Vague: Wandering, roaming, unsettled, uncertain…not definite in meaning, not explicit or precise, of indistinct ideas…absence of clear perception or understanding…meaningless [1].

The Cases

Case 1
A 68-year-old woman with a clinical diagnosis of pancreatitis underwent CT of the abdomen (Fig. 1). The radiologist who interpreted the study included the following sentences in his report:

There is a nodular appearance of the pancreas. No definite mass is seen, but if there is any clinical suspicion of neoplasm, an endoscopic retrograde cholangiopancreatogram may be warranted.

No immediate follow-up studies were performed, but 7 months later the patient, now severely jaundiced, underwent another abdominal CT. The study disclosed a large tumor arising from the head of the pancreas. Biopsy confirmed carcinoma.

Case 2
A 37-year-old man underwent routine chest radiography (Fig. 2A) that was interpreted by the radiologist as:

A 1 × 1.5 cm nodular density is projected over the anterior portion of the right second rib in the right suprahilar region. It is not clear whether this is due to overlapping shadows, an area of increased density within the rib, or a pulmonary nodule. Appearance suggests a granuloma. Nevertheless, a follow-up chest film in 3 to 4 months is recommended to evaluate this finding.

Chest radiography obtained 3 months later (Fig. 2B) was interpreted by the same radiologist as:

There is a persistent nodular density in the right suprahilar region, unchanged since previous study. Although I suspect this is due to overlapping vascular shadows, correlation with computed tomography of the region may be of value to definitely exclude a pulmonary nodule.

No follow-up chest radiography or CT was performed until 1 year later, at which time a large right-lung tumor was easily seen (Fig. 2C). Biopsy disclosed adenocarcinoma.

Case 3
A 42-year-old man who had been treated in the past for a soft-tissue sarcoma of the left lower extremity underwent chest radiography (Figs. 3A and 3B). The radiologist rendered the following interpretation:

There is a 4 cm density in the frontal projection on the left, which in the lateral view appears to lie in the major fissure and is compatible with a pseudotumor.

Fig. 1.—Case 1: 68-year-old woman with clinical diagnosis of pancreatitis. Abdominal CT scan was reported by radiologist as showing “nodular appearance of the pancreas…if there is any clinical suspicion of neoplasm, an endoscopic retrograde cholangiopancreatogram may be warranted.”

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Case summaries are based on actual events and lawsuits, although certain facts have been omitted or modified by the author, who has supplied and obtained authorization for the reproduction of the radiographic images. All opinions expressed herein are those of the author and do not necessarily reflect those of the American Journal of Roentgenology or the American Roentgen Ray Society.

Department of Radiology, Rush North Shore Medical Center, 9600 Gross Point Rd., Skokie, IL 60076, and Rush Medical College, Chicago, IL 60612. Address correspondence to L. Berlin.
Fig. 2.—Case 2: 37-year-old asymptomatic man who underwent routine chest radiography. A, Posteroanterior radiograph shows 1 x 1.5 cm density in right suprahilar region. Radiologist concluded, "It is not clear whether this is due to overlapping shadows, an area of increased density within the rib, or a pulmonary nodule. . . . a follow-up chest film in 3 to 4 months is recommended to evaluate this finding." B, Radiograph obtained 3 months after A. Radiologist reported that nodular density is unchanged and that "correlation with computed tomography of the region may be of value. . . ." C, Radiograph obtained 1 year after B reveals extensive carcinoma.

Fig. 3.—Case 3: 42-year-old man who had undergone treatment for sarcoma of left lower extremity. A and B, Posteroanterior (A) and lateral (B) chest radiographic findings were abnormal. Radiologist reported 4-cm density on left, "which in the lateral view appears to lie in the major fissure and is compatible with a pseudotumor." Radiologist suggested comparison with patient's prior films. C and D, Radiographs obtained 6 months after A and B show round 12-cm diameter mass in left lung. Biopsy disclosed recurrent sarcoma.
Comparison with the patient’s prior films is recommended to assess whether this represents an acute or chronic finding. The chest is otherwise unremarkable.

No follow-up radiologic studies were performed until 6 months later, at which time chest radiographs revealed a large round 12-cm diameter mass in the left lung (Figs. 3C and 3D). Biopsy disclosed recurrent sarcoma.

Case 4
A 38-year-old woman underwent routine chest radiography (Fig. 4A). The interpreting radiologist rendered the following report:

A soft tissue density in the right chest overlying the seventh rib posteriorly is seen. This could be a scar or even neoplasm. If previous chest x-ray is available for comparison, this would be most helpful. If not, then a 4-view chest x-ray may be of benefit.

The patient was not seen again by her physician until 22 months later, at which time chest radiography disclosed a 4 × 4 cm diameter mass in the right lung with associated infiltration and hilar involvement (Fig. 4B). Biopsy disclosed adenocarcinoma.

Case 5
A 59-year-old man underwent chest radiography as part of a routine physical examination (Fig. 5). In his report, the radiologist stated:

Soft tissue density in right upper lung field which appears to have some calcification within it and may represent a granuloma. However, would suggest an old chest film for comparison.

Eighteen months later, the patient returned with diffuse metastatic lung cancer.

Case 6
Chest and abdominal radiography was performed on a 61-year-old woman because of abdominal pain (Fig. 6A). The study was interpreted by the radiologist as follows: “Normal abdominal and chest radiographs except for band of atelectasis or infiltrate in the left lung base.”

Although the abdominal pain subsided spontaneously, follow-up chest radiography was performed 1 week later (Fig. 6B). The radiographic findings were “small patchy increased density in left lung base that is stable and probably chronic.”

Follow-up chest radiographic findings obtained 7 weeks later (Fig. 6C) were reported by the radiologist simply as “slight decrease in left lung base density.”

Ten months later, the patient was seen by physicians at another facility. There, radiographs disclosed a well-defined 3-cm tumor in the left lower lobe. Biopsy disclosed carcinoma.

Case 7
A 53-year-old man underwent chest radiography as part of a preemployment physical examination (Fig. 7A). The radiologist interpreted the study as follows: “Normal except for an ill-defined density present in the right upper lobe that is probably an artifact, but if indicated, a repeat view is suggested.”

The patient did not return for follow-up studies until 2 years later. At that time, chest radiography disclosed a tumor in the right upper lobe (Fig. 7B). Biopsy confirmed squamous cell carcinoma.

Case 8
A 59-year-old woman underwent an upper gastrointestinal radiography because of dysphagia and epigastric fullness (Fig. 8). The radiologist issued the following report: “Irregularity in the cardia of the stomach. Small hiatal hernia.”

No additional diagnostic studies were obtained at the time. Ten months later, the patient underwent endoscopic examination that revealed a large lesion of the cardiac portion of the stomach. Biopsy confirmed the presence of adenocarcinoma.

Case 9
A 55-year-old man with epigastric discomfort underwent upper gastrointestinal radiography (Fig. 9). The radiologist interpreted the study as follows:

Fig. 4.—Case 4: 38-year-old woman who underwent routine chest radiography. A, Radiologist reported this radiograph as showing soft-tissue density in right chest. Radiologist added, “This could be a scar or even neoplasm. If previous chest x-ray is available for comparison, this would be most helpful.” B, Radiograph obtained 22 months after A revealed 4 × 4 cm mass with associated infiltration and hilar involvement. Biopsy disclosed adenocarcinoma.

Fig. 5.—Case 5: chest radiograph of 59-year-old man who underwent routine physical examination. Radiologist reported, “Soft tissue density in right upper lung field which appears to have some calcification within it and may represent a granuloma. However, would suggest an old chest film for comparison.” Eighteen months later, patient returned with diffuse metastatic lung cancer.

Fig. 6.—Case 6: chest radiograph of 61-year-old woman because of abdominal pain. A, Radiograph obtained 1 week later of follow-up chest radiography with band of atelectasis or infiltrate in the left lung base. B, Radiograph obtained 7 weeks later with slight decrease in left lung base density.

Fig. 7.—Case 7: chest radiograph of 53-year-old man who underwent chest radiography as part of a preemployment physical examination. A, Radiologist reported no abnormality. B, Radiograph obtained 2 years later revealed a tumor in the right upper lobe. Biopsy disclosed carcinoma.

Fig. 8.—Case 8: A 59-year-old woman who underwent an upper gastrointestinal radiography because of dysphagia and epigastric fullness. Radiologist reported, “Irregularity in the cardia of the stomach. Small hiatal hernia.”

Fig. 9.—Case 9: A 55-year-old man with epigastric discomfort who underwent an upper gastrointestinal radiography. Radiologist reported, “Normal except for an ill-defined density present in the right upper lobe that is probably an artifact, but if indicated, a repeat view is suggested.”
There is gastroesophageal reflux and irregularity of the distal esophageal mucosa compatible with peptic esophagitis and a possible stricture. Reexamination of the esophagus after appropriate medical therapy with either endoscopy or esophagram is recommended.

The patient did not return to his physician until 14 months later. Endoscopy and biopsy at that time revealed carcinoma of the esophagus.

Case 10

A 57-year-old woman underwent screening mammography (Fig. 10A). The radiologist interpreted the mammograms as follows:

There is an asymmetrical area of increased density and prominent dysplasia with benign-appearing calcifications in the upper outer quadrant of the right breast. Clinical correlation and follow-up studies are recommended to exclude a mass.

Eight months later, the patient consulted her physician because of a palpable lump in the breast. Mammography now revealed two masses highly suggestive of malignancy (Fig. 10B). Biopsy disclosed invasive ductal carcinoma.

Malpractice Issues

In all but one of the 10 cases described, attorneys representing the patients in whom the diagnosis of cancer was delayed filed medical malpractice lawsuits against the interpreting radiologists.

Case 1

In the first case, a medical malpractice lawsuit was filed against the radiologist alleging that the initial CT report was not “strong enough” to convince the referring physician to order additional studies to evaluate the patient for possible pancreatic cancer. This case proceeded to trial, during which an expert radiology witness for the plaintiff testified before a jury that the defendant radiologist should have used the words “suspicious for cancer” in his report and should have “recommended” additional studies such as an endoscopic retrograde cholangiopancreatogram or biopsy, rather than merely stating that such a test “may be warranted.” An expert radiology witness for the defense, along with the defendant radiologist himself, contended that the findings on the CT scan were indeterminate and that the phraseology used by the radiologist in his report was acceptable. At the conclusion of the
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Cases 2–7

Five of the cases alleging delay in diagnosis of lung cancer resulted in the filing of malpractice lawsuits, all of which were settled before trial. Payments made on behalf of the defendant radiologists were not disclosed in cases 2, 3, 4, and 6. In case 7, a settlement of $1 million was agreed to on behalf of the defendant radiologist and codefendant [2]. In case 5, the plaintiff's attorney did not believe he had sufficient evidence against the defendant radiologist and thus declined to institute litigation [3].

Cases 8–10

Large settlements were paid on behalf of the defendant radiologists in cases 8 and 9, in which lawsuits alleging delay in diagnosis of gastrointestinal malignancies had been filed. Case 8 was settled for a total of $900,000 [3] and case 9 was settled for $1.25 million. The malpractice lawsuit in case 10, dealing with an alleged delay in diagnosis of breast cancer, was settled with a payment of $1.5 million on behalf of the defendant radiologist.

Discussion

The common thread that binds these 10 cases is the nature of the radiology reports—or to be more specific, the vagueness of the radiology reports. The reports were not truly inaccurate—the pancreas in case 1 was nodular but without apparent mass; the chest radiographs in cases 2–5 and 7 did reveal abnormal densities that were not obviously indicative of malignancies; the radiographs in case 6 did disclose nonspecific left lower lobe infiltration; the findings in the distal esophagus and proximal stomach in cases 8 and 9 were described with reasonable objectivity; and an asymmetric density was present on the mammogram in case 10. Notwithstanding the likelihood that most radiologists might judge these radiology reports as reasonably accurate in every one of these cases, the referring physicians failed to take action that would have led to the prompt diagnosis of malignancy. We must, therefore, ask ourselves who, if anyone, was at fault and why.

The delay in diagnoses and the ensuing medical malpractice litigation that took place in these cases may well have been the result of simple carelessness and lack of follow-up on the part of the referring physicians. On the other hand, we cannot ignore the possibility that these
events also could have been the result of inadequate if not negligent reporting on the part of the interpreting radiologists. We know what the attorneys and insurance companies that agreed to settle the eight cases thought: they determined that both the referring physicians and the interpreting radiologists were negligent and, therefore, jointly liable for injuries sustained by the patients. The legal culpability attributed to the radiologists clearly stems from a problem with a key link in the information chain that connects radiologists to their referring physicians—namely, the radiology report. Let us now further analyze that key link—the radiology report.

Over the years, a number of commentators in the radiology literature have discussed the subject of radiology reports. Three quarters of a century ago, Enfield [4] criticized radiologists who issued written radiology reports that:

...describe in detail all that the roentgenologist sees in the film or on the screen but does not tell what he thinks about it, what conclusions he draws from it, and what it means to him.

This kind of report “commits the roentgenologist to nothing except accurate vision and good description.... It tells much, yet almost nothing,” wrote Enfield, who then exhorted radiologists to “give not only their opinion but also their method of arriving at that opinion.”

Commenting 60 years later on radiology reports, Friedman [5] held that “it is the obligation of the radiologist to state what has been found as clearly and pointedly as possible.” Fischer [6] added that the radiology report must be not only accurate but also meaningful. Indeed, clarity and meaningfulness were the most valued qualities of radiology reports among 200 referring physicians, according to a Canadian survey [7]. Let us digress and focus on the definitions of these terms in more detail.

“Meaningful” is defined as “capable of being understood or interpreted...the thing one intends to convey by language...exhibiting a specified intent or purpose...” [1]. Meaningful is an antonym of meaningless, which is defined as “lacking an assigned function...having no significance...vague” [1]. The definition of “vague” is given at the beginning of this article.

Spira [8] has urged radiologists to render more meaningful reports of radiologic studies, going so far as to write that radiologists do themselves, their patients, and referring physicians a disservice when they create a vague report. He asserts:

A rambling description of findings without a reasonable conclusion does not add anything positive and often is perceived as an attempt to distance the interpreter from the clinical issue at hand...leaving the reader confused.

In its “Standard for Communication: Diagnostic Radiology” [9], the American College of Radiology steers away from using such words as “vague” or “meaningful” and instead states simply that the radiology report “should use precise anatomic and radiologic terminology to describe the findings accurately” and that an impression should include “a precise diagnosis...whenever possible.” The standard also mandates radiologists to “recommend follow-up or additional diagnostic studies to clarify and confirm the impression...when appropriate” [9].

Let us now turn to the practical and legal question that is the crux of this article: did the 10 radiology reports convey to the referring physicians a truly accurate representation of the radiologic findings, the radiologists’ opinions of the meaning of the findings, and the radiologists’ recommendations for further action to the referring physicians?

In each of the cases described, the referring physicians testified either in deposition or at trial or stated off the record to their attorneys that if the radiologists had only been stronger in their reports, they would have acted (to pursue a diagnosis) much sooner. In some of the cases, the defendant radiologists acknowledged that the complaints of the referring physicians had merit, but in other cases, the radiologists did not agree with the complaints.

Communication between two individuals is, of course, a two-way street. In the context of radiology reporting, sometimes the radiologist’s meaning is not accurately conveyed to the referring physician, and at other times, the referring physician misunderstands the radiologist. A failure of communication between two physician professionals is more likely because of some degree of fault in both. In not one of the 10 cases discussed here did the interpreting radiologists use in their reports such phrases as “the radiographic findings are suggestive for carcinoma” or “carcinoma is possible” or “car-
cinoma should be considered,” all of which are meaningful phrases. In not one of the cases did the interpreting radiologist clearly recommend an additional radiologic study or biopsy, again, meaningful phrases. Such terms as “if clinically warranted” or “if clinically indicated may be of value” or “comparison with patient’s prior films is recommended” or “would be most helpful” or “may be of benefit” or “clinical correlation is recommended” were all used quite freely—but these phrases are vague rather than meaningful.

Is it because of the vagueness of these reports that the referring physicians did not obtain additional studies to diagnose carcinoma earlier? Did the language used in the radiology reports lull the referring physicians into inaction and lethargy (conduct referred to as “soporific” by Goldsmith [10]), rather than alert them to the fact that prompt action must be taken? Considering the amount of indemnification paid on behalf of the defendant radiologists in these cases, the answers to these questions appear to be “yes.” Although it may be true, at least in some of the cases, that the delays in diagnoses were more the result of lackadaisical if not substandard conduct of the referring physicians, the fact remains that the law holds radiologists responsible for lapses in their own conduct, irrespective of any liability that might be imposed on other physicians [11]. This fact should provide a wake-up call for all radiologists to review their technique of reporting.

Recognizing the wide variation and lack of uniformity of reports rendered by radiologists, Hickey [12] proposed 78 years ago that national radiology organizations try to achieve uniform reporting by developing standardized nomenclature and writing style. Although such a system has yet to be implemented for general diagnostic radiology, it has already been accomplished in the subspecialty of mammography. The American College of Radiology instituted the Breast Imaging Reporting and Data Systems (BI-RADS) [13], which consists of a lexicon of terminology and definitions to provide standardized language in reporting mammography. By providing clear and succinct reports, BI-RADS has achieved its goal of making communication of mammographic findings more accurate and decisive. Ambiguity and vagueness have, for the most part, been eliminated in mammography [14].

Summary and Risk Management

Written interpretations by radiologists of radiologic studies are extremely important from both medical and legal perspectives. These reports provide an integral part of the medical record and are an essential link between the diagnosis and treatment of a patient’s illness. The legal authority and importance of radiology reports were emphasized by a federal appeals court that characterized them not simply as “reports of diagnosis or opinions,” but rather as “factual reports of analysis of [a patient’s] body” [15]. The court added, “A radiologist’s enumeration of the contents of an x-ray is not … mere medical hypothesis, but, rather, a learned statement of an observable condition.”

Radiologists owe patients the interpretation of radiologic studies in a manner that is meaningful to the referring physician [16]. Once a malpractice lawsuit is filed, the radiology report becomes important evidence—a legal exhibit—in the courtroom. It is then determined by a court of law whether a report rendered by a defendant radiologist clearly conveyed to the referring physician the results of a given radiologic study—that is, whether the radiologist’s report conformed to or breached the radiologic standard of care. If it is determined that the phrasing of the radiology report is insufficient to meet the standard, indemnification will be paid, either through settlement negotiations or a jury verdict. Radiologists must remember that they have an independent duty to be accurate and concise, regardless of whether the actions of the referring physician are negligent [11].

Risk management in radiology practice can lessen the likelihood of incurring a medical malpractice lawsuit, maximize the chance for a successful defense if a suit is filed, and at the same time enhance good patient care. The following risk management pointers will help radiologists meet all three of these objectives:

• Radiologists should heed the words of Rothman [17], who wrote that because radiologists are paid for using both their eyes and their brains, a complete radiology report must include both sets of evaluations. The body of the report should contain a complete description of all abnormalities—that is, everything that is seen with the eyes—but the conclusion should discuss only those findings that are important to the brain, contended Rothman. The length of the body of the report depends on the number of findings, whereas the length of the conclusion varies with the radiologist’s ability to make sense of the findings.

• Before completing a radiology report, radiologists should ask themselves, “What do I want my referring physician to conclude from my interpretation?” The interpreting radiologist should try to address in his report the following self-imposed questions: What did I see on the radiographic studies, by what do I believe the findings are caused, and what do I suggest the referring physician do next? Radiologists should not sign their reports until these questions are answered in a meaningful manner.

• Radiologists should minimize, if not eliminate altogether, the use of such phrases as “if clinically warranted,” or “if clinically indicated may be of value,” when assessing abnormal radiographic findings. Because radiologists are acknowledged to possess radiologic expertise derived from training and experience, they should not relinquish to nonradiology physicians the responsibility of evaluating the potential significance of a purely radiographic finding that is unexpected or unusual.

• When rendering radiology reports, radiologists should refrain from hedging, defined as the making of calculatedly noncommittal or ambiguous statements [1]. Radiologists should be mindful of the following aphorism coined by one radiology educator: “Do not let the fear of being wrong rob you of the joy of being right” (Rogers LF, personal communication).

• A report need not always be brief but it can always be concise [18]. Radiologists should attempt to convey important radiologic findings as briefly as possible. Good writing is succinct, accurate, clear, and unambiguous; it grabs the attention, conveys a message, and elicits a response [19].

• Readers who want specific hints as to what constitutes a good radiology report should consult specific references listed at the
end of this article [3, 20–22]. All radiologists should read the 16 tips on how to write a radiology report by Revak [23]. They are as valid today as they were 17 years ago when they were first published.

References

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