

Beyond Compliance: Dose Management for Meaningful Change

Healthcare organizations are tasked with optimizing pre- and post-scan processes in the imaging workflow to drive improved clinical excellence. This starts with a comprehensive dose management program; focusing on increasing compliance rigor, optimizing patient dose and raising the performance of clinical staff.

Rising awareness around patient radiation exposure has led to increasing compliance aimed at enforcing dose efficiency. Europe has seen an increased focus on promoting the appropriateness of radiological imaging, using the right level of dose, and using up-to-date equipment with built-in dose monitoring technology. In the United States, there are national guidelines for monitoring and recording patient exposure, and several states require tracking of CT dose.

Such regulations are important steps forward, and compliance can be achieved through basic point solutions. However, according to the independent industry analysts at Frost & Sullivan, building a quality dose management program goes well beyond complying with today's regulatory requirements. "A real quality

system requires a holistic view of radiation exposure across multi-facility, multi-modality, and multi-vendor imaging environments. The solution must allow assessing, benchmarking and improving the dose performance of the healthcare enterprise as a whole, essentially supporting a full-fledged enterprise dose management program," said Michelle Reich, analyst with Frost & Sullivan and author of the firm's new [Best Practices Research Report](#) for dose management solutions. An ecosystem of data surrounds the medical devices involved during or after an imaging procedure. Automating the collection of this data, and using analytics to draw insights allows organizations to better manage clinical quality and safety.

But, no two healthcare systems are alike. Every system is at a different stage of understanding and prioritizing their dose management strategy. Here are a few examples of what healthcare organizations are doing to manage dose across their enterprise.



Kaiser Permanente Hawaii Division

“Dose management is important,” says the director of diagnostic imaging for the Hawaii Division of Kaiser Permanente. “We believe that if we can make meaningful change that truly reduces necessary dose, then we can sleep better at night, knowing we’ve done the right thing.”

For years, technologists have been collecting and calculating dose data from exams and sharing it with radiologists for inclusion in reports. Cumulative patient dose data was made available in the electronic medical record. But the Hawaii Division of Kaiser Permanente wanted to go beyond tracking dose and begin benchmarking dose data between facilities in the region and against other divisions in the Kaiser Permanente network.

To that end, the Hawaii Division of Kaiser Permanente started with a day-long Dose Management Design Workshop that included all key stakeholders in the division. This session helped the team create a dose management culture, vision and an outcomes-based roadmap to drive change. Collectively deciding how to assess the dose data from DoseWatch™, how to determine what is normal, what is appropriate and what is an outlier.

“GE led a productive discussion. It was successful in getting our thinking on track. Everyone came to the table with their own perspectives on what dose management means. The session helped get us all get on the same page in terms of what success looks like and come to some decisions on how to approach identifying dose targets.” (see figure 1)

The Dose Management Program at Kaiser Permanente Hawaii Division is broken down into several elements of their continuous quality improvement program:

Study Dose	Cumul. Dose	Clinical info	Image Quality	Date & Time	Name & Sex	Patient ID	Age	BMI	Contrast
⚠️	○		●	2015-07-30 17:08	DW-Demo Thin-SSDE, GE CT Class 4 (F)	HVH_51099492176	15	17.99	XENETIX 300, 100.00 mL
⚠️	○	⚠️	●	2015-07-30 11:48	DW-Demo Fat-SSDE, GE CT Class 4 (F)	HVH_51141462262	78	38.57	VISIPAQUE 270, 90.00 mL
○	○		●	2015-07-30 10:35	BernardGE, N.,	HVH_41801383857	78	23.15	IOMERON 300, 90.00 mL
○	○		●	2015-07-30 10:17	SmithGE, K.,	HVH_31959864280	67	90.00	VISIPAQUE 320, 92.00 mL
⚠️	○		●	2015-07-30 09:08	WilliamsGE, C.,	HVH_4152941362	56	42.92	OMNIPAQUE 300, 120.00 mL

Figure 1. DoseWatch displays a worklist for each modality with planned exams including patient information, irradiation history and notifications if the previous number of exams and/or the cumulative dose for the patient exceeds predefined thresholds.

1. Establish a dose team and strategy across the division
2. Leverage automated dose monitoring and analytics
 - o To justify changing protocols
 - o To change staff behaviors
 - o To set dose targets
 - o To eliminate outliers (see figure 2)
3. Implement the University of Wisconsin Dose Optimized Protocols
4. Benchmark practices against the rest of the Kaiser Permanente Network

One critical next step is to determine how to set dose targets for the various exams. “If we’re using the same dose monitoring program and basically the same imaging devices, and we’re using the same dose targets, then the only thing that separates us is our operational workflow and practices. So benchmarking can help identify where we’re different and identify best practices that we can model.”

“GE’s support has been pivotal in getting us on track toward our end state for dose management. Their team did a great job of helping us understand the benefits and showing us what this tool could potentially do for us. It’s about the guidance they provided, facilitating discussion on how to best use the dose management program to achieve our desired end state.”

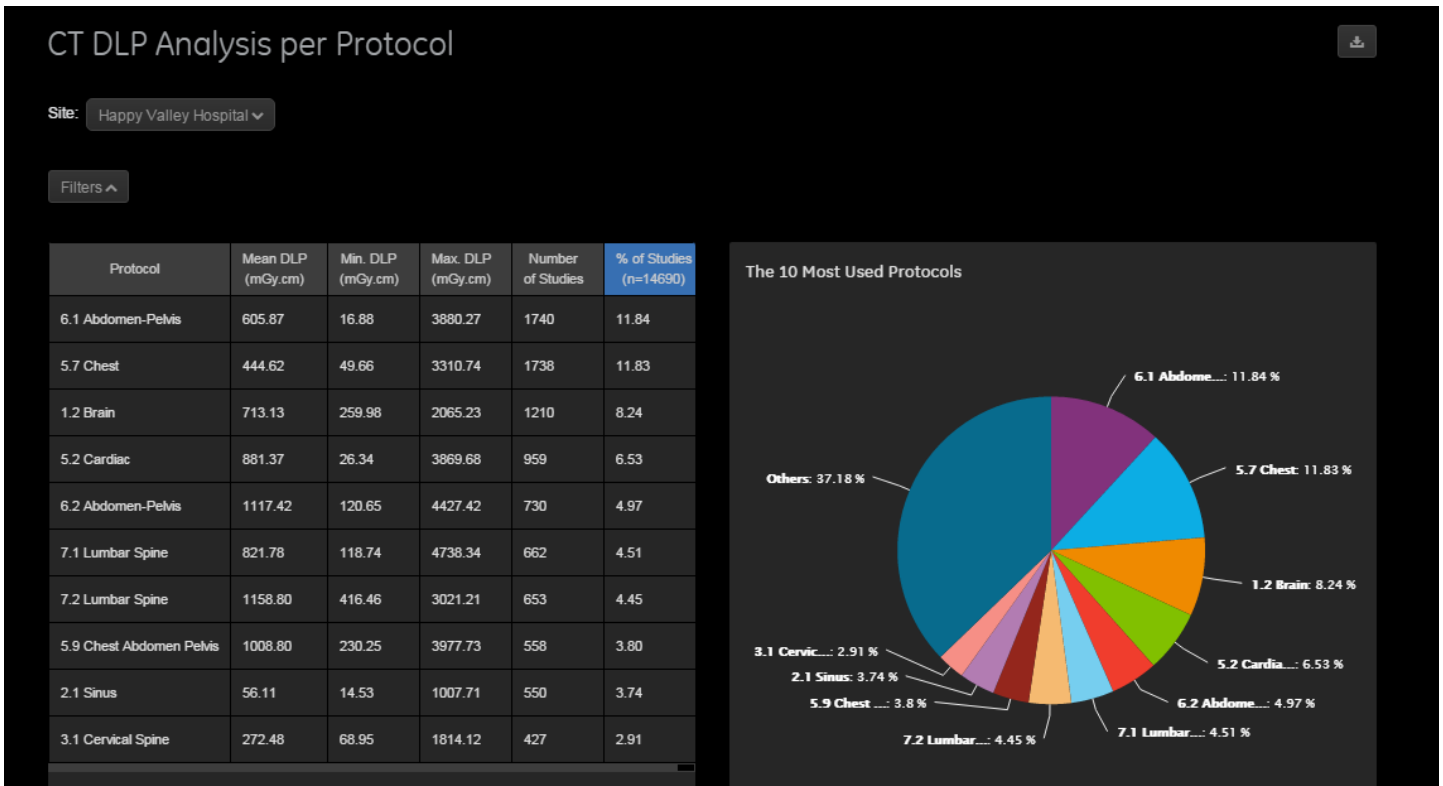


Figure 2. Analyze dose trends based on protocols, procedures, device and sites to help eliminate outliers.

About Kaiser Permanente Hawaii Division

Kaiser Permanente Hawaii cares for its' 229,000 members at their 235-bed medical center in Honolulu, 18 outpatient clinics on

the islands of Oahu, Hawaii, and Maui, and through independent primary care providers on Kauai, Lanai, and Molokai. All facilities are supported by their regional offices, located in Honolulu.

Salem Health

"At Salem Health (SH), our top priority is the patient. State of the art equipment and low dose practices are already in place at SH, but we wanted to take our dose management even further. We are building a culture around managing dose for radiology and cardiology procedures. With DoseWatch, we can really do some great work" said Anna Mench, Ph.D., Diagnostic Imaging Physicist. "Our journey with DoseWatch is just beginning, but we have already implemented the software in many ways to best serve our patients." Salem Health's program is leveraging GE Healthcare's Dose Management portfolio of solutions to build their strategy focusing first on dose monitoring and analytics with DoseWatch and then expanding with the Dose Excellence Program. Salem Health's dose management program is focused on several projects to actively manage dose and improve patient care.

Cardiovascular/Interventional Peak Skin Dose Tracking

Salem Health monitors skin dose for all patients undergoing cardiovascular and interventional procedures. DoseWatch facilitates the identification of patients with cumulative doses over 5Gy. The quality control tools such as the dose overlap map and procedure details (table height) provide information that can be helpful when calculating skin dose.

Lung Cancer and CT Dose Index Registries

Salem Health joined the Lung Cancer Screening Registry (LCSR) and the CT Dose Index Registry (DIR) in 2015. DoseWatch has been instrumental in the management of data for both of these registries. It has been configured to automatically push the RadLex mapped studies to the CT DIR. It also offers an easy to use interface for non-clinical staff managing the lung cancer screening entries. Staff are able to quickly pull relevant data from one screen.

CT High Level Study Review

CT studies that exceed dose alert levels must be tracked and reviewed. DoseWatch provides straightforward tracking and tools such as SSDE view (see figure 3) and quality control, which allow the user to determine a plausible reason for the elevated dose. Additionally, we are able to pick up on trends of consistent alerts, and adjust our practices almost immediately.

Hospital-wide Quality and Safety Improvement Projects

Salem Health employees are consistently engaged in quality improvement projects. Most recently, their CT department has begun an initiative to reduce CT doses by 10-20% across all scanners and all protocols, where feasible. The CT Lead Technologist uses DoseWatch to track clinical outcomes of protocol adjustments.

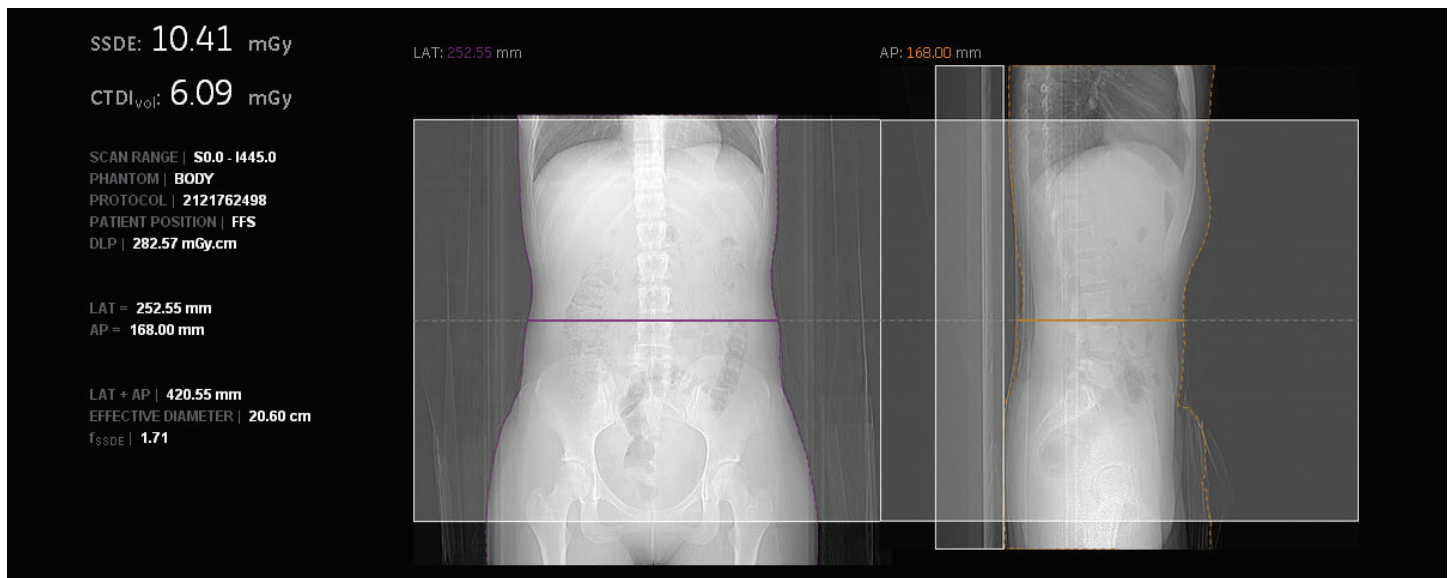


Figure 3. mA modulation: DoseWatch displays on a scout the patient's density and the mA level by slice.

About Salem Health

Salem Health is a community-based, not-for-profit institution for Oregon's Willamette Valley. Made up of the main campus in Salem, Salem Health West Valley in Dallas, Willamette Health Partners, and other clinics and services. Salem Health's Salem hospital is one of the largest of Oregon's 62 acute care hospitals and operates

the busiest emergency department in Oregon. It is a not-for-profit hospital, licensed for 454 acute-care beds. The hospital is the Salem's largest private employer, with approximately 3,900 employees and 673 practitioners and an additional 76 at Salem Health West Valley. More than 460 people provide nonmedical support as volunteers.

Affidea

Affidea, the biggest independent provider of advanced diagnostic imaging services in Europe, believes a cornerstone to becoming the biggest global brand for diagnostic imaging and cancer care is introducing practices that are standardized, unified and optimized. This isn't easy given the number of geographies it operates in and the amount of data it accrues.

"As far as we know, the Affidea dose excellence program is the largest dose optimization program of its kind," said Rowland Illing, Chief Medical Officer with Affidea. The foundation of this program was its initial cooperation with GE Healthcare in 2012 on the DoseWatch analytics platform. Today, Affidea's dose excellence program centralizes and analyses data from 65,000 CT scans each month.

"GE Healthcare had the foresight of making the platform vendor neutral, meaning that we are able to compare dose data between different models of CT and different manufacturers using different dose reduction algorithms," said Illing. (see figure 4)

However, before this takes place they have to be certain that they are comparing 'like with like'. There are no pan-European standards currently available, so Affidea had to develop their own standardized CT protocols. They have also created standard operating procedures and guidelines for the comprehensive implementation of the program.

Affidea's dose management program is a continuous quality improvement process focused on two paths managing dose and standardizing protocols:

Managing Dose

1. Transform dose awareness from an act to habit
2. Track, record and analyze dosimetric data and more
3. Provide comprehensive education on the insights
4. Justify and minimize high-level dose examinations

Standardizing Protocols

1. Unify and optimize protocols and practice
2. Promote and implement best practices
3. Promote scientific presence
4. Create CT protocols and guidelines

Despite the focus on standardization and unification of pathways and processes, Affidea does not forget that medicine remains an art, and that to have a truly patient-centered approach there must be nuances in delivery of care. "We have shown that with the correct processes, standards and engagement with staff, it is possible to take an analytic tool and make it a powerful agent for change," said Illing.

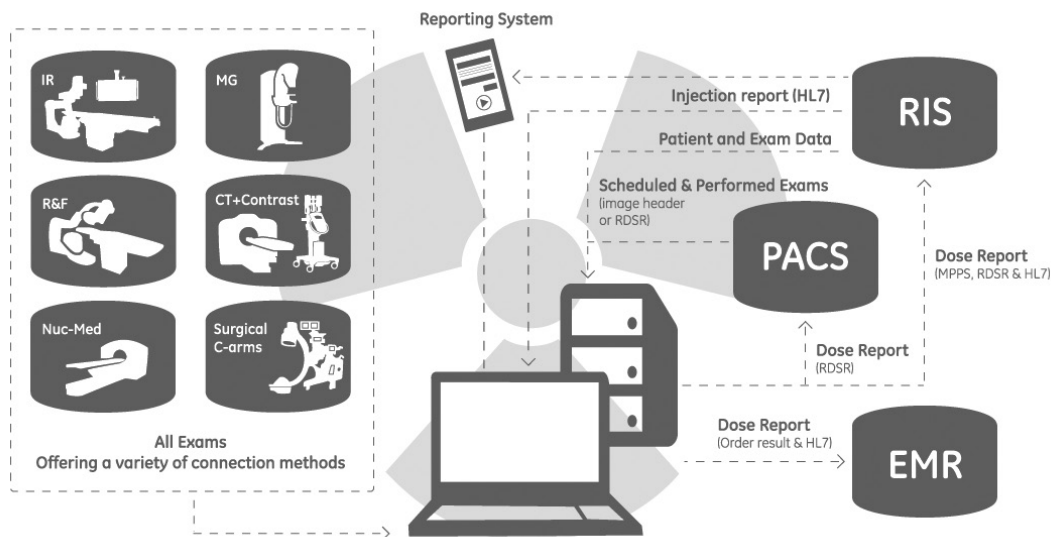


Figure 4. DoseWatch is an enterprise-wide dose management solution designed to automatically collect and analyze patient radiation across multi-facility, multi-modality, and multi-vendor imaging environments.

About Affidea

As the biggest independent provider of advanced diagnostic imaging services in Europe, Affidea owns and operates 170 medical centers and grows at a rate of (on average) one new center every fortnight. As the company evolves, owners Waypoint Capital want

to turn it into the biggest global brand for diagnostic imaging and cancer care. The cornerstone of doing this is to introduce practices that are standardized, unified and optimized, but that respect local cultures and remain patient centric.

About GE Healthcare

GE Healthcare provides transformational medical technologies and services that are shaping a new age of patient care. Our broad expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, biopharmaceutical manufacturing technologies, performance improvement and performance solutions services help our customers to deliver better care to more people around the world at a lower cost. In addition, we partner with healthcare leaders, striving to leverage the global policy change necessary to implement a successful shift to sustainable healthcare systems.

For more information, contact your GE Healthcare representative or visit www.doseoptimization.gehealthcare.com

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