

## Case Study: Sharpening the Tools

**Advocate Lutheran General Hospital deploys cutting-edge technologies to manage contrast and radiation dose to enhance patient safety.**

By Amena Hassan

### Key Takeaways:

- Advocate Lutheran General Hospital (ALGH), part of Advocate Health Care, has successfully adopted advanced analytics tools for managing IV contrast and radiation dose.
- Through a dose management quality improvement project, ALGH focuses on patient safety, image quality, staff education, and data-driven results to enhance clinical outcomes.
- ALGH will report data to the Dose Index Registry with their newest technology for dose reduction, using servers that will link to ACR's database.

In 2008-2009, hundreds of patients in the U.S. were overexposed to ionizing radiation from CT brain perfusion scans. Learning of this, Advocate Health Care, Illinois' largest health care system, took immediate proactive measures by evaluating and deploying advanced technologies for managing radiation dose throughout the enterprise to enhance patient safety and quality. As a premier Level I trauma center in the western suburbs of Chicago, Advocate Lutheran General Hospital (ALGH), a member of Advocate Health Care, felt it was their responsibility to implement state-of-the-art diagnostic imaging innovations. Incorporating electronic analytics tools is the mainstay of advanced cross-sectional imaging.

In 2011, ALGH implemented computer-assisted CT delivery software for IV contrast. They deployed the Certegra Informatics Platform® with P3T® (Bayer Healthcare) to calculate the appropriate dose by computing custom injection protocols based on patient weight. This automated algorithm minimizes dose and contrast use while maximizing attenuation of the target vessels. In 2012, GE Healthcare and Advocate Health Care collaborated to launch a system-wide radiation dose reduction initiative utilizing GE DoseWatch™, a management tool to measure, track, and optimize patient radiation dose over time.

These tools facilitate both quantitative and qualitative analyses of how patients are imaged. They form the bedrock for ongoing quality improvement and enhanced patient safety and are completely integrated into the hospital's workflow. At ALGH, the tools have proven invaluable in objectively evaluating performance metrics through regular internal auditing. In the case of radiation dose, external auditing is facilitated by submitting data to the ACR's Dose Index Registry (DIR) for evaluation against national benchmarks.

### Calculating Contrast

According to Lisa Laurent, MD, MBA, CT medical director at ALGH and chair of the CT medical directors



at Advocate Health Care, "One of the most helpful, relevant, and pragmatic applications for the Certegra informatics platform was point-of-care documentation. This provided us with accurate, reliable, and objective information rather than surrogate or anecdotal data. By being able to identify and analyze what was done at any point along the timeline of performing a CT, we were able to troubleshoot quality, safety, efficiency, and process improvement opportunities across all shifts."

This methodology was the framework for training technologists, monitoring compliance, and facilitating continued performance improvement in using the new P3T technology. "Rather than relying on conjecture, we had factual information," Laurent emphasizes. "We provided that data to the staff in a non-punitive, supportive environment that promoted increased awareness and engagement."

The breadth of data mining capabilities also included analyzing repeat exam rate and the effect of flow rates and pressures on target vessel enhancement. The latter

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is particularly helpful when educating medical, nursing, and house staff about the necessity of using the lowest gauge needle possible to deliver IV contrast at the highest flow rate possible to maximize target vessel enhancement (thereby producing the highest quality image possible).

Certegra also links radiologists to the hospital's PACS. "The informatics platform shows us what happens, when, and by whom — from the time a patient enters the CT suite to the moment the patient is discharged from the department," Laurent states. "I can tell you exactly how much IV contrast was given and why as well as the effect that it had. Then I can compare that to the image quality. So it really is a revolutionary way to help our patients."

### Tracking Dose

Just as integral to quality patient care at ALGH, the DoseWatch analytics tool is an invaluable resource to monitor, track, and optimize dose. DoseWatch automatically sends alerts when dose parameters exceed established thresholds; limits can be set manually or automatically according to a practice's procedure guidelines and Diagnostic Reference Levels. It provides a mechanism by which technologists and radiologists alike can re-think the significance of ionizing radiation in daily practice.

During two weeks of focused dose assessment and protocol optimization activities, the team was able to personally witness the effects of modifying variables that directly affect CTDIvol. "Radiologist, technologist, and applications specialist — standing side-by-side at the scanner tweaking protocols to see how changes could impact dose — that was a powerful learning experience," says Laurent. "It is more impactful than any classroom didactic lecture, because it makes the physics of radiation dose analysis real and relevant. And it helps all of us approach radiation dose reduction strategy in a more meaningful way."

As part of the intensive two-week session, randomly selected technologists took a 59-question radiation dose *self-assessment test*. They graded themselves on topics spanning radiation physics, dose management, and patient safety. The team matched their scores against the assessment of the applications specialist to identify strengths and opportunities for improvement. "We presented results anonymously and in a supportive fashion, so the technologists felt very comfortable," explains Laurent. "It was purely

educational and part of the process to learn and reinforce concepts. We realize that the test should not be viewed as a one-time exercise, but as a foundation for ongoing awareness, healthy dialog, and productive feedback."

### Linking with the DIR

ALGH is the first hospital in the U.S. and Puerto Rico to undergo dose assessment and protocol optimization using DoseWatch. It is using the analytics tool to report CT data to the DIR to gauge institutional outcomes against national benchmarks. The team is using this initiative to establish a *Dose Management Quality Improvement Project (QIP)*.

DoseWatch calculates dose from archived images to build a historical database. All studies performed are transferred from the DoseWatch servers to the DIR database using the ACR TRIAD™ system for seamless exchange of images and data. There is no manual sending of information at any step of the process. "It's important not only to compare our data to national standards, but to perform periodic auditing within our own department to conduct comparisons of dose among all of our facilities," says Laurent.

With these solutions in place for assessing radiation and contrast dose, ALGH is fast becoming an example of how large hospitals can implement cutting-edge imaging tools effectively, while continuously prioritizing quality and safety.

### Next Steps

Radiology practices that want to follow ALGH's lead in implementing advanced contrast management and dose reduction solutions should:

- Establish a team comprising a physician representative, CT technologist, departmental manager, physicist, and vendor support.
- Be fully prepared before linking with the ACR DIR by determining software compatibility and the steps required to correctly report CT dose data.
- Utilize assessment tools to bridge the gap between perceived and actual staff knowledge of software applications.
- Spread the word. Assemble leaders and key stakeholders who are involved with ionizing radiation.

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### Join the Discussion

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Have a case study idea you'd like to share with the radiology community? Please submit your idea to <http://bit.ly/CaseStudyForm>



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