Case Study: Collaboration Takes Flight

**Key Takeaways:**

- A team of neuro-oncology specialists breaks down silos and provides patients with a multifaceted approach to neurological issues.
- Neuroradiologists join the clinical side of medicine by providing real-time image guidance within the OR and playing a direct role with patients in the clinic setting.
- The neurosurgical oncology service has posted a 30 to 40 percent reduction in length of stay, mortality, and readmission rates, as well as a 10 percent reduction in cost per case.

Not everyone would compare a successful multidisciplinary neurosciences center to the airline industry. However, not everyone is world-renowned neurosurgeon Amin Kassam, MD, who sees parallels between commercial flight and a health care model built on value through risk reduction rather than volume.

“I wanted to build a health care service line that mitigates risk, and the airline industry has done that well;” he says. “Flying is a safe event, when you look at the number of flights as opposed to the number of plane crashes. You can look at health care the same way.”

With that in mind, Kassam spearheaded the creation of the Aurora Neurosciences Innovation Institute (ANII), a multidisciplinary program of the Aurora Health Care Medical Group in Milwaukee, Wis. The program’s goal is to create a collaborative environment where neurosurgeons pilot through brain surgery with navigation from neuroradiologists — all working side-by-side in the OR. Each team member provides support for the competency for which they are best suited.

Typically, imaging would be done in a separate location and provided to neurosurgeons in preparation for surgery. By combining efforts in one location, Kassam says patients benefit from more immediate care.

According to Jonathan E. Jennings, MD, section chief of neuroradiology for Aurora Health Care Medical Group and a neuroradiologist with ANII, the overarching goal of the new program is improved outcomes, decreased patient morbidity, and reduced length of stay for patients. “In the two years since the program began, we’ve amassed a significant amount of data about the progress of this multidisciplinary approach,” he says. “Now we’re analyzing that information to help us drive better patient outcomes.”

**Model Design**

In 2014, Kassam was recruited by Aurora Health Care Medical Group to build its multidisciplinary neurosciences program. Kassam has had extensive experience over the past two decades in building service lines focused on multidisciplinary collaboration, and proposed the concept of integrating neuroradiology as a clinical component of neurosciences. He designed the ORs and clinics to contain reading spaces for radiology. This open-minded thinking led to a natural collaboration that broke down silos and made implementing the concept much easier.

Radiologist Dale J. Lye, MD, who leads Aurora Imaging Services, was also forward thinking and supportive of establishing the ANII, not only because it provides a higher quality of patient care but because it is a natural progression in the evolution of how radiology will need to look in the future, particularly as health care moves from volume to value. This open-minded thinking led to a natural collaboration that broke down silos and made implementing the concept much easier.

During the design process, the imaging team analyzed the clinicians’ workflow to see where having a radiologist on-site could help improve efficiency. They realized neurosurgeons were spending time weeding through stacks of imaging reports in order to plan their next course of action. In response, they proposed that adding a neuroradiologist to the crew would provide the guidance necessary to complete a surgical flight plan.
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“At ANII, neurosurgeons are pilots, radiologists are the navigators, and the OR is the cockpit,” Jennings says.

Planning and Workflow

The cockpit of this multidisciplinary clinic space comprises a state-of-the-art, four-room operating theater, with a dedicated planning room embedded within the semi-restricted area adjacent to the OR. Neuroradiologists work together with their neurosurgery colleagues within that space.

The need for efficiency in radiology is maintained on the OR floor. At ANII, reading rooms are located within the OR suite and allow neuroradiologists to read non-surgical cases during down time. In addition, a network of video communication creates connectivity between the OR, the planning room, clinical offices, and the main radiology reading room – essentially creating air traffic control.

With this model, no one service line "owns" the patient. “Just as a plane doesn't have just one pilot, a patient doesn't have just one surgeon taking care of him or her," Kassam says. “There are always two attending doctors with a patient, and we put the radiologist in the cockpit with us, reading images and providing our navigation in real time. In fact, the radiologist generates the flight plan before we even see the patient.”

Neuroradiologists also play a direct role with patients within the clinic setting, joining oncologists in discussions with patients about the benefits and risks of surgery. For most complicated discussions, the neuroradiologist reviews the imaging directly with the patient and the rest of the team. Patients have the opportunity to ask questions while all the members of their treatment team are in one place. It's a unique role for radiologists, who historically don't have much patient contact.

Each member of the team brings a different strength to the case at hand, Kassam adds. “A surgeon can put information about a patient's case into the context of the disease, but a radiologist has the data and the ability to present the information at clinic in a way that the patient can understand,” he explains.

“With this program, we break down the silos and form a collaborative unit,” Jennings says. “As the silos break down between medical specialties everyone comes up with good ideas. We are fortunate to have been welcomed as integral members of the neurosurgical care team.”

The Patient Care Continuum

Melanie Brown Fukui, MD, a neuroradiologist at ANII, embraces the opportunity to work side-by-side with neurosurgeons. In addition to providing her imaging expertise in the OR, she is in a position to bridge patients' imaging needs from their clinic visit through preoperative planning and into the operative and postoperative phases of their treatment.

“This is a window into neuroscience here that I believe doesn't exist anywhere else," she says. “We're a multidisciplinary unit in which radiology participates in planning and workflow. We are included in the overall work environment. Within this model, having a neuroradiologist immediately available at critical moments during anatomically complex procedures can decrease the potential for adverse outcomes.”

According to Fukui, radiologists are involved with the pre-surgical planning along with the surgeons. They also stay in the OR during “inflight cross checks” when the surgeon is working in the brain, following the anatomy in imaging.

“We have come to speak a common language with our partnering neurosurgeons and advanced practice providers,” Jennings says. “We directly observe the manner in which imaging is used for operative guidance, and have accordingly designed a set of pathology-specific MR protocols to fit the unique operative approaches and technologies our neurosurgeons use.”

Learn how neuroradiologists have incorporated preoperative functional MRI (fMRI) brain mapping into the clinic.

Doctors in the operating room at Aurora St. Luke's Medical Center, of which the Aurora Neurosciences Innovation Institute is a part, rely on brain mapping images created by neuroradiologists who are part of the program.
Collaborative Impact

Jennings, Fukui, and Kassam agree that the collaboration among members of the ANII team strengthens the clinical environment and incrementally improves patient care.

In one instance, during surgery to remove a cluster of blood vessels from the brain of a 36-year-old man who suffered from seizures, imaging guidance in the OR suite provided Kassam with a map to the malformation. It also helped that the patient was kept awake during surgery in order to regulate the effects of the surgery on his functionality.

The culmination of this collaborative process has yielded significant results in a short period of time. The neurosurgical oncology service has posted a 30 to 40 percent reduction in length of stay, mortality, and readmission rates as compared to national risk-adjusted rates. This has also translated into a financial benefit, with a 10 percent reduction in cost per case, despite increasing the case complexity in comparison to the pre-ANII era.

The neuroradiologists also benefit from direct and immediate clinical-radiologic correlation, observing surgical procedures in real-time and working in sync with surgeons and other members of the team. This enables imagers to see how their navigation helps the surgeon, and where they can improve the process of providing the right map for surgeons to follow.

Jennings points out that participating physicians share information and learn from each other. “Now, the radiologist is involved at the point-of-care,” he says. “We interact with each other in a more natural way, with a more open flow of communication.”

Next Steps

- Look for opportunities across the health care continuum where the radiologist can come into more direct patient contact.
- Seek out the clinicians in your practice or facility who use and value imaging the most, and work to form alliances between them and your radiologists.
- Develop collaborative models that overcome silos in budgeting by valuing risk reduction for the patient rather than volume delivery by the provider.

Join the Discussion

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