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Title:

Radiologist and MDT clinician opinions on the quality of MRI rectal cancer staging reports: how are we doing?

Author's:

Brown PJ[1],

Rossington H[2],

Taylor J[2],

Lambregts DMJ[3],

Morris EJA[2],

West NP[4],

Quirke P[4],

Tolan D[1]

on behalf of the YCR BCIP Study Group

Author Contributions:

1 guarantor of integrity of the entire study: PB

2 study concepts and design: PB, HR, NW, PQ, DT,

3 literature research: PB

4 clinical studies: N/A

5 experimental studies / data analysis: PB, HR

6 statistical analysis: PB, JT, DT

7 manuscript preparation: PB, DT

8 manuscript editing: PB, HR, JT, DL, EM, NW, PQ, DT

Abstract

Aim

Rectal cancer magnetic resonance imaging (rcMRI) allows accurate assessment and preoperative staging of rectal cancers. Significant variability in the content and style of rcMRI reports has been shown to exist. Given the implications for treatment, this study evaluated the current opinion of rcMRI reports amongst specialist clinicians involved in colorectal cancer multi-disciplinary teams (CRC-MDTs).

Materials and Methods

Active participants at 16 United Kingdom CRC-MDTs across a population of 5.7 million were invited to complete a questionnaire, this included 22 closed and 3 open questions. Closed questions used ordinal (Likert) scales to judge the subjective inclusion of tumour descriptors and impressions on rcMRI report clarity and consistency. Open (free-text) questions allowed overall feedback and suggestions.

Results

A total of 69 participants completed the survey (21 radiologists and 48 other CRC-MDT clinicians). Both groups highlighted that reports commonly omit the status of the circumferential resection margin (CRM; 83% versus 81% inclusion, other clinicians and radiologists respectively, $p>0.05$), presence or absence of extra-mural venous invasion (EMVI; 67% versus 57% inclusion, $p>0.05$) and lymph node status (90% inclusion in both groups). Intra-radiologist agreement across rcMRI scans is reported at 75% by other clinicians. Free-text comments included suggestions for template-style reports.

Conclusion

Both groups recognise a proportion of rcMRI reports are sub-optimal with key tumour descriptors omitted. There are also concerns around the presentation style of rcMRI reports and inter- and intra-radiologist report variability. The widespread implementation of standardised report templates may improve completeness and clarity of rcMRI reports and thus clinical management and outcomes in rectal cancer.

Abstract word count: 248/250

Keywords

Rectal Cancer; Magnetic Resonance Imaging; Quality improvement

Key Points

- Rectal cancer MR staging reports vary in content and style
- Other clinicians and radiologists participating in colorectal MDTs recognise that key tumour descriptors are often missing from rcMRI reports
- Differing report-styles (prose vs. template reports) raised concern amongst clinicians for report completeness and accuracy including inter- and intra- radiologist variability

Introduction

Magnetic resonance imaging (MRI) is the most accurate method of rectal cancer pre-operative staging and post-treatment reassessment and so is vital to treatment planning 1–4. Despite the importance of describing key tumour features, however, the standard of rectal cancer staging MRI (rcMRI) reports are variable. As a result, recent guidelines for rcMRI reports from the European Society of Gastrointestinal Abdominal Radiology (ESGAR) and Society of Abdominal Radiology (SAR) both advocate the use of structured report templates 5,6.

Standardising presentation styles and development of structured report templates is increasingly being recognised throughout radiology and pathology as a method of improving the communication of imaging and pathological findings 7–10. Nonetheless these templates are not widely adopted by radiologists, with many preferring traditional prose reports 11,12. Assuming clinically pertinent information is conveyed within rcMRI reports the presentation style is perhaps less important if it allows the appropriate treatment stratification of patients. Other clinician and radiologist opinions on the current standards and consistency of rcMRI reports are, however, unknown.

As rcMRI techniques have improved, the number of key tumour features recommended for inclusion in rcMRI reports has similarly increased 2,5,13,14. The demand for the inclusion of

these features is often led by specialist clinicians involved in the colorectal cancer multi-disciplinary teams (CRC-MDTs) to optimize and individualise patient treatment 15. The opinions of CRC-MDT clinicians on the quality and contents of rcMRI reports could, therefore, guide radiologists. Furthermore, continual improvements to the quality of care provided, and standardisation across organisations of different sizes and specialist interests are imperative to audit services and deliver good patient outcomes; continued professional development including the use of reflective practice is vital to sustained and progressive clinical practice 16.

Here we evaluate the current standard of, and satisfaction with rcMRI reports, in the United Kingdom (UK), provided by specialist gastrointestinal radiologists trained in rcMRI reporting; as assessed by CRC-MDT clinician service users and reporting radiologists. The aim was to identify key tumour descriptors and features of rcMRI reports that are consistently good and areas for improvement, as well as assessing differences in ratings of rcMRI reports between radiologists and other clinicians.

Materials and methods

This was a qualitative service evaluation study so local ethical approval was not required. All questionnaire responses were collected as anonymised data and contained no patient or individual clinican identifiable information.

16 United Kingdom CRC-MDTs serving a combined population of over 5.7 million, were invited to participate in the study. From June 2017, the CRC-MDT lead clinician at each centre was invited to distribute by email a questionnaire assessing rcMRI report quality to

active participants in their local CRC-MDT, this included; colorectal surgeons, medical oncologists and clinical (radiation) oncologists, histopathologists and clinical nurse specialists. A similar, but modified questionnaire assessing rcMRI report quality was distributed to each consultant radiologist involved in the CRC-MDTs, or routinely reporting rcMRI across the region; all invited radiologists were gastrointestinal sub-specialists that had received specialist training in rcMRI and are members of either ESGAR and/or the British Society of Gastrointestinal Abdominal Radiology (BSGAR).

A total of 25 questions were included in the questionnaire; 22 were closed questions and 3 were open questions inviting further feedback and suggestions, figure 1. Of the closed questions; 4 described the responders experience and the size of the CRC-MDT they participate in, 9 were on the content and completeness of rcMRI reports, 7 were on the clarity of reports and 2 were on the overall satisfaction with reports. Responses regarding contents and clarity questions were framed into ordinal, 5-point Likert-type scales to help categorise responses, for contents from 'always included' to 'never included', and for clarity this ranged from 'highest agreement' to 'diasgree/lowest agreement'. Responses to the questions for key tumour descriptors were dichotomised from the Likert-type scale into two groups to improve statistical power and provide meaningful groups for comparison. Likert-responses 'always included' and 'usually included' were collectively grouped as the variable 'sufficiently' included. Whereas, Likert-responses; 'maybe included', 'occasionally included', or 'never included' were collectively grouped as the variable 'not sufficiently' included. Similar groupings were used to dichotomise the questions on report clarity; 'disagree/ lowest agreement', 'some disgreement' and 'neither agree or disagree' were grouped in 'diasgree' and goups 'highest agreement' and 'somehwat agree' were grouped to for an

'agree' group. The middle category, neither agree or disagree, was included in the 'disagree' group to help optimise rcMRI reports standards.

The three open questions required free text comments from questionnaire respondents facilitating anonymous feedback from clinicians to radiologists and between radiologists, these were;

1) *In your opinion are any important topics/items not 'routinely' included in rcMRI reports?*
2) *In your opinion could rcMRI provide additional information that would be clinically useful?*
3) *In your opinion are there areas that could be improved in reporting these cases that might lead to improved patient outcomes?*

All data were tabulated in Microsoft Excel (Office 2010, Richmond, Virginia, USA) and all statistical analysis comparing response between the groups was performed using Stata (StataCorp. 2017. Stata Statistical Software: Release 15. College Station, TX, USA). Fisher's exact test was used to test for statistical significance in differences in reporting standards between other clinician and radiologist groups. A p-value < 0.05 was required for statistical significance.

Results

A total of 69 participants completed the questionnaire; this included 21 specialist gastrointestinal radiologists and 48 other clinicians from the CRC-MDT, a response rate of 27.9% (a total of 172 other clinicians were invited to participate). Of the questionnaire responders the other clinician group was composed of; 24 surgeon, 5 clinical (radiation) oncologists, 4 histopathologists, 2 medical oncologists and 5 clincial nurse specialists, all with specialist training related to colorectal cancer. The roles of the remaining 8 clinicians were unspecified.

Questionnaire responders had extensive experience of dealing with colorectal cancer; 12 responders (3 radiologists, 9 other clinicians; 17% of the total population) had 1 to 5 years of experience, 16 responders (5 radiologists, 11 other clinicians; 23% of the total population) had 5 to 10 years of experience, 18 responders (9 radiologists, 9 other clinicians; 26% of the total population) had 10 to 15 years of experience and 23 responders (4 radiologists, 19 other clinicians; 33% of the total population) had over 15 years of experience. Only one centre had a single radiologist routinely providing rcMRI reports and attending the CRC-MDT. In all other centres multiple radiologists were involved with a mean of 3.0 radiologists issuing rcMRI reports for each participating CRC-MDT centre (range 1- 5 radiologists) and a mean of 2.8 radiologists attending CRC-MDT meetings (range 1-4 radiologists).

Rating rcMRI completeness of reporting

Of the key tumour descriptors assessed; local tumour stage, tumour location, circumferential resection margin (CRM) and lymph node status were deemed to be 'sufficiently' reported by the majority (>80%) of respondents. Poorest results were obtained

for the presence of absence of extra-mural venous invasion (EMVI), relationship of the tumour to the peritoneal reflection, tumour size and distance of the tumour from the anal verge, which were deemed to be 'not sufficiently' reported (41%-71% of reports were deemed to 'sufficiently' contain these variables; table 1).

No statistical significance was demonstrated in the differences between radiologists and other CRC-MDT clinicians subjective reflections on the proportion of rcMRI that 'sufficiently' contain key tumour descriptors. Responses from radiologists, however, did reflect that the rcMRI reports they provide do 'not sufficiently' include some key tumour descriptors; 29% of reports were deemed to 'sufficiently' include relationship of the tumour to the peritoneal reflection and 57% or reports were deemed to 'suficiently' include EMVI status.

Rating rcMRI clarity of reporting

Most CRC-MDT members thought the rcMRI reports were; clear and understandable (92% of all questionnaire repsonders 'agree'; table 2), of a high quality (93% 'agree') and intra-radiologist reporting was consistent (90% 'agree'). This resulted in 94% overall satisfaction with rcMRI reports for all CRC-MDT members (100% of radiologists, 92% of CRC-MDT clinicians).

Both groups responded with lowest levels of 'agree' for inter-radiologist consistentcy of inclusion of key features in reports; collectively only 75% 'agree' reports were consistent between different radiologists (radioligsts 74% and other clinicians 75%).

Analysis by questionnaire responder group (radiologists or other clinicians) indicated disagreement in the opinions on report clarity. 95% of radiologists subjectively 'agree' reports were 'easy to read', but only 75% of other clinicians ($p = 0.09$). Similarly, 100% of radiologist 'agree' reports were 'clear and understandable' compared to 83% of other clinicians($p = 0.09$) and 100% of radiologists, compared to 85% of other clinicians 'agree' that 'important findings were highlighted' ($p = 0.09$).

Open question response

There were a total of 39 free text comments and suggestions for rcMRI report improvement. To aid with interpretation these were grouped into themes. From the whole group of questionnaire responders, the responses suggested the need for; pro-forma/template reporting (23% of free text comments), inclusion of T3 staging sub-divisions (ie T3a-d, or at least depth of invasion beyond the muscularis propria; 13% of free text comments), clearer distinction of involved and/or reactive lymph nodes (10%), distance and tumour location closest to CRM (8% of free text comments) and routine inclusion of significant but negative findings (8% of free text comments). Further suggestions included the inclusion of tumour regression grade following neoadjuvant therapy or a patient's eligibility for open clinical trials.

Discussion

This study is the first to our knowledge where other CRC-MDT clinicians and radiologists have rated their perceptions on the quality of rcMRI reports. It has shown overall

satisfaction with reports is good, but improvements could be made in the perceived consistencty of reporting between radiologists, the readability of reports and the perceived completeness of reports. This observation was made, to differing degrees, by both radiologist and other CRC-MDT clinician groups. It appears that other clinicians perceive a limitation not (yet) recognized by the radiologists.

Despite over a decade of evidence supporting the use of rcMRI for staging purpose, including for the accurate prediction of CRM involvement and/ or EMVI status; our questionnaire demonstrates these key tumour descriptors were still deemed to be 'insufficently' included in reports by almost 20% and 40% of responders to this survey, respectively.

In addition, the rcMRI reports were regarded as sub-optimal when evaluated for report clarity and the accessibility of their contents, by both the GI-specialist radiologist and other CRC-MDT clinician groups. It is perhaps surprising that the radiologist group recognise this as an issue, given they were/are providing the reports they perceive to lack key tumour descriptors. The majority of centres in our region provide prose reports rather than structured template reports17. Implementing the use of template style reports, as recently recommended by ESGAR and SAR, may improve the completeness and clarity of rcMRI reports 5,13. Similar studies of colorectal cancer histopathology reports have shown a significant increase in the inclusion of key tumour descriptors after the introduction of report templates18–20. Furthermore, the main theme of responses to the open questions, predominantly from other clinicians rather than radiologists, suggested the use of template rcMRI reports. Theoretically template reports would facilitate the standardisation of

descriptions and ensure the inclusion key tumour descriptors beyond their current inclusion levels. This standardisation was summarised within one free-text response as '*template rcMRI reports would aid in prompter and unambiguous clinical decision making*'. Additionally, the use of template-style reports should hypothetically increase inclusion of more key negative findings addressing the concerns of other respondents to our open questions.

In another study from our institution template reports also demonstrated improved consistency to the inclusion of key tumour descriptors in rcMRI reports compared to prose reports17. We have shown that radiologists and other CRC-MDT clinicians view inter-radiologist rcMRI reports as being inconsistent with regard to the inclusion of key features. Further interventions to help improve this rating and increase confidence in rcMRI reports for clinical decision making are important. Clearer documentation of findings in rcMRI reports may help, but further studies assessing inter and intra-radiologist agreement in clinical practice are required, in comparison to the initial studies that assessed the feasibility of rcMRI 2,4. Furthermore, additional work assessing the correlation of rcMRI reports with histopathological findings would better assess intra- and inter- radiologist agreement, which may have an impact on the clinical care provided.

A different theme within the responses to the open questions suggested reports should provide a clearer distinction between involved and reactive lymph nodes. Unfortunately, this distinction is recognised as difficult and potentially unreliable in rcMRI interpretation

but it might be aided through the use of defined morphological criteria rather than size criteria alone to improve the specificity of these decisions21–24.

A limitation of this study is the small number of questionnaire respondents and the possibility for recall bias. However, within the radiologist cohort, the participation of 21 specialist GI radiologists represents over half of the 41 specialist GI radiologists in our region of 5.7 million that routinely report rcMRI and contribute to the CRC-MDT. The small number of respondents is likely to have contributed to our failure to observe any statistically significant differences in the questionnaire responses between the radiologist and CRC-MDT other clinician subgroups. Nonetheless the involvement from multiple CRC-MDTs across the region increases the relevance of our findings to other centres.

We purposefully did not link questionnaire responses to individuals or sites. Whilst this has improved participation and minimised observer bias it precluded inter-departmental analysis to assess for outlier departments in the ratings of rcMRI.

Continued evaluation of the service offered in any medical specialty is a necessary step in its development and improvement. As radiology reports are accessed and used for clinical decision making by clinical teams, it is their opinion(s) that should be sought to help drive improvements. Similarly, self-reflective practice is recognised as an important tool in learning and self-development by medical practitioners16. Here we have assessed the opinions of both the radiologists providing the reports and other CRC-MDT clinicians using

reports, to gauge different viewpoints. Our methodology could be replicated in the service evaluation and improvement of other inter-disciplinary medical arenas.

Conclusion

Both radiologists with specialist training in rcMRI and other experienced CRC-MDT clinicians recognise that rcMRI reports are, at present sub-optimal in many cases. There is potential for improvement in the inclusion of key tumour descriptors and the presentation style of rcMRI reports. Additionally, there are concerns from both groups that require further investigation regarding the intra- and inter- radiologist consistency in the reporting of key features. The widespread implementation of standardised report templates may improve these outcomes and this study provides further support for their use; indirectly this should improve confidence in rcMRI reports, report consistency and thus clinical management and outcomes in rectal cancer.

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Table 1

	Total (n=69 responders) %	**Radiologists (n=21 responders) %**	**Other CRC-MDT Clinicians (n=48 responders) %**	**P-value**
Local tumour stage	86	86	85	1.000
Tumour location	86*	90	83*	0.712
Tumour distance from the anal verge	71*	81	66*	0.259
Tumour size	71*	76	68*	0.575
Tumour relationship to the peritoneal reflections	41*	29	46	0.190
CRM status	83	81	83	1.000
Lymph node status	90	90	90	1.000
EMVI status	64	57	67	0.587
Distant metastatic status	67	62	69	0.579

Table 2

	Total (n= 69 responders) %	Radiologists (n= 21 responders) %	Other CRC-MDT Clinicians (n= 48 responders) %	P-value
Consistent between radiologists	75*	74*	75	1.000
Consistent for each radiologist	90	90	90	1.000
Easy to read	81	95	75	0.090
Their contents are easily accessible	86	95	81	0.263
Clear and understandable	92*	100	83*	0.090
Of a high quality	93	95	92	1.000
Important findings highlighted	94	100	85	0.092
Overall satisfaction with reports	94	100	92	0.306

Table 1.

Percentage of questionnaire responders who deemed reports to 'sufficiently' include the stated key tumour descriptors in rcMRI reports, including breakdown by responder group and statistical analysis to assess for differences between these groups. 'Sufficiently' included in reports was defined as a 5 point Likert-type scale response of either 'always included' or 'usually included' dichotomised from a 'sufficiently' included group with the reminaing response 'not sufficiently' included. *percentages calculated from 68 and 47 responders respectively due to one clinician not answering these questions. rcMRI= rectal cancer magnetic resonance imaging, CRM= circumferential resection margin, EMVI= extra-mural venous invasion.

Table 2.

Percentage of questionnaire responders who subjectively 'agree' with the variables assessing the clarity of rcMRI reports. 'Agree' included in reports was defined from a 5 point Likert-type scale including questionnaire responses of either 'highest agreement' or 'most agreement' dichotomised to form the 'agree' group with the remaining responses

grouped to ‘not agree’ included. *percentages calculated from 68, 20 and 47 responders, respectively due to one radiologist and one clinician not answering these questions. rcMRI= rectal cancer magnetic resonance imaging, CRC-MDT= colorectal cancer multi-disciplinary teams.

Figure 1

Questionnaire submitted to clinical radiologists and other CRC-MDT clinicians to assess opinions on the quality of rectal cancer magnetic resonance imaging reports. CRC-MDT= colorectal cancer multi-disciplinary teams.