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## FROM THE EDITOR

### Bringing Down the Drapes

Sara Scarlet, MD, MPH and Patricia Doerr, MD

For most, the operating room (OR) is a place of mystery, shrouded in sterile drapes. This holds true for patients and clinicians alike, few of whom will ever see the inside of an OR. Depictions of ORs tend to highlight surgeons' unique roles. It comes as no surprise, then, that most depictions of the OR rely on 2 central figures—surgeon and patient.<sup>1</sup> However, these depictions fall short. Modern surgical care is built on a triadic relationship between surgeons, anesthesiologists, and patients.

Surgical patients—who are often anesthetized and chemically paralyzed—are among the most vulnerable patients in health care. Surgeons and anesthesiologists work together in pursuit of common a goal—to care for and protect these patients while they undergo operations that promote and restore health. It is this shared goal that unifies surgeons and anesthesiologists and serves as the foundation for relationships between them.

Relationships between anesthesiologists and surgeons are complex, owing in part to their disparate roles in the operating room. To successfully complete an operation, a surgeon often must focus intently on a specific region of the body or task at hand. This narrowing of perspective begins when the drapes are unfurled, covering up a patient's body with the exception of the surgical site. In contrast, the anesthesiologist's primary focus is maintaining a patient's homeostasis in a fluid, tenuous environment. With induction of anesthesia, the patient often loses their ability to breathe, and the anesthesiologist must quickly master that function for the patient. Additional changes in heart rate and blood pressure occur, and the anesthesiologist must take a holistic approach to monitoring patients' vital functions, awareness, and comfort on a continuous basis for the entire duration of an operation.

This issue of the *AMA Journal of Ethics* examines current and [historical relationships](#) between surgeons and anesthesiologists, who can sometimes have different perspectives about what it means to take good care of patients and how to manage complications and crises. It examines ethical questions related to the scope of these different specialists' expertise and authority and their responsibilities during all phases of perioperative care.

During the course of an operation, transitions between anesthesiologists are common for the purpose of [relief breaks](#) or shift changes. Today, anesthesia

care is founded on a systems-based care team model, wherein multiple anesthesiologists share the work of anesthesia during a single operation.<sup>2</sup> Surgeons, however, rarely step away from the operating table or take shared responsibility for procedural tasks. Unsurprisingly, these differences in practice contribute to conflicting views on whether breaks and transitions of care have a place in the OR.

One important set of issues pertains to [cardiac arrest in the OR](#), a rare but catastrophic event. Eliciting patients' code status and setting forth a clear plan should a patient have a cardiac arrest in the OR is an essential part of perioperative planning, especially for patients who have a do-not-resuscitate order in place. In the event of a patient cardiac arrest in the OR, surgeons' and anesthesiologists' differing perspectives can influence the management of care in these challenging scenarios.

When something goes wrong in the OR, surgeons and anesthesiologists work together to promote patient safety. Sometimes, despite their best efforts, there are [poor outcomes](#). It is difficult—and often impossible—to determine who is at fault for an error in the OR, with the result that surgeons and anesthesiologists often share responsibility for errors and complications. Unfortunately, surgeons and anesthesiologists may blame one another for bad outcomes, which can hinder an appropriate response to errors that occur in the OR.

While surgeons and anesthesiologists often work in tandem on different parts of a patient's body, sometimes they share the same space. When surgeons [operate on the airway](#), collaborative joint decision making must occur. Yet in such situations, conflicts can take place. These conflicts could be mitigated by cross-training experiences, which foster open communication channels and mutual respect between professions. Unfortunately, these experiences are rare among resident trainees, owing to work-hour restrictions and changing requirements for certification.<sup>3</sup>

In the past, surgeons unilaterally made decisions about [postoperative pain control](#), but this situation is changing. Advances in pain management have allowed anesthesiologists to become significantly more involved in pre- and postoperative care by offering advanced pain management techniques (nerve blocks and epidurals) and multimodal pain medicine management.<sup>4</sup> The creation of enhanced recovery after surgery (ERAS<sup>®</sup>) pathways, a collaborative effort between anesthesiologists and surgeons, has improved patient outcomes.<sup>5</sup> As anesthesiologists have taken a more active role in managing postoperative pain, conflicts can arise between anesthesiologists and surgeons, who may have different philosophies on how best to manage their patients' pain.

This issue examines the complex, interdependent—yet sometimes strained—relationship between 2 physicians who care deeply for their patient. With different training backgrounds and perspectives come varied thoughts on the

best course of action in a given scenario. A common theme throughout this issue is that improved communication and mutual respect lead to better patient care and outcomes. When anesthesiologists and surgeons have an established relationship, understand the strengths of each specialty, and maintain good perioperative communication, the barriers come down. The unfurled drape becomes a sterile wall, and nothing more.

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## CASE AND COMMENTARY: PEER-REVIEWED ARTICLE

### How Should Trainees' Influences on Postoperative Outcomes Be Disclosed?

Rhashedah Ekeoduru, MD

#### 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.”<sup>1</sup> 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.<sup>2</sup> 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.<sup>3</sup>

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.<sup>4</sup> 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,<sup>5</sup> historically, each specialty adopted a “soloist” approach to expert care.<sup>6</sup> 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.<sup>4</sup>

*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.<sup>7</sup> 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.”<sup>8</sup> 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.<sup>9</sup> 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.”<sup>9</sup>

*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,<sup>10</sup> 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.<sup>11</sup> 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.<sup>12</sup> 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.<sup>13</sup> 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.<sup>14</sup> 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,<sup>10</sup> 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.<sup>11</sup> 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."<sup>15</sup> However, complication rates and mean surgery duration are higher in teaching hospitals.<sup>16,17</sup> 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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The author(s) had no conflicts of interest to disclose.

*The people and events in this case are fictional. Resemblance to real events or to names of people, living or dead, is entirely coincidental. The viewpoints expressed in this article are those of the author(s) and do not necessarily reflect the views and policies of the AMA.*

**CASE AND COMMENTARY**

**Who Should Manage a Patient's Airway?**

Stephen Collins, MD, MS, Megan Coughlin, MD, and James Daniero, MD, MS

**Abstract**

Ear, nose, and throat procedures in intraoperative environments often involve surgeons' and anesthesiologists' use of shared and sometimes competing approaches to managing a patient's airway. Both clinicians have expertise in laryngoscopy and unique skill sets needed for advanced airway management. This article explores how joint decision making is best achieved despite disagreements and how collegial, collaborative relationships can be preserved to prioritize patients' safety during risk assessment and goal setting.

**Case**

Ms C is a 52-year-old woman with a hoarse voice and trouble swallowing. She has a history of obesity and obstructive sleep apnea and cannot lay flat without getting short of breath, due to a large (8 x 8 cm) benign thyroid mass that deviates her trachea and narrows its oral opening. Ms C has elected to have a total thyroidectomy with Dr E, a senior ear, nose, and throat surgeon and Dr A, a junior anesthesiologist new to the practice group.

Being able to breathe for a patient after suppressing (via administration of anesthetics and paralytics) the natural drive to breathe is an anesthesiologist's primary focus during surgery. Developing an airway plan is how anesthesiologists and surgeons work together to map out how they will intubate the patient and manage risk that a patient's airway could collapse during general anesthesia induction. A Mallampati score is used to predict how likely a patient can be intubated without complication. Ms C's Mallampati score is 3, indicating her intubation will probably be difficult.

When discussing the airway plan for Ms C's procedure, Dr A recommends fiberoptic intubation, emphasizing the importance of a more conservative, less risky approach to securing Ms C's airway. That is, Dr A's preferred airway plan involves keeping Ms C awake and breathing on her own while they place and secure her breathing tube prior to general anesthesia induction.

Dr E asserts that fiberoptic intubation is not necessary. Although preserving Ms C's drive to breathe longer is less risky, being awake can also make a patient



anxious. Dr E is concerned that Ms C will feel terrified and panic during fiberoptic intubation and thus prefers an airway plan that rapidly secures her airway via rigid bronchoscope.

Dr A reluctantly defers to Dr E's seniority and experience and agrees to implement Dr E's airway plan. Ms C is brought to the operating room, monitors are applied, and she is placed in a 45-degree, head-up position to help her feel more comfortable breathing. Dr A administers anesthetics and paralytics and places an oral airway, but he has trouble securing it. Dr A uses a 2-handed technique to mask ventilate Ms C, but not much oxygen moves into her lungs and her oxygen saturation falls to 88%. Dr A then performs direct laryngoscopy but cannot visualize Ms C's vocal cords and thus cannot intubate her. The team again attempts to mask ventilate Ms C but without success. (After amending the initial fiberoptic intubation plan, Dr A apparently has no back-up plans for failed direct laryngoscopy.) Dr E then attempts several times to place the airway via rigid bronchoscope, but Ms C's oxygen saturation, blood pressure, and heart rate fall, indicating looming cardiac arrest. Finally, Dr E secures Ms C's airway, she slowly stabilizes, and her surgery proceeds.

Drs A and E are relieved. They wonder about how they weighed potential risks and benefits in planning and implementing Ms C's airway plan.

### **Commentary**

Communication and teamwork are important and complex elements in perioperative patient safety. Although assessment of surgical risk factors and outcomes has traditionally prioritized patient comorbidities, extent of disease, and complexity of surgery, there is increasing recognition of interprofessional interactions within teams and within the systems and environments in which team members work as critical contributors to adverse events.<sup>1</sup> Despite its high-stakes implications for patient safety, operating room communication remains underresearched.<sup>2</sup> Within the operating room—a place of interprofessional demands, potential tension, and need for collaboration and teamwork—[professionals](#) have distinct roles and responsibilities in motivating shared patient safety and patient care goals. Surgeon-anesthesiologist relationships might be the most central factor in determining how effectively operating room teams function. As the case highlights, the dynamics between these 2 physicians—who might share, yield, or compete for leadership in operating room settings—can ultimately facilitate or impede success.<sup>3</sup> This article explores how joint decision making is best achieved despite disagreements and how collegial, collaborative relationships can be preserved to prioritize patients' safety during risk assessment and goal setting.

### **Communicating for Collegiality and Patient Safety**

The word communicate derives from the Latin *communicare*, meaning to impart and participate; and to “speak forth” is the literal meaning of *profess*, the root of *professionalism*.<sup>4</sup> Both anesthesiologists and surgeons face and contribute to

communication challenges that have profound medical, ethical, legal, and personal significance within perioperative environments. Perioperative communication can be for purposes of patient safety, negotiating professional relationships, distributing responsibility, assessing competence, or cooperating on a common interventional goal. Success in communication and other kinds of [interdisciplinary collaboration](#) is influenced by established hierarchies, perceptions of professional roles and leadership, training and expertise, mental models, personality, priorities, stress, and institutional culture. Importantly, how well professionals know, trust, respect, and rely on each other during routine and tense clinical moments influences whether and how information critical to an intervention's success and a patient's safety is communicated.

Conflict about professional decisions, variation in expertise, and judgment differences are to be expected and can motivate collegiality and patient safety when managed well. If an anesthesiologist-surgeon relationship functions well, each clinician can help the other, which serves the interest of the patient.<sup>3</sup> If this relationship does not function well, working environments can be [unpleasant and unproductive](#). In the above case, the relationship between the anesthesiologist and surgeon is not a long-standing one, and significant generational and [hierarchical differences](#) exist.

Communication failures often arise from vertical hierarchical differences, role conflict or ambiguity, and interpersonal struggles or power differentials.<sup>5</sup> In particular, interprofessional communication failures can arise when professionals lower in a hierarchy perceive their co-professionals as unwilling to listen, fear offending them, or are unwilling to risk being perceived as incompetent. In the highlighted case, Dr. A reluctantly defers to the seniority of the surgeon, as he asserts that fiberoptic intubation is not necessary. Safety priorities, case elements, and contingency plans are not discussed, and the junior anesthesiologist fails to communicate a back-up plan after failed laryngoscopy.

Other hurdles to effective collaborative communication, decision making, and teamwork include lacking confidence in others, lacking awareness of cross-disciplinary colleagues' knowledge and skills, feeling threatened by a perceived loss of autonomy, and territorialism. The "captain of the ship" and "quarterback" metaphors for surgeons' roles, for example, are antiquated, and those who hold onto them might have the most difficulty sharing responsibility.

In order for anesthesiologist-surgeon relationships to function well, the 2 professionals must agree on common patient care management goals and a strategy for airway management while recognizing constraints on care goals for any given patient. A plan in which one professional "asserts" and another "reluctantly defers," as in the case scenario, is less likely to be successful or adaptable. Expressing respect for others' expertise and skill; communicating openly, clearly, nonpunitively, and respectfully; acknowledging conflict

productively; and sharing information inclusively are key to successful interdisciplinary teamwork and to taking good care of patients. This formula is easily stated but can be hard for some to practice. In anesthesiologist-surgeon relationships, the clinicians' familiarity with each other and frequent sharing of patient case management duties can defuse conflict and help reconcile disagreement. Alternatively, familiarity can perpetuate dysfunction and distrust, creating distress and even fear.

### **Making Safer Teams**

In other high-risk, high-intensity environments such as aviation, standardized communication tools and behaviors have been developed, studied, and applied to enhance teamwork and reduce risk.<sup>6</sup> These strategies have been incorporated in high-risk environments like operating rooms to reduce error and improve safety.<sup>7,8</sup> One such tool adapted from aviation, crew resource management (CRM), includes simulation, interactive group debriefings, and performance measures with a goal of improving team functioning.<sup>9</sup> Mental models have not been well studied within surgical and perioperative environments,<sup>10</sup> but one recent study of professionals from multiple disciplines in cardiac operating room settings reported a high degree of variability both within and between professional groups in their recognition of and attribution of importance to distinct critical time points during cardiac surgery that have implications for preventable error.<sup>11</sup> Ultimately, convergence of knowledge of team tasks, goals, and abilities can lead to the development of shared mental models. This approach ideally would allow an anesthesiologist, a surgeon, and all the other team members to anticipate each other's actions and coordinate their behaviors in time-limited situations.<sup>12</sup> A shared mental model should prioritize patient care and safety over informal hierarchical norms and stipulate how leadership is designated and shared during surgery in different situations. For example, a surgical approach to a patient's airway management, when indicated, should be led by that professional most experienced and adept in this skill. In our experience, collegiality protects patients and is nourished by a collaborative environment, an open attitude, and feelings of mutual respect and trust.

Importantly, debriefing and discussing challenging cases or adverse patient outcomes as a team is highly beneficial for team members, enabling them to recognize and repeat successes, learn from mistakes, optimize interdisciplinary relationships, and foster collaboration and a sense of accountability for and collective ownership of patients' safety and care. Regardless of whether these debriefings and discussions are formalized, they should be predicated on the following assumption about each team member: *I believe that you are intelligent, competent, trying your hardest to do your best and seeking to improve, and acting in the best interest of this patient and the organization.*<sup>13</sup>

In the event of patient harm or other adverse events, the surgeon and anesthesiologist also have a responsibility to share details with a patient or

surrogate in a private setting, with full disclosure and openness to fielding and responding to questions. Case difficulties should be communicated even in cases in which there are no patient deaths, complications, or additional care measures. For instance, in the above case, the details of airway management should be discussed with the patient even though the patient was ultimately and successfully intubated. Communication should be done in a professional and empathetic manner, with both anesthesiologist and surgeon present. This disclosure can be documented in a letter to the patient to inform future care needs as well.

### **Airway Management**

All team members' concerns should be voiced, heard, considered, and addressed well in advance of surgery on a patient to allow time for good decision making and inclusive discussion, confirmation of available equipment, and an organized approach to managing a patient's care. In particular, the patient's airway management plan needs to be discussed by the surgeon and anesthesiologist and agreed upon before a patient is taken to the operating room.

In formulating the plan, one team member's skill set can be prioritized. The anesthesiologist's communication of a pharmacological approach to sedation during an attempted awake fiberoptic intubation might alleviate the surgeon's concerns about patient comfort. Alternatively, a surgeon's adeptness and experience with an available rigid bronchoscope might mitigate an anesthesiologist's concerns that a patient remain spontaneously ventilating during the induction process. Of course, a patient should be aware of surgery goals and potential challenges, decision making should be shared when possible, and the patient's agreement with goals and consent to an intervention should be secured.

Intraoperative and postoperative airway management decisions should be informed by relevant considerations of a patient's anatomy, likelihood of success with any planned strategy (eg, video laryngoscopy), image review, and contingency planning. For example, when considering alternative airway management strategies, anesthesiologists and surgeons can exchange views in response to questions like these: Will a standard-sized endotracheal tube pass through this patient's compressed or deviated trachea? Will cricothyrotomy or tracheostomy be possible in a patient with a large goiter, especially in an emergency? Can or should this patient be extubated later, and what challenges exist? Practice domains of the anesthesiologist and ear, nose, and throat surgeon distinctly blur in the operating room during such clinical encounters and discussions; each professional has expertise, proficiencies, and tools that need to be discussed and shared for effective collaboration and good patient care.

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*The people and events in this case are fictional. Resemblance to real events or to names of people, living or dead, is entirely coincidental. The viewpoints expressed in this article are those of the author(s) and do not necessarily reflect the views and policies of the AMA.*

**CASE AND COMMENTARY**

**What Should an Anesthesiologist and Surgeon Do When They Disagree About Terms of Perioperative DNR Suspension?**

Alexander E. Loeb, MD, Shawn Y. Jia, MD, and Casey J. Humbyrd, MD

**Abstract**

This case examines perioperative suspension of a do-not-resuscitate (DNR) order during surgery. The commentary considers the appropriateness of DNR orders; types of DNR order suspension in the context of alternative anesthesia techniques; and what is required from a surgeon, anesthesiologist, and patient or surrogate to reach a decision expressing the patient's best interest. It concludes by offering communication recommendations based on joint discussion and decision sharing.

**Case**

A 76-year-old woman with dementia, Ms B, is brought to the emergency department after she fell at her nursing home. An X-ray reveals a left femoral neck fracture, and she is seen by an orthopedic consultant, Dr S, who recommends surgical repair.

Ms B has numerous comorbidities, including aortic stenosis and chronic atrial fibrillation (severe heart disorders that affect the heart's rhythm and overall function). To treat these conditions, she takes a blood thinner. Ms B also uses supplemental oxygen to treat her chronic obstructive pulmonary disorder. For the past 3 years, her husband took care of her at home and was her surrogate decision maker. Since her husband's recent death, Ms B's son, who lives abroad, placed her in a skilled nursing facility. Last year, Ms B's husband agreed with clinicians' recommendation that Ms B's code status should be do not resuscitate (DNR). Ms B's son, who is her current surrogate decision maker, continues to agree with this recommendation.

That night, an orthopedic surgeon, Dr O, explains via telephone to Ms B's son that surgery should be done within 24 hours to achieve the best possible outcome and that the goals of surgery are to restore Ms B's hip mobility and help palliate her pain. Ms B's son gives consent for his mother to undergo surgery in the morning.

In the morning, with surgery scheduled to begin in 30 minutes, the anesthesiologist, Dr A, meets Ms B in the preoperative holding area; she is

agitated and disoriented. Dr A calls Ms B's son to confirm her past medical history and explains that, based on her comorbidities, she is at a high risk for complications and adverse outcomes. Dr A also explains that, in many cases, a patient's DNR order is suspended during and immediately after surgery. Ms B's son seems surprised. "This is the first time I'm hearing about her being high risk. And, well, the DNR.... She's been DNR for years. Why would I suspend it now? I just talked with the surgeon yesterday about this. I thought this procedure would help reduce her pain." After a pause, Ms B's son rescinds consent for his mother's surgery.

Dr S is surprised and frustrated to learn this news. "Ms B needed this operation and delaying it will only increase her risk of mortality and other complications."

Dr A replies, "I agree that the surgical goals make sense overall. But Ms B is a sick, frail, elderly person for whom a DNR order has been appropriately in place for many years. She could die during surgery, or she could make it through but then require ventilator support and intensive care. Her son was surprised when I mentioned suspending her DNR order."

They stood together, concerned about what to do next for Ms B.

### **Commentary**

Each year, more than 300 000 [patients over age 65](#) are hospitalized for hip fractures.<sup>1</sup> Unfortunately, many of these patients also have numerous comorbidities, as frailty and comorbidity increase patients' risk of falling.<sup>2</sup> Consistent with their medical complexity, 13.6% of hip fracture patients present for surgery with a DNR order in place,<sup>3</sup> creating a variety of perioperative ethical questions that need to be addressed by anesthesiologists, surgeons, and their teams.

### **Why Talk About DNR Status Before Surgery?**

Because the one-year mortality rate for patients who sustain a hip fracture is approximately 30%,<sup>4</sup> discussing general goals of care and particular resuscitation parameters is important, especially for those patients who have not previously considered creating an advance directive. Hip fractures treated nonoperatively have dismal prognoses, with mortality rates above 80%, and complications of bed rest—including pneumonia, pressure ulcers, venous thromboemboli, and general deconditioning—are common.<sup>5</sup> Recent data supports urgent surgical treatment of hip fractures, with improved 30-day mortality seen when surgical wait times are under 24 hours.<sup>6</sup> Regarding anesthesia choice, spinal blocks have demonstrated reduced mortality in some studies<sup>7,8,9</sup> and might also reduce sedation requirements, need for airway instrumentation, incidence of venous thromboembolism, and postoperative confusion, pneumonia, and hypoxia.<sup>7,8,10</sup> American College of Surgeons and American Academy of Orthopaedic Surgeons guidelines both recommend either regional or general anesthesia and surgical treatment for patients with hip fractures.<sup>10,11,12</sup>



### **Self-determination vs Clinical Expertise**

The appropriateness of DNR orders in perioperative environments has been debated for many years. As the administration of anesthesia inherently involves resuscitative techniques, the informed refusal of cardiopulmonary resuscitation and the informed consent to anesthesia are in some ways mutually exclusive.<sup>13</sup> Before the Patient Self-Determination Act (PSDA) of 1990, DNR orders were frequently automatically suspended without discussion with patients, their surrogates, or treatment teams.<sup>14,15,16</sup> A seminal article by Robert Truog in 1991 exposed the inherent conflict between automatically suspending DNR orders and the PSDA.<sup>16</sup> Truog argued for preoperative discussion of DNR order suspension followed by case-by-case decision making instead of a universal policy, suggesting that temporary informed suspension of a DNR order might be most appropriate in perioperative settings.<sup>16,17</sup> American Society of Anesthesiologists (ASA) guidelines followed in 1993,<sup>17</sup> stating that “policies automatically suspending DNR orders ... may not sufficiently address a patient’s rights to self-determination in a responsible and ethical manner. Such policies ... should be reviewed and revised.”<sup>18</sup> With the addition of a goals-directed, limited-attempt-at-resuscitation (LAR) option in 1998,<sup>17</sup> the ASA guidelines suggested 3 options for suspending DNR orders in perioperative settings: [full attempt at resuscitation](#), LAR with regard to specific procedures, and LAR with regard to patients’ goals and values.<sup>18</sup> These 3 options, discussed below, still guide practice today.

### **Three Ways to Enact Suspension**

*Full attempt at resuscitation.* A patient or surrogate could elect to have the DNR order suspended with a full attempt at resuscitation. This option allows not only full suspension of an existing DNR order but also the use of any indicated resuscitative methods and procedures to treat the patient in the intraoperative and immediate postoperative periods.<sup>18</sup>

*Procedure-directed LAR.* With a procedure-directed LAR, a patient or surrogate specifies which interventions and resuscitative measures—such as endotracheal intubation, use of vasoactive medications, positive-pressure ventilation, or electrical defibrillation—can and cannot be performed during surgery.<sup>15,18</sup> Although procedure-directed LAR clearly identifies specific interventions, its inflexibility could result in clinicians withholding treatment for easily reversible conditions<sup>19</sup> because they might feel that their hands are tied in situations in which decisions about medical or surgical interventions are being made by patients without medical or surgical expertise. For example, a patient in respiratory failure due to an opioid overdose might be treated with temporary ventilatory support and naloxone. However, if assisted ventilation is prohibited by a procedure-directed LAR, a patient’s demise would be imminent, avoidable, and likely a source of distress to an anesthesiologist whose hands are tied by the patient’s order, regardless of whether the patient really understood the clinical impact of a critical decision to preclude an indicated clinical option.

*Goal-directed LAR.* With a goal-directed approach, patients articulate their goals and values and rely on anesthesiologists to use their clinical judgment to determine which resuscitative measures are indicated and to interpret which measures best correspond with those goals and values in a specific surgical situation.<sup>18,19</sup> This approach would permit full resuscitation for easily reversible adverse events but also allow withholding interventions that are interpreted as contrary to a patient's quality of life goals, for example, particularly if they're likely to result in major disability, prolonged dying, or subsequent unwanted life-sustaining interventions.

Regardless of the mode used to suspend a DNR order, presurgical plans should be made to indicate whether, when, and where (in a postanesthesia care unit, on a ward, or somewhere else) a DNR order will be reinstated.<sup>18</sup> Interestingly, inpatients' DNR status is not associated with increased morbidity.<sup>3</sup> Accordingly, the presence of an active DNR order in patients' health records should not influence their care unless an intervention is resuscitation related.

### **Choice Perception and Need for Education**

In the case, there is discord among the anesthesiologist, surgeon, and Ms B's son, the surrogate, who believes that his mother's long-standing DNR order and his consent for anesthesia are fundamentally irreconcilable. He acts on this belief by withdrawing consent for Ms B's surgery without adequate discussion with her anesthesiologist and surgeon. While the surgeon and anesthesiologist disagree about whether imminent surgery is appropriate, most likely they are working together to support Ms B's best interests but have not yet reached agreement. A good next step for Drs A and S would be to invite collaborative discussion with her son, with the goal of explaining to him that her situation is more nuanced than the binary option he sees before him. Specifically, Ms B's son needs help seeing the 2 LAR options with partial DNR order suspension that are intermediate between the 2 extremes of surgery with complete DNR order suspension (ie, with full attempt at resuscitation) and no surgery due to maintenance of the DNR order with resuscitative attempts disallowed. Another option not currently visible to Ms B's son is proceeding with surgery while keeping the DNR order in place.

Ms B's son's perception of a lack of choices suggests that he might not fully understand clinically relevant facts about hip fractures in general or what's at stake for his mother in terms of surgical management of her injury. These and other specific points would likely be helpful focal points of discussion to make sure his consent or refusal is adequately informed.<sup>20</sup> Dr S should discuss the nature and surgical management of the hip fracture in detail with Dr A and Ms B's son, as the details of the case might influence the anesthesiologist's technique and the son's decision. For example, a displaced femoral neck fracture might require 2 hours of operating time, lateral positioning, muscle paralysis of the patient, and a large open approach for hemiarthroplasty.

However, a nondisplaced femoral neck fracture might require 30 minutes, supine positioning of the patient, no paralysis, and placement of 3 percutaneous screws, which could be performed under minimal anesthesia or with a peripheral block. Dr S should discuss risks and benefits of nonoperative and operative treatment options to help clarify goals of care for Ms B. Dr S should also explain that Ms B's risk for complications is high and why surgery is still recommended despite those risks. Drs A and S are responsible for educating their patient's surrogate and helping him cultivate understanding so that he can give informed consent or refusal for surgery and other interventions over the course of his mother's care.

Drs A and S should also consult Ms B's health record and ask Ms B's son about her preexisting DNR order—specifically, whether endotracheal intubation or electrical defibrillation is permitted. Alternative anesthesia options should also be explored, including use of positive pressure ventilation, vasoactive medications, and a regional block. Frequently, patients and surrogates are unaware of these anesthetic techniques. Explaining these options to Ms B's son could motivate his deeper and fuller understanding of her care and lead to agreement on her treatment plan—even if that plan is to perform wide-awake surgery under regional anesthesia with an active DNR order, for example. Although surgery under an active DNR order could be uncomfortable for Drs A and S, the risks and benefits of surgery in the face of no resuscitative ability should be discussed with Ms B's son and fully considered.

In this case, it is important that Drs A and S and Ms B's son all understand these facts. Recall that the health outcomes of patients with a natural history of hip fractures are extremely poor. While risk of a patient dying during surgery is real, 1-year mortality risk without surgery is 84.4%.<sup>5</sup> Simply framing the treatment options as surgery or nonoperative management is misleading, as both options have significant mortality and morbidity risks. The patient (or surrogate), surgeon, and anesthesiologist must be honest, recognizing that no treatment pathway for a frail patient is without risk. If Ms B's son refuses all surgical intervention after discussing the details just considered, discussion should proceed to risks and prognosis of nonoperative management of Ms B's injury. A goals-of-care discussion would also be helpful at this time, as would a palliative medicine consultation.

### **Communication Recommendations**

Perioperative DNR conversations are time-consuming but vital for maintaining good relationships with patients and their surrogates and for expressing respect for patients' autonomy. DNR order suspension should be examined on an individual case-by-case basis and reexamined with relevant changes in a patient's health status and clinical context.<sup>16,21</sup> Complete suspension of a DNR order should never be assumed, as this assumption undermines patient autonomy.<sup>13,18</sup> Although negotiating which resuscitative techniques are indicated and appropriate is typically the purview of an anesthesiologist, it is

imperative that the patient (or surrogate), surgeon, and anesthesiologist jointly discuss and share their perspectives to motivate informed and shared decision making. Ideally, discussion should occur as soon as surgery is planned to avoid surprise or conflict just prior to surgery. If the patient (or surrogate), anesthesiologist, or surgeon disagree about the terms of a perioperative DNR suspension, surgery should be delayed until effective communication is established or restored to forge consensus or at least facilitate agreement.

A patient's values and treatment goals should also be outlined in the discussion. As part of this discussion, iatrogenic and worst-case medical scenarios should be considered, as well as an appropriate length (eg, days, weeks, indefinite) of an intervention.<sup>13</sup> The discussion should cover details of the operation to be performed, such as need for muscle paralysis, position of the patient, expected length of surgery, expected blood loss, and other risks and benefits of undergoing or not undergoing surgery. Perioperative DNR conversations should also include anesthesia options with attention to a patient's relevant medical history and current health state.<sup>18</sup>

A patient or surrogate might choose to maintain a DNR order, thereby prohibiting intensive care escalation or resuscitative efforts and perhaps limiting surgical intervention. Conversely, a patient might elect to suspend a DNR order entirely and allow full resuscitation attempts. In our experience, most patients opt for procedure-directed or goal-directed LAR. Combining procedure-directed LAR and goal-directed LAR is also appropriate and should be honored when a patient or surrogate selects this option.

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**CASE AND COMMENTARY**

**How Should a Surgeon and Anesthesiologist Cooperate During Intraoperative Cardiac Arrest?**

Joshua S. Jolissaint, MD and Deepika Nehra, MD

**Abstract**

Surgeons and anesthesiologists each have a unique sense of duty and responsibility to patients throughout all phases of perioperative care. Intraoperative cardiac arrest during elective, noncardiac surgery is rare, with an incidence between 0.8 to 4.3 per 10 000 cases. Fortunately, patients who suffer cardiac arrest during surgery are more likely to survive than patients who suffer cardiac arrest in other settings. This article considers factors that have been shown to influence outcomes after intraoperative cardiac arrest and offers a framework for analyzing and discussing these clinically, ethically, and emotionally complex cases.

**Case**

Ms D is a 43-year-old woman who consents to undergo an elective laparoscopic left nephrectomy to remove a renal cell carcinoma. The surgery team, led by Dr S, and the anesthesiology team, led by Dr A, agree that Ms D's risk for perioperative complications is low. Her surgery proceeds routinely, and she wakes from anesthesia in stable condition.

A few hours later, however, Ms D develops a tense, distended abdomen; her heart rate is elevated; and her blood pressure is low. Dr S evaluates Ms D and believes that she has internal bleeding and needs to be taken back to the operating room.

Back in the operating room, massive transfusion of blood products is begun. After induction of anesthesia, Ms D's blood pressure drops significantly. Dr A's team administers medications to try to raise her blood pressure. Dr S's team opens Ms D's abdomen, and it is clear that there is significant internal bleeding. Dr V, the on-call vascular surgeon, is paged to the room, and everyone works together to try to control of Ms D's bleeding. Dr A continues to deliver blood products and escalates doses of blood pressure-augmenting medications, but Ms D's condition declines, with ST elevations on her electrocardiogram indicating cardiac compromise. Dr A communicates this information to surgical team members, who continue to try to identify the source of bleeding. After 15

minutes, however, Dr A asks the surgical team to pause to allow the anesthesiology team to resuscitate the patient.<sup>1</sup>

The surgery team stops, but only after applying packing and pressure to what they've now finally identified as the source of the bleeding, Ms D's inferior vena cava (IVC). Dr A administers more blood products.

The surgery team resumes operating, and Ms D sustains cardiac arrest. The surgical team stops operating and applies pressure to Ms D's IVC during resuscitation, led by Dr A for 10 minutes—and after administration of more than 100 units of blood products.

Spontaneous circulation is achieved, and Dr S's team resumes operating. Dr A now worries about Ms D's neurological status, as anesthetics have not been administered for several minutes, suggesting Ms D has had brain injury as a result of low blood pressure.

Ms D sustains a second cardiac arrest. Dr A's team resumes resuscitation, then requests resuscitation be stopped, believing Ms D is moribund. Dr S's team requests resuscitation be continued while they attempt to control the IVC bleeding.

Dr A wonders whether to insist on ceasing resuscitation.

### **Commentary**

The case in question is rare, but it is one that most surgeons and anesthesiologists will experience during their careers. Here, we see an elective operation complicated by a devastating vascular injury resulting in hemorrhage and, ultimately, [intraoperative cardiac arrest](#) while an attempt was made to repair what was identified as an injury to the IVC. Dramatic attempts to rescue such patients are common. These patients not only are statistically more likely to survive cardiac arrest than the general population, but also have been documented to survive, if rarely, after prolonged resuscitation.<sup>1</sup> Moreover, while caught up in the chaos of a cardiac arrest, surgeons and anesthesiologists alike are united by at times overpowering hope—hope that their years of medical education and training will be substantiated, hope that they will not have to meet a patient's family in the waiting room and recount how this 43-year-old woman died during an elective procedure, and hope that the patient will survive.

In an era of meticulous internal auditing and continual emphasis on quality improvement, extensive research has been devoted to risk prediction and the subsequent mitigation of risk.<sup>2,3,4</sup> As an example, early efforts to treat pancreatic cancer with the Whipple procedure (pancreaticoduodenectomy) carried a staggering in-hospital mortality rate of 25%, an unacceptable figure for any operation; the mortality rate for pancreaticoduodenectomy is now reported to



be less than 5% after years of procedural refinement and both retrospective and prospective critical study.<sup>5,6</sup> Historical examples such as this one reflect the significant risks that patients will undertake in the search for a cure or an improved quality of life.

Surgeons, anesthesiologists, and patients alike would agree that a world without surgical site infections, aspiration pneumonias, and venous thromboembolic events would be ideal, although some complications are easier for all parties to navigate than others. For any clinician, intraoperative death is the apex of bad outcomes, the event that has caused some physicians to leave medicine entirely, and the memory of which often haunts those who continue to practice. This article considers factors that have been shown to influence outcomes after intraoperative cardiac arrest and offers a framework for analyzing and discussing these clinically, ethically, and emotionally complex cases.

### **Intraoperative Cardiac Arrest**

Intraoperative cardiac arrest during elective, noncardiac surgery is a rare event, occurring with an incidence between 0.8 to 4.3 per 10 000 cases.<sup>7,8</sup> Over time, this occurrence has become less common, with Sprung and colleagues' retrospective study reporting rates of cardiac arrest that fell from 5.1 to 4.6 per 10 000 anesthetics between 1990 and 1995 compared to a rate of 2.5 per 10 000 anesthetics in 2000, at the study's conclusion.<sup>8</sup> Unfortunately, perioperative and in-hospital survival after intraoperative cardiac arrest has not appreciably improved.<sup>8</sup> Reported immediate survival rates vary depending on the cause of arrest but ranged between 18% to 72% in one study<sup>8</sup> and from 32% to 56% in a systematic review.<sup>9</sup> Perhaps unsurprisingly, patients who sustain cardiac arrest during an elective operation have improved survival compared to those who sustain an arrest during an emergency operation or one for trauma (59.2% vs 30.6% in one series).<sup>8</sup> These figures are comparatively optimistic when compared to the general population; among patients who suffer an out-of-hospital cardiac arrest and receive cardiopulmonary resuscitation, the expected hospital survival rate is approximately 14%.<sup>10</sup>

Probable causes of cardiac arrest in patients undergoing noncardiac surgery include primary cardiac dysfunction (eg, myocardial infarction), pulmonary embolism, electrolyte abnormalities, hemorrhage, and the anesthetic used at the time of arrest.<sup>8,11</sup> A minority of cases are attributable solely to anesthesia management (ie, the anesthetic medication used or airway complications during surgery), and these patients have considerably higher rates of hospital survival than the overall rate of hospital survival (79% vs 35%).<sup>8,12</sup>

Some risk factors for both immediate and in-hospital mortality among such patients have been elucidated. Indications for surgery, comorbidities, physical status, and type and duration of operation are all factors that ultimately influence the outcome.<sup>8</sup> Other factors include documented hypotension, the requirement for vasopressors, intraoperative bleeding, and cardiac arrest during

nonstandard working hours.<sup>8</sup> For example, Sprung and colleagues reported an 18% immediate and 10.3% in-hospital survival rate for cases in which bleeding was determined to be the cause of cardiac arrest.<sup>8</sup> Unfortunately, there is a paucity of quality evidence in this area due to the rarity of intraoperative cardiac arrest. However, it is worth remembering that the cause of arrest may provide insight into survivability and futility.

### **Surgeons' and Anesthesiologists' Responsibility to Patients**

Surgeons and anesthesiologists [share duties](#) and obligations as they work together to usher patients safely through the various phases of perioperative care.

*Surgeons' responsibilities.* Surgeons have a unique relationship with their patients and bear the onus of responsibility when choosing to operate for any indication. Often, the operation in question, the approach, and timing are recommended by the surgeon. Regardless of the operation's medical necessity or comparative technical difficulty, patients enter into a mutual contract with their surgeon. Patients trust that their ailment will be alleviated or that cancer will be resected through invasive means, and the surgeon, in turn, promises to guide the patient through both the operation and the subsequent recovery period.

*Anesthesiologists' responsibilities.* Similarly, anesthesiologists have complete physiological governance over each surgical patient throughout the duration of their operation. Once the decision to proceed with surgery has been made, the value of the anesthesiologist-patient relationship is as important as the anesthetic itself, with research as early as 1963 demonstrating both anxiolytic and analgesic effects of preoperative visits.<sup>13,14,15</sup> The emotional and psychological effects of both the surgeon's and the anesthesiologist's [relationships with their patients](#) cannot be overstated, and teamwork between these individuals is critical in order to usher these patients through some of the most invasive and life-altering periods of their lives.

### **Desisting Resuscitative Efforts**

Ms D is one of the patients who do gain a return of spontaneous circulation after heroic efforts. Nevertheless, she still likely suffers irreversible hypoxic brain injury and again suffers cardiac arrest, bringing to the forefront the potential futility of continued efforts at resuscitation. Many physicians would act similarly to Dr S and request continued resuscitation despite the already staggering use of resources due to a sense of responsibility, fear, anxiety, or any number of strong emotions. Given the lack of quality evidence on whether resuscitation is futile in these circumstances, there are no guidelines to aid in decision making. However, based on the available data, we can understand trends and make predictions that can help guide decision making. Patients' comorbid and functional status, along with the cause of and circumstances surrounding their arrest, should factor into decision making during the initial

resuscitation. Research on prognosticating meaningful neurological recovery after in-hospital cardiac arrest may not be directly applicable to patients who suffer an intraoperative cardiac arrest due to inherent differences in cause and patient demographics. However, there is evidence that older patients with multiple comorbidities or those who experience hypotension, asystole or pulseless electrical activity (as opposed to ventricular fibrillation or ventricular tachycardia), or sepsis prior to an arrest are less likely to survive in-hospital cardiac arrest with a favorable neurological status.<sup>16,17</sup> After efforts to correct all underlying causes have been exhausted—particularly in the context of possible neurological injury—surgeons and anesthesiologists must also consider the utilitarian implications of continued resuscitation and utilization of limited resources such as blood products.

We do feel that the decision to cease resuscitative efforts during a cardiac arrest in the operating room must be one that is shared by all parties. All physicians, nurses, and staff in the room should feel that appropriate efforts have been made and that further efforts are futile. When a decision to cease resuscitative efforts is being considered, it should be voiced openly in the room and, if anyone disagrees, efforts should be resumed. Each member of the perioperative team brings a different skill set and viewpoint to these scenarios and all opinions must be respected and heard. Only through collaboration, open communication, trust, and teamwork can we continue to care for our patients in these most trying of circumstances.

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## CASE AND COMMENTARY

### What Constitutes Effective Team Communication After an Error?

William M. Hart, MD, Patricia Doerr, MD, Yuxiao Qian, MD, and Peggy M. McNaull, MD

#### Abstract

Many procedures performed today involve a team of specialists with their own training histories and backgrounds. Some errors are inevitable in the course of clinical careers. Because errors tend to lead to complications, they often also lead to assignments of blame. When this happens, too often clinicians are at odds with each other about how to respond to a patient or a patient's loved ones after that patient suffers harm. This commentary on a case of a surgical complication examines how transparency in communication, cooperative disclosure, and working collaboratively to restore an injured patient's health support clinicians' common purpose, long-standing work relationships, and collegiality.

#### Case

After taking over an all-day abdominal perineal resection in which a patient experienced "some blood loss," the patient's surgical team was informed about the anesthesiology team's plan to transfuse the patient with a third unit of packed red blood cells. The team members looked up in acknowledgement and continued surgery. A blood gas was drawn, revealing the patient's hemoglobin (Hgb) level as 6.6 g/dL, compared to 14.8 g/dL at the start of the surgery. When the surgeons were informed of the Hgb, they indicated that more bleeding should be expected but didn't say why. On 3 separate occasions, the attending anesthesiologist asked the surgeons for updates on the patient's current surgical situation because the anesthesiology team was not able to keep up with the patient's blood, fluid, and resuscitation demands. Specifically, the amount and source of blood loss (eg, arterial vs venous vs oozing) and the surgical team's plan to continue dissection despite continued bleeding was not clearly communicated to the anesthesia team. The patient's hemodynamics continued to worsen. A massive transfusion protocol, transesophageal electrocardiogram, and rapid infuser were initiated, and additional anesthesia personnel were called. The surgeons finally disclosed to the anesthesiology team that the patient's iliac vein was nicked earlier in the surgery. The extent of injury to the patient now became evident, as did one consequence of the absence of real-time communication from the surgeons: the anesthesia team had dramatically underestimated how much blood loss the patient would suffer during the earlier

intraoperative resuscitation. Fortunately, hemostasis was achieved, and the patient stabilized. The surgeons recommended additional blood resuscitation to the anesthesia team before completing the surgery and leaving the operating room. At the end of the surgery, the patient was not extubated as usual, and, based on the update provided by the surgeon, the patient's family members understood that the anesthesia team was responsible for the patient's unplanned postsurgical stay in the intensive care unit (ICU).

### **Commentary**

Separated between the drape, 2 teams of physicians with different training backgrounds stand with the shared goal of patient safety. Their relationship with the patient is often quite different. The surgeon likely has a long-standing relationship with the patient, cultivated over the span of years, and has made a decision to bring the patient in for surgery. The anesthesiologist often meets the patient on the morning of surgery and must quickly establish trust in taking the patient's life into his or her hands. Physicians are human and errors or negative outcomes occur in these high-risk situations. When an error, harm, or unanticipated outcome occurs, one physician might blame the other. For example, in the above case, the surgeon could state that the patient hemorrhaged because the anesthesiologist did not resuscitate the patient appropriately. The anesthesiologist could argue that the surgeon ligated the vein, which caused the sudden and massive blood loss. In such cases, engaging both parties in speaking with the patient and family members after the surgery is better for patient care and improves health care systems.<sup>1</sup> This approach might seem logical, but only recently has it become standard to be transparent when communicating with patients and families, and, to this day, long-standing cultural norms in medical education and practice still need to be challenged to reach this goal.<sup>2</sup> Here, we examine how clinicians' disclosure of error, transparency, and accountability when communicating with patients and families and their collaborative efforts to restore injured patients' health can support their common purpose, long-standing work relationships, and collegiality.

### **Blame Gaming**

Imagine taking a closer look at the previously mentioned scenario. During a complex case involving a tedious tumor removal, a vein is accidentally ligated that results in significant active bleeding. The surgical team takes appropriate measures to stem the bleeding while at the same time the anesthesiologist works to resuscitate the patient utilizing fluids and blood products as well as pressor agents. Unfortunately, even when a complication is addressed and the patient survives, it results in an unanticipated ICU stay and prolonged recovery.

The disclosure of the complication to the family could depend on who is doing the disclosing. The surgeon could focus on the possibly ineffective resuscitation by the anesthesiologist and how that led to worsening intraoperative conditions and affected the recovery. At the same time, the anesthesiologist could point

out that the main error was the ligation of the vein and that, if the surgeon had not made that mistake, the surgery and recovery would have progressed more smoothly. With these differing and confrontational explanations, the family could be caught in the middle, uncertain of whom to trust and believe. Additionally, the important working relationship between the surgeon and anesthesiologist would be harmed, potentially leading to problems with future cases.

### **Transparency Is Collective Accountability**

The need for better patient-physician communication has long been recognized. Beginning in the 1990s, studies were conducted on the relation between effective patient-physician communication and patient outcomes.<sup>3</sup> Moreover, the paternalistic and authoritative approach to decision making is slowly being replaced with a team-based approach wherein every stakeholder—including the patient, the patient's family, and the clinician—has a voice in the treatment plan. Indeed, patients are being appropriately cast as equal stakeholders and decision makers in their health. Accordingly, in communicating with patients and families, physicians place emphasis on laying out various treatment options, when applicable, as well as providing thorough and easy-to-understand summaries of outcomes and prognoses. With a view to promoting shared decision making, multiple organizations, including the Agency for Healthcare Research and Quality,<sup>4</sup> the American Medical Association,<sup>5</sup> and specialty specific organizations such as the American Society of Anesthesiologists<sup>6</sup> and the American College of Surgeons,<sup>7</sup> have developed guidelines outlining how to communicate with families. Additionally, institutions have created internal policies that provide guidance on the aims and methods of communicating with patients about errors, adverse events, and unanticipated complications.<sup>8</sup>

One element common to all these programs is acknowledgement that it is acceptable to [apologize for errors](#) or negative outcomes.<sup>1,2,9,10</sup> Disclosure is no longer viewed as an admission of guilt but instead as helping to build empathy among all parties and as reinforcing a commitment to patient safety and well-being. Along with their acceptance of apologizing to patients, health care organizations have emphasized full and complete error disclosure to patients.<sup>1,2</sup> Guidelines and policies concerning patient communication and error disclosure can be used to help guide conversations with patients and their families about medical errors.

As discussed in more detail below, in cases of surgical error, both the surgeon and the anesthesiologist could come together to meet with the family. Together, they could explain the course of events, what measures they each took to help fix the problem, and how they are going to avoid future mistakes. Jointly, they could apologize for the outcome but emphasize that together they are going to work to improve the situation. In this way, trust between the medical teams and family could potentially be restored and an ongoing open line of communication maintained.



### **Owning an Error Together**

After a medical error has occurred and the decision has been made to discuss the situation with the patient and family, preparation and adherence to certain key steps can help make the process more effective. The key medical clinicians involved in the complication should come together and review the case and reach an agreement on the specifics of what happened.<sup>9</sup> At this meeting, it should be determined who is going to take the lead in the discussion with the patient and family. Typically, it would be advisable for the team responsible for the error to guide the discussion, but it can be helpful to have all teams represented: surgical team, anesthesia team, and nursing staff. If it is unclear who is responsible, then jointly leading the discussion would be appropriate. This team approach helps to demonstrate that all parties are concerned about what happened and similarly focused on finding a solution. However, having a point person lead the conversation can help make it seem less intimidating for the patient and family, as this approach will make the conversation seem one-on-one. Equally important is ensuring that the key members of the family are all present. The setting of the conversation is also a notable factor. Ideally, it should be quiet and free of distractions, with an emphasis on privacy and comfort. With the right setting, the discussion can focus on what is truly important about the situation: the patient.

After the setup for the meeting is complete, the most important step is the disclosure. Keeping a few principles in mind and adhering to a general plan can help make the conversation more constructive and less confrontational not only for the clinicians and family but also for the clinicians themselves. When communicating medical errors, it is important to use language that is easily understandable to all parties involved to avoid confusion and misinterpretation. Additionally, it can be helpful to take the cultural background of the patient and family into consideration. What is perfectly acceptable discussion material in one culture might be taboo in another. For example, in some Asian or Pacific Islander cultures, asking about the health of family members can be considered rude or only appropriate when discussed as a group but can be pivotal to discussion of a patient's family medical history.<sup>11</sup> Throughout the discussion, it is important to demonstrate empathy and concern while at the same time clearly stating the facts as they are currently understood. Instead of focusing on who is to blame and pointing fingers, delineate what happened but, just as importantly, what is going to be done. Explaining the steps being taken to currently care for the patient is also essential to demonstrating that the team truly cares for the patient and family and is concerned about their well-being. Also, it is helpful to reassure the patient and family that the source of the error is being investigated and to clarify that changes will be made to prevent future recurrences.<sup>1,2,4,5,6,7,9,10</sup> Throughout the conversation, it is important to be responsive to family members as opposed to merely lecturing to them. It is helpful to them to answer questions, provide comfort, and say "I'm sorry."

Admittedly, there is no one correct way to disclose errors. There is no well-studied and validated algorithm to help smooth over the problem and satisfy all involved parties in every situation. The immediate aftermath of a serious complication can be emotionally charged, and the tendency is to protect oneself and blame others. Too often, colleagues with great working relationships built on trust can resort to an adversarial confrontation. Unfortunately, this not only can negatively affect workplaces and careers, but also—and more importantly—can prohibit effective communication with the patient and family and harm the patient's ongoing health care.

In the case described at the beginning of his article, it is obvious that there is a lack of communication between the 2 teams. And, unfortunately, this led to inadequate patient care in the setting of an unforeseen but honest error. After the case, if the 2 teams came together and debriefed each other about the sequence of events and how they could have more effectively handled the situation, possibly their working relationship could be restored and similar situations in the future could be avoided.

### **Keep Caring**

The goal when discussing negative outcomes or errors should be full disclosure with an emphasis on a constructive conversation.<sup>1</sup> Without laying blame or finger-pointing, the conversation should include a [full disclosure](#) of the error in simple-to-understand terminology and an explanation as to why the error occurred, how the error's side effects will be minimized, and steps the team will take to prevent recurrences. The side of the drape that is responsible for the error can lead the discussion, but members of the other team can be present to offer support, their perspective, and their standpoint on how the error will be redressed. The aim should be to facilitate not service recovery (ie, risk management optimization) but an extension of the patient care process. Accidents and errors are going to occur because no one is infallible. The natural tendency when they occur is for medical practitioners to go on the defensive and start assigning blame to others. However, doing so only serves to hurt working relationships and patient-physician relationships. The common goal for all clinicians is to focus on taking care of the patient; but by also caring for each other, clinicians can reach that common goal more effectively. Through coming together and addressing the problem as a team, clinicians can maintain the integrity of the medical system.

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## MEDICAL EDUCATION

### Escape the Drape Divide by Making Off-Service Rotations a Part of Surgery and Anesthesia Residencies

Aurelie Merlo, MD and Benjamin Haithcock, MD

#### Abstract

Unfortunately, the drape dividing the anesthesiologist from the surgeon is far too often a symbol of a greater divide in both communication and culture between the 2 specialties. When anesthesiologists and surgeons spend time rotating on each other's services, they develop a mutual respect for each other's clinical acumen and foster open communication channels for times of both routine clinical care and crisis. There is no better time than in residency, and no better way than cross-training, for anesthesia and surgical residents to hone these skills.

#### History Shows Need for Cross-Training

The relationship between surgeons and anesthesiologists has evolved over time as the fields of surgery and anesthesiology have developed. At the beginning of the 19th century, surgery changed from being a trade practiced by seasoned artisans to a profession practiced by trained specialists.<sup>1</sup> With this change in status came [changes in surgical training](#). Rather than book learning, surgical training emphasized developing practiced skills through clinical care of patients under the tutelage of a mentor; this new model became known as the Halsted model.<sup>1</sup> Throughout the 20th century, surgical education became more formalized. Various governing bodies were created to oversee this formalization—most notably, the American Board of Surgery, established in 1937, and the Accreditation Council for Graduate Medical Education (ACGME), established in 1981.<sup>2</sup> In 1999, the ACGME developed the 6 core competencies (medical knowledge, patient care, interpersonal and communication skills, professionalism, practice-based learning and improvement, and systems-based practice), which are viewed as foundational to resident education.<sup>3</sup> No longer focusing solely on imparting knowledge, resident education has undergone a shift to including teaching *skills*.<sup>3</sup>

The field of anesthesia has also undergone transformative change. Although the first public demonstration of anesthesia was by a dentist in 1846, the [field of anesthesiology](#) truly started to blossom only in the early 20th century with the advent of endotracheal tubes and neuraxial blockade.<sup>4</sup> Soon anesthesia went from being administered by nurses who were trained on the job to physicians who underwent years of rigorous specialized training in the field of

anesthesiology.<sup>4</sup> The first anesthesiology residency program was created at the University of Wisconsin in 1927.<sup>4</sup> Like surgical residencies, anesthesiology residencies developed formalized criteria and governing bodies (such as the American Board of Anesthesiology) beginning in the 1930s.<sup>4</sup> More recently, the ACGME core competencies were instituted.<sup>4</sup>

Here, we will argue that cross-training anesthesia and surgery residents—that is, having surgery residents rotate on anesthesia rotations and anesthesia residents rotate on surgical rotations—contributes to the fulfillment of every single one of the core competencies and should be an integral component of resident education.

### **Benefits of Cross-Training Residents**

*Medical knowledge.* All surgical residents can benefit from a thorough understanding of principles and techniques already mastered by their anesthesiology colleagues. These concepts include airway management in complex patients, sedation and pain control in the perioperative setting, monitoring of the critically ill patient, and evaluation and management of the physiological derangements caused by surgical insults. For example, it is paramount for thoracic surgeons to understand the anesthetic risks associated with induction with general anesthesia for a patient who has superior vena cava syndrome from a mediastinal tumor. Preinduction preparation must include lower extremity intravenous access and possibly even draping a sterile field prior to induction due to the risk of rapid cardiovascular collapse. Thoracic surgeons need to understand what the anesthesiology team will be doing to mitigate such a patient's risk, and both teams need to communicate throughout the process. Surgeons' anesthesiologist colleagues are the experts in these domains and have a long history of teaching their own residents the nuances of surgical and critical care physiology. In the same way, anesthesia residents need to master surgical positioning, intraoperative complications, and estimated postoperative recovery time. They must have a general understanding of a large array of surgical procedures in terms of both their key operative steps and postoperative recovery times. In these ways, cross-training contributes to the core competency of increasing medical knowledge for both anesthesia and surgery residents.

*Interpersonal and communication skills.* In addition to shared knowledge, cross-training promotes better communication. At our institution, both anesthesiology and surgery attending physicians provide coverage in the surgical intensive care unit (ICU). As junior surgical and anesthesia residents rotate through the ICU, they can develop relationships with attending physicians that extend into the operating room. For example, an anesthesia resident in the ICU might be the first to consider an epidural for pain control for a multisystem trauma patient with multiple rib fractures. In addition to convincing the surgeon of the plan of pain control, the anesthesia resident would be able to facilitate the coordination of the epidural, including communication with the attending

anesthesiologist regarding the timing and placement of the epidural. Later, when these anesthesiology residents are more senior and making crucial decisions for critically ill, complex patients, an already existing collegial relationship with ICU attending physicians will be an important component of formulating the best decision for the patient. The same is true of interprofessional communication between residents. For example, many postsurgical patients have epidural catheters placed, and the management of these at our institution is by the anesthesiology acute pain service. Communication between the surgical and pain teams regarding management of the catheter (ie, adjustment in rate and duration of use of narcotic) is more efficient and much more pleasant when the 2 residents already know each other by name. Furthermore, if communication patterns are not established and reinforced in a nonurgent setting, high levels of efficient communication cannot be reproduced in an emergency, and patient care suffers.<sup>5,6,7</sup>

Enhanced communication becomes even more relevant in emergency situations. Simulations are used in residency training for critical airway management and code situations in order to teach communication and practical skills,<sup>5,6,7</sup> and these simulations are excellent opportunities to practice cross-specialty communication. In fact, reinforcing team-based skills through simulation is becoming a priority in resident education,<sup>3,8,9,10</sup> especially with duty-hour restrictions and the increase in subspecialization.<sup>1</sup> Of course, the natural extension of simulating roles is not only practicing these roles in real clinical scenarios as a trainee but also seeing the clinical scenarios from across the drape.

*Systems-based practice.* The real purpose of improving communication skills and opening multidisciplinary lines of communication is improving patient care. Perhaps the best example of an initiative with this goal is enhanced recovery after surgery (ERAS<sup>®</sup>) programs. These programs, which were largely spearheaded by anesthesiologists and then adopted by surgeons, demonstrate the impact on patient related outcomes<sup>11</sup> that institutional programs based on interprofessional partnerships can have. [ERAS programs](#) are institutional protocols that standardize intraoperative and postoperative care for standard procedures. For example, for lung resections such as lobectomies, intraoperative fluid resuscitation is kept to a minimum, and chest tubes are placed to water seal on postoperative day 1. This evidence-based protocol has been shown to improve outcomes such as length of stay, duration of chest tube, and postoperative narcotic use for large groups of patients.<sup>11</sup>

*Professionalism.* An important element of perioperative patient care is to make the patient feel safe going into the operating room. That sense of safety can be greatly enhanced if the patient trusts his or her entire care team, including both the surgeon and the anesthesiologist. The surgeon usually has the opportunity to build a relationship with the patient well before the day of surgery by meeting the patient in the office. The anesthesiologist, on the other hand, is

usually only meeting the patient for the first time on the day of surgery, although the anesthesia team members are usually the first clinicians to see the patient the day of surgery. It is vital for the anesthesia team members to stress their own confidence in the surgical team and vice versa in order to build patient confidence prior to the surgery. Residents' or attending physicians' expression of negative attitudes toward the surgical or anesthesia team can lead to patient fear and mistrust.<sup>12</sup> By rotating on each other's services, residents can learn the challenges of their counterparts' roles and might be more likely to speak favorably of their procedural partners.

*Practice-based learning and improvement.* Better communication fosters not only clinical but also scientific collaboration, which contributes to improving patient care and medical practice. Unfortunately, the anesthesia and surgical literatures rarely overlap, even when they are discussing very similar patient populations. This silo effect could be mitigated through resident cross-training. Gathering intraoperative anesthetic data (sedation doses, pressor use, and reversal agents) to better understand postoperative surgical outcomes would enrich the surgical literature. Similarly, using more postoperative outcome data, such as emergency room visits, could help guide anesthetic practices. At our institution, all surgery and anesthesia residents are required to participate in quality improvement initiatives. The most productive of these are interdisciplinary in nature.

*Patient care.* Finally, the most important benefit of residency cross-training is improved patient care. It is well known that good interprofessional communication improves patient outcomes. For example, in one survey of trauma team members, the majority of respondents reported that the preinduction "time-out" improves patient care.<sup>13</sup> The first time the surgeon addresses the anesthesiologist should not be to say "incision" when the operation begins. Rather, communication between the two should start in the preoperative area with discussion of the joint surgical-anesthetic plan. This plan should then be reconfirmed in the operating room, where aspects of the surgery such as monitoring requirements, expected approach, duration, and blood loss, as well as anticipated problems, should be discussed prior to starting the procedure. Finally, good communication should extend beyond the operating room. Many times, anesthesiologists at our institution visit the postoperative patients on the floor to see how they are recovering from surgery. There is an open line of communication between both teams after the surgery to allow for opportunities for improvement.

One example of enhanced patient care occurred recently on our thoracic surgery service. A patient with an active do-not-resuscitate order required a pleurodesis. She was very wary of prolonged intubation and made this clear to the surgical and anesthesia teams. When the anesthesia team members met her in the preoperative area, they had concerns regarding her ability to be extubated, especially with the insertion of a double lumen tube. The anesthesia



resident contacted the surgical resident, and the 2 teams had a discussion. In addition to the patient, both attending physicians and residents were involved. It was decided to attempt the pleurodesis under moderate sedation. The patient was induced with both teams in the room but became very sedated with a very small dose of propofol. Another discussion was had between the 2 teams, and it was decided to intubate the patient and use a bronchial blocker instead of a double lumen tube. Ultimately, the procedure was performed successfully, and the patient was extubated at the end of the case. Despite numerous changes in the surgical-anesthetic plan, an open line of communication between the teams allowed for safe, effective, and efficient patient care delivery.

### **Possible Disadvantages of Cross-Training**

For the sake of a balanced argument, we will highlight the few disadvantages of residents rotating off service. With the need to obtain case numbers, it can be difficult for residents to graduate with the experience they need in their own specialty if they spend too much time off service, especially with the further subspecialization of medical care and the diversification of both anesthesiology and surgery.<sup>14,15</sup> It is true that, for purposes of training, it is important for anesthesiologists to spend as many hours as possible practicing anesthesiology and for surgical trainees to spend as many hours as possible practicing surgery. For example, anesthesia residents who do a preliminary year in anesthesia programs rather than surgery or medicine programs do better on the anesthesia in-training examination.<sup>16</sup> Nonetheless, as we have argued, anesthesia residents rotating on surgery are still honing their skills as an anesthesiologist.

A second disadvantage occurs if residents don't embrace their off-service rotation. Occasionally, based on our experience, off-service residents can become less engaged with that rotation, thereby limiting its educational impact. At times, this lack of buy-in occurs as a result of a change in a resident's attitude, and, at others, it occurs because faculty become less engaged in teaching a resident who will move off service. Disengagement can be avoided in settings where the anesthesia and surgery departments have an excellent working relationship and faculty members of each department engage in teaching residents from all backgrounds. Overall, these small challenges of cross-training are largely overshadowed by the benefits of improved knowledge and communication.

### **Conclusion**

In conclusion, we think there is no better way to become an excellent surgeon or anesthesiologist than to rotate on a service across the drape. The educational opportunities outlast the rotation and help to breed long-lasting relationships not only between residents but also between specialties. This collaboration breeds a pleasant work environment that is more enjoyable for physicians and, most importantly, safest for patients.

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**IN THE LITERATURE**

**Should Anesthesiologists and Surgeons Take Breaks During Cases?**

Sara Scarlet, MD, MPH and Elizabeth B. Dreesen, MD

**Abstract**

Anesthesiologists regularly take breaks during operations, whereas surgeons do so more rarely. This article considers the origins of this difference in practice in relation to different characteristics of the work of these 2 specialties as well as differences in professional identity, both of which can contribute to varying break practices and perceptions of the value of breaks. The authors draw upon current literature about the influence of breaks on attention, focus, and stamina and then reflect on the influence of breaks on the relationships between anesthesiologists and surgeons.

**Breaks in the Operating Room**

In virtually every context, the practice of modern medicine relies on teams of clinicians. The attitudes, interactions, and behaviors of these teams influence patient safety and have been the focus of a significant body of recent medical literature. Recognizing the [importance of teamwork](#) in the operating room, anesthesiologists and surgeons have collaborated in recent decades to improve patient safety through the development of shared mental models of the surgical plan and procedures, protocolized communication, checklists, and handoffs.<sup>1</sup>

Over the past 30 years, team training related to perioperative patient safety has drawn on safety literature in nonmedical industries, such as the airline industry.<sup>2</sup> One focus of this nonmedical literature has been on the role of breaks as a way to minimize error related to fatigue, distraction, and inattention.<sup>3</sup>

Anesthesiologists have embraced the concept of intraoperative breaks, which they describe as “relief” breaks.<sup>4</sup> For surgeons, however, intraoperative breaks are much more rare. In our experience as surgeons, we have witnessed conflict over breaks. We have seen surgeons experience an anesthesiologist’s break and the sign-out it requires as distracting or disruptive. Sometimes, tension arises between surgeons, present throughout the course of an operation, and covering anesthesiologists, who might not be fully aware of the events of a case that occurred prior to their arrival. After observing intraoperative tension related to breaks, we sought to examine breaks more closely, through both literature review and discussion with our anesthesia colleagues.

This article considers the origins of differences in break practices in relation to different characteristics of the work of these 2 specialties as well as differences in professional identity, both of which can contribute to varying break practices and perceptions of the value of breaks. We draw upon current literature about the influence of breaks on attention, focus, and stamina and then reflect on the influence of breaks on the relationships between anesthesiologists and surgeons.

### **Practice Norms in Surgery and Anesthesia**

*Common ground.* Anesthesiologists and surgeons have worked together since the differentiation of [anesthesia as a specialty](#) in the early 20th century.<sup>5</sup> They care for the same patient and share the physical space of the operating room. They work together to ensure that operations proceed safely and efficiently and share a common goal of good patient outcomes. They also depend on each other to co-manage unanticipated complications or significant events in the operating room. Despite these shared elements, the work of surgeons and anesthesiologists is actually quite different—not only in specialty knowledge, but also in the specific tasks and stressors that define their workdays and create their respective cultures.

*The work.* Although intraoperative decision making is critical to performing surgery, executing an operation is a physically demanding task. Surgeons stand or sit for hours, typically working with a narrow field of focus as they control hemorrhage, drain pus, resect abnormal tissue, and reconstruct functional anatomy. Standing for hours, holding a specific posture, and wearing headlights and magnifying glasses to augment vision and focus can be physically strenuous, especially when done for long hours without a break. In our experience, however, the continuous “doing” of one tangible task after another, although exhausting, promotes wakefulness and attention and a profound sense that the work is progressing.

In describing their work to us, our anesthesia colleagues identify their primary goal as the maintenance of patient homeostasis while surgery progresses. They emphasize vigilance and attention as key components of this work.<sup>6</sup> Positioned between the patient and the anesthesia machine, they monitor and record the vital signs, cardiac electrical activity, and pulmonary function of a sleeping, paralyzed patient. They continuously evaluate the patient for evidence of adequate perfusion or shock and for signs of pain or wakefulness. They assess the operative field, estimating blood loss and the degree to which the procedure is progressing in a timely fashion. This continuous monitoring of a patient, with the same level of attention and vigilance throughout the case, can be mentally exhausting.<sup>4,6</sup> As a result, anesthesiology is built around a systems-based care team model in which multiple anesthesiologists and advanced practice clinicians share the work of anesthesia during a single surgery and incorporate dedicated relief break time into their daily practice.<sup>7</sup> Moreover, through speaking with our anesthesia colleagues, we were surprised to learn

that taking a relief break often makes the most sense during the middle of an operation. Induction and reversal of anesthesia require a rapid succession of active maneuvers, such as inserting and removing a breathing tube. In contrast, maintaining anesthesia during a case that is running smoothly often requires more monitoring than it does procedural care. Furthermore, anesthesiologists use breaks between operations to meet their patients, obtain consent for anesthesia, and do procedures such as establishing intravenous access or performing nerve blocks to prevent perioperative pain.

*Relationships with patients.* Although surgeons and anesthesiologist share patients, the relationships they have with patients differ. Except in true emergencies, patients develop relationships with their surgeons before they undergo or even consent to an operation. In our experience, when patients consent to surgery, it is typically with the expectation that their surgeon will actively care for them throughout the operation and that their relationship will continue after completion of the surgery.

Anesthesiologists' relationships with patients, however, often start when they meet patients on the day of surgery in the preoperative work area. Often these relationships are physically limited to the perioperative area and temporally limited to the perioperative period. Most commonly, once patients leave the postanesthesia care unit, an anesthesiologist is no longer participating in their care.

Different perioperative tasks and unique characteristics of the [patient-specialist relationship](#) give rise to different values among anesthesiologists and surgeons. As the initiators and drivers of surgical procedures, surgeons typically feel tremendous personal "ownership" of their patients. This sensibility is best articulated by Miles Little, who argues that the defining principles of surgical ethics include the presence and proximity of the patient's individual surgeon and the commitment of that surgeon to personally witness both the ordeal and the aftermath of surgery itself.<sup>8</sup> Anesthesia clinicians are committed to ensuring that the patient is free of pain and maintained at an appropriate level of wakefulness. In their vigilant practice, great emphasis is placed on communication among clinicians, with handoffs that ensure the safe transfer of information that is critical to patient safety and [team efficacy](#). These differing commitments are at the root of anesthesia clinicians' and surgeons' differing attitudes toward breaks, with anesthesia clinicians embracing them and surgeons experiencing them as a part of anesthesia culture that can be associated with distraction and the potential for discontinuity of care.

### **Literature on Breaks**

The literature on breaks is relatively scant. Given the long acceptance of breaks within anesthesia culture, it is not surprising that much of the literature on breaks is written from the anesthesia perspective. Moreover, because anesthesia has embraced the patient safety movement, which emphasizes the

importance of clear communication during transitions of care, the anesthesia literature on breaks focuses on patient outcomes associated with intraoperative breaks. In contrast, the surgical literature on breaks focuses not on patient outcomes but on the physical and mental well-being of the surgeon.

*Anesthesia literature on intraoperative breaks.* To date, 8 large studies in the anesthesia literature specifically focus on breaks and handoffs among anesthesia clinicians.<sup>4,9,10,11,12,13,14,15</sup> Within this literature, a distinction is made between breaks that involve a complete care transition (with one clinician leaving permanently and a second clinician taking over the case) and relief breaks, in which the primary clinician is given a short respite by a temporary, secondary clinician. Unfortunately, only 2 of these studies clearly address relief breaks as distinct from complete care transitions.<sup>4,9</sup> The 6 remaining studies either address complete care transitions<sup>10,11,14,15</sup> or appear to include both care transitions and relief breaks as a combined exposure variable.<sup>12,13</sup> Both studies examining relief breaks in isolation, however, found that these breaks positively affected patient outcome, with multiple cases in which the clinician providing temporary relief identified a problem overlooked by the primary clinician.<sup>4,9</sup> All but 2 of the studies examining complete care transitions found that care transitions had a negative impact on outcome.<sup>10,11,14,15</sup>

*Surgical literature on intraoperative breaks.* The surgical literature on intraoperative breaks focuses on short surgeon breaks that are similar to relief breaks in anesthesia. In contrast to the anesthesia literature, however, the surgical literature focuses on the impact of breaks on surgeons' well-being and arises from concerns related to physician pain and injury from protracted standing in fixed positions during minimally invasive surgery. We identified few studies examining the health effects of surgeons taking breaks during the course of an operation. Two groups of minimally invasive surgeons have performed randomized, controlled studies investigating the impact on surgeon well-being of short "microbreaks" incorporating stretching and brief rest without breaking scrub or leaving the operating room.<sup>16,17</sup> Outcome variables in these studies included physician-reported physical comfort and mental alertness as well as stress hormone levels and tachycardia.<sup>16,17</sup> Both studies reported improved physician physical well-being in groups that participated in microbreaks. Although operative time did not increase significantly in either study, the samples were not large enough to detect the impact of microbreaks on the well-being of surgeons who experienced significant intraoperative complications, which were rare.<sup>16,17</sup>

Clearly, the existing literature is insufficient for us to draw conclusions about either patient or clinician outcomes associated with relief breaks of any sort. Unfortunately, in the absence of data, clinicians' attitudes and practice can be informed by habit, opinion, and dogma, which sometimes lead to stereotyping. Surgeons might feel that anesthesiologists are inattentive or distracted during an operation.<sup>18</sup> Anesthesiologists might find surgeons so absorbed with the

technical aspects of surgery that they fail to acknowledge their patients' health conditions and how these comorbidities could influence perioperative care.<sup>18</sup>

### Conclusions

At best, breaks function to promote and restore attention, efficiency, and physical stamina— important traits of surgeons and anesthesiologists alike. At their worst, breaks and the handoffs they require can be a distraction to people who continue working as others take breaks, creating concerns for patient safety. Unfortunately, as we note above, there is little guidance in the literature on best practices related to breaks in the operating room.<sup>19</sup> Clearly, transitions of care, including relief breaks, are an important component of anesthesia culture.<sup>20,21</sup> The American College of Surgeons Code of Professional Conduct affirms the importance of surgical presence, stating, “In general, the patient’s primary attending surgeon should be in the operating suite or should be immediately available for the entire surgical procedure.”<sup>22</sup> Nonetheless, the Code of Professional Conduct does allow “valid exceptions” to surgical presence, including “breaks during long procedures” that require preoperative discussion with the patient about any planned absence of the primary surgeon.<sup>22</sup> Certainly, the tenor of the Code is that breaks are the exception rather than the rule.<sup>22</sup>

We suggest that at least 4 questions would be worthy of more ethical and empirical investigation as part of the ongoing patient safety movement.<sup>10</sup>

1. Who should take breaks and when?
2. How long should a break be?
3. Where should breaks occur?
4. Should operating room charges include surgeons’ break time?

Better understanding of intraoperative breaks would likely help anesthesiologists and surgeons to take better breaks, regardless of whether they do so to promote their own wellness, teamwork, or patient safety. Acquiring more data and having more casual and scholarly discourse about breaks would likely help us debunk stereotypes that can undermine collegiality, self-care, and patient care.

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**POLICY FORUM**

**Should Surgeons or Anesthesiologists Manage Perioperative Pain Protocols?**

Patricia Doerr, MD and Brooke Chidgey, MD

**Abstract**

Enhanced recovery after surgery (ERAS®) protocols vary by surgery type. This article examines benefits of ERAS pathways, compares ERAS pathways to traditional protocols from clinical and ethical standpoints, and discusses formal recommendations of the American College of Surgeons, the American Society of Anesthesiologists, and other groups.

**Need for Better Pain Management**

Surgical pain begins at incision and can last for days, weeks, or even years after surgery.<sup>1</sup> Traditionally, anesthesiologists manage pain during surgery and immediately afterward in the recovery area. As patients transition to their hospital bed and then home, surgeons take over pain management. However, a more collaborative and evidence-based approach is needed, given the wide variations that exist in postoperative opioid prescriptions for the same surgery<sup>2</sup> and the risk of [opioid addiction](#). In the face of the opioid epidemic, much attention has been paid to how and when addiction begins. A recent review of 6 studies found that 67% to 92% of surgical patients reported unused opioids.<sup>3</sup> Sadly, 3 of 4 users of heroin begin by using prescription drugs.<sup>4</sup> Unused and leftover prescription drugs at home contribute to addiction, as 44% of those who misuse opioids identify family members as a source of prescription opioids and 88% identify friends as a source.<sup>5</sup> Given these staggering statistics, cautious and thoughtful perioperative pain planning is necessary to decrease the use of opioids at the hospital and reduce unused pills at home. Such planning is being accomplished through enhanced recovery after surgery (ERAS®) pathways, which implement evidence-based opioid prescribing guidelines.<sup>6,7,8</sup>

**Benefits of ERAS Pathways**

ERAS pathways involve collaboration between anesthesiologists and surgeons to improve patient care. These pathways include optimizing preoperative medical care; standardizing intraoperative fluid and ventilation management and employing epidural or regional anesthesia (ie, numbing medicine around the nerves of the spine and periphery, respectively) in conjunction with, or in addition to, general anesthesia; and postoperatively prescribing multimodal pain medications and encouraging early ambulation and removal of lines and drains.<sup>7,9,10,11</sup> The evidence-based medical interventions applied during ERAS pathways are aimed at improving normal recovery after an operation and at

preventing common problems such as pain, nausea, urinary tract infections, pneumonia, delirium, and delay in return of bowel function. The solution to many of these problems is early mobilization facilitated by nonsedating pain control. These pathways have shown encouraging results, including decreased length of hospital stay, fewer complications, cost savings, and a reduced 2-year mortality rate.<sup>7,9,10,11</sup>

Studies have also shown a decrease in opioid use in patients on an ERAS pathway.<sup>7,9</sup> While opioids control acute pain quickly, many deleterious side effects can accompany their use such as sedation, a decreased drive to breathe, a delay in the return of bowel function, and nausea or vomiting.<sup>12,13</sup> Epidural and regional anesthesia can be more effective in controlling pain, as they work to prevent pain transmission.<sup>12</sup> Controlling postsurgical pain well with nonnarcotic pain medications and other modalities such as epidurals or nerve blocks contributes to early mobilization and decreased time to discharge.<sup>7,9,10,11</sup> As ERAS pathways evolve, more attention is being dedicated to discharge opioid planning as well. Opioid stewardship is an additional key component of ERAS pathways that highlights how collaboration between anesthesiologists and surgeons can provide benefits beyond the perioperative period. Given the success of ERAS pathways,<sup>7,9,10,11</sup> the number of pathways is growing,<sup>11</sup> and the ERAS society currently has 22 separate reviews and recommendations.<sup>14</sup>

### **Comparison of ERAS Pathway to Traditional Protocol**

The creation of an ERAS pathway begins when a [multidisciplinary team](#), including anesthesiologists and surgeons, meets to discuss a particular surgery. A patient undergoing an ERAS pathway will have a very different experience than one undergoing a traditional protocol. Imagine that 2 men of similar age and medical history are having a section of their lung removed through a large chest wall incision, but at different hospitals with different perioperative protocols. The following narrative illuminates how collaborative treatment planning can change patient outcomes.

Mr Smith's journey through surgery could be described as follows: at his visit with the surgeon prior to surgery, he receives an incentive spirometer (IS), which is a machine to help him perform deep breathing exercises. He will bring the IS with him to the hospital to perform frequent exercises after surgery to help prevent pneumonia. Additionally, he meets with the anesthesiologist at a clinic for evaluation to ensure that he is medically optimized and appropriate for surgery. He is told which of his medications to take the day of surgery and is instructed to drink a bottle of an electrolyte solution 2 hours prior to arriving at the hospital. On the morning of surgery, he is given nonnarcotic pain medication, including acetaminophen, pregabalin, and celecoxib, to help minimize pain before it begins. He also receives a thoracic epidural for pain control. During surgery, the anesthesiologist infuses numbing and narcotic medication through the epidural to prevent the transmission of pain. This epidural will stay in place after surgery until his chest tube is removed and he is

able to take medications by mouth.<sup>7</sup> Medications in the epidural space have a fraction of the systemic penetration compared to those given intravenously or by mouth, and therefore much less medication is needed.<sup>12</sup> Epidurals also enhance the return of bowel function through a number of mechanisms.<sup>12,13</sup> Mr Smith's chest tube and foley catheter are removed on postoperative day 2. His pain is well controlled, and he tolerates foods well, so his epidural is removed on postoperative day 3. He has opioid medications as needed and is on scheduled nonopioid medications for pain control. Mr Smith's daily opioid requirement over the past 24 hours is calculated, and, based on his past needs and an evidence-based guideline for opioid discharge prescribing,<sup>15</sup> he is sent home with a prescription that consists of 21 opioid pills. He leaves the hospital on postoperative day 4.

Across town, Mr Jones presents for the same surgery but has a different experience without an ERAS pathway in place. He is unsure which medications to take on the day of surgery, so he doesn't take any of them and his blood sugar and blood pressure are poorly controlled prior to surgery. He is dehydrated because he has not had anything to eat or drink since 8 pm the prior evening, and it is very difficult for the nurses to place an intravenous catheter. The anesthesiologist and surgeon meet in the operating room and the surgery begins. The 2 physicians disagree on proper fluid management intraoperatively. The surgeon fears too much fluid will compromise breathing postoperatively, and the anesthesiologist notes that, based on lab values and vital signs, the patient needs more fluid. Mr Jones is given a large amount of opioids intraoperatively due to elevated heart rate and blood pressure indicating pain. After surgery, he requires high doses of intravenous opioids and complains of pain with deep breathing. He becomes drowsy and confused at night and his wife must remain at his bedside to reorient him. His bowels are slow to wake up and he is nauseous. On postoperative day 4, he begins to walk and his bowels wake up, and on postoperative day 5, his chest tube is removed. On postoperative day 6, he goes home with a prescription for 84 opioid pills, the number his surgeon has always prescribed for each patient.

The difference between Mr Smith's and Mr Jones' outcomes seems to beg the question, why doesn't every surgery have an ERAS pathway? Each patient comes to surgery with a unique medical history, and the anesthesiologist and surgeon must take that into consideration when planning for that patient's care, realizing that some patients are not candidates for components of ERAS pathways. For example, a patient having a thoracotomy or colectomy who remains on blood thinners is not safely able to receive an epidural. The barriers to implementation may also lie in the fact that necessary teaching and planning would require time, effort, and resources. There are costs associated with the initiation of the pathways, but, ultimately, ERAS pathways have been shown to save money.<sup>7,9,10,11</sup> The largest obstacle is likely changing the practice habits of physicians—particularly if they have been performing surgery “successfully” for a number of years. Why would an epidural or nerve block, which is a procedure

not without risk, be beneficial if patients historically have been discharged safely postoperatively? The answer to that question lies in the data emerging from ERAS pathways, which show decreased patient complications, opioid requirements, and length of stay.<sup>7,11</sup> Practice habits should evolve to serve patients better.

### **Opioid Stewardship**

In the midst of the opioid epidemic, it has become clear that each component of perioperative care, including discharge medications, requires careful thought for patient safety.<sup>4,5</sup> The opioid problem in this country can be attributed in part to perioperative opioids, and national organizations have made clear statements instructing their members to use alternative pain control strategies.<sup>1,2,3,4,5</sup> The American College of Surgeons and the American Society of Anesthesiologists both advocate using alternatives to opioids for pain control whenever possible and basing opioid discharge prescriptions on calculated use.<sup>15,16,17</sup> The website of the American College of Surgeons explicitly states that the surgical team will “use alternatives to opioids whenever possible” and advocates for “using the lowest dose of opioids for the shortest amount of time.”<sup>16</sup> Additionally, the association’s current guidelines for opioid discharge prescriptions instruct surgeons to analyze the patient’s opioid use during the last 24 hours of a patient’s hospital stay to determine the discharge prescription.<sup>15</sup> For example, a patient who used 3 opioid doses within the last 24 hours would go home with a prescription for 21 pills. Similarly, the American Society of Anesthesiologists’ updated guidelines for postoperative pain management recommend use of neuraxial opioids and peripheral nerve blocks.<sup>17</sup> The development and implementation of such evidence-based postoperative opioid prescribing guidelines is an important initiative in both ERAS pathways and hospital systems at large.<sup>6,15</sup>

In an effort to guide discharge opioid prescribing, researchers at the University of Michigan (UM) and the University of North Carolina (UNC) surveyed patients on their postoperative use of opioids. At UM, they found that “the median prescription size was 250 mg (OME) [oral morphine equivalents], while median patient use was only 30 mg. This is equivalent to receiving 50 tablets of hydrocodone/acetaminophen, 5/325 mg, and using only 6 tablets.”<sup>6</sup> Similarly, at UNC, follow-up interviews with patients revealed that the vast majority of patients used less than half of their prescription. With this information, UNC’s Opioid Stewardship Steering Committee (with which the second author is affiliated) created prescribing recommendations to guide surgeons based on specific surgical procedures. Within a year of implementing these “right-sized” opioid prescriptions, 367 756 fewer opioid pills were prescribed than in the previous year.

Evidence-based prescribing programs are examples of perioperative collaboration designed to decrease misuse of opioids through precision opioid prescribing, clinician and patient education, and safe storage and disposal of

unused opioids. Decreasing the number of leftover pain pills can help prevent opioid misuse and addiction on the part of both patients and their families and friends. ERAS pathways, including perioperative opioid stewardship programs led by anesthesiologists and surgeons, greatly improve patient care and positively impact society.

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## MEDICINE AND SOCIETY

### Strategies for Collaborative Consideration of Patients' Resuscitation Preferences

Kimberly Kopecky, MD, MSci, Pete Pelletier, MD, and Pringl Miller, MD

#### Abstract

Procedural treatment teams encounter patients with preoperative do-not-resuscitate (DNR) orders who are seeking procedural interventions to improve their quality of life. *Required reconsideration* is the professional discussion standard that seeks to engage patients or their surrogate decision makers in revisiting patient preferences for rescinding or maintaining a DNR order perioperatively. This article canvasses features of a required reconsideration discussion and guidelines for adhering to this standard.

#### Perioperative DNR Decision Making

Since the passage of the Patient Self-Determination Act in 1990, patients have been legally supported in their right to participate in and direct their own health care decisions. The law itself was written to encourage discussion between health care professionals and patients regarding autonomy, especially at the end of life.<sup>1,2</sup> The tenets of medical ethics similarly support patient autonomy in the context of perioperative decision making, complementing legal perspectives.<sup>3</sup>

Perhaps one of the most misunderstood situations confronting patients, surrogate decision makers, and clinicians practicing anesthesia or surgery is the handling of an existing do-not-resuscitate **(DNR) order perioperatively**.<sup>4,5</sup> In clinical practice, a DNR order is commonly suspended temporarily while a patient is undergoing a surgical intervention, despite the fact that such a suspension might conflict with a patient's preference to maintain the DNR order throughout the preoperative period. Patients and surrogate decision makers might be challenged by clinicians to rescind a DNR order perioperatively because normal vital sign parameters can be compromised by anesthetic agents and other pharmaceuticals used to provide anesthesia during surgery, necessitating elements of **cardiopulmonary resuscitation** (CPR) that would otherwise be precluded if patients maintained their DNR order. Therefore, a DNR order is in direct opposition to anesthesiologists' scope and responsibilities of practice. Additionally, patients are more likely to survive perioperative than out-of-hospital CPR,<sup>6</sup> thus calling into question why a DNR is medically appropriate in this setting. Indeed, if perioperative resuscitation is likely to be

successful and offer a therapeutic benefit, it might actually align with a patient's goals and preferences for care. Mandated resuscitation conflicts with the ethical principle of respect for patient autonomy and the legal right of a patient or surrogate decision maker to refuse unwanted treatment.<sup>2,7</sup> For these reasons, a comprehensive review concluded that it is unethical to automatically rescind such orders.<sup>8</sup>

When an anesthesiologist or surgeon discusses a patient's perioperative DNR order with the patient or surrogate decision maker, it is referred to as a *required reconsideration discussion*. Data show that implementation of required reconsideration during the perioperative period has been slow,<sup>9</sup> although it has been recommended in professional society statements, including those of the American Society of Anesthesiologists (ASA),<sup>10</sup> the American College of Surgeons (ACS), and the Association of Perioperative Registered Nurses (AORN).<sup>11</sup> This article focuses on the need for surgeons and anesthesiologists to conduct required reconsideration discussions with patients regarding code status in the perioperative period—specifically, to determine how patients with a DNR order might choose to modify their code status while undergoing a procedural intervention.

### **What Happens in Practice**

There is evidence that anesthesiologists are unfamiliar with the current guidelines. Nurok et al's 2014 study showed that up to 55% of attending anesthesiologists at an academic medical center were unfamiliar with the ASA and ACS guidelines on advanced directives in the perioperative setting.<sup>5</sup> A prior study similarly showed that 18% of academic anesthesiologists and 38% of surgeons agreed that preexisting DNR orders should automatically be suspended for patients undergoing intraoperative interventions.<sup>7</sup> Moreover, a multi-institutional simulation study published in 2018 showed that 10% of clinicians would intubate an unstable patient with a do-not-intubate order. This study also found that physicians' perception of the "reversibility" of the patient's situation influenced their decision to intubate, as did their presumption of patient preference.<sup>12</sup>

Nevertheless, institutional guidelines are available. Waisel et al have outlined guidelines for institutional adoption of perioperative reevaluation of DNR orders.<sup>13</sup> Baumann et al have also shared the process of their quality improvement efforts.<sup>14</sup> Factors limiting implementation of required reconsideration discussion include tradition, time constraints, and the routine care accompanying resuscitation that is provided by anesthesia and surgical staff.<sup>15</sup> Other barriers to implementation include fear of legal liability, documentation requirements, and the need for flexible written policies that respect the moral agency of the treating clinicians.

### **Patient Perspective**

The ethical principle of respect for autonomy relies on patients' freedom of choice to make their own decisions based on their goals and values.<sup>16</sup> A study of patients with acting DNR orders found that 88% agreed that patients with preexisting DNR orders should receive information about suspension of the DNR order during the perioperative period.<sup>17</sup> All patients who agreed that a discussion should take place recommended that family members or supportive caregivers be present for the discussion. And all of the patients interviewed in this study agreed that patients should be offered the opportunity to maintain their DNR status during the perioperative period. A similar study showed that 92% of all-comers seen in a preoperative evaluation clinic (with unknown code status) agreed that a discussion regarding perioperative resuscitation plans should always occur.<sup>7</sup>

In practice, patients or surrogates often have an inadequate understanding of the situation and their choices, including the implications of those choices. Modes et al found that 69% of patients who prioritized relief of pain and discomfort preferred CPR in their current state of health while 33% of people who preferentially valued extending life would not want CPR if they would be dependent on others.<sup>18</sup> These conclusions are somewhat unsettling, given that medical professionals—anesthesiologists and surgeons alike—often rely on advance directives to help guide their clinical decisions.<sup>19</sup>

### **Anesthesiology Perspective**

Anesthesiologists know that anesthetic interventions inherently affect vital functions, often resulting in respiratory depression or hemodynamic instability that make the use of mechanical ventilation and vasopressors tantamount to resuscitation. For these reasons, an argument can be made that any patient with a preoperative DNR logically should not receive anesthesia.<sup>8</sup>

With the introduction of the Patient Self Determination Act in 1990, the anesthesia community began to gradually reconsider how to handle patients with a DNR order in the perioperative setting. Initially, patients and surrogate decision makers were presented with options of either rescinding the DNR or keeping it in place.<sup>20,21,22</sup> It wasn't until 1998 that the ASA Committee on Ethics revised its initial guidelines to include a third option.<sup>23</sup> This third approach is more pragmatic and respects a patient's goals and values. Nevertheless, anesthesiologists can and do make predetermined decisions to forego intraoperative interventions that do not align with a given patient's overall goals of care. In one survey, 91% of anesthesiologists responded that they strongly or somewhat agree that a patient with decision-making capacity should be given the opportunity to refuse attempts at resuscitation in the setting of intraoperative cardiac arrest.<sup>7</sup>

The statistical knowledge<sup>6,15,24,25</sup> of better outcomes of intraoperative cardiac arrest compared to out-of-hospital cardiac arrest can be discussed with

patients, but this supportive data is not a reason to rescind a DNR order without a required reconsideration discussion. In fact, the viable survival rate from intraoperative cardiac arrest is only approximately 25%.<sup>6</sup>

### **Surgical Perspective**

Surgeons are more likely than anesthesiologists to automatically rescind a DNR order at the time of operative intervention. Seventy-five percent of surgeons surveyed by Burkle et al felt that active DNR orders didn't make sense during surgical procedures, and many surgeons held a fixed presumption that patients are all in for the duration of the perioperative period (ie, that DNR orders should automatically be suspended during surgery).<sup>8</sup> These and other beliefs<sup>26</sup> have direct consequences for surgeon behavior, including (1) unwillingness to operate on patients who set boundaries on postoperative interventions and (2) refusal to withdraw life-sustaining treatments.

Because of their ongoing care of patients in the postoperative setting, surgeons struggle more than anesthesiologists when patients ask them to acknowledge or honor limitations on care. This phenomenon can in part be explained by surgical "buy-in." As described by Schwarze et al, surgical buy-in is a complex process by which surgeons negotiate a commitment to postoperative care with patients before undertaking high-risk surgical procedures.<sup>26</sup> In particular, surgeons seek a commitment from the patient to abide by prescribed postoperative care in isolation of potential prolonged suffering or a change in the anticipated clinical outcome, which would then no longer align with the patient's goals and values. Additionally, Christakis and Lamont found that, as the duration of the physician-patient relationship increased, prognostic accuracy for terminally ill patients decreased; physicians' optimism potentially provides a rationale for continued aggressive care at the end of life.<sup>27</sup>

### **Framing Discussion**

The decision to maintain or revoke a DNR order in the operating room (OR) depends on patients' understanding of their illness and their broader goals of care. Cooper et al convened a panel of national leaders who made recommendations for best communication practices to facilitate goal-concordant care for seriously ill older patients with emergency surgical conditions. These recommendations include 9 key elements:

(1) formulating prognosis, (2) creating a personal connection, (3) disclosing information regarding the acute problem in the context of the underlying illness, (4) establishing a shared understanding of the patient's condition, (5) allowing silence and dealing with emotion, (6) describing surgical and palliative treatment options, (7) eliciting patient's goals and priorities, (8) making a treatment recommendation, and (9) affirming ongoing support for the patient and family.<sup>28</sup>

If the patient or surrogate elects to move forward with surgical intervention, a perioperative plan can be formulated and adhered to. This perioperative plan

would serve as a guideline for therapeutic interventions and goals of care that would align with the patient's expressed preferences and address unwanted interventions while clearly outlining the expected quality of life that would be acceptable to the patient during recovery and beyond. This plan can inform all members of the perioperative treatment team—including surgeons, anesthesiologists, and nurses—about the patient's goals of care and should be clearly documented in the patient's medical record.

### **Putting Required Reconsideration Into Practice**

The ASA's Ethical Guidelines for the Anesthesia Care of Patients With Do-Not-Resuscitate Orders or Other Directives That Limit Treatment suggests that there are 3 alternatives to consider when caring for patients with DNR orders during anesthesia care<sup>29</sup>:

1. "Full Attempt at Resuscitation."
2. "Limited Attempt at Resuscitation Defined With Regard to Specific Procedures" (eg, chest compressions, mechanical ventilation, or chemical intervention).
3. "Limited Attempt at Resuscitation Defined With Regard to the Patient's Goals and Values." Based on "the patient's stated goals and values," the members of the surgical team should be allowed to use their clinical judgment to determine "which resuscitation procedures are appropriate," depending on the context of the situation.

We agree with Waisel et al that the leading hurdle in following these recommended guidelines is clinician bias towards an expected course of action.<sup>13</sup> If there are members of the OR team who have moral or ethical objections to participating in the care of a patient with a perioperative DNR in place, arrangements must be made to permit such individuals to withdraw from the case and to provide a suitable alternative team member in a timely manner.<sup>30</sup>

### **Upshot**

In sum, when a patient with a DNR order undergoes a procedure involving anesthesia or conscious sedation, the DNR order should be formally reconsidered using the required reconsideration framework, beginning in the preoperative period. We suggest that a decision to maintain or rescind a DNR order should be made in the context of the patient's overall goals of care and that honoring patient autonomy and patient preference at the end of life should outweigh physician concerns about perioperative metrics or quality measures.<sup>31</sup>

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**HISTORY OF MEDICINE**

**From Ship Captains to Crew Members in a History of Relationships  
Between Anesthesiologists and Surgeons**

Yvon F. Bryan, MD and Lavinia Kolarzyck, MD

**Abstract**

With increasing specialization, more collaborative relationships have developed between anesthesiologists and surgeons. Specialization has influenced not only relationships but also communication between anesthesiologists and surgeons. This article considers the nature and scope of these transitions in recent histories of both professions.

**From Conflict to Collaboration**

The relationship between anesthesiologists and surgeons has evolved since the first anesthetic was delivered in 1846 by William Morton.<sup>1</sup> In caring for the patient, the helper or assistant to the surgeon was initially seen as subservient to the master surgeon.<sup>2,3</sup> The surgeon was the captain of the ship who was in control, and those assisting were perceived as being members of the crew. With the specialization of medical care in the first half of the 20th century, however, the relationship became more collaborative in nature, since the anesthesiologist had become a specialist and functioned as a consultant.<sup>4</sup> Further subspecialization affected the relationship, as new fields such as cardiac and pediatric surgery were developed beginning in the 1950s.<sup>5</sup> The development of enhanced recovery after surgery protocols, the perioperative surgical home, and surgical navigation have enabled the anesthesiologist to become a perioperative physician and the surgeon to become more involved from the initial diagnosis and plan for surgical intervention to the postoperative care of the patient.

This article considers the nature and scope of these transitions in recent histories of both professions. The time periods covered by this essay will be divided into 3 main parts: the initial operating rooms of the late 1800s to 1950s, the late 20th century, and the new millennium. During all these periods, the relationship between surgeons and anesthesiologists benefited from technological advances.

**Ship Captains in Turbulent Waters (1860-1950)**

Since the start of modern surgery in the second half of the 19th century, the personnel performing anesthesia were usually fellow surgeons, physicians, or nurses who offered to help the surgeon in caring for the patient by

administering a limited number of agents or medications.<sup>6</sup> At the time, administration of anesthetics was an art or craft and not a very scientific endeavor.<sup>2</sup> The surgeon usually demanded complete control since the competency of the anesthesiologist or anesthetist would not be known, given the lack of training standards.<sup>7</sup> The patient belonged to the referring physician; the surgeon performed the procedure, and the person who anesthetized the patient was left with certain responsibilities, such as selecting from a limited number of medications and monitoring the equipment. Nevertheless, legal and procedural consequences of this relationship emerged during this period, as both professions continued to develop independently of one another.

*The legal ramifications of the relationship: stormy waters.* If a crisis developed or poor results were obtained, then the legal implications of the relationship were brought to the forefront.<sup>2</sup> Who was responsible for a poor outcome, the surgeon performing the operation, the assistant administering the medications or agents to the patient, or both? Did it matter if the patient aspirated prior to surgery or bled to death during the procedure or postoperatively? Both had responsibility when it came to patient care and in cases of error. The question became whether the anesthetist was really the legal “servant” and the surgeon the legal “master” and therefore responsible for the actions of the anesthetist.<sup>8</sup> With the increasing specialization of anesthesiology and surgery, 20th-century case law delimited the roles and legal liabilities of anesthesiologists and surgeons in the operating rooms.<sup>8</sup>

*The development of the relationship: making waves.* Historically, the surgeon may have picked the anesthesiologist who was a friend, fellow surgeon, or colleague. Surgeons chose among a group of physicians or nurses who shared an interest in medicating patients or who had developed expertise in the area. After the development of board certification, anesthesiologists usually assigned which procedures they would partake in themselves. The surgeon no longer just picked his or her favorite anesthesiologist, as expertise and training in subspecialties affected who worked in specific areas within the hospital. Different systems for scheduling cases and communication errors in the operating room highlighted the need for better communication between the anesthesiologist and the surgeon whether they were in private or academic practice.<sup>9,10</sup>

### **Subspecialties’ Influence on Relationships**

*Cardiac surgery.* The advent of cardiac surgery and use of cardiopulmonary bypass machines in the 1950s highlighted the need for better communication in the operating room,<sup>11</sup> as exemplified by Walton Lillehei and his group at the University of Minnesota in their pioneering work on open-heart surgery.<sup>12</sup> The challenge of anesthetizing and operating on 2 patients simultaneously during bypass surgery demanded that surgeons and anesthesiologists coordinate care for the patient with less emphasis on their hierarchical relationship. As cardiac surgery progressed, the use of pacemakers and the development of many

byproducts related to the management of cardiac disease also necessitated better collaboration. For example, cardiac transplantation, which was developed in the 1960s, required excellent communication to optimize the timing of the procedure and overcome the many difficulties that occurred during these cases. Another example of good teamwork was the use of cardiopulmonary bypass, which required surgeons to recognize the need for the anesthesiologist to use vasopressors and begin ventilation once the patient came off the cardiopulmonary bypass machine and the heart started beating.

*Pediatric surgeon and crews navigating smaller vessels.* Pediatric surgery is another area where good communication has occurred between anesthesia and surgery subspecialties. The care of children involves not only the patient but also the family, as both the anesthetic and the surgical risk must be communicated to the parents—for example, in deciding whether to proceed with elective surgery for a child with a recent upper respiratory infection. A great working relationship between anesthesiologists and surgeons is also observed during a pediatric or trauma code, which requires that team members respect each other's expertise and contribute to the common goal.

*Other surgical subspecialties controlling different course.* In certain surgical subspecialties, such as orthopedics, ophthalmology, and gynecology, specialists have their own unique relationships with anesthesiologists. In orthopedics, for example, surgeons and anesthesiologists agree on the use of neuraxial and regional rather than general anesthesia in patients undergoing procedures, based on their clear understanding that regional anesthetic techniques have better outcomes than general anesthesia.<sup>13</sup> In contrast, most ophthalmologists perform the majority of their cataract surgeries with local anesthesia and therefore without an anesthesiologist,<sup>14</sup> so confusion might exist as to when a patient might require general anesthesia if restless, scared, or claustrophobic. Although the ophthalmic surgeon might prefer that the patient be immobilized, the important point to remember is that the patient might need further optimization before proceeding with a general anesthetic. The use of laparoscopic and robotic surgery in gynecology provides another example of the need for good understanding of the challenges that can occur during procedures because the surgeon and anesthesiologist now must observe what occurs on the video screens of the operating room. Robotic surgery presents a further challenge, as access to the patient is limited and a robotic "third person" has its own requirements alongside those of the anesthesiologist and the surgeon.

Better communication and cooperation in this era of specialization and technical advance most likely was fostered by surgeons' improved understanding of anesthesia and greater emphasis on trust and coordination than a hierarchy of command.

### **Dynamic Co-captains**

The modern relationship between surgeons and anesthesiologists can best be described as one of fellow collaborators. While both are leaders in their respective areas, they must learn to work together on the same patient, in the same intense environment, in respectful harmony. The 2 physicians in this relationship can share, yield, or compete for leadership in a variety of contexts and situations.<sup>15,16</sup>

*Shared leadership.* The surgeon and anesthesiologist can **share leadership roles** in a variety of contexts, including in multidisciplinary efforts to improve patient outcomes. One example is the perioperative surgical home model of patient care. In this model, anesthesiologists take an active role in many aspects of perioperative management and care coordination alongside their surgery colleagues.<sup>17,18</sup> Another example of shared decision making is the development and execution of an airway management plan for a patient with a large obstructive airway mass. In such cases, the patient's outcome critically depends on decisions jointly made by—and informed by the expertise of—members of the physician team. A surgeon will be focused on resecting a large tumor in the airway, while the anesthesiologist will ensure that the patient remains not only still but also oxygenated for the procedure.

*Yielded leadership.* There are times in which critical decision making is yielded to the physician with the most experience or expertise in the situation. An example would be acute intraoperative hemorrhage, in which the physician best suited to stop the bleeding would be the surgeon. In this example, the surgeon takes the lead in fixing the problem, whereas the anesthesiologist assumes the role of running a code and temporizing the situation with resuscitation. In the end, the patient benefits from the specialists' shared understanding of each other's role in a crisis.

*Competition for leadership.* When the 2 physicians appear to compete for leadership roles, it is generally in the context of administrative rather than patient care matters.

At the heart of the surgeon's and anesthesiologist's collaborative relationship is mutual respect and understanding of each other's roles. Over time, as they work together, the 2 physicians learn each other's style and expertise. What is unique about the surgeon-anesthesiologist relationship is that interactions are often transient. Most surgeons, especially in large practices, do not work with the same anesthesiologist every day. As such, it may take years of practice in the same institution to fully develop this relationship. In contrast, small practices and specialized areas of surgery (eg, hybrid cardiology, cardiac surgery) and anesthesiology (eg, cardiothoracic and pediatric anesthesiology), in which innovative and complex procedures are performed, might foster these relationships sooner.

## Navigating the Future

The relationship between surgeons and anesthesiologists has changed substantially from one of master-servant to one of fellow collaborators. Specialization has not only changed the leadership role of medical teams but also improved communication between surgeons and anesthesiologists. And better communication—such as in the performance of a time-out prior to the beginning of a procedure—has improved the quality and safety of patient care.<sup>19</sup> It is also common for surgeons to discuss with anesthesiologists the indications for the surgery along with other important aspects of care, such as whether the patient has allergies or which antibiotics are requested. The days of surgeons being barbers and anesthesiologists lacking training are things of the past. No longer are anesthesiologists and surgeons perceived as “needles vs knives” or “brains vs blood.” Now both groups may be represented as fellow crew chiefs of teams safely caring for patients.

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**ART OF MEDICINE**

**Surgical Transfiguration**

Kristina Alton

**Abstract**

This drawing considers the nature and scope of clinicians' responsibilities to speak and act in ways that express great regard for the breadth and depth of their capacity to influence patients' pre- and postsurgical self-understandings.

**Figure.** *Transfigurations of Body and Mind*



**Media**

Pen and watercolor.



**Caption**

Conversations clinicians have with patients about their disease processes, code status, and informed consent, for example, can influence how patients reconcile their illness experiences with their identities. In operating room settings, actions we commit with our hands can drastically change how patients see themselves and how they orient themselves to their lives. Anatomical features of our patients' bodies are transformed physically, as are our—and their—perceptions of their pre- and postsurgical bodies. This drawing considers the nature and scope of our responsibilities as clinicians to speak and act in ways that express great regard for the breadth and depth of our capacity to influence patients' self-understandings.

**Kristina Alton** is a third-year medical student at the University of North Carolina at Chapel Hill. After becoming interested in drawing while attending an arts magnet high school, she began to focus on anatomical subjects in pen and watercolor in her gap year after college. She now enjoys using art to reflect on her clinical experiences.

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## ART OF MEDICINE

### Who's in the Hospital Lobby?

Katelyn Norman, MD

#### Abstract

Lobbies and waiting rooms of hospitals and clinics tend to be places where physicians spend little time. These spaces, intended for occupancy by patients and their loved ones, can accommodate a physician who is alone, in reflection, after hours.

**Figure 1.** *Hospital Lobby, 2018*



#### Media

Oil on Canvas.

**Caption**

Lobbies and waiting rooms of hospitals and clinics tend to be places where physicians spend little time. These spaces are rather intended for occupancy by patients and their loved ones. This painting depicts a solitary physician after hours in an empty hospital lobby, where few, if any, would expect to find her; it is a tribute to such spaces in health care. Occupying these spaces in time alone can nourish clinicians' cultivation of empathy and offer opportunities to recommit to [compassionate practice](#) and ethics.

**Katelyn Norman, MD** is a third-year resident in the Yale-Waterbury Internal Medicine Residency Program in Waterbury, Connecticut. She earned a medical degree from the Quinnipiac University Frank H. Netter MD School of Medicine and a bachelor of fine arts degree from New York University.

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ART OF MEDICINE

Cohesion in Distancing

Michael Shen, MD

Abstract

In isolation, we are physically apart; in solidarity, we are together. The COVID-19 pandemic emphasizes our social responsibility to maintain physical distance from one another. In doing so, we solidify our collective strength.

Figure. *Solidarity*



Media

Digital drawing

Caption

Via the social contract, we tacitly endorse—with all members of society—limiting our personal freedoms to benefit our collective. Amidst unprecedented need for distance, isolation, and quarantine, human beings are asked to keep apart to prevent exposure, illness, and fatality, particularly of those among us at highest risk. This image suggests we are like individual hands separated by the COVID-19 pandemic.

A problem arises, however. Prioritizing physical distance means acting contrary to our need for sensual proximity. Agreement is embodied in a handshake, camaraderie in a hug. If not touch, what, then, will hold us together culturally and socially?

An answer arises. Standing separately, we are together, fists raised, to do the work of illuminating how notions of *community* and *togetherness* can be detached from physicality. Physical distancing and cohesion are seemingly opposite. This same tension, however, holds us in [solidarity](#).

**Michael Shen, MD** is an artist and internal medicine resident at NYC Health + Hospitals/Bellevue in New York City. Interested in palliative care, ethics, and social medicine, he hopes to find a fulfilling career at the intersection of art and science.

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