

How KMC Manipal serves more patients with Al-enabled CT workflows

As part of a long-standing innovation partnership with Philips, the radiology department at Kasturba Medical College (KMC) Manipal in India implemented CT Smart Workflow in their CT exams and played a critical role in its clinical validation. This increased workflow efficiencies, allowing KMC Manipal to scan more patients daily, with better diagnostic confidence and improved patient experience.

Executive summary

Faced with growing patient demand, the radiology department at Kasturba Medical College (KMC) Manipal sought to increase workflow efficiency to serve patients more quickly and reduce the time to diagnosis. As part of a long-standing innovation partnership with Philips spanning over two decades, KMC Manipal was one of the first hospitals to implement CT Smart Workflow, a set of AI-enabled tools designed to optimize various steps in the CT workflow, from patient positioning to image reconstruction and batching. With CT Smart Workflow, KMC Manipal has saved time across the CT workflow, enabling them to serve 90-100 patients daily, up from the previous 70-80. Patients can be seen as scheduled, even at peak hours, without needing to reschedule to the next day. Thanks to improved image quality, radiologists also experienced increased diagnostic confidence. which helps them guide better patient care.



About Kasturba Medical College Manipal

Kasturba Medical College (KMC) Manipal is part of the Manipal Academy of Higher Education (MAHE), India's third-largest healthcare group with 33 hospitals across 17 cities, 5,000+ doctors, and 9,500+ beds. KMC Manipal has consistently been ranked among the top ten medical colleges in the country. The institute also has strong academic partnerships with reputable national and international universities. Since 2004, MAHE and KMC Manipal have partnered with Philips to innovate in fields like oncology research, cardiac screening, ultrasound, and fetal monitoring.



KMC Manipal can now perform 90-100 CT scans daily, up from 70-80





Up to 85% lower noise in CT images, supporting increased diagnostic confidence¹





Up to 80% lower radiation dose, enhancing patient safety during CT exams¹



The challenge

Like many radiology departments worldwide, KMC Manipal faces increasing patient demand, putting pressure on radiologists and imaging staff to reduce diagnostic turnaround times while maintaining highquality patient care. This pressure is particularly felt in CT imaging due to its critical role in quickly diagnosing a wide range of medical conditions, including emergencies requiring immediate intervention.

Any workflow inefficiency can lead to a loss of valuable time, requiring staff to work longer hours or risking delays in diagnosis and patient care. "Prior to implementing Philips CT Smart Workflow, several steps in our CT workflow took more time than we wanted," says Dr. Rajagopal K.V., Professor and Head of the Radio Diagnosis Department at KMC Manipal.

Patient positioning was one such area. Dr. Prakashini K., Professor and Radiologist at KMC Manipal, explains: "We spent significant time training our medical imaging students to operate our CT machines and apply various clinical protocols. Each year we welcome new students, requiring ongoing training. While this is important, it can also be time-consuming, especially when we have heavy workloads. Patient positioning accuracy was not always optimal because it involved a lot of manual handling."

The speed of image processing also left much to be desired, Dr. Rajagopal adds. "For example, batching brain scans required several manual steps, while time is of the essence, especially when we are dealing with trauma patients. In addition, images could be noisy, making it harder to notice subtle abnormalities. It was also a priority for us to minimize radiation dose for patients without compromising image quality, as many of our patients – such as those receiving cancer treatment – must undergo repeated scans."

The approach

Building on a long-standing innovation partnership with Philips, KMC Manipal was one of the first hospitals to

"Having a dedicated innovation manager and clinical scientist from Philips on site has been key to our partnership."

Dr. Prakashini K., Professor and Radiologist at KMC Manipal

adopt Philips CT Smart Workflow. Radiologists, PhD, MSc and BSc students at KMC Manipal also played a critical role in its clinical evaluation, ensuring its effective implementation while supporting cuttingedge academic research on its real-world benefits. Using the power of AI, CT Smart Workflow provides the radiology department at KMC Manipal a comprehensive suite of applications to optimize CT workflows at every step.

Starting at the point of image acquisition, Precise Position automates patient positioning through an Al-enabled camera designed to increase positioning accuracy and user-to-user consistency. Radiologists at KMC Manipal also benefit from Precise Image, an Al-based reconstruction technique that uses the power of a deep-learning neural network for improved clinical confidence. Other applications that KMC Manipal's radiologists use in their daily work include Precise Brain, which supports automatic batching of brain scans for timely analysis, and Precise Cardiac, which corrects for motion in cardiac images to improve image quality at high heart rates.



The results

Three years into the use of CT Smart Workflow, the results have been significant. "With CT Smart Workflow, we have been able to achieve time savings throughout our entire workflow," says Dr. Prakashini. "We used to do 70-80 exams a day, sometimes working until late at night to manage the case load. Now we scan 90-100 patients a day, with less overtime from staff. "With Precise Image, we have seen significant reductions in image noise even at low dose, which helps us better detect subtle lesions or signs of metastasis in cancer patients."

Dr. Rajagopal K.V., Professor and Head of the Radio Diagnosis Department at KMC Manipal

Referring clinicians are pleased that we are able to provide them with our images and reports more quickly, which helps to improve patient care."

Time savings start with patient positioning, Dr. Prakashini explains. "Previously, staff had to manually identify bodily landmarks and then correctly center the patient in the gantry by turning on the laser light and adjusting the region of the scan to the iso-center. But now, with Precise Position, that happens automatically with the press of a button. This can easily save us 1-2 minutes per case and helps consistently position even our most challenging patients, ensuring the region of interest is at the iso-center for optimal image quality at the optimal radiation dose." She highlights additional time savings in areas such as automatic batching of brain scans using Precise Brain, which has saved up to 5 minutes per scan.

Dr. Rajagopal adds how his department has benefited from improved image quality in many types of exams – including brain, chest, and abdomen – while simultaneously lowering radiation dose. "With Precise Image, we have seen significant reductions in image noise even at low dose, which helps us better detect subtle lesions or signs of metastasis in cancer patients," he says. "Better image quality adds to our diagnostic confidence, which helps us deliver better care to patients. And by keeping dose levels as low as reasonably achievable, we avoid putting unnecessary burden on the patient."

Similarly, Precise Image has helped Dr. Rajagopal's team improve low-contrast detectability when a contrast agent is needed to enhance specific areas of interest in CT images. "This is especially beneficial for patients with renal impairment," Dr. Rajagopal explains, "because, to ensure patient safety, we want to minimize the need to administer additional contrast. We can save up to 20 ml of contrast per angio scan."

For Dr. Prakashini, another welcome addition to her workflow has been Precise Cardiac, which helps her address a common challenge in cardiac imaging: motion, especially at high heart rates. "Previously, we had to repeat a scan if there was significant motion in the arteries," says Dr. Prakashini. "Precise Cardiac has helped us eliminate these motion artifacts in most cases, providing better image quality that aids in my interpretation."

Next steps

Having experienced the benefits of AI-enabled tools throughout the CT workflow, the radiology department at KMC Manipal is now looking to further integrate advanced technologies into their practice. Together with Philips, Dr. Rajagopal and Dr. Prakashini are exploring additional AI-enabled solutions to streamline operations, enhance diagnostic accuracy, and improve patient outcomes.

"We are particularly interested in incorporating AI for real-time image analysis and automated reporting," says Dr. Rajagopal. "For example, this could expedite reporting on routine cases while alerting us to subtle abnormalities in images that need further inspection by the radiologist."

Dr. Prakashini adds, "We see strong interest from our graduate and PhD students in working with the latest AI technologies, which has resulted in a series of high-profile and impactful academic publications. Our partnership with Philips helps us stay at the forefront of innovation – allowing us to attract top talent to our institution, research the benefits of new technologies, and advance care for our patients."

¹https://www.documents.philips.com/assets/20240223/4f2cbfa4d0df4 28f94bfb11f01751a87.pdf

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