Radiology: Imaging Cancer

EDITORIAL

Standardized Reporting of Oncologic Response: Making Every Report Count

Richard K. G. Do, MD, PhD • Robert A. Lefkowitz, MD • Vaios Hatzoglou, MD • Weining Ma, MD • Krishna Juluru, MD • Marius Mayerhoefer, MD, PhD

From the Department of Radiology, Memorial Sloan Kettering Cancer Center, 1275 York Avenue, New York, NY 10065. Received March 17, 2022; revision requested April 6; revision received May 2; accepted May 11. **Address correspondence to** R.K.G.D. (email: *dok@mskcc.org*).

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Patients are increasingly accessing their own medical records, including radiology reports. One impetus to share medical records directly with patients is to increase patient autonomy, with the potential of vastly improving care. At the same time, patient access to reports has generated substantial fear among radiologists who are used to communicating only with other physicians. However, how does our fear compare with the anxiety of our patients reading their radiology reports? What is going through their minds as they read it? What if the report is an MRI, CT, or PET/CT scan in the context of a cancer diagnosis?

In cancer imaging, our reports deliver an outsized impact on patient care. By identifying a response to therapy, we are delivering a glimmer of hope to someone preparing for the worst. By reporting progression of disease, we are challenging the oncologist to find an alternative therapy. By declaring the absence of disease, we are providing a reason to celebrate. But what if our report is unclear? Is it unclear because we are unable to interpret the images or because the imaging test needs to be repeated or modified? What if it is unclear simply because of the language we use? We should avoid creating more difficulty for patients through our personal reporting style. Patients have expressed a desire for better clarity of our radiology reports, with more structured information and less confusing terminology (1). At Memorial Sloan Kettering Cancer Center (MSK), we have taken a few steps to standardize our reports and terminology with the aim of removing ambiguity and improving patient care.

As radiologists, we always express our diagnostic certainty when discussing an imaging finding, whether or not a standardized lexicon is available. For example, we can state that a finding is suspicious for cancer, or that cancer cannot be excluded, but the potential for miscommunication abounds (2). To address this challenge, MSK has implemented a Certainty Lexicon across the Department of Radiology since 2012 (3) (Table 1). The purpose of this lexicon is to remove the ambiguity in our own language when we express uncertainty. We always provide an estimate of certainty in a diagnosis, either explicitly or implicitly; use of a standardized lexicon communicates that level of certainty in the report more explicitly and clearly (3), an approach that has been supported by others (4).

To further reduce reporting ambiguity, we developed a Numbering Lexicon to describe how many lesions are visible (Table 2). The interpretation of qualitative words such as *few*, *several*, *multiple*, and *numerous* has been investigated as a potential source of miscommunication (5). The number of lesions matters; when a patient has only a few metastases, they may have oligometastatic disease and may be considered for certain local-regional treatment options. On the basis of a current consensus for oligometastatic disease, we chose five lesions as the cutoff between *few* and *multiple*. A threshold of 20 lesions between *multiple* and *numerous* was chosen more arbitrarily but was informed by the work of England et al. We also encouraged staff to eliminate *innumerable* from the reporting vocabulary. Whether there are numerous or innumerable lesions has no clinical impact for the oncologist. However, we hope that avoiding the use of *innumerable* may somewhat lessen patients' fear and worry when reading their reports.

This brings us to a current gap in standardized reporting for oncologic patients: how to report disease response or progression. Imaging often guides our oncologists in their treatment choice, where patients with imaging evidence of response usually continue their current regimen. Patients with evidence of progression often discontinue their current therapy and are offered alternatives. While Response Evaluation Criteria in Solid Tumors (RECIST) offers clear guidelines for response assessments through the use of target and nontarget lesions (6), its use in routine clinical care has not been widely implemented. RECIST also has known limitations with respect to target lesions; it is a subjective process that can lead to important differences in response categories (7). Furthermore, progression of disease is often influenced by nontarget and new lesions, diminishing the importance of target lesions selected on baseline scans. Thus, while RECIST still offers important quantitative data for clinical trials, its methodology is not always desirable for routine clinical practice.

In the absence of RECIST, radiologists continue to report treatment response subjectively and qualitatively. To address this gap, we have piloted an Oncologic Response Lexicon (Figure), which we have internally called *OR-RADS*. Analogous to other reporting and data systems, we have five categories of response, from OR-1 to OR-5, which describe decreased (OR-1) to increased (OR-5) disease, with OR-3 used to describe unchanged disease. We prefer *unchanged* to *stable* given the RECIST definition of stable disease, which allows a substantial change in the sum of diameters, specifically between −30% and +20%, the thresholds for partial response and progressive disease,

respectively (6). The category of OR-0, for no evidence of disease was also included to capture patients who may have no existing disease at imaging (eg, after curative intent surgery). Finally, two additional categories were introduced, OR-E and OR-M, to describe equivocal progression and mixed response, respectively.

A patient may be categorized as having equivocal progression (OR-E) when there are new imaging findings that may represent progression of disease, but there remains some degree of uncertainty. For example, new liver lesions in a patient with pancreatic cancer may appear after biliary stent placement, and these may represent new metastases or new abscesses. The OR-E category is used here to acknowledge that progression of disease may be present but not definite. OR-E is analogous to use of an unconfirmed progressive disease (iUPD) category defined by iRECIST, a modification of RECIST currently used for patients receiving immunotherapy (8). Even RECIST version 1.1 indirectly acknowledges that equivocal findings may be present at imaging, stating that to identify disease progression based on nontarget lesions, a "finding of a new lesion should be unequivocal: i.e. not attributable to differences in scanning technique, change in imaging modality or findings thought to represent something other than tumor" (6). Documenting the uncertainty in progression with standardized language also offers opportunities for feedback and quality improvement. Our preliminary data show that approximately 7% of our reports had equivocal findings at any one time (Figure).

Finally, a mixed response (OR-M) category is defined in our Oncologic Response Lexicon for patients with both unequivocal increase and decrease in extent of disease within the same organ and/or between different organs. A mixed response category is not currently acknowledged in either RECIST 1.1 or iRECIST. However, a mixed or heterogeneous pattern of response across sites is not uncommon and remains an area of research interest for oncologists. The true rate of mixed response at imaging remains unknown, but our preliminary data based on more than 11 000 reports to date show a mixed response rate of less than 5%. Documenting the frequency and outcomes of OR-M in clinical practice has potential to open new areas of investigation on treatment resistance and intertumoral heterogeneity.

We are not the first to propose a standardized system to document oncologic response (9). We also acknowledge the natural resistance to implementing standardized reporting throughout radiology. In our department, the Radiology Reporting Committee has been responsible for the dissemination of standardized reporting and lexicons, which is a stepwise and iterative process involving faculty education and interactions with the institutional medical board. Given the success of our Certainty Lexicon, our faculty has been more receptive to new lexicons, which are presented at departmental faculty meetings.

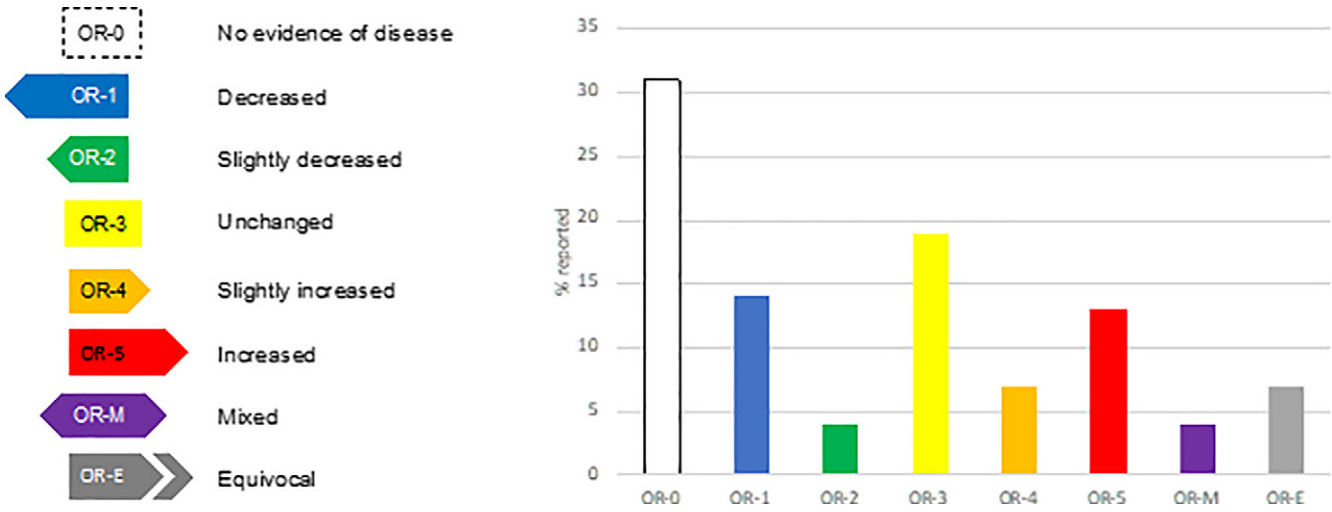
Standardized lexicons are designed primarily to reduce ambiguous communication and to help oncologists make the best possible treatment decision with their patients. In cancer care, our patients deserve as unambiguous a report as possible. An Oncologic Response Lexicon can also reduce the time and effort needed to extract data on disease progression from radiology

Table 1: Certainty Lexicon

Certainty Term	Probability Estimate
Unlikely	<10%
Less likely	~25%
Possibly	~50%
Suspicious for, probably	~75%
Consistent with	>90%

Table 2: Numbering Lexicon

Numbering Term	Number Estimate
Few	2–5
Multiple	6–20
Numerous	>20



Oncologic Response Lexicon. The distribution of oncologic response (OR) categories across more than 11 000 reports from the Memorial Sloan Kettering Cancer Center is shown. Categories are as follows: decreased (OR-1) to increased (OR-5) response, mixed (OR-M) response, and equivocal (OR-E) response. Patients with no evidence of disease are categorized as OR-0.

reports. Tremendous resources have been used to train nonradiologist annotators to interpret our clinical reports for use in natural language processing models. This is part of a larger effort to build real-world evidence (RWE) to help identify biomarkers of response outside of the clinical trial setting, using electronic medical records. By adopting a standardized lexicon for oncologic response, we can positively influence the outcome of patients with cancer at a large scale by contributing directly to RWE. As stated by Davenport and Weinstein, "we generate most of our value by serving as translators, who translate the language of images into words, and as communicators, who use words to change provider behavior and improve patient outcome" (10). We invite you to join us and develop a consensus on how best to report cancer response using a standardized lexicon in routine clinical care. It is time to make every report count, not just for the individual patient, but for entire cancer populations.

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