VOLUME 4: MEDICAL SERVICES	Effective Date: 6/1/12
CHAPTER 30: MEDICAL IMAGING	Revision Date(s):
4.30.3 CONTRAST MEDIA	Attachments: Yes ☒ No ☐

I. PROCEDURE OVERVIEW

The California Correctional Health Care Services (CCHCS) Medical Imaging Services (MIS) personnel or contractors who administer contrast media must be informed of contraindications for all types of contrast, shall be proficient to recognize the variety of adverse events that may occur, monitor the patient-inmate and institute the appropriate measures should the treatment of an adverse reaction become necessary.

MIS staff shall be aware of and adhere to the following guidelines for the safe use of all types of contrast media. Information contained in this policy is referenced directly from the ACR Manual on Contrast Media, Version 7, 2010.

II. PURPOSE

To ensure that the use of contrast media is appropriate for the patient-inmate and the indication, to minimize any adverse effects, and to be fully prepared to treat adverse effects should they occur.

III. RESPONSIBILITIES

The Chief Executive Officer of healthcare is responsible for the implementation of this policy at the local level.

IV. PROCEDURE

A. Oral and Rectal Contrast

Administration of oral and rectal contrast can only be performed in required protocol as reviewed and approved by a radiologist. If a referring physician requests NO oral or rectal contrast for a patient, it shall be noted in the Reason and Symptoms for the interpreting radiologist's awareness.

B. Injection Contrast

1. A full patient-inmate history shall be provided to the radiologist to ensure the use of appropriate contrast media.
2. MIS shall use CCHCS pharmacy approved non-ionic, iodine-based, water soluble, radiopaque contrast medium.
3. Patient-inmates shall be screened for risk factors that could possibly indicate an increased likelihood of a subsequent contrast reaction or adverse health effect:
   a. History of significant allergies to any food or medication
   b. Asthma
   c. Cardiac Status
   d. Anxiety
   e. Paraproteinemias, particularly multiple myeloma

4. All patient-inmates will have a creatinine clearance test performed prior to injection of contrast agents to ensure lab values are within recommended ranges. (See IMSP&P Policy 4.30.2 Medical Imaging Services Departmental Safety Guidelines.)
5. Any patient-inmate with a prior history of allergic reaction requiring premedication will not be scanned on-site and shall be scheduled at an off-site medical facility. All positive risk factors found on the screening questionnaire or by verbal history shall be reviewed with the radiologist prior to injection of contrast.
6. Emergency Management
   a. Refer to the Emergency Medical Response System policy, located in IMSP&P, Volume 4, Chapter 12-A.

C. Reporting

1. Patient-inmate records will be documented when there is a contrast reaction.
2. Any future ordering of contrast procedures will require review by the radiologist or referring physician with approval prior to scheduling future contrast procedures.

D. Extravasation of Contrast Media

1. Contrast extravasation is described as the unintentional leakage of contrast media into subcutaneous tissue. MIS staff shall be aware of the potential extravasation, including compartment syndrome, skin sloughing and necrosis.
2. All extravasation events shall be reported to the primary care provider and the consulting radiologist, in addition to being documented in the patient-inmate's medical record.
3. All treatment shall be documented in the medical records, as well as in the radiologist's interpretation report of the obtained study.
4. Clinical follow up by a nurse or physician for a period of several hours is essential for all patient-inmates in which an extravasation occurs.
   a. Raise the patient-inmate's arm above the level of the heart, as much as you can, until the swelling goes down.
   b. For the first 24 hours, apply ice pack to the swollen area for 15 minutes every 1 to 2 hours until the swelling goes down.
5. Patient-inmates should be reevaluated at twenty-four (24) and forty-eight (48) hours post injection for skin inflammation. Documentation shall be noted in the medical records.
6. A surgical consultation should be obtained immediately for any patient-inmate with any of the following:
   a. Progressive swelling or pain
   b. Altered tissue perfusion as evidenced by decreased capillary refill
   c. Change in sensation in the affected limb
   d. Skin ulceration or blistering

E. Contrast Induced Nephropathy

1. Nephrotoxicity is attributed to radiologic iodinated contrast media where there has been a sudden deterioration in renal status after the administration of a contrast media and no other etiology appears likely from the clinical records.
2. Patient-Inmate Considerations:
   a. Renal insufficiency (also consider history of renal tumor, transplant or nephrectomy)
   b. Prior Renal surgery
   c. Multiple Myeloma
   d. Diabetes
   e. Lab values for blood urea nitrogen and creatinine
   f. Metformin or metformin-containing drugs
      1) Trade names of metformin containing medications:
         - Glucophage
         - Glucophage XR
         - Fortamet
         - Glumetza
         - Riomet
         - Glucovance
         - Metaglip
         - ActoPlus Met
         - Avandamet
3. The Radiologic Technologist shall:
   a. Ensure all patient-inmates have completed the pre-examination questionnaire and provided signed consent for the procedure.
   b. Positive risk factors will be reviewed with the radiologist prior to injection of IV contrast to determine if contrast can be administered.
   c. Verify current lab tests have been performed and are within recommended values.
   d. Refer to the Inmate Medical Services Policies and Procedures, Volume 4, Chapter 30, Policy 9, Mobile Imaging and Specialty Services, for metformin protocol information.
   e. Instruct the patient-inmate to keep adequately hydrated post-examination.

F. Gadolinium-Based Contrast Medium

1. MIS shall use CCHCS pharmacy approved Gadolinium-Based Contrast Medium (GBCM). GBCM are tolerated by the majority of patients injected. Pharmaceuticals are not completely devoid of risk, however, severe allergic type reactions are considered to be .001 percent to .01 percent.
2. Any patient-inmate with a prior history of allergic reaction from gadolinium and requiring premedication will not be scanned on-site and shall be schedule at an off-site

medical facility. All positive risk factors found on screening questionnaire or by verbal history shall be reviewed with the radiologist prior to injection of contrast.

3. Should a severe reaction occur, the treatment for reaction to GBCM is the same as Iodinated Contrast Media.
4. Care must be taken to follow the Emergency Response Procedure specific to the magnetic resonance unit. *Warning: Avoid the introduction of any ferro-magnetic objects into the magnet area.*

G. Nephrogenic Systemic Fibrosis

1. Nephrogenic Systemic Fibrosis must be a consideration when an order is placed for magnetic resonance with GBCM. Risk factors must be evaluated and the use of GBCM should be avoided in patient-inmates with increased risk factors.
2. Any patient-inmate found either through screening questionnaire or verbal history to have severe renal impairment, chronic kidney disease or acute kidney injury, will have their history and calculated estimated glomerular filtration rate (GFR) reviewed by the radiologist prior to injection of contrast.

V. ATTACHMENTS

- Attachment A, Table 3, Categories of Reactions
- Attachment B, Table 6, Management of Acute Reactions in Adults

VI. REFERENCE

- California Code of Regulations, Title 22, §§ 79713, 79715, 79717.
- Inmate Medical Services Policies and Procedures, Volume 4, Chapter 30, Policy 9, Mobile Imaging and Specialty Services
- Inmate Medical Services Policies and Procedures, Volume 4, Chapter 12-A, Emergency Medical Response System
- ACR Manual on Contrast Media, Version 7, 2010, http://www.acr.org/SecondaryMainMenuCategories/quality_safety/contrast_manual/FullManual.aspx

ATTACHMENT A

Table 3
Categories of Reactions

Classification of Severity and Manifestations of Adverse Reactions to Contrast Media

Mild

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:

- Nausea, vomiting
- Cough
- Warmth
- Headache
- Dizziness
- Shaking
- Altered taste
- Itching
- Pallor
- Flushing
- Chills
- Sweats
- Rash, hives
- Nasal stuffiness
- Swelling: eyes, face
- Anxiety

Treatment: Requires observation to confirm resolution and/or lack of progression but usually no treatment. Patient reassurance is usually helpful.

Moderate

Signs and symptoms are more pronounced. Moderate degree of clinically evident focal or systemic signs or symptoms, including:

- Tachycardia/bradycardia
- Hypertension
- Generalized or diffuse erythema
- Dyspnea
- Bronchospasm, wheezing
- Laryngeal edema
- Mild hypotension

Treatment: Clinical findings in moderate reactions frequently require prompt treatment. These situations require close, careful observation for possible progression to a life-threatening event.

Severe

Signs and symptoms are often life-threatening, including:

- Laryngeal edema (severe or rapidly progressing)
- Profound hypotension
- Clinically manifest arrhythmias
- Convulsions
- Unresponsiveness
- Cardiopulmonary arrest

Treatment: Requires *prompt* recognition and aggressive treatment; manifestations and treatment frequently require hospitalization.

Note: The above classifications (mild, moderate, severe) do not attempt to distinguish between allergic-like and non-allergic-like reactions. Rather, they encompass the spectrum of adverse events that can be seen following the intravascular injection of contrast media.

ATTACHMENT B

Table 6
Management of Acute Reactions in Adults

Urticaria

1. Discontinue injection if not completed
2. No treatment needed in most cases
3. Give H_1-receptor blocker: diphenhydramine (Benadryl®) PO/IM/IV 25 to 50 mg.

   If severe or widely disseminated: give alpha agonist (arteriolar and venous constriction): epinephrine SC (1:1,000) 0.1 to 0.3 ml (=0.1 to 0.3 mg) (if no cardiac contraindications).

Facial or Laryngeal Edema

1. Give O_2 6 to 10 liters/min (via mask).
2. Give alpha agonist (arteriolar and venous constriction): epinephrine SC or IM (1:1,000) 0.1 to 0.3 ml (=0.1 to 0.3 mg) or, especially if hypotension evident, epinephrine (1:10,000) slowly IV 1 to 3 ml (=0.1 to 0.3 mg).

   Repeat as needed up to a maximum of 1 mg.

   If not responsive to therapy or if there is obvious acute laryngeal edema, seek appropriate assistance (e.g., cardiopulmonary arrest response team).

Bronchospasm

1. Give O_2 6 to 10 liters/min (via mask).

   Monitor: electrocardiogram, O_2 saturation (pulse oximeter), and blood pressure.
2. Give beta-agonist inhalers (bronchiolar dilators, such as metaproterenol [Alupent®], terbutaline [Brethaire®], or albuterol [Proventil® or Ventolin®]) 2 to 3 puffs; repeat as necessary. If unresponsive to inhalers, use SC, IM, or IV epinephrine.
3. Give epinephrine SC or IM (1:1,000) 0.1 to 0.3 ml (=0.1 to 0.3 mg) or, especially if hypotension evident, epinephrine (1:10,000) slowly IV 1 to 3 ml (=0.1 to 0.3 mg).

   Repeat as needed up to a maximum of 1 mg.

   Call for assistance (e.g., cardiopulmonary arrest response team) for severe bronchospasm or if O_2 saturation < 88% persists.

Hypotension with Tachycardia

1. Legs elevated 60 degrees or more (preferred) or Trendelenburg position.
2. Monitor: electrocardiogram, pulse oximeter, blood pressure.
3. Give O_2 6 to 10 liters/min (via mask).
4. Rapid intravenous administration of large volumes of Ringer's lactate or normal saline.

   If poorly responsive: epinephrine (1:10,000) slowly IV 1 ml (=0.1 mg)

   Repeat as needed up to a maximum of 1 mg

   If still poorly responsive seek appropriate assistance (e.g., cardiopulmonary arrest response team).

Hypotension with Bradycardia (Vagal Reaction)

ATTACHMENT B

1 Secure airway: give O_2 6 to 10 liters/min (via mask)
2. Monitor vital signs.
3. Legs elevated 60 degrees or more (preferred) or Trendelenburg position.
4. Secure IV access: rapid administration of Ringer's lactate or normal saline.
5. Give atropine 0.6 to 1 mg IV slowly if patient does not respond quickly to steps 2 to 4.
6. Repeat atropine up to a total dose of 0.04 mg/kg (2 to 3 mg) in adult.
7. Ensure complete resolution of hypotension and bradycardia prior to discharge.

Hypertension, Severe

1. Give O_2 6 to 10 liters/min (via mask).
2. Monitor electrocardiogram, pulse oximeter, blood pressure.
3. Give nitroglycerine 0.4 mg tablet, sublingual (may repeat × 3); or, topical 2% ointment, apply 1 inch strip.
4. If no response, consider labetalol 20 mg IV, then 20 to 80 mg IV every 10 minutes up to 300 mg.
5. Transfer to intensive care unit or emergency department.
6. For pheochromocytoma: phentolamine 5 mg IV. (may use labetalol if phentolamine is not available)

Seizures or Convulsions

1. Give O_2 6 to 10 liters/min (via mask).
2. Consider diazepam (Valium®) 5 mg IV (or more, as appropriate) or midazolam (Versed®) 0.5 to 1 mg IV.
3. If longer effect needed, obtain consultation; consider phenytoin (Dilantin®) infusion – 15 to 18 mg/kg at 50 mg/min.
4. Careful monitoring of vital signs required, particularly of pO_2 because of risk to respiratory depression with benzodiazepine administration.
5. Consider using cardiopulmonary arrest response team for intubation if needed.

Pulmonary Edema

1. Give O_2 6 to 10 liters/min (via mask).
2. Elevate torso.
3. Give diuretics: furosemide (Lasix®) 20 to 40 mg IV, slow push.
4. Consider giving morphine (1 to 3 mg IV).
5. Transfer to intensive care unit or emergency department.

Abbreviations: IM = intramuscular
IO = intraosseous
IV = intravenous
PO = orally