ORIGINAL ARTICLE

STRUCTURED VS NON STRUCTURED REPORTING IN PRIMARY RECTAL CANCER: A SURVEY OF THE PREFERENCES OF CLINICIANS AND RADIOLOGISTS

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ABSTRACT

OBJECTIVES: The aim of this study was to compare the impact of structured reports (SRs) vs non-structured (NS) magnetic resonance imaging (MRI) reports in patients with histologically proven rectal cancer. Effects of both types of reporting on completeness of report, clinical decision making, staging, linguistic quality, interdisciplinary communication etc were studied. **MATERIAL AND METHODS:** All patients underwent rectal MRI at 1.5T for local rectal cancer staging before surgery/neoadjuvant radio-chemotheraphy. Two patients with histopathologically proven carcinoma of rectum were selected randomly from Hospital information system (HIS) and images were studied from DICOM for structured reports. Non structured reports (NSR) of two selected patients were already generated under clinical routine practice by fellows and consultants. Structured reports of these patients were generated by two fellow radiologists. 18 clinicians and 9 radiologists evaluated a questionnaire regarding SRs vs NSRs that included 9 parameters like clarity, content, tumor stage etc. The clinicians and radiologists further scored these parameters from very satisfied to very dissatisfied on likert scale. The institutional review board approved this retrospective study. **RESULTS:** Structured reports achieved significantly higher satisfaction rates between radiologists, however clinicians were more in favour of NSR. Clinicians however were also satisfied and very satisfied regarding some of the parameters of SR but overall felt that SR are dissatisfying with regard to clarity, linguistic quality and were more time consuming. **CONCLUSIONS:** Despite of the fact that most of the recent studies showed higher accuracy of SR, it is still not in widespread use in most of the set ups including ours. It might be challenging and will still take more time to replace NSR completely.
Key words: Structured, reports, MRI, Rectal carcinoma.

Introduction

Over the past few years there is progressive increase in complexity of medical imaging. Hence radiologists are posed to interpreting more images and comparing more imaging modalities. Radiologists and clinicians are required to correlate ever-greater amounts of radiologic, clinical and laboratory data. Most of the reports are non-structured, however, given the increase complexity of the information it is worth considering whether standardization of the reports could result in completion, better communication and fewer misdiagnoses.[1]

An alternative to non structured reporting (NSR) is structured reporting (SR), which involves standardization of report by consisting of standard set of

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concepts in a sequence.[2] Structured reports often use standardized language, such as the standardized lexicon called RadLex that is being developed by the Radiological Society of North America.[3] Looking at the advantages of SR, the U.S. Food and Drug Administration mandated the use of the Breast Imaging Reporting and Data System for all mammography reports nearly two decades ago.[4,5] Few studies have investigated the value of structured reporting in areas of radiology outside of breast imaging. Therefore, we conducted this study in state of art oncology institute of Pakistan to compare the content, clarity and clinical usefulness of conventional (ie, non structured) and structured radiology reports of rectal carcinoma on MRI.

Material and Methods

Two patients with histopathologically proven carcinoma of rectum were selected randomly from Hospital information system (HIS) and images were studied from Di-com for structured reports (Fig. 5). This survey was given waif-off by ethical review committee. Non-structured reports of two selected patients were already generated under clinical routine practice by fellows and consultants (Fig. 6). Structured reports of these patients were generated by two fellow radiologist (Fig. 7). Eighteen clinicians including experienced consultant abdominal surgeons, medical oncology senior instructors, surgical and medical oncology fellows, radiation oncology consultants and nine radiologists including consultants, senior instructors and fellows evaluated a questionnaire that included 9 questions regarding clarity, satisfaction with respect to content, clinical decision making, radiologist reconsultation rate, determining tumor stage, linguistic quality, time consumption, missing out key clinical points and overall satisfaction were evaluated. The clinicians and radiologists further scored these parameters from very satisfied to very dissatisfied on likert scale (Fig. 8). The institutional review board approved this retrospective study.

Results

Clinician data in SR reports:

Clinicians were very satisfied or satisfied regarding most of the parameters of SR such as content (50%), clarity (33%), clinical decision making (61%), less radiologist consultation (55%) and less chance of missing key points (77%). 39% were very satisfied and 44% clinicians were satisfied with determining the tumor stage. 50% thought that over all SR are satisfying. A large group of clinicians were also neutral about different parameters.

28% clinicians were dissatisfied regarding clarity. 55 % thought that it is more time consuming and 50 % thought that its linguistic quality is difficult. The reason they gave was that they are more used to text reporting and so understood NS reports more easily than SR. They also thought that SRs were more complex (Fig. 1).

Clinician data in NSRs:

Surprisingly majority clinician were more satisfied with NSRs with regards to all parameters compared to SR. 56 % were satisfied regarding clarity, clinical decision making and over all satisfaction. 66 % found linguistic quality very satisfactory and 83 % thought that it is less time consuming. Few clinicians were dissatisfied with NSRs and only 6 % said that they found linguistic quality of NSR difficult (Fig. 2).

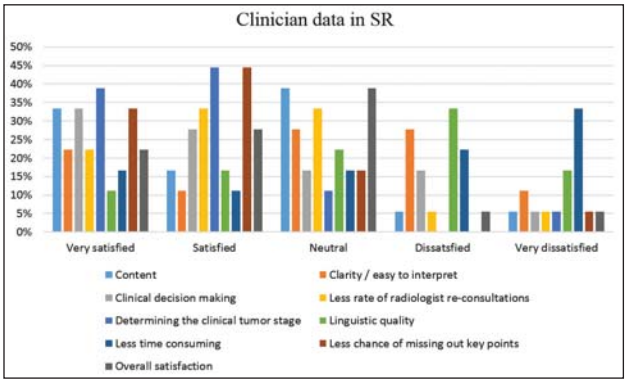


Figure 1:

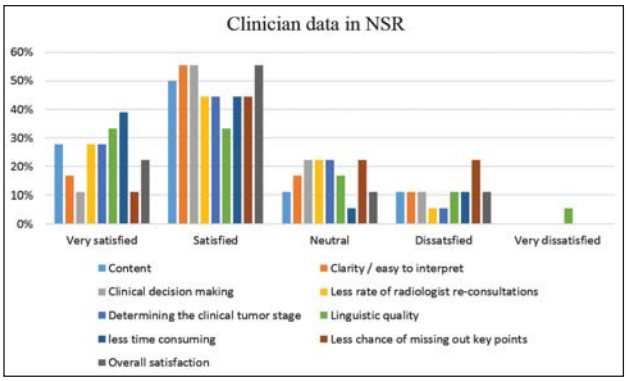


Figure 2:

Radiologist data regarding SR:

Most of the radiologists scored the parameters as satisfying and very satisfying. 66 % though that SR are less time consuming where as 22 % radiologist were of the opinion that as they are more into habit of non structured reporting so switching to SR template might be more time consuming for them (Fig 3).

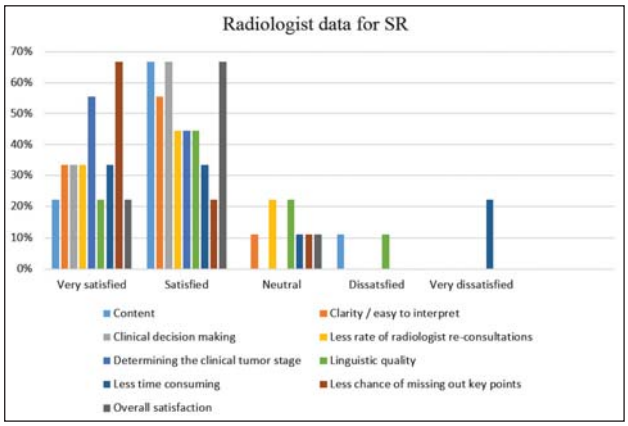


Figure 3:

Radiologist data regarding NSR:

The results for non structured reports were mixed and variability was seen regarding different parameters. Majority radiologists were either satisfied or very satisfied or were neutral regarding NSR. (89%) felt that NSR are less time consuming and 55% felt are better in linguistic quality compared to SR. 33% felt that it may miss key clinical information. 44% radiologists were neutral regarding content and determining tumor stage (44%) and clarity of NSR (56%). 33% radiologists thought that NSR may miss out main key points. 11% were also of the opinion that content, clarity and clinical tumor stage are not satisfactory in NSR (Fig. 4).

Over all trend is more towards SR. In our institute structured report showed a significantly higher satisfaction amongst radiologist but clinician were more comfortable with non structured reports. They found the paragraph explanation of the tumors more easy to understand as it provided continuity for the reader. Few of the clinicians thought that structured report was in bullets and was more confusing for them to interpret.

Despite of the above results the Clinician also didn t disapprove SR. Although they found that 3 parameters in structured reports ie linguistic quality / time consumption and clarity were dissatisfying.

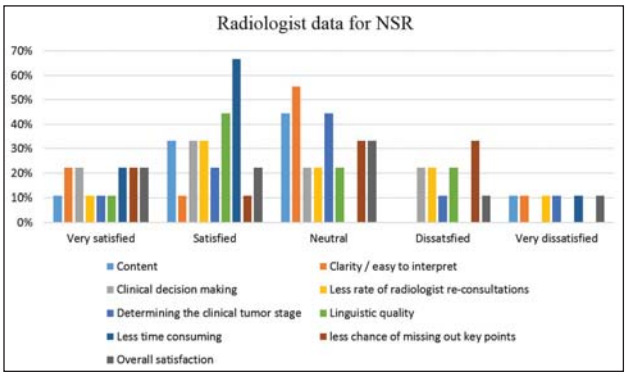
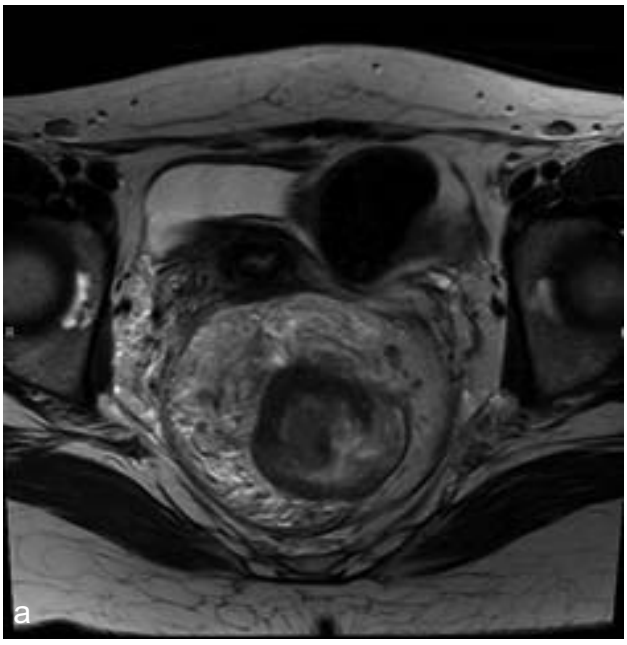


Figure 4:



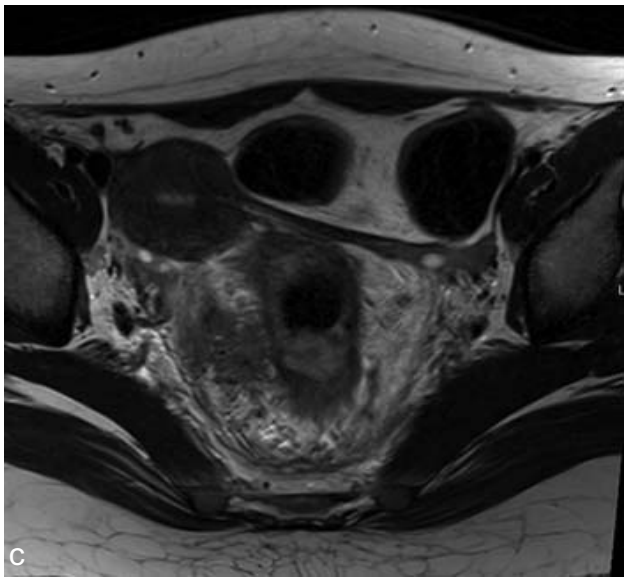


Figure 5: Large FOV T2WS, semiannular **(a)** upper and mid rectal tumor **(b)** extending for a length of 6.8 cm and 7 cm from anal verge.Transmural spread and postive CRM at 12 o clock and EMVI at 9 o clock position **(c)**.

Unstructured Report template (pelvis)

Report :

There is marked eccentric soft tissue thickening of the upper and mid rectum mainly to the right side and posteriorly. There is thickening and nodularity of the peritoneum on right. There is frank extramural growth of the tumor invading the mesorectum. The right ovary lies very close to the tumor, but there is no evidence of adjacent organ invasion. Extensive lymphadenopathy is noted in the surrounding mesorectum as well as extramural vascular invasion. The Circumferential resection margin (CRM) is frankly infiltrated.

Conclusion-:

There is locally infiltrative rectal tumor with extensive surrounding lymphadenopathy. Stage T4aN2. CRM and EMVI are positive.

Figure 6: Unstructured report template.

Structured MRI report template

Local tumor status:
Morphology — Solid –polypoid ☐ / Solid – **semi annular** / annular ☑ from 5 to 12 o clock / Mucinous: ☐
- Distance from anorectal junction to lower pole of tumor 7 cm
- Tumor length 6.8 cm
- Involvement: rectosigmoid junction, **Upper, mid,** lower rectum, anorectal junction
- T Stage T1-T2 / T3 → T3a or T3b (< 5mm extramural growth) / T3c or T3d (>5mm extramural growth) / T4 → ● **T4a (peritoneum)** / T4b ( )
- Sphincter invasion — **-ve. No** ☑ / Internal sphincter only ☐ / - / + intersphincteric plane. ☐ / - / + external sphincter ☐

Mesorectal fascia and peritoneal involvement
- Shortest distance between tumor and CRM ___mm / free(> 2mm) ☐ / Threatened/**Involved** (<2mm) ☑
- Location of shortest distance between tumor and CRM **12.0 clock**

Lymph nodes
- N stage NO ☑ N+ ☐
- Total number of lymph nodes : **9**
- Number of suspicious nodes : **4** Mesorectal : **4** extra mesorectal : **0**
  - ✓ Nodes with short axis diameter >9mm : **1**
  - ✓ Nodes with short axis diameter 5-8mm and at least 2 morphologic criteria:**3**
  - ✓ Nodes with short axis diameter <5 and all 3 morphologic criteria: **0**
  - Note: morphologic suspicious criteria 1. Round shape 2. Irregular borders 3. Heterogenous signals

Extramural vascular invasion YES ☑ NO ☐
Diffusion restriction YES ☑ NO ☐
Tumoral T2 signal intensity: YES ☑ NO ☐

Figure 7: Structured report template.

Questionaire

Speciality:

Designation:

	Structured Report VD, DS, N, S, VS 1 - 2 - 3 - 4 - 5	Non structured report VD, DS, N, S, VS 1 - 2 - 3 - 4 - 5
Content		
Clarity/ easy to interpret		
Clinical decision making. (surgery vs neoadjuvant radiochemotherapy)		
Less rate of radiologist re-consultations		
Determining the clinical tumor stage		
Linguistic quality		
Less time consuming		
Less chance of missing out key points		
Overall satisfaction		

Likert scale	Score
VD: Very dissatisfied	1
DS: Dissatisfied	2
N: Neutral	3
S: Satisfied	4
VS: Very satisfied	5

Figure 8: Likert scale for both types of reporting.

Discussion

Implementation of a structured report template increased the quality of MRI reports for rectal cancer staging, significantly increasing the proportion of optimal or satisfactory quality reports. The use of structured reports is gaining in popularity within the radiology community. Accurate local staging of rectal cancer using MRI is of high importance because it is essential for determining the correct treatment approach. Magnetic resonance imaging has proven to be the most accurate noninvasive imaging modality for local staging of rectal cancer and often helps in treatment decision.[6] We conducted a study to see the preferences of clinicians and radiologists regarding both types of reporting. 72% clinicians thought that NSR is satisfying in determination of tumor stage, however 83% thought that SR are superior in determination of tumor stage. 100% radiologists agreed that tumor stage determination is better in SR.

Several recent studies suggest that structured reporting helps radiologist in making complete and better quality of radiological reports and hence influencing the process of clinical decision making.[7,8,9] It is seen from many studies that there is increasing interest in SR by both radiologists and clinicians, because of the structured approach and compliance

of included information to guidelines and clinical relevance of SRs in comparison to conventional radiology reports.[10,11,12,13] However in our study all the clinicians were more in favour of the non structured reports whereas radiologists were more in favour of SR. The reason clinicians gave was they were used to text reporting and few also said that SR were too detailed and were not structured in real sense.

Determination of the optimal treatment plan for patients with rectal cancer involves a complex decision-making process. The complexity of such surgical treatment decisions, the implementation of key features for surgical planning into SRs is of utmost importance. Study conducted by Vaids et al found that less than 40% of conventional MRI reports contained important key prognostic features.[14] NSR were frequently lacking important key features that surgeons desired for surgical planning especially in low and middle rectal tumors. There was a statistically significant increase in the number of reported key features for low and mid-rectal tumors using a structured reporting template versus conventional NS reports.[15]

Although TN staging is more commonly and routinely assigned in pathological reports, it is important to implement TN staging in radiology reports as the treatment depends on the TNM stage and whether the mesorectal fascia (circumferential resection margin) is involved. Although only a minority of radiologists do so in practice. The incorporating information boxes for TN staging into the template in SR may help radiologists to remember and to include TN staging into their reports. The radiologists of our institute were aware of the fact and so were unanimously convinced that SR are better and accurate in staging of rectal carcinoma.[15] SR also mentions pertinent negative findings and hence is more satisfactory in terms of completeness of report.[10] Some of these findings, for example, the absence of visible metastatic disease and/or infiltration of the mesorectal fascia, relation of the tumor to the peritoneal reflecting fold may be easier for radiologists to remember if its already incorporated in to SR.[16]

Different studies are conducted to investigate the use of DWI for rectal cancer (re)staging and evaluate response (the yT-stage) to chemoradiotherapy, hence it is incorporated into SR. DWI can improve the performance of MRI for T-restaging after neoadjuvant treatment, specifically for differentiation between complete and partial response.[17,18] Diffusion restriction may not be seen in all rectal carcinomas as mucinous adenocarcinomas are non diffusion restricting tumors and hence role of DWI in restaging is minimal. Mucinous carcinoma has higher local recurrence, distant metastasis, lymph node metastasis, and venous invasion compared with nonmucinous carcinoma.[19] Therefore T2 signals and DWI can predict mucinous nature of the rectal carcinoma and hence guide towards more aggressive surgical approach.

SRs provide an additional educational component for radiology residents as they may facilitate learning among them by providing a systematic approach to local rectal cancer staging and by highlighting important key features that are essential for further clinical decision making.

According to N renberg et al, surgeons also found that SRs were more likely to have the sufficient information needed for surgical planning and that it was easier and faster to extract the relevant information from an SR than from an NSR, thereby indicating a preference for report clarity and content of SR. In addition, trust in the given information and the linguistic quality of SR were rated significantly better in comparison to NSR reports.[15] The results in our study showed that clinicians were not satisfied with clarity and linguistic quality of SR.

Al-Sukhni et al evaluated 128 MRI reports for rectal cancer generated by 54 radiologists. Reports were evaluated for T stage, relationship to the mesorectal fascia (MRF), and lymph node involvement. Only 40% of the reports contained all three elements. The relationship to MRF was the least reported feature.[16,20]

According to Sahni et al no assessment was made regarding the clinical impact of structure report.[21] We evaluated structured report impact on clinical decision making after taking reviews of clinicians who unexpectedly favored non structured reports more compared to SR.

Conclusion

Quality reporting can facilitate clinicians to decide proper patient management. Most of the recent studies showed higher accuracy of SR however it is still not in widespread use in most of the set ups including ours.

Our study showed statistically significant differences regarding opinions and scoring of clinician and radiologists regarding SR and NSR. There was higher satisfaction level of the referring clinicians regarding non structured reports in comparison to structured reports. However radiologist on the other hand were more in favour of SR system. It might be challenging and will still take more time to replace NSR completely.

Limitation of study: Relatively small number of non structured and structured reports were used for scoring and comparison by radiologists and clinicians.
Further retrospective design of the study didn t provide much opportunity to clinicians to see impact of SR in future treatment management of the patient.
Clinician s feedbacks were mainly through e mails rather face to face conversation which also produced lack of understanding. If these reports were discussed in multidisciplinary tumor board meetings which are frequently carried out in our state of art oncology institute, we could have changed SR reports according to clinicians ease of readability as they thought that SR are complex and more time taking.
Further studies will be useful to assess the same parameters but in prospective manner where multidisciplinary expert panels (radiologists, medical and surgical oncologists) could discuss and improve the overall quality of structure reports templates as required.

Conflict of interest: None.

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