COE QS Research Grant Fall 2015 - Application

Trainee Information
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Program: Allergy/Immunology Fellowship
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PGY: 5

Proposal Information
Title: Clinical Impact of Educational and Computerized Electronic Interventions on Care of Patients with Reactions to Radiocontrast Media

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RESEARCH NARRATIVE

Problem to be addressed: Background: Every year, radiocontrast media is used in millions of imaging studies in the United States [1]. In the general population, reactions to intravenous radiocontrast media occur with a reported incidence of 0.7-3.1% [2]. Reactions to radiocontrast media can present with symptoms ranging from itching and rash to anaphylaxis and shock, and can be fatal [3]. The American College of Radiology has published guidelines for treatment of acute contrast reactions [1]. Although the majority of recurrent reactions can be prevented with standard, evidence-based anti-histamine and steroid premedication [4], the rate of breakthrough reactions (recurrent reactions that occur despite adequate premedication and use of non-hyperosmolar contrast media) has still been reported at approximately 10% [5]. If standardized premedication regimens are used as described in published guidelines, the rate of breakthrough reactions can be reduced to 6.7% [6]. This clearly highlights the need for education of physicians involved in the care of patients with a history of contrast allergy requiring subsequent contrast studies in order to decrease risks of another reaction. According to our preliminary retrospective chart review of patients who experienced acute contrast reactions from 2010 to 2015 (IRB Protocol #2015P001510), we have found that the rate of breakthrough reactions at MGH and MGH-affiliated satellite locations is 15%, much higher than what is expected if standardized premedication regimens are used [5,6]. This discrepancy is likely due to inadequate premedication regimens. We have additionally observed that there are patients who receive substandard imaging studies or have delays in diagnosis and treatment due to a reported contrast allergy. We hypothesize that an educational initiative, paired with computerized decision support, would improve contrast allergy management.  

Objective: To determine if an educational and electronic intervention increases the number of patients with contrast allergy who receive safe and effective care.  

Intervention: The quality improvement interventions we plan to implement are: (1) education of healthcare providers regarding contrast allergy management guidelines (30-minute educational sessions, access to a 5-minute online video, access to an online handout reviewing contrast allergy management guidelines and step-by-step description of Epic premedication ordering) and (2) standardized premedication ordering in Epic through an “Orders” and “Clinical Decision Support” request.  

Quality Measures: After 6 months’ time, we will re-assess the state of contrast allergy management to see if the following outcomes have been achieved: (1) decrease in rate of breakthrough reactions, (2) increase in number of subjects who receive adequate standardized premedication, (3) decrease in number of subjects in whom necessary contrast imaging studies are completely avoided due to reported contrast allergy, and (4) decrease in number of subjects where delays in receiving contrast studies due to reported contrast allergy result in delays in work-up / diagnosis / treatment.
Literature Review (1-2 paragraph summary and a maximum of 6 references): Effective communication between healthcare providers and education regarding management of contrast reactions is important as contrast media is used in millions of imaging studies annually [1]. Reactions to intravenous radiocontrast media occurs with a reported incidence of 0.7-3.1% in the general population, with an even higher incidence among atopic individuals [2]. Before the development of low-osmolality contrast media, reaction rates to high-osmolality contrast media were as high as 5-15% [1]. Reactions to intravenous radiocontrast media are thought to be due to direct effects of non-isosmolar media on inflammatory mast cells, basophils, and eosinophils [3]. Radiocontrast media can also activate the complement cascade, resulting in release of mediators including histamine, fibrin-split products, and bradykinin [3]. This means that allergy to radiocontrast media looks similar to many immediate allergic reactions, with symptoms can range from itching and rash to anaphylaxis and shock, and can be fatal [3]. Premedication with anti-histamines and steroids has been shown to effectively prevent subsequent mild contrast reactions, although more data is needed to conclude that it effectively prevents the recurrence of moderate to severe reactions [4]. Reported rates of breakthrough reactions (recurrent reactions that occur despite adequate premedication and use of non-hyperosmolar contrast media) have been reported as approximately 10% [5]. When standardized premedication regimens are used as described in published guidelines, the rate of breakthrough reactions is as low as 6.7% [6], highlighting the need for education of physicians involved in the care of patients with a history of contrast allergy requiring subsequent contrast studies in order to decrease risks of another reaction. Data from a recent study suggest that hospital providers prescribe inadequate premedication and that an automated, standardized premedication system for contrast allergy was effective at increasing the appropriate usage of premedication and decreasing the number of breakthrough contrast reactions [6].

Study hypothesis: Educational and electronic interventions to promote standardized, evidence-based guidelines will reduce the rate of breakthrough reactions to radiocontrast media. Educational and electronic interventions will also improve the following secondary outcomes of patient quality and safety: (1) increase number of subjects with a history of contrast reaction who receive adequate premedication (2) decrease in number of subjects in whom necessary contrast imaging studies are completely avoided due to reported contrast allergy (3) decrease in number of subjects who have a delay in work-up/diagnosis/treatment due to a reported contrast allergy.

Population: We propose a retrospective pre/post analysis that will evaluate quality improvement initiatives in the management of contrast reactions. The pre-intervention study population will consist of patients who experienced allergy to contrast media from 2010 to

Description of intervention or study design: Educational Intervention: (1) Educational 30-minute sessions regarding contrast allergy management for residents in radiology, internal medicine, pediatrics, surgery, and internal medicine/pediatrics/surgical subspecialties. We will use multiple-choice questions to assess pre- and post-educational session knowledge among residents. Each educational session will include a description of our planned Epic ordering implementation. (2) Posters on medical and surgical inpatient floors reviewing contrast allergy management guidelines and step-by-step instructions for Epic premedication ordering. (3) Access to a 5-minute online video reviewing contrast allergy management and step-by-step
instructions for Epic premedication ordering. (4) Online handout reviewing contrast allergy management guidelines and step-by-step instructions for Epic premedication ordering. Electronic Intervention: (1) Standardized ordering and documentation of premedication in Epic through an “Orders” and “Clinical Decision Support” request.

**Description of comparison group (if relevant):** Pre-Post analysis (see #7)

**Outcome variable to be used to determine the efficacy of the intervention (if relevant):** Primary Outcome: rate of breakthrough reactions to radiocontrast media. Secondary Outcomes: (1) number of subjects with a history of contrast reaction who receive adequate premedication (2) number of subjects in whom necessary contrast imaging studies are completely avoided due to reported contrast allergy (3) number of subjects who have a delay in work-up/diagnosis/treatment due to a reported contrast allergy.

**Power analysis to determine feasibility (when relevant):** N/A


**IRB status of project:** The protocol has been submitted for IRB.

**BUDGET**

**Line item budget and budget narrative:** Research Assistant (5% FTE): $1,500.00 Statistician ($130/hr for around 8 hours): $1,000.00 Teaching Materials (10 posters x $100, pens, handout copy fees): $1,250.00 Poster printing / publication costs: $750.00 Video production (outside assistance with producing and editing video): $500.00 Total, 2015-2016: $5,000.00 The funding would be requested in stages over the course of the year. November 2015 to December 2015: Initial funding would be used to complete pre-intervention data collection (research assistant cost) and analysis (statistician cost). January to March 2016: Another portion of funding would be used for preparation of educational materials (research assistant cost, teaching materials cost, video production costs). October 2016: Another portion of funding would be used for post-intervention data collection and analysis (research assistant cost, statistician cost), which should be completed by November 2016. November 2015 to 2016: Funding would be used for any conference presentations and peer-reviewed publications resulting from this this project (poster printing / publication costs). Analysis of pre-intervention data may potentially be publishable.

**Disclosure of other funding sources.** (Will receipt of this grant augment or replace other funding sources for your research?) This grant would be sole source of funding.

**OTHER**

**Previous COE involvement to date:** This is my first time applying for funding from CoE. I would like to become more involved in CoE programs in the future.

**Previous COE funding:**