Quality in musculoskeletal radiology: Can we measure the 'perfect' report?

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THE RADIOLOGY REPORT

- Although a report is the most important product a radiologist generates towards patient care, radiologists rarely receive any direct training (86% residents receive <1h annually[1])

- The variety in style of individual radiologist's reports, influenced by training and experience, makes defining the quality of reports notoriously difficult

- Structured reporting templates help standardise terminology but may fragment findings and overall coherence

- As the primary communication between radiologist and referrer, the ultimate measure of quality is end-user satisfaction, however teleradiology and remote reporting – hastened by the coronavirus pandemic – have diminished the opportunities where such feedback can be obtained

- Studies have attempted to identify formats preferred by referrers[2,3], but quality metrics are sparse and not subspecialty focused

OBJECTIVES

- To establish a quality dashboard among a group of radiologists in a department by using the most pertinent of all metrics: end-user feedback
- To 'measure' quality of reports in order to identify and target areas of reporting style/ structure for improvement

- Knee MRI chosen (most frequent MSK MRI exam and hence greatest potential for quality improvement from the widest number of radiologists)
- Orthopaedic surgeon feedback used

METHODS

- A senior orthopaedic knee surgeon with 8 years consultant experience provided quality metrics with weighted importance (rated from 1 to 10) for MRI knee reports performed for trauma

- 9 metrics identified as important

- The degree to which each metric could be satisfied in a report was agreed upon by consensus of the authors

- The maximum score for each metric is the weighted rating listed by the surgeon
  Eg. Timeliness was rated 4/10 in weighted importance and hence only assigned a maximal score of 4

Quality metrics:

1. Diagnostic certainty

2. Answering the clinical question

3. Readability (points/ paragraphs/ free prose)

4. Report length (brevity)

5. Suggesting additional management

6. Mentioning relevant structures (relevant negatives)

7. Timeliness (within 48 hours)

8. Lack of spelling/ grammatical errors

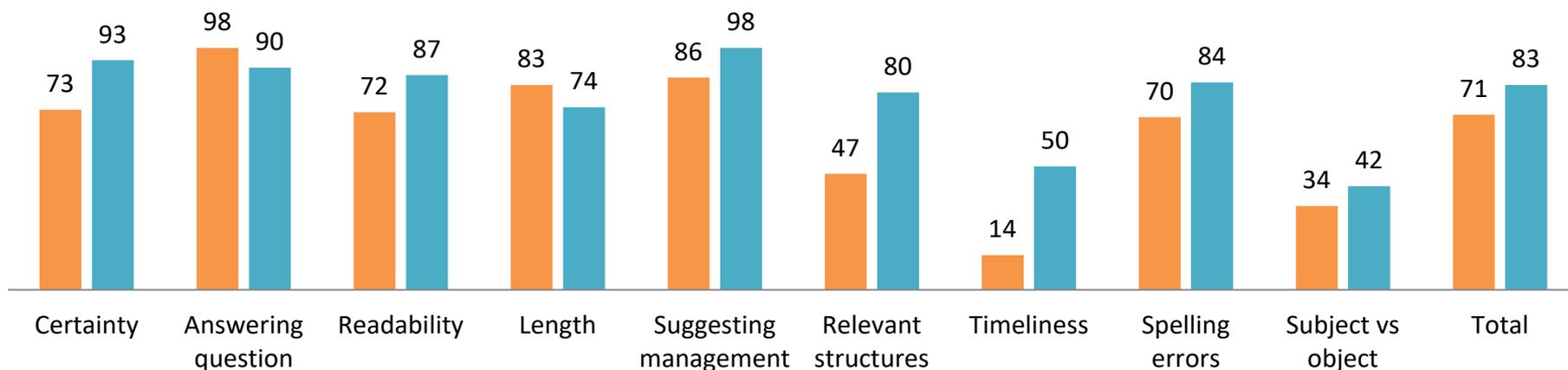9. Sentence structure (subject vs object)

METHODS

- Retrospective analysis of 50 MRI adult (18 to 50 years old) knee scans for investigation following trauma performed at two out of three hospitals in our acute hospital group from January to April 2018

- A 'quality in radiology seminar' was subsequently delivered by a consultant MSK radiologist to 20 staff and resident radiologists, introducing quality concepts, with particular reference to report style, communication, and quality metrics

- Re-audit of 50 MRI adult knee scans performed during March to April 2021

- Scores compared using t-test, with significance level of $\alpha = 5\%$

RESULTS

Quality Metric	Possible scores	2018 Average (Range)	2021 Average (Range)	p-value (significant results in orange)
Certainty	0-10	7.3 (0-10)	9.3 (0-10)	.0018
Answering clinical questions	0-9	8.8 (0-9)	8.1 (0-9)	.0939
Readability (Paragraphs vs free prose)	0-8	5.8 (0-8)	7.0 (4-8)	.0044
Length of report (brevity)	1-7	5.8 (2-7) [165 (55-434 words)]	5.2 (2-7) [199 (76-417) words]	.0257
Suggesting additional management	0-6	5.2 (0-6)	5.9 (0-6)	.0135
Mentioning relevant structures	1-5	2.4 (1-5)	4 (1-5)	<.00001
Timeliness	0-4	0.6 (0-4)	2 (0-4)	.00007
Spelling/ grammatical errors	0-3	2.1 (0-3)	2.5 (0-3)	.02987
Sentence structure (subject vs object)	0-2	0.7 (0-2)	0.8 (0-2)	.4150
Total	**2-54**	**38.5 (21-49)**	**44.8 (29-54)**	**<.00001**

Comparison of Quality Metric Scores (as % of maximum possible score)   ■ 2018 ■ 2021

	Certainty	Answering question	Readability	Length	Suggesting management	Relevant structures	Timeliness	Spelling errors	Subject vs object	Total
2018	73	98	72	83	86	47	14	70	34	71
2021	93	90	87	74	98	80	50	84	42	83

DISCUSSION

Initial audit

- Answering the clinical question and suggesting further management done well
- Certainty and readability scored <75%
  - Equivocal phrases such as 'indeterminate for' and 'possibly' used
  - Lack of separation of the report into logical and easily readable sections
- A number did not mention relevant negatives such as marrow signal and posterolateral corner structures, possibly due to report brevity
- Only 14% were verified within the 48-hour target set

Re-audit

- Significant improvement in majority of the metrics, particularly certainty and timeliness
- Total score significantly improved from 38.5 to 44.8 (maximum possible score 54)
- Reports were longer (199 versus 165 words on average), likely reflecting inclusion of more relevant negatives, although repetition of findings were seen

DISCUSSION

- Report length is a balance between sufficient descriptors and concentration of reader
- Inferred from our study that a word length of approximately 120 to 180 is appropriate for post-traumatic MRI knee reports

The quality of reports will be improved by:

1. Leading with the diagnosis
2. Use of the subject, rather than the object, in the wording of each sentence (omitting the use of the phrase 'there is')
3. Omitting equivocal phrases from the lexicon
4. Use of paragraphs or new lines, and numbered conclusions
5. Proofreading with zero-tolerance for spelling, punctuation and syntax errors
6. Providing details of further management and radiological investigations, but only when required depending on the referrer

CONCLUSION

- A wide variation in MSK radiology reports can be found in one department. However, common themes for improvement can be found consistently to produce clear, clinically useful and prompt reports, without redundant information and minimal ambiguity.

- By focusing on one's individual report style, and with a relentless and iterative drive for quality improvement, the difficult trade-off between sensitivity and speed (report length) can be developed at the optimal level for each reporter.
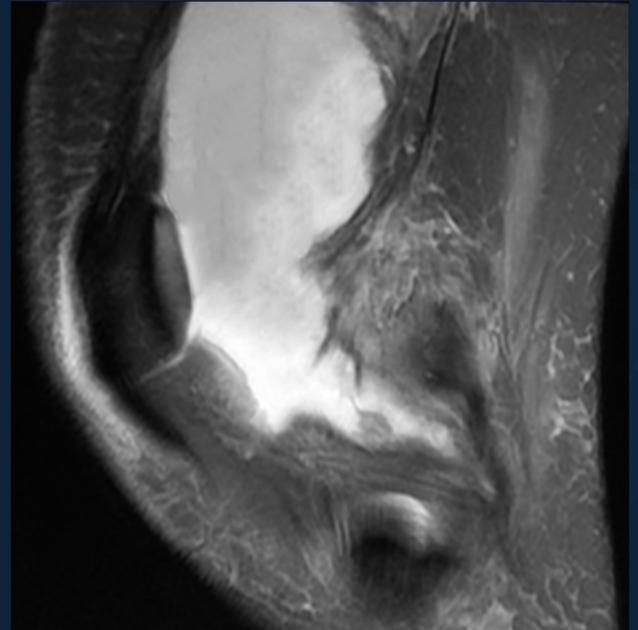
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Spot the animals?

"Art (and quality) is in the eye of the beholder, and everyone will have their own interpretation."

Image credits: For Elephants Inc, Michael Kahn