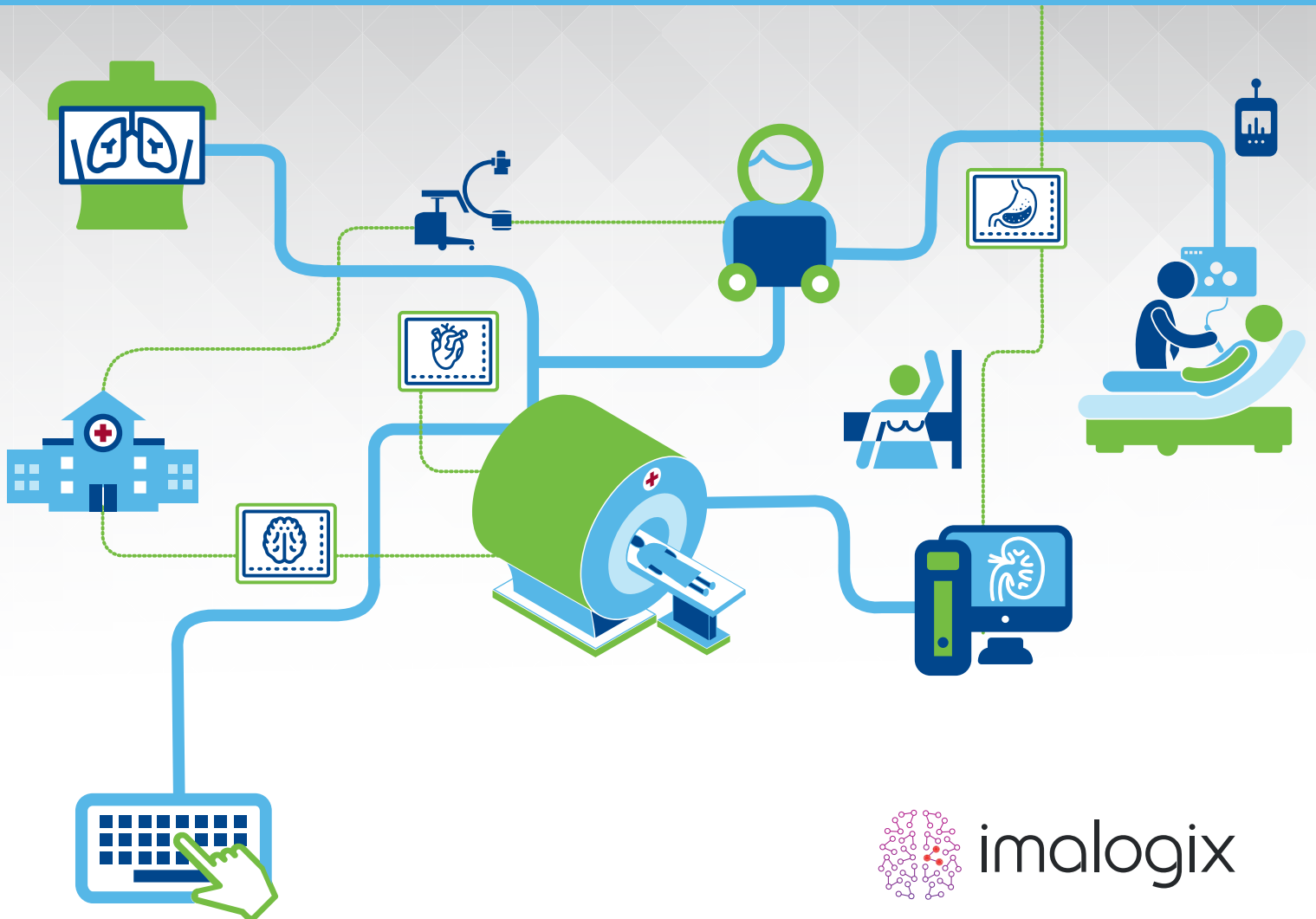


Image Quality and Radiation Dose Management Software:

An Executive Guide to Developing an RFP



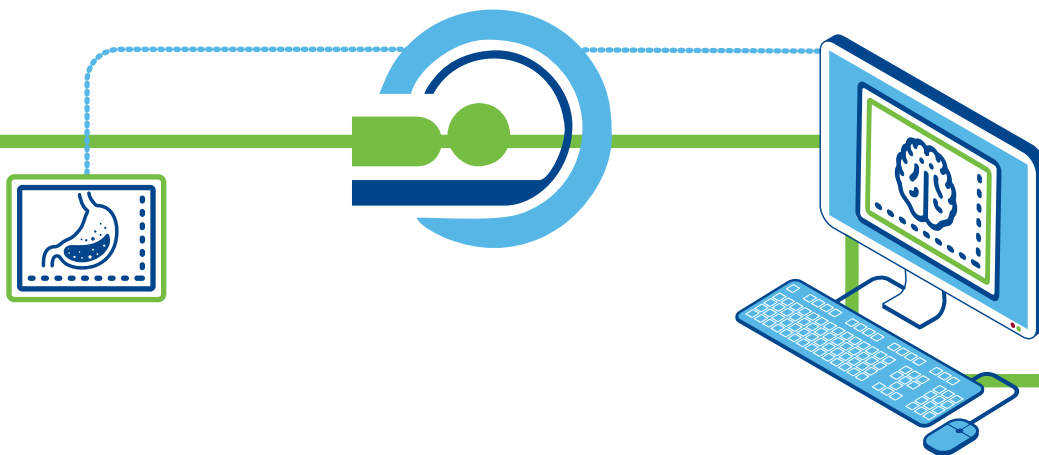


Image Quality and Radiation Dose Management Software

RADIATION DOSE MONITORING SOLUTIONS

are more than record-keeping systems, and should be considered tools to help optimize imaging operations. The best solutions on the market contribute to better patient outcomes, reduce provider risk and optimize equipment utilization and workflows. They do this by applying analytics on dosage data, patient characteristics and image quality to reduce variance.

All radiation dose monitoring systems capture data about the dose administered. Whether they can do more, such as helping optimize doses by protocol, patient, equipment manufacturer and specific mode, determines their role in improving quality. Regardless of how the role is viewed, radiation dose monitoring is increasingly seen as important, as the following developments illustrate.

- The American College of Cardiology (ACC) and the Society of Nuclear Medicine and Molecular Imaging (SNMMI) were among eight medical societies that issued a joint statement¹ in May 2018 calling for better

radiation dose tracking. The document notes *“Consequently, for quality assessment and improvement purposes, a program should track, compile and analyze its radiation exposure data.”*

- The Leapfrog Group postulated that reducing the top quartile of computerized tomography (CT) doses administered to children to the average level would have the effect of preventing 4,350 cancer cases annually².
- The Joint Commission Sentinel Alert³ calls for providers to follow ALARA (as low as reasonably achievable) guidelines for radiation dosage. One of its specific recommendations is to *“Investigate patterns outside the range of appropriate doses.”*

Achieving these results and following these directions requires more than simply tracking radiation administered. It requires analyzing results and making appropriate changes to protocols. A comprehensive solution should directly contribute to improving overall imaging performance. Radiation dose management solutions can enable improvements by integrating into multiple systems, supporting



the ability to add new scanners or modalities with ease and providing data insights to inform threshold levels at the patient level based on specific conditions.

Not all solutions on the market have these capabilities. There is tremendous range in their functionality, integration capability and ease of use. This high-level guide to developing a request for proposal (RFP) for a radiation dose monitoring solution will help organizations identify the issues and ask the questions to differentiate the solutions that contribute to better outcomes.

each manufacturer’s product line, so protocols can be optimized to the unit level. Analytics have found differences in the optimal settings among different units of the same model, so machine-level analysis and reporting is desirable. When analytics, machine learning and artificial intelligence are embedded into radiation dose monitoring solutions, the solutions can flag any differences in the actual vs. expected performance (for example, if the protocol programmed into the imaging machine is accurately being followed).

Ideally the solution will also account for other variables, such as protocol, patient type, patient size and individual technologists to make recommendations to improve image quality or reduce the required dose. Solutions with such functionality help organizations with more than data collection; they support better outcomes, because:



KEY REQUIREMENT: Core Dose Monitoring Functionality

At a minimum, a radiation dose monitoring solution must support all radiating modalities used across all settings at the organization’s facilities. It should account for different manufacturers, and different models within

- Alerts and analytics help ensure protocols are followed by facility, machine and operator.
- Analytics help determine optimal dosage, highest image quality and workflow improvement.

- Some solutions have built-in proactive quality control measures to help the technologist ensure proper patient placement for the isocenter. If a patient is not optimally centered in a CT scanner, automatic exposure control (AEC) will not perform optimally. By some estimates, being off center by just a few centimeters can cause a 40 percent shift⁴ in radiation dose output and dramatically affect image quality.

To get these benefits from a radiation dose monitoring solution, the selection process must include an informed evaluation that focuses on more than imaging equipment compatibility and basic data recording.

What to ask potential vendors:

- Does your software support:
 - » CT?
 - » C-Arms?
 - » DR?
 - » Cardiac catheterization procedures?
 - » Fluoroscopy and interventional radiology?
 - » Mammography?
 - » PET?
 - » X-Ray?

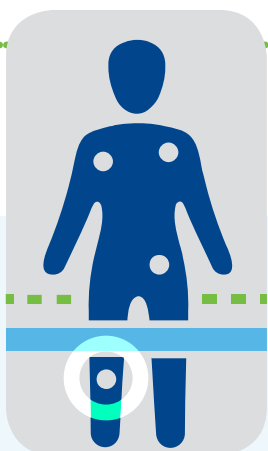
- What kind of quality control features are built in?
- How does your system support The Joint Commission CT requirement for diagnostic reference levels (DRLs)?
- Does the system automatically benchmark against national standards?
- Does the solution include organ dose calculators?
- Does the solution include fetal dose calculators?
- Does the system support a mobile workflow for alerts?
- Does your solution support the new Joint Commission fluoroscopy standards that are scheduled to take effect Jan. 1, 2019?
- Does the system support level 1 and level 2 alerts for fluoroscopy procedures?
- Does the system track cumulative patient dose for fluoroscopy patients six months after a procedure?



KEY REQUIREMENT:

Advanced Functionality and Patient-Specific Flexibility

To ensure the balance between the quality and the safety of an imaging exam and to meet ALARA principles, organizations must have the ability to optimize doses according to the individual patient, taking multiple variables into account. Such flexibility may be lacking in radiation monitoring solutions that focus on data collection rather than optimization.



Radiation dose management is not a commodity type of software. Solutions are sophisticated, and each vary in how easy they are to use and how much training is required.

What to ask potential vendors:

- How does the system help improve and optimize imaging care delivery?
- How are analytics and machine learning applied to collected data?
- Can the software automatically convert Volume Dose CT Index (CTDI) to size specific dose element (SSDE)?
- Does the system highlight how a technologist can improve imaging technique?
- Does the system help technologists properly place patients relative to the isocenter?



KEY REQUIREMENT:

Mitigate Risk of Alert Fatigue

False positive alerts can be common with some systems, and thus can be a key source of risk for alert fatigue. Large patients have been a frequent source of false positive alerts because of the higher CTDI associated with these patients. Studies that include a bolus acquisition can be a source of frustration due to frequent alerts caused by high CTDI values. To reduce false positive alerts, solutions should readily address these scenarios to ensure the safe and effective delivery of dose across all patients.

What to ask potential vendors:

- What are your typical false positive rates?
- How does the solution allow thresholds to be set for various patient sizes?
- Can alerts be set at the acquisition level?
- Can the system perform root cause analysis for recurring system alerts?



KEY REQUIREMENT:

Planning and Implementation Support

Radiation dose management is not a commodity type of software. Solutions are sophisticated, and each vary in how easy they are to use and how much training is required. Implementations also differ from vendor to vendor based on system and client requirements. Some solutions can take up to two or more years to implement if they require protocols to be manually mapped, while others can be installed and running in a day.

It is important to understand what types of training are required and what additional training and implementation services may be offered, or if they would be helpful to reduce the time needed to implement the system, improve utilization and minimize the amount of support calls.

It is important that the solution is easy to learn and operate with minimal training, and for the provider to offer ongoing training resources.

What to ask potential vendors:

- How much time is typically required to roll out the system at each site and system-wide? Ask for a sample implementation plan and timeline.
- How does the solution scale to add additional scanners, modalities, departments or organizations?
- How does the product get installed?
- How are protocols mapped for each machine? (If each machine requires manual mapping, the process may take more than a year for a typical size organization to complete).

It is important to understand how a dose management solution is installed to uncover how easily it can scale to add new modalities, departments or even organizations.

Depending on the system architecture, unseen costs can quickly add up from requirements to bring new equipment into the solution, or the need to assign internal resources to support manual protocol mapping.

- What internal staff resources are required to support the rollout? Will this require support from a patient safety officer, IT, lead technologist and radiologist?
- Are medical physics services available?
- What additional support or expert consulting services are available?
- What kind of training is offered?
- Following the initial training and deployment, what resources are available to train new users as they are hired? Does this require additional costs to support?
- Ask to speak to customer references that have been using the solution to determine what they like and do not like.



KEY REQUIREMENT:

Integration, Compatibility and Reporting

It is important to understand how a dose management solution is installed to uncover how easily it can scale to add new modalities, departments or even organizations. Depending on the system architecture, unseen costs can quickly add up from requirements to bring new equipment into the solution, or the need to assign internal resources to support manual protocol mapping. Understanding if the solution can integrate with, at a minimum, dictation systems and picture archiving and communication systems (PACS) is important to understand so you can align to your organization's needs and goals. Note that many organizations integrate radiation dose monitoring solutions with their electronic health record (EHR) systems, but The Joint Commission does not require this as part of its requirement.

What to ask potential vendors:

- Do scanner software updates impact the solution and require additional manual work to maintain the software?
- How do you integrate with our EHR system? Can you provide client references?
- How do you integrate with our PACS? Can you provide client references?
- Can existing dose data be imported from another dose tracking system?
- Does the system provide insights on how to improve efficiency or uncover unmet capacity?
- How much typical customization is required? Can you provide references?
- Can your software translate protocol language between CT modality vendors?
- How does your system monitor cumulative exposure?

- Does it support an enterprise master patient identifier (EMPI)? How does it reconcile different patient identifiers used at different sites?
- What standard reporting does the system provide? How is the data displayed? Does it benchmark performance across peers? Does it provide deep learning highlights on where and how to make improvements?



KEY REQUIREMENT:

Data Security and HIPAA Compliance

The software handles protected health information and, therefore, must comply with HIPAA requirements and all organizational security policies and protocols.

What to ask potential vendors:

- Describe how you are HIPAA compliant.
- Where does the data reside?
- How is data secured?
- Is data encrypted: At rest? In transit? How?
- Are passwords encrypted? At rest? In transit? How?
- How are users authenticated?
- Does the solution offer automatic logoff?
- Provide a list of your security certifications.



KEY REQUIREMENT:

System Architecture, Lifecycle and Support

The underlying software architecture is a factor in the effort and expense needed to integrate the software with enterprise IT systems, how easily it will be to support and its lifetime cost to maintain and operate.

What to ask potential vendors:

- Where is the solution hosted (on premise, private cloud, public cloud)?
- What kind of tech support is included and what is offered for an additional fee?
- Does the software license or maintenance agreement include updates?
- How often is the software updated or are new releases available? Does this require additional costs?
- How are updates managed? What percentage of customers are on the latest release?
- How do you ensure disaster recovery and business continuity?



ENDNOTES

- 1 2018 ACC/HRS/NASCI/SCAI/SCCT Expert Consensus Document on Optimal Use of Ionizing Radiation in Cardiovascular Imaging: Best Practices for Safety and Effectiveness Accessed September 13, 2018 at www.onlinejacc.org/content/early/2018/04/30/jacc.2018.02.016
- 2 <http://www.leapfroggroup.org/ratings-reports/pediatric-radiation-doses>
- 3 The Joint Commission Sentinel Event Alert Issue 47, August 2011, Addendum May 2017 "Radiation risks of diagnostic imaging"
- 4 <https://aapm.onlinelibrary.wiley.com/doi/pdf/10.1118/1.2748113>



The Radiation Dose Management and Analytics Solution from Imalogix has earned the exclusive endorsement of the American Hospital Association.



About Imalogix

Imalogix is a leader in artificial intelligence and workflow solutions that support healthcare providers to better understand and manage process, quality and safety related to diagnostic imaging services, interventional procedures, and meet evolving regulatory standards with ease. Insights fueled by intelligence accelerate meaningful change to protect revenue, reduce risk, and evolve the standard of care. For more information, visit www.imalogix.com.



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