Residents inRadiology

How Sure Are You, Doctor? A Standardized Lexicon to Describe the Radiologist's Level of Certainty

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OBJECTIVE. A standardized lexicon to specify the radiologist's level of certainty in a radiologic diagnosis can decrease the confusingly large number of words and phrases currently used for that purpose. Such a lexicon furthermore can minimize ambiguity and facilitate clearer communication among radiologists, referring physicians, and patients.

CONCLUSION. We would like to share our experience with the lexicon that we developed in 2009. For ease of communication, the lexicon itself is included in each radiology report.

The various words and phrases used to convey a radiologist's assessment of the likelihood of a diagnosis in a radiology report have been shown to have widely different meanings to both radiologist colleagues and nonradiologist physicians [1, 2]. Examples of such words include "suggestive of," "highly suggestive of," "may be," "compatible with," and "worrisome for." All radiologists believe that they are clear in expressing their thoughts, yet evidence exists to the contrary: complexity often leads to considerable degradation and confusion in the communication process [3]. To decrease this complexity and improve communication, in 2009, our department developed and began using a well-defined and agreed-on lexicon of certainty terms (Fig. 1) for all examination reports (other than in breast imaging, which instead uses the BI-RADS lexicon). It is not our intent to suggest that the terms we chose, or their associated numeric estimates, are the optimal or only way to express one's level of certainty. Instead, we would like to share our experience with the hope of stimulating others to develop and adopt standardized terminology for this critical aspect of radiology reporting.

No new words or phrases were developed for the lexicon; instead, only a subset of existing terms was selected by our radiologists and referring physicians. A numeric percentage is associated with each term to indicate the radiologist's estimate of the likelihood of a given diagnosis on the basis of their experience and judgment. Such estimates have always existed in each radiologist's mind, either consciously or subconsciously. Referring physicians often ask the radiologist, "How sure are you?" about a diagnosis. This lexicon simply communicates that level of certainty in the report more explicitly and clearly.

Of course, there are occasions when the radiologist is certain of an obvious diagnosis (e.g., a displaced femoral shaft fracture or numerous lung metastases in a patient with known cancer). Similarly, the radiologist may be certain of the absence of a diagnosis (e.g., lung metastasis, pneumothorax, or bowel obstruction at CT). In many other situations, however, a different, lower level of certainty exists in the radiologist's mind. Our standardized lexicon is used to express these less-than-certain diagnoses. To maximize clear communication, the lexicon terms are used consistently throughout the body and the impression (summary) of each report. A copy of the lexicon is posted on each PACS workstation throughout the department for quick reference by radiologists and is displayed on the home page of our departmental intranet. The lexicon is also printed at the bottom of each radiology report (except for those of breast imaging examinations).

Details of Lexicon

Each of these lexicon terms is explained further here, with examples and sample usage.

Consistent With (> 90%)

Definition—The proposed diagnosis is the best explanation for the imaging findings in view of the clinical information available,

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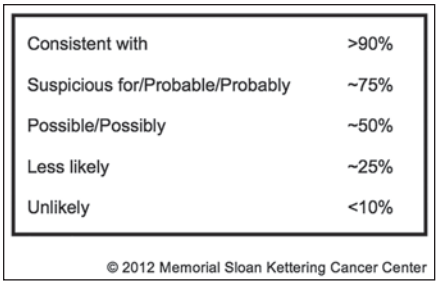

Fig. 1—List of certainty terms in standardized departmental lexicon, with associated numeric estimate of radiologist's certainty. Reprinted with permission from Memorial Sloan Kettering Cancer Center.

although a different diagnosis could be offered in different clinical circumstances.

Example—The presence of a patchy pulmonary consolidation on CT is consistent with pneumonia in a patient with acute onset of fever and cough, or consistent with lung cancer in a patient with weight loss and hemoptysis.

Sample usage—Patchy consolidation in the right lung is consistent with pneumonia in this patient with fever and cough.

Suspicious for/Probable/Probably (~75%)

Definition—The proposed diagnosis is suspected on the basis of the imaging findings, but the findings are not pathognomonic for that diagnosis, and other alternative diagnoses exist. "Suspicious for" generally is used when discussing a malignant entity, and "probable/probably" is used for a benign entity.

Examples—A 2-cm nodule in an adrenal gland of a patient with lung cancer is suspicious for metastasis, although an adenoma could have a similar appearance. A 6-mm adrenal nodule found in a patient with an early-stage melanoma probably represents an adenoma, although a metastasis could have a similar appearance.

Sample usage—A 2-cm nodule in the right adrenal gland is suspicious for metastasis. A subcentimeter left adrenal nodule is probably an adenoma.

Possible/Possibly (~50%)

Definition—Some, but not all, of the imaging findings usually associated with the proposed diagnosis are present. Other findings not typically encountered in that diagnosis are present, or the finding has numerous potential causes.

Example—A 5-mm noncalcified lung nodule in an elderly patient with colon cancer possibly represents a metastasis, although a granuloma could have a similar appearance.

Sample usage—A small lung nodule is possibly a granuloma or possibly a metastasis.

Less Likely (~25%)

Definition—The proposed diagnosis is believed to have a substantially lower likelihood of being correct than the other options provided, but still remains a plausible explanation for the imaging findings.

Example—Two subcentimeter sclerotic osseous lesions in an elderly woman with bladder cancer are probably due to bone islands and are less likely to be due to blastic metastases.

Sample usage—Two small sclerotic osseous lesions are probably bone islands; blastic metastases seem less likely.

Unlikely (< 10%)

Definition—The proposed diagnosis is believed to have a low likelihood of being the actual explanation for the imaging findings. Note that the use of "unlikely" is encouraged instead of the overused and potentially harmful radiologic cliché, "cannot exclude" [4].

Example—An 8-mm sclerotic lesion in the ischium is unlikely to represent a metastasis in a patient with renal cancer, given that an untreated metastasis of renal cancer typically is lytic.

Sample usage—Small sclerotic lesion in ischium is probably a bone island; the lesion is unlikely to represent metastatic renal cancer.

Effect of the Lexicon

Measuring the effect of changes resulting from the use of a lexicon is difficult, given the inherent complexity of human communication and the numerous other factors that can affect an observed change. One recent study [5] did assess the effectiveness of our lexicon: reports produced before the lexicon contained 38 different terms for describing the degree of certainty regarding the presence of extracapsular extension of prostate cancer on MRI. The lexicon was used by radiologists in 85.3% of reports; its use was associated with an AUC of 0.852 for diagnosing extracapsular extension. Because the study used the official clinical readings, it could not compare the accuracy before and after introduction of the lexicon; also, the examinations were read by the same group of radiologists. Nevertheless, the level of accuracy in these official readings (i.e., prospective clinical reports) was similar to the accuracies previously published in retrospective studies.

Future critical assessment of the perceived utility of our lexicon in other clinical settings and by the various users of radiology reports is needed. In addition, it would be interesting to determine the interobserver variability in usage of each certainty term among radiologists, on the basis of their level of experience, practice environment (private office, community hospital, or academic medical center), or degree of subspecialization.

Our radiology residents, fellows, and faculty appreciate this lexicon because it helps them shape their thoughts and descriptions while reporting examinations. Each new group of trainees readily adopts the lexicon. For many radiologists already in practice, however, introduction of the standardized lexicon in 2009 represented a culture change that required continual encouragement and discussion to achieve buy-in. Over time, acceptance and usage of the lexicon have become nearly universal; for example, review of the impression section from a recent sample of 50 consecutive body CT reports and 50 consecutive brain MRI reports showed 98% and 96% compliance with the lexicon, respectively.

Many of our referring physicians have expressed strong support for the lexicon, stating that it clarifies the radiologists' impressions for them. Also, our patients read their reports on our online web portal and sometimes mention the radiologist's level of certainty during discussions of the reports with their oncologists. Perhaps the strongest endorsement of all has come from our large group of radiologists themselves, at all levels of training and experience. One faculty radiologist's comment in particular sums up the effect of the lexicon well: "At first, I didn't like the lexicon…then I realized that it actually made me *think* while dictating each report…now I love it!" If a lexicon does nothing more than make radiologists think while dictating reports, it will have accomplished much.

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