UAB MEDICINE *Radiology Policy*

Title:	*Iodinated Contrast Media Management*				
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PURPOSE: To outline a process for safe use and management of iodinated contrast agents.

SCOPE: This policy applies to the Radiology Department of UAB Medicine Clinical Facilities as defined by the UAB Hospital Medical Staff Bylaws.

ASSOCIATED INFORMATION

A. Contrast Material or agents are stored per manufacturer's recommendations, not accessible to patients, and are considered prescription drugs.

B. Contrast reaction treatments are consistent with other practices and adhere to the guidelines of the American College of Radiology (ACR).

POLICIES

A. Administration of IV contrast will be under the supervision of the Radiologist/Physician and be given by the RN, Radiologist/Physician, Radiology resident**,** or Registered Radiologic Technologist who has met the requirements for the administration of IV contrast.

1. Per ARRT guideline, administration may also be monitored and supervised by a registered radiologic technologist.

   a. The Radiologist directs the technologist in the protocoled administration of contrast. If contrast is given outside of the limits of the protocol this decision will be made individually by the Radiologist/Physician. The Radiologist, radiology resident, radiology nurse or registered technologist in the department shall administer contrast and document the dose in Radnet Technical Comments.

   b. The appropriate dosage of contrast to be utilized is provided in the Contrast Media Protocol.

   c. A Radiologist, Radiologist designee, ACLS/BLS trained RN, or Physician shall be available to respond within 5 minutes any time contrast is being administered.

   d. An emergency crash cart or bag will be immediately available in all areas in which IV contrast is used.

   e. Prior to intravenous administration of contrast, the technologist will inquire about general risk factors that include, but are not limited to: previous reaction, severe allergy history, renal insufficiency, medication consisting of metformin, history of diabetes, known renal disease, and solitary or transplant kidney.

f. Technologist should ask patient about previous reactions to intravenous contrast or iodine. If patients inform the technologists of previous adverse reactions to intravenous contrast, the technologist will inform the radiologist. The technologist will also update the patient's electronic medical record after consulting with the radiologist. The radiologist will then determine if premedication is needed.

g. The technologist will ensure proper documentation to include patient weight, type and volume of contrast, route, site and rate of injection.

h. Technologist must get the radiologist approval prior to administering contrast if patient has received a dosage of contrast in the last 24 hours.

i. There are no strict maximum permissible doses of intravenous contrast, but in general, volumes over 250 mL of Omnipaque 350 or Isovue 370 in a 24-hour period should be avoided.

j. Prefer 2 hours NPO unless urgent/emergent indications.

Lab Values

A. To determine the risk of nephrotoxicity**,** Nephrogenic Systemic Fibrosis (NSF), or any contrast induced nephropathy (CIN) it is necessary to evaluate the serum creatinine value and the resultant estimated Glomerular Filtration Rate (eGFR).

B. If the patient's eGFR is 30mL/minute or less or if there is an increase in serum creatinine of 0.2 mg/dL or greater with the previous 48 hours, notify the radiologist. The radiologist will determine how to proceed.

1. **Inpatient**: A value within 72 hours prior to the scheduled contrasted examination is required if there are no other risk factors for contrast induced nephropathy (CIN).

a. In the event of a life-threatening emergency and the patient's renal function values are abnormal a radiology resident, fellow, or attending along with the ordering team chief resident, fellow, or attending have the authority to instruct the CT technologist to proceed with the administration of IV contrast. The CT technologist will notify the radiologist and document the serum creatinine value and estimated GFR in the Technical Comments, "Emergent exam per Dr. _____."

b. A radiology resident, fellow, or attending along with the ordering team chief resident, fellow, or attending may determine that the patient's condition is such that a CT cannot safely be delayed until a serum creatinine and estimated GFR is obtained. In this situation, the physician will authorize the technologist to proceed with the injection of IV contrast. The technologist will notify the radiologist and will document in Technical Comments, "Labs deferred per emergency order of Dr._____," noting the name of the requesting physician.

c. In the event of a code stroke and the patient renal function values are abnormal or doesn't have any labs, a radiology resident, fellow, or attending along with the neurology resident, chief resident, fellow, or attending have the authority to instruct the CT technologist to proceed with the administration of IV contrast. The CT technologist will document in Technical Comments, "Emergent exam per

Dr. _____.

2. **Outpatient**: A value within 90 days to the scheduled contrasted examination is required if there are no other risk factors for contrast induced nephropathy (CIN).

    a. At the discretion of a radiology resident, fellow or attending, an updated eGFR can be requested if the patient is 65 years old or older, even if they have no known or suspected renal dysfunction.

    b. If no value is available, upon arrival to the Radiology department, a serum creatinine and eGFR will be performed in the unit with the use of I-stat equipment provided by the UAB office of Bedside Testing. The referring physician order for the exam/procedure serves as the order to initiate necessary labs to perform the requested exam/procedure.

        i. An abnormal creatinine or eGFR obtained with iStat in Radiology may be the first indication of significant renal dysfunction. At the discretion of the radiologist, the referring physician or a member of the clinical team may be contacted, and documentation of such contact should be placed in the report. The abnormal value and any resulting alteration of contrast administration should be included in the report.

        ii. The lab at Acton Road Clinical will perform a blood test serum creatinine value.

3. When a CT order is placed, the ordering physician must initiate the contrast media protocol. By initiating the contrast media protocol, he or she is taking responsibility of the patient receiving contrast and any complications post contrast.

4. The ordering physician should not be asked to place a note in the chart prior to the patient receiving contrast when patients' lab are abnormal. Technologist will consult the Radiologist and once approved to proceed, document the Radiologist's name of approval.

Oral Contrast

A. Oral Contrast Agents will be administered according to the Enteric Contrast Protocol.

    1. Inpatient oral contrast is dispensed to the appropriate nursing unit for administration by the nursing personnel.

        a. Radiology personnel will label the containers with the following Information: patient name, medical record number, exam, contents, and date and time the oral was prepared. Radiology personnel will also label the cups being dispersed to the units with the same information.

B. The technologist will document the dosage of contrast given in Radnet Technical Comments.

C. If the exam is ordered STAT or the ordering physician doesn't want oral but the indication is listed on the Enteric Contrast Protocol, technologist must consult the radiologist.

Patients on Metformin

A. Review the patient's medication history to determine if they are currently taking metformin.

    1. In patients with no evidence of AKI (acute kidney injury) and with eGFR≥30 mL/min/1.73m2, there is no need to discontinue metformin either prior to or following the intravenous administration of iodinated contrast media, nor is there an obligatory need to reassess the patient's renal function following the test or procedure.

2. In patients taking metformin who are known to have acute kidney injury or severe chronic kidney disease (eGFR<30) or who are undergoing arterial catheter studies that might result in emboli (atheromatous or other) to the renal arteries, metformin should be temporarily discontinued at the time of or prior to the procedure, and withheld for 48 hours subsequent to the procedure and reinstituted only after renal function has been re-evaluated and found to be normal.

Renal Dysfunction Patients

The following actions are recommended for patients with risk factors for whom IV contrast administration is anticipated:

1. Do NOT place the patient NPO prior to examination unless required for another indication.
2. Encourage oral hydration the day prior to and the day of examination.
3. Allow only clear liquids beginning two hours prior to the examination.

A. Permanent Dialysis*

1. **Anuric patients** who make less than2 cups of urine/day (100 mL) with end-stage renal disease who do not have a functioning transplant kidney are not at risk for contrast-associated acute kidney injury because their kidneys are nonfunctional. The technologist can proceed with administering iodinated IV contrast without contacting the radiologist.
2. **Oliguric patients** who make more than 2.1cups of urine/day (100 mL) are considered non-anuric and are at risk of further renal damage. These patients should be treated as high-risk for contrast-associated acute kidney injury. The technologist should contact the radiologist prior to administering iodinated intravenous contrast. A discussion between the radiologists and referring physician about the need for iodinated IV contrast should be performed.

B. Temporary Dialysis or Continuous Renal Replacement Therapy (CRRT):

Many patients on temporary hemodialysis or CRRT are in acute renal failure. These patients should be treated as high-risk for contrast-associated acute kidney injury. The technologist should contact the radiologist prior to administering iodinated intravenous contrast.

A discussion between the radiologists and referring physician about the need for iodinated IV contrast should be performed.

***There is no need to initiate dialysis immediately after receiving IV contrast.**

Management of Contrast Reactions in Radiology

A. Adverse reactions to contrast media can be categorized as:

1. **Mild -** Signs and symptoms are self-limited without evidence of progression.
    a. E.g., itching, rash, hives, swelling of eyes or face, nasal stuffiness, headache, shaking.
2. **Moderate -** Signs and symptoms are more pronounced and commonly require medical management. Some of these reactions have the potential to become severe if not treated.
    a. E.g., hypertension, mild hypotension, tachycardia, bradycardia, dyspnea, mild laryngeal edema, bronchospasm, wheezing.

3. **Severe -** Signs and symptoms are often life-threatening and can result in permanent morbidity or death if not managed appropriately.

    a. Severe or rapidly progressing laryngeal edema, clinically manifest arrhythmias, convulsions, profound hypotension, unresponsiveness, cardiopulmonary arrest.

B. Shellfish allergy and topical iodine are not a risk factor for reactions, so premedication is not required solely for this history.

C. If the patient's prior reaction(s) was/were mild and have received the appropriate premedication, the technologist can proceed with exam without consulting the Radiologist. All prior moderate, severe, indeterminate reactions, or deviations from the routine premedication protocol should be consulted with a radiology resident, fellow, or attending.

D. The risk of such contrast reactions is most likely to occur in patients with prior reactions to contrast and patients with asthma. Patients with a significant history of allergies to other agents, particularly other medications, are also at increased risk. For treatment plan, please refer to Contrast Reaction Cards posted within the department.

1. **Outpatients** with a prior allergic-like or unknown-type contrast reaction to the same class of contrast medium should undergo a 12-hour premedication regimen as detailed below. A radiology resident, fellow, or attending may override this requirement as needed for outpatients with prior mild contrast reactions.

METHYLPREDNISOLONE 32 mg PO 12 and 2 hours prior
+/- DIPHENHYDRAMINE 50 mg PO 1 hour prior

2. **Emergency Department Patient or Inpatient** with a prior allergic-like or unknown-type contrast reaction of the same class of contrast medium in whom use of the 12-hour premedication is anticipated to adversely delay care decision or treatment typically undergo a 5 hour accelerated IV premedication regimen as detailed below.

METHYLPREDNISOLONE 40 mg IV 5 hours and 1 hour prior
Or
HYDROCORTISONE 200 mg IV 5 hours and 1 hour prior
+/- DIPHENHYDRAMINE 50 mg IV 1 hour prior

    a. In emergent clinical situations, the urgency of a contrast-enhanced exam may outweigh the benefits of prophylaxis, necessitating that contrast medium be administered to a patient in the absence of premedication. This determination should be made jointly by the radiologist team, the referring service, and potentially the patient (if feasible). In such cases, a team of individuals skilled in resuscitation and ACLS certified should be present at the CT scanner during the injection to monitor for and appropriately manage any developing reaction.

3. A patient with a prior allergic-like or unknown-type contrast reaction who is **already on a corticosteroid regimen** that is similar in dose to the 12-hour or 5-hour regimens may not need additional premedication. Technologists should obtain information on the current corticosteroid regimen and consult with the radiologist to see if an additional premedication regimen is needed.

4. Technologist should document premedication information into technical comments or documentation on the contrast questionnaire.

5. See Contrast Reaction card below.

E. Annual Adverse Drug Reaction competency is required for all technologists who administer contrast.

F. **Contrast Desensitization**

1. There is a set desensitization protocol/process that is handled by pharmacy and an allergist, who administers individual doses of diluted contrast to desensitize the patient prior to the study.
2. The contrast desensitization process should be completed for each CT exam that is ordered with contrast.
3. Technologist will consult the Radiologist to make them aware of the patient and the process being taken once the technologist receives the order.
4. Technologist will verify the protocol is complete based on documentation in chart or consulting the ordering physician.
5. A physician from the team must be present at the time of the scan. Therefore, this process can be performed during anytime of the day (i.e., regular hours and after hours).
6. Technologist will document "Contrast Desensitization Process due to contrast allergy" in technical comments.

Contrast Extravasation

A. All staff and resident radiologists, fellows, nurses, technologists and other health care professionals involved in caring for patients having intravascular iodinated contrast procedures and involved in caring for patients who have experienced extravasation of iodinated contrast shall be aware of the risk factors that are associated with increased chance of contrast extravasation.

B. When a contrast extravasation has occurred, the technologist shall notify the radiologist. The approximate volume of extravasation and site should be estimated and recorded.

1. The radiologist or designee shall notify the referring physician or designee of any significant contrast extravasation.
2. A report of the extravasation incident shall be completed by the technologist within Trend Tracker. All significant volume extravasations or those with resultant symptoms should be documented; the documentation shall include observations, interventions and follow-up. Specific items to be noted are listed below. The radiologist should also note the extravasation in the dictated report.

    a. Patient Name
    b. Patient MRN
    c. Date, time of episode and procedure during which it occurred.
    d. Type and estimated volume of contrast extravasated
    e. Gauge of needle/ rate of injection
    f. Site of extravasation
    g. Symptoms/Signs include:
        i. **Pain**: yes/no, pain increasing or decreasing
        ii. **Appearance at site**: swelling, redness, any changing skin color, skin blistering, is site hard to the touch, hot or cold to touch
        iii. **Altered perfusion**: are distal pulses intact or diminished, is there decreased capillary refill, and are there signs of nerve compression
        iv. **Treatment**, if any (if not, document no treatment was judged necessary)
        v. **Any consultation** (e.g., Plastic Surgery)
        vi. **Follow-up procedures** to be followed, if any
        vii. Name of referring physician notified

Procedural Steps/Critical Elements

A. Once an extravasation of contrast has been identified, treatment, if needed, should begin immediately.

B. Typically, the initial treatment should include:

1. Elevating the affected extremity above the heart level.

2. Application of ice packs or cool compresses to the site for a period of 10-20 minutes, and then intermittently. This may be followed with or substituted by warm packs if that is comfortable for the patient. Warm compresses should be used if cool compresses are contraindicated (i.e., Raynaud's disease).

C. Observations should include:

1. Increasing swelling or pain.

2. Altered skin perfusion.

3. Skin blistering.

4. Change in neurological exam (numbness, weakness of affected extremity.

D. Following initial assessment and initial treatment (if needed) in the Department of Radiology, follow-up will be arranged as needed by that unit team for all inpatients.

E. Depending on symptoms, the radiologist or designee based the clinical team will determine if an outpatient requires additional observation. Due to the risk of compartment syndrome, a surgical consultation may be required in cases of high dose extravasation. Significant symptoms of note include:

1. Increasing swelling or pain

2. Altered skin perfusion

3. Skin blistering

4. Increasing pain or worsening physical exam

F. Discharge Instructions for Contrast Extravasation

1. Discharge instructions should be given to the patient or an accompanying person (if the radiologist determines the patient may not be capable of understanding or following those instructions).

CONTRAST EXTRAVASATION MANAGEMENT SUMMARY

Elevate arm.
Cool compress, remove rings.
Observe.
Consider surgical consultation for decreased perfusion, sensation, strength, active range of motion, or increasing pain.

CONTRAST REACTION CARD

ACR American College of Radiology

ADULT CODE BLUE #: 4-1010

Modified by UAB Department of Radiology 8/22/2024

EXAMPLE PREMEDICATION REGIMENS

Outpatient:
Methylprednisolone 32 mg PO 12, 2 hrs prior +/- Benadryl 50 mg PO 1 hr prior.

Inpatient/Emergent Cases
Hydrocortisone 200 mg **or** Methylprednisolone 40mg IV 5 hrs and 1 hr prior and Benadryl 50 mg IV 1 hr prior.

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 FOLLOWING CONTENT IS ADMINISTRATIVE AND IS NOT PART OF THE POLICY.

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CMS:		**TJCH:**	**MM**
Cross-References (CR)			
**Management of Medical Emergencies(CR)* **Protocol: Contrast Media(CR)*		**Standing Order Treatment of Contrast Reactions in Radiology(CR)* **Standing Order Vascular Access and De-Access for the Radiology Department (CR)*	

ATTACHMENTS: None

INTERDISCIPLINARY COLLABORATION

Pharmacy and Therapeutics Committee	10/2/24
Hospital Administration/ Department(s)/Committees	Endorsement Date

Tracking Record

Action				Reasons for Development/Change of Policy							Change in Practice		
Devel-oped	Refor-matted	Re-viewed	Revised	Re-quired Review	Rele-vance	Ethics	Legal	New Knowl-edge	QA/I	Risk	No	Yes	Comment/ Explanation of Impact
		X	X										
Supersedes:	Formerly IV Contrast Media, R#17, 10/07/02. Combined: Venipuncture Procedure in Radiology, kra26 04/28/003/02/153 and Injection Procedure in Radiology kra11 04/28/03, IV Contrast Media, kra#7 05/10/04. IV Contrast Media Use in Radiology, kra7r 08/07/06. Contrast Media Management in Radiology, kra7r2 11/05/07, 01/05/09, 01/03/12; Intravenous Contrast Media Management in Radiology 12/01/14; 3/2/15, 6/21/17, *Iodinated Contrast Media Management* 4/24/20, 9/22/22, 4/20/23												
File Name:	Iodinated Contrast Media Management R# 36r7												
REVISIONS: Consistent with Joint Commission Standards, this policy is to be reviewed at least every 3 years and for changes in practice.													