Contrast Administration Policy

Version 1.6

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Document History

Version Number	Date Version Finalized	Author	Summary of Updates
1.0	09/05/2024	Ayla Lazorcik	N/A-- Initial Draft
1.1	10/24/24	Ayla Lazorcik	Updated
1.2	01/22/2025	Ayla Lazorcik	Edits to Renal Insufficiency
1.3	05/28/2025	Ayla Lazorcik	Updated Policy Name
1.4	06/16/2025	Ayla Lazorcik	Updated metformin instructions
1.5	07/24/2025	Ayla Lazorcik	Added MRI contrast guidelines
1.6	11/24/2025	Ayla Lazorcik	Revised GFR guidelines for CT and added IV hydration protocol

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Contrast Administration Table of Contents

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1. Contrast Administration Overview

Document Goal:
The purpose of this policy is to provide standardized protocols and ensure safe administration of contrast media and management of contrast-related adverse events.

Intended Audiences for Document:
All healthcare professionals providing direct or indirect patient care related to contrast administration will be responsible for adhering to the guidelines in this policy.

Associated Documents:
Attachment A: Reaction Severity Assessment (RSA)
Attachment B: Contrast Reaction Card: Adults
Attachment C: Contrast Reaction Card: Pediatrics

Definitions:
GFR - Glomerular Filtration Rate
IV - intravenous
FDA - Food and Drug Administration
CKD - Chronic Kidney Disease
AKI - Acute Kidney Injury
ESRD - End Stage Renal Disease
CT - Computed tomography
PICC - Peripherally Inserted Central Catheter
ACR - American College of Radiology
MRI - Magnetic resonance imaging

FAQs:

Email Contact to Ask Questions and / or Provide Feedback: help@imagen.ai

2. Contrast Parameters

Intravenous contrast will be administered when ordered by a referring provider, excluding any contraindicating scenarios as mentioned in this policy.

For CT exams, oral contrast will be administered in addition to intravenous contrast in selected situations, including:

- Possible bowel perforation, postoperative leak, enteric fistula/sinus tract, or abscess
- Confirmation of feeding tube positioning
- Prior to planned endoscopic procedures
- In small bowel obstruction, when surgery may be planned

For MRI exams, oral contrast will be administered in addition to intravenous contrast in selected situations, including:

- Possible bowel perforation, postoperative leak, enteric fistula/sinus tract, or abscess
- Identification of fistula(s)
- Identification of an abscess in or within the bowel
- Suspected tumor in the bowel wall
- Postoperative evaluation

Contrast in CT Exams: Imagen has chosen to utilize Iohexol, an iodinated, water-soluble contrast media. Iohexol is FDA-approved for intravenous and oral use as a contrast agent. Administration amounts and practices will follow guidelines published by the contrast manufacturer.

Contrast in MRI Exams: Imagen recommends a Group II classified gadolinium-based agent as they are associated with few, if, any, renal complications. Administration amounts and practices will follow guidelines published by the contrast manufacturer.

MRI Contrast Agents	
Group I	**Group II (recommended)**
Gadodiamine (Omniscan)	Gadobenate dimeglumine (MultiHance)
Gadopentetate dimeglumine (Magnevist)	Gadobutrol (Gadavist)
Gadoversetamide (OptiMARK)	Gadoetric acid (Dotarem)
	Gadoteridol (ProHance)
	Gadopiclenol (Elucirem)
	Gadoxetate disodium (Eovist)

Total volume of contrast will not exceed limitations stated within the contrast manufacturer’s guidelines.

3. Patient Screening

Patients receiving iodinated or gadolinium-based contrast will be screened for the following conditions and past medical history:

- Prior allergic reaction to the same classification of contrast media
- Renal Insufficiency
    - Chronic Kidney Disease (CKD)
    - History of Acute Kidney Injury (AKI)
    - Removal of part of the kidney through surgery or ablation
    - History of Kidney Cancer

    - History of Kidney Transplant
    - Single Kidney
    - ESRD - with or without dialysis treatment
- Vascular Access Limitation
    - Dialysis Access
    - Vascular intervention
    - History of Lymphedema
    - Central Venous Line/PICC Line/Port
- Diabetes - taking Metformin and Metformin-containing medications (iodinated-contrast only)
- Pregnancy - all female patients between the ages of 12 and 55 will be screened for the chance of pregnancy per policy, Pregnant Patient and Operators Guide.
- Breastfeeding: Patients may continue breastfeeding, as less than 1% of injected contrast is excreted in breast milk. ACR asserts that available research and data indicate it is safe for mothers to breastfeed after contrast administration.

4. Premedication

Premedication regimens less than 4-5 hours in duration have not been shown to be effective. Therefore, a 12-13 hour oral regimen or accelerated IV regimen is recommended, depending on the patient's scenario. A history of a severe allergic reaction to contrast material is an absolute contraindication. Should a contrast-enhanced exam be requested for a patient with a history of prior severe contrast reaction, the study will not be completed. An alternative imaging study must be ordered, including non-contrast-enhanced CT/MRI. *See Attachment A for a full list of allergic reactions by severity.*

12- or 13-hour oral premedication may be considered in the following settings:

1. Outpatients with a prior allergic-like or unknown-type contrast reaction to the same class of contrast medium.
2. Emergency or urgent care patient with prior allergic-like or unknown-type contrast reaction to the same class of contrast medium in whom the use of premedication is not anticipated to adversely delay care decisions or treatment.

Suggested oral premedication regimens:

1. Prednisone-based: 50 mg prednisone by mouth at 13 hours, 7 hours, and 1 hour before contrast medium administration, plus 50 mg diphenhydramine 1 hour before contrast medium administration.
2. Methylprednisolone-based: 32 mg methylprednisolone by mouth 12 hours and 2 hours before contrast medium administration; 50 mg diphenhydramine may be added as in option 1.

Accelerated IV premedication may be considered in the following settings:

1. Emergency or urgent care patient with a prior allergic-like or unknown-type contrast reaction to the same class of contrast medium in whom the use of 12- or 13-hour premedication is anticipated to adversely delay care decisions or treatment.

2. In an emergency or urgent care setting where accelerated premedication is utilized or premedication protocol is amended, the ordering provider will document the discussion with the patient or his/her representative, addressing the risks of allergic reaction versus the benefit of obtaining imaging.

Suggested IV premedication regimens:

1. Methylprednisolone sodium succinate 40 mg IV or hydrocortisone sodium succinate 200 mg IV immediately, and then every 4 hours until contrast medium administration, plus diphenhydramine 50 mg IV 1 hour before contrast medium administration. This regimen usually is 4-5 hours in duration.
2. Dexamethasone sodium phosphate 7.5 mg IV immediately, and then every 4 hours until contrast medium administration, plus diphenhydramine 50 mg IV 1 hour before contrast medium administration. This regimen may be useful in patients with an allergy to methylprednisolone and is also usually 4-5 hours in duration.
3. Methylprednisolone sodium succinate 40 mg IV or hydrocortisone sodium succinate 200 mg IV, plus diphenhydramine 50 mg IV, each 1 hour before contrast medium administration. This regimen, and all other regimens with a duration less than 4-5 hours, have no evidence of efficacy. It may be considered in emergent situations when no alternatives are available.

Patients receiving oral contrast with a known or suspected allergy to contrast may be given water as a substitute.

5. Renal Insufficiency

To avoid contrast-induced nephropathy in CT, patients with a history of renal insufficiency are evaluated for adequate renal function prior to iodinated contrast administration. Patients with a history of renal insufficiency must have lab work, including GFR, within 30 days of contrast CT.

GFR value should be >30. Patients with a GFR less than 30 should have a CT scheduled to ensure dialysis within 24 hours post-CT. CT or an IV hydration protocol can be used when applicable. Technologists must reach out to the ordering provider prior to contrast CT for patients with a GFR less than 30 who are not receiving routine dialysis to determine risk versus benefit of contrast-enhanced CT and for appropriateness of IV hydration protocol. In life-threatening conditions, imaging will not be delayed. Technologists should document the benefit-risk decision.

If hydration is contemplated, at the sole discretion of the ordering Health Care Provider (HCP) suggested IV hydration protocols include:

- Inpatients - 0.9& normal saline at 100 mL/hr IV beginning 6-12 hours prior to contrast administration and continuing 4-12 hours afterwards
- Outpatients - 0.9% normal saline 500 mL IV bolus prior to contrast administration and 1 cup of water per hour for 8 hours post contrast exposure

To avoid contrast-induced nephropathy in MRI, group II gadolinium-based contrast agents are recommended. GFR testing is not necessary when group II contrast agents are utilized. If using a group I contrast agent, follow the guidelines listed in the table below:

Patient Condition	eGFR Requirement
Patient on dialysis	No eGFR required
Patient with AKI	No eGFR required
Inpatient	Obtain eGFR within 2 days of MRI study
Outpatient/ED with no prior eGFR at the time the MRI is scheduled	If NO risk factors, no eGFR required WITH risk factors, obtain eGFR prior to MRI
Outpatient/ED with the most recent prior eGFR of 45 or above	If NO risk factors and the most recent eGFR is 60 or above, no new eGFR is required WITH risk factors and/or eGFR and/or 45-59 eGFR within 6 weeks
Outpatient/ED with the most recent prior eGFR of 44 or below	Obtain eGFR within 2 days of the MRI study

6. Metformin and Metformin-containing medications

Most patients taking Metformin or Metformin-containing medications need no special consideration. Patients with severe CKD (stage 4 or 5) or with severe Acute Kidney Injury and GFR <30 require screening for Metformin-containing medications and should be provided the instructions below:

- Do not take the dose on the day of the exam and for 48 hours after the exam
- Evaluate kidney function after 48 hours, and if normal, resume medication

No accommodations or instructions are necessary for patients receiving gadolinium-based contrast agents for MRI.

7. Contrast Reactions & Extravasations

Although allergic and allergic-like reactions are uncommon, they can occur without any prior exposure to iodinated contrast. Therefore, all facilities administering iodinated contrast should be equipped with the proper equipment, protocols, and staff training to effectively care for patients experiencing a reaction to iodinated contrast. All reactions will be treated according to current best practices delineated in the ACR Manual on Contrast Media.

1. Equipment
    a. Device to monitor vital signs
    b. Access to oxygen as needed.
    c. Emergency Medication box (see details in policy).
2. Protocols

a. Premedication is utilized for patients with a history of allergic reactions.
b. Reaction Severity Assessment (Attachment A).
c. Notification to Supervising Healthcare Provider.
d. Maintain IV access.
e. Obtain vital signs.
f. Contrast Reaction Management (Attachment B).
g. Patient observation, with monitoring of vital signs, for a minimum of 20 to 30 minutes post-intervention to ensure clinical stability or recovery.
h. Documentation of contrast reaction in the patient's chart- EMR.
i. Post reaction instructions provided to patients. Patients should present to the Emergency Department if symptoms worsen.

3. Staff Training
    a. Initial training upon hire and annually thereafter.
    b. Reaction Assessment Survey, Contrast Reaction Management Card, and Emergency Response Procedure must be easily accessible to personnel.

Contrast extravasations occur when saline or contrast material is inadvertently injected into the soft tissues surrounding the injection site. Again, all facilities administering iodinated contrast should be equipped with the proper protocol and staff training to effectively care for patients with an extravasation event. All extravasations will be treated according to current best practices delineated in the ACR Manual on Contrast Media.

1. Protocol
    a. Appropriate venous access sites will be used in accordance with the IV Access and Safe Injection Guidelines (link) to reduce the risk of extravasation events. Verification of working IV access will be assessed by aspirating blood and flushing the catheter prior to injection.
    b. Assessment of the IV site by the technologist after injection or during if the patient reports concerns. Evaluate for initial swelling, tightness, stinging or burning pain at the site, edema, erythema, and tenderness.
    c. Notification to Supervising Healthcare Provider.
    d. There is no standard treatment for extravasation events. There is limited data documenting the benefits of interventions; however, the following techniques can be used.
        i. Elevation of the affected extremity above the heart until swelling subsides.
        ii. Use of cold or warm compresses in 15-minute intervals until swelling improves.
        iii. Patients should present to the Emergency Department if symptoms worsen.
        iv. Surgical consultation is recommended for events associated with severe pain, severe swelling, progressing symptoms, and concern for compartment syndrome or skin necrosis.
    e. Documentation of extravasation event in patient chart.
    f. Post extravasation instructions provided to the patient

8. Contrast Supervision

Supervising providers are required to perform any procedures involving contrast administration to ensure adequate response time and care in the event of a contrast reaction.

Direct supervision is required anytime contrast is being administered. The following providers are capable of providing direct supervision:

Radiologist (MD/DO)

OR - one of the following under the general supervision of a radiologist:

Non-radiologist physicians (MD/DO)
Advanced practice provider (NP, PA)
Registered nurses follow a symptom and sign-driven treatment algorithm

Any individual providing direct supervision also must:

- Have received training and meet institutional periodic competency guidelines for evaluating patients and diagnosing, and differentiating different types of adverse reactions to contrast material.
- Be able to recognize when medical intervention is required for hypersensitivity, immediate reaction, or physiological adverse event due to contrast administration.
- Be trained and legally permitted to administer prescription medication and other appropriate interventions independently or under a standing order/algorithmic approach under state law or regulations, and under local, institutional, site, and facility policies, guidelines, and rules. These interventions are those indicated for urgent response to a contrast material adverse event as listed in the ACR Manual for Contrast Media or similar local policies or guidelines.
- Has minimum BLS certification.
- Understand when to call for assistance and how to activate emergency response systems
    - If general supervision by a physician is performed remotely, the process should comply with all federal/state laws and regulations, as well as local, institutional, site, and facility policies, guidelines, or rules related to telemedicine. This remote general supervision should be available whenever contrast material is administered and include standard post administration monitoring as dictated by all federal/state law or regulations and local, institutional, site, and facility policies, guidelines, or rules
    - Overall staffing should take into account the timeliness of available emergency response symptoms

-Contrast Administration-

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Attachment A: Reaction Severity Assessment

1. Mild Reaction - Usually requires no treatment
    a. Limited urticaria/pruritus
    b. Cutaneous edema
    c. Limited “itchy”/”scratchy” throat
    d. Nasal congestion/sneezing/conjunctivitis/rhinorrhea
    e. Limited nausea/limited vomiting
    f. Transient flushing/warmth/chills
    g. Headache/dizziness/anxiety/altered taste
    h. Mild hypertension
    i. Vasovagal reaction that resolves spontaneously
2. Moderate Reaction - Usually needs medical management
    a. Diffuse urticaria/pruritus
    b. Diffuse hives or redness, stable vital signs
    c. Protracted nausea/vomiting
    d. Face swelling without dyspnea
    e. Throat tightness or hoarseness without dyspnea
    f. Wheezing/bronchospasm, mild or no hypoxia
    g. Hypertensive urgency
    h. Isolated chest pain
    i. Vasovagal reaction that requires and is responsive to treatment
3. Severe Reaction - Life-threatening. Requires immediate treatment. Initiate Emergency Response Procedure.
    a. Any moderate reaction symptoms accompanied by:
        i. Difficulty breathing/hypoxia
        ii. Hypotension
        iii. Tachycardia
    b. Patients struggling to maintain their vital signs.
    c. Diffuse edema, or facial edema with dyspnea
    d. Diffuse erythema with hypotension
    e. Laryngeal edema with stridor and/or hypoxia
    f. Wheezing/bronchospasm, significant hypoxia
    g. Anaphylactic shock (hypotension + tachycardia)
    h. Vasovagal reaction resistant to treatment
    i. Arrhythmia
    j. Convulsions, seizures
    k. Hypertensive emergency

References:

2024. ACR Manual on Contrast Media. ACR Committee on Drugs and Contrast Media. American College of Radiology
UCSF Department of Radiology and Biomedical Engineering: CT and X-Ray Contrast Guidelines: https://radiology.ucsf.edu/patient-care/patient-safety/contrast/iodinated#accordion-guidelines-for-iv-iodinated-contrast-administration-for-ct-exams

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Attachment B: Contrast Reaction Card: Adults

ACR AMERICAN COLLEGE OF RADIOLOGY

ADULT

CODE BLUE #:

EXAMPLE PREMEDICATION REGIMENS

Methylprednisolone 32 mg PO 12, 2 hrs prior +/- Benadryl 50 mg PO 1 hr prior.
OR
Prednisone 50 mg PO 13, 7, 1 hours prior
+/- Benadryl 50 mg PO 1 hr prior.
OR
Hydrocortisone 200 mg IV 5 hrs and 1 hr prior and Benadryl 50 mg IV 1 hr prior.
(urgent, NPO only, ER, inpatient)

CONTRAST EXTRAVASATION

Elevate arm (heart level), apply cool compress, remove rings. Observe. Consider surgical consultation for decreased perfusion, sensation, strength, active range of motion, or increasing pain.

Document reaction & monitor for return of symptoms post-treatment

HIVES/DIFFUSE ERYTHEMA

1. Observation; monitor vitals q 15 min. Preserve IV access.
2. If associated with hypotension or respiratory distress then considered **Anaphylaxis**:
   - O_2 6-10 L/min by face mask
   - IVF 0.9% NS wide open; elevate legs > 60°
   - Epinephrine 0.3 mL of 1mg/mL IM (or auto-injector) OR Epinephrine 1 mL of 1mg/10mL (0.1 mg/mL) IV with slow flush or IV fluids
   - **Call 911** or **CODE BLUE**
3. If *ONLY* skin findings but severe or progressive may consider Benadryl 50 mg PO, IM, IV but may cause or worsen hypotension.

HYPOTENSION WITH TACHYCARDIA (ANAPHYLAXIS)

1. Preserve IV access, monitor vitals q 15m
2. O_2 6-10 L/min by face mask
3. Elevate legs > 60°
4. IVF 0.9% NS wide open
5. Epinephrine 0.3 mL of 1mg/mL IM (or auto-injector) OR Epinephrine 1 mL of 1mg/10mL (0.1 mg/mL) IV with slow flush or IV fluids
6. **Call 911** or **CODE BLUE**

HYPOTENSION WITH BRADYCARDIA

1. Preserve IV access; monitor vitals
2. O_2 6-10 L/min by face mask
3. Elevate legs > 60°
4. IVF 0.9% NS wide open
5. Atropine 0.6-1.0 mg IV if refractory
6. **Consider calling 911** or **CODE BLUE**

ADULT

LARYNGEAL EDEMA (INSPIRATORY STRIDOR)

1. Preserve IV access, monitor vitals
2. O_2 6-10 L/ min by face mask
3. Epinephrine 0.3 mL of 1mg/ mL IM (or auto-injector) OR Epinephrine 1 mL of 1mg/10mL (0.1 mg/mL) IV with slow flush or IV fluids
4. **Call 911** or **CODE BLUE**

BRONCHOSPASM (EXPIRATORY WHEEZE)

1. Preserve IV access, monitor vitals
2. O_2 6-10 L/min by face mask
3. Beta-2 agonist inhaler 2 puffs; repeat x 3
4. If not responding or severe, then use Epinephrine 0.3 mL of 1mg/ mL IM (or auto-injector) OR Epinephrine 1 mL of 1mg/10mL (0.1 mg/mL) IV with slow flush or IV fluids
5. **Call 911** or **CODE BLUE**

The content of this card is for reference purposes only and is not intended to substitute for the judgment and expertise of the physician or other user. User is responsible for verifying currency and applicability of content to clinical situation and assumes all risk of use.

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Attachment C: Contrast Reaction Card: Pediatrics

ACR American College of Radiology

PEDIATRIC

CODE BLUE #:

EXAMPLE PREMEDICATION REGIMENS

Prednisone 0.5-0.7 mg/kg PO (*Max 50 mg*) 13, 7 and 1 hr prior + Benadryl 1 mg/kg PO (*Max 50 mg*) 1 hr prior.
OR
Hydrocortisone 2 mg/kg IV (*Max 200 mg*) 5 hrs and 1 hr prior + Benadryl 1 mg/kg IV, IM, or PO (*Max 50 mg*) 1 hr prior.
(urgent, NPO only, ER, inpatient)

CONTRAST EXTRAVASATION

Elevate arm (heart level), apply cool compress, remove rings. Observe. Consider surgical consultation for decreased perfusion, sensation, strength, active range of motion, or increasing pain.

Document reaction & monitor for return of symptoms post-treatment

HIVES/DIFFUSE ERYTHEMA

1. Observation; monitor vitals q 15 min. Preserve IV access.
2. If associated with hypotension or respiratory distress then considered **Anaphylaxis:**
   - O_2 6-10 L/min by face mask
   - IVF 0.9% NS 10-20 mL/kg (max 500-1000 ml); elevate legs > 60°
   - Epinephrine IV or IM or Auto-injector
   - **Call 911** or **CODE BLUE**
3. If ONLY skin findings but severe or progressive, consider Benadryl PO, IM, IV 1 mg/kg (*max 50 mg*).

HYPOTENSION WITH TACHYCARDIA (ANAPHYLAXIS)

1. Preserve IV access, monitor vitals q15m
2. O_2 6-10 L/min by face mask
3. Elevate legs > 60°
4. IVF 0.9% NS 10-20 mL/kg (*Max 500-1000 mL*)
5. **Epinephrine IV, IM,** or **auto-injector***
6. **Call 911** or **CODE BLUE**

HYPOTENSION WITH BRADYCARDIA

1. Preserve IV access; monitor vitals
2. O_2 6-10 L/min by face mask
3. Elevate legs > 60°
4. IVF 0.9% NS 10-20 mL/kg (*Max 500-1000 mL*)
5. If refractory, Atropine 0.02 mg/kg IV (*Max 1 mg infants/children and 2 mg adolescents*)
6. **Consider calling 911** or **CODE BLUE**

PEDIATRIC

LARYNGEAL EDEMA (INSPIRATORY STRIDOR)

1. Preserve IV access, monitor vitals
2. O_2 6-10 L/ min by face mask
3. **Epinephrine IV, IM,** or **auto-injector***
4. **Call 911** or **CODE BLUE**

BRONCHOSPASM (EXPIRATORY WHEEZE)

1. Preserve IV access, monitor vitals
2. O_2 6-10 L/min by face mask
3. Beta-2 agonist inhaler 2 puffs or nebulizer, can repeat x 3
4. If not responding or severe, add **Epinephrine IV, IM,** or **auto-injector***
5. **Call 911** or **CODE BLUE**

*EPINEPHRINE DOSING - PEDIATRIC (can repeat q5-15 min)

IV 0.1 mL/kg of 1mg/10ml slowly into IVF (max 1 mL). **IM** 0.01 mL/kg of 1mg/mL (max 0.3 mL). If between **15-30 kg** use pediatric (Jr) auto-injector; if >30 kg use adult auto-injector; if **<15 kg** follow institutional guidelines