

## The MRI Report; Room for Improvement

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Which MRI report would you prefer to defend on a witness stand?

A. "IMPRESSSION: Pituitary tumor"

Or:

B. "IMPRESSSION: A 24 mm enhancing right parasellar mass, described above, expands into the sella turcica, erodes bone, and elevates the right side of the optic chiasm. The differential diagnosis includes.... Further studies that might narrow this differential diagnosis, if clinically or surgically appropriate, include ...."

From an actual case, "A" is typical of many reports I read daily. "B" is my attempt to write a better report after viewing the films as an expert witness. Careful readers may notice that "B" leads them toward a diagnosis other than "pituitary tumor." Written communication of observations and conclusions is paramount. As many as 75% of medical malpractice claims against radiologists result from errors in communication.<sup>1</sup> The well-being and even life of a patient may depend upon our written report. It is the lasting, and often only, product of our work. When subpoenaed, the report is a legal document. It also directly and permanently reflects our education and skill. A sloppy or cursory report suggests a similar approach to the process of interpreting the scan. For an expensive test, patients and physicians (and others) deserve a complete and well-written, as well as accurate, report.

The physician who will have to defend "A" will contend with subsequent developments: a surgeon lacerated a carotid aneurysm during attempted transsphenoidal hypophysectomy. A young woman suffered serious complications.

Had the reader of the scan taken time to compose a more complete and thoughtful IMPRESSSION, like "B," his mind might have opened during the process to additional diagnostic possibilities. The mention in the report of a range of possibilities might have led the referring physicians to explore some of them, averting the disaster. Instead, "A" indelibly stamped the patient with the wrong diagnosis; several attending physicians viewed a typical aneurysm on a pre-operative MR angiogram, but, with minds locked onto the unequivocal "pituitary tumor," none questioned that diagnosis.

This example testifies that a well-prepared report is not just another paperwork burden that steals time from daily practice. As an occasional expert witness, I can confirm that neurologists are increasingly called to task for deficiencies of MRI reporting as "malpractice litigation involving radiologic communication has moved to center stage in the legal arena."<sup>1</sup> The following is an attempt to suggest improvements in the reports of neurologists who regularly read MRI scans.

### **What's the point?**

The MRI (or CT) report serves several purposes.

*Accessibility* -- The report makes results of the test accessible to anyone, including those cannot interpret the images. It is easily transmitted.

*Permanency* -- On paper or digitized, the report can be available indefinitely.

*Legality* -- The report becomes a legal document when subpoenaed. It is the official record of the test results, as an EMG report becomes of action potentials.

*Guidance* -- The report can guide further diagnostic and therapeutic steps.

*Education* -- The report can educate other medical personnel, especially residents learning to interpret scans.

*Reimbursement* -- A signed report is necessary before a bill for the MRI can be sent.

*Marketing* -- The report demonstrates to colleagues the competence, authority, and value of its writer.

### **Is this the party to whom I am speaking?**

*"In writing reports, radiologists must use language that is shared by their audience ...preparing a single report intended for multiple specialties demands a certain agility of expression...."*<sup>2</sup>

Compose a report that all the readers below can understand. A single report may cross the desks of every one of them.

*Neurologic specialists* -- Include precise anatomic localization of lesions, their size, and their effects on neighboring structures. Estimate their temporal properties (acute, subacute, chronic), and offer a complete and carefully considered differential diagnosis.

*Orthopedic surgeons, rehabilitation specialists* -  
- Level by level, systematically describe degenerative changes, measure and grade spinal

stenosis, disc herniations, and spondylolisthesis, and describe root compression, etc. If you can't determine the age of a lesion, such as a herniated disc, use "uncertain duration" because many spinal abnormalities can exist without symptoms.

*Other specialists* -- Define neurologic terms and acronyms, eg, "NPH," "PML," etc. Avoid -- or define -- jargon ("T2 shine through," "flow voids," "susceptibility artifact," etc). Include descriptions of normal structures and abnormalities adjacent to the neuraxis, in the orbits, paranasal sinuses, nasopharynx, paraspinal muscles, etc. Mention an enlarged uterus, abdominal aortic aneurysm, dilated renal calyx, renal cyst, thyroid mass, pelvic metastasis, etc. You will be held responsible (and liable) for any abnormality visible on the images.

*Family physicians* -- Put neurologic diagnoses in perspective: a pineal cyst is usually normal in young women; a perineural cyst is usually asymptomatic, many spinal degenerative changes are almost inevitable in older individuals and may be asymptomatic. Include recommendations for a next diagnostic step or consultation; make clear the degree of urgency when appropriate.

*The Patient* -- Avoid unnecessary mention of obscure or highly unlikely diagnostic possibilities that may alarm: "vascular disease" in very young individuals, "MS," etc. The same applies to qualifying terms with emotional implication, like "huge," "severe," etc, unless the terms are clearly appropriate.

*Lawyers, Courts, Insurance Companies* -- Include a paragraph of INDICATIONS that tells why the study was ordered, but avoid unsupported cause-and-effect associations, such as, "a 23-year-old man who complains of (back pain, etc) due to an automobile accident." That statement may be mistakenly considered your conclusion based on your findings. Clearly distinguish speculative statements (educated guesses) from definite observations.

#### ***Grammar and Style***

In addition to making a report readable and observations and conclusions precise, clear prose and good grammar add authority. Use an active voice and complete sentences. Have mercy on the transcriptionist by speaking clearly, spelling difficult words, and indicating punctuation when it is critical to clarity. Separate FINDINGS into multiple paragraphs based on content instead of stuffing all

observations in a single ungainly jumbo paragraph, or using a separate paragraph for each sentence. List multiple diagnoses in separate numbered paragraphs in IMPRESSION. Then proofread and edit your reports. Never have them automatically signed without reading them first or allow them to enter the permanent record as "Dictated but not read." Imagine yourself explaining to a jury that you really said "Note: Follow-up is recommended" when the report states: "No follow-up is recommended."

#### ***Coherence and Flow***

*The radiologist is a sort of linguist, aiming to convey the meaning and significance of imaging abnormalities in a way that will enhance clinical care."*<sup>2</sup>

Who is better equipped than a neurologist to use MRI to enhance clinical care of neurologic patients? We should take the greatest advantage of our perspective, and further enhance it by devoting time and effort to good writing. The report should flow from an introduction of the problem(s) in INDICATIONS, through the strategy to solve them in TECHNIQUE, to the results of that strategy described in FINDINGS. Finally, discuss the meaning, or interpretation, of those results, especially as they relate to the care and prognosis of each particular patient, in IMPRESSION (or "CONCLUSIONS").

This common organic structure is used not only in medical clinicopathologic conferences, but also by Jane Austen and later novelists and even by composers, like Beethoven writing in sonata-allegro form. The writer first captures the interest of the reader or listener, explores characters, relationships, and themes, then finally brings all to a meaningful resolution. Like a "*leitmotif*" a problem (symptom or deficit) introduced in INDICATIONS should be carried through all sections of the report until a final explanation of it appears in IMPRESSION. The TECHNIQUE should be adequate to explore any problems set out in INDICATIONS. IMPRESSION should discuss all problems raised in INDICATIONS and any unexpected ones discovered in FINDINGS. Anything unmentioned, like administration of gadolinium, will necessarily be assumed by the reader not to have been accomplished or considered. Any structure not mentioned in FINDINGS, like the 8<sup>th</sup> nerves, will (and should) be assumed by the reader to have been overlooked, a major oversight, especially if INDICATIONS include hearing loss.

***Don't drop the ball!***

*"If there are urgent or significant unexpected findings, radiologists should communicate directly with the referring physician."* -- ACR Standard for Communication in Diagnostic Radiology<sup>3</sup>

It is the writer's responsibility to ensure that the report reaches its target in a timely manner. When sound clinical judgment requires, telephone the referring physician and document the call in the written report:

*Footnote: I talked with Dr. Doctor at 1300 on 9/24/2007 to report these urgent results.*

***"I'm not making this up, you know!"***

The following bad examples appear so often in reports they are worth mentioning.

Do not:

-- use jargon ("UBO's"), antiquated terms ("CVA"), indefinite terms ("hard disk"), chiropractic terms ("subluxation"), lay terms ("ruptured disk," "mini-stroke"), gruesome grammar ("hyperintensities," "there is seen").

-- overuse the term, "microvascular disease." Recognize the typical patterns of "non-specific multifocal cerebral high-intensity change," including CADASIL, amyloid angiopathy, hypertensive angiopathy, watershed infarcts, posterior reversible encephalopathy, embolic disease, etc. Use "nonspecific" in such cases, but discuss the appropriate possibilities.

-- conflate a disc "bulge," "protrusion," "extrusion," and "herniation." Settle on the terminology that seems to you most reasonable, stay consistent, and try to make a distinction. Elaborate whenever possible: "flattened disc bulges circumferentially," "left lateral protrusion," "free disk fragment in the anterior epidural space closest to the L4-5 interspace," etc.

-- make diagnoses in FINDINGS. Instead, use descriptive terms: "lateral ventricular enlargement," not "normal pressure hydrocephalus."

-- confuse antero- and retrolisthesis or pachymeninges and leptomeninges

-- call an eighth nerve normal in a patient with hearing loss unless you see it clearly after contrast administration.

-- hesitate to say that an examination is suboptimal or inadequate and why. Make

suggestions for improvement (sedation, different sequences, contrast, etc).

-- neglect to use contrast when neoplasm is possible, after spinal surgery, and in all other cases when it might change the diagnosis. Ask the patient to return for contrast if necessary.

-- neglect to examine and report on everything that appears on the images. Even though the referring physician requested an exam of the lumbar spine to investigate sciatica, you have the responsibility (and liability) to detect a renal carcinoma or an aortic aneurysm, if either appears on the scan.

-- neglect to examine and mention all the spinal facets. Disease in them may cause up to 40% of back symptoms.

Above all, remember that the report is the ultimate product of your education and skill and a document you may have to defend someday in public. It deserves thoughtfulness and care.

## REFERENCES

1. Berlin L, *Communicating Findings of Radiologic Examinations: Whither Goest the Radiologist's Duty?* Am J Roentgenol 2002;178:809-815.

2. Bruzzi JF, *The Words Count -- Radiology and Medical Linguistics.* N Engl J Med 2006;54:665-667.

3. *ACR Practice Guideline for Communication of Diagnostic Imaging Findings.* Available from the American College of Radiology, Headquarters Office: 1891 Preston White Dr, Reston, VA 20191, (703) 648-8900; or at ACR.org.

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