

## Radiology Reports: How Much Descriptive Detail Is Enough?

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**OBJECTIVE.** The purpose of our study was to determine whether physicians prefer radiology reports with no description, a brief description, or a detailed description of the radiologic findings. We also examined the effects of various clinical circumstances and physician characteristics (e.g., specialty and number of years in practice) on these preferences. This study, which is limited to commonly encountered scenarios, is concerned solely with the description of imaging findings and not with other aspects of the reports, such as the diagnosis and technique.

**MATERIALS AND METHODS.** A questionnaire was sent to the 100 physicians who most frequently refer patients to our practice for chest radiographs and abdominal sonograms. The questionnaire outlined six clinical scenarios. For each scenario the physician was asked to indicate the preferred radiology report from a set of three reports varying in descriptive detail.

**RESULTS.** Seventy-seven physicians replied. For a normal chest radiograph in a patient without specific chest symptoms, the most popular report format indicated simply that the examination was normal. When there were clinical findings involving the chest or abnormal radiologic findings, the majority of referring physicians desired a description of the findings and the radiologic diagnosis. For abdominal sonograms the majority of physicians favored reports detailing the findings, even when the findings were normal. In all instances the preferences expressed were independent of the academic status, number of years in practice, number of reports read per day, and specialty of the referring physician.

**CONCLUSION.** Our results show that preferences of referring physicians for the extent of description of imaging findings included in radiology reports depend on the clinical circumstances. In the specific clinical scenarios examined, physicians preferred that the report include a brief description of the findings, except for screening chest radiographs, for which "normal examination" was an acceptable report. The referring physicians' preferences regarding the amount of descriptive detail included in the report were independent of their specialty, academic status, and experience.

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Information is the primary product of the radiologist. The radiology report is the usual mode of communicating this information to a referring physician. Radiology reports may contain many elements: a description of the technique, quality, and limitations of the examination; a summary of the patient's clinical or radiologic history or both; a description of radiologic findings; a diagnostic impression; a differential diagnosis; and recommendations for further investigations. To date few studies have examined the attitudes of referring physicians to these elements in defined scenarios.

The objective of this study was to determine the attitudes of clinicians to one of these elements, the description of radiologic findings, in commonly encountered clinical scenarios. We wanted to answer the following questions. (1) Do referring clinicians prefer reports with no description, a brief description, or a detailed description of the findings? (2) Are these preferences influenced by the clinical circumstances? (3) Are these prefer-

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ences influenced by the specialty, academic status, or experience of the referring physicians? Accordingly, we elicited the responses of referring physicians to a selection of sample radiology reports under different clinical circumstances.

### Materials and Methods

A questionnaire was sent to the 100 physicians who most frequently refer patients to our department for chest radiographs and abdominal sonograms. We selected these examinations because they are the two most frequently performed studies in our practice. We chose 50 referring physicians based at our hospital and 50 based at outside offices. It was stated at the outset that the purpose of the questionnaire was to ascertain the radiology report format preferred by referring physicians so that we, as radiologists, could better serve them. Respondents were assured of anonymity.

The questionnaire outlined six commonly encountered scenarios. In four of the scenarios patients underwent chest radiography. The results of the radiographs were normal in scenarios 1 and 2 and abnormal in scenarios 3 and 4. In the final two scenarios patients underwent abdominal sonography. The results of the sonograms were normal in scenario 5 and abnormal in scenario 6. For each scenario there was a set of three radiology reports. The first report (format A) gave no description of the radiologic findings but instead indicated that the radiologic examination was normal or indicated the radiologic diagnosis. The second report (format B) briefly described normal or abnormal radiologic findings. The final report (format C) described normal and abnormal radiologic findings in considerable detail. When the body of the report contained three or more phrases, the diagnostic impression was given separately. We derived all sample reports from actual reports issued from our practice. The referring physician was asked to indicate the preferred report for each scenario. In addition, the physician was asked to indicate his or her specialty, the number of radiology reports read per day, and the number of years he or she was in practice. The scenarios follow.

#### Scenario 1

Clinical: Weakness

Radiologic: Normal chest X-ray

#### Example Reports

##### Format A

Normal and unchanged since 2/16/94 (month/day/year)

##### Format B

No abnormality of cardiomeastinal contour; lung fields are clear; no change since 2/16/94

##### Format C

History: Weakness

Findings: No abnormality of cardiomeastinal contour when compared with prior films of 2/16/94; lung fields are clear of active disease; no major bony abnormality; no pneumonia, masses, or effusions

Impression: No active disease

#### Scenario 2

Clinical: Cough and fever; rule out pneumonia

Radiologic: Normal chest X-ray

#### Example Reports

##### Format A

Normal and unchanged since 2/16/94

##### Format B

No abnormality of cardiomeastinal contour; lung fields are clear; no pneumonia; no change since 2/16/94

##### Format C

History: Cough and fever

Findings: No abnormality of cardiomeastinal contour when compared with prior films of 2/16/94; lung fields are clear of active disease; no major bony abnormality; no pneumonia, masses, or effusions

Impression: Normal study

#### Scenario 3

Clinical: Cough and fever; rule out pneumonia

Radiologic: Pneumonia present on chest X-ray

#### Example Reports

##### Format A

Pneumonia in posterior basal segment of right lower lobe

##### Format B

Patchy air-space consolidation in posterior basal segment of right lower lobe, in keeping with clinical diagnosis of pneumonia; no effusion; otherwise normal

Impression: Pneumonia in posterior basal segment of right lower lobe

##### Format C

History: Cough and fever

Findings: Standard posteroanterior and lateral views were obtained; patchy air-space consolidation in posterior basal segment of right lower lobe; no associated effusion or volume loss; normal cardiomeastinal silhouette; bones are unremarkable

Impression: In view of clinical history of cough and fever, air-space disease in posterior basal segment of right lower lobe most likely represents pneumonia

#### Scenario 4

Clinical: Dyspnea; rule out congestive heart failure (CHF)

Radiologic: Chest X-ray shows congestive failure with widespread alveolar and interstitial edema

#### Example Reports

##### Format A

Widespread alveolar and interstitial edema indicating CHF

##### Format B

Cardiomegaly; bilateral small effusions; widespread changes from interstitial and alveolar edema; redistribution of blood flow to upper lung zones

Impression: CHF with widespread alveolar and interstitial edema

##### Format C

History: Dyspnea; rule out CHF

Findings: Standard posteroanterior and lateral views were obtained; cardiomeastinal silhouette is enlarged; both costophrenic angles are blunted, likely by small effusions; slight thickening of interlobar fissures, likely also the result of fluid; redistribution of blood flow to upper lung zones; widespread areas of patchy alveolar consolidation with a tendency for confluence in lower zones; Kerley A and B lines are present in both lung bases

Impression: Congestive failure with alveolar and interstitial pulmonary edema, cardiomegaly, and bilateral effusions

#### Scenario 5

Clinical: Pain in right upper quadrant (RUQ); rule out gallstones

Radiologic: The sonogram is good quality, and all intraabdominal structures are normal

#### Example Reports

##### Format A

Normal

##### Format B

Liver, bile ducts, gallbladder, pancreas, spleen, kidneys, and major vessels are all well seen and are normal; no gallstones

**Format C**

History: RUQ pain, rule out gallstones

Findings: Liver is well defined; gallbladder is clearly seen; within gallbladder, one or two small echoes that float are probably just minimally thickened bile; no evidence of gallstones; no shadowing is seen; common bile duct measures 4 mm; pancreas appears normal; right kidney measures 10.3 cm in length, and left kidney measures 9.9 cm in length; both kidneys are normal; spleen is normal; aorta and inferior vena cava are normal

Impression: No significant abnormality in abdomen

**Scenario 6**

Clinical: RUQ pain; rule out gallstones

Radiologic: Gallbladder contains stones, but all other structures are normal

**Example Reports****Format A**

Gallstones; otherwise normal

**Format B**

Gallbladder contains multiple stones; liver, spleen, kidneys, pancreas, bile ducts, and major vessels are all well seen and are normal

**Format C**

History: RUQ pain; rule out gallstones

Findings: Liver is normal; gallbladder contains several stones; common duct measures 6 mm in diameter; no stones are seen within common bile duct; pancreas appears normal; both kidneys are clearly seen; right kidney measures 10.4 cm in length, and left kidney measures 10.8 cm in length; both kidneys are normal; spleen is normal; aorta and inferior vena cava are normal

Impression: Gallbladder contains several stones; no other abnormality in abdomen

Seventy-seven physicians replied to the questionnaire, for a response rate of 77%. Of those responding, 42 were based at our hospital and 35 were based at outside offices. This included 29 internists (nine oncology; three each respiratory medicine, critical care, and nephrology; two internal medicine; and one each infectious diseases, hematology, gynecology, cardiology, dermatology, psychiatry, occupational medicine, neonatology, and pediatrics), 16 surgeons (seven general surgery; two orthopedic surgery; two otolaryngology; and one each neurosurgery and vascular, thoracic, maxillofacial, and plastic surgeries), 16 family practitioners, and 14 emergency physicians; two did not indicate their field of practice. Thirty-eight respondents held academic positions, 36 held non-academic posts, and three did not indicate their academic status. The average time in practice was  $14.47 \pm 11.29$  years (range, 1–50 years). On average each physician read 10 radiology reports per day (range, 1–100).

Confidence intervals for the percentage of format preferences for each scenario were computed by use of the exact binomial distribution. Associations were assessed by use of Pearson's chi-square test or analysis of variance, as appropriate. In analyses involving data in which single physicians contributed more than a single rating, such as in the comparison of preferences by scenario, the methods for analysis of cat-

egorical data of Grizzle et al. [1] were applied. When multiple pairwise comparisons of scenarios were involved, Bonferroni corrections were applied. A *p* value of .05 was considered significant.

**Results**

Table 1 summarizes the report format preferences for each scenario.

**Chest Radiography Reports**

Format A (no description of radiologic findings) was the most commonly selected report for a normal chest radiograph with symptoms not specifically involving the chest (scenario 1). However, the majority of physicians (57%) still preferred a more detailed report (format B or C) in this scenario. Format A (no description of radiologic findings) was otherwise the least preferred report in each scenario, selected by less than 10% of physicians when radiologic findings were abnormal.

Format B (brief description of radiologic findings) was the most popular report format when radiologic findings were abnormal (scenarios 3 and 4) or when the radiograph was normal but symptoms involving the chest were present (scenario 2).

Note that for each scenario approximately one third of referring physicians favored the most detailed report (format C), even in the absence of positive radiologic findings.

Stated differently, for a normal chest radiograph, a "normal" report was the most popular format in the absence of chest symptoms, whereas descriptive detail was preferred when chest symptoms were present. When the chest radiograph was abnormal, few appreciated a report indicating only diagnosis; the majority desired a description of the radiologic findings as well.

**Abdominal Sonography Reports**

For both scenarios, format B (brief description of sonographic findings) was the most popular report format, and format A (no description of sonographic findings) was the least preferred. Again, approximately one third of referring physicians favored the most detailed report (format C), even in the absence of positive sonographic findings. In other words, for abdominal sonography (for which all patients had abdominal symptoms), the majority favored reports detailing the findings, even in the absence of abnormal features.

**Statistical Analysis**

The 95% confidence intervals for the percentage of format preferences are on the order of  $\pm 10\%$  (Table 1). Differences

**TABLE 1: Report Format Preferences for Each Scenario**

Format	Physician Preference in Scenario					
	1	2	3	4	5	6
A	43 (32–55)	27 (18–39)	7 (2–15)	7 (2–15)	9 (4–18)	14 (7–24)
B	23 (15–34)	42 (30–53)	58 (47–70)	54 (43–66)	58 (47–70)	53 (42–65)
C	34 (23–45)	31 (21–43)	35 (25–47)	39 (28–51)	33 (22–44)	33 (22–44)

Note.—Data are reported as percentages of physicians (95% confidence interval).

in preferences among scenarios 1–4 were significant ( $p = .0002$ ), with the only nonsignificant pairwise comparison being that between scenarios 3 and 4 ( $p > .80$ ). Scenarios 5 and 6 were considered separately and did not differ ( $p = .32$ ).

No association was found between physician characteristics (academic status, number of years in practice, number of reports read per day, or specialty) and preferences.

## Discussion

A recent editorial concluded that “the value of radiologists will depend on how much other people value us. We must be ever vigilant in assessing and responding to the needs of...other physicians....” [2]. In this regard it is important that our reports contain information desired by referring physicians in a format appreciated by them. This topic has received limited attention in the radiologic literature. Several editorials [3–5] and a letter [6] have discussed the format and content of radiology reports, reflecting the views of radiologists rather than clinicians. Few studies [7, 8] have elicited the opinions of referring physicians on this matter.

Previous articles yield conflicting opinions. Two editorials [3, 4] recommend a report of “normal” for negative examinations. However, in a recent survey none of the respondents appreciated a preprinted “no significant abnormality” report [8]. Unlike previous investigators, we presented clinicians with sample reports for different clinical situations. Using this approach we found that the detail expected varies with the clinical circumstances. For patients without relevant symptoms and a normal examination, a report of “normal” may be acceptable. Otherwise, reports describing the radiologic findings were favored by most clinicians.

Unlike previous investigators, we attempted to quantify the descriptive detail desired in defined, common clinical scenarios. In the scenarios examined, most referring physicians expected a brief description of the radiologic findings (format B), but one third of respondents favored a more detailed description (format C). The desire for descriptive detail when there are abnormal radiologic findings or relevant symptoms is understandable. To our knowledge this preference has not been previously documented. We were surprised, however, at the percentage of physicians who preferred detailed descriptions (format C), which usually did not provide any further information. We speculate that such a report indicates to a clinician that a thorough examination was performed. We also were surprised to find no association between physician characteristics and preferences.

We deliberately limited our study to the description of radiologic findings. We do not intend to belittle the importance of other report elements. On the contrary, we believe that clinicians' opinions on other aspects of the radiology report also should be sought. Our results are relevant to the reporting practices of radiologists, as the scenarios described are common and constitute a significant volume of radiology practice outside of tertiary centers. However, this study must be read in the context of the scenarios defined, and we do not attempt to generalize to other, more complex situations, such as when a complex abnormality is found or when there is a differential diagnosis. Neither do we make any pretense to represent the attitudes of all clinicians. Because our study population included a broad spectrum of medical practitioners and

because the 95% confidence intervals for the percentage of format preferences in each scenario were narrow ( $\pm 10\%$ ), our findings will be applicable to other comparable practices. The profiles of referring physicians in our practice and their use of radiology services have been described, and readers must decide whether the findings are relevant to their own practices.

Although of necessity somewhat artificial, our method emulates daily practice, in which a clinician reads a radiology report in a given clinical scenario. This approach is more realistic than those taken in previous studies, in which clinicians were questioned regarding radiology reports in general, without reference to particular examinations or clinical situations [7, 8]. However, caution must be exercised in interpreting the results of surveys. Our subjects may have responded as they thought they should by selecting reports that seemed to contain more information. We believe this possibility is unlikely, as physicians were assured of confidentiality and understood that we were trying to ascertain the report format preferred by referring physicians so that we could better serve them. It was thus in the interest of respondents to indicate the report format that they genuinely preferred. Similarly, the order in which alternative scenarios are presented can exert a powerful effect on subjects. In this regard, the choice made in the first scenario is likely to be repeated in the second scenario. This makes a similar choice more likely in the next scenario, and so on. This bias did not occur in our survey. The most popular choice in scenario 1 was the format A report, which was the least favored response in subsequent scenarios. Similarly, format B was the least popular report format in the first scenario but the most favored in the remaining scenarios. Finally, for data in which single physicians contributed more than a single rating, such as in the comparison of preferences by scenario, the methods for analysis of categorical data of Grizzle et al. [1] were applied. These procedures allow for any influence that a choice made in one scenario would have on a choice made in another scenario.

In conclusion, our results show that the descriptive detail expected by clinicians in radiology reports depends on the clinical circumstances. We have outlined the degree of descriptive detail expected for several commonly encountered scenarios and have shown that these findings are independent of the specialty, academic status, and experience of the referring physician. As radiologists we must continue to educate ourselves regarding the information and format that clinicians desire in our reports. Only in this way can we continue to be valuable as consultants to them.

## REFERENCES

1. Grizzle JE, Starmer CF, Koch GG. Analysis of categorical data by linear models. *Biometrics* 1969;25:489–504
2. Potchen EJ. Future of diagnostic radiology. *RadioGraphics* 1994;14:936–938
3. Martin LFW. Opinion: is this your report? *Can Assoc Radiol J* 1982;33:255–256
4. Friedman PJ. Radiological reporting: structure. *AJR* 1983;140:171–172
5. Orrison WW, Nord TE, Kinard RE, Juhl JH. The language of certainty: proper terminology for the ending of the radiologic report. *AJR* 1985;145:1093–1095
6. Revak CS. Dictation of radiology reports. *AJR* 1983;141:210
7. Clinger NJ, Hunter TB, Hillman BJ. Radiology reporting: attitudes of referring physicians. *Radiology* 1988;169:825–826
8. Lafortune M, Breton G, Baudouin JL. The radiological report: what is useful for the referring physician? *Can Assoc Radiol J* 1988;39:140–143