Implementation of Speech Recognition in a Community-based Radiology Practice: Effect on Report Turnaround Times

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Purpose: Large academic practices have reported important benefits with the implementation of speech recognition software (SRS). However, the applicability of these results has been questioned in the community hospital setting because of major differences in workflow. The aim of this study was to evaluate the impact of SRS on radiology report turnaround times (TATs) at a community-based hospital practice with no radiology training program. The secondary goal was to evaluate the impact of SRS on radiologist productivity.

Methods: SRS was implemented at a 150-bed community hospital between May 2011 and July 2011. Radiology report TATs and normalized radiologist productivity were determined during 5 months before and after SRS implementation. Median and 80th and 95th percentile report TATs were compared between the preimplementation and postimplementation periods. The trend in productivity was also assessed.

Results: Median and 80th and 95th percentile report TATs decreased multiple-fold between the preimplementation and postimplementation periods (median, from 24 to 1 hour; 80th percentile, from 60 to 10 hours; 95th percentile, from 165 to 33 hours; $P < .0001$). No significant trend in report TATs was appreciated beyond the initial implementation of the software, a sustained effect on TATs. Normalized radiologist productivity was stable throughout the study period.

Conclusions: The implementation of SRS was associated with 24-fold improvement in the median radiology report TAT in a community hospital setting with no radiology trainees. Improvements were obtained without affecting normalized radiologist productivity.

Key Words: Speech recognition, community hospital, report turnaround time

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INTRODUCTION

Significant reductions in radiology report turnaround time (TAT) have been demonstrated with the implementation of speech recognition software (SRS) [1]. However, the majority of the implementations have been studied at large academic centers [1-3], and the reported benefits have been received with skepticism by community-based and private practices [4]. Some authors have minimized the importance of optimizing report TATs in outpatient or community radiology settings, claiming that these settings have lower acuity and diminished need for immediate report availability [4]. However, this posture runs counter to professional society guidelines and other evidence for the negative implications of long report TATs for patient care, even in the outpatient setting [5,6]. Furthermore, failure to provide timely final reports for patients who are transferred out of these lower acuity settings may be an underrecognized barrier to the coordination of care between the transferring and receiving institutions. If report TAT is not optimized in the community setting, patients may be transferred with incomplete medical records (ie, no final radiology report). This approach can be detrimental to continuity of care during the patient handoff [7,8] and may place additional burdens on receiving institutions.

We have previously reported the effect of speech recognition implementation on radiology report

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TATs at a large academic practice, showing significant decrease in signature times using a combination of SRS automated notification, and financial incentives. Our hypothesis was that significant radiology report TAT reduction was also feasible in a community-based hospital practice with no radiology training program (residency or fellowship) without negatively affecting radiologist productivity.

METHODS

This study was undertaken as a quality improvement initiative and as such was not formally subject to review by the institutional review board.

Site

The study site is a 150-bed urban, not-for-profit community hospital with approximately 25,000 emergency department visits per year. The radiology department performs approximately 100,000 imaging examinations annually that are interpreted by 12 radiologists who constitute approximately 11 full-time employees.

Baseline

Before speech recognition implementation, radiologists dictated imaging studies using a transcription service. The service used a back-office speech recognition program (transparent to radiologists) designed to improve transcriptionists' productivity. Report drafts were initially reviewed by transcriptionists before being submitted to radiologists for final signature. Once signed, an electronic version of each report was distributed to different information systems within the hospital, and a paper version of the final report was printed for distribution to referring physicians.

Intervention

The intervention consisted of the implementation of SRS (Precision Reporting version 10.7; GE Healthcare, Barrington, Illinois), integrated into the hospital's existing PACS (Centricity PACS 3.2 [RA1000]; GE Healthcare), which allowed radiologists to dictate and sign reports without using transcriptionists. The application reportedly recognizes human speech and "understands" the context of the report to increase transcription accuracy. Once a radiologist reviews the initial results of speech recognition, the radiologist can make any appropriate edits and sign the final report within the same application.

The implementation happened in 3 phases. The preimplementation phase, during which technical details were tested, started in mid-May 2011. The medical imaging IT department, in cooperation with the vendor, executed a limited pilot with two radiologists to evaluate for workflow idiosyncrasies that had to be further addressed. The pilot underscored the importance of making simple reporting templates available before rollout and improving the ability to report multiple studies in a single radiology report. The initial templates included only subheadings such as "indication", "findings," and "impression" in the body of the report and did not contain any further structured reporting capabilities or automated fields.

After resolution of these components, the second phase of the implementation took place between June 6 and 17 and consisted of a rollout in the department of radiology, with the exception of the breast imaging center. Vendor representatives, 2 or 3 individuals from the medical imaging IT department, and a PACS administrator participated in this phase. Support was available during every radiologist's first day of use of the application. Two additional days of support were also offered to each radiologist if needed.

The third implementation phase happened between June 20 and July 1 and was dedicated to the breast imaging center. The breast imaging rollout was jointly conducted by vendor representatives, one or two individuals from the medical imaging IT department, and the PACS administrator. The breast imaging rollout required more complex templates with structured reporting capabilities and the use of "macros." Screening mammography was set up to include prepopulated fields from the radiology information system. After full implementation on July 1, refinements were done, and support was made available as needed. Anecdotally, radiologist workdays were slightly longer (an addition of <1 hour to their regular workday) during the first few days after the implementation, returning to regular hours within a week of implementation.

During and after implementation, departmental and physician-specific report TATs were provided to the chief of radiology. Results were reviewed and discussed at departmental meetings, when appropriate. Report TAT was added to the department's web-based quality analytics dashboard, containing several predefined quality, safety, and efficiency metrics, and made available within the hospital's intranet.

Outcome Measures

The primary outcome measure was radiology report TAT, defined as the time elapsed between examination completion (completion of image acquisition) and signature time of the final radiology report for all full-time radiologists in the department covering weekdays (8 AM to 5 PM) and weekends. The secondary outcome measure was radiologist reporting productivity. Normalized reporting productivity (RP_n) [9] was selected to assess radiologists' productivity and was evaluated as follows: $RP_n =$ (weekly report volume)/(weekly full-time employee). This measure normalizes radiologist reporting volume by weekly personnel utilization.

Statistical Analysis

To assess the impact of the intervention on report TATs, we compared the 5-month period preceding its implementation (January 2011 to May 2011) with the 5-month period after full implementation was completed