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Research Article

Approvers, Disapprovers, and Strugglers: a Q-methodology study of rectal cancer MRI proforma use

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Abstract

Objectives: Rectal cancer MRI (rcMRI) allows accurate staging and informs treatment decisions in rectal cancer. There is variability in reporting completeness; however, template proforma reports can significantly increase the inclusion of key tumour descriptors. We aimed to identify socially shared viewpoints of radiologists relating to barriers to implementing proforma reporting. Measuring the subjectivity of opinions relative to other radiologists will allow identification of common patterns preventing implementation.

Methods: Specialist gastrointestinal radiologists from 16 hospital trusts were invited to a Q-methodology study. Participants ranked 56 statements on barriers to using proforma reports (the Q-set) in a normal distribution (Q-grid). Factor analyses were undertaken to identify independent accounts, and additional survey data were used to support interpretation.

Results: Twenty-seven radiologists participated; 11 (41%) had more than 10 years reporting rcMRIs. Three distinct accounts of radiologist attitudes to proforma-use were identified: Approvers, Disapprovers, and Struggling champions. The highest ranked barriers related to proforma format, individual radiologists' preferences and beliefs about efficacy and factors relating to wider multidisciplinary teams and health system-level implementation.

Conclusions: Radiologists that disapprove of proformas are unlikely to use them unless external influences are applied, such as a requirement by treating clinicians. Increased internal and organizational support would also increase use. Targeted implementation strategies focusing on these barriers has the potential to increase uptake of similar interventions.

Advances in knowledge: Specialist radiologists require a multi-level adaptive implementation strategy, tailored to proforma characteristics as well as individual and organizational barriers to increase proforma reporting for rcMRI to support accurate treatment decision making.

Keywords: MRI; rectal cancer; structured reporting; proforma; implementation; barriers.

Introduction

MRI provides the most accurate staging assessment of rectal cancers for treatment decisions.[1-5] Guidelines for rectal cancer (rectal cancer MRI [rcMRI]) reports from the European Society of Gastrointestinal Abdominal Radiology (ESGAR) and Society of Abdominal Radiology (SAR) advocate structured report templates to limit variability of reporting and improve description of specific tumour features that influence decision making.[6,7] The number of recommended features is increasing, to allow colorectal cancer (CRC) specialists to optimize and individualize patient treatment decisions at multidisciplinary team (MDT) meetings.[3,6-8] Limited information impacts informed treatment decisions by clinicians, adversely affecting disease-free survival and tumour recurrence rates for patients.[9,10]

The main barriers to implement an intervention include the subjective attitudes and associated behaviours of key stakeholders whose cooperation is required for its success.[11] Q-methodology combines qualitative and quantitative research methods to measure this subjectivity and identify shared viewpoints about a particular subject. This has potential value to predict and respond to challenges when implementing interventions.[12] It uses factor analytic techniques to identify and systematically describe the range of viewpoints within key stakeholders.[13] This provides detailed insights into "who you are working with," how they see the problem in relation to other issues, and where implementation barriers and levers are likely to exist, as well as the relative importance of those barriers.[14]

Despite increasing recognition that templates improve aspects of reporting in radiology and pathology, adoption of structured report templates has been slow.[1] This study aimed to characterize socially shared viewpoints of radiologists reporting rcMRIs on the barriers and facilitators to increase uptake of structured report templates.

Methods

Fifty-six specialist gastrointestinal radiologists reporting rcMRIs were identified and invited to participate by email. Invitees were from all hospital trusts within the Yorkshire Cancer Research (YCR) Bowel Cancer Improvement Programme (BCIP), which aims to address variation in practice to improve outcomes in

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CRC[15]; the region has 16 CRC MDTs across a population of 5.7 million people, with approximately 1000 new rectal cancer diagnoses per year.[1] All Trusts have access to the same template reporting proforma, which can be modified and tailored to local needs.

A representative sample size of 20-40 specialist radiology reporters was considered appropriate[16] to recruit a representative sample including those with considerable experience in rcMRI reporting and the decision-makers as service leads, as well as radiology trainees, from different trusts to gather different attitudes that might be present with varying reporting experience. Institutional ethics approval was granted, and all participants provided informed consent.

Q-methodology participants ranked a set of statements, called the "Q-set."[12] The Q-set of 56 statements was developed from a prior interview study,[17] exploring barriers and facilitators to structured report template use in reporting rcMRIs based upon the Consolidated Framework of Implementation Research (CFIR; Table 2 in Results).[18,19] CFIR is a comprehensive implementation framework providing a structure for understanding and analysing contextual factors that impact implementation success. It consists of 5 domains: intervention characteristics (IC), outer setting (the contexts outside the trust; OS), inner setting (contexts inside the trust; IS), characteristics of individuals (CI), and implementation processes (P).

Participants ranked statements from +5 (strongly agree) to −5 (strongly disagree) on a grid (the "Q-sort," Figure 1) that forces participants to prioritize their opinions in a normal distribution using online Q-methodology software[20] for the Q-sort process.

A pre-Q-sort questionnaire evaluated demographics, current use, and previous decisions related to adoption of structured report templates. Participants sorted statements into 3 groups: "agreed," "disagreed," or "unsure/neutral." From the "agreed" group, they chose 2 statements they most agreed with to place in the +5 column; the next 3 statements they most agreed with in the +4 column, repeating this process until all statements in the "agreed" group were placed. The same process was then repeated with the statements in the "disagreed" group (−5, −4 etc.), before the statements in the "unsure or neutral" group were finally placed in the remaining central spaces. Participants could rearrange statements until they were satisfied it represented their priorities. Finally, a post-Q-sort questionnaire explored reasons for placing statements in the strongest agree and disagree boxes on the grid and any other relevant information to assist the researcher's interpretation of their responses.

Q-sorts were analysed within Q-methodology software[20] using factor analytic techniques to identify how individuals' viewpoints cluster together by an inversion of the usual factor analytic approach.[16] The first stage involves calculated pairwise correlations between all the statement scores for each Q-sort; the resultant data matrix was subjected to a centroid factor analysis and subsequent by-hand rotation. Scree tests, Eigenvalues, study variance, and factor correlation determined the number of factors to include (Appendix S1).[16] A 3-factor solution explaining 50% of the total variance produced the best fit to produce interpretable accounts recognizable from the comments made after the sorting procedure.

After rotation, exemplar Q-sorts were identified. Only Q-sorts with a weighting of 0.34 ($P < 0.01$) or higher on 1 factor were retained. For each factor, the total weighted scores for each statement in the Q-set were converted to Z-scores. Z-scores are a weighted average of the values that each Q-sort retained in each factor gives to each statement. The list of statements ranked in size order (most agreed with to most disagreed with) created an ideal factor array (distribution of statements within the Q-sort grid, Appendix S2) for each of the 3 factors. Interpretation of each factor array identified statements ranked most positively and negatively as well as statements that were ranked in a significantly different fashion compared with the other factors to identify issues related to a polarizing factor and its polarization relative to other accounts. The pre- and post-Q-sort questionnaire data were used to interpret the factor arrays. Consensus statements that did not distinguish between the different factors were also identified.

Finally, the highest-ranking barriers for each account (ranked +4/5 or −4/5) were entered into the Expert Recommendations for Implementing Change (ERIC) tool for identifying evidence-based implementation strategies.[21] ERIC has 73 different process or action-based implementation strategies to identify those

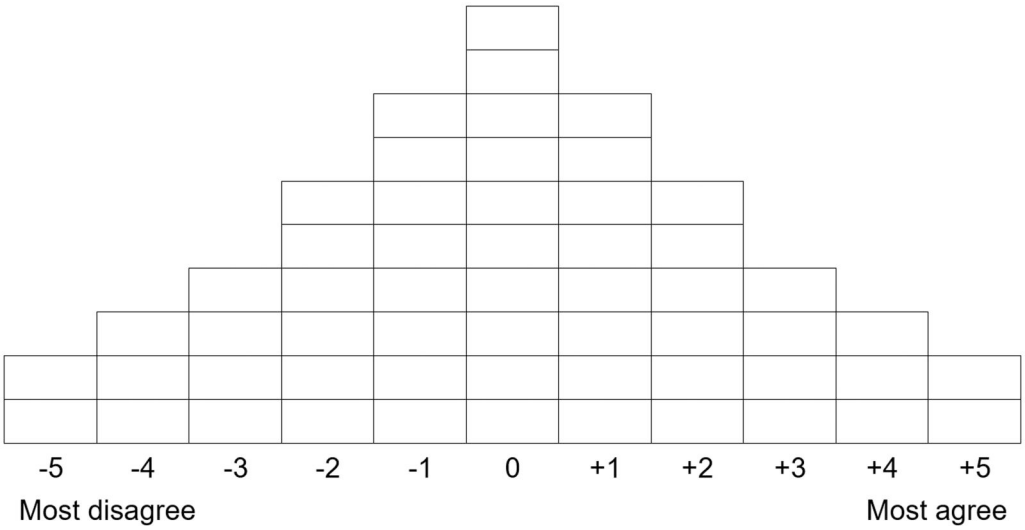

Figure 1. Q-sort grid.

most likely to address identified barriers by implementation expert consensus.

Results

Fifty-six invitees met the inclusion criteria with 27 (48%) recruited as participants, distributed across 9 out of 14 hospital trusts representing 50% of study variance (Table 1).

Twenty-four participants were grouped into 1 of 3 factors based on Q-sorts and subsequent factor array evaluation. Factor 1 consisted of 17 (63.0%) participants categorized as "Approvers," factor 2 had 5 (18.5%) participants categorized as "Disapprovers," and factor 3 had 2 (7.4%) participants categorized as "Struggling champions"; 3 (11.1%) participants did not align with any factor.

Consensus statements

Fifteen statements did not distinguish significantly between any factors, reflecting common points of view. These consensus statements did not highlight significant barriers to reporting proforma adoption across all 3 factors but did highlight shared areas of uncertainty in practice.

All 3 factors found proforma reporting easy to incorporate into picture archiving and communication system (PACS) and awareness of regional uptake for proforma reporting (35-IS: 3,2,1; 19-OS: 1,2,3). However, they were unsure how to report specific sections of the proforma (eg, lymph nodes, prostate invasion) and improvements to facilitate this would be suitably supported (21-OS: 3,0,2; 37-IS: 1,1,0).

All factors were unsure if they have up-to-date knowledge of the evidence-based benefits to proforma reporting, whether a change to adopt proforma reporting is expected or supported by national guidelines (2-IC: 1,0,0; 38-IS: 1,0,0; 25-OS: 0,0,0; 26-OS: 0,1,2; 28-IS: -1,+1,0), or whether proformas benefit the reader more than directly benefitting patients (23-OS: 0,0,-1).

Factors did not think having a higher proportion of more senior consultants or poor communication within the department inhibited proforma adoption. They had adequate IT support to adopt proformas but poor access to information on how to incorporate it into their department (except factor 3) (39-IS: -1,-1,-2; 40-IS: -1,-2,-1; 56-P: -2,-1,-1; 48-IS: -1,-2,-4). They generally thought they had a clear leader who would oversee the proforma adoption (45-IS: -2,-1,-2).

Table 2 provides the statements and factor array results for the 3-factor solution. Appendix S1 provides the ideal Q-sort for each factor. Table 3 gives example quotes from the pre- and post-Q-sort survey by factor to support factor interpretation of participants experience of adoption and barriers to using reporting proformas.

Factor 1—Approvers

Eight of 17 defining sorts were from the Trust leading proforma development, with 16 of 17 always using a proforma. They agreed proformas were the MDT preference, provided standardization of reports, ensured detail for planning care, and the agreed method of reporting within the Trust.

This group was confident in using the proforma (51-CI: +5) and saw its use as a positive change (50-CI: +4). They found them well structured (5-IC: +4), did not ask for excess detail (7-IC: +3), and found them slightly aesthetically pleasing (6-IC: +1). They thought that using proformas and the improved "completeness" of reports benefited patients (17-OS: +2; 22-OS: -4) and were reasonably sure the evidence-base is strong enough to support use (3-IC: +2) but were unsure whether other aspects of care were more important to change (44-IS: 0). They found that other Trusts using the proforma encouraged their use (20-OS: +2), and they had access to information on how to use the proforma (47-IS: -3). They were confident that using proformas did not slow down MDT meetings, disrupt their workflow, were too complex or long, were too restrictive, or increased unnecessary reporting of negative findings (24-OS: -5; 41-IS: -4; 12-IC: -3; 14-IC: -2; 42-IS: -3; 15-IC: -4). However, they were less sure whether the proforma asked for too much detail in parts (13-IC: -1). Overall, they were enthusiastic about their use (52-CI: -5).

Table 1. Characteristics of participants.

Characteristic	All participants ($n = 27$) (%)	Factor 1—Approvers ($n = 17$; 63.0%)	Factor 2—Disapprovers ($n = 5$; 18.5%)	Factor 3—Struggling champions ($n = 2$; 7.4%)	Not aligned with any factor ($n = 3$, 11.1%)
Eigenvalue	n/a	9.21	3.02	1.21	n/a
Study variance	50%	34%	11%	4%	n/a
Grade					
Consultant	19 (70%)	10 (37%)	5 (19%)	2 (7%)	2 (7%)
Trainee	5 (19%)	4 (15%)	0 (0%)	0 (0%)	1 (4%)
Other	3 (11%)	3 (11%)	0 (0%)	0 (0%)	0 (0%)
Number of Trusts represented[a]					
Trusts	9 (100%)	6 (22%)	3 (11%)	2 (7%)	3 (11%)
Years reporting rectal cancer MRI scans					
Over 10 years	11 (41%)	5 (19%)	3 (11%)	2 (7%)	1 (4%)
6-10 years	5 (19%)	0 (0%)	2 (7%)	0 (0%)	1 (4%)
5 or less years	11 (41%)	12 (44%)	0 (0%)	0 (0%)	1 (4%)
Attendance at colorectal MDT meetings where rectal cancers discussed					
Yes (currently)	23 (85%)	15 (56%)	4 (15%)	2 (7%)	3 (11%)
Yes (in past)	4 (15%)	2 (7%)	1 (4%)	0 (0%)	0 (0%)
Use of rectal cancer MRI proformas					
Always	21 (78%)	16 (59%)	2 (7%)	1 (4%)	2 (7%)
Sometimes	2 (7%)	1 (4%)	0 (0%)	1 (4%)	0 (0%)
Never	4 (15%)	0 (0%)	3 (11%)	0 (0%)	1 (4%)

[a]Out of 14 Trusts invited.
Abbreviation: MDT = multidisciplinary team; n/a = not applicable.

Table 2. Q-set statements and factor array results for the 3 accounts.

Statement number	CFIR domain	Statement	Factor 1 Approvers	Factor 2 Disapprovers	Factor 3 Struggling champions
1	IC	I trust the people who developed this proforma	*5*	**1**	*5*
2	IC	I have up-to-date knowledge of the evidence-based benefits to proforma reporting	*1*	*0*	*0*
3	IC	The evidence-base for proforma reporting is strong enough to warrant a change	**2**	**−3**	**0**
4	IC	Proformas are very flexible	−2	**−5**	−2
5	IC	Proformas are well structured for workflow	**4**	**−2**	**0**
6	IC	Proformas are aesthetically more pleasing	**1**	−3	−1
7	IC	Proformas do not ask for excess detail	**3**	**−4**	**−2**
8	IC	Proformas make auditing/QI easier	4	**5**	3
9	IC	In my own practice, proforma reporting offers little advantage compared to free text reports	**−4**	**4**	**−2**
10	IC	The advantages of the proforma are outweighed by the disadvantages of using	0	**4**	1
11	IC	Reporting proformas are difficult to tailor to personal preferences	0	**1**	−1
12	IC	Reporting proformas are complex to use	**−3**	0	2
13	IC	Certain parts of proformas ask for too much detail	**−1**	**5**	4
14	IC	Proformas are too long	**−2**	4	3
15	IC	Use of proformas leads to unnecessary reporting of negative findings	−4	**1**	−3
16	OS	Proformas can directly benefit patients	3	**−1**	4
17	OS	Proformas benefit patients by improving flow in MDT	**2**	**−4**	**−1**
18	OS	Proformas make a difference to patient outcomes	2	**−2**	2
19	OS	I am aware of the regional prevalence of proforma reporting	1	*2*	3
20	OS	Other trusts using proformas encourages me to use them also	**2**	−1	−1
21	OS	There is clear guidance on how to report specific sections of the proforma (eg, lymph nodes, prostate invasion)	3	0	*2*
22	OS	The improved "completeness" of proformas does not meaningfully impact patient care	**−4**	2	0
23	OS	Proformas benefit the reader more than patients directly	*0*	*0*	*−1*
24	OS	Proformas slow down MDTs	*−5*	**0**	−3
25	OS	There is a lack of national guidelines for a switch to proforma reporting	*0*	*0*	*0*
26	OS	There is a lack of national incentives for a switch to proforma reporting	*0*	*1*	*2*
27	IS	Our department is receptive to change	2	2	**−2**
28	IS	My department believes our reports do not need improving	*−1*	*1*	*0*
29	IS	Using proformas reduces my reporting time	1	**−5**	1
30	IS	Our clinicians (readers) prefer the proformas to free text	1	**−1**	1
31	IS	Our trust has incentivized us to make the change to proforma reporting	**−2**	−3	*−5*
32	IS	The feedback from MDT has been positive in favour of proforma reporting	1	0	1
33	IS	Internal audit has shown good completeness with free text reports	−1	0	0
34	IS	Our trust has set a clear goal of transitioning to proforma reporting	**0**	**−3**	**−5**
35	IS	A proforma could be easily incorporated into our PACS	*3*	*2*	*1*
36	IS	Our department has capacity for change	2	3	**−4**
37	IS	Change to proforma reporting would be suitably supported	*1*	*1*	*0*
38	IS	Change to proforma reporting would be expected	*1*	*0*	*0*
39	IS	Having a higher proportion of more senior consultants inhibits proforma adoption	*−1*	*−1*	*−2*
40	IS	Poor communication within the department inhibits our ability to adopt proforma reporting	*−1*	*−2*	*−1*
41	IS	Proformas disrupt my workflow	**−4**	3	2
42	IS	Proformas feel restrictive due to lack of free text	**−3**	2	2
43	IS	Free text reporting is more professionally satisfying	−1	**1**	−3
44	IS	We have other more important changes that need to be made	**0**	**1**	**4**
45	IS	We do not have a clear leader who would oversee the proforma adoption	*−2*	*−1*	*−2*

(continued)

Table 2. (continued)

Statement number	CFIR domain	Statement	Factor 1 Approvers	Factor 2 Disapprovers	Factor 3 Struggling champions
46	IS	There is a lack of resources to help facilitate the change	**−2**	**−1**	**1**
47	IS	I have poor access to information on how to use it into our practice	−3	−4	**1**
48	IS	I have poor access to information on how to incorporate it into our department	*−1*	*−2*	*−4*
49	IS	Internal audit has shown no difference in quality of our free text reports vs proforma reports	−1	−1	**−4**
50	CI	I view proforma adoption as a positive change	**4**	**−2**	**1**
51	CI	I feel confident in using the proforma	**5**	2	3
52	CI	I am not enthusiastic about using proforma reporting in my ongoing practice	**−5**	**3**	**−1**
53	CI	Proformas push for more detail than is sometimes available in a scan	0	**3**	0
54	P	We have external leaders who are advocating a change to proforma reporting	0	0	**5**
55	P	We have/had a clear plan of implementation of proforma reporting	**0**	−2	−3
56	P	We do not have an IT person who would lead incorporating the proformas into the IT system	*−2*	*−1*	*−1*

Abbreviations: CFIR = Consolidated Framework for Implementation Research; CI = characteristics of individuals; IC = intervention characteristics; IS = inner setting; MDT = multidisciplinary team; OS = outer setting; P = process.
Key: **Bold** = distinguishing statement; *Italic* = consensus statement.

Table 3. Example participant survey quotes pre- and post-Q-sort by factor.

Factor 1—Approvers
"They give me a very clear structure to follow ensuring I don't forget to comment on key descriptors." Participant 25, Trust 6, Trainee, experience ≤ 5 years
"In MDT setting all members of the MDT are getting familiar with the proforma and are able to ask relevant questions about specific parts of the text." Participant 3, Trust 2, Consultant, experience 6-10 years
"Proformas are concise and to the point. They have enhanced my confidence in reporting, ensuring I don't miss anything." Participant 26, Trust 3, Fellow, experience ≤ 5 years
"The proforma reporting makes MDT prep much faster because all of the info is there, and it also means that other radiologists can readily see the information required." Participant 7, Trust 4, Consultant, experience >10 years
Factor 2—Disapprovers
"I find using proforma reports interrupts my reporting flow, I concentrate more on where I am in the report than looking at the images. […] A narrative report succinctly describing the key points is a better and more accurate form of communication. […] I think that they're awful in rectal MR and honestly think that I might rather withdraw from reporting rectal MR than be forced to use them." Participant 16, Trust 9, Consultant, experience >10 years
"I think proformas are easy to adopt and introduce, with most receptive to change. They are generally more time consuming and break down a flow in reporting that can lead to misses and inability to relay views on the pathology and stage. I personally think standardisation across the region is a top motivator." Participant 7, Trust 5, Consultant, experience >10 years
"I don't have a clear understanding of how the proforma will impact patient care and what the clear benefit to the patient is directly." Participant 11, Trust 7, Consultant, experience 6-10 years
"I don't think there any tangible barriers i.e IT or leadership. It's more the difficulty and 'fiddliness' of reporting on a proforma that is restrictive." Participant 8, Trust 5, Consultant, experience >10 years
Factor 3—Struggling champions
"My view is that the proforma is a good thing. […] Colleagues reluctant to use. I think it should be shorter if you want to get people on board." Participant 12, Trust 7, Consultant, experience >10 years
"The proforma is too lengthy, particularly the nodal questions." Participant 15, Trust 8, Consultant, experience >10 years

Factor 2—Disapprovers

Reasons for using proformas in reporting in this factor included the generation of thorough reports logically, but there was a dislike of proforma reporting, and participants described an increase in time needed to create reports.

This group had mixed use of proforma reporting despite finding the advantages outweighing the disadvantages (10-IC: +4). They believed that proformas made auditing and quality improvement easier (8-IC: +5), but in their own practice, it offered little advantage to free text reporting, were not

enthusiastic about their use, and were unsure if they found free text reporting more satisfying (9-IC: +4; 52-IC: +3; 43-IS: +1). They were unsure of benefits to patients or improvements in patient outcomes and disagreed that it led to improvements to the flow in MDT meetings (16-OS: -1; 18-OS: -2; 17-OS: -4). They thought proformas increased reporting time, was not flexible, and not well structured for workflow (29-IS: -5; 4-IC: -5; 5-IC: -2), although less sure that they slow down the MDT process (24-OS: 0). The proforma asked for excess detail and more than available on rcMRIs (7-IC: -4; 13-IC: +5; 53-CI: +3). They had less trust in those who developed the proforma (1-IC: +1) and did not believe that the evidence-base is strong enough to warrant a change (3-IC: -3). They were unsure whether other clinicians preferred to read free-text reports (30-IS: -1) and did not see proforma reporting as a positive change (50-CI: -2). They were less sure of the relative importance and whether there were the resources needed to make change (44-IS: +1; 46-IS:-1).

Factor 3—Struggling champions

One participant found the proforma too lengthy, but the other found it quick to use, that trainees like it and used it because of local recommendations.

This group used proformas because of external leaders advocating for the change (54-P: +5) but their Trust did not have a clear goal of transitioning to proforma reporting, their department was not receptive and did not have capacity to change (34-IS: -5; 27-IS: -2; 36-IS: -4), despite internal audits showing improvements in the quality of reporting (49-IS: -4). They felt there were other more important changes to make (44-IS: +4), were unsure of the evidence-based benefits, or whether there were available resources for change (3 IC: 0; 46 IS: +1).

Participants were unsure if they had enough access to information on how to use the proforma, whether proformas asked for excess detail, and if the proforma was well structured for workflow or improved flow in the MDT meeting (47-IS: +1; 7-IC: -2; 5-IC: 0; 17-IC: -1). They did see some advantages to using proformas in their own practice, but less so than Factor 1 (9-IC: -2) and were unsure if adoption was a positive change (50-CI: +1) and were neither enthusiastic nor unenthusiastic about using (52-IC: -1).

Identified implementation strategies for proforma reporting

Factor 1 had no barriers ranked +4/5 or -4/5. For factor 2, the highest ranked barriers were in 3 CIFR domains: intervention characteristics (Adaptability; Complexity; Design quality and packaging; Cost), outer setting (Patient needs and resources), and inner setting (Compatibility). For factor 3, the highest-ranking barriers were mostly related to CIFR constructs of intervention characteristics (Design quality and packaging) and the inner setting (Relative priority, Organizational incentives and rewards, Goals and feedback, Available resources).

Discussion

This study identified 3 distinct-radiologist subjective viewpoint groupings, 2 of which identified significant barriers to rcMRI template proforma reporting, which would explain the ongoing variation in use of template proformas and why variation in the quality of reporting of important tumour descriptors continues. This is the first radiology study to identify both the barriers to proforma use, but also the relative importance of those barriers. Strategies to increase proforma use should logically focus on the highest ranked barriers if variation in completion of tumour descriptors influences patient outcomes.

The barriers identified as most significant by the "Disapprovers" and "Struggling champions" are at different system levels. Disapprovers identified individual characteristics that reduced proforma use (personal preference to narrative reporting, not seeing a link between proforma use and patient outcomes) and related characteristics of the intervention (lack of flexibility in proforma structure). The Struggling champions identified organizational-level barriers (the relative priority within their institution and available resources). These findings are similar to the barriers identified in structured reporting in pathology, where barriers included lack of nuance in structured templates, beliefs that they do not increase accurate reporting, lack of support from MDT colleagues, and perceived additional work involved.[22] Other studies in surgical proforma use also identify organizational-level barriers, including the information technology infrastructure and support and how collaborative cultures can facilitate or increase barriers to implementation of interventions.[23]

When interventions are introduced, multiple barriers are frequently identified. Interventions to increase uptake often try to address as many barriers as possible; however, more strategies are not necessarily more effective.[24] Evidence-based practices often fail to be implemented or sustained due to barriers at multiple levels (healthcare system, hospital and individual clinician levels), as identified in this study. This suggests a multi-level adaptive implementation strategy (MAISY) would be appropriate to develop to address proforma use. MAISYs are a sequence of decision rules used to guide how best to adapt implementation strategies at critical decision points, across multiple levels, and based on both baseline and ongoing or changing status of the targets in an organization.[25,26]

Our research is the first to apply Q-methodology as a robust novel methodology to determine the relative importance of different barriers in an area of radiology practice. We invited all radiologists reporting rcMRI in a large geographical area to minimize selection bias to produce a diverse group with varied clinical experience and use of template proformas.

We recognize limitations to our study. Firstly, we sampled practice in 1 region within England with 5 of 14 Trusts not represented, which may limit generalizability. While it is possible those who did not respond may have strong beliefs about the barriers regarding proforma use, a wide range of Trusts and participants took part in the process, including those who do not use proformas and our findings are similar to those in other specialities using proformas. Secondly, MDT clinicians (oncologists, surgeons) were not included who use the proforma reports to make treatment decisions. While their inclusion could have allowed a more complete overview of possible barriers to proforma use, the content of the survey was not considered appropriate beyond radiology. Finally, while we identified the highest ranked barriers to proforma use, it is uncertain whether ranking barriers in this process and targeting them with their associated implementation strategies will necessarily lead to a greater uptake of proforma use.

The results of this study suggest that 4 implementation strategies have the potential to increase proforma use. First, further education is needed for those who currently do not

recognize patient benefits and differences in outcomes that are attributable to the variation in proforma use, with clear reference to current guidelines. Second, while the proforma used in this area is adaptable with opportunities to add narrative descriptions within, further work is needed to ensure this is communicated. Tailoring of the proforma to personal preferences, local systems, and processes could encourage those Disapprovers who find the generic proforma difficult to complete or not meeting local needs. We did not ask whether any Trust had tailored the proforma to local needs. Third, engagement of surgeons and oncologists to request assessment of all tumour descriptors for MDT treatment decisions can appropriately challenge beliefs that this information is not desired or necessary. Finally, engagement of Trusts through comparison of proforma use and patient outcomes may increase top-down pressure to improve performance.

Future research is needed to understand if targeting implementation strategies using this MAISY approach to barriers improves uptake and whether a personalized adaptive strategy is more effective than a "one-size-fits-all" approach with tailoring determined within individual sites.

In conclusion, this study has identified 3 distinct radiologist viewpoints to rcMRI-structured proforma use with differences in identifying barriers associated with the characteristics of the individual radiologist and the intervention and organizational barriers they identify. Targeting implementation strategies at the barriers that are most important for individuals has the potential to increase uptake of an intervention. The use of Q-methodology to sort barriers to proforma completion into the most and least important allows selection of implementation strategies that target specific barriers likely to have the largest impact on uptake. Further research is needed to determine if targeting these barriers are more effective than a more generic approach.

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Supplementary material

Supplementary material is available at *BJR* online.

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Conflicts of interest

The authors of this manuscript declare no relationships with any companies, whose products or services may be related to the subject matter of the article.

Guarantor

The scientific guarantor of this publication is Sarah Alderson.

Informed consent

Written informed consent was obtained from all subjects in this study.

Ethical approval

Institutional Review Board approval was obtained: This study received ethical approval from the University of Leeds Medical and Health Ethics Board on August 9, 2023 (ref: MREC 22-082). The YCRBCIP has received a favourable ethical opinion from the Solihull - West Midlands Research Ethics Committee on December 12, 2017 (17/WM/0374).

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