

Language of the Radiology Report: Primer for Residents and Wayward Radiologists

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The ability to write clearly is a skill, not an art, and it is learned by practice.
[1]

The lucid and terse conveying of factual information necessitates more stringent rules than do other types of expository writing. Scientific journals have formulated and refined such rules over many years [2]. However, in other areas of clinical medicine, including radiology reporting, few linguistic guidelines exist. The ACR (American College of Radiology) standard for communication [3] provides only brief common sense guidelines for the wording of reports.

The major reason that most residents receive little or no formal instruction in dictating is the lack of consensus about what constitutes a good report [4]. My own efforts at teaching this subject to residents are constantly undermined by colleagues with strongly held but differing views. I direct this article primarily to residents because the “bad” habits of mature radiologists, of which I am certainly one, are difficult to change.

General Thoughts

Our reports are our product, and it is important to read and correct those products before they are finalized [3, 5, 6]. Judgments of clinical

colleagues about radiology are increasingly made through these documents rather than through personal interactions. It is embarrassing to read a garbled report, particularly when it is your own. Fortunately, it is easier to correct today’s computer-generated reports than those of the carbon paper era.

Efficient conveying of information does not require complete sentences in a narrative style. This subject is contentious [7], but the sample reports in the ACR *Breast Imaging Reporting and Data System* (BI-RADS) [8] are composed primarily of nonsentences such as “no evidence of malignancy.”

Acronyms are rampant in medicine and are entirely appropriate in radiology reporting when usage is well established. Think of the time saved over a lifetime by dictating, transcribing, and reading Hx, CHF, CABG, SOB, WNL, XRT, Fx, SBO, PTX, CT, or MR.

Parentheses often convey information more tersely although this punctuation is frowned on by editors.

The present tense is always preferable and is appropriate despite the fact that every examination or procedure is performed before the dictation [7]. Comparisons can be dictated “there is” rather than “there has been” no change. Avoid the passive voice “is seen.”

Paragraphs are overused. Single-sentence paragraphs in the “Impression” of the report are particularly vexing [7].

History (Indications or Symptoms)

Keep it short. Remember, restating the same information is noncontributory to the ordering physician. Because the purpose of this section of the report is primarily to facilitate reimbursement, notation of symptoms is important. Do not repeat the age and sex of the patient when this information is already included in the header. All computer-generated requests in my department have the provided history automatically incorporated into the official report [9]. If pertinent history is not provided, this omission should often be explicitly stated in the report. This recommendation reflects current medicolegal advice, sends a subtle message to the ordering physician, and may appropriately convey diagnostic uncertainty [10].

Observations (Descriptions or Findings)

Brevity is espoused by most radiologists, but its definition is in the eye of the beholder [7, 11]. Length often varies inversely with the confidence and preparation of the radiologist. To paraphrase Winston Churchill, I would be shorter if I had more time to prepare. In this regard most residents would benefit from moonlighting as transcriptionists. This section does not require a separate heading. Most discussions belong here rather than in the impression [7, 12].

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Detailed technical descriptions are less necessary as examinations become more commonplace. I look forward to the time when reports no longer detail MR sequences, CT parameters, and the nuances of common interventional procedures.

Only pertinent negatives are appropriate, but what is pertinent? Beginning residents who are formulating methods of search may find it useful to comment on nonpertinent findings. Redundancy may be necessary for billing purposes such as separate paragraphs for CT of the abdomen and pelvis, or for with and without contrast media.

Do not confuse "Descriptions" with "Impressions." This observational section of the report is for vascular congestion and consolidations, whereas the "Impression" is for congestive heart failure (CHF) and pneumonia.

Comparisons logically come after descriptions. It is disconcerting to read a report that begins with the statement "this examination is compared with the study of..." Not only does the reader not yet know what findings are being compared, but there is repetition when the comparison is finally made.

Numeric dating will be an increasing problem with teleradiology extending across national boundaries. July 8 may be 7/8 in the United States, but it is 8/7 throughout most of the world.

Terminology

The following words and phrases can be omitted from most reports: this exam is provided, is obtained, is taken, or is submitted for interpretation; appearances are; a finding is seen, visualized, or identified; as stated above, as described above, or as noted above; please note, as noted, of note, or note is made of; is remarkable for; unremarkable; if clinically indicated; as well as; at this time; however; in addition to; in nature; otherwise normal; quite; unique; some and somewhat.

Avoid tautological phrases such as oval in shape, close proximity, small in size, slightly anechoic, direct comparison, interval change, time period, interval comparison, previous history, previous exam of (date), and completely asymptomatic [2]. "Total or partial occlusion" and "normally or abnormally dilated" are part of our everyday lexicon but are no less inappropriate [2]. Avoid double negatives like "not uncommon" and "not rare" [2].

A "hedge" is an evasive statement to avoid the risk of commitment, and it has perhaps justifiably been called the tree of our specialty [13]. A rule of thumb is not to use more than one hedge per sentence [13]. Avoid "no overt evidence of CHF" and "no obvious pneumonia

identified." Common hedge vocabulary includes density or opacity [14, 15], apparent, appears, possible, borderline, doubtful, suspected, indeterminate, identified, seen, no definite, no gross, no obvious, no overt, no evidence of, no significant, possible, probable, suggested, suspected, suspicious for, vague, clinical correlation needed, and equivocal.

The word "significant" in scientific writing is usually used only in the context of statistical significance. In radiology reporting "no significant abnormality or change" is acceptable but overused.

The following list of inappropriately used words and phrases reflects my personal biases and interests:

- **Azygos lobe:** This mythic lobe results from an anomalous vein and fissure [16, 17]. There is no corresponding bronchial or vascular anatomy.

- **Aphthous ulcer:** An aphtha is already an ulcer, "a small ulcer on a mucous membrane" [16].

- **Atypical, asymmetric, adynamic:** The meaning of these words will be reversed if they are transcribed "a typical." Nontypical is preferable.

- **Bony or bone:** The noun "bone" has evolved into an adjective [2]. Osseous is preferable.

- **Cardiac silhouette:** This term, rather than simply "heart," is appropriate only in the 1% of chest radiographs in which a pericardial effusion is suspected.

- **Cardiothymic silhouette:** This pediatric term is inappropriate in adults.

- **COPD:** Chronic obstructive pulmonary disease is a clinical spectrum of diagnoses that includes chronic bronchitis. Radiographs reveal emphysema, a far more specific and important entity [18].

- **Dye:** Contrast agents have no color [16, 19]. The only rationale for the misuse of this term is that dye has only three letters and is a single syllable.

- **Echolucent and sonolucent:** These terms are throwbacks to "radiolucent," whatever that is. "Anechoic" or "hypoechoic" are more acceptable [16].

- **Epicenter:** This term, meaning over the center, is applicable to earthquakes [16].

- **Flat plate of abdomen:** Most of us would not recognize an antique glass photographic plate [13, 16]. This term is on a par with KUB (kidneys-ureters-bladder).

- **Good, satisfactory, acceptable:** These judgments are in the eye of the beholder.

- **Hip fracture:** Joints dislocate and bones fracture [16].

- **Infiltrate:** This is an acceptable pathology term, but its use will unduly disturb most of your pulmonary imaging colleagues [14, 15, 20].

- **Inhomogeneous:** Do you mean heterogeneous?

- **IVP:** Pyelo means pelvis. The acronym IVP originated because early contrast agents often opacified only the renal pelvis. The acronyms EU or IVU (excretory or intravenous urogram) are preferable [16, 19, 21, 22]. If you perform many of these obsolete examinations, you and your referring clinicians might benefit from additional continuing medical education [23].

- **KUB:** This term originated with urologists. Radiologists need broader horizons when perusing abdominal radiographs [16, 21].

- **Lung markings:** This terminology is controversial [14, 24, 25], but the use of "lung fields" is inexcusable.

- **Mild:** Mild (or severe) are functional or physiologic adjectives. "Slight" is the preferable scientific term for size or quantity. Slight cardiomegaly and slight congestion may reflect mild CHF [26].

- **Neer and Judet views:** Radiologists were obtaining oblique images of the shoulder and pelvis long before Neer and Judet made their important contributions.

- **Obese:** This is an acceptable scientific word but it has pejorative connotations, and patients read their reports. Preferable language might be large size or large body habitus.

- **Osteoporosis and osteopenia:** The use of these qualitative terms to describe radiographs has been preempted by quantitative T scores greater than 2.5 and 1.0, respectively. I now use the term "demineralization" [27].

- **Permits and permission:** Physicians should not request permission to perform an examination. The patient does the requesting and should sign an informed consent rather than a permit. Take note when physicians and lawyers agree.

- **Plain and conventional radiograph:** I agree with Rogers [28] that "radiograph" without the modifiers [28, 29] is preferable.

- **Poor inspiration or inspiratory effort:** A poor effort is subjective, possibly disparaging, and often incorrect. High diaphragms usually reflect body habitus or decreased lung compliance [16].

- **Portable radiograph:** Portable means capable of being carried. Radiographs are portable, but X-ray machines are not. The term "bedside" is also imperfect but preferable [16, 19, 30].

- **Pulmonary edema:** This term is etiologically less specific than CHF [14, 31]. It may

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also confuse clinicians who associate it with symptomatically severe CHF.

- Reading examinations: Books are read and images interpreted [28]. Likewise, images “show,” “reveal,” and possibly “detect” but only thinkers, like the radiologist, can “demonstrate.”

- Shadow: Shadows are the lowest level of interpretation [14, 31]. I associate them with electromagnetic waves in the visible spectrum.

- Shoulder separation: Acromioclavicular joints separate and glenohumeral joints dislocate.

- Status post: How does status post differ from post? Is one status post surgery for life, or is there a time limit?

- Wet reading: For persons rendering these interpretations, I recommend a film processor and a new business manager [16, 19].

- X ray or roentgenogram: These terms for a radiograph are incorrect or archaic [16, 19, 28].

Impression (Conclusion)

“Impression” or “Conclusion” is preferable to “Diagnosis” [32] because a diagnosis is more specific and thereby encourages radiologists to hedge. Others disagree and alternative words include summary, opinion, interpretation, and reading [33].

When there is a 98% chance that findings are normal, or cancer, or fracture, or small-bowel obstruction (SBO), “go for the gusto” and omit the hedges. After all, it is only an impression. The statement that no fracture is seen or identified, implying that a fracture may have been missed, is appropriate for radiographs of ribs or externally rotated hips in osteoporotic women. It is inappropriate for radiographs of long bones in young individuals.

Impressions are an excellent gauge of the common sense and clinical judgment of the radiologist. Separating the important from the incidental often takes time and thought.

Keep it short. If readers want details they can refer to the descriptive section of the report. Impression: “Pneumonia” is preferable to repeating that it is a “patchy posterior segment left upper lobe pneumonia.”

Brief reports do not require “Impressions.” Unfortunately, the definition of “brief” is variable [3, 7]. “Impressions” are superfluous when reports will never be read (my apologies to several orthopedic colleagues).

Do not number diagnoses and place each on a separate line or paragraph. This prac-

tice lengthens reports and encourages listing of nonpertinent findings.

Tailor the “Impression” by addressing the clinical problem. Urgent or important findings should be described first [7]. This advice is particularly applicable to lengthy reports and impressions that are unlikely to be completely read.

Do not repeat observations in the “Impression.” This admonition is difficult when the diagnosis is uncertain. However, stating that there is an abnormality of uncertain cause or significance is preferable to iterating previous descriptions.

I prefer the “Impression” at the end of the report because I often reach my conclusion only during the course of the dictation and because I am old-fashioned and think summaries belong at the end [6, 32]. However, computers make it possible to place them at the beginning [5].

Do not repeat the name of the examination in the “Impression.” “Normal chest radiograph,” “normal CT of the abdomen” (if there is such a thing), and “no mammographic evidence of malignancy” are repetitious.

The use of the first person adds a personal touch, particularly when there is equivocation: “I doubt this is of clinical significance” or “I would be happy to discuss this with you.”

Radiologists make too many recommendations, particularly in patients about whom we have little clinical history. These recommendations are often not helpful, are sometimes inappropriate, and are occasionally simply wrong. When the recommendation is obvious, it may be resented; most clinicians are not interested in our suggestions when the tube is in a bronchus or there is a new lung mass. Conversely, insecure clinicians may feel medicolegal pressure to act on our suggestions for additional imaging.

The terms “clinical correlation needed” and “if clinically indicated” are overused. They sometimes reflect defensive posturing by the radiologist.

State in the report that findings were conveyed to the referring physician [3, 10, 34]. Written documentation is also necessary if a preliminary report, perhaps by a resident, undergoes substantive change before finalization [35]. In our department any change in a preliminary report automatically prompts the radiologist regarding a generic addendum stating that a significant change has been made.

Summary

In 1922, a classic article by Hickey [36] in the *American Journal of Roentgenology* con-

cluded that “the ARRS should recommend a standardized nomenclature to be used in writing roentgenological reports.” Only one such standard has been developed: the ACR BI-RADS [8]. It includes an imaging lexicon, report organization, conclusions, and recommendations. These guidelines have almost entirely replaced the previous haphazard reporting of mammograms in the United States. Kudos are particularly forthcoming from our clinical colleagues, some of whom participated in the collaborative development process. Similar guidelines are under development by the ACR Expert Working Panel on Breast Ultrasound.

Guidelines for general radiology reporting would be developed by consensus, be subject to change, not be mandated, and have few of the medicolegal implications of the ACR standard for communication [34, 37, 38]. The logical umbrella organization to develop such a project would be the ACR, which was instrumental in developing both BI-RADS [8] and the ACR standard for communication [3]. A collaborative group of the ACR and the Association of Program Directors in Radiology is currently developing noninterpretive skills curricula in residency training programs [39–41]; this would be the logical group to develop guidelines for general radiology reporting.

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