UC San Diego Health	POLICY/PROCEDURE/GUIDELINE TITLE: **WD1111 INTRAVENOUS CONTRAST MEDIA GUIDELINES – ADULT**
Related to: ( ) Medical Center Policy (MCP) (X) The Joint Commission (TJC) (X) California Dept. of Public Health (CDPH) (x) Centers for Medicare and Medicaid Services (CMS) ( ) UCSD Radiation Safety (x) Title 17 ( ) Pharmacy Services ( ) Infection Control ( ) Other	Unit/ Department of Origin: **Imaging Services** Modality: ( ) Administrative (X) Clinical Approved by: Imaging Services Executive Effective/ Approved Date: 2006 Revised/ Reviewed Date: 6/18/2014, 3/28/2016, 3/21/2018, 6/19/2019, 11/16/2022, 6/17/2023

POLICY STATEMENT:

To establish guidelines for the prevention, diagnosis and treatment of contrast media reactions after intravascular injection, and to reduce the chance of inducing contrast media nephrotoxicity.

Responsible Parties

Physicians, Medical Trainees, Radiologic Technologists, Nurses, Students, Technical Assistants

PROCEDURE:

I. Intravenous Access

When the power injector is utilized, a 22g or larger needle/cannula 1.25” to 1.5” length is preferred for IV contrast injection.

It is advisable to obtain a good backflow of blood to test adequate positioning of the needle in the vein. Adequate position of the cannula in the vein is checked again, by flushing IV with 10mL of saline flush into the vein before delivering the injection of contrast.

Use of existing access routes:

1. **Only power-injection rated PICC** or central lines are approved for power injection.
2. Pre-existing IV lines will be flushed with 10mL of saline flush, to ensure patency, prior to contrast injection.

3. Port-a-cath to be accessed by R.N., L.V.N under R.N. supervision, or Physician, with training. If no trained staff is available, send patient to the Infusion Center or Cancer Center.
4. Consult Physician/RN prior to using any central line catheters. If not power rated, the injection must be hand injection.

IIa. Prevention of Nephrotoxicity with Iodinated Contrast Media

Requirements for CREATININE and Glomerular Filtration Rate (GFR) testing **prior** to contrast media injections (for the purpose of reducing the chance of contrast-induced renal failure)

A. Patients ≥ 60 years of age are to have a recent (**within 6 weeks**) serum Creatinine prior to contrast injection. If there has been significant interval change in the patient's condition, a more recent serum Creatinine should be obtained. Patients currently receiving dialysis do not need labs prior to receiving IV contrast for CT

B. Patients **<** 60 years of age do **not** require labs, **UNLESS** the patient has one or more of the following:
- History of renal disease or surgery on the kidneys: Including dialysis, kidney transplant, single kidney, kidney surgery
- Diabetes mellitus
- History of Hypertension
- Renal Cancer
- Recently (within 3 months) had chemotherapy
- Patients currently receiving dialysis do not need labs prior to receiving IV contrast for CT

C. When clinical findings or history raise doubt about the patient's current renal function, a physician will order a STAT Creatinine/eGFR test which should be done prior to injecting contrast media.

D. IODINATED CONTRAST AGENTS (Both ionic and non-ionic contrast agents): If the GFR is **<** 30 ml/min/1.73m^2, the ordering provider will be contacted by the radiologist to determine whether a contrast-enhanced imaging study must be done to obtain critical medical information. Adequate patient hydration must be maintained (See section E).

The ordering provider might consider therapies to mitigate the impact of contrast on the renal function. Clinical trials show little benefit, but the following options are available to the ordering provider

a. Mucomyst (N-acetylcysteine) Orally, 600 mg twice daily on the day before and the day of the contrast imaging study,

OR

b. Bicarbonate 150 mEq in 1000 ml D5W, IV, 3mL/kg bolus, then 1 mL/kg/hr x 6 hours.

For patients with end stage renal disease who are on dialysis, current literature indicates there is no lasting harm to receiving contrast. If the study is deemed medically necessary, the study should be done with contrast.

E. Adequate patient hydration is important to minimize the risk of nephrotoxicity. **No patient receiving radiographic contrast should have NPO orders unless they are being properly hydrated with IV fluids.** Patients having a CT with oral contrast should have nothing solid 4 hours prior to the exam, but clear liquids are allowed up until the exam. If the patient cannot take adequate oral fluids, consider adequate intravenous hydration.

F. All patients should be encouraged to drink lots of fluids for several hours after receiving contrast material.

G. Patients taking **Metformin** (such as ACTOplusmet, Avandamet, Janumet, Fortamet, Glucovance, Glucophage, Glumetza, Riomet, Metaglip, Jentadueto, Kombiglyze, PrandiMet) for whom renal function data are available (see criteria A and B above):

1. In patients with **eGFR < 30 mL/min/1.73m^2**, hold metformin for 48 hours following the procedure. The eGFR should be re-evaluated 48 hours after the imaging procedure in which the patient received contrast, and metformin can be restarted if renal function is stable.

2. In patients with **eGFR between 30-60 mL/min.1.73m^2**, hold metformin for 48 hours following the procedure. 48-hour follow-up is not necessary.

3. In patients with eGFR **≥ 60 mL/min/1.73m^2**, there is no need to discontinue metformin or perform 48-hour follow-up.

H. No other medications should be stopped for patients received radiographic contrast media**. Important, unless specifically instructed by their physician, patients should continue taking their regular prescribed medications for diabetes (Insulin, etc), cardiac, and other medical conditions.**

IIb. Use of Gadolinium Based Contrast Agents in Patients with Renal Insufficiency or Failure

Requirements of CREATININE and GFR testing **prior** to contrast medical injections:

Gadolinium-based contrast agents using a standard dose (0.2 ml/kg [0.1 mmol/kg]) are very safe in patients with normal renal function. However, Gd-based contrast agents have been implicated in causing Nephrogenic Systemic Fibrosis (NSF). Reported cases

were patients with severe renal dysfunction (on dialysis or eGFR < 30 ml/min), and most patients received double or triple doses of gadodiamide (Omniscan, Amersham/GE). Therefore, we have set the following guidelines for giving Gd-based contrast agents.

Requirements for CREATININE and GFR testing **prior** to contrast media injections:

A. Class II Agents (eg Multihance and Gadavist) as defined in the ACR Manual on Contrast Media:

1) Single dose: No screening of any kind is necessary prior to single dose administration of these agents as there is no documented risk of harm. Patients on dialysis do not need to alter their dialysis schedule and may be imaged before or after dialysis

2) 1.5 -2x Dose: If deemed necessary for Cardiac MR, the renal screening guidelines used for Class I or III agents apply (see section llb.B)

B. Class I or III Agents (eg Eovist):

1. Patients > 60 years of age are to have a recent (within 6 weeks) serum Creatinine and GFR prior to contrast injection. If there has been significant interval chancel in the patient's condition, a more recent serum Creatinine and GFR should be obtained.
2. Patient < 60 years of age do not require labs, UNLESS the patient has one or more of the following.
    - History of renal disease or surgery on the kidneys: Including dialysis, kidney transplant, single kidney, kidney surgery
    - Diabetes mellitus
    - History of Hypertension
    - Renal Cancer
    - Recently (within 3 months) had chemotherapy

3. If GFR is $\geq$ 30 ml/min, then Class I/III agents can be given. If GFR is < 30 mL/min, **DO NOT** give unless in the judgement of the radiologist, the anticipated benefits exceed the potential risks. If both the physician and referring physician decide that Class I/III agent contrast-enhancement is necessary, it can be given with the following precautions.
    1. Discuss the risks, benefits, and alternatives with the patient.
    2. Obtain signed consent from the patient. If patient is unable to give consent, follow Medical Center policy regarding informed consent. The

physician must write the order for gadolinium, including the specific agent, dose, and reason for taking the risk.

4. **Patients who are on dialysis:** The clinical indications for the study should be assessed. If Class I/III is not necessary, a non-contrast (e.g., MRI) or Class II agent MR contrast study should be performed, and the referring physician should be informed about the change in the ordered exam. If Class I/III might be helpful, the referring physician should be called to discuss the risks and benefits of giving this to the patient. If both the physician (e.g., radiologist) and referring physician decide that contrast agent scan is necessary, it can be given. It is not necessary to change the dialysis schedule because of the contrast injection.

III. Allergic Type Contrast Reaction Prevention

A. For patients receiving iodinated or gadolinium contrast media, obtain a complete history of any prior reactions to dyes or contrast used in X-ray, CT, or MRI.
   1. Contrast screening question responses are documented in the electronic medical record by a scheduler when the examination is scheduled.
   2. The technologist or licensed staff is to review the screening with the patient prior to injection.
   3. The screening process is documented in the patient's medical record. The Technologist is to complete the information regarding type and volume of contrast, and any contrast reaction.

B. For patients receiving iodinated or gadolinium contrast media, the following guidelines are to help prevent contrast reactions:
   1. Patients with history of
      - Severe contrast reaction (types of reactions deemed severe are delineated below in Section IV a). to contrast from one modality and are to receive contrast in another modality (eg. Allergy to CT contrast and now receiving MR contrast) do NOT require premedication but will be imaged on a hospital-based scanner, unless supervised by a provider (MD, DO, RN, PA)
   2. Pre- Treatment to prevent or lessen reactions should be given under the following guidelines:
      - Prior moderate or severe contrast reaction who will be receiving that same type of agent (i.e. allergy to CT contrast and will receive CT contrast again)
      - Severe asthmatics with active wheezing or acute shortness of breath

C. For patients requiring pre-treatment, consider calling the referring physician to discuss the following options:

1. Perform a non-contrast study only,
2. Perform an alternative imaging study (if available), or
3. Pre-treat according to the protocol below before giving the contrast agent

Note: If an asthmatic patient is under the care of a pulmonary physician or if a patient has a history of psychotic reaction to steroids, check with their physician prior to prescribing steroids.

Standard Pre-Medication Dosing:

Medication	Type	Dose	Dose Time
Prednisone	Steroid	50 mg p.o.	13 hrs, 7 hrs, and 1 hr prior to injection
Diphenhydramine	Antihistamine	50 mg p.o.	1 hr prior to injection

a. If a patient arrives without being pre-treated, it is preferable to reschedule the exam to allow steroid treatment. Alternative options are at the discretion of the physician. If there is a history of moderate to severe contrast reaction, another procedure (e.g MRI, non-contrast CT, US or Nuclear Medicine) should be considered as an alternative.

b. Patients will be required to arrange transportation so they do not have to drive after taking premedication.

Alternate IV pre-medication dosing: *(To be used if patient requires pre-medication for contrast allergy, but exam needs to be done urgently.)*

Medication	Type	Dose	Dose Time
Hydrocortisone OR Methylprednisolone	Steroid	200 mg IV 40 mg	5 and 1 hour prior to exam
Diphenhydramine	Antihistamine	50 mg P.O. or IM or IV	1 hour prior to exam

D. Do not remove the I.V. line from the patient until the exam is completed and it is confirmed that the patient is not experiencing any reaction to the contrast injection. If there is an extravasation, refer to the Extravasation Policy.

E. The emergency equipment will be checked daily.

F. **Documentation:** All injections will be documented in the Radiology Information System (patient notes) and written on the bottom portion of the IV contrast questionnaire and/or in the patient progress notes. The questionnaire and if used, the progress notes are to be included in the patient's Medical Records. The documentation must include:

1. Date and Time of injection
2. Contrast type utilized
3. Pre-treatment if given
4. Volume injected
5. Any reactions
6. Any Treatments

G. **Any adverse reactions to contrast (including hives) will be documented in enterprise electronic health record (i.e EPIC), in any other medical record used in the area (e.g., the (RIS) Radiology Information System (Patient Notes)), in an incident report ("iREPORT"), and in the dictation of the exam/procedure.**

IV. DIAGNOSIS AND MANAGEMENT:

Look for any signs of contrast reaction, no matter how mild they may seem. **The physician must initiate medications, if needed, and must not wait for ED, Rapid Response of Code Blue Team**. The sooner the medications are administered, the greater likelihood that they will have effect. Have a low threshold to give Diphenhydramine.

A. Management of Contrast Reaction:

Severity of Reaction	Symptoms	Treatment
Physiologic Reactions to contrast (Normal)	Nausea, anxiety, altered taste, headache, dizziness, warmth (heat), pallor, flushing	**No treatment needed**
Mild	• Limited urticarial (hives)/itching • Limited cutaneous edema • Limited itchy/scratchy throat • Nasal congestion/sneezing/ conjunctivitis/runny nose	**Consider Diphenhydramine 25 – 50 mg PO** **If needed, consider Diphenhydramine 12.5 – 50 mg IV/IM. If there is no IV access, Diphenhydramine can be given IM.** **Disposition:** **- Home or hospital room if recovers** **- ED or RRT if patient worsens/plateaus**
Moderate (moderate degree of clinically evident signs/symptoms)	• Diffuse urticarial (hives)/itching • Diffuse redness, stable vitals • Facials edema w/o SOB • Throat tightness or hoarseness w/o SOB • Wheezing/bronchospasm, mild or no hypoxia	• **Diphenhydramine 50mg IV/IM** • **Consider Epinephrine (EpiPen) 0.3mg/0.3mL IM.** Consider age & risk of cardiovascular disease before giving. IM route is best but can also give subQ. • Disposition: ❖ Home or hospital room if recovers without Epinephrine ❖ ED or RRT if patient worsens/plateaus
Severe (Life-threatening with severe signs/symptoms)	• Diffuse edema or facial edema w/SOB • Diffuse redness with low BP • Laryngeal edema with stridor/hypoxia • Wheezing/bronchospasm with hypoxia • Anaphylactic shock (low BP, high HR) • Altered mental status from	• **Epinephrine (EpiPen) 0.3mg/0.3mL IM** • **Diphenhydramine 50mg IV/IM** • **Code Blue (*Call x 6111 for Code Blue)**

	decrease perfusion	

B. Patients experiencing reaction will be monitored according to the severity of the reaction.
   1. If there are few hives only, the patient may be discharged from the department as soon as the hives begin to fade, and the patient is medically stable (See Table above).
   2. If the reaction is more severe follow the treatment listed above.

C. Management of Vagal Reaction:

Reaction	Treatment (specific)	Comments
Hypotension with Bradycardia (Vagal Reaction)	• Monitor vital signs • Legs up 60 degrees or more (preferred) or Trendelenberg position • Secure airway; give O_2 6-10L/min(via mask) • Secure IV access; push fluid replacement with **Ringer's Lactate** or **NS** if necessary • Give **Atropine** 0.6–1 mg IV slowly if patient does not respond quickly to above. • **Repeat Atropine** up to a total dose of 0.04 mg/kg (2-3 mg) in adults.	*Call **Code Blue** and/or transfer to Emergency Department for further care.*

DOCUMENTATION:

A. For mild, requiring medical intervention, to severe contrast reactions:
   - **Physician** will document the reaction on a Progress Note for the patient's medical record.
   - **Technologist** or licensed staff will document the reaction in other medical records (i.e., Epic and RIS) used and complete an event report in the health systems event reporting system(i.e., iReport).

B. Patient Questionnaire Form insertion into the patient's Medical Records Chart after all information is documented by scanning into HER.

C. Dictated Reports: The Physician must include:
   1. Contrast type and volume utilized
   2. Any reaction and treatment

VI. Giving Contrast to Breast-Feeding Mothers

A. As stated by the American College of Radiology and the American Academy of Pediatrics, breast feeding is not a contraindication for giving contrast agents.

B. Less than 1% of contrast agent is secreted in breast milk. Less than 1% ingested by baby is absorbed in the intestine. The final amount of contrast in the baby's blood is less than 1% of dose infant would get for an imaging study.

VII. Pregnant & Potentially Pregnant Patients

A. Pregnancy is not an absolute contraindication for giving contrast agents. However, caution is advised during pregnancy, especially the 1st trimester.

VIII. Emergencies

If the information from the contrast imaging study is critical for patient care, the contrast agent may be given without consideration of allergy, renal function, or pregnancy.

IX – Pediatric contrast dose guidelines

A. Pediatric contrast use must be approved by the Radiologist
B. Only pediatric approved contrast media will be used (e.g. Omnipaque 300)
C. Contrast dose is based on weight per manufacturer specifications (e.g. Omnipaque 300 is 1-2mL/Kg).
D. Contrast injections for neonates and infants should be done using "hand-injection."

REFERENCES:

1. American College of Radiology - Manual on Contrast Media
2. http://www.biomedcentral.com/1471-2342/6/2 (Delaney A, Carter A, Fisher M: The prevention of anaphylactoid reactions to iodinated radiological contrast media: a systematic review. BMC Medical Imaging 2006; 6:2)