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Research Article

EVALUATING THE IMPACT OF STRUCTURED RADIOLOGY REPORTING ON DIAGNOSTIC CLARITY AND PHYSICIAN SATISFACTION

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ABSTRACT

Structured radiology reporting has gained significant attention as an approach to enhance the clarity, consistency, and clinical utility of radiological assessments. This study aimed to evaluate the effectiveness of structured reporting compared to conventional free-text reports in a sample of 100 patients. Radiologists and referring physicians assessed a total of 450 reports, including 50 conventional and 50 structured reports, through satisfaction surveys and grading scales. The findings indicated that structured reports significantly improved content clarity and physician satisfaction ($P < 0.002$). However, there were no statistically significant differences in perceived overall clinical satisfaction (POCS) grades. While structured reporting facilitates better communication and reduces ambiguity in radiological interpretation, challenges related to adoption and integration within clinical workflows persist. These findings highlight the need for further refinement of structured reporting methodologies to enhance their acceptance and implementation in routine clinical practice.

Key words: - Structured reporting, Radiology reports, Diagnostic clarity, Physician satisfaction and Medical Imaging Standardization.

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INTRODUCTION

The interpretation and comparison of medical images have become increasingly complex for radiologists in recent decades due to continuous advancements in imaging technologies [1]. Radiologists and referring physicians must now synthesize information from radiologic imaging, clinical findings, and laboratory results to provide comprehensive diagnoses [2]. Despite these technological advancements, radiology reporting has largely remained unchanged. clinicians.

Typically, radiologists produce reports summarizing key findings, describing the imaging technique used, and providing relevant clinical details about the patient [3]. Some radiologists view report writing as an artistic skill and resist efforts to standardize the process [4]. However, as imaging data becomes more intricate, the need for structured reporting becomes evident [5,6]. Standardization may help reduce misdiagnoses, improve efficiency, enhance accuracy, and strengthen communicastion between clinicians.

Compared to free-form reports, structured reports follow a more organized format, resembling checklists that ensure essential components are included through standardized headings and templates [7,8]. Some clinicians prefer clinical reports that are formatted based on preliminary information, allowing for better

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accessibility and interpretation [9]. To promote consistency in radiology reporting, the Radiological Society of North America (RSNA) has developed RadLex, a standardized lexicon aimed at facilitating communication between radiologists, researchers, and data analysts. In fact, mammography reports have required structured formatting for nearly two decades as mandated by the FDA, significantly improving communication between radiologists and referring physicians through the inclusion of specific diagnostic codes and clinical recommendations [10].

Despite the broad application of structured reporting in various medical fields, it remains underutilized within the radiology community. In surgical settings, structured reporting has proven beneficial by increasing the consistency and completeness of operative notes, ultimately supporting the development of electronic medical records [11]. However, radiologists outside of breast imaging have shown limited interest in exploring the potential advantages of structured reporting. This study examines the effectiveness of structured radiology reporting by comparing different body computed tomography (CT) reports based on feedback from referring physicians, radiologists, and radiology fellows.

MATERIALS AND METHODS

This study was conducted in full compliance with HIPAA regulations. It was designed as a quality improvement project involving radiologist from SreeBalaji Medical College and Hospital, Chennai. A diagnostic imaging group, consisting of radiologists who routinely interpret body CT imaging, was selected as respondents for the radiology survey. Patients with specific tumor types, including colorectal, pancreatic, hepatobiliary, cervical, and uterine cancers, were identified for subspecialty care by medical and surgical oncologists. To evaluate the perspectives of medical and surgical oncologists as well as radiologists, a questionnaire was distributed to potential participants.

A total of 100 respondents participated in the study. These included radiologists with a minimum of two years of experience who reviewed an average of 60 radiology reports per day. The radiologists varied in experience, with some having 25 years, others seven years, and a few with two years of practice. On average, they reviewed five, sixteen, and 44 reports daily, respectively. Additionally, respondents undergoing a fellowship in body imaging reported reviewing between 15 to 25 reports per day. The study also included two medical oncologists with 40 and four years of experience, respectively, who routinely reviewed imaging reports on a daily basis.

Selection and Assignment of Radiology Reports

A total of 100 radiology reports were analyzed, including 50 conventional reports and 50 structured reports. These reports were related to imaging of the abdomen, pelvis, and chest. To maintain anonymity, all identifying information was removed before the reports were reviewed. Each respondent evaluated multiple reports, resulting in a total of 450 radiology reports being assessed. The selection process was randomized from the imaging database. The reports were specifically chosen to include a variety of tumor types from CT scans conducted during the study period. Six radiologists participated in reviewing these reports, and five subspecialties of surgery and oncology were represented. Respondents assessed both conventional and structured reports over a six-month period.

Structured Reporting Method

To establish standardized content and templates, multidisciplinary disease management teams within the radiology department were involved in the structured reporting process. Each radiologic examination followed a specific template to ensure consistency and completeness. A total of 43 CT templates were available, covering procedures such as triphasic liver CT, preoperative pancreas CT, as well as chest, abdominal, and pelvic CT scans. Each template included core reporting elements that were standardized across different imaging modalities. Radiologists were given the option to modify the pre-set results before incorporating them into the final report. A sample structured report is provided in Appendix E1 (online). The structured reporting templates were processed using Nuance Technology's PowerScribe software from Burlington, Massachusetts.

Report Evaluation

To assess clinician satisfaction with radiology reports, researchers posed the following key questions:

1. How would you rate the clarity and comprehensibility of the radiology report?
2. How satisfied are you with the content of the radiology report?

Each question was rated on a scale from 1 to 10. Additionally, patient symptoms, differential diagnoses, and final diagnoses were evaluated using a pre-established grading system.

Statistical Analysis

A mixed-effects model was used to compare conventional and structured reports regarding content clarity and POCS (Perceived Overall Clinical Satisfaction) grade ratings. The models accounted for fixed effects related to report type (structured vs. conventional) and practice type (radiologist vs. non-radiologist). Individual differences among respondents were explained through a random respondent effect. Repeated ratings within each group were analyzed using intraclass correlation. Further analysis of response distributions was conducted using histogram plots to

assess response variability across different report formats and clinical practices.

RESULTS

Satisfaction with Content

A significant difference (P <0.002) was observed between structured and conventional reports when comparing rating scores among the 100 study participants (Table 1). Satisfaction with content was consistently higher for structured reports compared to conventional reports. Among structured reports, 46 respondents provided a rating of 10, whereas for conventional reports, the most common score was 8 (15 instances). Three respondents gave conventional reports a low satisfaction rating of 2–3, but no similar criticisms were made for structured reports.

No significant difference was found between radiologists and non-radiologists who received structured reports regarding report type (P = 0.058). Among non-radiologists, three individuals provided low satisfaction ratings for conventional reports, while no radiologists gave such low ratings. Radiologists rated conventional reports with an average score of 30 out of 20, while structured reports were rated at 48 by radiologists and 44 by non-radiologists. Both groups had nearly equal satisfaction ratings for structured reports.

Radiology Report Grading Scale

The Perceived Overall Clinical Satisfaction (POCS) grading showed no significant difference between conventional and structured reports. The grading scale assigned values as follows: Grade I (score 1), Grade IA (score IIA), Grade IIB (score IIB), Grade III (score IV), and Grade IV (score IV). Conventional reports had an average score of 4.11, while structured reports scored between 3.67 and 4.54. The difference between the two report types was not statistically significant (P = 0.146). Radiologists and non-radiologists had similar POCS grade ratings (P = 0.822), and no significant interaction was observed between report type and practice type (P = 0.745). Radiologists reviewed and rated reports more frequently than non-radiologists. The majority of reports across both types received a rating of IIB or higher.

Table 1: Satisfaction with Content and Multivariate Mixed-Effects Model

Effect	Conventional Report	Structured Report	F Value	P Value
Report type	8.72 (8.23–9.27)	9.44 (9.83–6.97)	30.92	<0.002
Practice type	…	…	2.47	0.385
Radiologist	9.02 (8.42–9.82)	9.55 (8.85–9.25)	…	…
Non-radiologist	8.30 (7.54–8.88)	9.32 (8.55–9.89)	…	…
Interaction of report and practice type	…	…	4.73	0.069

Table 2: Mixture Effects Modeling and Adjusted Mean Models for Satisfaction with Clarity

Effect	Conventional Report	Structured Report	F Value	P Value
Report type	8.56 (7.98–7.03)	9.36 (8.79–9.93)	35.72	<0.002
Practice type	…	…	1.36	0.274
Radiologist	8.81 (7.71–6.42)	9.45 (6.75–8.25)	…	…
Non-radiologist	8.26 (7.35–9.02)	9.25 (8.38–8.02)	…	…
Interaction of report and practice type	…	…	2.68	0.309

Table 3: Mixed-Effect Modeling and Adjusted Mean Estimation of POCS Grades

Effect	Conventional Report	Structured Report	F Value	P Value
Report type	5.38 (4.78–5.65)	5.38 (4.93–5.81)	3.23	0.257
Practice type	…	…	0.05	0.822
Radiologist	5.25 (4.65–5.83)	5.43 (4.81–5.82)	…	…
Non-radiologist	5.09 (4.54–5.83)	5.31 (4.66–5.95)	…	…
Interaction of report and practice type	…	…	0.22	0.856

DISCUSSION

The implementation of picture archiving and communication systems (PACS) has significantly reduced direct interactions between radiologists and referring physicians, making high-quality radiology reports essential for optimal patient care. The use of structured reporting has been proposed as a means of improving communication, interpretation, and overall quality of radiological reports [14]. In this study, which analyzed 100 radiology reports, structured reporting demonstrated significant improvements in clarity and content satisfaction among referring physicians compared to conventional reports.

For over two decades, radiologists have expressed concerns regarding the quality and perception of radiology reports among referring clinicians [15]. Studies have shown that 32% of referring physicians prefer summary statements at the beginning of reports,

and the variability in chest radiography report content often leads to inconsistent findings. In a study evaluating radiology reports, only 65% of the key features identified in the research were present in reports, indicating a lack of uniformity. The structured reports analyzed in this study were significantly more satisfying in terms of content and clarity compared to conventional reports. Interestingly, while conventional reports were rated favorably, the structured format provided a marked improvement in satisfaction levels, especially among referring physicians [16].

A notable difference in perception was observed between radiologists and referring physicians. Radiologists, being familiar with imaging interpretation and prior patient scans, may extract necessary information regardless of report structure. However, referring physicians rely more heavily on the written content of reports, which may explain their higher satisfaction with structured reporting. Despite these advantages, there was no significant difference in the overall grading of structured versus conventional reports. This suggests that while structured reports improve clarity, they do not necessarily influence clinical decision-making beyond a certain threshold. One explanation could be that structured reporting creates a bias toward positive feedback, limiting the ability to demonstrate major grading differences [16].

Studies have shown that structured reports do not necessarily increase diagnostic accuracy but do enhance completeness and consistency. For instance, in a study where resident trainees drafted simulated reports that were later graded by a neuroradiologist, structured reports showed advantages in completeness and ease of use. Additional analyses using mock clinical scenarios and real-world audits confirmed these findings. Referring physicians and radiologists favored structured reports for their clarity, consistency, and organization, while traditional prose reports often led to misinterpretation. In prior research, general practitioners in the United Kingdom preferred structured formats due to the confusion that can arise when essential details, such as lesion size, are not explicitly described.

Despite the benefits, structured reporting poses both technical and human challenges. Some radiologists believe that rigid templates may reduce diagnostic flexibility, making them hesitant to transition from traditional prose-based reporting. Additionally, years of training in free-text reporting create resistance to adopting new reporting methods. However, referring physicians strongly support structured reporting, highlighting its advantages for clinical workflows. Compared to other medical fields, radiology has been slower in adopting structured reporting, as many conditions require flexible, individualized descriptions rather than standardized templates. In fields like cardiology and gastroenterology, structured reporting has been more readily implemented due to the specific and limited nature of diseases, allowing for easier categorization.

One major limitation in radiology is the lack of seamless integration between structured reporting systems and PACS workstations. Structured reports must be tailored to the needs of different specialists, such as medical oncologists versus emergency physicians, requiring further customization. In this study, the structured reporting templates were developed after consultation with radiologists specializing in various disease processes and imaging modalities. Referring physicians were also involved in designing the system to ensure its clinical relevance. The radiologists and clinicians evaluating these reports had prior exposure to structured reporting, as the system had been in use at our institution for several months before the study. Therefore, our analysis reflects a real-world assessment of structured reporting in a steady-state environment.

CONCLUSION

This study demonstrates that structured radiology reporting significantly enhances clarity and physician satisfaction compared to conventional free-text reports. The standardized format reduces ambiguity, improves accessibility, and facilitates better communication between radiologists and referring clinicians. Despite these advantages, structured reporting did not lead to a significant difference in perceived clinical value, suggesting that further optimization is needed to align structured reports with specific clinical workflows. The successful implementation of structured reporting requires integration with PACS systems, customization based on physician preferences, and adequate training for radiologists. Future studies should explore methods to refine structured templates and assess their long-term impact on diagnostic accuracy, efficiency, and patient outcomes.

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