Improvement in Clinical Decision Support Coverage and Reduction in "Unscored" Examinations through a PDSA Project

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Background

- Los Angeles County Department of Health Services (DHS) is the second largest municipal health system in the nation
- Comprised of 3 acute care hospitals, 1 rehabilitation hospital, and ambulatory care outpatient clinics
- Between 2/2015 and 3/2016, a Clinical Decision Support (CDS) platform (MedCurrent CDS, Toronto Canada) was integrated with and implemented in tandem with the rollout of the electronic medical record (Cerner, Kansas City, MO) throughout DHS
- CDS was purchased by DHS to improve ordering appropriateness of imaging examinations in a safety net system as well as comply with upcoming CMS legislation mandating use of CDS in specific outpatient radiology examinations

Purpose

- A clinical decision support (CDS) platform that includes the American College of Radiology (ACR) Appropriateness criteria (ACR Select) was implemented at our institution for RF, CT, US, MR, NM and MG examinations

- CDS requires providers answer 1-2 questions when ordering imaging studies, then CDS assigns a score – usually not appropriate (Low, 1-3), may be appropriate (Medium, 4-6), and usually appropriate (High, 7-9)

- During this implementation, "**hard stops**" were not included in the decision support process. This resulted in many orders triggering decision support, yet remaining "unscored"

- A PDSA (Plan Design Study Act) project was initiated analyzing these "unscored" orders and solutions implemented to reduce the number of unscored studies thus improving CDS "coverage" from baseline

1. Provider selects a structured indication and answers 1-2 clinical questions
- In this example, "appendicitis suspected" was the structured indication and a "classic for appendicitis" presentation and "yes" to pregnant status were the selected clinical scenario (above)

2. Based on clinical scenario, CDS provides feedback on the selected procedure, and recommends additional examinations which may have a higher or lower score. Recommendations may have some explanatory information (right)
- In this example, the selected examination, MRI pelvis w/ +w/o Contrast is scored "3" – usually not appropriate for evaluating appendicitis in a pregnant patient. The provider can then continue with the original selection, select a different exam with a higher appropriateness score, or cancel the order

Some customization based on local best practices was made to the CDS recommendations. Customized rules were designated with the DHS logo

Definitions

- Exams triggering CDS were scored as follows: **High** (score 7-9), **Medium** (Score 4-6), **Low** (score 1-3) based on the ACR appropriateness criteria classification scheme
- "**Recommendation provided**" – recommendations were provided by the software, but the provider chose a procedure that was not scored
- "**Coverage**"- sum of (High + Medium + Low + Recommendations provided + Cancelled exams) / Total orders
- "**Unscored**" examinations - no CDS recommendation was able to be provided

Unscored exams were a result of three causes:

(1) "**Custom indications**" in which a provider entered an indication not included or selected from the CDS database

(2) "**Logic gaps**" were clinical indications without rules designed in CDS , commonly due to the fact that some ACR Appropriateness Criteria did not provide recommendations for all variations of a given decision tree logic

(3) "**Unanswered questions**" due to some clinical indications allowing an optional element to question answering, which if left unanswered resulted in no score

Methods

- Periodic analysis was performed on CDS utilization from 8/7/2015 to 3/31/2016 to improve coverage of the software and reduce unscored exams

Methods

- Custom indications were targeted:

(1) Development of a five minute online **instructional video and reference card** to the providers on proper utilization of the software

(2) Identification of areas that would benefit from **locally created** consensus rules based on best practice, or other available evidence based guidelines not incorporated in the ACR select rule sets

(3) Implementation of a **user interface** change with a "drop down" of the top indications chosen at our institution for the order selected, allowing the provider to simply "pick and click" instead of "type and search"

(4) Utilizing **provider incentives** in locations where a Radiologist approval was required for an examination, particularly in the Emergency Department; if a provider selected exam resulted in a medium or high score (4 or greater), the exam would be automatically approved and the technologist would perform the exam


Custom Indications: Locally Created Structured Indications

- Frequently entered provider custom indications were identified, indications created and local based best practice rules with imaging recommendations were provided

- In the example below, a custom rule was created for "Lung Nodule Follow Up" based on the latest Fleischner Criteria.

Note: Custom DHS logo alerting provider the recommendation is a local rule

Custom Indications: Modification of the User Interface

- A user interface upgrade presented the ordering provider with a "pick-list" of the top structured indications chosen for a given procedure at DHS. This allowed the provider a "pick and choose" mechanism to select an indication rather than "type and search"
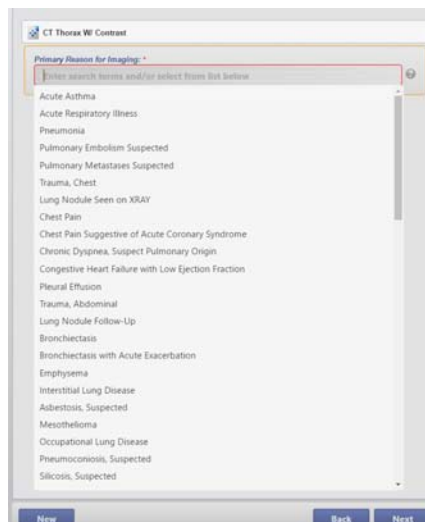
Custom Indications: Provider Incentives in the Department of Emergency Medicine (DEM)

- Workflow changes in the DEM at the largest hospital within DHS, also the busiest DEM in Los Angeles County, were implemented which incentivized providers to utilize CDS properly.

- Prior to CDS, CT and MRI orders from the DEM at this facility required a phone call to a radiologist for approval. The time and interruption resulted in frustration for ED providers and Radiologists.

- To incentivize uptake of CDS, workflow was changed such that exams scored 4 or greater by CDS were automatically approved for performance by the technologist, thus avoiding need to find and call the Radiologist.

- Exams from approved order sets (trauma, meningitis, seizure, stroke-tPA, minor head trauma) were automatically approved for performance by the technologist

- Exams with a score 1-3 or unscored required a Radiologist approval

Technologists can view the exam details in their workflow and easily identify the CDS score provided for an examination. In this case, the selected examination scored "8"- usually appropriate (left), and thus would be considered automatically approved (vetted).

Logic Gaps

- Logic gaps are scenarios in the ACR appropriateness criteria where no recommendations are available.
- These were identified for the most commonly used scenarios and local best practice recommendation panels were created

PANEL: **Vascular**
TOPIC: **Upper Gastrointestinal Bleeding**

ACR Version
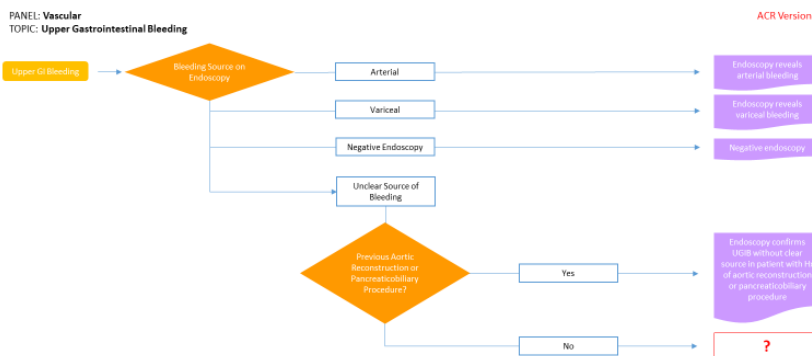
For example in the ACR appropriateness criteria for "Upper Gastrointestinal Bleeding," no recommendations are available for the scenario of "unclear source of bleeding" and no "previous aortic reconstruction or pancreaticobiliary procedure." In this situation, there is a logic gap, for which a DHS recommendation panel was created.

"Recommendations provided" and Unanswered Questions

- Unanswered questions were not able to be modified, due to current limitations in the software.
- "Recommendations provided" was targeted by identifying procedures in the order catalog not currently mapped in CDS but equivalent to currently mapped exams, thus providing a score when these equivalent procedures were ordered. This occurs because the DHS order catalog contains unique procedures with redundant CPT codes.
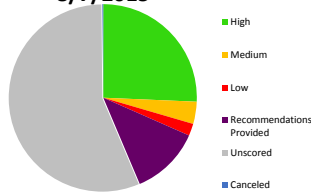
For example, CDS might provide a score for the procedure "CT abdomen w/wo contrast", but the provider selected the procedure "CT multiphase liver." These procedure gaps were identified, targeted and included in the appropriate decision support scenario.
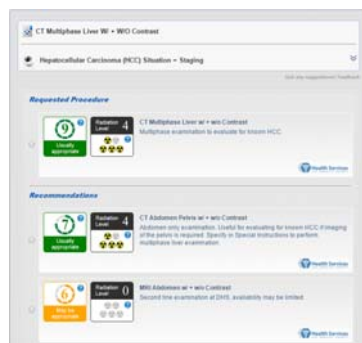
Results

- CDS coverage increased from 43.8 % in 8/2015 to 77.5% in 3/2016.
- Order volumes increased during the observation period as additional facilities were brought onto the CDS platform.
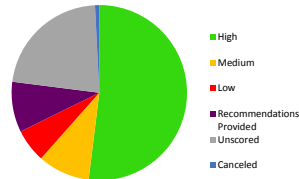
All Orders in 90 days 8/7/2015

Legend:
- High
- Medium
- Low
- Recommendations Provided
- Unscored
- Canceled

All Orders 90 days 3/31/2016

Legend:
- High
- Medium
- Low
- Recommendations Provided
- Unscored
- Canceled

All Orders	Quarter	%
High	7864	25.7%
Medium	1174	3.8%
Low	633	2.1%
Recommendations Provided	3690	12%
Unscored	17208	56.2%
Canceled	51	0.2%
TOTAL	30620	100%

All Orders	90 Days	%
High	47177	52.0%
Medium	8724	9.6%
Low	5580	6.1%
Recommendations Provided	8453	9%
Unscored	20154	22.2%
Canceled	716	0.8%
TOTAL	90804	100%

Baseline

Post Interventions

Conclusion

- Using a PDSA process, changes were created and tracked to incentivize proper CDS use, expand coverage, and reduce custom indications, logic gaps, and ignored recommendations
- Following the interventions:
  - High and Medium scored exams increased 108% from 29.5% to 61.6%
  - "Recommendations Provided" were reduced 25% from 12% to 9%
  - Unscored exams were reduced 60% from 56.2% to 22.2%
  - CDS coverage improved 76% from 43.8 % to 77.5%

- Future PDSA process related workflow changes under consideration to further expand CDS coverage and reduce custom orders include implementation of "hard stops," requiring a provider to select from a structured indication, while allowing the flexibility to provide additional clinical history in the requisition