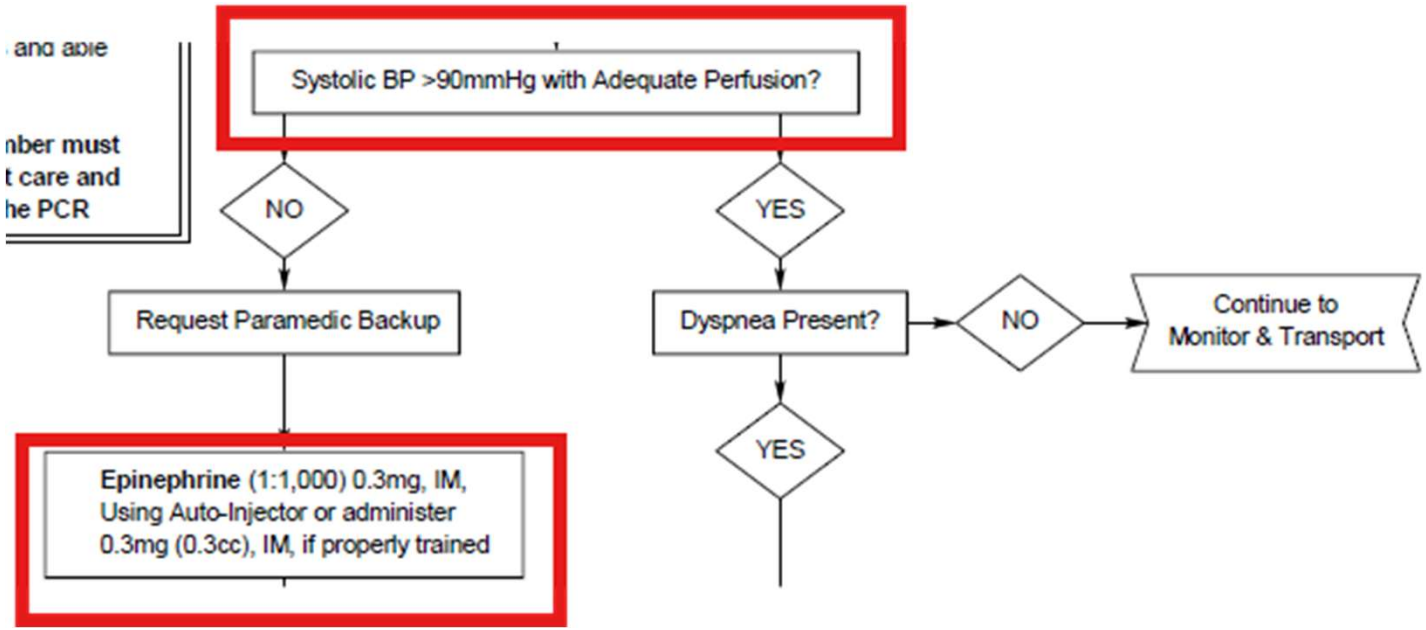
- Apply Oxygen IMMEDIATELY
  - Don’t wait to load or complete assessment
- Contact Paramedic Backup if hypotensive or dyspnea is present
- EMTs must use Epi Auto-Injectors unless properly trained (and documented) on IM injections

Key Points on SPEMS EMT Protocol (2 of 3)

- If minor reaction (localized), PO Benadryl may be given
  - If Benadryl given, the highest certified crewmember must maintain control of patient care and document the call on the PCR
  - 50mg for adult
  - 1mg/kg up to 50mg for pediatrics
- Duo-Neb should be administered as indicated

Key Points on SPEMS EMT Protocol (3 of 3)

- Systolic BP MUST be below 90mmHg before Epinephrine can be administered without orders



ALLERGIC REACTION*

Advanced EMT

^If minor reaction and unable to establish IV, consider **Benadryl**, 50mg PO if patient is conscious and able to follow commands.

Highest certified crewmember must maintain control of patient care and document the call on the PCR

1. ABCs
2. **Oxygen**
3. Assist Respirations if inadequate (Insert OPA/NPA if needed)
4. IV, **NS**, TKO

* Request paramedic backup immediately for all patients with bee stings that have shortness of breath or BP < 90mmHG.

Systolic BP >90mmHg with Adequate Perfusion?

NO

IV, **NS**, Infuse Fluid to Obtain Systolic BP >90mmHg

Epinephrine (1:1,000), 0.3mg, IM, Using Auto-Injector or administer 0.3mg (0.3cc), IM, if properly trained

Benadryl 50mg, IV

***Signs & Symptoms Relieved?

NO

1. **Xopenex** (optional), if available 1.25mg/3cc, HHN, repeat as needed
2. If **Xopenex** not available, repeat **Duo-Neb** (0.5mg Ipratropium Bromide with 3mg Albuterol) via HHN as needed
3. Request Paramedic Backup (If Not Done Previously)

YES

Continue to Treat, Monitor & Transport

YES

Benadryl 50mg, IV^

Dyspnea Present?

NO

Continue to Treat, Monitor & Transport

YES

1. Monitor Waveform Capnography
2. ** **Duo-Neb** (0.5mg Ipratropium Bromide with 3mg Albuterol) via nebulizer. May be repeated as needed if improvement noted.

** Generally, **Duo-Neb** should be utilized as the first line drug. However, if the patient has had previous success with **Xopenex**, **Xopenex** may be administered, if available, before **Duo-Neb**

*** If dyspnea not relieved and **Epinephrine** not previously given, contact medical control for use of **Epinephrine** (1:1,000) 0.3mg (0.3cc) IM if properly trained.

PEDIATRIC DOSE

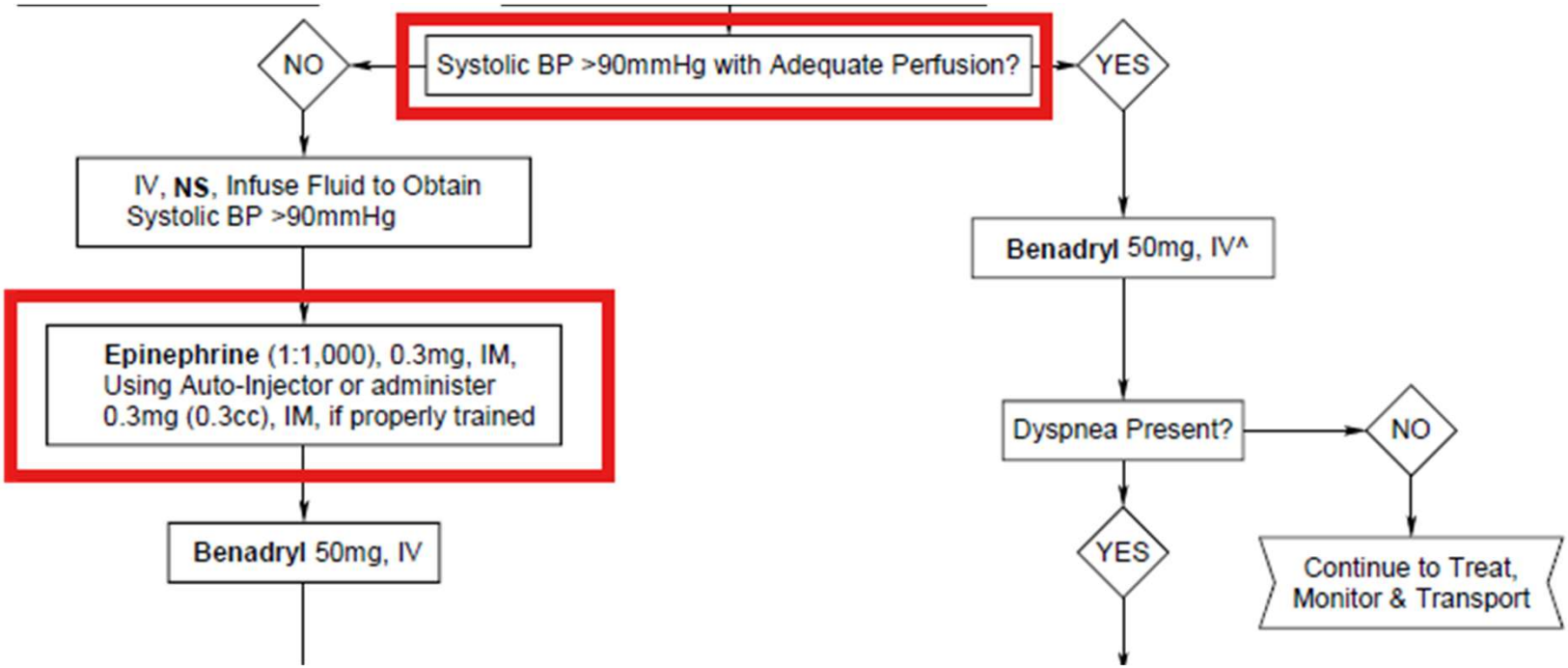
- **Epinephrine**, 0.15mg, IM, Using Auto-Injector or
- **Epinephrine**, (1:1,000), 0.01mg/kg to a max of 0.15mg (0.15cc), IM, if properly trained
- **Duo-Neb** (0.5mg Ipratropium Bromide with 3mg Albuterol), by nebulizer, dose and frequency same as adult
- **Benadryl** 1mg/kg, IV to max of 50mg
- **Liquid Children's Benadryl**, 1mg/kg to a max of 50mg. Patient must have a GCS of 15
- **Xopenex (optional)**, 1.25mg via nebulizer, dose and frequency same as adult

Key Points on SPEMS AEMT Protocol
(1 of 4)

- Apply Oxygen IMMEDIATELY
  - Don’t wait to load or complete assessment
- Establish IV of NS
  - TKO if SBP is above 90
  - W/O if SBP below 90 to obtain SBP > 90
- Waveform capnography must be applied if dyspnea is present

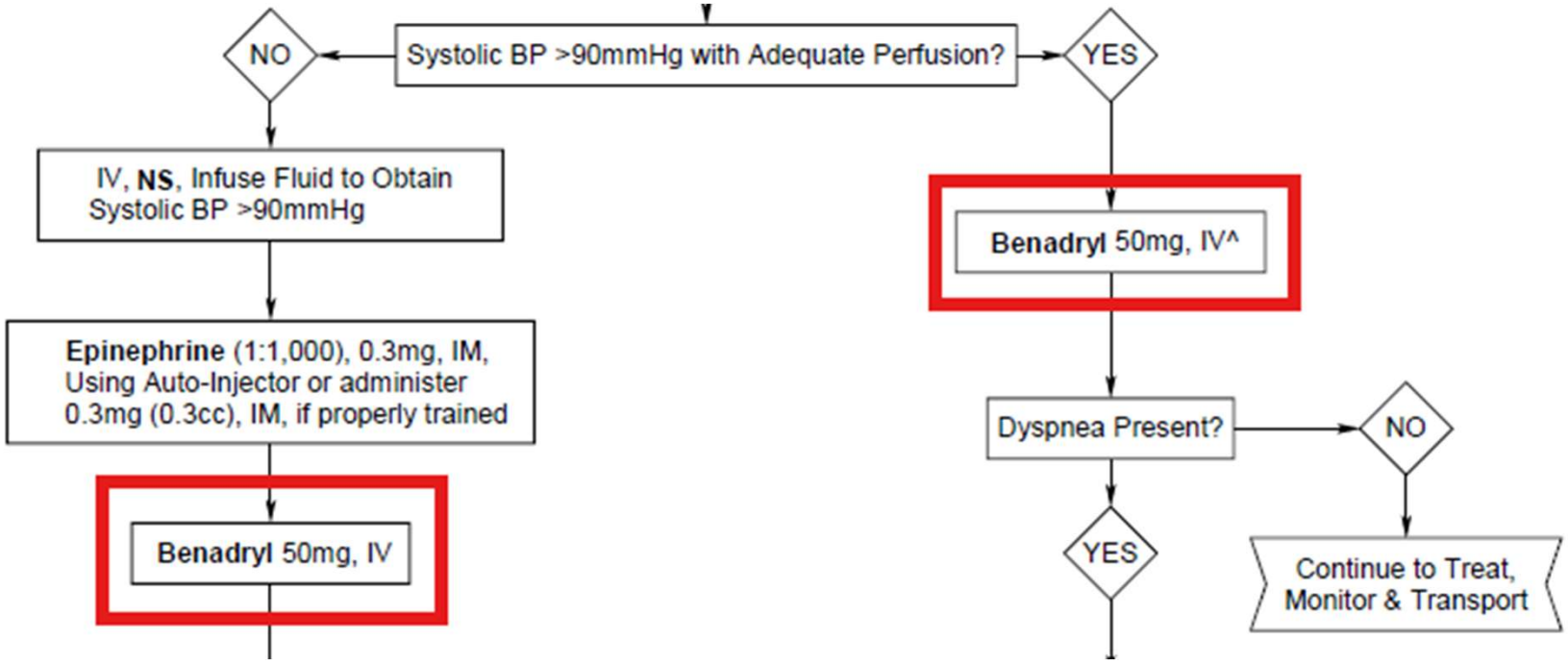
Key Points on SPEMS AEMT Protocol
(2 of 4)

- Systolic BP MUST be below 90mmHg before Epinephrine can be administered without orders



Key Points on SPEMS AEMT Protocol
(3 of 4)

- Benadryl IV should be given as initial drug if BP is > 90mmHg and AFTER Epi if BP is < 90mmHg



Key Points on SPEMS AEMT Protocol
(4 of 4)

- If minor reaction (localized), PO Benadryl may be given
  - If Benadryl given, the highest certified crewmember must maintain control of patient care and document the call on the PCR
  - 50mg for adult
  - 1mg/kg up to 50mg for pediatrics
- Duo-Neb should be administered as indicated

ALLERGIC REACTION*

EMT-Paramedic

* Administer **Decadron** 20mg, IV, to a Patients with Bee Stings

#If IV/IO is unobtainable after failed attempts, Administer **Epinephrine 1:1,000,** 0.3mg IM

1. ABCs
2. **Oxygen**
3. Assist Ventilations if Respirations Inadequate (Insert OPA/NPA if needed)
4. Monitor EKG
5. IV, **NS**, TKO

Systolic BP >90mmHg with Adequate Perfusion?

NO

1. Run IV to Obtain Systolic BP >90mmHg
2. **Benadryl**, 50mg, IV

Patient Conscious?

YES

Epinephrine (1:10,000), 0.2mg, IV#; Repeat Dose x1 in 3-5 Minutes if Needed

NO

Epinephrine (1:10,000), 0.5mg, IV

YES

Benadryl 50mg, IV^

^If minor reaction and unable to establish IV, consider **Benadryl**, 50mg PO if patient is conscious and able to follow commands.

Paramedic must maintain control of patient care and document the call on the PCR

Dyspnea Present?

NO

Continue to Treat, Monitor & Transport

YES

1. Monitor Waveform Capnography
** 2. **Duo-Neb** (0.5mg Ipratropium Bromide with 3mg Albuterol) via nebulizer. May be repeated as needed if improvement noted.
3. **Decadron** 20mg, IV ***

Signs & Symptoms Relieved?

NO

1. **Xopenex** (optional), if available 1.25mg/3cc, HHN, repeat as needed
2. If **Xopenex** not available, repeat **Duo-Neb** (0.5mg Ipratropium Bromide with 3mg Albuterol) via HHN as needed

YES

Continue to Treat, Monitor & Transport

** Generally, **Duo-Neb** should be utilized as the first line drug. However, if the patient has had previous success with **Xopenex**, **Xopenex** may be administered, if available, before **Duo-Neb**

*** If dyspnea not relieved contact medical control for use of **Epinephrine(1:1,000)** 0.3mg (0.3cc), IM

PEDIATRIC DOSE

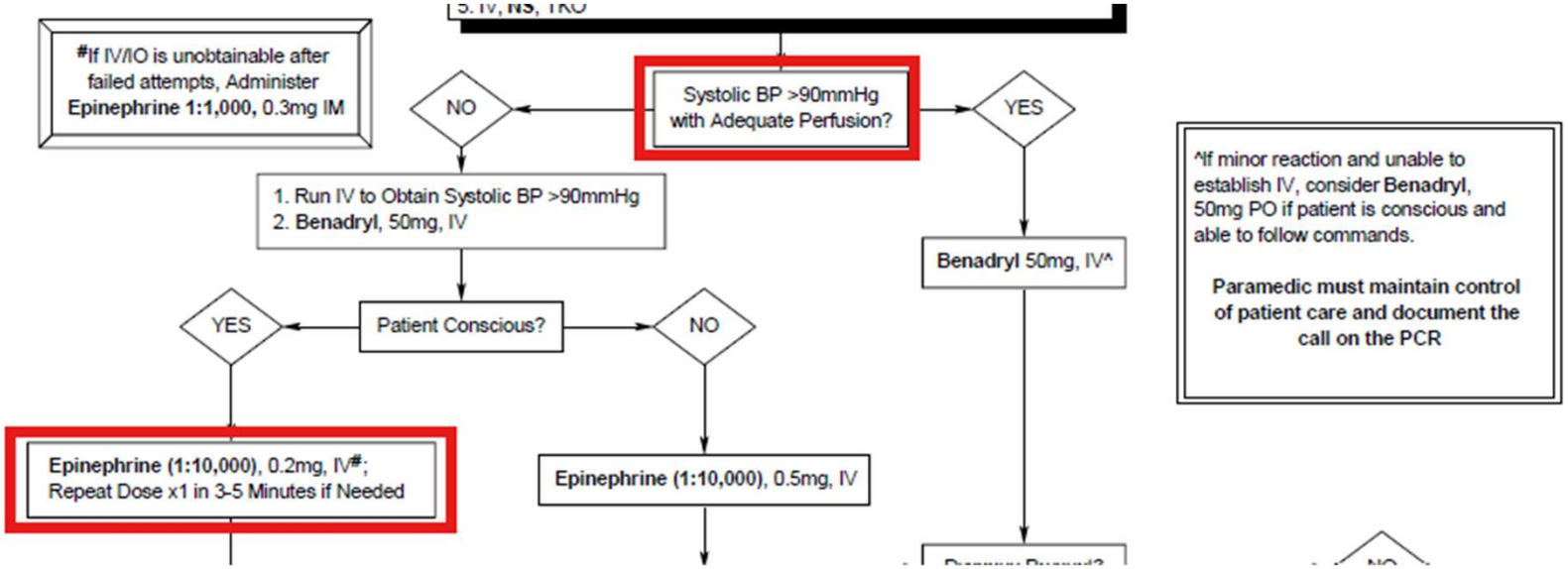
- **Epinephrine (1:10,000)**, 0.01mg/kg, IV to a max of 0.5mg(5cc) **(Administer only if evidence of Shock is present)**
- **Epinephrine (1:1,000)**, 0.01mg/kg, to a max of 0.15mg (0.15cc), IM
- **Benadryl** 1mg/kg, IV to a max of 50mg
- **Liquid Children's Benadryl,** 1mg/kg to a max of 50mg. Patient must have GCS of 15
- **Decadron** 0.6mg/kg to a max of 20mg, Do not administer **Decadron** to patients < 2 years of age.
- **Duo-Neb** (0.5mg Ipratropium Bromide with 3mg Albuterol), by nebulizer, dose and frequency same as adult
- **Xopenex (optional)**, 1.25mg via nebulizer, same dose and frequency as adult

Key Points on SPEMS Paramedic Protocol
(1 of 5)

- Apply Oxygen IMMEDIATELY
  - Don’t wait to load or complete assessment
- Establish IV of NS
  - TKO if SBP is above 90
  - W/O if SBP below 90 to obtain SBP > 90
- Waveform capnography must be applied if dyspnea is present

Key Points on SPEMS Paramedic Protocol
(2 of 5)

- Systolic BP MUST be below 90mmHg before Epinephrine can be administered without orders
- Paramedics generally Administer Epi 1:10,000 (not 1:1,000) IV push

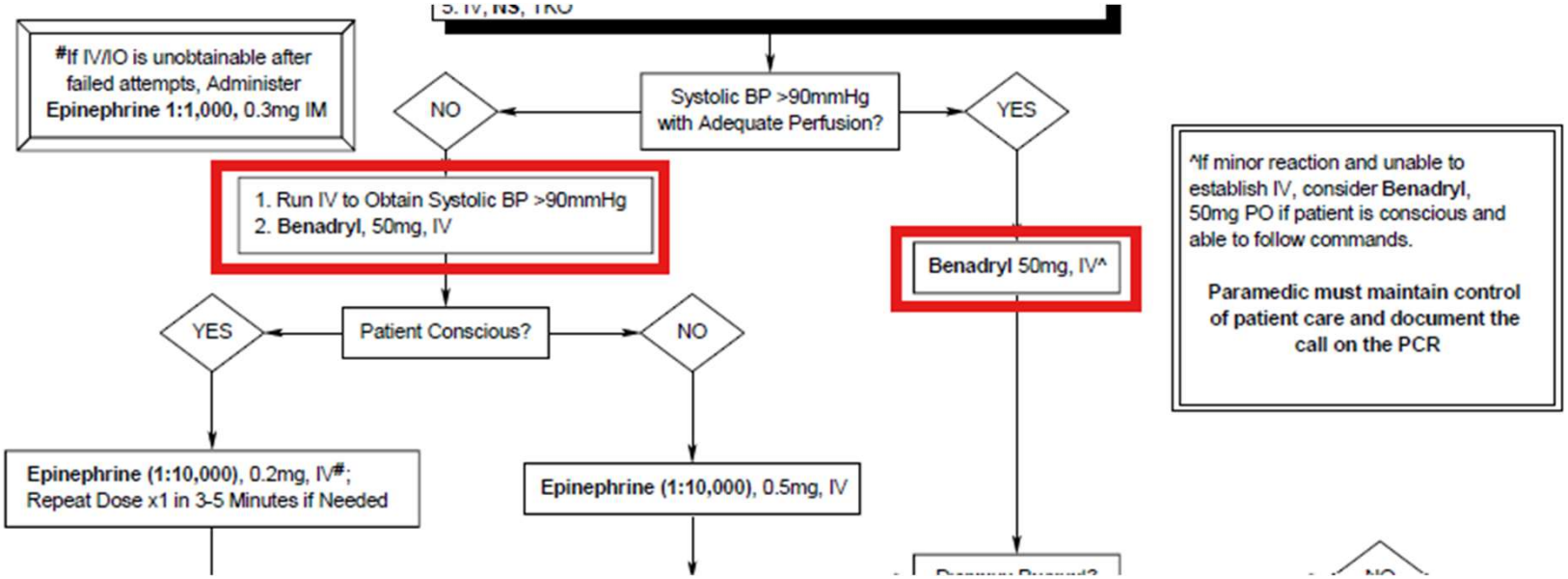


Key Points on SPEMS Paramedic Protocol
(3 of 5)

- If IV/IO is unobtainable after failed attempts, Administer Epinephrine 1:1,000, 0.3mg IM
- Again, the preferred concentration is 1:10,000 IV push
- CAUTION: Epinephrine 1:1,000 should NEVER be given IV push (IM only)

Key Points on SPEMS Paramedic Protocol
(4 of 5)

- Benadryl IV should be given as initial drug if BP is > 90mmHg and AFTER Epi if BP is < 90mmHg



Key Points on SPEMS Paramedic Protocol
(5 of 5)

- If minor reaction (localized), PO Benadryl may be given
  - If Benadryl given, the Paramedic must maintain control of patient care and document the call on the PCR
  - 50mg for adult
  - 1mg/kg up to 50mg for pediatrics
- Duo-Neb and Decadron should be administered as indicated

SPEMS Epinephrine Dosages and Routes
(1 of 2)

For ECAs, EMTs and AEMTs:

- The Adult dose of Epinephrine 1:1,000 is 0.3mg (0.3cc) given IM
  - Or 1 Adult Ep-Pen
- Pediatric dose is 0.01mg/kg to a max of 0.15mg given IM
  - Or 1 Epi-Pen Jr.
- Epinephrine cannot be repeated without online medical direction

SPEMS Epinephrine Dosages and Routes
(2 of 2)

For Paramedics:

- Epinephrine 1:10,000 is given IV push
  - If patient is conscious, the dose is 0.2mg IV
  - If patient is unconscious, the dose is 0.5mg IV push
- Epinephrine cannot be repeated without online medical direction

Side Effects of Epinephrine

- Increased heart rate
- Pale skin
- Dizziness
- Chest pain
- Headache
- Nausea and vomiting
- Excitability and anxiousness

Reassessment

- Look for indications a mild or moderate reaction is progressing.
- Monitor the effects of treatment.
- Closely monitor airway, breathing, oxygenation, and circulation.
- Reassess vital signs.

Biphasic Anaphylactic Reaction

- 20 percent of patients experiencing an anaphylactic reaction have a biphasic (or late stage) reaction.
- Initial signs/symptoms resolve, sometimes without any treatment but a second reaction occurs 4 to 6 hours afterward
- Second reaction may be life threatening
- S/S and treatment are the same

Lesson Summary

- Not all allergic reactions result in anaphylaxis.
- The pathophysiology includes airway edema, bronchoconstriction, and vasodilation.
- Care includes airway management, ventilation and oxygenation, and administration of epinephrine.
- Anaphylaxis can progress rapidly; reassess the patient frequently.