

Teamwork among pediatric anesthesia and radiology providers at a large tertiary-care children's hospital: past, present and future

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Introduction

Cooperation and coordination between anesthesia and radiology providers is required to create and maintain a safe, productive and efficient environment in a pediatric radiology department. We describe the important components of a proficient model for collaboration with anesthesia-radiology staff including radiologists, anesthesiologists, nurses and MR imaging technologists at our institution and how policies and procedures have evolved to efficiently deliver safe patient care in a high-volume pediatric radiology department.

Background

Today's practice of medicine is increasingly complex, with highly technical, system-based, multidisciplinary teams caring for very sick patients. Recent advances in technology and the important role of MR diagnosis in the management of childhood diseases have increased the need for sedation and anesthesia [1]. Procedural sedation in radiology

departments has historically been performed under supervision of pediatric radiologists [2, 3], but the number of complicated cases requiring anesthesia rather than sedation has steadily increased during the last 10 years, prompting a switch from radiologist-led sedation practices to anesthesia-led sedation/anesthesia practices. In this commentary we discuss the strategies we have employed to address these changes and the impact they have had on our ability to deliver high-quality care.

Setting

Cincinnati Children's Hospital Medical Center (CCHMC) is a large, urban pediatric academic medical center and serves as a primary referral center for an eight-county area in southwestern Ohio, northern Kentucky and southeastern Indiana. In 2011, we performed more than 14,000 diagnostic MR imaging procedures, of which 2,318 required general anesthesia (GA) and 1,238 required sedation performed by anesthesia providers. The MR imaging section at our main hospital consists of four MR imaging suites, an induction room and an eight-bed recovery room. The enterprise is supported by booking clerks, reception staff, MR imaging technologists, nurses, anesthesia providers, a patient family advocate, patient care assistants, child life specialists, radiology fellows and staff radiologists.

Leadership vision and strategy

Our institution has a wide organizational structure for promotion and implementation of quality improvement initiatives termed Clinical Systems Improvement, which provides the infrastructure and ensures that improvement efforts throughout the hospital are aligned with the priority areas

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identified by hospital leadership. These priorities include patient safety, improving patient flow across the system, value initiatives, and patient- and family-centeredness throughout the organization. These priorities are reflected in the goals that have been defined by the anesthesia radiology leadership at our institution, a group that includes medical, nursing, safety, quality, finance and business leaders. The overall goals defined by our leadership are as follows: (1) ensure patient safety and optimal patient outcome, (2) provide high-quality imaging studies required for accurate interpretation and subsequent medical decision-making, (3) maximize the efficiency in the radiology department, (4) decrease patient delays, (5) enhance satisfaction among patients and (6) enhance employee (staff and physicians) satisfaction.

Governance in the collaboration between radiology and anesthesia includes two groups: the Executive and the Radiology-Anesthesia groups. The Executive group consists of the radiologist-in-chief, anesthesiologist-in-chief and the administrative vice presidents of Radiology and Anesthesiology. This group meets annually and sets the overall strategic plan. The Radiology-Anesthesia group includes ten section directors representing radiologists, anesthesiologists, nurses, technologists, schedulers and administrators. This group meets every other month to discuss and address everyday operational problems.

Recognizing problems

In looking at feedback from families and staff, both the Executive and the Radiology-Anesthesia groups concluded that our performance in achieving our goals was not at the level we expect. The following improvement initiatives are examples of the collaborative work performed to address some of these inefficiencies.

On-time start initiative

Reducing the time patients have to wait for their imaging study once they arrive at the hospital is an important goal for our team. We found that we were starting the first case of the day on-time less than 50% of the time. To address this issue, we organized a multidisciplinary team consisting of physicians, nurses, radiology technologists and registration staff. The team mapped the entire patient experience from the time of arrival to the acquisition of the first MR image. By using the framework of small tests of change, or the Plan-Do-Study-Act model [4], we focused primarily on standardizing the processes for completing the pre-imaging evaluation by creating effective early screening and identification of complex cases, early identification of patient arrival and

registration, adjustment of nurse and anesthesia provider availability, and efficient processes for anesthesia induction and MRI safety screening. When we evaluated all aspects of nurse duties and workflow, we found that the scheduled first patient arrival time coincided with the nurse arrival time, which left little time for preparation prior to patient evaluation. As a test of change, the nurses assigned to the MRI suite being utilized were asked to arrive 15 min before the first patient arrival time. We also found that an important reason for delays in anesthesia assessment was the overall clinical complexity of many children, necessitating a longer evaluation time. We generated a screening process prior to the day of imaging conducted by a group of anesthesia staff who decide whether further anesthesia consultation/testing is required. For example, all efforts are made to identify children with known or expected difficult intravenous access from history or examination. For these children we ask to have a vein finder or US machine available to help facilitate intravenous placement during anesthesia induction. These interventions have led to an increase in the on-time start percentage for the first case scheduled with GA in our radiology suite from 36% to approximately 84%, and for the delayed cases we were able to decrease the average delay after initiation of the project from an average of 20 min to less than 10 min. We have been examining the sustainability of this improvement, and we have been able to maintain the same level of success with on-time start with GA. We learned many lessons from this project such as early identification of patient arrival and registration. We are working to improve on-time starts for sedated children and mid-day starts for all scanners.

Communication and transparency initiative

A key to increasing efficiency and improving team performance is to parlay the skills and talents of the individual team members into a more fine-tuned team. This goal is accomplished by improving transparency, collegiality and communication among the team members. In this way, the team as a whole can accomplish tasks in a safer, more efficient and more professional manner. Barriers to this include the inclination to restrict accountability by relying on strictly limited job descriptions and promoting individual achievements over team-oriented goals. The Radiology-Anesthesiology leadership took steps to promote and facilitate shared responsibilities and team-dependent targets to combat these tendencies. Rather than sticking rigidly to specific job duties, team members were encouraged to “cross borders” and help with tasks that were normally not considered part of their responsibilities. For example, available anesthesia patient care assistants might be asked or volunteer to clean the MRI table and coils during

scanner turnover, a task normally reserved for the anesthesia nurses or MR technologists.

A significantly impactful strategy was the designation of facilitators from anesthesia and radiology who share the responsibility of running the patient flow board. Each facilitator is given a cell phone with voice and text capability to assist with communication among all care providers. These facilitators have the authority to make patient flow decisions on their own but communicate directly with the radiologists and anesthesiologists to address complex issues requiring physician guidance. A significant role for the “charge” MR technologist facilitator is the review of studies scheduled 10 days and 1 day before the day of imaging to ensure that scan protocols are appropriate for both the time allotted and MR scanner designated, appropriate nil per os (NPO) guidelines have been communicated to families, and potential MR safety issues have been identified and addressed. When such issues are only recognized on the day of imaging it can result in patient delays, employee frustration, and most significantly, an increased risk of safety events.

The implementation of an electronic status board in the department has enabled the facilitators to more accurately track case progress and send for the next child earlier, reducing room downtime. It also enables patient care assistants to transport the child to the evaluation room as soon as registration is complete and increases their availability to help with room turnover.

The designation of facilitators has also had a positive impact on communication between radiologists and anesthesiologists. Both groups have physicians that rotate intermittently through the section, and lessons learned on one day won't necessarily be appreciated by the physicians working the next. As an example, a laryngeal mask airway (LMA) is an efficient and safe manner for maintaining airway control in some cases, but it can distort anatomy and reduce diagnostic accuracy for exams of the larynx and upper airway. This concern may not be recognized by the anesthesiologist who wishes to use an LMA, and the decision to use one wouldn't traditionally be communicated to the radiologist prior to the exam completion. The nursing and technologist facilitators are in the unique position to recognize the impact of the decision to use an LMA and can initiate a discussion between the anesthesiologist and radiologist to ensure that the most appropriate anesthetic and imaging techniques are employed.

The recognition and mitigation of potential problems before they occur has been the most important benefit of increased and improved communication. Not only does it directly improve patient experience and safety, it is a source of satisfaction and pride among the staff to know that they took a potential headache and eliminated it before it could

affect the entire process. In order to facilitate this process we have initiated a morning huddle run by the imaging nurse and technologist facilitators, with representatives from anesthesiology and radiologists from each MR imaging section (neuroradiology, musculoskeletal, body imaging, cardiac imaging and fetal imaging). This huddle takes place at 7:30 am every weekday and typically lasts 5–10 min. During this huddle, any issues identified from the prior day are reviewed in order to learn for the future, and any foreseeable issues for the upcoming day are addressed. This serves to reinforce the concept that all participants share in the success or failure of the patient flow process and are therefore invested in contributing to ensure its success.

Protocol and time-allowed initiative

Appropriate allotment of time for performance of complex studies is a vital and often overlooked component of patient flow in MR imaging. Exams that require more than the allotted time negatively impact the flow of all subsequent studies, and in turn increase stress on staff and dissatisfaction of patients and families. Conversely, exams that are allotted more time than is necessary will waste valuable radiology and anesthesia resources and can encourage inefficient practice patterns. The Radiology-Anesthesia leadership group undertook a review of MR imaging protocols to more accurately match the amount of time required for specific exam protocols with the length of time scheduled on the resource.

This review employed the specific concepts of image time, study time and room time. Image time was defined as the total time of the sequences employed in a protocol. Study time was defined as 120% of image time, in order to account for time spent prescribing sequences and performing pre-scan series. Room time was defined as study time+15 min, to account for the time needed to get the child into and out of the room and positioned comfortably on the scanner table. By this method, in order for a study to be appropriately scheduled in a 1-h time slot, the total time of the image sequences must be less than 38 min. Numerous exam protocols were found to be inappropriately designated for 1-h slots, virtually guaranteeing a mismatch and poor performance. In response, some protocols were adjusted to more appropriately fit into a 1-h slot, and others were designated to be performed in longer time slots. These new, better-fit designations were then shared with the scheduling staff so that exams would be appropriately scheduled from the start. As a result, the number of exams that require more than the scheduled exam time has dropped, and this in turn has substantially reduced tension between the anesthesiologists and radiologists.

Improving morale initiative

Good teamwork-related behaviors can lead to better patient outcomes [5]. One of the best-studied laboratories of this science has been the aviation industry. Research in commercial aviation has demonstrated important ties between teamwork and performance. The link between teamwork and safety was most obvious after plane crash investigations exposed cockpit crew members' reluctance to question a captain's performance as a root cause of aviation accidents. The willingness of personnel to speak up about a patient-safety concern is an important part of safety in the operating room.

An extremely important issue we are working on together as a team is creating a culture where any care provider, at any level, can feel that their input is desired and respected. The first step in creating this culture is placing a critical importance on transparency, professionalism and collegiality at all levels of the anesthesia and radiology departments, beginning at the top with the chairs and the directors of clinical services of the two departments. Once a culture of transparency and mutual respect has been established, it is second-nature for individual team members to value one another's roles and contributions to the team. The establishment of this department culture has led to a perceptible decline in the hesitation of team members to speak up on potential system inefficiencies and safety concerns. It has also led to an increase in the willingness with which team members provide constructive feedback, both positive and negative, to one another. All of these changes have resulted in an improved work environment, improved efficiency and, we hope, a decline in the risk of errors.

Conclusion

Teamwork is not easy—significant effort must be put forth by the individuals communicating and coordinating their activities. We believe that a strong, collaborative and collegial team made up of radiology and anesthesia members makes for a more efficient, pleasant and safe pediatric radiology department and that it has been a key component in our ability to change and improve the delivery of health care to the children we serve.

Conflict of interest The authors have no financial disclosures or conflicts of interest to disclose.

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