# Driving consistency and increasing efficiency in X-ray IQ

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Medical imaging is an integral part of providing diagnostic care for patients around the world. However, healthcare systems and hospitals are operating under stress and resource constraints. X-ray imaging, often the starting point of patients' diagnostic journey, is one of the most utilized imaging modalities. Though each X-ray exam requires a certain level of customization to meet the patient's needs, reducing variability is key to increasing image consistency. An improved, more efficient workflow can result in better image quality, no matter the experience level of the X-ray technologist.

## Understanding the cost of variability in X-ray image quality

According to the World Health Organization (WHO), an estimated 3.6 billion diagnostic examinations are performed each year globally.[1] Industry reports indicate that in 2021, 126.8 million X-ray exams were performed on fixed X-ray systems.[2] However, up to 25 percent of X-ray are rejected or must be repeated due to poor quality or a non-diagnostic image.[3] Rejected images can cause multiple inefficiencies, including inconveniencing the patient, who needs to repeat the exam, and increasing the financial burden on the health system, as the rejected exam may not be reimbursable. Ongoing inconsistencies in X-ray imaging can contribute to the resource challenges and financial constraints of a health system.

Staffing challenges in radiology include unfilled technologist positions and increased turnover frequency.[4] Navigating staff management, varying levels of technologist experience, and protocol variations can contribute to exam variability. An additional factor is the management of patients who have varying needs in relation to their size and positioning.

## Addressing X-ray workflow to increase image consistency

Given these variability challenges, industry partners such as GE HealthCare are committed to streamlining the workflow and image acquisition process for the X-ray technologist. Automated tasks and standardized protocols can improve image quality and image consistency. Department administrators can reduce the operational inefficiencies in X-ray imaging with comprehensive solutions that help the technologist staff produce consistent, high-quality X-ray images using on-device automations, ergonomic features, and sophisticated artificial intelligence (AI) solutions.

> "We're collaborating with our customers to help address their needs," said Laura Hernandez, Chief Marketing Officer for Women's Health and X-ray at GE HealthCare. "By integrating comprehensive and efficient solutions, we can help reduce some of the burden from their staffing challenges. The latest imaging technologies and automated tools streamline the exam setup and image acquisition process to help achieve consistent, high-quality X-ray imaging regardless of the technologist's level of experience."

## Aligning priorities to improve quality and satisfaction rates

According to a recent industry report, two of the top five priorities of radiology administrators are improving X-ray workflow, productivity, and managing department costs in anticipation of lower reimbursement levels.[5]  Prolonged inconsistency in X-ray image quality has the potential to impact those focus areas. When the first X-ray images are rejected for poor quality or non-diagnostic value, workflow and productivity are impacted with patient rescheduling, increased workload to accommodate repeat exams, and productivity lost due to reading poor-quality images.

The current global shortage of radiologists is further exacerbated by overwork and stress.[6] From a financial perspective, reimbursement cuts have been significant across radiology, and hospitals are on the hook for retakes due to poor image quality.[7]

Working with new or less experienced X-ray technologists can also contribute to variation across X-ray imaging, and inconsistent imaging protocols can impact continued relationships with referring physicians if they are not able to see the images or specific views they ordered.

This ripple effect can be changed with consistent, high-quality X-ray imaging across the department. Aligning protocols and training to level up inexperienced X-ray technologists can help generate

reproducible, quality imaging, making the first image the best image possible. Less patient rescheduling, fewer retakes, and faster turnaround to diagnosis can alleviate some of the challenges felt by department administrators.

## Workflow automation to drive efficiency in X-ray

Evolving X-ray technology is changing the game by leveling the playing field for improving efficiency and consistency to help attain high-quality clinical images. Automated solutions can reduce workflow burdens and help radiology departments reduce variability in X-ray imaging.

Currently, even with digital X-ray technology, technologists often need to manually input some of the imaging parameters regarding patient size and specific anatomies, for example. Using recent X-ray innovations, the technologist workflow is automated to reduce manual and repetitive tasks, facilitating the setup and acquisition process and reducing the potential for variability.

Modern X-ray systems offer a substantial protocols database and include features to auto-select the parameters required to perform each X-ray once a patient is chosen. Additionally, for longitudinal studies, they offer automatic selection and setup of the same views from the previous exam for that patient. These features can help improve outcomes for patients that may require repeated X-ray exams, such as patients with fractures or surgical repairs with pin or plate placements, so healing may be tracked temporally and spatially isolated.[8]  This ensures referring physicians get the images they prefer so they can monitor hard tissue repair and pin or plate placement.

## Using AI to improve workflow and image quality in X-ray

The digital transformation continues to evolve radiology. Digital advancements in X-ray are increasing image quality. For instance, X-ray technologists no longer need to affix a physical scatter grid to the X-ray detector to improve image contrast. Sophisticated software can replicate the effects of imaging with the scatter grid and can eliminate the extra step for the technologist.

Leading industry partners, such as GE HealthCare, developed sophisticated deep-learning algorithms for image processing in X-ray. These algorithms can correct brightness and contrast across all images and even correct imprecise exposure settings that may have been input by the technologist. Filters for noise and contrast levels can be customized across a facility to meet their needs but can also be adjusted locally if a clinician would like to see more contrast enhancement. This can help improve the reading

experience for radiologists due to the high image quality, helping them to confidently make a definitive diagnosis, and it can also help reduce the necessity for repeat exams.

X-ray department administrators look to manage image quality and consistency across the department and drive efficiency. A protocol management tool can ensure the same protocols are used on each system, including the ability to edit and deploy protocols across the fleet when needed. Utilizing a quality monitoring application across the X-ray fleet can track the number of repeat exams and rejected X-ray images in the department. It can also track quality issues by individual technologist performance, system performance, and protocol.

## Transforming X-ray through continued innovation

Innovations in X-ray are helping to reduce the burden on technologists and department management to ensure consistency in image quality and workflow efficiency. GE HealthCare is committed to advancing X-ray by integrating AI tools and deep-learning algorithms that impact workflow, improve image quality, and reduce the cost of inefficiencies.

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**REFERENCES**

[1] World Health Organization. To X-ray or not to X-ray. Published April 14, 2016. https://www.who.int/news-room/feature-stories/detail/to-X-ray-or-not-to-X-ray-. Accessed March 31, 2023.

[2] IMV. 2021 X-ray DR CR Market Outlook Report. https://imvinfo.com/product/2021-x-ray-dr-cr-market-outlook-report/. Accessed March 31, 2023.

[3] Little KJ, et al. Unified database for rejected image analysis across multiple vendors in radiography. *Journal of the American College of Radiology.* 14.2 (2017): 208-216. https://pubmed.ncbi.nlm.nih.gov/27663061/.

[4] Reeves K. Times are tight: Staff shortages prompt new strategies. Applied Radiology. Published July 14, 2022. https://appliedradiology.com/articles/times-are-tight-staff-shortages-prompt-new-strategies. Accessed March 31, 2023.

[5] IMV. 2021 X-ray DR CR Market Outlook Report. https://imvinfo.com/product/2021-x-ray-dr-cr-market-outlook-report/. Accessed March 31, 2023.

[6] Windsor M. This radiologist is helping doctors see through the hype to an AI future. The University of Alabama at Birmingham. Published December 5, 2022. https://www.uab.edu/reporter/people/achievements/item/9925-this-radiologist-is-helping-doctors-see-through-the-hype-to-an-ai-future. Accessed March 31, 2023.

[7] Greeson T. New data reveals extent of declining Medicare reimbursement for diagnostic radiology services. ReedSmith. Published August 3, 2022. https://viewpoints.reedsmith.com/post/102hu1l/new-data-reveals-extent-of-declining-medicare-reimbursement-for-diagnostic-radiol. Accessed March 31, 2023.

[8] Morgan EF, De Giacomo A, Gerstenfeld LC. Overview of skeletal repair (fracture healing and its assessment). *Methods Mol Biol*. 2014;1130:13-31. doi: 10.1007/978-1-62703-989-5_2.