
NOT FOR RESIDENTS ONLY
Department-wide Training for the Management of Contrast Reactions
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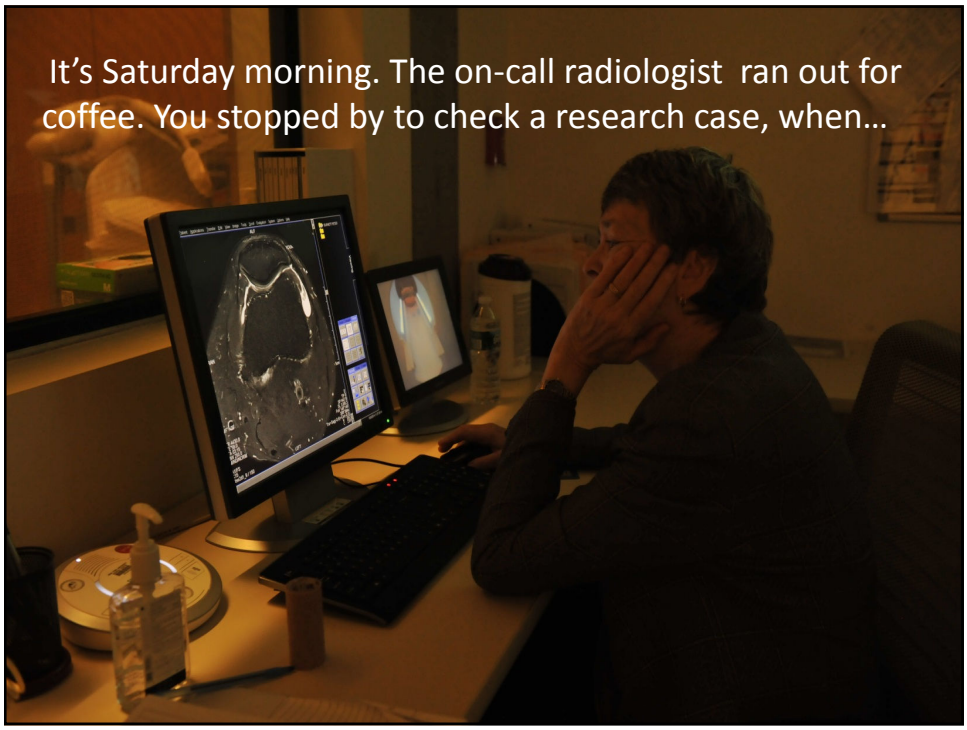
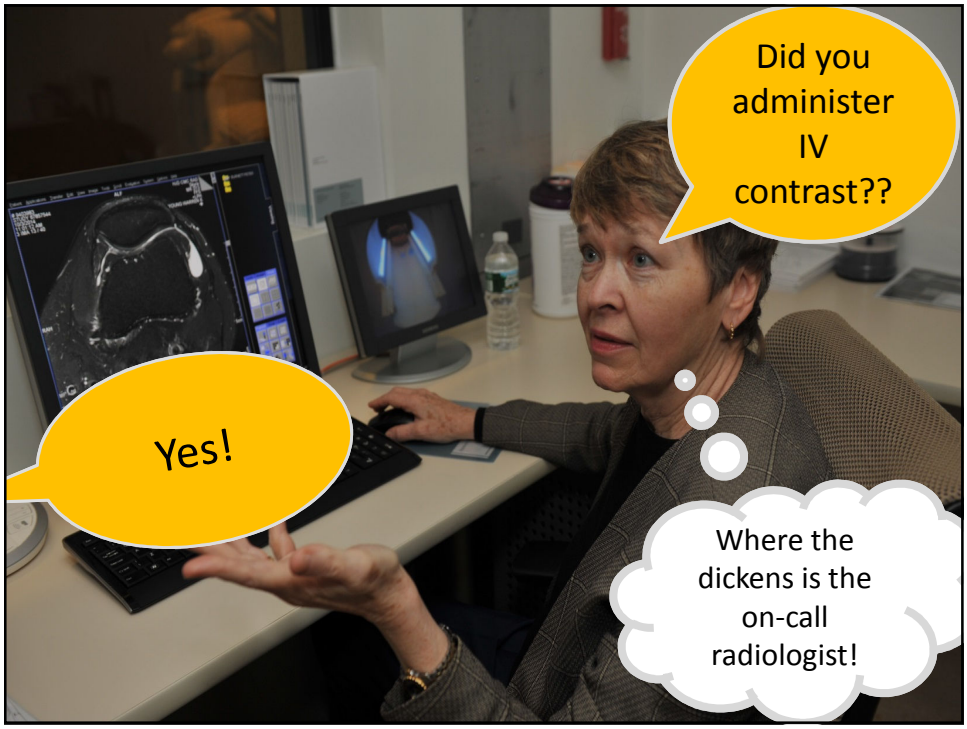

It's Saturday morning. The on-call radiologist ran out for coffee. You stopped by to check a research case, when…


The technician is concerned that the patient doesn't look well
DOC?


She runs to ask for your help
Doc, I am worried about the patient in room 2!


Did you administer IV contrast??
Yes!
Where the dickens is the on-call radiologist!


I've never dealt with a reaction before!
I have—but that was… uh… 16 years ago !!


Where is the crash cart?
First let's move him out of the MRI scanner area


When we get him outside of the scanner area can you call the emergency response team?
I dial zero for that??

Introduction

- Contrast reactions are infrequent, but are unpredictable *high stakes* events. They require swift, expert management by radiologists, despite widespread paucity of first-hand experience.
- Most training programs teach contrast reaction management to residents preparing for the boards but do not address the need for ongoing training. Will residents maintain their skills?
- What about attendings who have not managed a contrast reaction for many years??

Is managing a contrast reaction like running a code? Not really

- Managing a serious contrast reaction differs from the ICU and ER code setting in which *several* health care workers work as a team to manage a high risk/ HIGH frequency event.

- A radiologist summoned for a contrast reaction often has to function alone, in a potentially high risk/LOW frequency setting--akin to sporadic management crises that airline pilots may encounter.

Hypothesis

We hypothesize that all radiologists--from junior trainee to senior attending can attain comparable expertise for managing reactions.

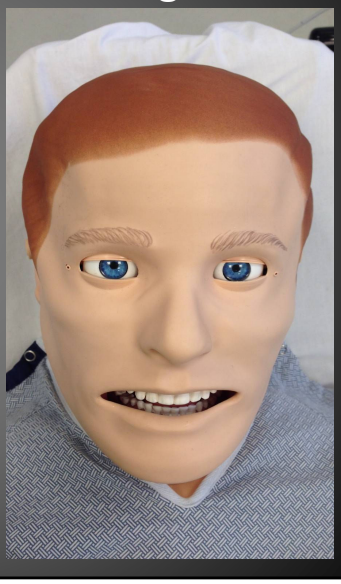
All cohorts can increase confidence with intensive review and interactive simulation exercises.

Pilots take SIMULATION training for rare adverse events. So can radiologists

Simulation training with manikins is already used to train residents in surgery, anaesthesia, Ob-Gyn and a few radiology programs

Contrast reaction scenarios can be simulated with manikins and trainee response debriefed

If you do not have a SIMS Center, actors, interested residents can act out scenarios



Methods and Materials

- IRB exemption was obtained.
- 10 radiology attending trainers volunteered to conduct small group training sessions at our institution's Simulation Center.
- This ongoing project trains each incoming class of residents and fellows, and interested attendings.
- Attending involvement is voluntary, residents are required to train.

Methods and Materials

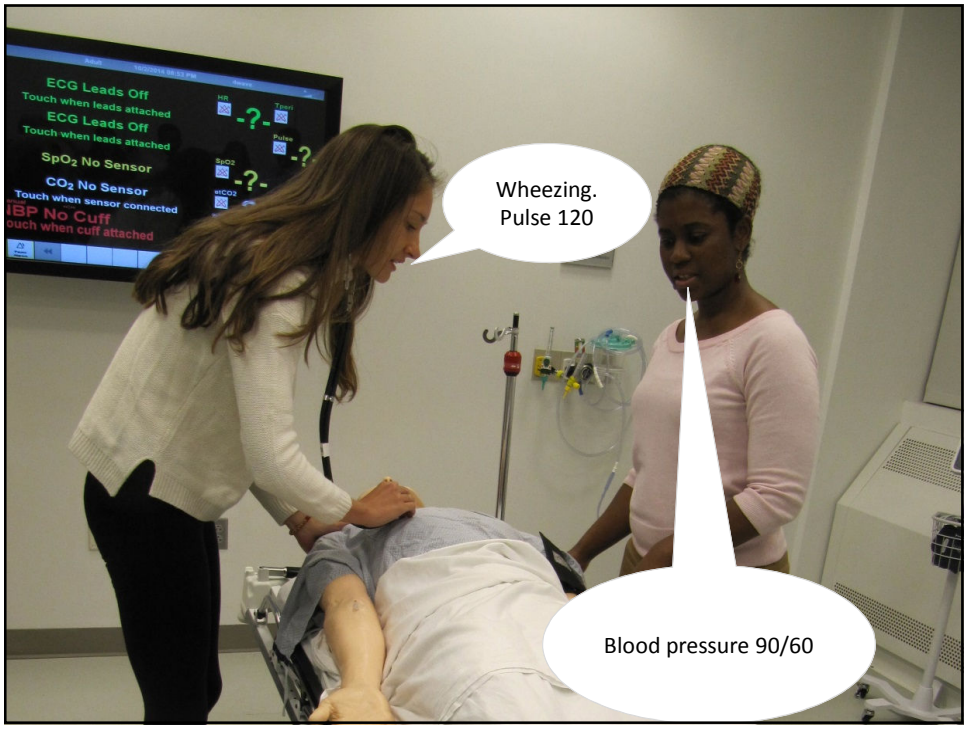
- A "pop" pre-training quiz assesses baseline KNOWLEDGE of reactions/reaction MANAGEMENT, appropriate DRUGS, and subjective CONFIDENCE levels through 5 scenarios graduating in severity.
- This is followed by an interactive training powerpoint based on the ACR Manual on Contrast Media
- The trainees then practice hands-on management of reactions using programmable manikins

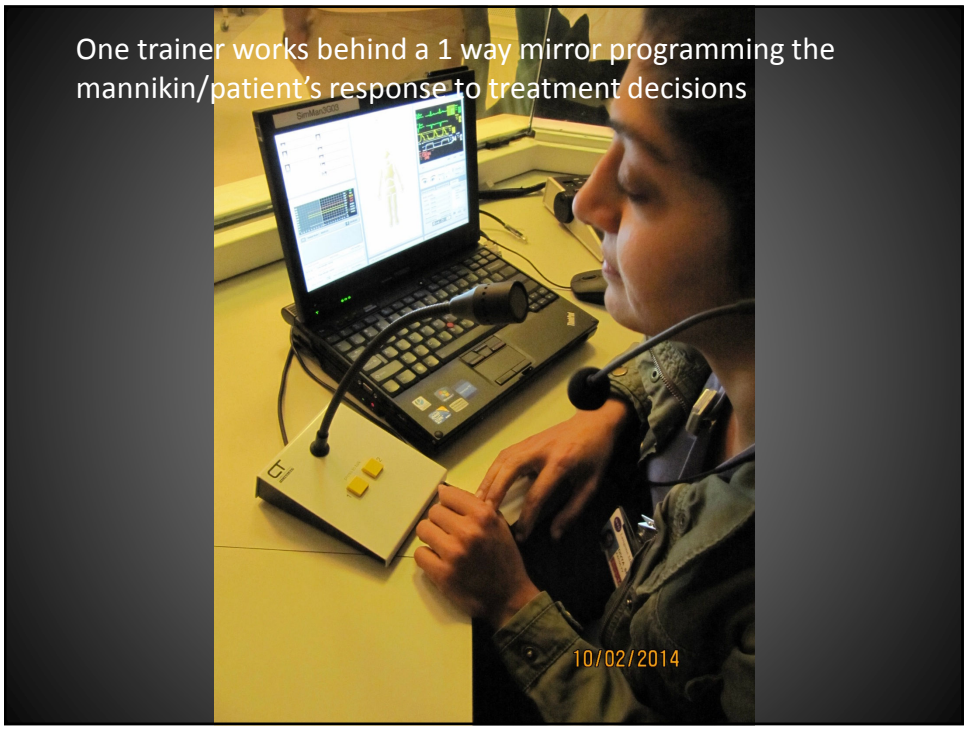
Examples of scenarios

- Child with hives
- Cardiac patient with ?? anaphylaxis
- Young athlete with anaphylaxis
- Vasovagal response during a shoulder arthrogram

The trainer presents a scenario:

"This is a 67 year old cardiac patient with confusion and sudden change of phonation'"


ECG Leads Off
Touch when leads attached
ECG Leads Off
Touch when leads attached
SpO2 No Sensor
CO2 No Sensor
Touch when sensor connected
IBP No Cuff
ouch when cuff attached
Wheezing.
Pulse 120
Blood pressure 90/60


One trainer works behind a 1 way mirror programming the mannikin/patient's response to treatment decisions
10/02/2014

Methods and Materials

- After managing scenarios trainee performances are discussed at group “debriefing” sessions.
- To date 109 participants--58 residents, 23 fellows, and 28 attendings--have trained
- Residents and attendings have been re-quizzed at 1 year and/or 2 years following initial training.
- Because new cohorts are included annually, not all trainees have yet been re-tested.

Statistical Methods:

- A paired sample Wilcoxon signed rank test assessed whether there was a change in confidence and test scores over each interval year within each training level cohort.
- Statistical tests were conducted at the two-sided 5% significance level using SAS 9.3 (SAS Institute, Cary, NC).

RESULTS: CONFIDENCE

- All cohorts reported a significant subjective increase in confidence in managing contrast reactions between pre-training and testing one year later (p=<0.010).
- Initially, and at one year post-training, attending trainees had confidence scores < resident's for 3 of 5 confidence questions.
- All groups tested demonstrated a significant increase in confidence (p=<0.001) between pre-training and testing at 2 years, except for the simplest scenario (managing hives, p=0.073).

RESULTS: COMPETENCE

- Overall initial test scores were comparable across resident/ fellow/ attending cohorts
- Test scores for DRUG administration improved for all groups at one year (p=<0.001) with junior residents scoring higher than upperclassmen (recent ACLS??). Scores for DRUG administration improved for all groups tested between the initial and the 2nd year test (p=0.010).

RESULTS: COMPETENCE

- Test scores for basic KNOWLEDGE of reactions declined between pre-training and 1 year, but improved between the 1st and 2nd year tests for all groups ($p=<0.001$), with highest scores by upperclassmen.
- Test scores for reaction MANAGEMENT did not significantly improve for all trainees one year after training ($p=0.382$), but did significantly improve between the pre-training and the second year test ($p=0.001$), and between the first and second year tests ($p=0.003$).

Attendings vs Residents

The mean pre-training score for management was lower among attendings than among residents ($p=0.028$).

However, at one year mean attending scores for management exceeded that of residents.

Conclusion

- Overall initial test scores were comparable across training level cohorts.
- Total CONFIDENCE scores improved significantly between pre-training, year 1, and year 2 post-training testing.
- Total reaction MANAGEMENT scores showed improvement 2 years after initial training.
- These findings suggest that CONFIDENCE in managing reactions may precede testable COMPETENCE.

Conclusion

- Not all trainees are equally confident for managing reactions. Better understanding of the differences in confidence and baseline knowledge between cohorts may facilitate tailored training *per* specific cohort.
- For example, some junior residents and attendings had low subjective confidence scores and could benefit from a second training session
- Some fellows (recently trained for the boards) test as more knowledgeable and confident; the test and training sessions could be stepped-up for them

What's Next?

- We hypothesize that real-life practical testing or scenario based web tests for management of contrast reactions would assess management skills more optimally than written quizzes, and we are working toward their introduction.

- Intensive follow up scenario-based live sessions could strengthen training. Many participants have requested these

In sum

- Because knowledge can diminish over time ***all*** radiologists must continually refresh their confidence and maintain their competence in managing contrast reactions.
- Our program demonstrates to residents by precept that reinforcing this training is a life-long endeavor.
- A department-wide training program creates an inclusive culture that encourages all radiologists to take on this challenge.

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