



Volume 12 - Issue 1, 2012 - ECR Special Preview

Departmental Management: Process Improvement



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Moving to an Organ-Based Workflow

Today's era of patient-centric medical/imaging care evolved from the modality specialists of the 1980s and '90s. It became obvious in subsequent years that radiology had to become more workflow-oriented, and be a more integral part of a multidisciplinary patient care team.

At the same time, the arrival of PACS/RIS, the digitalisation of imaging in particular but also of the laboratory and other medical specialties, necessitated a critical look at how imaging delivered its product to its two customers: the patient and the referring physician. That we could not just do this at our own pace was the result of the publication in 1999 'To err is human', a critical treatise on medical care, errors and poor outcome.

Couple this with certainty that the demand for imaging continues to expand due to growing and aging populations and imaging technology's continuing advances, it is not difficult to conclude that we imagers must either adapt or lose our place (also referred to as 'commoditisation'...) in the diagnostic and therapeutic pathway. As a result, amongst other factors, radiologists are faced with the question of how to balance providing a product - in this case, an exceptional patient experience along with superior images and a (correct, helpful) final report - with speed and efficiency that is error-free and doesn't compromise patient safety.

To meet this need, we need to examine all processes in the imaging department and ensure they perform reliably and under all circumstances. These include, but are not limited to, scheduling the appropriate study quickly, performing them in an efficiently run imaging suite, making the resulting images available for interpretation within a short time and ensuring timely delivery of the resulting report to the requesting physician.

Volume Drives the Bottom Line

At the URMC department of radiology, we perform over 600,000 procedures annually, in a hub-and-spoke set of facilities, with 70 radiologists, 39 residents and a dozen fellows. It is a busy trauma centre with two helicopters, serving an area of over one million inhabitants. It is at the forefront of imaging technology in the region and blessed with top-notch leadership, seemingly state-of-the-art. But, like everywhere, despite stringent efforts to keep up, technology is evolving faster than even the largest medical centre can react, and our task is to do as well as we can with the means we have.

Ten years ago, in the backyard of Kodak, but not getting all that much support, integrating best of breed, namely getting the best products and tying them together, was the way that many imaging departments set up PACS, RIS and enterprise-wide viewers, which came with its own challenges.

Today, we continue to face obstacles of interconnectivity saddled with basically two PACS/RIS systems working in parallel. The challenge was to upgrade the PACS/RIS, update viewing stations, and make sure our systems will seamlessly integrate into Epic/eRecord, the new enterprise-wide Electronic Medical Record (EMR) currently being rolled out. So, technological problems and their solutions in medical imaging are being thrown up quickly, if not, unfortunately, in synchronicity. It is quite a task to manage these processes pro-actively.

Underlying these elements, volume drives the bottom line, particularly in the U.S. market, even for healthcare providers. Hence our shift to organ-system based workflow and re-organisation this past year. More efficient use of the modalities and the ancillary personnel allows us to communicate the final report, our product, more quickly and more specifically to the referring clinician. In this article, I will share some aspects as to how that process has evolved at the URMC, hopefully helpful to those who must travel the same path.

Technology Alone Insufficient

Leaps in technology alone are not enough to adequately meet the explosion in demand for productivity, nor for cost-efficiency. To deliver our product faster and safer, we must urgently analyse and optimise the entire process of scheduling, performing, interpreting and delivering the signed report to our referring clinicians. And lest we forget, the patient experience is of paramount importance throughout this whole process. The patient-centric approach that results in highly consistent levels of patient satisfaction is key if we expect to succeed.

The medical centre took the lead here, embracing Patient Family Centered Care (PFCC) as the leitmotiv from which the entire enterprise is schooled in delivering care to the 'entire' patient. Put the patient first!

We must bear in mind that both the clinician and the patient can go elsewhere for their imaging studies. But, like any marathon, these efforts start with small steps. Recent key examples of process improvements in this area in our department include instituting:

- A patient safety committee;
- Shared governance councils;
- Mandatory departmental QA meetings and initiatives, and
- Changing the workflow for all from a modality-oriented department to an organ-based one.

All these efforts aim to place accountability at the heart of the entire care chain: and all of us share in making the end product the best we can provide. The following are some examples that newly formed

teams of radiologists, technologists, RNs and administrative staff are working on currently:

1. Scheduling

- *How difficult is it to make an appointment at our department of imaging sciences?*
- *Can we make the process equally simple for our administrative staff, patients and referring physicians across the enterprise?*

2. Protocols

- *Do we use the same imaging IV or PO contrast doses for our studies, so patients can be scanned more efficiently and consistently?*
- *Do our technologists use the same imaging protocols at all our locations, so they can work efficiently without having to call residents or radiologists?*
- *Are protocols in place to effectively apply the 80/20 rule for efficiency without compromising safety?*

3. Workflow

- *How do we make it easy and intuitive for our technologists to complete their portion of the imaging process so that putting their initials (i.e. their mark of expertise, their pride) on that study will satisfy the radiologist's imaging requirements?*
- *How do we ensure that most of our daily studies are signed, sealed and delivered by the end of the workday (or >95% within 24 hrs after completion)?*

In the last two years, significant headway into each and every one of these areas has been made. Part of the success is due to the tightening of the 'chain-of-command' of these entities, so that quick and efficient reactions can take place. Also, these are all examples of letting employees 'own' the process, and, with (preferably positive) feedback loops in place, rewarding individuals for contributions to a team.

A recent national employee satisfaction survey, two years after the last one, showed improvement across the board and the value points were well above average as compared to similar organisations.

What Does Organ-Based Mean?

A few years ago, our department adopted the title "Imaging Sciences" to better reflect the increasing variety of imaging done in our department and to emphasise that radiology is based on science and not just technique. More and more was imaging the central key, the 'spider in the web' of the diagnostic process. How do we stay on top of our game in this?

If we look at this evolution of Mr. Roentgen's creation from a helicopter-view perspective, we can break the medical professional side down into four categories of effort:

1. Communication and clinical practice support;
2. Image processing;
3. Decision support and knowledge delivery, and
4. Performance metrics.

Like businesses everywhere, in order to function as such, we must critically assess, check and, if needed, improve our processes. For imaging that means we must improve our customer (physician) service and the delivery of our product. Here at the URM, this refers to optimal, safe and timely imaging. What we are really doing is reinventing radiology in a digital age - and rightly so: Imaging is a fixed 'stop' in the care of both inpatients (each admission generates over four visits to our department) and outpatients and represents a sizeable profit centre for hospitals.

The best way for us to add the most value to our system and all of the departments that utilise our services is to do the appropriate studies at the most appropriate time, optimising throughput in each modality, and have the expert on each body section finalise a userfriendly report and useful images

as rapidly as possible. We are working on incorporating the Appropriateness Criteria of the ACR into the ordering process as well.

Faster Treatment Path

That patients receive a faster diagnosis, treatment and discharge is both good for the patient, our goal, and for URM, as an inpatient stay that exceeds medical necessity is very costly to the hospital. Our department, as noted earlier, switched from a modality-based (MR, CT, ultrasound, etc.) to organ systems-oriented (abdomen, chest, paediatrics, etc.) workflow to optimise each of these steps, from order to exam to final report.

Major academic medical centres across the world have made this shift in the past decade. This is not surprising as the imaging department is really an information manager. For example, localisation and guided intervention are done by the IR division of our department for a variety of specialties including neurosurgery, vascular surgery and oncology. Implant orientation, fracture healing, following the course of curvature of the back (scoliosis) as well as the management of bone tumours for the orthopaedic department is done by our MSK section, or, if pertaining to the paediatric age group, by the PEDS section.

Now, in addition to the traditional report, many specialties also need the images in planning the treatment of their patient. Neurosurgery or orthopaedics would like to have an imaging roadmap to the tumour, provided by imaging. Who in imaging provides those? At several institutions, a special unit has been set up to produce these specialised reconstructions off-line. It became clear that having radiographers, residents or faculty do this on the fly at the console or while dictating is too time-consuming and impedes workflow. We needed to address this issue here at URM and look at how this would affect the delivery of our product. Budgetary constraints so far have hampered this effort.

This focusing of expertise also extends into research programmes and teaching facilities as the amount of information has so exploded that it is impossible to learn our field in the traditional time allotted. For instance, instead of the traditional four-year residency, starting with this year's incoming first-year residents, the curriculum has a basic three-year core to acquire the basic knowledge and then has a two-year period to allow for super-specialisation. Thus, those who want to specialise in neuro imaging will not learn other parts of imaging as intensively, again a shift to better define the 'value added' in a specific subspecialty of imaging.

Playing an Active Role

Clinical decision support means that we take an active part in deciding what happens to the patient with regards to therapy through appropriate imaging and timely communication of the imaging findings.

There are many facets to this; the most important one is that we are visible and present when decisions on medical care are made. The digital age has made that more difficult: when the image was 'fuzzy' the clinician would travel to the radiology department to get educated. Currently, the image is looked at in the office or on the ward, and if the report is available and makes sense, no 'face time' between clinician and referring colleague is needed. There are many ways to try and re-create this contact. The overriding probable solution is to be there: a live voice on the phone, a faculty imager always reachable (officer-of-the-day), etc. In addition to the above, we have implemented a distinct emergency department radiology imaging section. Not only does it allow us to finalise a report with a faculty radiologist's signature within minutes after the image was obtained, it also gives the ED physicians immediate access to live specialty interpretation.

This dovetailed with the realisation obtained through feedback throughout the whole enterprise that we were frequently woefully late with our reports. For example, calling the ICU with the report that the endotracheal tube was wrongly positioned approximately six hours after this endotracheal tube had been placed, was counterproductive and reflected badly on our professionalism. This paradigm can

be extrapolated to pretty much any scenario where imaging is used.

Clearly, in acute patients, this means that we should give online decision support and thus deliver our knowledge minutes after the imaging has been concluded. It would also be nice if we were involved in planning the appropriate and most optimal study with the appropriate reasoning.

Hence our new officer-of-the-day (OOD) construct where we are physically present with our knowledge and imaging support from noon until the next morning 8:00 a.m. every day, traditionally the hours that most imaging is required in the emergency department, as well as when acute studies are requested by the rest of the hospital. This has been in place now since mid-2011. I can only report positive feedback!!

Measure what you Manage

How do we measure whether this new strategy is actually working? A well-known statement in business as well as in medicine is that 'you cannot manage what you cannot measure'. We have therefore set up a number of performance metrics that give us an idea as to how we are doing, but also warn us in real time fashion when correction and changes are required to meet our performance expectations. These include numbers with regard to scheduling, the performance of our procedures, as well as some QA issues, the most important one being critical findings.

The most noticeable improvements we have made recently are:

1. **Scheduling** - The number of no-shows per month, per modality were tracked and we set in place a system where the referring providers are notified that their patient has not shown for their appointment. Also, the patients that are scheduled for time and labour intensive studies such as IR are being called the day prior. We need more improvement here as compliance with ensuring every attempt has been made to contact the patients is low.
2. **Study performance** - We are also monitoring the time it takes from each study to go from I(ncomplete) to C(omplete) status, in other words, when the study is available for the radiologist to interpret. At this point, this metric is unsatisfactorily long but improving. Both our possibly outdated protocols, but also our technologists' less than optimal workflow might be the culprits here. The system does allow for better QA of the technologists' product: in the olden days we could track 're-takes'; in the digital age we cannot and thus must devise other ways such as time to completion and adherence to protocols.
3. **Workflow** - Our new ED coverage schedule has allowed us to look at the actual volume of studies that we do per modality from 8:00 a.m. to 12:00 noon, 12:00 noon to 5:00 p.m, 5:00 p.m. to 10:00 p.m. and from 10:00 p.m. to 8:00 a.m. in an 'acute' setting. The volume of completed, preliminary and final reports for these studies is also tracked and shows significant improvement already.
4. **Time** - We also measure the time it takes from order entry to completion of the study. Particularly in the ED this will help us avoid complaints about the imaging department being the reason for poor length-of-stay metrics in the ED. This is in progress.
5. **Critical findings** - Lastly, we look at how we manage the reporting of critical findings, for instance, pneumothorax or tube malplacement has to be reported within 30 minutes. Do we a) do that? and b) in a timely fashion so patient care is optimal? Our performance is within Joint Commission Standards, but there is room for improvement.

Conclusions

Most of these metrics, if not all, are visible for every person in this department via SharePoint, our new communication tool for the department. They are summarised in a so-called dashboard; this will give each section, each modality and each colleague insight into how we are doing, but also to see where he or she might be able to help in further improving these metrics. It is hoped that with timely advice, timely performance and timely interpretation imaging sciences has real, reproducible and reliable added value to achieving medicine of the highest order.

Published on : Mon, 30 Jul 2012