Quality Improvement Project to Decrease Inpatient Radiology Turnaround Time: Experience at Christiana Care Health System

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This quality improvement project was an intervention designed to decrease radiology turnaround time. Success factors included the use of elegant technology and frequent public feedback to the radiologists until the desired results were achieved.

The radiology group at Christiana Care Health System is a private practice group consisting of 32 members who have an exclusive contract with the health network for inpatient and outpatient imaging services. In 2004, the inpatient radiology turnaround time* at Christiana Care Health System was excessive. A quality improvement project was implemented with the following goals:

- improve radiology report turnaround time
- have reports available on patient's chart in a shorter time period
- decrease length of stay
- reduce transcription costs.

Baseline data collected between January and April 2004 revealed that imaging report turnaround time averaged 50 hours. The "gold standard" for report turnaround is 24 hours or less.[1] In April 2004, only 16% of imaging reports were completed in 24 hours or less. The quality improvement team mapped the current process flow (Figure 1) and determined that the greatest opportunity was to shorten the times between the radiologist reviewing the films, dictating the report, editing the report, and having the report available on the nursing unit.

Phase 1 – Speech Recognition Software

The first step in redesigning the process was purchasing Powerscribe© speech recognition software and installing it in 2004. The assumptions were that:

- The system will deliver 95% accuracy for speech recognition.
- The radiologists will accept the new system.
- The radiologists will self-edit their reports.
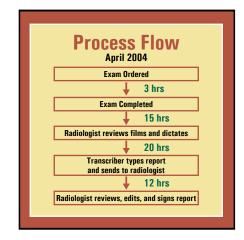- Adequate workstations will be available.

Process Flow
April 2004

Exam Ordered
↓ 3 hrs
Exam Completed
↓ 15 hrs
Radiologist reviews films and dictates
↓ 20 hrs
Transcriber types report and sends to radiologist
↓ 12 hrs
Radiologist reviews, edits, and signs report

Figure 1. Process Flow

- Speech recognition software will interface with existing network software and hardware.

The radiologists were trained over a 2-month period from April to May 2004. The transcriptionists were trained to edit rather than type reports. Workstations were installed in all film reading areas. Increased information technology (IT) services support was made available, especially during peak hours, and several radiology support staff were trained to be "super

*Time from order of exam to report verification

(*continued from page 1*)

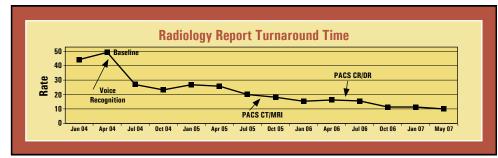users." By June 2005, 74% of exams were completed in 24 hours or less.

Phase 2 – Picture Archival Computer System

The next process improvement was the implementation of a picture archival computer system (PACS) for computerized tomography (CT) and magnetic resonance imaging (MRI) in September 2005. This technology allowed images to be viewed at individual workstations. By January 2006, 78% of exams were completed in 24 hours or less; by January 2007, 88% of exams were completed in 24 hours or less, performance that was maintained through May 2007.

Figure 2 illustrates the change in mean radiology report turnaround time over the past 3.5 years. Although each of the technologies positively affected the turnaround time when introduced, the greatest decrease occurred with the introduction of voice recognition software.

An added benefit of this process improvement effort was the cost savings realized from a reduction in the use of transcriptionists. Preimplementation, 14 full-time transcriptionists were employed and an additional $200K per year was spent for outsourcing. Postimplementation, the number of full-time transcriptionists was decreased to 5, and outsourcing was unnecessary. The transcriptionist's role changed from a transcriber of dictation to an editor of transcribed material, resulting in annual cost savings of more than $550,000.

During the installation phase, initial software problems resulted in the loss of some reports, causing frustration among the radiologists. Several issues remain unresolved. Although

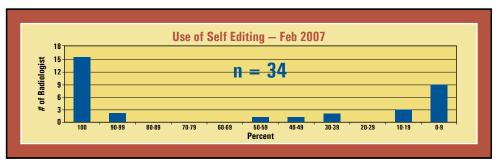**Figure 2. Report Turnaround Time**

Figure 3. Self-Editing Usage

all radiologists have accepted speech recognition technology, several resist self-editing. Figure 3 displays this bimodal distribution for compliance with self-edits among radiologists. Transcriptionists continue to be employed to do initial reports or edits for the noncompliant physicians.

Several radiologists speak with accents that cause the voice recognition software to misinterpret words. Some radiologists are also reluctant to use templates, which could significantly reduce the dictation time.

Attempts to resolve these issues include:

- retraining voice files for radiologists who continue to have voice recognition difficulties

- weekly posting of each radiologist's use of voice recognition and self-edits in an attempt to use peer pressure to increase use of self-edits

- positive reinforcement and continued communication with our radiologists

- external pressure from the Radiology Department Chairman to increase the use of templates.

There have been sporadic complaints from radiologists and referring physicians that radiology reports are less accurate with the new system. To address this concern, periodic audits are conducted to evaluate the accuracy of reports by comparing the results of self-edits vs. transcriptionists' edits.

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