



Building Radiology Residents' Confidence in Managing Contrast Reactions: The Navy's First Ever High-Fidelity Contrast Reaction Simulations

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Background

Intravenous contrast is administered to our patients countless times throughout the day, typically without event. However, although rare, adverse reactions to contrast media do occur and can be **life threatening**. Radiology residents have **little to no experience** in identifying and managing such reactions, but they are likely the first ones to be notified and arrive on scene. The goal of this project was to integrate simulation training to focus not only on knowledge, but also **enhance residents' comfort level** in managing contrast reactions.

Objective

The overarching principal is building a **Culture of Safety** within the Radiology Department through educating trainees, staff, and technologists on methods to reduce harm to the patient. Additionally, **teamwork** is promoted as simulations are performed in a group setting, a rarity in the realm of radiology. This **patient-centered initiative** succeeds in educating providers and building their comfort level so that the standard of care may be provided safely and efficiently.

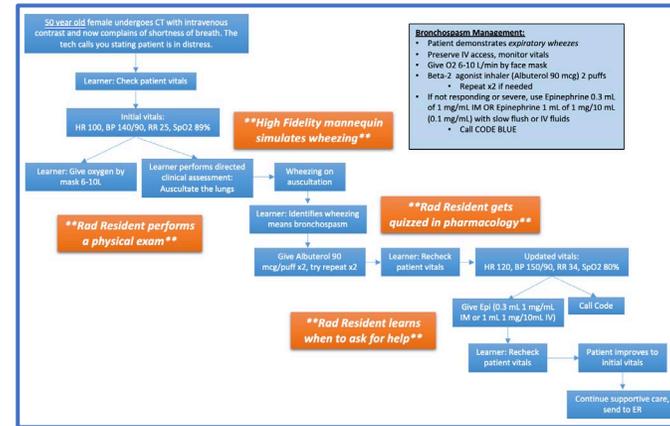
Methods

In partnership with the Simulation center, we created our Radiology Department's first ever **High-Fidelity Contrast Reaction Simulation**, in which three scenario algorithms were created to simulate real-life adverse contrast reactions. Learners were first given a short brief on potential reactions, and how to identify and respond to such patient presentations. They were then separated into three groups, rotating through each simulation. The simulations ranged from mild to severe reactions, with the latter evolving into a **full code**.

During the simulations, the residents were challenged to interpret **vitals**, perform **physical examinations**, and determine next steps and management. The addition of bronchospasm reaction deliberately **extends beyond the ACLS algorithm** to challenge learners to identify a reaction that is more specific to contrast reactions, and may occur with asthmatics, particularly children.

Each scenario was followed by a discussion emphasizing the salient points of the specific reaction, its safe management, and what could be done going forward to enhance overall comfort level.

Individually Designed Simulation Algorithms



Employing the high-fidelity mannequin, trainees were expected to perform physical exam, identify wheezing as bronchospasm, attempt albuterol, and progress to epinephrine treatment as patient's status declined



BEFORE: Radiology resident is by herself, staring at a screen, dictating in a dark room



AFTER: Radiology resident is working with her colleague, out of the dark, saving a mannequin's life

Results

Rather than test on specific treatments which are generally looked up and consulted during a live event, our algorithms were dedicated to specific patient care steps and the post-simulation assessment focused on comfort level and confidence.

Using a 10-point scale, participants were asked several questions surveying their comfort and knowledge level regarding the identification and management of contrast reactions as demonstrated below. All measures yielded statistically significant improvements. Prior to the simulation, the average was 4.3 out of 10. After the simulation, the average was **8.3 out of 10!**

Iodinated Contrast Simulation Course Questions Results (n=10)	Scores (AVG)			
	pre-Sim	post-Sim	difference*	
Q1 - Rate your overall confidence in managing an iodinated contrast reaction.	3.7	7.9	4.2	
Q2 - Rate your familiarity with the locations and contents of contrast kits.	3.8	7.8	4	
Q3 - Rate your ability to recognize the signs a symptoms of an iodinated contrast reaction.	5.1	8.4	3.3	
Q4 - Rate your familiarity with the indications and appropriate doses for administration of epinephrine in an iodinated contrast reaction.	4.2	8.2	4	
Q5 - Rate your familiarity with initial treatments for an iodinated contrast reaction.	3.8	8.6	4.8	
Q6 - Rate your familiarity with indications to activate the emergency response team.	4.9	8.7	3.8	
* Pre/post scores for each of the six questions (and overall) were found to be significantly different p < 0.05	Overall	4.3	8.3	4.0

Note the greatest improvements were in overall confidence and treatment familiarity



Discussion

Reactions to contrast media are uncommon but do happen, and often the radiology resident is the first physician to assess the patient. Acting out the management of such reactions is more effective than reading how to do so, and this simulation proved to be a useful endeavor in building the residents' competency. Moreover, it encouraged teamwork within a group of residents that are more accustomed to operating alone.

Our intention is to continue this simulation with future classes, and expand the participation to staff radiologists and technologists, all of whom may be the first provider in **saving an anaphylactic patient's life**.

If you are interested in integrating this simulation training into your program and/or department, please contact LCDR DeMarco at kara.m.demarco2.mil@health.mil as we are happy to share algorithms and methodology.