CONTRAST REACTION TREATMENT PROTOCOL

GENERAL GUIDELINES/COMMENTS

- The radiologist should have the knowledge and equipment available to treat most contrast reactions without assistance. It is the responsibility of the technologist performing the scan to have the necessary medications and equipment readily available and in working order.
- The response time to treatment should be minimized. Not all contrast reactions present with a classical complex of signs and symptoms. Failure to recognize that a patient is indeed having an adverse reaction may delay appropriate treatment.
- Know the Patient
  - Does the patient have a history of coronary artery disease or other significant cardiac problems? IV contrast agents can compromise cardiac function.
  - Is the patient being treated for congestive heart failure? IV contrast agents will increase the effective circulating volume and may cause pulmonary edema in a poorly compensated patient.
  - Does the patient have a history of asthma and is experiencing an acute exacerbation? IV contrast agents can provoke bronchospasm and worsen preexisting airway constriction.
  - The technologist performing the procedure will obtain a list of the medications that the patient is taking before the examination. Some medications may mask the symptoms of a contrast reaction.
  - Beta blockers slow the heart rate and block its acceleration response to physiologic stress. They may interfere with a tachycardic response (which sometimes occurs prior to a severe reaction). Beta blockade blunts the effects of epinephrine, requiring increased doses to achieve similar physiologic effects. Once the beta effect is overcome, there is an unopposed alpha-adrenergic effect of epinephrine that predominates with a marked increase in peripheral vascular resistance and a subsequent hypertensive response. Beta blockers may increase the rate of moderate to severe anaphylactoid reactions caused by IV contrast agents.
  - Calcium channel blockers are peripheral vasodilators and are frequently prescribed for hypertension, coronary insufficiency and arrhythmias. Correction of hypotension by fluid replacement may be more difficult due to persistent peripheral vasodilation.
- Recognize That There Is A Problem
  - Look for the classic and more subtle signs that the patient is having an adverse reaction.
    1) Dermal - urticaria, pruritus, and skin flushing.
    2) Mucosal edema may present with increased production of tears, difficulty in swallowing, nasal congestion, severe bronchoconstriction or laryngeal edema with hoarseness.
    3) Generalized edema may present with edematous eyelids or perioral edema.
  - All patients in the IR suite should have continuous vital signs monitoring.

- The person in attendance will have to depend on the patient's signs and symptoms to determine if the patient is having an adverse reaction. A patient who is becoming hypotensive may display a change in mental status, becoming restless or confused. This may be related to analgesics, sedative medications or could indicate a vasovagal reaction. This should prompt the radiologist to check the patient's vital signs.

- Be Prepared to Deliver Treatment Quickly and Know When to Call for Help
  - Evaluate the situation, categorize the type of adverse reaction and determine if it is mild, moderate or severe.
  - After treatment is given, reevaluate the patient frequently and decide if the situation is improving or becoming worse.

URTICARIA (HIVES)

- Observe until hives are resolving. Further observation may be necessary if treatment is administered.
- 1st generation antihistamines (diphenhydramine/Benadryl) can cause drowsiness. IV/IM forms may cause or worsen hypotension.
- 2nd generation antihistamines (cetirizine/Zyrtec) cause less drowsiness and may be beneficial for patients who need to drive themselves home.

Severity	Treatment	Adult Dosing	Pediatric Dosing
Mild scattered and/or transient	often none needed	Benadryl 50 mg PO or IM/IV slow push Zyrtec 10 mg PO	Benadryl 1 mg/kg PO or IM/IV slow push (max 50 mg)
Moderate more numerous & bothersome	monitor vital signs preserve IV access	Benadryl 50 mg PO or IM/IV slow push Zyrtec 10 mg PO	Benadryl 1 mg/kg PO or IM/IV slow push (max 50 mg)
Severe widespread and/or progressive	monitor vital signs preserve IV access	Benadryl 50 mg IM/IV slow push	Benadryl 1 mg/kg IM/IV slow push (max 50 mg)

LARYNGEAL EDEMA

Severity	Treatment	Adult Dosing	Pediatric Dosing
All Forms	monitor vital signs preserve IV access	10 L/min O2 by mask Epinephrine 1 mL IV slow push every 5 minutes up to 10 doses max total dose 10 mL Epinephrine 0.5 mL IM slow push can repeat once after 5 mins max total dose 1 mL EpiPen 1 shot (0.3 mL) every 5 mins up to 3 doses equivalent to IM dose	10 L/min O2 by mask Epinephrine 0.1 mL/kg IV slow push every 5 mins up to 10 doses max single dose 1 mL Epinephrine 0.01 mL/kg IM slow push every 5 mins up to 3 doses max single dose 0.3 mL >30 kgs Adult EpiPen 1 shot <30 kgs EpiPen Jr 1 shot

*In hypotensive patients, the preferred route of epinephrine is IV, as the extremities may not be perfused sufficiently to allow for adequate absorption of IM administered drugs.

DIFFUSE ERYTHEMA

Severity	Treatment	Adult Dosing	Pediatric Dosing
Normotensive	monitor vital signs preserve IV access	10 L/min O2 by mask	10 L/min O2 by mask
Hypotensive	monitor vital signs preserve IV access	10 L/min O2 by mask 1000 mL NS/LR IV rapid bolus Epinephrine 1 mL IV slow push every 5 minutes up to 10 doses max total dose 10 mL Epinephrine 0.5 mL IM slow push can repeat once after 5 mins max total dose 1 mL EpiPen 1 shot (0.3 mL) every 5 mins up to 3 doses equivalent to IM dose	10 L/min O2 by mask 20 mL/kg NS/LR IV rapid bolus (max 1000 mL) Epinephrine 0.1 mL/kg IV slow push every 5 mins up to 10 doses max single dose 1 mL Epinephrine 0.01 mL/kg IM slow push every 5 mins up to 3 doses max single dose 0.3 mL >30 kgs Adult EpiPen 1 shot <30 kgs EpiPen Jr 1 shot

*In hypotensive patients, the preferred route of epinephrine is IV, as the extremities may not be perfused **sufficiently** to allow for adequate absorption of IM administered drugs.

BRONCHOSPASM

Severity	Treatment	Adult Dosing	Pediatric Dosing
Mild	monitor vital signs preserve IV access	10 L/min O2 by mask Albuterol 90 mcg 2 puffs up to 8 puffs	10 L/min O2 by mask Albuterol 90 mcg 2 puffs up to 8 puffs
Moderate or Severe	monitor vital signs preserve IV access	10 L/min O2 by mask Albuterol 90 mcg 2 puffs up to 8 puffs Epinephrine 1 mL IV slow push every 5 minutes up to 10 doses max total dose 10 mL Epinephrine 0.5 mL IM slow push can repeat once after 5 mins max total dose 1 mL EpiPen 1 shot (0.3 mL) every 5 mins up to 3 doses equivalent to IM dose	10 L/min O2 by mask Albuterol 90 mcg 2 puffs up to 8 puffs Epinephrine 0.1 mL/kg IV slow push every 5 mins up to 10 doses max single dose 1 mL Epinephrine 0.01 mL/kg IM slow push every 5 mins up to 3 doses max single dose 0.3 mL >30 kgs Adult EpiPen 1 shot <30 kgs EpiPen Jr 1 shot

*In hypotensive patients, the preferred route of epinephrine is IV, as the extremities may not be perfused sufficiently to allow for adequate absorption of IM administered drugs.

PULMONARY EDEMA

Severity	Treatment	Adult Dosing	Pediatric Dosing
All Forms	monitor vital signs preserve IV access elevate head of bed	10 L/min O2 by mask Lasix 40 mg IV slow push	10 L/min O2 by mask 1.0 mg/kg IV slow push max dose 40 mg

HYPOTENSION (SYSTOLIC <90 MMHG)

Severity	Treatment	Adult Dosing	Pediatric Dosing
Hypotension w/ Bradycardia <60 bpm (vasovagal)	monitor vital signs preserve IV access elevate legs > 60 degrees	10 L/min O2 by mask 1000 mL NS/LR IV rapid bolus Atropine 1 mg IV slow push every 5 mins up to 3 doses	10 L/min O2 by mask 20 mL/kg NS/LR IV rapid bolus (max 1000 mL) Atropine 0.2 mL/kg IV slow push max single dose 1 mg max total dose 1 mg infants/kids and 2 mg adolescents
Hypotension w/ Tachycardia > 100 bpm (anaphylactoid shock)	monitor vital signs preserve IV access elevate legs > 60 degrees	10 L/min O2 by mask 1000 mL NS/LR IV rapid bolus Epinephrine 1 mL IV slow push every 5 minutes up to 10 doses max total dose 10 mL Epinephrine 0.5 mL IM slow push can repeat once after 5 mins max total dose 1 mL EpiPen 1 shot (0.3 mL) every 5 mins up to 3 doses equivalent to IM dose	10 L/min O2 by mask 20 mL/kg NS/LR IV rapid bolus (max 1000 mL) Epinephrine 0.1 mL/kg IV slow push every 5 mins up to 10 doses max single dose 1 mL Epinephrine 0.01 mL/kg IM slow push every 5 mins up to 3 doses max single dose 0.3 mL >30 kgs Adult EpiPen 1 shot <30 kgs EpiPen Jr 1 shot

*In hypotensive patients, the preferred route of epinephrine is IV, as the extremities may not be perfused sufficiently to allow for adequate absorption of IM administered drug.

HYPERTENSIVE CRISIS (SYSTOLIC PRESSURE >200 MG HG OR DIASTOLIC >120 MG HG)

Severity	Treatment	Adult Dosing	Pediatric Dosing
All Forms	monitor vital signs preserve IV access	10 L/min O2 by mask Labetalol 20 mg IV slow push can double dose every 10 mins or Nitroglycerin 0.4 mg sublingual every 5 mins Lasix 40 mg IV slow push	

SEIZURES/CONVULSIONS

Severity	Treatment	Adult Dosing	Pediatric Dosing
All Forms	observe/protect patient turn patient on side suction airway as needed monitor vital signs preserve IV access	10 L/min O2 by mask Ativan 4 mg IV slow push	10 L/min O2 by mask

HYPOGLYCEMIA

Severity	Treatment	Adult Dosing	Pediatric Dosing
All Forms	preserve IV access	10 L/min O2 by mask	10 L/min O2 by mask
		two sugar packets, 15 g glucose tablet/gel or 4 oz fruit juice	
		or	
		D50W 1 amp IV over 2 mins	D50W 2 mL/kg over 2 mins
		or	
		Glucagon 1 mg IM/SQ	<20 kgs Glucagon 0.5 mg IM/SQ >20 kg Glucagon 1 mg IM/SQ

REBOUND PREVENTION

Adult Dosing	Pediatric Dosing
Methylprednisolone 1 mg/kg IV slow push or Dexamethasone 8 mg IV slow push	Methylprednisolone 1 mg/kg IV slow push (max 40 mg) or Dexamethasone 0.5 mg/kg IV slow push (max 10 mg)

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, they may be considered for patients having severe allergic-like manifestations prior to transportation to an ER.