



Reducing Errant Ordered Radiology Exams

By Benjamin Duman and Patrick Martin

The credit earned from the Quick Credit™ test accompanying this article may be applied to the AHRA certified radiology administrator (CRA) operations management domain.



EXECUTIVE SUMMARY

- With grant funds, Providence Saint Patrick Hospital set out to reduce the occurrences of errant ordered radiology exams from clinicians. The goal was to also provide a tool that would assist in reducing unwarranted dose from diagnostic imaging modalities.
- An interactive web based utility for CT protocols was developed, which included ACR Appropriateness Criteria that was easy to use and maintain.
- The second stage of the program will be expanded to include more modalities, as well as to provide patients with a convenient source of information.

In an imaging department, incorrect exam orders contribute to increased costs to patients, staff, and a facility in terms of radiation dose, money, and time. With the increasing sophistication and technological advancements that continue to transform radiology, many clinicians can benefit from guidance regarding exactly what type of imaging study would best suit their patients. In 2009, Providence Saint Patrick Hospital in Missoula, MT was awarded the AHRA and Toshiba Putting Patients First grant. With the awarded funds, a program was initiated to improve the quality of the radiology exam ordering process.

Saint Patrick Hospital set out to create an interactive utility on the hospital intranet to provide ordering physicians and staff with detailed information on CT protocols with their indications and specific parameters. The goal was to assist physicians in ordering the most appropriate CT study and reduce the need for repeat studies and unnecessary high dose procedures.

Background

The entire project was based upon research previously conducted for a thesis on root causes of errant ordered

radiology exams.¹ The focus of the study was on a facility where there were documented “errant ordered” radiology exams from caregivers. They varied from no signature or date to incorrect ordered exam per the diagnosis. The technologists were recognizing these mistakes and would have to call the ordering caregiver’s office to rectify the order before the procedure could take place. These errant ordered exams caused problems for everyone involved. The patients had to wait for extended times while the order was resolved (delaying their diagnosis). The radiology department was not nearly as efficient as they could be because the technologist was attempting to resolve these mistakes. All of this time was spent resolving incorrect orders. Equally alarming were the exams that were ordered incorrectly and not recognized. If the incorrect exam was ordered (incorrect area of interest) and it wasn’t recognized until the ordering caregiver reviewed the results, the patient would have to come back for the correct exam. These were the errant ordered exams that we wanted to focus on because of the potential “double dose” of radiation.

In this research study, there were three possible solutions, two short term and one long term, that would reduce errant

ordered radiology exams. The first short term solution was a paper-based, quick reference sheet to assist the ordering caregiver in ordering the correct imaging exam. The second short term solution was a standardized radiology order form in both format and nomenclature, regardless of hospital location (ED, ICU). The third solution, a long term option, was to create a software utility that would incorporate the use of the quick reference sheets in a digital format that would standardize radiology orders across all concerned personnel and allow physicians to select the proper exam based on the results of the electronic, quick reference utility. It was during this time, as well, that reports were beginning to surface about excessive dose from modalities in radiology departments throughout the United States.² Specifically, The Joint Commission had recently issued a Sentinel Event Alert (Issue 47, August 24, 2011) regarding the radiation risks of diagnostic imaging.³ This, along with the grant offering and funds, allowed Saint Patrick Hospital to pursue a similar web based solution to address its own issues with errant orders. As a healthcare provider, we wanted to provide our ordering caregivers a tool that helped them order the correct exam type the first time. This tool would not only provide them site specific CT protocols, it would also give them the option of using the ACR Appropriateness Criteria to select other radiology modalities, such as ultrasound or MRI, if their patient had consecutive CTs.

To begin creating the tool, we met with multiple third party web developers over a three month period. We talked about the vision for how the website should look and how it was imperative the site be easy to use. After speaking with different web developers, one was selected that both complied with our budget as well as understood the requirements for a fully functional website. After choosing the final developer, there was a series of meetings that comprised beta versions of the website that were continuously modified and changed based on the oversight of a radiologist.

Once the look and feel of the site was right, site specific CT protocols needed to be built and data mining of the ACR Appropriateness Criteria needed to take place for inclusion in the tool. The ACR data mining proved to be fairly effortless. The CT protocols, on the other hand, required hours of build time. With the assistance of two students who were fulfilling their required clinical hours as radiology technologists at the hospital, all of the major site specific CT protocols were completed. Although the entire process of building the CT protocols took a great deal of time, the payoff for the students was great because they were involved in an atypical learning experience. They were also reimbursed for their extracurricular time with funds from the grant.

After two years of meetings, data collecting and design, and approximately \$3500, a fully functional interactive utility was created that serves as an easy to use job aid. Not only did this utility have to be easy to use and understand, it had to be 100% correct in content. It was also imperative to be easy to amend as new protocols and exams surfaced.

Results

The interactive utility on the intranet (Figure 1) has allowed Saint Patrick Hospital to take a proactive approach in addressing an industry wide issue in assisting physicians that have access to the hospital's intranet (eg, ED physicians and hospitalists) to order the most appropriate CT study and reduce the need for repeat studies and unnecessary high dose procedures. The website also utilizes a search function that integrates the resources of the ACR Appropriateness Criteria.

Although Saint Patrick Hospital has invested in dose reduction programs for CT exams, patient doses are being reduced further by making the exam order requests more specific with the addition of the interactive website. Because CT studies are acquired only for the area needed to accurately satisfy the study goals, the unnecessary dose from radiation used to obtain irrelevant information is avoided. The lead CT technologist is impressed with the website and feels that it is a very useful job aid for ordering clinicians. "I am most impressed with

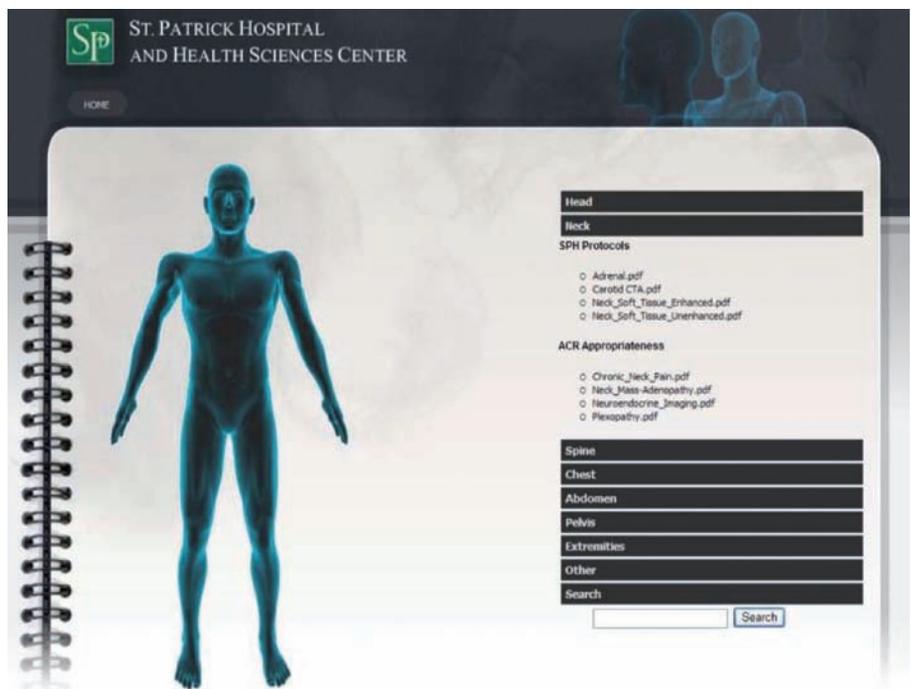


Figure 1 • Screen Shot of Web Based Utility.

this site and I think it will be a useful tool for clinicians to direct them to appropriate exams. I like that each exam gives indications for ordering the exam as well as listing the protocol, describing the coverage on the body and then, too, it gives the format in how the exam is displayed on PACS (Figure 2). I also like the section on the ACR appropriateness for an exam to direct clinicians to the best exam to evaluate a specific diagnosis.”

Another component of the utility is that the user is made aware of the information needed by the radiologists, radiologic technologists, and schedulers to accurately send and obtain the most useful test. This has started the process of standardizing the radiology study ordering form such that orders are unambiguous, the proper procedure is requested for a given diagnosis, and any specific details such as contrast, patient orientation, or imaging parameters are addressed. The utility has been designed to function as a job aid for all key stakeholders involved in the radiology exam order process.

The appeal of using a web based utility has been its flexibility and scalability. Hosting the utility on a single server allows for very tight control over the quality of the content. Changes to the site can be approved by a group which includes a radiologist, radiology administrator, and a medical physicist. In addition, a web based utility can be implemented over a network as large as one would like, from a department in a hospital to a system of hospitals. By providing a single point of content manipulation and a stringent approval process, quality, consistency, and compliance across the entire hospital system has been ensured.

Next Steps

For now, the focus has been on CT exams for both adults and children. However,

time and money are the only obstacles to extending the scope of the utility to include other imaging modalities. All of the data on the utility is generated and updated with information provided by the ACR and hospital radiologists as well as feedback from ordering caregivers and hospital staff.

At Providence Saint Patrick, the next step in this project will be to expand the intranet website with more useful information for providers as well as to create a website with information targeted toward a general patient population. After all, part of the impetus for this was the Sentinel Event Alert issued by The Joint Commission regarding the radiation risks of diagnostic imaging. After careful review of this alert and the issues that it discusses, we can address many of the issues with exactly the kind of website utility that has been created for CT studies. The Joint Commission has made it clear that it is the responsibility of a hospital to eliminate avoidable radiation to patients by using the right test, with the right dose, in the most effective process possible. We hope to provide solutions to the following problems discussed in The Joint Commission Sentinel Alert, including:

1. Establishing a comprehensive patient safety program, including education about dosing in imaging departments.
2. Create awareness of the potential dangers from diagnostic radiation among organizational leadership, hospital staff, and patients.
3. Create adequate awareness among physicians and other clinicians about the levels of radiation typically used and related risks.
4. Provide guidance in the appropriate use of potentially dangerous procedures and equipment.
5. Provide knowledge regarding typical doses.

6. Create clear protocols that identify the maximum dose for each type of study.
7. Foster communication among clinicians, medical physicists, technologists, and staff.
8. In order to reduce the exposure of the patient to ionizing radiation, use other imaging techniques, such as ultrasound or MRI, whenever these tests will produce the required diagnostic information at a similar quality level.
9. Ensure all physicians and technologists who prescribe diagnostic radiation or use diagnostic radiation equipment receive dosing education and are trained on the specific model of equipment being used. Institute a process for annual education, review, and competency testing.

This second stage of the program will begin by fleshing out a more comprehensive web resource with content drawn from reliable and well regarded sources such as the ACR as well as content specific to Saint Patrick Hospital based on contributions from the radiologists, radiation safety committee, and other staff. The expanded web utility will be a one stop clinical resource to provide information regarding not only our radiology department but also regarding medical imaging in general. We will have two major goals. The first goal will be to provide information that will allow providers to make more informed imaging decisions and thus maximize the medical benefit of an imaging study while minimizing the risks and expenses to patients. The second goal will be to provide patients with a convenient source of information that will answer any questions or concerns they may have. A computer kiosk hosting this utility will be available in all the radiology waiting areas.

Conclusion

Although quantifiable data has not yet been abstracted based on the effects of the web utility, it is our hope that since implementing this program patient

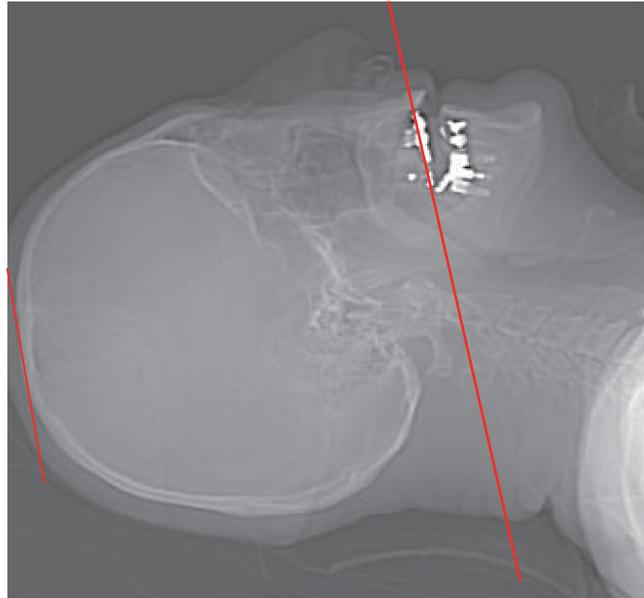
The appeal of using a web based utility has been its flexibility and scalability. Hosting the utility on a single server allows for very tight control over the quality of the content.

HEAD

Indications Enhanced: Tumor, Infection, Staging Neoplasm

Prep: Npo except water 3 hrs if contrast (unless exam is deemed emergent)

Contrast: IV: 1 per second for 100ccs. if ordered



Acquisitions:

<i>Enhanced:</i> if ordered		<i>Coverage:</i> Mid C2 thru vertex		<i>Scan delay:</i> 5 minutes
<i>PACS name</i>	<i>Plane</i>	<i>Thickness/spacing (mm)</i>	<i>Algorithm</i>	<i>Window/level</i>
Axial enhanced	axial	2.5/2.5	standard	80/40

Dose Estimate*:

<i>DLP (mGy*cm)</i>	<i>Effective Dose (mSv)</i>	<i>Approximate Background Radiation Equivalent (yr)</i>
707	1.5	0.5

*Scan dose is given assuming no change to scan techniques, an adult patient, and an average annual background radiation level from natural sources of 3 mSv. The actual dose to the patient will vary.

Notes: Multidetector CT acquisitions obtained thru the cranium (before and after iv contrast). Axial 2.5 mm reconstructions.

Figure 2 • Site Specific CT Protocol.

radiation exposure has been reduced by preventing the need for repeat studies and by making the clinicians aware of equally effective, but less dose intensive, exams that they may not have been aware of. These feelings are shared by a radiologist at Providence Saint Patrick Hospital: “The referring clinician

is well aware of the region of interest but often doesn’t know the protocol for maximizing the amount of practical data from the examination. The website will enable them to choose the correct protocol for a specified diagnosis at least 90% of the time. This will lead to lower costs and more efficient utilization. This

will benefit the referring clinician and the technology team and interpreting physician.”

The entire project consumed many hours of build and rebuild based on input from staff and radiologists, but in the end the final product is one that we were, and continue to be, proud of. 🌟

References

¹Duman BD, Chyung SY, Villachica SW, Winiecki D. Root causes of errant ordered radiology exams: results of a needs assessment. *Performance Improvement*. 2011;50(1):17–24. Available at: <http://onlinelibrary.wiley.com/doi/10.1002/pfi.20192/pdf>. Accessed November 29, 2011.

²Steenhuysen J. FDA pushes to make CT diagnostic scans safer. Reuters. November 9, 2010. Available at: <http://www.reuters.com/article/2010/11/09/us-radiation-exposure-fda-idUSTRE6A84JW20101109>. Accessed November 29, 2011.

³The Joint Commission. Radiation risks of diagnostic imaging. *Sentinel Event Alert*. Issue 47, August 24, 2011. Available at: http://www.jointcommission.org/assets/1/18/SEA_471.PDF.

Benjamin Duman holds a master of science degree in instructional and performance technology from Boise State University. He currently works as a senior biomedical technician at Providence Saint Patrick Hospital and can be contacted at BDuman@saintpatrick.org.

Patrick Martin holds a master of science degree in medical physics from the University of Wisconsin. He currently works as medical physicist at Providence Saint Patrick Hospital and can be contacted at PMartin@saintpatrick.org.

ahra

the association for medical imaging management

Industry News Blog

Aggregating the latest medical imaging management news and research.

ahraindustrynews.wordpress.com

Use your smartphone to scan the tag to the right after downloading the free app at gettag.mobi.

Try it!

The tag will bring you to the AHRA Industry News website.

