

Itemised or Prose Radiology Reports? A Survey of Referring Physicians' and Radiologists' Preferences

Dear Editor,

A radiology report contains a radiologist's analysis of radiological findings and is a reflection of the radiologist's experience and expertise. It serves as a record of the procedure and acts as a medium of communication to the referring physician. It is also a legal document that is used for billing, as well as for research, teaching and accreditation purposes. As part of clinical quality improvement and customers' satisfaction endeavour, we surveyed the referring physicians' and radiologists' preferences with regard to the presentation style of the radiology report, and investigated the reasons for and barriers to the adoption of these differing reporting styles.

Materials and Methods

The study was a questionnaire-based study with sets of itemised and prose reports for 4 hypothetical clinical scenarios commonly encountered (ultrasound of hepatic-biliary system with normal findings, ultrasound of hepatic-biliary system with abnormal findings, computerised tomography [CT] abdomen with normal findings, and CT abdomen with abnormal findings). Each set of report was identical in terms of content (Table 1). The referring physicians were to rank their level of satisfaction for prose and itemised reports and state the reasons for their responses. For the radiologists' survey, radiologists were further asked if they had utilised the itemised reporting format in his or her daily reporting and their reasons for doing so. They were also invited to choose the imaging modalities (plain radiography, fluoroscopy, mammography, ultrasound, CT, magnetic resonance imaging [MRI]) they thought were suitable for reporting in the itemised format. The radiologists' survey was distributed to all practising faculty radiologists within our institution's diagnostic radiology department. The referring physicians' survey was distributed to all practising referring physicians from various departments via their department secretaries and during a hospital grand round. Sign test was used to determine the statistical significance of the differences between the referring physicians' and radiologists' preference for itemised reporting over prose reporting. *P* values less than or equal to 0.05 were considered statistically significant.

Results

Of the 300 questionnaires distributed to the referring physicians, a total of 92 responses were received. A wide range of specialties, including anaesthesia, cardiology, emergency medicine, general medicine, geriatric medicine, oncology, endocrinology, family medicine, psychiatry, general surgery, orthopaedic surgery, sports medicine, ophthalmology, otorhinolaryngology and urology were represented. Of the 30 questionnaires distributed to the radiologists, 30 responded (100% reply rate). Table 2 summarises the results of the survey. Itemised reporting style was the preferred style of report by most referring physicians for all the 4 scenarios ($P < 0.05$). In contrast, although not statistically significant, a trend toward a preference for prose report was observed for majority of radiologists. The preference for a particular style was independent of the scan findings (abnormal or normal findings) and the scan modality (ultrasound or CT). No associations with clinical specialties were found. Reasons cited by the referring physicians for preference of itemised reporting included ease of comprehension and enhanced clarity of radiology report. A 5-point critical finding indicator was included at the end of every report which provides referring physicians with an indication of the level of severity of the radiological findings (Fig.1). Referring physicians found the critical finding indicators a helpful guide (senior physicians 76%, junior doctors 62.5%, $P > 0.05$, overall, 69.7%) in their resource management of care delivery, for example, the provision of appropriate level and timeliness of care, and for the more junior doctors, the threshold to activate the next level of care.

A total of 31.3% of replying radiologists used itemised reports in their daily reporting while another 37.5% sometimes used itemised reporting. The remaining 31.3% did not use itemised reporting at all. Reasons cited for using itemised reporting included the increased speed of reporting and improvement in the clarity of the report. Those who did not use itemised reporting at all cited familiarity with the prose reporting style and perceived it as providing more detailed report although the contents in both reports were the same. They also find itemised reporting monotonous, akin to the task of a data entry clerk, and mechanical,

Table 1. CT Scan Report for Abnormal Findings

A. Itemised Report*	
Findings	
Stomach	
Site	Body and pylorus.
Wall thickening	Eccentric irregular enhancing mural thickening, compatible with submitted history of gastric tumour.
Perigastric changes	Surrounding mild perigastric fat stranding, suggestive of serosal involvement.
Lymphadenopathy	Perigastric, region, gastro-oesophageal junction, and gastrohepatic region (largest node measures 1.5 cm in short axis diameter); foramen of Winslow (measuring up to 1.6 cm in short axis diameter), and celiac axis, aortocaval nodes, left para-aortic node at level of left renal hilum.
Small bowel	Normal calibre. No abnormal mass or wall thickening.
Large bowel	Normal calibre. No abnormal mass or wall thickening.
Liver	Normal. No focal lesion.
Gallbladder	Normal. No gallstone. Biliary duct not dilated.
Pancreas	Normal. No focal lesion.
Spleen	Normal. No focal lesion.
Kidneys	Normal. Symmetrical excretion. No stone or hydronephrosis.
Adrenals	Normal. No focal lesion.
Ascites	Present, with small amount of free pelvic fluid.
Mesentery/peritoneum	Normal.
Blood vessels	Normal.
Pelvic adenopathy	No.
Pelvic organs	Normal.
Bony lesions	No.
Lung bases	Right pleural effusion with adjacent compressive atelectasis.
Impression	Large tumour involving body and pylorus stomach with multiple enlarged lymph nodes as described.
B. Prose Report*	
Findings	<p>There is eccentric irregular enhancing mural thickening of the body and pylorus of the stomach compatible with the submitted history of gastric tumour. The surrounding perigastric fat show mild fat stranding suggestive of serosal involvement.</p> <p>There are enlarged perigastric nodes, gastro-oesophageal junction nodes and gastrohepatic nodes, largest measuring 1.5 cm in short axis diameter. There are also enlarged nodes at the foramen of Winslow, measuring up to 1.6 cm in short axis diameter. Clusters of small celiac axis nodes are evident. Small aortocaval nodes are evident. There is an enlarged left para-aortic node at the level of the left renal hilum measuring 1.2 cm in short axis diameter.</p> <p>There is a small sliver of ascites in the abdomen and a small amount of free pelvic fluid. Included lung bases show dependent atelectasis. There is a sliver of right pleural effusion with adjacent compressive atelectasis.</p> <p>The liver shows normal size, shape and attenuation with no focal lesion. There is no dilatation of the biliary tree and the gallbladder has normal features. No gallstone detected. The hepatic veins and the splenoportal axis are well-opacified. No filling defects are noted.</p> <p>Spleen is not enlarged. No adrenal masses identified. Both kidneys enhance symmetrically with no hydronephrosis identified. Pancreatic outline and enhancement are preserved. The uterus is unremarkable. No adnexal masses identified. The visualised bowel is normal in calibre. No destructive bone lesion identified.</p>
Impression	Large tumour involving body and pylorus stomach with multiple enlarged perigastric nodes as described.

CT: Computerised tomography

*Both reports are for the same abdominal CT examination with a clinical scenario of "Loss of weight? Gastric tumour".

as if reported by machine. More radiologists felt that advanced imaging, such as ultrasound, CT and MRI, which required longer and detailed report due to the multiple findings and numerous structures examined, were most suitable for itemised reporting than film-screen

radiography such as plain radiography, fluoroscopy, and mammogram (advanced imaging, 50% to 66.7% vs film-screen radiography, 3.3% to 23.3%). We felt that itemised reporting style remains relevant for mammography and fluoroscopy.

Table 2. Referring Physicians' and Radiologists' Preference for Itemised and Prose Reporting Styles in Each Given Scenario

Itemised Report vs Prose Report	Clinicians (n = 92)*		Radiologists (n = 30)*	
Normal ultrasound				
Positive ranks	43	(48.30%)	8	(26.70%)
Negative ranks	24	(27.00%)	10	(33.30%)
Ties	22	(24.70%)	12	(40.00%)
Number of respondents	89*		30	
		<i>P</i> = 0.028	<i>P</i> = 0.815	
Abnormal ultrasound				
Positive ranks	43	(48.30%)	7	(23.30%)
Negative ranks	25	(28.10%)	16	(53.30%)
Ties	21	(23.60%)	7	(23.30%)
Number of respondents	89*		30	
		<i>P</i> = 0.039	<i>P</i> = 0.093	
Normal CT				
Positive ranks	41	(47.10%)	9	(30.00%)
Negative ranks	24	(27.60%)	13	(43.30%)
Ties	22	(25.30%)	8	(26.70%)
Number of respondents	87*		30	
		<i>P</i> = 0.047	<i>P</i> = 0.523	
Abnormal CT				
Positive ranks	47	(53.40%)	11	(37.90%)
Negative ranks	21	(23.90%)	11	(37.90%)
Ties	20	(22.70%)	7	(24.10%)
Number of respondents	88*		29*	
		<i>P</i> = 0.002	<i>P</i> = 1.000	

CT: Computerised tomography

*Some respondents did not answer all questions.

CT Abdomen and Pelvis
 Clinical history: heterogeneous hyper-echoic lesion in right hepatic lobe
 Comparison: No
 IV Contrast: Yes Volume: 80 ml rate: 4 ml/s
 Protocols: Multi-phasic study

Findings:
 Liver: Abnormal
 Lesion characteristic:
 Location: Segment 8
 Size: 3.0 x 4.5 cm
 Margin: well-defined
 Attenuation: homogeneous hypodense
 Enhancement kinetic: progressive peripheral
 Gallbladder and biliary trees: Normal
 Spleen: Normal
 Pancreas: Normal
 Kidneys and ureters: No
 Adrenal glands: Normal
 Stomach, and bowels: Normal
 Peritoneum and mesentery: Normal
 Lymph nodes: Normal
 Pelvic organs: Normal
 Visualized bones: Normal
 Visualized lungs: Normal

IMPRESSIONS:
 Right hepatic lobe hemangioma
 Report category:
 0. clinically benign findings
 1. normal or anatomical variant
 2. clinically benign findings
 3. Probably Useful Information, for Clinical Review/Follow up
 4. Potentially Important Finding, for Clinician Attention
 5. Critical findings requiring immediate action

Fig.1. An example of a structured itemised report for CT abdomen and pelvis of a patient with hepatic haemangioma. There is a drop-down list using the “point-and-click” input method in the reporting (indicated by an arrow) for a patient with a liver mass. The choices in the drop-down list allow the use of an appropriate lexicon that is relevant for describing the imaging findings. The choices in the list also provide a structured checklist that guides and aids radiologists in the accuracy and completeness of their reporting so that pertinent data are not omitted. A 5-point critical finding indicator at the end of the report is indicated by an open arrow. Referring physicians found this to be a useful guide in the provision of appropriate level and timeliness of care to patients.

Discussion

Traditionally, radiological report is created using prose dictation by radiologists. There is often a wide variation and lack of standardisation in the narratives reported by different radiologists, and not uncommonly, by the same radiologist at different times, despite similar interpretation on the same set of images, leading to inconsistency in reports.¹ Consistency in processes is known to improve outcome while reducing variability of radiology reports is thought to improve quality. A way to standardise would be the use of a structured itemised report with standardised coherent radiological lexicon. Consistent terminology and presentation will improve communication, reducing errors of omission and enhance clarity of radiology report.

Structured itemised report is considered easier to read and provides report completeness and legibility.²⁻⁴ Similar to other studies,²⁻⁷ referring physicians in our survey preferred the itemised reports to the prose reports and cited ease of comprehension and enhanced clarity of the radiology report for their preference. This observation is independent of the examination results. On the other hand, majority of our radiologists expressed preference for the prose reports. One critical obstacle to adopting itemised reporting may lie with the current methods for the creation of this type of report, which some radiologists found to be time-consuming and a distraction from the core task of analysing and interpreting the images.^{3,8} A disruptive technological innovation for generating a structured itemised report can occur in

tandem with an evolving workflow-optimised advanced image visualisation software. It raises the capability of radiologists to manage the challenge of an enormous amount of radiological information in a systematic and organised fashion. The benefit of this efficiency advantage is the production of a prompt radiology report^{2,5,8} within the context of a balanced sustainable turnaround time (TAT).⁹ One example is the incorporation of a drop-down list permitting a “point-and-click” input method (Fig. 1) instead of manual typing or dictation. Compared to traditional prose report, itemised structured reports enable information and values to be extracted for analysis and decision-making with greater ease.

Conclusion

Structured itemised reporting style has been the preferred style of report for referring physicians, because it allows for the ease of comprehension and enhances clarity of radiology report. Workflow re-engineering through structured itemised reporting potentially improves our supply-chain efficiency in the reporting TATs. It expands our core business competency in the delivery of a quality radiology report, enabling consistency in the work that we do and positively impacting patient management.

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