Event Documentation and Transfer of Care After Severe Contrast Reactions

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Abstract

Purpose: Radiology residencies are increasingly using clinical simulation to teach contrast reaction management. The aim of this study was to evaluate resident documentation of management and transfer of care in severe contrast reactions after a clinical simulation.

Methods: After a high-fidelity mannequin simulation of contrast-induced anaphylactic shock, residents (n = 18) were asked to document the event in a progress note and transfer care to a receiving medical team. A total of 22 prospectively determined criteria were selected, and notes were analyzed by a blinded reviewer.

Results: Notes contained between 12 and 21 of the prospectively determined 22 criteria (54%-95%). The median number of criteria contained in a note was 16. None of the notes fulfilled all 22 criteria. However, consistent deficiencies were found in documenting prior reaction to contrast (28%) and transfer-of-care criteria (22%-44%).

Conclusions: Although standards for the documentation of advanced cardiovascular life support codes and other emergencies have been devised, no such standards exist for documentation in the management of contrast reactions. The results of this study suggest the need to develop a standardized documentation system for severe contrast-induced reactions. Education regarding transfer of care and documentation should be emphasized during clinical simulation.

Key Words: Contrast reaction, simulation, transfer of care

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INTRODUCTION

The proper management of acute contrast reactions is central to the role of the radiologist, and yet, in a recent study, only 41% of radiologists recalled the correct dose and route of epinephrine administration in the treatment of life-threatening anaphylactic contrast reactions [1]. Radiology residency programs are increasingly using clinical simulation-based training to teach contrast reaction management. Sarwani et al [2] demonstrated that management of contrast-induced reactions by radiology residents improved after two simulation sessions. However, there is no literature evaluating the accuracy of documentation or transfer of care in the event of severe contrast reactions as a postsimulation primary end point. Direct documentation in a patient's chart and transfer of care are skills that practicing radiologists may not exercise for extended periods of time, yet they are essential to patient safety in the rare event of a severe contrast reaction. No national standard for the documentation of contrast reactions exists, and to our knowledge, no studies have been conducted to evaluate radiologists' documentation of contrast reactions. Thus, after conducting a clinical simulation of severe contrast reaction management, we evaluated residents' documentation of the event and transfer of care to a receiving medical team. The intent of this study was to analyze radiology residents' ability to accurately document severe contrast reactions and effectively transfer care to a medical team.

METHODS

Our institution recently established a new educational simulation module to help teach the management of contrast-induced anaphylactic shock. A total of 18 residents were enrolled into the simulation. Before the simulation, the residents were given two hour-long didactic lectures on the nature of the upcoming simulation and the proper management of a variety of acute contrast-induced reactions. The simulated patient, a high-fidelity

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mannequin, initially experienced a mild reaction to iohexol 350 administered for abdominal and pelvic CT, which progressed to anaphylactic shock and loss of consciousness. The residents were to take a focused history, address the patient's symptoms, and take vital signs during the early phase of the reaction. As the symptoms progressed to anaphylaxis, participants were expected to resuscitate and manage the patient with continuous vital sign monitoring, intravenous (IV) fluid resuscitation, supplemental oxygen and airway support, administration of bronchodilators or diphenhydramine, administration of epinephrine, and activation of a rapid-response team. At the conclusion of the simulation, a rapid-response team arrived to assume care of the patient, and residents were asked to transfer care to the receiving medical team. The participants were to give a verbal sign-out and document the event in a progress note for the purposes of transfer of care to the receiving medical team.

After we obtained a waiver from the institutional review board, the residents' notes were systematically analyzed and evaluated for content and completeness. Notes were excluded from the final analysis if they were incomplete, the reviewer deemed them illegible, or the resident writing the note failed to complete the simulation. A blinded independent reviewer read and scored all of the resident notes. Given that there are no national standards for the documentation of acute contrast reactions, we derived a novel set of criteria from the "ACR Practice Parameter for Communication of Diagnostic Imaging Findings" [3], the *ACR Manual on Contrast Media* [4], and the American Heart Association's "Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care" [5]. Using the "ACR Practice Parameter for Communication of Diagnostic findings," we used basic elements of a radiologic report (demographics, relevant clinical information, techniques, findings and impression) to serve as a basis for documentation. Using this framework, we consulted the *ACR Manual on Contrast Media* and the American Heart Association's "Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care" to develop criteria specific to documenting a life-threatening adverse reaction to contrast. The documentation criteria were broken into five categories including 22 criteria in all:

1. Demographics: a title, label, and header on the note; date of event; time of event; patient's age; and patient's gender (five criteria).
2. Imaging procedure: type of imaging study the patient underwent, type and dose of contrast administered, and route of contrast administration (three criteria).
3. Initial evaluation: presenting symptoms, history of prior contrast reactions, pertinent physical examination findings, and initial vital signs (four criteria).
4. Progression and management: IV fluid resuscitation, bronchodilator or diphenhydramine given, development of hypotensive shock or unresponsiveness, activation of a code team, route and rate of supplemental oxygen given, and dose and route of epinephrine administered (six criteria).
5. Transfer of care: patient's subjective condition upon transfer, vital signs upon transfer, vital support including supplemental oxygen and IV fluid rates, and the need for future premedication if contrast administration cannot be avoided (four criteria).

To reduce ambiguity of the criteria for the reviewer, a number of criteria were further defined. If a criterion contained the word *and*, all elements must be present to receive credit (eg, both type and dose of IV contrast must be documented). Pertinent physical examination findings include any of the following: tachycardia, tachypnea, wheezing, coughing, weak pulses, rapid pulses, skin pallor, rash or hives, and airway swelling. These were the pertinent positive physical examination findings the simulation mannequin was programmed to display. Either hypotensive shock or unresponsiveness may be documented as evidence of life-threatening progression of the reaction as the simulation progressed to either or both of these outcomes. The mention of epinephrine being given without documenting the dose and route was not considered to be sufficient, as giving epinephrine was a basic tenet of the simulation, and it was incumbent upon the participants to determine the appropriate dose and route. If the patient was unconscious at the time of transfer, this was to be documented in lieu of the patient's subjective condition. As all patients were receiving IV fluids and supplemental oxygen at the time of transfer, both must be documented. Any mention of the need for future premedication was considered adequate, even if no further specifics were given.

RESULTS

In the final analysis, all residents who participated in the simulation wrote complete and legible notes, so no notes were excluded by the reviewer (n = 18). The final cohort included nine first-year residents, three second-year residents, four third-year residents and two fourth-year residents. Notes contained between 12 and 21 of the 22 prospectively determined criteria (54%–95%). The