

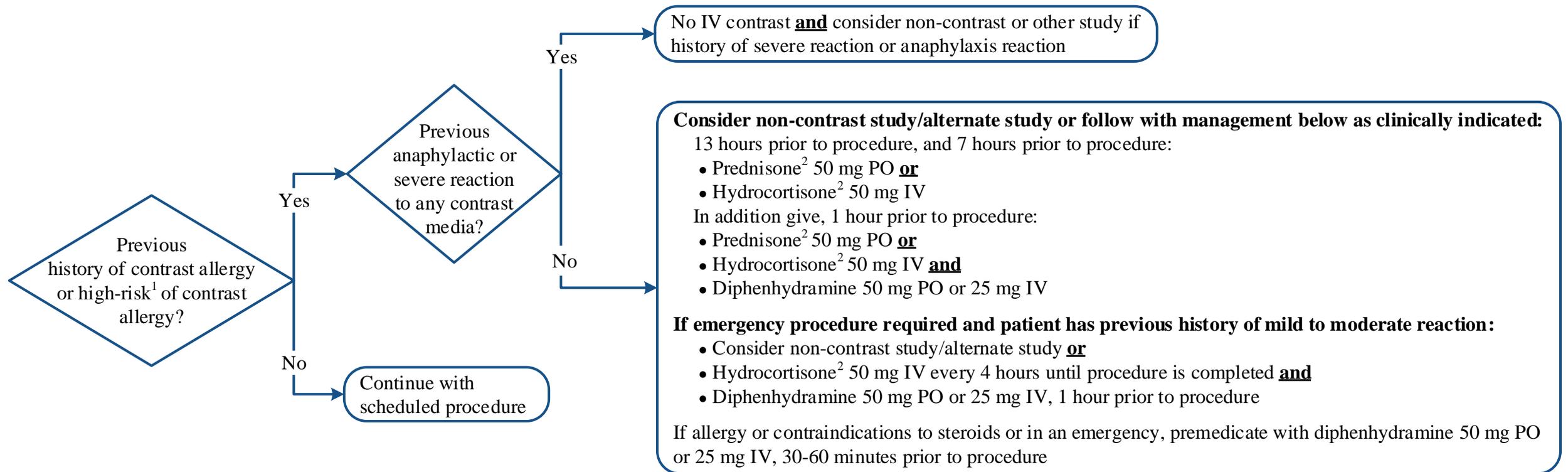
Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.

**Any signs or symptoms of HSR/allergic reaction, notify Radiologist. If patient unresponsive at any point, call a "code" as appropriate for your area.**

Note: Page 1 of this algorithm is intended for Providers; subsequent pages (2-8) are for both Providers and Nurses

## PREVIOUS HISTORY OF REACTIONS

## PROPHYLACTIC TREATMENT



**Note:** See [Appendix A](#) on Page 7 for Reaction Rebound Prevention

<sup>1</sup> High risk factors include patients with previous anaphylactic reactions

<sup>2</sup> Caution use of steroids in patients with uncontrolled hypertension, diabetes, tuberculosis, systemic fungal infections, peptic ulcer disease, neutropenic colitis or diverticulitis. If allergic, contact primary physician.

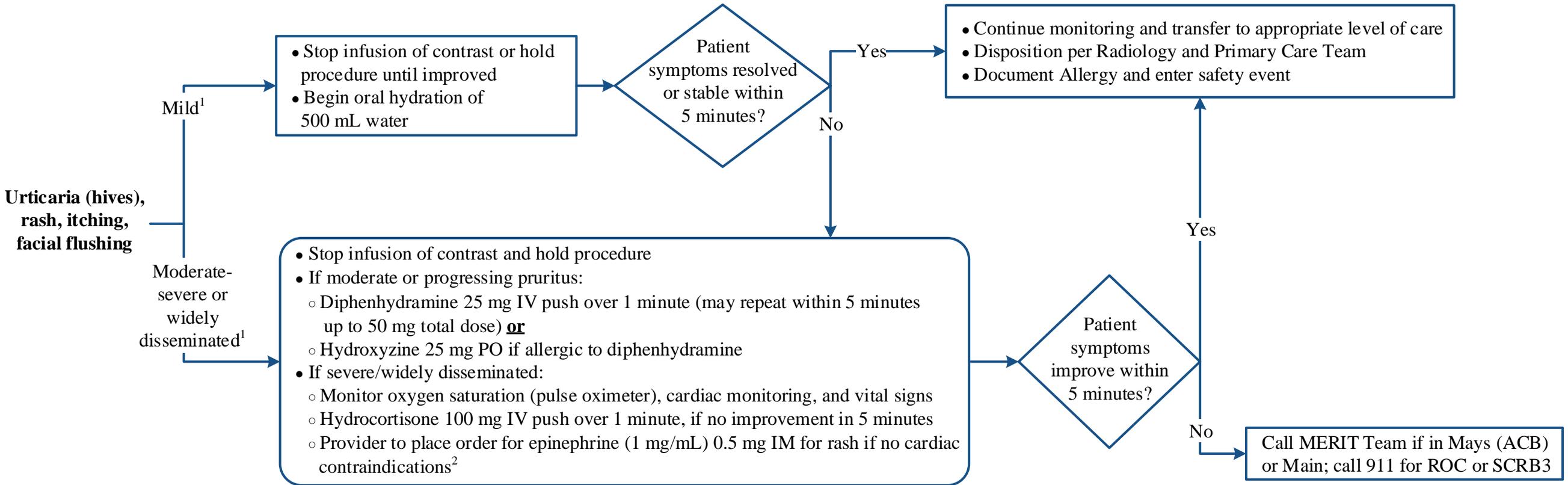
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## PRESENTING SYMPTOMS

## TREATMENT

## DISPOSITION



**Note:** See [Appendix A](#) on Page 7 for Reaction Rebound Prevention

<sup>1</sup> For Categories of Acute Reactions to Contrast Media see [Page 8](#)

<sup>2</sup> If patient on beta blockers, consult physician prior to use of epinephrine. Administer epinephrine IM into the antero-lateral mid-third portion of the thigh. Administration via IM route is preferred regardless of platelet count.

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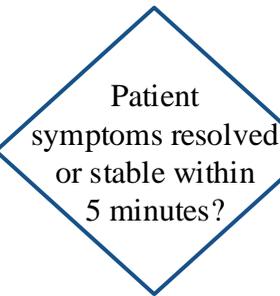
## PRESENTING SYMPTOMS

## TREATMENT

## DISPOSITION

**Hypotension<sup>1</sup> with bradycardia<sup>2</sup>/vagal reaction (responsive patient)**

- Position patient in Trendelenburg position
- Place on cardiac monitoring [EKG, oxygen saturation (pulse oximetry), heart rate], and monitor vital signs
- Initiate oxygen via non-rebreather mask at 10 L/minute and titrate up to 15 L/minute to maintain oxygen saturation  $\geq$  92%
- Give sodium chloride 0.9% (NS) 1 L IV bolus<sup>3</sup> to maintain appropriate blood pressure as clinically indicated



Yes  
 Continue monitoring and consider transfer to appropriate level of care

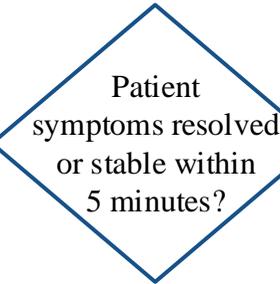
- Document allergy and enter safety event
- Disposition per Radiology and Primary Care Team

- No
- Call MERIT Team if in ACB or Main; call 911 for ROC or SCR3
  - Call provider to place order for atropine 0.5 mg IV push over 1 minute for vasovagal reaction
  - Provider to evaluate need to repeat atropine every 5 minutes up to 0.04 mg/kg or 3 mg total dose
  - Continue monitoring vital signs
  - Provider to evaluate need for additional IV fluid bolus

If no improvement, call Code Blue Team 2-7099 and transfer to higher level of care

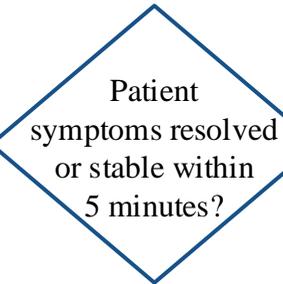
**Hypotension<sup>1</sup> with tachycardia<sup>4</sup>**

- Position patient in Trendelenburg position
- Place on cardiac monitoring [EKG, oxygen saturation (pulse oximetry), heart rate], and monitor vital signs
- Initiate oxygen via non-rebreather mask at 10 L/minute and titrate up to 15 L/minute to maintain oxygen saturation  $\geq$  92%
- Give sodium chloride 0.9% (NS) 1 L IV bolus<sup>3</sup> to maintain appropriate blood pressure as clinically indicated



Yes  
 Continue monitoring and consider transfer to appropriate level of care

- No
- Provider to evaluate and place order for epinephrine (1 mg/mL) 0.5 mg IM<sup>5</sup> if no cardiac contraindications
  - Provider to evaluate need for additional IV fluid bolus



Yes  
 Continue monitoring and consider transfer to appropriate level of care

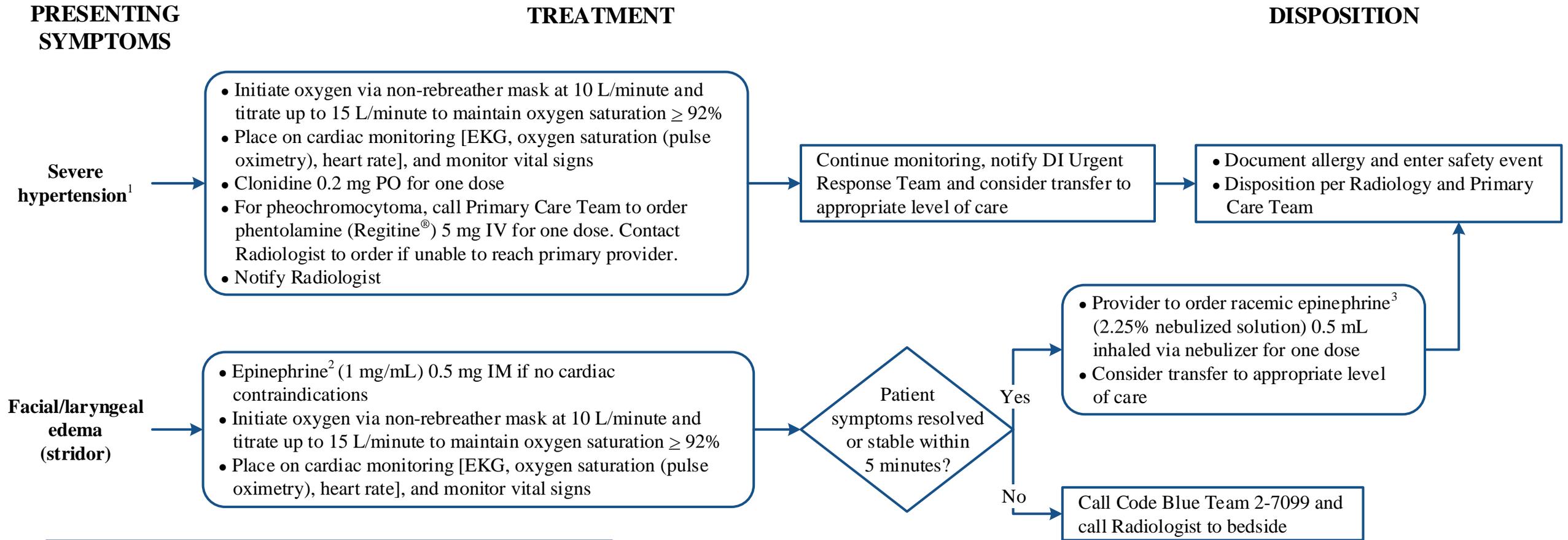
No  
 Call Code Blue Team 2-7099, and transfer to ICU

**Note:** See Appendix A on Page 7 for Reaction Rebound Prevention

<sup>1</sup> Hypotension is defined as SBP < 90 mmHg **or** a drop in SBP > 20 mmHg from baseline  
<sup>2</sup> Bradycardia is defined as HR < 50 bpm  
<sup>3</sup> Use caution pushing fluids in patients with congestive heart failure to avoid fluid overload  
<sup>4</sup> Tachycardia is defined as HR > 100 bpm  
<sup>5</sup> If patient on beta blockers, consult physician prior to use of epinephrine. Administer epinephrine IM into the antero-lateral mid-third portion of the thigh. Administration via IM route is preferred regardless of platelet count.

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**Note:** See [Appendix A](#) on Page 7 for Reaction Rebound Prevention

<sup>1</sup> Severe hypertension is defined as SBP  $\geq$  180 mmHg **and/or** DBP  $\geq$  120 mmHg

<sup>2</sup> If patient on beta blockers, consult physician prior to use of epinephrine. Administer epinephrine IM into the antero-lateral mid-third portion of the thigh. Administration via IM route is preferred regardless of platelet count.

<sup>3</sup> Nebulized agent by respiratory therapy preferred over beta agonist inhalers such as albuterol, terbutaline, and metaproterenol

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**PRESENTING SYMPTOMS**

**TREATMENT**

**Respiratory distress (responsive patient)**

- Secure airway, IV access and initiate oxygen via non-rebreather mask at 10 L/minute and titrate up to 15 L/minute to maintain oxygen saturation  $\geq 92\%$
- Call MERIT and ICU teams
- Epinephrine<sup>1</sup> (1 mg/mL) 0.5 mg IM if no cardiac contraindications
- Place on cardiac monitoring [EKG, oxygen saturation (pulse oximetry), heart rate], and monitor vital signs

Pulmonary edema as determined by provider

Provider to place order for furosemide 40 mg IV push over 2 minutes

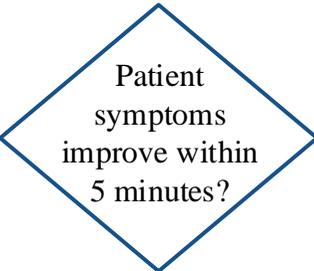


- Verify the MERIT team was contacted
- Continue monitoring and consider transfer to appropriate level of care

- Verify the MERIT team was contacted
- Call Code Blue Team 2-7099 as appropriate

Bronchospasm (wheezing) as determined by provider

- If receiving beta blockers, call Radiologist to bedside
- If not receiving beta blockers:
  - Albuterol (2.5 mg nebulized solution) 3 mL inhaled via nebulizer for one dose
  - Provider to determine need for epinephrine<sup>1</sup> (1 mg/mL) 0.5 mg IM if no cardiac contraindications; may repeat once in 5 minutes if no improvement



- Continue monitoring and provider to consider further doses of albuterol as needed
- Consider transfer to appropriate level of care
- Document allergy and enter safety event
- Disposition per Radiology and Primary Care Team

Call Code Blue Team 2-7099 and call Radiologist to bedside

**Note:** See [Appendix A](#) on Page 7 for Reaction Rebound Prevention

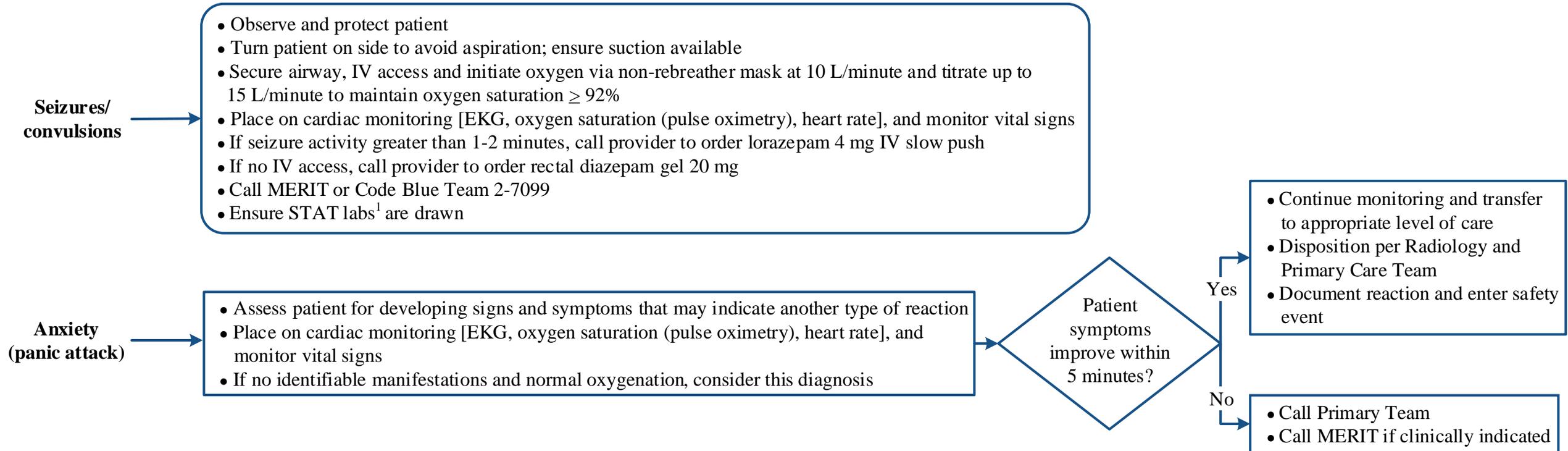
<sup>1</sup>Note to physician: If resistant to epinephrine, can use glucagon 1-5 mg IV (rapid administration of glucagon can cause GI upset - caution to maintain airway and prevent aspiration). If patient on beta blockers, consult physician prior to use of epinephrine. Administer epinephrine IM into the antero-lateral mid-third portion of the thigh; administration via IM route is preferred regardless of platelet count.

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## PRESENTING SYMPTOMS

## TREATMENT



<sup>1</sup> STAT labs: CBC, basic metabolic panel with ionized calcium, phosphorus, magnesium, and capillary blood glucose with or without venous blood gas (VBG)

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## APPENDIX A: Reaction Rebound Prevention

Drug	Recommended Dose	Daily Maximum dose
Hydrocortisone (Solu-Cortef®)	50 mg IV; administer over 1 minute every 6 hours	200 mg per day
Methylprednisolone (Solu-Medrol®)	40 mg – 125 mg IV; administer over 1 minute every 6 hours	Maximum dose depends on severity of reaction

**Note:** While IV corticosteroids may help prevent a short-term recurrence of an allergic-like reaction, they are not useful in the acute treatment of any reaction. However, these may be considered for patients having severe allergic-like manifestations prior to transportation to an emergency department or inpatient unit.

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## CATEGORIES OF ACUTE REACTIONS

### Mild Reactions

Signs and symptoms appear self-limited without evidence of progression (e.g., limited urticaria with mild pruritus, transient nausea, one episode of emesis) and include:

#### Allergic-like

Limited urticaria/pruritus  
 Limited cutaneous edema  
 Limited "itchy"/ "scratchy" throat  
 Nasal congestion  
 Sneezing/conjunctivitis/rhinorrhea

#### Physiologic

Limited nausea/vomiting  
 Transient flushing/warmth/chills  
 Headache/dizziness/anxiety/altered taste  
 Mild hypertension  
 Vasovagal reaction that resolves spontaneously

### Moderate Reactions

Signs and symptoms are more pronounced. Some of these reactions have the potential to become severe if not treated and include:

#### Allergic-like

Diffuse urticaria/pruritus  
 Diffuse erythema, stable vital signs  
 Facial edema without dyspnea  
 Throat tightness or hoarseness without dyspnea  
 Wheezing/bronchospasm without hypoxia

#### Physiologic

Protracted nausea/vomiting  
 Hypertensive urgency  
 Isolated chest pain  
 Vasovagal reaction that requires and is responsive to treatment

### Severe Reactions<sup>1</sup>

Signs and symptoms are often life-threatening and can result in permanent morbidity or death if not managed appropriately and severe reactions include:

#### Allergic-like

Diffuse edema, or facial edema with dyspnea  
 Diffuse erythema with hypotension  
 Laryngeal edema with stridor and/or hypoxia  
 Wheezing/bronchospasm with hypoxia  
 Anaphylactic shock (hypotension plus tachycardia)

#### Physiologic

Vasovagal reaction resistant to treatment  
 Arrhythmia  
 Convulsions, seizures  
 Hypertensive emergency

<sup>1</sup> Cardiopulmonary arrest is a nonspecific end-stage result that can be caused by a variety of the following severe reactions, both allergic-like and physiologic; if it is unclear what etiology caused the cardiopulmonary arrest, it may be judicious to assume the reaction is/was an allergic-like one. Pulmonary edema is a rare severe reaction that can occur in patients with tenuous cardiac reserve (cardiogenic pulmonary edema) or in patients with normal cardiac function (noncardiogenic pulmonary edema). Noncardiogenic pulmonary edema can be allergic-like or physiologic; if the etiology is unclear, it may be judicious to assume that the reaction is/was an allergic-like one.

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## SUGGESTED READINGS

American College of Radiology. (2018). Manual on Contrast Media, (Version 10.3).

American Heart Association, (2006). Vascular Access Procedure.

Simons, F. (2010). Anaphylaxis. *The Journal of Allergy and Clinical Immunology*, 125(2 Suppl 2), S161–S181. doi:10.1016/j.jaci.2009.12.981

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## DEVELOPMENT CREDITS

This practice algorithm is based on majority expert opinion of the Contrast Media Reaction Work Group Faculty at the University of Texas MD Anderson Cancer Center. It was developed using a multidisciplinary approach that included input from the following:

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