Management of Contrast Media Reactions - Adult

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 Responding Provider¹ and activate the appropriate emergency response process for your area.

PREVIOUS HISTORY OF REACTIONS²

Yes

Previous anaphylactic or severe reaction to any contrast media?

No

Continue with scheduled procedure

No IV contrast and consider non-contrast or other study if history of severe reaction or anaphylaxis reaction

PROPHYLACTIC TREATMENT

Consider⁴ non-contrast study/alternate study or follow with management below as clinically indicated:

- Regimen 1:
  - Prednisone 50 mg PO – Give 13 hours, 7 hours, and 1 hour prior to procedure and
  - Diphenhydramine 50 mg PO – Give 1 hour prior to procedure
- Regimen 2:
  - Methylprednisolone 32 mg PO – Give 12 hours and 2 hours prior to procedure and
  - Diphenhydramine 50 mg PO – Give 1 hour prior to procedure
- Regimen 3 (for patients unable to tolerate oral or inpatient):
  - Hydrocortisone 50 mg IV – Give 13 hours, 7 hours, and 1 hour prior to procedure and
  - Diphenhydramine 25 mg IV – Give 1 hour prior to procedure

If emergency procedure⁴ required and patient has previous history of mild to moderate reaction:

- Consider non-contrast study/alternate study or
- Regimen 1⁶ (preferred): Methylprednisolone 40 mg IV or hydrocortisone 200 mg IV STAT then every 4 hours until contrast medium administration. Give diphenhydramine 50 mg IV for 1 dose 1 hour prior to contrast medium administration.
- Regimen 2⁶ (alternative to patients with methylprednisolone allergy): Dexamethasone sodium sulfate 7.5 mg IV STAT then every 4 hours Until contrast medium administration. Give diphenhydramine 50 mg IV for 1 dose 1 hour prior to contrast medium administration.
- Regimen 3: Methylprednisolone 40 mg IV or hydrocortisone 200 mg IV plus diphenhydramine 50 mg IV 1 hour prior to contrast medium administration

No

Yes

¹ Appropriate provider may include: anesthesiologist, radiation oncology team, or diagnostic imaging team/radiologist
² See Appendix A for Categories of Acute Reactions to Contrast Media
³ High risk factors include patients with previous anaphylactic reactions
⁴ If the patient has an allergy to steroids and/or requires an emergency procedure, discussion between the radiologist and Primary Care Team is indicated, if feasible.
⁵ 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.
⁶ This regimen usually is 4-5 hours in duration

Note: See Appendix B for Reaction Rebound Prevention

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

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PRESENTING SYMPTOMS

- Urticaria (hives), rash, itching, facial flushing
- Moderate-severe or widely disseminated

TREATMENT

- Stop infusion of contrast and hold procedure until improved
- Give oral hydration with 500 mL water
- Patient’s symptoms resolved or stable within 5 minutes?
  - Yes: Stop infusion of contrast and hold procedure
  - No: If moderate or progressing pruritus:
    - Diphenhydramine 25 mg IV push over 1 minute (may repeat within 5 minutes up to 50 mg total dose) or
    - Hydroxyzine 25 mg PO if allergic to diphenhydramine
  - If severe/widely disseminated:
    - Monitor oxygen saturation (pulse oximeter) and vital signs
    - Hydrocortisone 100 mg IV push over 1 minute, if no improvement in 5 minutes
    - Responding Provider1 to place order for epinephrine (1 mg/mL) 0.5 mg IM for rash if no cardiac contraindications4

DISPOSITION

- Patient’s symptoms improve within 5 minutes?
  - Yes: Activate appropriate emergency response process
  - No: Continue monitoring

Note: See Appendix B for Reaction Rebound Prevention

Any signs or symptoms of HSR/allergic reaction, notify Responding Provider1 and activate the appropriate emergency response process for your area.

1 Appropriate provider may include: anesthesiologist, radiation oncology team, or diagnostic imaging team/radiologist
2 See Appendix A for Categories of Acute Reactions to Contrast Media
3 Communicate the contrast media reaction event to the Primary Care Team so that precautionary measures are considered for future scans
4 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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Any signs or symptoms of HSR/allergic reaction, notify Responding Provider¹ and activate the appropriate emergency response process for your area.

**PRESENTING SYMPTOMS**

- **Hypotension² with bradycardia³/vagal reaction (responsive patient)**
  - Position patient in Trendelenburg position
  - Monitor vital signs
  - Initiate oxygen via non-rebreather mask at 10 L/minute and titrate up to 15 L/minute to maintain oxygen saturation ≥ 92%
  - Give sodium chloride 0.9% (NS) 1 L IV bolus⁴ to maintain appropriate blood pressure as clinically indicated

**TREATMENT**

- Activate appropriate emergency response process
- Continue monitoring

**DISPOSITION**

- Disposition per emergency response team
- Document allergy and enter safety event

**Hypotension² with tachycardia⁶**

- Position patient in Trendelenburg position
- Monitor vital signs
- Initiate oxygen via non-rebreather mask at 10 L/minute and titrate up to 15 L/minute to maintain oxygen saturation ≥ 92%
- Give sodium chloride 0.9% (NS) 1 L IV bolus⁴ to maintain appropriate blood pressure as clinically indicated

- Evaluate and order atropine 0.5 mg IV push over 1 minute for vasovagal reaction if appropriate monitoring is available. May repeat atropine every 5 minutes up to 0.04 mg/kg or 3 mg total dose.
- Evaluate and order additional IV fluid bolus
- Ensure proper hand-off to the emergency response team and inform the Primary Care Team⁵

**Responding Provider¹:**

- Evaluate and order epinephrine (1 mg/mL) 0.5 mg IM⁷ if no cardiac contraindications
- Evaluate and order additional IV fluid bolus
- Ensure proper hand-off to the emergency response team and inform the Primary Care Team⁵

**Responding Provider¹:**

- Evaluate and order epinephrine (1 mg/mL) 0.5 mg IM⁷ if no cardiac contraindications
- Evaluate and order additional IV fluid bolus
- Ensure proper hand-off to the emergency response team and inform the Primary Care Team⁵

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¹ Appropriate provider may include: anesthesiologist, radiation oncology team, or diagnostic imaging team/radiologist

² Hypotension is defined as SBP < 90 mmHg or a drop in SBP > 20 mmHg from baseline

³ Bradycardia is defined as HR < 50 bpm

⁴ Use caution pushing fluids in patients with congestive heart failure to avoid fluid overload

⁵ Communicate the contrast media reaction event to the Primary Care Team so that precautionary measures are considered for future scans

⁶ Tachycardia is defined as HR > 100 bpm

⁷ 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.

Note: See Appendix B for Reaction Rebound Prevention
Management of Contrast Media Reactions - Adult

Any signs or symptoms of HSR/allergic reaction, notify Responding Provider\(^1\) and activate the appropriate emergency response process for your area.

### PRESENTING SYMPTOMS

- **Severe hypertension\(^2\):**
  - Initiate oxygen via non-rebreather mask at 10 L/minute and titrate up to 15 L/minute to maintain oxygen saturation ≥ 92%
  - Monitor vital signs
  - Activate appropriate emergency response process

- **Facial/laryngeal edema (stridor):**
  - Epinephrine\(^4\) (1 mg/mL) 0.5 mg IM if no cardiac contraindications
  - Initiate oxygen via non-rebreather mask at 10 L/minute and titrate up to 15 L/minute to maintain oxygen saturation ≥ 92%
  - Monitor vital signs
  - Activate appropriate emergency response process

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### TREATMENT

- **Clonidine 0.2 mg PO for one dose**
  - For pheochromocytoma, call Primary Care Team to order phenolamine 5 mg IV for one dose. Contact Responding Provider\(^1\) to order if unable to reach primary provider.

- **Responding Provider\(^1\) to evaluate and order racemic epinephrine\(^3\) (2.25% nebulized solution) 0.5 mL inhaled via nebulizer for one dose**

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### DISPOSITION

- **Continue monitoring**
- **Responding Provider\(^1\) to ensure proper hand-off to the emergency response team and inform the Primary Care Team\(^3\)**
- **Disposition per emergency response team**
- **Document allergy and enter safety event**

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**Note:** See Appendix B for Reaction Rebound Prevention

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\(^1\) Appropriate provider may include: anesthesiologist, radiation oncology team, or diagnostic imaging team/radiologist

\(^2\) Severe hypertension is defined as SBP ≥ 180 mmHg and/or DBP ≥ 120 mmHg

\(^3\) Communicate the contrast media reaction event to the Primary Care Team so that precautionary measures are considered for future scans

\(^4\) 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.

\(^5\) Nebulized agent by respiratory therapy preferred over beta agonist inhalers such as albuterol, terbutaline, and metaproterenol
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Any signs or symptoms of HSR/allergic reaction, notify Responding Provider¹ and activate the appropriate emergency response process for your area.

**PRESENTING SYMPTOMS**

- Respiratory distress (responsive patient)

**TREATMENT**

- Pulmonary edema as determined by provider
  - Activate appropriate emergency response process
  - 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 ≥ 92%
  - Monitor vital signs
  - Call Responding Provider¹ to bedside to evaluate

- Bronchospasm (wheezing) as determined by provider
  - Activate appropriate emergency response process
  - 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 ≥ 92%
  - Monitor vital signs
  - Call Responding Provider¹ to bedside to evaluate

- Responding Provider¹ to place order for furosemide 40 mg IV push over 2 minutes
  - Bronchospasm (wheezing) as determined by provider
  - Activate appropriate emergency response process
  - 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 ≥ 92%
  - Monitor vital signs
  - Call Responding Provider¹ to bedside to evaluate
  - Albuterol (2.5 mg nebulized solution) 3 mL inhaled via nebulizer for one dose. Consider further doses of albuterol as needed.
  - Epinephrine² (1 mg/mL) 0.5 mg IM if no cardiac contraindications; may repeat once in 5 minutes if no improvement

**DISPOSITION**

- Continue monitoring
- Responding Provider¹ to ensure proper hand-off to the emergency response team and inform the Primary Care Team²
  - Disposition per emergency response team
  - Document allergy and enter safety event

Note: See Appendix B for Reaction Rebound Prevention

¹ Appropriate provider may include: anesthesiologist, radiation oncology team, or diagnostic imaging team/radiologist

² Communicate the contrast media reaction event to the Primary Care Team so that precautionary measures are considered for future scans

³ 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.
**Presenting Symptoms**

- Seizures/convulsions
  - Activate appropriate emergency response process
  - Observe and protect patient
  - Turn patient on side to avoid aspiration; ensure suction is available
  - 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 ≥ 92%
  - Monitor vital signs

- Anxiety (panic attack)
  - Assess patient for developing signs and symptoms that may indicate another type of reaction
  - Monitor vital signs
  - If no identifiable manifestations and normal oxygenation, consider this diagnosis

**Treatment**

- Responding Provider¹ to order if available:
  - Lorazepam 4 mg IV slow push or
  - Rectal diazepam gel 20 mg if no IV access

**Disposition**

- Continue monitoring
- Responding Provider¹ to ensure proper hand-off to the emergency response team and inform the Primary Care Team²
- Disposition per emergency response team
- Document allergy and enter safety event

- Patient’s symptoms improve within 5 minutes?
  - Yes
    - Continue monitoring
    - Disposition per Responding Provider¹,²
    - Document reaction and enter safety event
  - No
    - Activate appropriate emergency response process
    - Continue monitoring
    - Responding Provider¹ to ensure proper hand-off to the emergency response team and inform the Primary Care Team²
    - Disposition per emergency response team
    - Document reaction and enter safety event

---

¹ Appropriate provider may include: anesthesiologist, radiation oncology team, or diagnostic imaging team/radiologist
² Communicate the contrast media reaction event to the Primary Care Team so that precautionary measures are considered for future scans

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# APPENDIX A: CATEGORIES OF ACUTE REACTIONS TO CONTRAST MEDIA

## Mild Reactions
Signs and symptoms appear self-limited without evidence of progression (e.g., limited urticaria with mild pruritis, 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
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

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1 Cardiovascular 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 cardiovascular 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.
APPENDIX B: Reaction Rebound Prevention

<table>
<thead>
<tr>
<th>Drug</th>
<th>Recommended Dose</th>
<th>Daily Maximum dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrocortisone</td>
<td>50 mg IV; administer over 1 minute every 6 hours</td>
<td>200 mg per day</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>40 mg – 125 mg IV; administer over 1 minute every 6 hours</td>
<td>Maximum dose depends on severity of reaction</td>
</tr>
</tbody>
</table>

**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.
SUGGESTED READINGS


This practice consensus statement is based on majority opinion of the Contrast Media Reaction workgroup at the University of Texas MD Anderson Cancer Center for the patient population. These experts included:

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