Implementation and Results from Integrated Electronic Health Record Contrast Allergy Decision Support

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The Problem

- The need for pre-medication in patients allergic to iodinated contrast is often not recognized before the patient arrives in the radiology department or the pre-medication protocol is often incomplete or incorrect.
- What are the failure points?
    - Ordering physicians often either don't ask the patient and/or don't reference the known allergies in the electronic health record (EHR) when ordering studies.
    - If the allergy is recognized by the ordering physician, premedication is often incomplete/incorrect
- What problems does this cause?
    - If allergies are recognized by the ordering physician, this often triggers a call to the radiology department for further direction. These interactions reduce resident and attending productivity.
    - Residents often recognize the history of allergy and lack of an ordered prep during the protocol process. Time is then lost educating patients and physicians about the allergy and the proper prep. Busy referring physicians are frustrated with the distracting calls as well.
    - If the allergy was not recognized during the protocol process, it is picked up by the CT technologist as part of the patient screening and pre-procedure checklist the day of the procedure. This often leads to patient rescheduling after a prescription for a prep is given to the patient by a resident/attending. Some cases are also changed to a non-contrast if there is a history of a severe allergy.
- All of the above problems lead to an "Unhappiness Trifecta"
    - Lost slots = unhappy administrators
    - Phone calls/interruptions = unhappy residents and attendings
    - Lost time/cancellations = unhappy patients

METHODS

- Baseline Measurements
    - Generate a report of contrasted exams in patients with a documented contrast allergy using the electronic health record (EHR) (Epic, Verona WI).
    - Measured
        - Rates of contrast allergy preps ordered without radiology prompting
        - How often was the exam changed to a noncontrast study
        - How often was the exam cancelled the day of the procedure
        - Contrast reaction rates
- Make a best practice alert (BPA) using Epic decision support tools
    - Step 1: Identify patients with a contrast allergy using standard logic
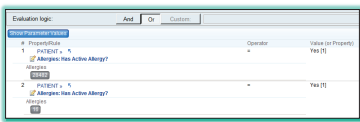

METHODS CONT.

- Step 2: Create a procedure grouper which includes exams which use iodinated contrast

- Step 3: Setup the BPA to trigger when an order is placed and the two following conditions are met 1) order for iodinated contrast enhanced exam and 2) Patient is allergic
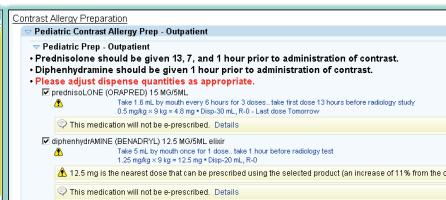

- Step 4: Have the EHR display a BPA at the time of order validation when an iodinated contrast study is ordered in an allergic patient, which
    1. Encourages use of non-contrast studies when the allergy is severe
   2. Makes the prep easy to order correctly through the use of a SmartSet

BPA
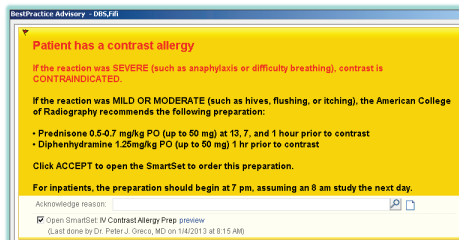
Sample SmartSet

- Step 5: Configure the SmartSet for four possible scenarios 1) Adult Inpatient 2) Adult Outpatient 3)Pediatric Inpatient 4)Pediatric Outpatient
    - The SmartSet was configured so only the appropriate orders are displayed based on age and patient location.
    - If the patient was an inpatient, the order timing was automatically configured so the timing of the prep would be complete at 8 A.M. the next day
    - Required the CT department to agree to actively identify inpatients with allergies and perform them as close to 8 A.M. as possible

- Step 6: We installed the alert with physician education in the form of an Epic Tip. We then waited 8 months and measured again.
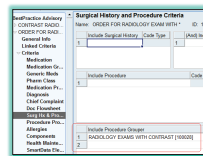
RESULTS

- 210 encounters had an alert triggered during the study period
    - Meaning user ENTERED, but did not necessarily SIGN, an order for a contrast enhanced study
- After the alert, twice as many of the preps were ordered without prompting by radiology staff:
    - 46% → 92% (p value <.0001)

Frequency of Prep Order Used Before and After Intervention *p<0.0001

- There were decreased same day cancellations
    - Pre-alert, 89% of all cancellations occurred on the day of the radiology appointment. Post-alert, 51% of all cancellations occurred on the day of the radiology appointment (p value <.0001)
- Before the alert, 32% of the exams were changed to noncontrast. After the alert, 48% were changed to noncontrast. (p value=0.017).
- No effect on contrast reactions: 1.4 % in both groups.
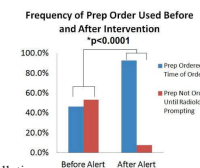
CONCLUSIONS

Implementation of a contrast allergy decision support system in the EHR, maintained appropriate anti-allergy prophylaxis with reduced need for radiologist intervention and resulted in fewer same day cancellations, thus likely improving patient satisfaction and departmental efficiency. The unanticipated decline in the frequency of contrast exams after BPA introduction requires further study. It is possible that the alert alarms the clinician more than the previous more reassuring verbal conversations with the radiology staff. Allowing the clinician to choose a reason for ignoring the alert or changing to a noncontrast exam could further enlighten us on reasons for the decline in frequency of contrast enhanced exams.

Want to replicate this alert in your version of Epic?
Step by step instructions can be found at:
https://galaxy.epic.com/?#Browse/page=1!68!421!2814503