

CASE AND COMMENTARY: PEER-REVIEWED ARTICLE

How Should Trainees' Influences on Postoperative Outcomes Be Disclosed?

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Abstract

Conflict arises when surgeons and anesthesiologists disagree about goals of care in perioperative settings. Collaboration is essential for safe, efficient, and effective care. Drawing on 2 pediatric cases that highlight risks of anesthetic exposure, this article examines the influence of surgical training on outcomes, barriers to collaboration, and anesthesiologists' ethical obligations to educate surgeons and parents about anesthesia-induced neurotoxicity risks. The article also discusses how to align surgical and anesthetic practice during surgeries with prolonged anesthetic use.

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Cases

Case 1. A 14-month-old presents with severe hydronephrosis from ureteropelvic junction obstruction. The parents are offered a novel, minimally invasive surgery—*robotic-assisted pyeloplasty*. The surgeon describes potential benefits, such as decreased pain, improved cosmesis, and shorter hospital stay, but does not discuss standard operative times for this procedure.

While obtaining consent for anesthesia, the anesthesiologist discusses prolonged anesthesia exposure risks, including long-term negative effects on memory, behavior, and learning, and explains that risk increases in surgeries longer than 3 hours and that robotic surgeries typically take 5 hours. The child's parents express concern and request additional discussion with the surgeon about possible risks and benefits. The surgeon explains the basis of his decision not to perform the procedure via open incision and reminds the child's parents of the importance of correcting an obstruction. The surgeon later confronts the anesthesiologist about having upset the parents and aroused their doubt about the procedure.

Case 2. A one-year-old with a history of traumatic brain injury secondary to a fall presents for cleft palate repair with bone graft harvest. The parents are concerned about their child's future neurological limitations, particularly since

they recently read about a US Food and Drug Administration (FDA) warning about anesthesia-induced neurotoxicity in children under age 3. During surgery, a fair amount of time is devoted to teaching a surgical fellow, which lengthens the surgery duration to 4 hours. The anesthesiologist expresses concern that lengthening surgical time for educational purposes is not in the patient's best interest.

Commentary

In December 2016, the FDA issued a safety warning that “lengthy use of general anesthetic and sedation drugs during surgeries or procedures in children younger than 3 years ... may affect the development of children’s brains.”¹ The warning applies to all inhaled anesthetics, barbiturates, benzodiazepines, ketamine, and propofol. Essentially all of the commonly used agents for general anesthesia and sedation in pediatrics are implicated, with the exception of opioids and dexmedetomidine. The warning is based primarily on preclinical studies in animals in which prolonged exposure to anesthetic agents caused neuronal apoptosis and long-term effects on the animals’ behavior and learning.² However, specific patterns of neuropsychological deficits following early exposure to general anesthesia have not been conclusively demonstrated in children. SmartTots, a collaborative research endeavor between the FDA and the International Anesthesia Research Society, reports no overt, persistent neurocognitive deficits in human infants after brief anesthetic exposures.³

Although the extent of long-term neurocognitive damage following young children’s prolonged anesthetic exposure is not known, extant data is troubling enough to prompt anesthesiologists to consider their ethical obligations to protect patients. A primary issue is that knowledge of anesthetic neurotoxicity risk is not uniform among clinicians.⁴ No major articles on this topic have yet been published in the *American Journal of Surgery* or the *Journal of Pediatric Surgery*, for example. It is imperative that anesthesiologists advocate for children’s surgical safety by educating their surgical colleagues, communicating risks to parents, and actively limiting anesthetic exposure.

The cases highlight 2 important issues that might cause increased anesthetic exposure in young children and increase their risk of long-term learning and behavioral disability: inappropriate communication of risks (timing, duration, and age at time of surgery) and learner involvement in prolonged surgeries.

Barriers to Anesthesiologist-Surgeon Collaboration

Anesthesiologists are consultants who specialize in [pain management](#) and maintenance of physiologic homeostasis during invasive procedures. Key to this role is collaboration with colleagues in numerous specialties to establish and achieve treatment goals.

Siloed approach to practice. Although emphasizing shared clinical responsibility results in increased safety, efficacy, and efficiency of patient care,⁵ historically, each specialty adopted a “soloist” approach to expert care.⁶ There was little communication between surgeons and anesthesiologists regarding best

practices for perioperative risk reduction. Advancements in medicine, improved technology, and altered social expectations, however, have favored a team-oriented approach to care.

Scope of expertise. Although anesthesiologists and surgeons share responsibility for [patient safety](#), their scope of expertise differs. Surgeons are trained to diagnose conditions and execute a treatment plan, while anesthesiologists are trained to identify impediments to concomitant safe anesthetic care. In the first case, the surgeon was operating within his scope of practice by choosing a surgical option that minimized the most common postoperative complications and concerns. The anesthesiologist drew on her expertise (and fulfilled her duty) in communicating with the parents about anesthetic complications that can occur following prolonged operative time, which resulted in conflict with the surgeon.

Lack of awareness of risk. Although surgeons have a duty to disclose surgical decisions that could increase anesthetic risk, they might be unfamiliar with recently issued neurotoxicity warnings from the FDA or with anesthetic implications of a particular surgical approach.⁴

Hierarchical practice structure. Although effective communication is critical for patient safety and team building, existing barriers such as hierarchies, differing goals of care, and divergent opinions about what constitutes appropriate disclosure can limit successful communication.⁷ The surgeon is the primary caregiver and thus the assumed care team leader; an anesthesiologist is viewed as a consultant. This medical hierarchy could discourage some surgeons from including anesthesiologists in perioperative decisions until after a problem is identified. By not including anesthesiologists, transmission and exchange of important clinical information among colleagues can be a source of delay and harm.

Disagreement about need for disclosure. Another barrier to effective collaboration is disagreement about risk. Some clinicians who are aware of the FDA warning and research supporting it might question whether and how to [communicate this risk](#), particularly given that conclusive research in humans is lacking. One expert explained, “Anesthesiologists and surgeons are struggling with how—and sometimes whether—to explain a theoretical hazard to parents who are already worried about the real risks of their child’s medical problem and the surgery needed to correct it.”⁸ It is possible that both the surgeon and the anesthesiologist in case 1 have read the relevant literature and disagree about its significance. Controversy can develop if care team members disagree about the extent to which risk stratification should influence thinking about care management goals.

Lack of surgeon buy-in. Notably, some surgeons might not think it is their role to communicate risk. Byrne et al gathered a panel of 4 pediatric surgeon specialists to generate dialogue about anesthetic neurotoxicity, surgical options, and current methods of addressing parents’ concerns.⁹ Panelists expressed

frustration and reluctance to discuss risk of neurocognitive deficits with parents due to the absence of clear evidence: “Surgeons tended to refer the question back to anesthesiologists and to rely on them for discovering the answers ... [since] there was much sensitivity about transferring partial and inconclusive information to parents and to disturbing the parent/surgeon communication process.”⁹

Timing of disclosure. Although obtaining informed consent is typically how anesthesiologists and surgeons express respect for patient autonomy, they risk undermining parental decision making if they choose an inopportune time for disclosure. Because surgeons establish patient-physician relationships during presurgical office visits, there is time to discuss goals of care, risks, and benefits. But anesthesiologists typically do not meet patients or parents until surgery day, so they have less time to earn parental trust and a narrow time frame in which to disclose anesthetic neurotoxicity. This just-before-surgery disclosure can be disconcerting for parents, and there is a risk that complex information will be unclearly or awkwardly presented. Risk perception is also subjective,¹⁰ and parents’ emotional responses to risk can lead parents to delay surgery or diagnostic procedures; canceling surgery can lead to frustration and animosity among all stakeholders.

Resolving Ethical Questions About Consent

It is impossible for all surgeons and anesthesiologists to be fully knowledgeable about changes to recommendations for safe, evidence-based practice, but both are obliged to keep current about practice recommendations, communicate about them, and collaborate on the basis of them. In the first case, the anesthesiologist probably should have first engaged the surgeon in a private discussion about how anesthetic risk is increased by prolonging surgery, regardless of the merits or drawbacks of the purposes of prolongation. The anesthesiologist could have stated the FDA warning as a fact, educating the surgeon about it as necessary. However, when 2 physicians have equal practicing authority but disagree on the practice approach, it can be difficult to determine whose opinion should be more influential.

When there is shared responsibility for patient safety and outcomes, how should risks and benefits best be conveyed to a child patient’s parents? In theory, all specialists should disclose risks and benefits of their respective procedures.¹¹ If a surgeon chooses nondisclosure, is an anesthesiologist ethically obliged to inform the parents? One argument against informing parents of risks is that acquiring knowledge of risks may cause parents needless anxiety since the risk data are uncertain and there might be no alternatives to surgery. A counterargument, however, is that withholding even incomplete information about risks undermines autonomy, promotes paternalism, and has legal and ethical implications.¹² An anesthesiologist should prioritize beneficence, nonmaleficence, and respect for autonomy over promoting collegial harmony, but every effort should be made to align or realign stakeholders’ goals of care and promote accord, including through legal, educational, and clinical means.

Legal initiatives. In my practicing state of Texas, anesthesiologists are now legally obliged to inform parents about risks of prenatal and early childhood anesthesia exposure. Anesthesia consent processes include explicit statements about the risk of long-term negative effects on memory, behavior, and learning following prolonged or repeated exposure to anesthesia during pregnancy or early childhood.¹³ This requirement would seem to solve anesthesiologist-surgeon disagreement about whether and when to acknowledge risk and include it in informed consent discussions with parents. Questions remain, however, about when to inform parents, who should inform them, and how risks should be communicated without causing alarm. Many anesthesiologists in the United States do not use a separate anesthesia consent form.¹⁴ If the Texas state precedent were accepted nationally, it could encourage anesthesiologists to issue a consensus statement and establish guidelines about communicating risks to parents of anesthetic neurotoxicity during surgery. At the very least, there should be consistency about how to respond when a parent asks whether anesthesia is safe.

Educational initiatives. Anesthesiologists should educate their surgeon colleagues about risks of early anesthetic exposure and encourage them to initiate conversations about anesthetic risk during presurgery office-based discussions of surgical options and associated risks. Prioritizing patient safety entails collaboration and hence breaking down hierarchical norms of authority and jurisdiction when they obstruct communication or hinder operating room collegiality. Accordingly, surgeons and anesthesiologists should do presurgical planning about care management, anticipate and discuss risks to patient safety, and commit to collaboratively minimizing patient morbidity before approaching parents with a care plan. This approach is not routinely taken—likely because of time constraints—but the benefits of collaboration and communication for improving patient safety are compelling. Parents benefit from earlier anesthetic risk communication because they have more time to process, research, and clarify critical information. All stakeholders benefit from anxiety reduction related to last-minute surgery cancellation.

Conversations with parents can be supported by distributing pamphlets or posting content online about anesthetic neurotoxicity risk and what clinicians do to reduce it. System-wide educational initiatives can update all clinicians about evolving practice recommendations, FDA warnings, or recently published pediatric anesthetic information. Pertinent information can also be disseminated at regional and national pediatric surgery meetings, perhaps during “ask the expert” panel sessions.

Preoperative clinical assessment. Another way to align goals of care and promote accord would be to require children under age 3 to visit an anesthesia clinic prior to presenting for surgery. This requirement would afford more time for risk communication and for tailoring information delivery to parents’ health literacy levels. Bester et al discuss how extending decisional time frames, using decision aids, and presenting information in “digestible chunks” improve patients’ understanding of complex clinical information,¹⁰ although downsides

include increased financial burden on parents who must finance co-pays, find parking, and take time off work as well as increased production pressure on clinics.

Technology and Trainee Influence on Safety

Novel technology influence. Surgeons have duties to utilize their expertise not only to care for patients but also to further medical progress, incorporate novel technology, and advance their fields. Importantly, however, doing so can prolong surgery duration and increase anesthetic risk. In the first case, the surgeon did not disclose that a robotic procedure, while reducing surgical risk, inadvertently increases anesthetic risk, since technical challenges tend to demand longer operative times. Even if unintentional, omitting discussion of this risk can influence decision making. Robbins opines that anesthesiologists have ethical, clinical, and legal obligations to disclose pertinent information in consent discussions, even when risk disclosure places them at odds with another physician caring for the same patient.¹¹ In the first case, the anesthesiologist should have discussed concerns with the surgeon prior to speaking with the child's parents, but revealing how a robotic procedure conferred increased anesthetic risk was justified.

Learner influence. Healey describes how trainees "hone their skills prior to passing on the benefit to others is a necessary and, to a large extent, unavoidable aspect of becoming a competent and skilled practitioner."¹⁵ However, complication rates and mean surgery duration are higher in teaching hospitals.^{16,17} The second case describes a scenario in which a child experienced prolonged exposure to anesthesia due to learners' needs. One could argue that [prioritizing trainee education](#) over possible adverse patient outcomes is justified because the knowledge a trainee gains has potential to help clinicians fulfill their duty to motivate good outcomes for future patients. But one could also give more weight to the action's consequences, one of which could be harm to the child's growth and development. Learner participation should be allowed for educational purposes, but clinicians should limit learner involvement that causes surgery duration to exceed 3 hours in children younger than age 3.

Practice Modification

In addition to standardizing how anesthetic risk is communicated, anesthesiologists should advocate for and agree on practice modifications that reduce exposure, shorten surgery duration, and minimize risk. It is not currently clear whether anesthetics lasting longer than 3 hours cause worse outcomes for children's learning and behavior than multiple short-acting anesthetics, but anesthetic duration should be considered carefully. Some children require diagnostic imaging to guide a surgeon's approach, which can require general anesthesia or sedation due to age-related nonadherence. Risks of using multiple anesthetics should probably also be considered and weighed against the value of treatment goals.

One opportunity for practitioners to limit anesthetic exposure is to discuss required imaging protocols with radiologists to determine when total scan time,

and thus anesthetic exposure, can be reduced. It might be difficult to negotiate which images can be delayed or scan times shortened because of many clinicians' heavy reliance on diagnostic imaging to guide treatment. Nonetheless, anesthetic exposure risk can be additive, so anesthesiologists are right to raise it as a source of concern.

Shared Responsibility and Decision Making

When treatment cannot be delayed, one practice approach—until there is more compelling data—is to shorten anesthetic duration, minimize concentrations of agents known to pose risk, and improve communication. Parents need to weigh risks of anesthetic morbidity against risks of delaying procedures. A decision whether to operate will depend on what is ultimately valued by parents, except in cases in which death or significant disability would result from not doing surgery. In situations in which a major benefit is cosmetic (eg, cleft lip repairs and circumcisions) or controversial (eg, serial imaging to differentially diagnose autism), some parents might deem the cognitive and behavioral risks of anesthesia not worth the potential benefits of surgery.

Conclusion

Interprofessional communication in perioperative settings necessitates collaboration among anesthesiologists, surgeons, and all caregivers. To express respect for autonomy, physicians should inform parents of risks, benefits, and alternatives. Depending on pathology, some might argue that it could be more prudent to emphasize the benefits of surgery than the risk of neurologic developmental delay. Sharing decision making among anesthesiologists, surgeons, and parents is appropriate since it enables patient-centered decision making, preserves autonomy, and discourages paternalism.

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