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.*

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

Note: Page 2 of this algorithm is intended for Providers; subsequent pages (3-10) are for both Providers and Nurses

PREVIOUS HISTORY OF REACTIONS[2]

Previous history of contrast allergy or high-risk[3] of contrast allergy?

- **Yes** → Previous anaphylactic or severe reaction to any contrast media?
  - **Yes** → No IV contrast **and** consider non-contrast or other study if history of severe reaction or anaphylaxis reaction
  - **No** → **PROPHYLACTIC TREATMENT**
- **No** → Continue with scheduled procedure

PROPHYLACTIC TREATMENT

Consider[4] non-contrast study/alternate study or follow with management below as clinically indicated:

- Regimen 1:
  - Prednisone[5] 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[5] 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[5] 200 mg IV – Give 13 hours, 7 hours, and 1 hour prior to procedure **and**
  - Diphenhydramine 50 mg IV – Give 1 hour prior to procedure

If emergency procedure[4] required and patient has previous history of mild to moderate reaction:

- Consider non-contrast study/alternate study **or**
- Regimen 1[6] (preferred): Methylprednisolone[5] 40 mg IV **or** hydrocortisone[5] 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 2[6] (alternative for patients with methylprednisolone allergy): Dexamethasone[5] 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[5] 40 mg IV **or** hydrocortisone[5] 200 mg IV **and** diphenhydramine 50 mg IV 1 hour prior to contrast medium administration

[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 factor 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 provider.
[6] This regimen usually is 4-5 hours in duration

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PRESENTING SYMPTOMS[2] | **TREATMENT** | **DISPOSITION**

Urticaria (hives), rash, itching, facial flushing

Mild

- Stop infusion of contrast or hold procedure until improved
- Give oral hydration with 500 mL water

→ Patient's symptoms resolved or stable within 5 minutes?

- **Yes** → Continue monitoring; Disposition per Responding Provider[1,3]; Document allergy and enter safety event
- **No** → Responding Provider[1]: evaluate and consider ordering diphenhydramine 25-50 mg PO **or** fexofenadine 180 mg PO → Patient's symptoms resolved or stable within 5 minutes?
  - **Yes** → Continue monitoring; Disposition per Responding Provider[1,3]; Document allergy and enter safety event
  - **No** → See Moderate or Severe treatment pathway below

Moderate

- Stop infusion of contrast and hold procedure
- Monitor vital signs
- Fexofenadine 180 mg PO

Severe (widespread and/or progressive)

- Stop infusion of contrast and hold procedure
- Monitor vital signs
- Ensure IV access
- Diphenhydramine 25 mg IV push over 1 minute

→ Patient's symptoms improve within 5 minutes?

- **Yes** → Continue monitoring; Disposition per Responding Provider[1,3]; Document allergy and enter safety event
- **No** → Responding Provider[1]: evaluate and consider ordering diphenhydramine 25 mg IV
  - Activate appropriate emergency response process
  - 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

Note: See Appendix B for Reaction Rebound Prevention

[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

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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[2]	TREATMENT	DISPOSITION
Diffuse erythema – Normotensive	• Monitor vital signs • Ensure IV access • Initiate oxygen via non-rebreather mask at 10 L/minute and titrate up to 15 L/minute to maintain oxygen saturation ≥ 92%	• Continue monitoring • Disposition per Responding Provider[1,3] • Document allergy and enter safety event
Diffuse erythema – Hypotensive[4]	• Monitor vital signs • Ensure IV access • 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 bolus[5] to maintain appropriate blood pressure as clinically indicated • Activate appropriate emergency response process	Responding Provider[1]: • Evaluate and consider ordering epinephrine (1 mg/mL) 0.5 mg IM[6] if no cardiac contraindications. May repeat every 5-15 minutes up to 1 mg. • Continue monitoring • 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

Note: See Appendix B for Reaction Rebound Prevention

[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] Hypotension is defined as systolic blood pressure (SBP) < 90 mmHg **or** a drop in SBP > 20 mmHg from baseline
[5] Use caution pushing fluids in patients with congestive heart failure to avoid fluid overload
[6] If patient is 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 Provider[1] and activate the appropriate emergency response process for your area.

PRESENTING SYMPTOMS[2]	TREATMENT			DISPOSITION
Hypotension[3] with bradycardia[4]/ vagal reaction (responsive patient)	• Monitor vital signs • Elevate legs at least 60 degrees • Ensure IV access • 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 bolus[5] to maintain appropriate blood pressure as clinically indicated	• Activate appropriate emergency response process • Continue monitoring	Responding Provider[1]: • Evaluate and order atropine 0.6-1 mg IV push over 1 minute for vasovagal reaction if appropriate monitoring is available. May repeat atropine every 5 minutes up to 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 Team[6]	• Disposition per emergency response team • Document allergy and enter safety event
Hypotension[3] with tachycardia[7]	• Monitor vital signs • Elevate legs at least 60 degrees • Ensure IV access • 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 bolus[5] to maintain appropriate blood pressure as clinically indicated	• Activate appropriate emergency response process • Continue monitoring	Responding Provider[1]: • Evaluate and order epinephrine (1 mg/mL) 0.5 mg IM[8] if no cardiac contraindications. May repeat every 5-15 minutes up to 1 mg. • Evaluate and order additional IV fluid bolus • Ensure proper hand-off to the emergency response team and inform the Primary Care Team[6]	

Note: See Appendix B for Reaction Rebound Prevention

[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] Hypotension is defined as SBP < 90 mmHg **or** a drop in SBP > 20 mmHg from baseline
[4] Bradycardia is defined as HR < 50 bpm
[5] Use caution pushing fluids in patients with congestive heart failure to avoid fluid overload
[6] Communicate the contrast media reaction event to the Primary Care Team so that precautionary measures are considered for future scans
[7] Tachycardia is defined as HR > 100 bpm
[8] If patient is 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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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[2]	TREATMENT		DISPOSITION
Severe hypertension[3]	• 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 • Ensure IV access • Activate appropriate emergency response process	• Clonidine 0.2 mg PO for one dose • For pheochromocytoma, call Primary Care Team to order phentolamine 5 mg IV for one dose. Contact Responding Provider[1] to order if unable to reach primary provider.	Responding Provider[1] to evaluate and consider ordering: • Labetalol 20 mg IV push over 2 minutes; can double the dose every 10 minutes **or** • Nitroglycerin 0.4 mg sublingual tablet; can repeat every 5-10 minutes **and** furosemide 20-40 mg IV push over 2 minutes
Laryngeal edema (stridor)	• Epinephrine[5] (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 • Ensure IV access • Activate appropriate emergency response process	Responding Provider[1] to evaluate and order: • Racemic epinephrine[6] (2.25% nebulized solution) 0.5 mL inhaled via nebulizer for one dose **or** • Epinephrine (1 mg/mL) 0.5 mg IM[5] if no cardiac contraindications. May repeat every 5-15 minutes up to 1 mg.	• Continue monitoring • Responding Provider[1] to ensure proper hand-off to the emergency response team and inform the Primary Care Team[4] • 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] See Appendix A for Categories of Acute Reactions to Contrast Media
[3] Severe hypertension is defined as systolic blood pressure (SBP) ≥ 180 mmHg **and/or** diastolic blood pressure (DBP) ≥ 120 mmHg
[4] Communicate the contrast media reaction event to the Primary Care Team so that precautionary measures are considered for future scans
[5] If patient is 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.
[6] 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 Provider[1] and activate the appropriate emergency response process for your area.

PRESENTING SYMPTOMS[2]	TREATMENT		DISPOSITION
Respiratory distress (responsive patient)	• 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 • Ensure IV access • Call Responding Provider[1] to bedside to evaluate		• 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
		Pulmonary edema as determined by provider	Responding Provider[1] to place order for: • Elevate head of bed • Furosemide 20-40 mg IV push over 2 minutes
		Bronchospasm (wheezing) as determined by provider – Mild	Responding Provider[1] to evaluate and place order for: albuterol (2.5 mg nebulized solution) 3 mL inhaled via nebulizer for one dose. Consider further doses of albuterol as needed.
		Bronchospasm (wheezing) as determined by provider – Moderate	Responding Provider[1] to evaluate and place orders for: • Albuterol (2.5 mg nebulized solution) 3 mL inhaled via nebulizer for one dose. Consider further doses of albuterol as needed. • Consider adding epinephrine[4] (1 mg/mL) 0.5 mg IM if no cardiac contraindications. May repeat every 5-15 minutes up to 1 mg.
		Bronchospasm (wheezing) as determined by provider – Severe	Responding Provider[1] to evaluate and place orders for: • Albuterol (2.5 mg nebulized solution) 3 mL inhaled via nebulizer for one dose. Consider further doses of albuterol as needed **and** • Epinephrine[4] (1 mg/mL) 0.5 mg IM if no cardiac contraindications. May repeat every 5-15 minutes up to 1 mg.
			• 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

Note: See Appendix B for Reaction Rebound Prevention

[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] 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 is 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[2]	TREATMENT	DISPOSITION
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	Responding Provider[1] to order if available: • Lorazepam 4 mg IV slow push **or** • Rectal diazepam gel 20 mg if no IV access → • 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 reaction and enter safety event
Anxiety (panic attack)	• Assess patient for developing signs and symptoms that may indicate another type of reaction • Monitor vital signs • Ensure IV access • If no identifiable manifestations and normal oxygenation, consider this diagnosis	Patient's symptoms improve within 5 minutes? Yes → • Continue monitoring • Disposition per Responding Provider[1,2,3] • Document reaction and enter safety event No → • Activate appropriate emergency response process • 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 reaction and enter safety event

[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

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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	Physiologic
Limited urticaria/pruritus	Limited nausea/vomiting
Limited cutaneous edema	Transient flushing/warmth/chills
Limited "itchy"/ "scratchy" throat	Headache/dizziness/anxiety/altered taste
Nasal congestion	Mild hypertension
Sneezing/conjunctivitis/rhinorrhea	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	Physiologic
Diffuse urticaria/pruritus	Protracted nausea/vomiting
Diffuse erythema, stable vital signs	Hypertensive urgency
Facial edema without dyspnea	Isolated chest pain
Throat tightness or hoarseness without dyspnea	Vasovagal reaction that requires and is responsive to treatment
Wheezing/bronchospasm without hypoxia	

Severe Reactions[1]

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	Physiologic
Diffuse edema, or facial edema with dyspnea	Vasovagal reaction resistant to treatment
Diffuse erythema with hypotension	Arrhythmia
Laryngeal edema with stridor and/or hypoxia	Convulsions, seizures
Wheezing/bronchospasm with hypoxia	Hypertensive emergency
Anaphylactic shock (hypotension plus tachycardia)	

[1] 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.

APPENDIX B: Rebound Reaction Prevention

Drug	Recommended Dose	Daily Maximum Dose
Hydrocortisone	5 mg/kg IV; administer over 1-2 minutes	200 mg per day
Methylprednisolone	1 mg/kg IV; administer over 1-2 minutes	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.

SUGGESTED READINGS

ACR Committee on Drugs and Contrast Media. (2024). *ACR manual on contrast media*. American College of Radiology. Retrieved from: https://edge.sitecorecloud.io/americancoldf5f-acrorgf92a-productioncb02-3650/media/ACR/Files/Clinical/Contrast-Manual/ACR-Manual-on-Contrast-Media.pdf

Simons, F. E. R. (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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