

Reducing the number of changed orders for radiographs in a radiology department

Alexander J Towbin, Laurie A Perry, Wendy Bankes, Christopher Alsip, Erin Adkins, Rachel Smith, and Emily Mueller



Problem

- Incorrect orders are a common occurrence in many radiology departments
 - Potential order errors include:
 - Ordering the wrong test for the indication
 - Ordering a test on the wrong body part
 - Ordering a test on the wrong side of the body
- Order errors can lead to unnecessary studies and excess radiation
- In order to prevent errors, the technologist must verify each potential error with the ordering clinician

Specific Aim

- The goal of this project was to reduce the percentage of changed radiography and fluoroscopy orders from a baseline of 4.2% to 2.1%

Methods

Environment

- Large academic pediatric radiology practice
- All inpatient and ambulatory orders are placed in a hospital-wide electronic medical record system (Epic; Verona, WI)
- Community providers order imaging studies through a variety of paper and electronic methods

Baseline measurements

- A weekly report was created in the radiology information system (Epic Radiant, Verona, WI) identifying the procedure type and originating department of each changed order
- The number of changed orders was compared to the total number of radiography and fluoroscopy studies performed each week to calculate the percentage of changed orders
- The percentage of changed orders per week was plotted on a P-chart and tracked as the primary outcome metric
- Pareto charts were created identifying the most frequently changed orders and the most common originating location for changed orders

Percentage of Changed Orders by Ordering Location

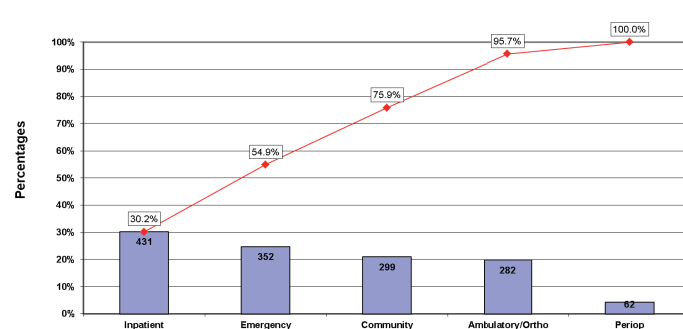


Figure 1: Pareto chart shows the percentage of changed orders per ordering department at baseline

Methods

Top Ten Radiography Orders Changed by Type

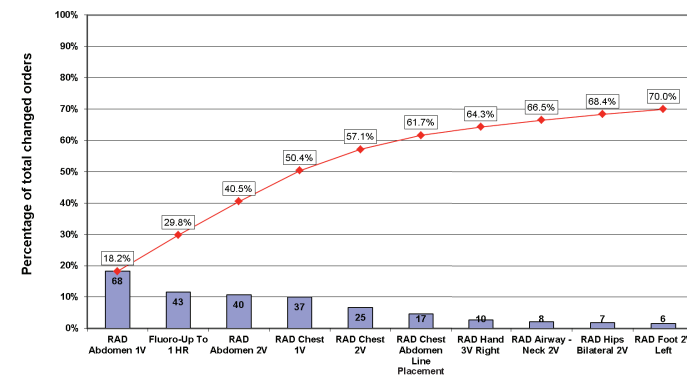


Figure 2: Pareto chart shows the top ten most commonly changed radiography orders as well as the percentage of overall changes that these orders represent

Interventions

- After analyzing baseline data, multiple interventions were identified
 - Delete unused orders from the electronic medical record
 - Outdated orders (i.e. Barium Enema)
 - Unused orders (i.e. Fluoro >1 hour)
 - Orders always changed per departmental protocol (i.e. 3-4 view radiograph of the pelvis)
 - Fix faulty order sets
 - Improve departmental and divisional preference lists
 - Remove orders that were either incorrect or rarely used for each division (i.e. 3-view hand radiograph for arthritis was removed from the emergency department preference list)
 - Group similar studies together (i.e. all upper extremity radiographs are in the same section)
 - Group different imaging studies of the same body part next to each other (i.e. one-view chest x-ray and two-view chest x-ray)
 - Rename orders to include the common indications for each imaging test (i.e. 1V abdomen – constipation)
 - Improve paper order form for community providers
 - Clarify departmental protocols
 - 1 versus 2 view abdominal radiograph
 - Imaging study to evaluate lower extremity PICC
 - Pelvis radiograph versus 2-view hip radiograph

Results

- At baseline, 4.2% of all radiography and fluoroscopy were changed
- After multiple interventions, the percentage of changed radiography orders decreased to 3.1% (Figure 3)
- Specific changes
 - 4 orders were removed from the electronic medical record
 - 4 orders in order sets were removed, 5 added, and 1 corrected
 - 20 preference lists were modified (Figure 4)
 - The paper order form (Figure 5) was modified and distributed

Results

Radiography Weekly Order Changes
June 2013 - Nov 2014

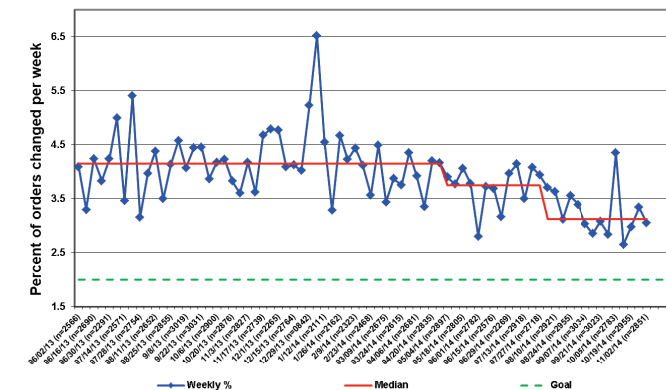


Figure 3: Run chart showing the percentage of changed orders per week. There has been a significant decrease in the percentage of orders changed from a baseline median value of 4.2% to a current median of 3.1%

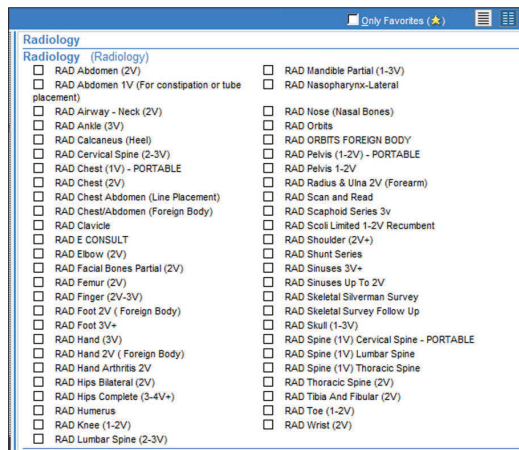


Figure 4: Emergency department preference list showing the original list (a) as well as the preference list after the change (b)

(a)

(b)

Results

Figure 5: Paper order form for community providers at baseline (a) and after the change (b)

(a)

(b)

Conclusions

- Quality improvement techniques can be used to decrease the number of radiography orders changed in a radiology department
- We believe that the changes we have made help to make our department safer by decreasing the chance that an incorrect study will be performed