Implementation of a Lecture Series Based on the American College of Radiology Appropriateness Criteria® for Emergency Medicine Providers

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Disclosures

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Background

- Medical imaging plays a major role in the evaluation of patients in the emergency department
- Growth in utilization of medical imaging has been cited as a factor in rising healthcare costs
- Despite evidence that the growth rate of imaging utilization has decreased over the past few years, *utilization rates continue to increase in the emergency department setting*

Background

- Use of evidence-based guidelines for decisions about ordering medical imaging studies is becoming not just beneficial, *but essential*
  - Nationwide transition to value-based reimbursement models
  - Upcoming federal mandate for use of clinical decision support tools before ordering advanced imaging studies
- Available evidence has suggested that the proficiency of emergency medicine residents in choosing appropriate imaging studies does not improve significantly over the course of residency training

Purpose

- We sought to improve awareness and knowledge about how to make appropriate decisions about ordering medical imaging studies in the emergency department at our institution
- We developed a lecture series based on the American College of Radiology Appropriateness Criteria® (ACR-AC) targeting clinical practitioners ordering medical imaging studies in our ED

Methods: Pre-lecture Survey

- Before the first lecture, a four-item survey (SurveyMonkey; Palo Alto, CA) was sent out via email to clinical practitioners in our emergency department
- Respondents included residents (PGY-1, 2, and 3 levels) and attending physicians
- Questions assessed provider familiarity with the ACR-AC, comfort in selecting appropriate imaging studies, and attitudes regarding the use of scientific evidence and cost/resource considerations when selecting imaging studies

Methods: Lecture Series

- A series of ten lectures was then given to emergency department practitioners over a five-month period (December-April) in the middle of the academic year
  - Lecture topics (based on ACR-AC topics) were chosen by the emergency medicine chief residents
  - Lectures were given during the weekly EM residency program didactic conference block
  - Each lecture was approximately 20-25 minutes in length, with two consecutive lectures given on each of five different dates

Methods: Lecture Topics

Head Trauma
Acute Chest Pain – Suspected Pulmonary Embolism
Acute Chest Pain – Suspected Aortic Dissection
Acute Pelvic Pain In The Reproductive Age Group
Right Lower Quadrant Pain – Suspected Appendicitis
Suspected Spine Trauma
Acute (Nonlocalized) Abdominal Pain And Fever Or Suspected Abdominal Abscess
Suspected Small Bowel Obstruction
Acute Trauma to the Knee
Orbits, Vision, and Visual Loss

Methods: Quizzes

- Prior to delivering two consecutive lectures, a pre-lecture quiz was given to those in attendance
  - Three questions assessing knowledge about each ACR-AC topic
  - Respondents included medical students, EM residents, and attending EM physicians
- Following the lectures, a post-lecture quiz was given to the attendees consisting of questions identical to those on the pre-test quiz to assess for an increase in number of correct answers following the delivery of the lectures

Methods: Statistical Analysis

- After the conclusion of the lecture series, we analyzed the aggregate pre- and post-lecture quiz results:
  - Data from total of 30 pre-lecture questions and 30 identical post-lecture questions
  - Paired two-tailed t-test was performed to assess for overall differences in the mean scores on the pre- and post-lecture quizzes
    - Subgroup analysis performed for each training level (medical students, PGY-1, 2, 3 residents, and attendings)

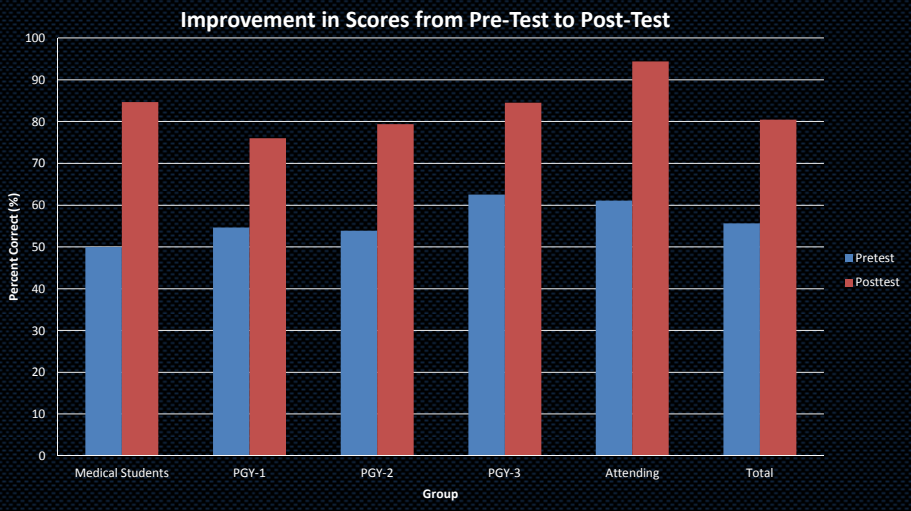
Methods: Post-lecture Survey

- After the final lecture in the series, a six-item survey (SurveyMonkey; Palo Alto, CA) was again sent out via email to clinical practitioners in our emergency department
- Questions assessed for changes in awareness and knowledge about the ACR-AC and resource-conscious imaging utilization
- We also asked for feedback regarding the quality of the lecture series and provided the opportunity for free-text responses

Results: Aggregate Quiz Scores

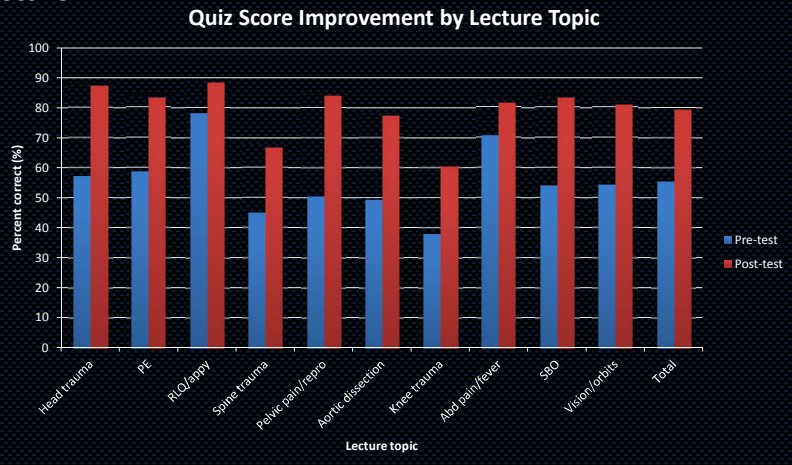
- A total of 228 pre- and post-lecture quizzes were completed over the course of the ten-lecture series
- *Significant improvement* ($p < 0.01$) in overall percent of questions correct between the pre- and post-lecture quizzes
  - Pre-lecture average score: **55.7%**
  - Post-lecture average score: **80.5%**
- Significant improvement ($p < 0.05$) was also seen within each training level subgroup

Results: Aggregate Quiz Scores



Results: Aggregate Quiz Scores

Score improvement was also seen for each individual lecture:



Results: Pre- and Post-lecture Surveys

- Data from the online surveys sent to EM residents and attendings before and after the lecture series demonstrated a change in subjective knowledge and attitudes about imaging utilization decisions
- Reponses were measured using a standard Likert scale from 1 (strongly disagree) to 5 (strongly agree)

Results: Pre- and Post-lecture Surveys

Statement	Pre-test mean (n = 38)	Post-test mean (n = 26)
I feel comfortable selecting the most appropriate imaging modality to work-up common emergency complaints.	3.97	4.23
I am familiar with the indications for different imaging modalities in the diagnostic work-up of common emergency complaints.	3.92	4.31
I am comfortable using the medical literature to assist me in determining the most appropriate imaging study.	3.61	4.23
I am familiar with the relative radiation doses associated with the various imaging modalities.	2.84	4.0

Results: Post-lecture Feedback

- When asked on the post-lecture survey, "Would you like to see this lecture series, in some form, repeated in the future?", 26/26 respondents (100%) answered "Yes"
- Free text comments on the post-lecture survey were almost entirely positive

Results: Post-lecture Feedback

Sample comments from post-lecture survey:

"These lectures also provide a forum for dialogue between our departments."
"This lecture series should become a standard part of our academic curriculum. Superb presentations with great clinical relevance."
"Very well done and appropriate series! Keep it going!"
"Really appreciated the Radiology department taking the time to educate us on the most appropriate tests to order. "
"Awesome job by radiology residents and attendings. Would love to have you back next year"
"the lectures were great! very helpful"
"this series increased the "appropriateness" and "usefulness" of our ED weekly conference 100-fold!"

Discussion

- Our results indicate that a lecture series based on the ACR-AC can result in increased knowledge about appropriate utilization of medical imaging studies among EM practitioners in an academic emergency department
- Additionally, our survey data suggests that a project like ours can improve comfort with using evidence-based guidelines for selecting imaging studies and be positively received by an EM training program

Discussion

- Some limitations of our study:
  - We measured short-term knowledge using a quiz immediately after the relevant lecture; longer-term retention was not tested
  - We did not directly evaluate whether any of the information transmitted by the lectures was translated into clinical practice in our ED
  - Only a limited number of attending physicians participated in the lectures (constituting less than 10% of quiz responses). Our lectures were not attended by any nurse practitioners or other mid-level providers, though they have a role in ordering imaging studies in our ED

Conclusion

- Given the increasing need to use evidence-based guidelines for diagnostic imaging selection in the ED setting, the possibility of improving practitioners' knowledge about this topic by lecture-based instruction is very promising
- Further study would be valuable to determine if these knowledge gains persist over time and, most importantly, if they translate into meaningful changes in clinical practice

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Thank you

Thank you for your interest!

Please direct any questions via email to:
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