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Editorial

Sometimes less is more – Data acquisition and its impact on liability

At the 2017 annual meeting of the American Society of Emergency Radiology there was quite a bit of focus given to Dual Energy CT, and its many potential uses including iodine selective imaging, virtual non-calcium imaging for edema, virtual mono-energetic imaging and sequences for optimally identifying gout. Clearly this new modality offers enormous diagnostic potential and will likely become a mainstay at academic institutions in the near future. However the question was raised as to how radiologists could be expected to review each and every new potential sequence that might be acquired or post-processed and loaded into PACS, and the medico-legal issues involved in archiving an enormous number of potentially unread sequences. Although this notion was essentially glossed over by the proponents of this new technology, suggesting that it would be fine to obtain sequences and maintain them unread for archival and future purposes while simply answering the clinical question based on only the conventional sequences, it is not clear that this sentiment is based on any reliable precedent.

Advances in technology are wonderful for problem solving and to answer clinical questions. It is undisputed that we can diagnose more things confidently today than we could have twenty years ago. But as technology becomes more widely available and more and more sequences become routinely acquired by our various modalities – things like 3D MIP reformats, volumetric renderings, cine images, multiple sequences, etc. – what obligation is there for radiologists to actually review each and every one of these sequences, and to what extent is our ability to generate and store additional sequences impacting a radiologist's liability risk? The typical chest CTA for pulmonary embolism is now often created with MIP imaging in 5 planes, presumably for problem solving, but is the radiologist expected to routinely look at each of them in multiple windows? And technology does not ever stop. Surgeons now want 3D printer renderings, there is potential use for body composition measurement sequences, curved planar reformats, and the like. New technologies are potentially limitless, but radiologist manpower and time is definitely not.

Certainly there is precedent for a radiologist to be responsible for every finding that exists in the acquired images [1]. This includes every image in PACS, even if not reviewed [1]. Scout images, for example, have occasionally had findings not visible in the field of view of the subsequent CT, are sometimes neglected, and have the potential to put radiologists in jeopardy – so its unclear how addition of new sequences to the mix should be any different [2, 3]. A jury is not going to ignore a finding visible on a sequence that was available to a radiologist just because the radiologist chose not to review it.

If a finding is seen on any image, even one not reviewed, it will be hard to get around the fact by saying the radiologist did not review that particular sequence. A lawyer will blow up the image onto a giant poster, put large bright red arrows on it, and a jury won't be able to unsee it, and will be hard-pressed to believe an experienced board certified radiologist could miss what was so obvious even to them sitting across the courtroom. Not having ever looked at the sequence containing such an “obvious” finding will not be much of a defense.

Even if an expert witness for the defense testifies that it is not a sequence a radiologist would generally be expected to read in the normal course, absent some express guideline or rule obviating a radiologist from looking, a radiologist would be expected by a layman to have reviewed such imaging available to him. A jury is already typically biased toward an injured defendant and against the “deep pockets” hospital or insurance company, and so it becomes a very difficult case to suggest that a finding that would help the injured patient was acquired, available and plainly visible in a sequence but the radiologist for some reason simply opted not to even bother to look at that sequence. How is this any different than choosing not to look at findings on a scout view when reading a CT?

1. Time and volume-

The two big issues with technological ability to create dozens of new potentially useful sequences are the issues of time and volume. For example a multiphase trauma pan scan with spinal and pelvic reformats in three planes can quickly exceed 10,000 images, each of which could potentially contain a finding that could put a radiologist into jeopardy if missed. Adding additional sequences to the mix with new technologies will only serve to increase the volumes which must be reviewed. Yet while potential volume of images will increase with new technology, the time in the day remains finite. Nor will reimbursements keep pace with the number of new sequences, making adding more manpower financially unrealistic for many practices. So the “advantages” of new technology may result in more images than possible to review per day than safely or financially possible.

Realistically how fast can a radiologist be expected to review imaging? If studies start to routinely include 10,000 images, that means we are reading at a fraction of a second per image, which is likely beyond the safe threshold of most radiologists. (Thus this is far beyond expecting a radiologist to simply review an additional two image scout).

Will these new sequences contain anything significant that could result in liability? You will never know if you do not actually look.

2. Storage issues no longer protect us-

At one time radiologists were somewhat protected from this

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sequence boom, as digital storage space was finite and costly, retrieval time was slow, and so only the optimal sequences were routinely obtained and archived. These storage issues are rapidly being eliminated, with ever decreasing memory costs and increased microprocessor speeds [4]. The number of imaging sequences which can today be generated and stored continues to increase and will only likely continue with these new modalities.

3. Other fields-

Other fields somehow manage to sidestep this issue. Cardiologists rarely find themselves on the hook for lung and other non-cardiac findings contained in a cardiac CT, and at some facilities may even ignore the corners of the film which are technologically acquired but cropped out of the final coned down images they receive and archive. Other fields (orthopedics, emergency physicians) tend to focus on their anatomical regions of concern and rely on radiology for the final read on incidental findings (essentially a professional "backstop") for things outside of their wheelhouse. But radiologists have no backstop – "the buck stops here".

4. So how can radiology avoid these issues?

One initial ethical question to consider is who are we trying to protect? Are we trying to protect the hard working radiologist from being overwhelmed of sued, or are we trying to protect and benefit the patient by gleaning all of the information we possibly can from a study, even if reviewing that information is excessively time consuming and not directly related to the reason the study is being performed? And is it realistic to expect to accomplish both? Certainly there are a finite number of hours in the work day, and a radiologist not choosing to look at every sequence or image in detail is not maximally benefitting his patient, but as technology progresses, we are at or possibly even beyond the point where there is simply too much potential information to slough through. One could argue that more radiologists, each reading fewer studies, would allow all of these sequences to be reviewed in due course, but in an era of ever decreasing reimbursements, this is a hard sell – slashing salaries to hire more bodies is not a desirable outcome for the specialty.

One solution is to only acquire those sequences you intend to look at. Not acquiring the data in the first place is always an option, and not a very satisfying one. And this relegates some of these groundbreaking technologies to niche uses.

It might be technologically possible to acquire certain sequences in digital data packages which are stored in PACS but never converted into imaging capable of being looked at by the radiologist without a direct need. This would essentially allow the radiologist the option of later creating post-processing imaging with the click of a button but not mandate it if not required. It is unclear though how this willful ignorance of findings in unconverted, potentially available sequences might be regarded in a courtroom.

The better solution is for the ACR or other radiology organization to issue practice guidelines (i.e. a "White Paper") explicitly stating which expected sequences a radiologist minimally needs to review to meet the "standard of care" for various studies. The standard of care is the degree of care which a reasonably prudent radiologist (in the community/specialty) should exercise under the same or similar circumstances [5]. Not meeting the standard of care is strong indicia of malpractice. To a large extent, the standard of care will be determined in the courtroom setting, based on expert testimony, and experts, in turn, often rely on published clinical practice guidelines in forming their opinions [6]. Practice guidelines which meet the definition of a "learned treatise" can also be admissible directly to a jury as evidence of the standard of care in certain settings [7, 8].

Any imaging sequences acquired but not deemed necessary to be reviewed pursuant to published guidelines could by policy be considered archival or exclusively for problem solving purposes. Organizational guidelines tend to be influential in setting the standard of care within the field, and a radiologist who explicitly follows published radiology guidelines in his practice would likely be on much surer footing than simply choosing to ignore available sequences in the absence of such a policy.

This White Paper approach is probably an effective stop gap, but the real solution will be to find better ways to review all of the possible data. One approach in the not too distant future will be to automate, or at least semi-automate, the task of reviewing radiology studies. Artificial Intelligence (Deep Learning) is rapidly improving to the point where one might think of it as an adjunct to the radiologist, pointing out lesions that he might not have noticed or might not have even looked at. We are not at that point yet where AI could be turned loose on the sequences we otherwise would choose not to look at, as the false positive rate is too high and currently only serves to add to the burden. But given the rapid rate of improvement, it is hard to imagine that this will not become a reality in our lifetimes. If this in fact comes to pass, we can face the issue head on, rather than trying to hide from it. But until we get to that point we need practice guidelines to rely on because technology will drive the volume of potential sequences and data faster than we can read them.

Disclosures

The author has no disclosures with respect to this manuscript.

References

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