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An Innovative Paradigm: Coordinating Anesthetic Care for Complex Pediatric Patients requiring Multiple Procedures

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Abstract

Background: The goal of the anesthesia coordination of care team is to optimize safety for children requiring multiple procedures under general anesthesia, by providing a single continuous anesthetic for imaging and surgical requests.

Methods: We developed an inter-professional team to create a pathway for providers to request multiple procedures with one anesthetic. Data collected includes patient and family satisfaction and a growing expertise of best practices for planning such coordinated care.

Results: The program began in December 2011, with over 300 cases completed to date. Through the development of this program, we have evolved our clinical expertise to provide optimal combinations and sequencing of procedures under one continuous anesthetic.

Conclusions: After a review of the literature, our team has not identified another care organization that consistently and prospectively plans for one continuous anesthetic for multiple procedures for children. Evidence supports this necessary planning, as there is a growing body of scientific research suggesting a possible risk of long term neurocognitive deficits related to anesthetic exposure at an early age. Certainly this approach is the right thing to do for patient safety, and it also is very appreciated by families.

Introduction and Background

Frequently, both a surgical procedure and an anesthetized radiological procedure are requested, but often they are not arranged to occur with one continuous anesthetic. Unfortunately, these procedures are planned by schedulers from multiple subspecialties, leading to uncoordinated care. Previously, hospital faculty and staff knew some patients were scheduled for more than one sedated procedure, such as an MRI and a minor surgery, often within the same month, but this was frequently discovered too late to coordinate the care. For patients, this means multiple trips to the hospital for two separate sedations and procedures or imaging. This results in two separate fasting periods, two separate intravascular access attempts, two intubations and two anesthetic exposures. To decrease risk for the patient, care can be coordinated to proactively plan for one continuous anesthetic that allows for all requested imaging and surgical procedures to be sequenced and completed in one visit.

Initiative Description

The goal of the coordination of care team is to optimize care for patients requiring multiple procedures under general anesthesia, often in multiple hospital locations, by providing a single continuous anesthetic for all requested procedures/imaging. In order to define the most efficient process for planning this care, we collaborated with pediatric surgical, medical, procedural, nursing, scheduling and admitting services in perioperative and radiology departments. The initial request is sent to the designated pediatric anesthesiologist who serves as a consultant to provide guidance and recommendation regarding optimal procedural sequence, procedural room reservation and timing details. When arrangements for care are finalized, the coordination of care plan is saved to the patient's medical record.

Innovation

After a review of the literature, our team has not identified another care organization that consistently and prospectively plans for one continuous anesthetic for multiple procedures for children. Recommendations for planning and sequencing combinations include:

a. As a general rule, non-invasive procedure or imaging should be scheduled first, then the procedure or surgery should follow. For sequence guidelines and examples see Figure 1.

b. Some procedural combinations are not recommended, such as elective imaging that must be read prior to the procedure.

		Example 1	Example 2	Example 3	Example 4
Step 1	**Arrival to Perioperative Services Location: Registration and consent**	Arrive to holding room for anesthesia assessment, consents, MRI safety documentation	Arrive to holding room for anesthesia assessment, consents, nuclear medicine safety documentation	Arrive to holding room for stealth MRI marker placement, assessment and consents	Arrive to holding room for anesthesia assessment, consents, CT safety and contrast screening
Step 2	**Non-invasive Imaging in radiology or minor procedure or study**	Brain MRI	Nuclear Medicine Study	Stealth MRI	Chest CT
Step 3	**Transport direct from imaging/ procedure to OR for surgery**	LP	Bone marrow aspirate or other minor procedure	Craniotomy	Bronchoscopy and Laryngoscopy
Step 4	**Recovery in the perioperative/ surgical location**	Recovery in perioperative / surgical location	Recovery in perioperative / surgical location	Recovery in perioperative / surgical location	Recovery in perioperative / surgical location
Notes	**Clinical significance for sequencing recommendations**	MRI images may be impacted from trauma from the LP, so imaging should be performed first	Nuclear Medicine study should be performed prior to the procedure or diagnostic results will be influenced	Stealth MRI performed on the day of surgery may save family an unnecessary night in the hospital	Bronchoscopy may influence interpretation of the chest CT scan, thus optimal to have bronchoscopy performed after the imaging

Figure 1: Template for Sequencing Coordination of Anesthetic Care.

For Example: MRI needs to be read and reviewed with the Interventional Radiology (IR) attending prior to performing joint injections, so taking the patient direct to IR leads to wasted time in the IR suite, and extra anesthesia time, so these must be purposefully planned to be separated. For additional examples see Figure 2.

Types of Procedures/ Imaging	Clinical Significance
Dental rehabilitation and adenoidectomy	nasal endotracheal tube required for dental procedure obstructs ability to excise adenoid tissue
T&A and pH probe	the pH probe cannot be in place during immediate T&A postop period due to risk of irritation and ensuing hemorrhage to newly cauterized tonsillar bed
Any invasive procedures with cardiac catheterization	combining EGD/colon or dental rehabilitation with a cardiac catheterization, presents increased risk for bacteremia.
MRI	Any non-urgent imaging that is required to be read prior to the procedure

Figure 2: Procedural/Imaging Combinations that are Not Recommended.

Actual Results and Outcomes

Positive outcomes include both significant patient satisfaction with the approach and better understanding of best practice for sequencing and planning coordinated anesthetic care. Families of children requiring combined care procedures can now expect a well-executed hospital experience (see Figures 3 and 4), improving satisfaction. Confirmation of enhanced patient and family satisfaction are evidenced by responses to our patient satisfaction survey (IRB # 120682). Families shared with us their impressions of their experience with this program.

"I am extremely pleased with the communication level and the compassion shown in trying to coordinate these procedures. My child does not handle anesthesia well and it helped my peace of mind knowing that this was going to be a one-time anesthesia."

Parent described the coordination of care as "lifesaving" for her autistic child. "It decreased my child's aggression and anxiety."

"Improved my child's safety"

"With him being 2 years old we wanted to limit his exposure to anesthesia"

"Appreciate the opportunity for multiple procedures in the same day since we live so far away"

"Initial communication from both clinics was a little confusing, but once the nurse (pre-operative clinic) became involved, everything became clear. Great experience overall!"

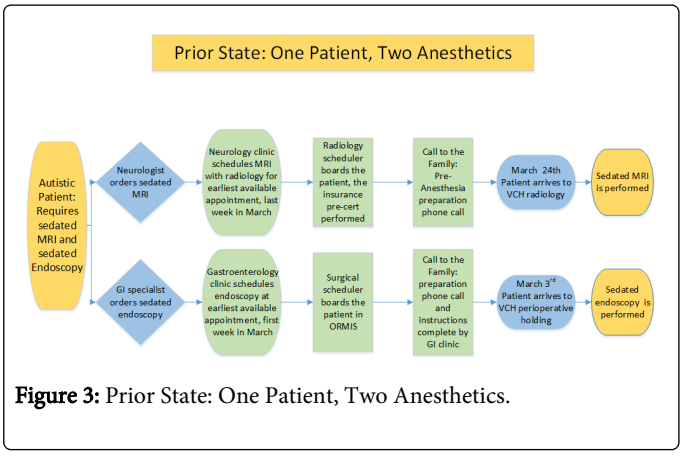

Figure 3: Prior State: One Patient, Two Anesthetics.

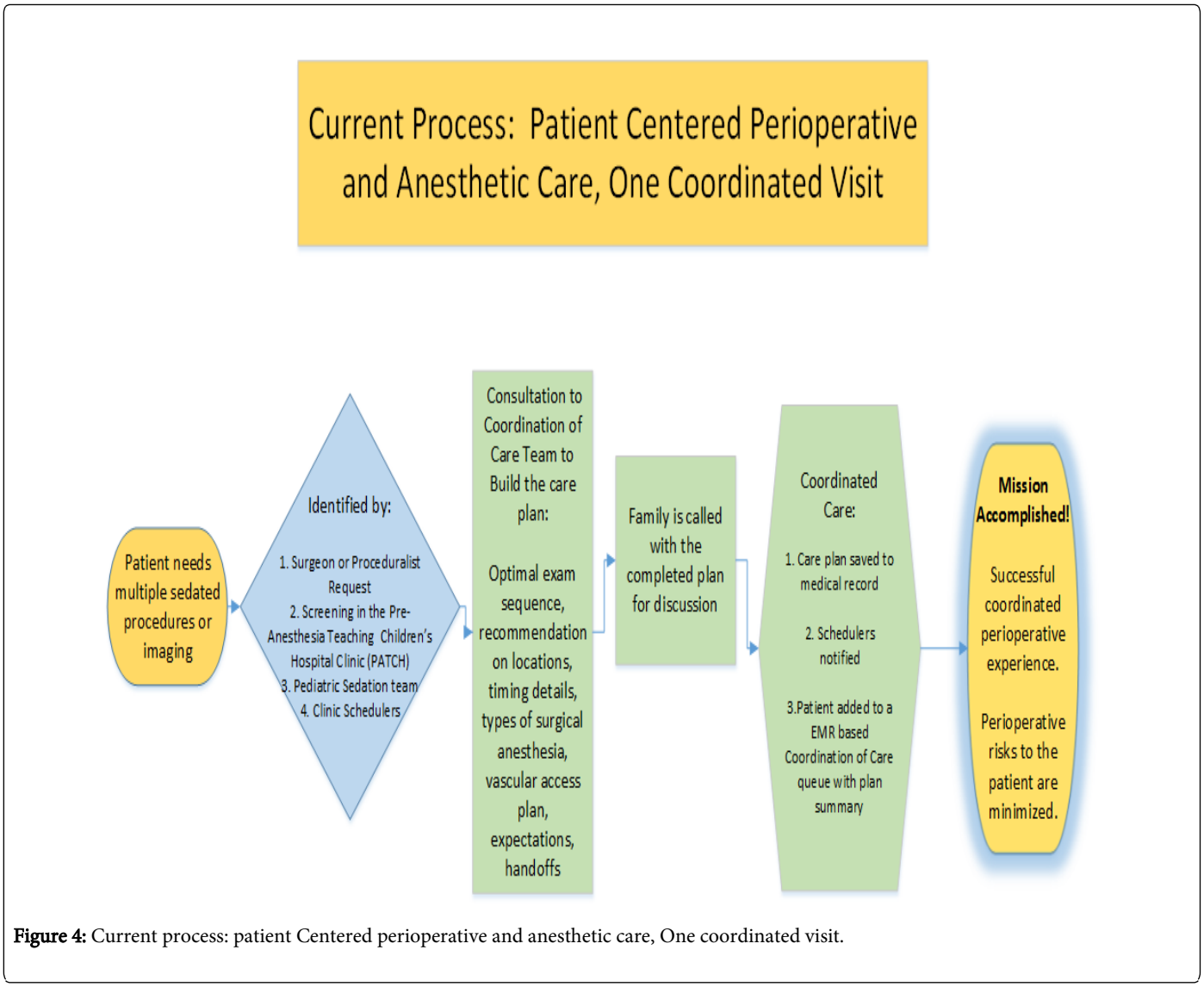

Figure 4: Current process: patient Centered perioperative and anesthetic care, One coordinated visit.

In addition to improving satisfaction, we hypothesize that patient risk is likely reduced by well-planned care that minimizes the number of required preoperative fasting experiences, preoperative anxiety, intubations, venipunctures and multiple discrete anesthetics. This is especially important for medically complex children who are at high risk for complications. Furthermore, this program allows fewer separate hospital trips, resulting in cost savings to families who travel a significant distance for each visit, and reduces absences from school or work days.

The program began in December 2011. To date, we have completed over 300 cases. Development of this program did not add expense for the hospital. Instead, the program grew as a result of two committed colleagues, who invested in seeing this concept become a real and sustainable program. One of our pediatric anesthesiologists has acted as physician champion of this program, with partnership from one of our perioperative nurse practitioner leaders. Ultimately, communicating the intent of the program to colleagues throughout the institution has helped create increasing enthusiasm for the process supporting coordination of services. We are experiencing an increase in requests now that we have a well-defined care pathway. As the service continues to grow, we recognize that sustainability will only be achieved through further team work, and we are beginning to engage and train a dedicated perioperative advance practice nursing team to help plan and coordinate these requests in the future.

Methods

IRB/Consent:

The study was approved and evaluated by the IRB and determined to be non-research and consent therefore is not necessary.

RE: IRB# 120682 "Patient/Family Satisfaction with Coordination of Multiple Procedures Under Single Continuous Anesthetic." A designee of the Institutional Review Board reviewed the research study identified above. The designee determined the project does not qualify as "research" per 45 CFR §46.102(d). Family satisfaction is discussed

via phone call and documented in a secure de-identified database, following their perioperative care.

To improve our process, we de-briefed with stakeholders and reviewed a number of early cases, and three key issues were identified. First, communication flow and a clear process was needed to support the team work. Second, an informatics access point for coordination and accountability for the plan was also necesarry. Finally, identifying team leaders for aligning resources and scheduling was also essential for success. This was an iterative process, and required ongoing communication to achieve a well-coordinated team approach. Bringing key stakeholders together to debrief was the most efficient form of designing and re-designing our approach. Repeating this investigation at other care organizations would start with identifying a physician champion who can lead the process development. First steps would include engaging key personnel, including admitting, registration, surgical schedulers, and anesthesia, surgical and informatics leaders, to start the discussion on how best to accomplish this coordinated care in their individual institution's setting.

Discussion

This coordination supports a culture of personalized care that children and families appreciate. Additionally this methodology streamlines the patient's care experience, specifically including the opportunity to decrease repeated anesthetic exposure. As a growing body of scientific research suggests a possible risk of long term neurocognitive deficits related to anesthetic exposure at an early age, this work is clinically relevant. A 2013 article by Bong et al. in Anesthesia and Analgesia, describes an observational cohort study undertaken to determine whether children exposed to general anesthesia for minor surgery during infancy exhibited differences in academic achievement at age twelve years, compared with children who were never exposed to anesthesia or sedation. Findings include a 4.5 times greater odds of a formal diagnosis of a learning disability by age 12 years in children who had been exposed to general anesthesia. Although further research is needed to sort out this clinical question of causality, it seems prudent to proactively minimize the number of exposures to general anesthesia for infants and children. Also, social media is actively bombarding parents of young children with these concerns and thus parents and families are seeking opportunities to minimize repeated anesthetic exposure.

Conclusions

After a review of the literature, our team has not identified another care organization that consistently and prospectively plans for one continuous anesthetic for multiple procedures for children. Evidence supports this planning as necessary, due to potential neurological sequelae related to anesthetic exposure at an early age.

Our experiences thus far have guided our development of the template for sequencing coordination of anesthetic care (see figure 1 and 2). Evaluation of our program has included both patient satisfaction feedback and successful streamlining of the perioperative process (see figure 3 and 4). We are enthusiastic to further explore other potential positive effects of this approach, including cost savings for the perioperative service line. This is especially relevant as our health care industry is challenged to shift from a fee-for-service model to a value based health care purchasing model.

This paradigm is dedicated to patient centered care and emphasizes the ethic of making the patient the first priority, rather than scheduling at the convenience of the operating room or surgical schedule. Although identifying the best process for coordinating this care will be somewhat different at each organization due to scheduling and registration systems, we hope that this article shares a framework on how to begin and thus encourages other organizations to develop similar programs.

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