

Radiology Resident Dictation Instruction: Effectiveness of the Didactic Lecture

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Purpose: The study's purpose was to determine the effectiveness of a didactic lecture for teaching and evaluating radiology resident dictation skills.

Methods: A 23-question test was created to assess resident knowledge of the American College of Radiology practice guidelines for reporting and our institution-specific requirements for communication of diagnostic imaging results. The test was administered to 23 residents before and after a 40-minute didactic lecture covering the structure of radiology reports and requirements for communication of imaging findings. The pre- and postlecture tests were graded on the basis of the number of correct answers. Data were analyzed using the mixed linear model for repeated measures and the Holm test for group comparisons.

Results: Mean pre- and postlecture test scores were $74.6\% \pm 2.73\%$ and $94.6\% \pm 5.94\%$ for postgraduate year (PGY) 2, $88.1\% \pm 5.55\%$ and $95.6\% \pm 4.50\%$ for PGY 3, $94.8\% \pm 2.5\%$ and $100\% \pm 0\%$ for PGY 4, and $96.8\% \pm 1.79\%$ and $98.4\% \pm 2.19\%$ for PGY 5, respectively. The increase of pre- to postlecture test scores was statistically significant for PGY 2, PGY 3, and PGY 4 residents ($P < .005$). Pre- to postlecture test improvement was greatest for PGY 2 residents. Test performance of PGY 2 residents compared with PGY 5 residents was statistically different.

Conclusion: Test scores for PGY 2 to PGY 4 residents significantly increased after didactic instruction on the reporting and communication of diagnostic imaging results. These findings suggest that a lecture and test format can be used to teach and assess radiology resident reporting and communication skills.

Key Words: Education, dictation, residents

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INTRODUCTION

An important component of radiology residency training is learning how to dictate accurate, clear, and concise reports for a variety of imaging modalities and examinations. Traditionally, dictation skills are gradually acquired and honed over the course of a 4-year residency through observation of fellow residents and attending staff. However, the Accreditation Council for Graduate Medical Education (ACGME) competency-based initiative is moving graduate medical education away from the apprentice model of education to a competency-based system that requires the establishment of goals and objectives for education in various competencies along with

objective assessment tools that demonstrate that the goals for competency have been met. In the instance of resident dictation skills, there is a new ACGME requirement that diagnostic radiology residency programs document "formal evaluation of quality dictated reports" by residents [1].

A 2002 to 2003 survey of program directors of accredited US radiology residencies found that most programs do not incorporate formal radiology dictation instruction or feedback into training. The survey revealed that 86% of responding programs provide residents with less than one hour per year of didactic instruction in radiology reporting [2]. In addition, through a recent series of 38 resident interviews, Steele et al [3] found that 78% of residents learn to dictate by listening to their peers or more senior residents, 13% by listening to faculty or staff, and 8% by reading other radiology reports. However, most of these residents would prefer a more structured process of learning how to dictate. The increasing variety and complexity of imaging examinations to

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Table 1. Radiology dictation lecture outline

Patient history
Acceptable vs unacceptable
Technique
Modality
Examination components
Examination date and time
Contrast use
Medications
Reactions and complications
Comparison studies
Findings
Clinical question
Terminology
Individual examination components and required elements
Factors compromising examination
Impression
Order of importance
Precise diagnosis vs differential diagnosis
Recommendations
Significant patient reaction
Documentation of communication

which residents are exposed during training further highlight the importance of providing them with early formal dictation instruction. In addition, residents need to be educated on proper reporting for appropriate reimbursement both for the financial health of the department in which they are working and for their future practice. To address the need for both organized resident dictation education and evaluation, we developed a didactic dictation lecture and a pre- and postlecture test. The test was designed to test both baseline dictation knowledge and the effectiveness of the didactic lecture.

MATERIALS AND METHODS

Institutional review board approval and waiver for informed written consent was obtained for this study, which is Health Insurance Portability and Accountability Act compliant. The study was conducted with our radiology residency program, which consists of 28 residents (7 residents per year).

We created a 40-minute didactic lecture covering the basic components of the radiology report based on the American College of Radiology's practice guidelines, as well as communication requirements specific to our institution [4]. Stylistic aspects of dictation with reference to the article by Hall [5] on the language of radiology were also addressed. The basic required elements for ultrasound, computed tomography, and magnetic resonance imaging examination dictations were covered (Table 1), and the lecture was given as a computer-based slide presentation (PowerPoint; Microsoft, Redmond, Washington). The lecture consisted of didactic text slides supplemented with example images and dictations from actual x-ray, ultrasound, computed tomography, and magnetic resonance examinations and reports (Table 2).

A 23-question written test composed of multiple choice and true/false questions that tested knowledge of the American College of Radiology guidelines, as well as our institution-specific dictation policies, was also developed. The test questions were listed in random order and consisted of 4 questions related to patient histories, 6 questions related to technique, 6 questions related to findings, 5 questions related to impression, and 2 questions related to communication of findings.

The dictation lecture and test were given to all 4 classes of radiology residents during the first week of new resident orientation in July 2007. The lecture and test were given to all of the residents in attendance for a required 1-hour resident noon conference. At the start of the con-

Table 2. Example dictation cases

Examination	History	Technique	Findings	Impression
Chest x-ray	Cough, Fever	Two views	Right upper lobe airspace opacity	Right upper lobe pneumonia
Pelvic US	Left lower quadrant pain	TA, TV, color Doppler	Enlarged left ovary without arterial or venous color Doppler flow	Left ovarian torsion
CT abdomen/pelvis	Trauma	Enhanced	Splenic lacerations with contrast extravasation	Splenic lacerations with active bleeding
Renal MRI	Renal mass	Unenhanced, enhanced	Complex renal cyst with thick enhancing septations and mural nodularity	Cystic renal cell carcinoma

US = ultrasound; CT = computed tomography; MRI = magnetic resonance imaging; TA = transabdominal; TV = transvaginal.

ference, each resident was randomly given a numbered packet containing 2 copies of the test, one titled pre-lecture and the other titled postlecture. The pre- and postlecture tests were identical, composed of the same 23 questions. The only identifying information that residents indicated on their test packets was their year in training. At the start of the conference, the residents were given 10 minutes to complete the pre-lecture test. The 40-minute didactic dictation lecture was then given. Time was allotted for questions to be asked and answered during the lecture. Immediately after the lecture, the residents then all took the same 23-question postlecture test.

On completion of the postlecture test, residents were also asked to indicate how helpful they found the didactic lecture and test based on a 5-point scale of strongly agree, agree, neutral, disagree, and strongly disagree with room for written comments. The pre- and postlecture test results were graded on the basis of the number of correct answers.

Statistical Analysis

The mean scores and ranges for the pre- and postlecture tests for each residency class were calculated. The mixed linear model for repeated measures was used to determine whether there was a statistically significant increase in the mean pre- to postlecture test score for each class. Positive statistical significance was determined using a *P* value less than .005. The Holm test for group comparisons also was used to assess for statistical difference between postgraduate year (PGY) 2 and more senior resident test performance. The expectation was that test performance would improve after the lecture and with increasing resident level of experience.

RESULTS

Twenty-three of the 28 residents in our radiology residency program were present for the didactic dictation lecture and completed the pre- and postlecture tests. Seven PGY 2, seven PGY 3, four PGY 4, and five PGY 5 residents were in attendance. Five residents were unable to be present for the lecture and test (3 residents were on vacation and 2 residents were on night-float rotations). For the test, the mean pre- and postlecture scores by class were as follows: mean PGY 2 resident pre- and postlecture scores were $74.6\% \pm 2.73\%$ and $94.6\% \pm 5.94\%$; mean PGY 3 pre- and postscores were $88.1\% \pm 5.55\%$ and $95.6\% \pm 4.50\%$; mean PGY 4 resident pre- and postlecture scores were $94.8\% \pm 2.5\%$ and $100\% \pm 0\%$; and mean PGY 5 pre- and postlecture scores were $96.8\% \pm 1.79\%$ and $98.4\% \pm 2.19\%$, respectively (Figure 1). There was a statistically significant increase in the pre- to postlecture test scores for the PGY 2, PGY 3, and PGY 4

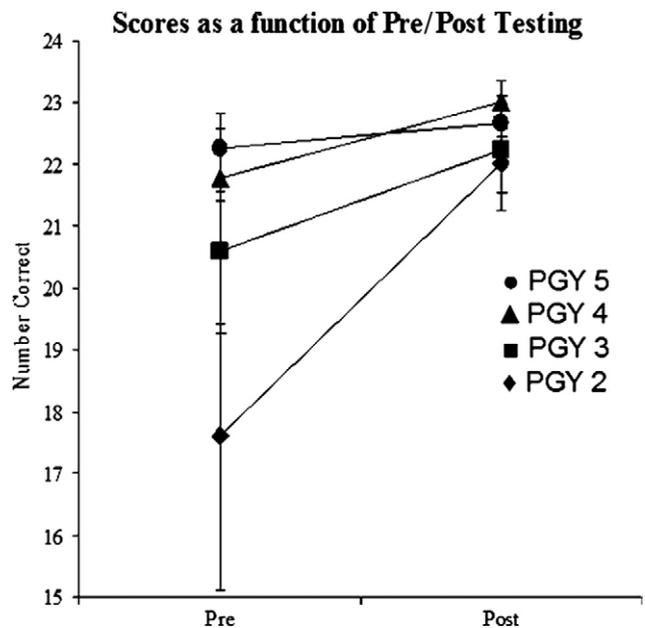


Fig. 1. Mean pre- and postlecture test scores by class by postgraduate year, (PGY).

residents based on the mixed linear model for repeated measures ($P < .005$). There was no significant statistical difference between the pre- and postlecture scores for the PGY 5 residents. There was also a statistically significant difference between the mean PGY 2 and PGY 5 test scores but not between any of the other classes based on the Holm test.

Twenty-two of the 23 participating residents either agreed (61%) or strongly agreed (35%) that the didactic lecture and test were helpful. One resident's (PGY 5) impression of the utility of the formal instruction was neutral. Specific resident comments regarding information that was most helpful to them included "the systematic approach to dictations," "descriptive terminology," and "how to organize dictations, especially impression." One resident indicated that the lecture was best suited for the junior residents.

DISCUSSION

At our institution, both the volume and complexity of diagnostic imaging examinations to which radiology residents are exposed during training are increasing. This trend coupled with the ACGME's requirement for documented evaluation of resident dictation skills formed our basis for developing formal resident dictation instruction [1]. Our findings of statistically significant improved postlecture test performances for the PGY 2 to PGY 4 residents indicates that the lecture format is an effective means of teaching dictation skills. In addition, 96% of the participating residents found the didactic dictation instruction useful. The high mean pre-lecture

quiz score for the PGY 5 residents also indicates that requisite dictation skills are eventually acquired over the course of residency training.

A review of the radiology literature revealed no prior reports on the utility of the lecture format for teaching residents how to dictate. However, another recently described method for teaching and evaluating resident reporting skills is the Objective Structured Clinical Examination (OSCE). Assessment of radiology resident reporting skills with the OSCE was described by Williamson et al [6], who compared resident and attending dictations for sample radiographs with respect to well-specified impressions. A linear trend of improved reporting skills with increasing experience was found, indicating that the OSCE is an effective technique for evaluating communication skills. The OSCE could also potentially serve as means of assessing the effectiveness of other formal dictation instruction, including a didactic lecture. Coakley et al [7] also found that routine attending editing of radiology resident reports improves the perceived report quality with respect to clarity, brevity, readability, and quality of impression. Both of these studies further demonstrate the need for more structured dictation instructing during training.

The focus of our dictation lecture was on the required elements and general structure of radiology reports with the goal of providing residents with a basic template from which even the most complex dictations could be created. This concept of more standardized radiology reporting was first proposed by Hickey in 1922 [8]. More recently, there has been renewed interest in the structure and quality of the radiology report with respect to referring physician preferences. A 1988 survey of referring physicians revealed that 40% thought radiology reports were occasionally confusing, 49% said the reports did not always clearly address the clinical question, and only 38% read the entire report [9]. In another survey of referring physicians, accuracy, followed by clarity, completeness, and timeliness was reported to be the most desired radiology report quality [10]. In addition, reports containing long and complex sentences may be viewed negatively by referring physicians, and both referring physicians and radiologists tend to prefer itemized over prose reports [11,12]. Our lecture emphasized this importance of creating timely, accurate, and concise reports that address the clinical question and include relevant and clear impressions.

Our institution currently uses traditional dictation with transcription for radiology report generation, which limits the number of standardized reports used by residents. We do have standard normal dictation templates for most studies, and all incoming residents receive a copy of these standard dictations. However, during their first 6 months of training, the first-year residents are

instructed to fully dictate all reports using the normal dictation templates for reference only. By learning how to efficiently dictate normal reports, we believe the residents are better able to generate clear and organized reports for abnormal examinations while still addressing all required report elements.

Our residents also review and edit all of their reports before attending review and sign-off. This gives them an opportunity to personally assess the quality and organization of their reports. We anticipate that with the eventual transition to voice recognition dictation, our residents will rely more heavily on standardized reporting templates to learn how to dictate. In addition, with voice recognition, the preliminary resident report may be immediately available for review by referring clinicians before attending editing, which further highlights the need for teaching residents accurate, concise, and clear reporting skills. Faster report generation with voice recognition also will allow for timelier faculty review and feedback of resident reports. Faculty review of resident radiographic interpretations has been shown to improve subsequent resident performance, which suggests that faculty review of resident reports with feedback could also improve dictation performance [13].

Limitations of our study include a general lack of consensus as to what constitutes a good radiology report, particularly with respect to terminology [5]. The stylistic aspects of dictating are difficult to teach given the variability of report style even at the attending level. We also do not know whether improvement in postlecture test performance also translated into actual improved radiology report dictations. Additional studies could look at the quality of resident dictations both before and after formal dictation instruction to further assess the effectiveness and retention of structured teaching. A potential source of bias in our study was the use of the same question set for the pre- and postlecture tests. It is possible that the residents focused on lecture information related to questions they found difficult on the pre-lecture test, allowing them to score higher on the postlecture test. In this manner, the pre-lecture test may have also enhanced the learning experience by focusing resident attention on individual areas of weakness during the course of didactic instruction. If we had used different pre- and postlecture test questions, there also would have been bias if the level of question difficulty was not identical for both tests. Finally, the results of our study may be limited to programs that primarily use traditional dictation where the report has to be structured by the resident without the help of a voice recognition, computer-generated template.

The high and similar pre- and postlecture test scores for the PGY 5 residents implies that dictation skills are learned by the fourth year of training, and senior resi-

dents are therefore less likely to benefit from formal instruction. To expedite the learning process and help junior residents learn to construct quality dictations in the first year of training, we plan to give the didactic dictation lecture and test to all incoming radiology residents. The correct test answers also will be reviewed with the new residents, which will give them an additional opportunity to ask questions and learn from mistakes. We believe the lecture format for instruction can be readily incorporated into a training program. A variable amount of time is initially required to create a didactic lecture. However, such instruction can then be easily administered to 1 or more classes of residents during a single lecture period. As our senior residents have learned these skills on service, we anticipate that the knowledge the junior residents gained by the didactic instruction will be reinforced by daily use and on-service feedback. Long term, we can monitor resident retention of instructional dictation information via our monthly electronic attending evaluations of resident performance. One component of these monthly evaluations is assessing the quality of resident dictations.

Although we plan to give only the first-year residents the general dictation lecture, all residents would likely benefit from periodic updates on required reporting elements. For example, the Centers for Medicare & Medicaid Services' Physician Quality Reporting Initiative currently requires specific report elements for computed tomography and magnetic resonance imaging examinations of the brain and for carotid imaging studies, and it is likely to mandate additional reporting standards in the future [14]. As the preliminary dictators of many radiology reports, residents need to remain current with reporting standards. If the required reporting elements are not included in preliminary resident reports, it will require additional attending time and editing of reports.

CONCLUSIONS

A didactic lecture is an effective means of teaching dictation skills, as evidenced by the improved postlecture test

performance of the PGY 2 to PGY 4 residents and overall favorable resident feedback. Such a lecture can readily be incorporated into a residency training program and may decrease the radiology dictation learning curve.

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