

# Analysis and Improvement of Written Radiology Reports: A Single Center Experience

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## Background

- Effective communication is a critical component of diagnostic imaging and vital for quality patient care.
- Written radiology reports are among the most important means of communication between radiologists and clinicians.
- Written reports are a core component of every imaging exam.
- The ultimate goal of a radiology report is to communicate imaging exam results in an accurate and easily understood manner.



## Purpose

The purpose of this study was to analyze and improve the quality of written radiology reports at William Beaumont Health System.



## Methods

- A total of 997 radiology reports created at Beaumont Health System during 2011 were randomly selected for inclusion.
- Reports were assessed for content, clarity, typographical errors, and format preference.
- Internal medicine physicians and radiologists scored reports on a scale of 1-4 (1=best, 4=worst).
- Participants were asked where they preferred the report Impression, how often they read the findings section, and for any free text suggestions to improve reports.
- Initial analysis was performed and a report improvement plan was generated and implemented.
- 305 subsequent radiology reports were re-analyzed and evaluated for improvement.



## Methods: Metrics to Measure Report Quality

- A panel of radiologists at our institution met with professors from the Department of Writing and Rhetoric at Oakland University to develop metrics to measure report quality.
- Consensus was achieved regarding three important parameters:
  - Content: Report is relevant to the clinical situation and question.
  - Clarity: Report has a clear style and presents information in a simple logical order.
  - Proofreading: Report contains accurate grammar and spelling without dropped words.



## Methods: Report Improvement Plan

- A report improvement plan was developed to address specific report quality metrics measured during the initial evaluation.
- Radiologists who participated in the initial evaluation were briefed through email and PowerPoint regarding the results of the initial evaluation and recommendations on how to improve written reports with respect to the three parameters:
  - Content: The importance of providing a concise impression that answered the clinical question was stressed.
  - Clarity: It was suggested that using multiple organized paragraphs would enhance report structure.
  - Proofreading: To address typographical and transcription errors, residents and staff were reminded to proofread reports.



## Initial Results

Table 1: Comparison of initial content, clarity, and typographical error scores (Mean  $\pm$  Std. Dev.) between internal medicine physicians and radiologists.\*

	Internal Medicine	Radiologists	p value
Content	1.65 $\pm$ 0.80	1.35 $\pm$ 0.55	< 0.05
Clarity	1.74 $\pm$ 0.81	1.47 $\pm$ 0.63	<0.05
Typographical Errors	1.61 $\pm$ 0.79	1.56 $\pm$ 0.71	p = 0.29

\*Metrics scored on a scale of 1-4 with 1 being the best, and 4 the worst.

- Internists scored radiology report content and clarity lower as compared to the radiologists.
- Typographical errors were scored similarly.



## Initial Results

Table 2: When reading radiology reports where do you prefer the impression to be located?\*

	Top of the Report (%)	Bottom of the Report (%)	No Preference (%)
Internal Medicine Physicians	34	56	9
Radiologists	13	75	13

\*Results reported as a % of respondents who answered in each category.

- There is a preference for the Impression to be located at the end of the report.
- The preference for the Impression at the end of the report was greater for radiologists.



## Initial Results

Table 3: When reading radiology reports how often do you read the findings section?\*

	Always (%)	> 50% of the time (%)	< 50% of the time (%)	Never (%)
Internal Medicine Physicians	16	55	29	0
Radiologists	25	51	22	1

\*Results reported at a % of respondents who answered in each category.

- Approximately  $\frac{1}{4}$  physicians in the study read the Findings Section of the report less than 50% of the time.



## Results following report improvement plan

Table 4: Comparison of content, clarity, and typographical error scores (Mean  $\pm$  Std. Dev.) between internal medicine physicians before and after implementation of the report improvement plan.\*

	Internal Medicine (Initial)	Internal Medicine (after)	p value
Content	1.65 $\pm$ 0.80	1.60 $\pm$ 0.71	p = 0.17
Clarity	1.74 $\pm$ 0.81	1.65 $\pm$ 0.70	p = 0.053
Typographical Errors	1.61 $\pm$ 0.79	1.55 $\pm$ 0.64	p = 0.11

\*Metrics scored on a scale of 1-4 with 1 being the best, and 4 the worst.

- Overall, there was a trend toward improvement in each measured category; however, the difference in report content, clarity, and typographical errors was not statistically different before and after implementing the report improvement plan.



## Discussion

- Internists scored radiology report content and clarity lower compared to radiologists. Potential reasons for this difference could include:
  - A communication barrier: the radiologist's lexicon is different than Internist's.
  - The customer (internist) may have a bias toward being more discerning and critical about the product that they are utilizing.
  - The producer (radiologist) is biased toward affirming the quality of the product that they produce.
- Typographical errors were scored similarly.
- There is a clear preference for the Impression section to be located at the end of the report and this follows classic organization principles.
- The preference for the Impression at the end emphasizes the need to provide a consistent report structure so clinicians can efficiently locate pertinent information.



## Discussion

- Approximately  $\frac{1}{4}$  of respondents read the report findings less than 50% of the time.
- There is a high likelihood that findings not included in the Impression may not be communicated to the ordering clinician.
- It is vital for the Impression to convey a pertinent summary of imaging findings and recommendations.
- After implementation of the report improvement plan, report content, clarity, and typographical scores trended toward improvement, but unfortunately these differences were not statistically significant.



## Limitations/Challenges

- In our experience improving written reports poses a number of challenges.
  - Metric Validation: For the purposes of this paper we chose to focus on content, clarity, and typographical errors, but there is no data to suggest these are the critical factors to define the quality of a report even though they make practical sense to us.
  - Physician Selection: Our study looked only at the scoring of internal medicine physicians and radiologists. Other medicine subspecialties could score reports differently.
  - Physician Buy-In: Implementing the report improvement plan was challenging. Some physicians are resistant to change. Making lasting change requires a coordinated long term effort which is difficult to achieve.



## Summary and Recommendations

- Improvement of written radiology reports has the potential to benefit patient care through improved communication, but poses a number of challenges.
- The report Impression should be at the end of the report following classic organizational principles and institutional standardization.
- It is critical that the Impression provide a complete and accurate summary of the important imaging findings because many clinicians do not read the findings section.
- Radiologists scored reports better in content and clarity than their internal medicine colleagues suggesting room for improvement in written communication between radiologists and the clinicians who use their reports.



Thank you.

