Radiology Contrast Agents and Management of Contrast Reactions: Implementation of a Residency Educational Module

Karen S. Lee, MD, Elisa Flower, MD, Sejal Shah, MD, Robin B. Levenson, MD, Emergency Radiology, Beth Israel Deaconess Medical Center

BACKGROUND

• Emergency radiology (ERad) residents often independently protocol a large number of CT examinations using various intravenous (IV) and oral contrast agents.
• ERad residents are frequently the primary responders called to manage contrast-related reactions in radiology.
• Although junior radiology residents rotate in other radiology divisions prior to working in ERad, these residents may experience difficulty with using appropriate contrast agents and with protocolling CT exams in the emergent setting, particularly when complex medical issues compound the use of various contrast agents.
• Inefficiencies regarding management of contrast reactions may occur, possibly due to unfamiliarity of setting and treatment algorithms.
• Lack of dedicated lectures and practical teaching of contrast agents early in residency may contribute to the relative paucity of knowledge regarding radiology contrast agents.

AIM

• The aim of this project was to develop a radiology resident educational module to instruct and review information on radiology contrast media, the management of contrast-related reactions, and departmental policies regarding the use of contrast media in various situations.

METHODS

• 62-slide, image rich powerpoint educational module was created which reviewed:
  - Types of currently available radiology contrast media
  - Practical aspects of contrast administration
  - Patient screening regarding contrast media administration
  - Management of acute contrast reactions
  - Management of IV contrast infiltration
  - Acute kidney injury post-contrast administration
• Radiology residents were required to review this educational module during their first ERad rotation.
• 18 question, multiple choice contrast quiz was administered prior to and following review of this educational module which had situational-based questions in order to assess the efficacy of this teaching module.
• Answers and scores were only shared with the resident after the post-module exam.

Selected questions from contrast quiz:

3. How do you treat a patient complaining of a few itchy bites after a contrast-enhanced CT exam?
   a) ApiPen
   b) PO H2 blocker
   c) 25-50 mg PO Benadryl
   d) 50 mg IV Benadryl IV and IV H2 blocker
   e) All of the above

4. A patient on dialysis receives a contrast-enhanced CT study. Can the patient receive this exam?
   a) No
   b) Yes, but not to diurese within 24 hrs.
   c) Yes, but need to dialyse within 48 hrs.
   d) Yes, regardless of when the patient is to receive dialysis.
   e) None of the above.

Selected slides from educational module:

- Facial and/or laryngeal edema:
  1. Give O2. 6-10 L/min via mask
  2. Give ApiPen
  3. If hypotension, will need IV epinephrine
  4. May require intubation if airway compromise is imminent.

- “seafood/shellfish allergy”:
  - Not a contraindication to IV Contrast.
  - Shellfish contain tropomyosin (a muscle protein) → allergen.

- 40 yo male with swollen lips and stridor.

- Barium containing oral contrast.

- “Seafood shellfish allergy”

- Acute kidney injury post-contrast administration.
Radiology Contrast Agents and Management of Contrast Reactions: Implementation of a Residency Educational Module
Karen S. Lee, MD, Elisa Flower, MD, Sejal Shah, MD, Robin B. Levenson, MD, Emergency Radiology, Beth Israel Deaconess Medical Center

RESULTS

- Resident knowledge of contrast media, ED contrast enhanced CT protocols, and management of contrast reactions was poor (mean <50%) prior to any dedicated teaching on the subject.
- As expected, prior to reviewing the educational module, residents rotating earlier in ERad performed worse than residents rotating later in their first year of radiology residency.
- Dedicated educational module on contrast media substantially improved residents’ knowledge of this subject, regardless of time in residency program.
- Our educational module is an effective teaching tool for instructing residents on contrast agents, familiarizing them with departmental policies on using contrast media, and reviewing treatment algorithms for management of contrast reactions.
- Resident use of our educational module will hopefully reduce errors in emergent CT protocols with contrast agents and provide reassurance in residents’ management of contrast-related reactions.

CONCLUSIONS

- From October 2014 to November 2015, 12 residents reviewed the educational module and took the contrast quiz pre- and post-module review.
- Mean score pre-module was 44.9% which improved to 72.8% post-module.
- Mean score of early rotator residents (n=6), those rotating in ERad during 1st 6 months of residency, pre-module was 34.2% and post-module was 71.5%.
- Mean score of late rotator residents (n=6), those rotating in ERad during 2nd 6 months of residency, pre-module was 55.5% and post-module was 74.1%.

FUTURE DIRECTIONS

- Our educational module will be updated yearly to reflect any changes in the ACR contrast manual as well as our departmental policies regarding contrast media.
- Questions on the pre- and post-contrast quizzes will continue to be developed to highlight new departmental contrast policies or changes and may be integrated into the teaching module to allow for an interactive component with the resident user.
- Practical application of contrast reaction management can be developed in the future with the use of the simulation center and mannequins.

REFERENCE