Improvement Beyond Dose Standards
Analytics and Interventions to Optimize Imaging Quality and Patient Safety

Computed tomography (CT) and magnetic resonance imaging volume has more than tripled in the past 30 years, enabling faster and more accurate diagnoses, reduced need for surgeries, fewer hospital admissions and faster patient throughput. Along with these advances has come scrutiny from regulators, the media and the public. Even with a small perceived risk to most individuals, the magnitude of CT utilization raises concerns.

One byproduct of this focus has been a call for accountability for both the frequency of medical imaging examinations involving ionizing radiation and the magnitude of the dose exposure. As a result, programmatic radiation dose monitoring has emerged as a valuable tool to understand, manage and mitigate dose concerns.

Some fast facts on CT
- CT is responsible for 25% of the U.S. per capita radiation from all sources, including background radiation.
- The threshold for and potential magnitude of risks for cancer from low-level radiation are the subject of much dispute in the scientific community.
- Studies have found as many as 4% of patients may be receiving too large a radiation dose from CT.
- Up to about 10% of all CT examinations are performed in children; the National Institutes of Health has found a correlation between CT scans in children and their subsequent risk of developing cancers.
Would your organization pass an audit today regarding The Joint Commission’s Radiation Dose Standards?

- Document and track dose
- Manage your protocols
- Set reference levels
- Identify outliers
- Benchmark performance

**THE RISKS**

1. Patient safety
2. Lose accreditation status
3. Financial penalties

Optimizing Protocols and Addressing Outliers

**Imaging Excellence Goals**

- Safety
- Compliance
- Quality of Care
- ROI

Imalogix helps organizations easily meet The Joint Commission’s diagnostic imaging requirements, which took effect in 2015, and provides the infrastructure of advanced analytics to help systematically reduce dose exposure to improve patient safety.

<table>
<thead>
<tr>
<th>ELEMENT OF PERFORMANCE</th>
<th>REQUIREMENT</th>
<th>IMALOGIX PREMIUM EDITION</th>
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<tbody>
<tr>
<td>PC.01.02.15 C5</td>
<td>Document the CTDI, DLP or SSDE in a retrievable format</td>
<td>Includes a full suite of dose calculations</td>
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</tbody>
</table>
| PC.01.03.01 A25         | Establish CT protocols based on current standards of practice including:  
  • Clinical indication  
  • Contrast administration  
  • Patient age (pediatric vs. adult)  
  • Patient size and body habitus  
  • Expected radiation dose index range | Review of protocols to ensure they address key criteria identified by TJC and are being performed appropriately  
Guidance on establishing expected dose index ranges |
| PC.01.03.01 A26         | CT protocols are reviewed with input from:  
  • Interpreting radiologist  
  • Medical physicist  
  • Lead imaging technologist | Review of protocols including:  
  • Percent alerts by protocol  
  • Comparison of doses to external benchmarks |
| PI.02.01.01 A6          | Review incidents where the radiation dose index exceeded the expected range and compare to external benchmarks | Oversight and review of cases that exceeded expected dose index ranges |
Analytics for actionable insights

Imalogix goes beyond dose tracking. Its software platform enables actionable insights, with a dashboard (see graphic) to compare dose trends, identify outlier conditions and map protocol performance. Analytics help drive consistent image quality from room to room, across shifts and facilities.

Imalogix uses proprietary algorithms that normalize data across the enterprise, creating the ability to effectively compare protocols and establish thresholds for performance metrics and dose reference levels. It can compare these values internally or against national averages and trends. It normalizes protocols across devices. The system generates automated alerts when established guidelines aren’t followed.

The software platform helps providers understand different techniques and operational procedures and workflows that affect the quality of the images. For example, if a patient is not optimally centered in a CT scanner, automatic exposure control will not perform optimally. By some estimates, being off center by just a few centimeters can cause a 40 percent shift in radiation dose output and dramatically affect image quality. By reading many parameters from thousands of studies, Imalogix will let a client know which technologists need more training.

The software also helps meet some state standards. California requires facilities to record an estimate of diagnostic CT dose on the patient report for every CT examination, and reports must be made when established thresholds are exceeded. Texas requires description of methods used and recording of specific dose estimation data, review of data by protocol review committees using recommended standards and reporting of doses that exceed established thresholds.

Such solutions help bring scientific rigor and automation to an area of medicine that needs it. Even the term “dose” in CT is something of a misnomer. Over the years, various metrics of radiation burden have been put forth. The most commonly implemented metric is volume CT dose index (CTDI), which reflects the radiation output of a CT system in units of dose to a standard-sized object, but fails to represent all protocols or fully account for individual patient attributes such as differences in body size that can lead to as much as a tenfold difference in dose. Dose length product (DLP) is the CTDI volume measured by length of the slice.

Size-specific dose estimate (SSDE) attempts to address the size issue, but shares CTDI’s issue of not accounting for body shape, organ location and orientation, tissue composition, scan range variability and tube current modulation.

Best Practices

1. Integrated medical physicist support
2. Establish a Clinical Dose Optimization Committee
3. Counsel on expected dose ranges and alert levels
4. Consultation in optimization of imaging protocols
5. Monitoring by physicist of dose tracking and quick response to alerts
6. Benchmarking your site against national standards

Imalogix is alone in that its Premium Edition includes support from leading medical physicists. They help clients understand how to manage change in processes and how to address outliers.
Speed of implementation, ease of use

Aria-Jefferson Health, the largest care provider in northeast Philadelphia, selected Imalogix as its dose tracking solution and has been live since January 2016. As a result, it has been able to change protocols on several systems and lower dose system-wide on seven scanners (six CTs and one PET/CT) located across five locations.

“The user interface was a distinguishing factor in our decision to go with Imalogix. It was a clear winner as we looked at multiple dose tracking solutions,” says Dr. Richard Beck, section head, CT imaging, diagnostic imaging at Aria.

The implementation process was streamlined, fast and simple for Aria. “It was a seamless experience that was quick and flawless, and it did not impact our daily workflow — everything happened in the background,” says Dr. Beck. Once Imalogix was installed, Dr. Beck and his team determined the appropriate thresholds, gathered benchmarking data and defined their internal policies. It took only eight weeks for Aria to meet Joint Commission compliance and to roll out its dose monitoring program across the organization.

“Immediately we could see what studies were in-line or not, allowing us to focus in on the protocols that had issues. Without the data from Imalogix, I would have never known that it was even necessary,” says Dr. Beck.

Aria’s CT fleet is standardized across one manufacturer, but each system is different in its age, model or software version. Those machine variances can make it difficult to assess performance. Imalogix is vendor-agnostic and can readily handle data from all scanner models. The system automatically normalizes the variances so that direct comparisons across the fleet can be made. “Without Imalogix, you would never know you made a mistake when inputting a protocol and that a change was necessary once the protocol was loaded,” says Dr. Beck.

Imalogix provides tangible data that allows Aria-Jefferson to quickly identify which technologists may not be following protocol as result of a system alert and to add staff to the busier scanners to maximize productivity. “With the system alerts, I have a tool that allows me to have an immediate conversation with my team to determine why a protocol may have been changed, or to determine the root cause of an issue,” says CT Supervisor Bridget Downey.