

Preventable Closed Claims in the AANA Foundation Closed Malpractice Claims Database

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Medical errors are among the top 3 causes of patient deaths in the United States, with up to 400,000 preventable deaths occurring in hospitalized patients each year. Although improvements have been made in anesthesia patient safety, adverse outcomes continue to occur. This study used thematic analysis to examine anesthesia closed claims that were associated with preventable morbidity and mortality. Investigators determined that 123 closed malpractice claims files from the American Association of Nurse Anesthetists

(AANA) Foundation closed claims database involved events that the involved Certified Registered Nurse Anesthetist could have prevented. Factors that were associated with preventable closed claims included communication failures, violations of the AANA Standards for Nurse Anesthesia Practice, and errors in judgment.

Keywords: Anesthesia closed claims, malpractice, perioperative, preventable.

Recent research findings suggest that more than 400,000 deaths in hospitalized patients each year in the United States are preventable.^{1,2} This number far exceeds that in the 1999 report from the Institute of Medicine (now the Academy of Medicine), which revealed that up to 98,000 preventable deaths due to medical errors occurred annually in the United States.³ An evidence-based review of a 2010 study performed by the US Office of the Inspector General examined the incidence of adverse events that caused harm or contributed to death of hospitalized Medicare patients. Physician reviewers determined that 44% of adverse events that resulted in patient harm were preventable.⁴ Other estimates of preventable adverse events range between 50% and 60%.²

Abundant literature exists regarding morbidity and mortality related to anesthesia care.⁵⁻¹⁰ Since its inception in 1995, the AANA Foundation closed claims research team (CCRT) has investigated the role of myriad covariates associated with damaging events and adverse outcomes that resulted in malpractice claims being made against insured Certified Registered Nurse Anesthetists (CRNAs).¹¹⁻¹⁶ A malpractice claim may be generated by events that are considered outside the control of the CRNA.¹⁶ However, studies that look specifically at anesthesia closed claims resulting from adverse events deemed “preventable” by the CRNA are notably lacking.

The definition of *prevent* includes to “keep from happening or existing,” “be in readiness for,” or to “act

ahead of.”¹⁷ The fact that a malpractice claim transpired because of a preventable event would suggest that this particular aspect of closed claims research deserves careful examination. If an adverse event is preventable, we should focus attention on interventions to predict, anticipate, and intercede in these events. The purpose of this study was to perform a quantitative and qualitative analysis of preventable anesthesia-related adverse events to identify strategies to help improve patient outcomes.

In this study, the authors examined closed claims that reviewers determined were preventable by the involved CRNA. The actions or inactions of the CRNAs in these cases—that is, medical errors—are likely to have contributed to damaging events and adverse outcomes. For example, a surgical mishap such as uncontrolled hemorrhage due to vascular trauma would not be preventable by the CRNA providing the anesthetic. On the other hand, failure to perform a complete preoperative airway assessment of a patient with unanticipated airway management difficulties resulting in brain damage or death would be categorized by researchers as being preventable by actions of the CRNA.

The authors are CRNA practitioners, educators, and researchers who share an interest in anesthesia patient safety and have been involved with closed claims review for periods ranging from 5 to more than 20 years. As new researchers have joined the CCRT, they have participated in review of cases with experienced reviewers, and interrater reliability has been established. Recent

closed claims research conducted by the authors includes a qualitative study on the impact of perioperative transfer of care (B.A.W.) and thematic analysis of obstetric closed claims (B.A.C.).

This study is thought to be the first to investigate malpractice claims filed against CRNAs that researchers found to be preventable. The information gleaned from preventable closed claims has the potential to enhance anesthesia patient safety and quality of care by influencing practice standards, educational requirements, and professional development activities for practitioners.

Methods

• **AANA Foundation Closed Claims Database.** The AANA Foundation closed claims database consists of 245 malpractice claims considered closed and involving either a CRNA or a student registered nurse anesthetist from 2003 to 2012; the database includes both quantitative and qualitative data.¹⁶ Most of these cases occurred in hospitals and involved outpatients who experienced intraoperative damaging events. The most frequently represented case types included orthopedics, general surgery, cosmetic, obstetric, and neurosurgical procedures. Damaging events and adverse outcomes were studied. In 35% of these cases, death was the adverse outcome.¹⁶

The data collection tool that the CCRT uses is a fillable form with 103 items. The current tool reflects multiple iterations of the original tool created by closed claims researchers in 1995, which was similar to the tool used at that time for the American Society of Anesthesiologists (ASA) closed claims study. Some major elements of the data collection tool are described in Table 1.

• **Querying the Closed Claims Database.** A team of experienced CRNA closed claims researchers was assembled to analyze closed claims found in the AANA Foundation closed claims database that were identified as preventable. The team leader of this study (M.J.K.) queried the AANA Foundation closed claims database for claims that were deemed preventable by CRNA reviewers. The authors used a consensus-driven process to re-evaluate which claims in this dataset were preventable by actions of the involved CRNA, and 123 claims (50.2%) were identified. The review process for the AANA Foundation Closed Claims Study has historically been consensus-driven. Interrater reliability across reviewers has been studied, with a reported κ value of 0.8.¹¹

A descriptive analysis was performed using statistical analysis software (SPSS 19, IBM Corp, Armonk, NY), and a thematic analysis of the 123 claims was conducted to code the events in these claims and to identify common themes. Table 2 describes the application of thematic analysis to the review of anesthesia closed claims by the CCRT.¹⁸ Detailed descriptions regarding the generation of the AANA Foundation closed claims database and

1. Provider demographics
2. Patient characteristics, including ASA physical status
3. Planned anesthetic technique
4. Procedure location
5. Type of procedure
6. Damaging events and adverse outcomes
7. Basis for the lawsuit
8. Types of documents reviewed
9. Reviewer's narrative of events

Table 1. Elements of AANA Foundation Closed Claims Data Collection Tool

Abbreviation: AANA, American Association of Nurse Anesthetists.

thematic analysis used in this project can be found in separate articles.^{16,18}

Results

A descriptive analysis of the 123 claims that were designated preventable revealed that 63% of the involved patients ($n = 77$) were female, and the mean age of the patients was 51 years. Most patients were identified as ASA physical status 2 ($n = 61$) and physical status 3 ($n = 47$). The most common adverse outcome was death ($n = 47$) followed by major temporary injury ($n = 21$). Most planned anesthetic techniques were general endotracheal anesthesia ($n = 40$) and monitored anesthesia care (MAC; $n = 34$). The most common surgical procedure types were orthopedic ($n = 24$), general surgical ($n = 24$), and cosmetic ($n = 15$). The initial certification year of the named provider ranged from 1964 to 2011. Seventy-seven claims resulted in payouts ranging from \$0 to \$1 million (mean [SD] = \$169,195 [\$264,713]; median = \$50,000).

A thematic analysis of the preventable closed claims revealed 3 themes: communication failure, violations of standards, and errors in judgment. Several claims represented more than 1 theme. The themes are detailed as follows, and the frequencies with which these themes were found is depicted in the Figure.

• **Communication Failures.** Communication failures ($n = 26$) were found between CRNAs and other healthcare providers, between CRNAs and patients, and between CRNAs and other anesthesia providers. In one claim, there was no communication between the surgeon and CRNA regarding use of an electrocautery device during a resection of an upper lip lesion. Oxygen was administered via nasal cannula, and a flash fire occurred when the electrocautery device was used. In another claim, the patient failed to disclose a history of chest pain and previous cardiac testing to the CRNA. The electrocardiogram (ECG) was abnormal, but the surgeon claimed it was consistent with previous ECGs. Asystole occurred after the case started, and resuscitative efforts failed. Postmortem findings included substantial coronary artery disease.

1. Transcription of data: Most often used when transcribing dialogue from interviews.
 - a. With closed claims research, the data from the comprehensive files provided by the insurers are extracted and entered into the instrument known as the reviewer's survey.
2. Familiarization with the interview: Taking notes, relistening to the entire interview, and researchers comparing notes.
 - a. The closed claims researchers, individually and in teams, read, reread, and become intimately familiar with each respective file.
 - b. Extensive dialogue ensues within teams.
3. Coding: Carefully reading the transcript line by line and applying a code that describes what was interpreted as important. Coding aims to classify the data so they can be compared systematically with other parts of the dataset. Codes can be behaviors, incidents, structures, values, emotion, elements of care, and other applicable variables.
 - a. Coding for each respective closed claims file is completed by individual researchers on each team, followed by team coding.
 - b. Consensus is reached for all coded words and phrases.
4. Developing a working analytical framework: Traditionally done separately from stage 3 and involves researchers initially comparing codes and agreeing on a set of codes to apply to subsequent transcripts.
 - a. The analytical framework used by the closed claims team is embedded in the mission and purpose of closed claims research. In each subgroup of closed claims files (eg, regional anesthesia), the mutually agreed on codes apply to all claims in this subset and are taken into consideration following the American Association of Nurse Anesthetists (AANA) Standards of Nurse Anesthesia Practice, the AANA Code of Ethics, and (in this example) the American Society of Regional Anesthesia and Pain Medicine Advisories and Guidelines.
5. Indexing of subsequent transcripts using existing categories and codes: Typically employing computer-assisted qualitative data analysis software to enter data, including a categorical and coding schematic.
 - a. The AANA Foundation closed claims research team does not employ computer-assisted technology but follows an established manual coding schematic process.
6. Charting the data into the framework matrix: The process used to do this depends on the volume of data.
7. Interpreting the data.
 - a. Interpretation of data is a team effort for each manuscript and follows the qualitative trustworthiness concepts.
 - b. Extensive literature reviews are conducted at various phases for each team, most notably when validating established themes.
8. Writing, disseminating, and communicating findings.
 - a. Results of the closed claims research are published in peer-reviewed literature.

Table 2. Thematic Analysis and Analysis of Closed Claims¹⁸

An example of miscommunication between a CRNA and another anesthesia provider occurred when an anesthesiologist completed the preanesthetic evaluation of a patient and did not document or communicate to the CRNA that the patient had pulmonary hypertension managed with home oxygen and sildenafil (Revatio) therapy. General anesthesia was administered, with severe bradycardia resulting. Chest compressions were performed. The patient experienced a severe anoxic brain injury, never regained consciousness, and died several weeks after the incident.

• **Failure to Comply With Standards.** Violations of the 14 AANA Standards for Nurse Anesthesia Practice¹⁹ were noted in 92 claims (75% of preventable claims). In some cases, more than 1 standard was violated, whereas in 25% of the preventable claims, no standard was violated. The frequency with which standards were breached is documented in Table 3. The most commonly violated standards were Standard VII (n = 41), Standard IX (n = 36), Standard III (n = 28) and Standard II (n = 21).

Standard VII includes implementing and adjusting the anesthesia care plan based on the patient's physiologic status. Standard IX addresses monitoring, evaluation and documenting the patient's physiologic condition as appropriate for the type of anesthesia and patient needs. Cases in which this violation was apparent involved

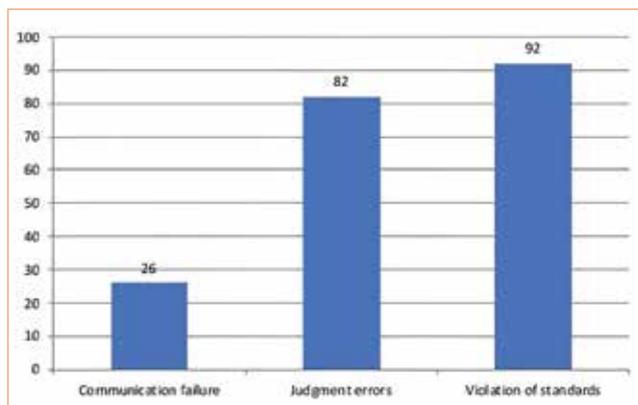


Figure. Incidence of Communication Failure, Violation of Standards, and Errors in Judgment

issues such as failure to use functional physiologic monitors (ie, starting a general anesthetic without functional oximetry or capnography). Standard III describes the need to formulate a patient-specific care plan. Most violations of this standard were related to inappropriate use of oxygen, which resulted in fire. Standard II addresses performing and documenting a thorough preanesthesia assessment and evaluation. Evaluation of failure to follow this standard included lack of physical assessment, including absence of airway assessment and inadequate

Standard ¹⁹	Total breaches
Standard I. Respect the patient's autonomy, dignity, and privacy, and support the patient's needs and safety.	0
Standard II. Perform and document or verify documentation of a preanesthesia evaluation of the patient's general health, allergies, medication history, preexisting conditions, anesthesia history, and any relevant diagnostic tests. Perform and document or verify documentation of an anesthesia-focused physical assessment to form the anesthesia plan of care.	21
Standard III. After the patient has had the opportunity to consider anesthesia care options and address his or her concerns, formulate a patient-specific plan for anesthesia care. When indicated, the anesthesia care plan can be formulated with members of the healthcare team and the patient's legal representatives (e.g., health care proxy, surrogate).	28
Standard IV. Obtain and document or verify documentation that the patient or legal representative (e.g., healthcare proxy, surrogate) has given informed consent for planned anesthesia care or related services in accordance with law, accreditation standards, and institutional policy.	4
Standard V. Communicate anesthesia care data activities through legible, timely, accurate and complete documentation in the patient's healthcare record.	18
Standard VI. Adhere to manufacturer's operating instructions and other safety precautions to complete a daily anesthesia equipment check. Verify function of anesthesia equipment prior to each anesthetic. Operate equipment to minimize the risk of fire, explosion, electrical shock, and equipment malfunction.	16
Standard VII. Implement and if needed modify the anesthesia plan of care by continuously assessing the patient's response to the anesthetic and surgical or procedural intervention. The CRNA provides anesthesia care until the responsibility has been accepted by another anesthesia professional.	41
Standard VIII. Collaborate with the surgical or procedure team to position, assess, and monitor proper body alignment. Use protective measures to maintain perfusion and protect pressure points and nerve plexuses.	0
Standard IX. Monitor, evaluate and document the patient's physiologic condition as appropriate for the procedure and anesthetic technique. When a physiological monitoring device is used, variable pitch and threshold alarms are turn on and audible. Document blood pressure, heart rate, and respiration at least every five minutes for all anesthetics.	36
Standard X. Verify and adhere to infection control policies and procedures as established within the practice setting to minimize the risk of infection to patients, the CRNA, and other healthcare providers.	3
Standard XI. Evaluate the patient's status and determine when it is appropriate to transfer the responsibility of care to another qualified healthcare provider. Communicate the patient's condition and essential information for continuity of care.	6
Standard XII. Participate in the ongoing review and evaluation of anesthesia care to assess quality and appropriateness to improve outcomes.	6
Standard XIII. Is physically and mentally able to perform duties of the role.	0
Standard XIV. Foster a collaborative and cooperative patient care environment through interdisciplinary engagement, open communication, a culture of safety, and supportive leadership.	0

Table 3. Breached Standards of Care in Preventable Closed Claims

Abbreviation: CRNA, Certified Registered Nurse Anesthetist.

cardiovascular evaluation, not obtaining a full medical history, failure to seek medical clearance, and insufficient laboratory and/or diagnostic testing.

Eighteen breaches of Standard V occurred, which is related to accurate, thorough, legible and timely documentation of pertinent anesthesia-related information. Several claims had incomplete, incongruent and even missing documentation. In one claim, the anesthetic did not cause or contribute to the patient's demise; however, poor documentation led to the conclusion of negligence, and therefore the CRNA was included in the lawsuit.

Standard VI (n = 16 breaches) involves adhering to appropriate safety precautions to minimize risk of fire, explosion, electrical shock, and equipment failure. Most Standard VI violations were fire-related. A few cases involved CRNAs knowingly using faulty or broken equipment.

- **Errors in Judgment.** Errors in judgment occurred

in more than 65% of the cases (n = 82) and included failure to recognize, diagnose, and treat; inappropriate anesthesia care; inappropriate preparations and/or planning; cognitive biases; production pressure; lack of vigilance; normalization of deviance; and lack of situational awareness. In one claim, a patient scheduled for elective surgery arrived at the outpatient facility and complained of chest pain. The patient was given intravenous morphine and transdermal nitroglycerin, which relieved the chest pain. An electrocardiogram revealed ST-T wave changes. The decision was made to proceed with the case. This judgment error may have contributed to the patient's death 3 hours after surgery. There were several examples of failure to recognize, diagnose, and treat, including undetected esophageal intubation, incorrect drug or dose administration, failure to recognize or treat patient deterioration, and improper positioning of the

patient. The consequences of these failures ranged from broken bones (patient's fingers caught between operating room table and arm board) to death.

Inappropriate anesthesia care occurred during a cataract procedure in which the patient was scheduled to receive MAC. The patient had numerous comorbidities, was morbidly obese, and had obstructive sleep apnea. The patient, who received midazolam, fentanyl, and a general anesthesia induction dose of propofol, became apneic. Efforts at mask ventilation and intubation were unsuccessful, and cardiopulmonary arrest ensued. The patient was revived after successful placement of a laryngeal mask airway and cardiopulmonary resuscitation. Following these events, the patient was admitted to the intensive care unit and was eventually discharged home. The patient accused the CRNA of inappropriate administration of medications. The most common example of inappropriate anesthesia planning, however, was related to the use of oxygen in the presence of electrocautery during procedures on the head and face during MAC. These cases included the use of high flow rates and high inspired oxygen concentrations, which resulted in fire. Examples of inappropriate preparation included use of known malfunctioning monitoring equipment and operating room tables. In one claim, general anesthesia was induced without functioning physiologic monitors, thus delaying the diagnosis of esophageal intubation, resulting in anoxic encephalopathy.

Cognitive bias was represented in a claim in which a patient's oxygen saturation decreased below 90% after administration of propofol and fentanyl during MAC. The CRNA believed the equipment was faulty and changed the pulse oximetry (SpO₂) probe and location several times without improvement and did not notice that the patient was apneic. The patient died after sustaining an anoxic brain injury.

An example of production pressure occurred in one claim in which a high-risk patient with a compromised airway was scheduled to receive care in a small rural facility. The CRNA questioned the appropriateness of performing the case in the facility but acquiesced when the surgeon declared the case an emergency. The CRNA was unable to secure the airway, and the patient died.

Lack of vigilance by the CRNA in one claim led to a patient's blindness. During a repair of a retinal detachment, the patient became hypotensive, and the volatile anesthetic concentration was reduced. The CRNA did not monitor neuromuscular blockade, and the patient subsequently coughed, resulting in vision loss in the operative eye.

Normalization of deviance is defined as the gradual process through which unacceptable practice or standards become acceptable.²⁰ The use of a known faulty monitor is an example of normalization of deviance. In one claim, the CRNA proceeded with induction of

general endotracheal anesthesia, despite having an unreliable oxygen saturation monitor. The CRNA knew the oxygen saturation monitor did not always work but presumed the patient's morbid obesity was the cause of the monitor malfunction. Once the patient was intubated, it was discovered that the end-tidal carbon dioxide monitor and gas analyzer were not working either. The patient sustained an anoxic brain injury and died.

Undetected esophageal intubation is an example of lack of situational awareness. A CRNA intubated a patient's esophagus, recognized it, and reintubated the patient. The second intubation attempt resulted in undetected esophageal intubation. Although the capnograph showed aberrant tracings, the CRNA thought he heard breath sounds. Cardiovascular collapse followed, and resuscitative efforts were unsuccessful.

Discussion

Our study revealed that 50.2% of the total anesthesia closed claims in the database were due to events deemed preventable by the CRNA, which is consistent with the findings in other studies.^{9,10,16} This thematic analysis of preventable claims yielded consistent themes, which represent opportunities to explore mechanisms to reduce future preventable events. The themes were communication failures, failure to comply with standards, and errors in judgment.

• **Communication Failures.** Miscommunication has been identified by the Joint Commission as the third overall leading root cause of sentinel events in health-care.²¹ Communication failures contributed to the adverse outcomes in many of the cases reviewed in this study. These communication breakdowns occurred throughout all phases of anesthesia care (preoperative, intraoperative, and postoperative). Communication failures between the patient and the CRNA occurred most commonly during the preanesthesia assessment. The reasons for this miscommunication are varied, but it resulted in obtaining incomplete histories from patients, patients failing to disclose medical conditions, and a lack of comprehensive discussion regarding anesthesia risk. It has been shown that patients often do not understand the technical terms that healthcare providers use during the preanesthetic assessment,²² and this may have contributed to incomplete assessments, particularly during discussions of the patient comorbidities and medications. In addition, patients may be unwilling to speak up or ask questions because of embarrassment, feeling rushed, or anxiety. Taking adequate time to communicate with a patient preoperatively is a challenge in fast-paced environments where productivity is emphasized.

The providers involved in the communication failures included CRNAs and other members of the healthcare team. Surgeons, nursing staff, and anesthesiologists were included in several cases of communication-related pre-

Cognitive error	Definition
Anchoring	Overreliance on the initial data source, called the anchor, when making decisions. Also called focalism. ³⁰
Availability bias	Thinking of things that first come to mind are more representing reality despite inadequate review of available data. ^{30,31}
Premature closure	A diagnosis is made before the associated evidence is fully verified. ³²
Feedback bias	Clinical decision making is affected to a greater extent by feedback provided by others vs use of available data. ³³
Framing effect	Reaction to a choice and clinical decisions vary depending on how information is presented. ³⁴
Confirmation bias	Interpreting new evidence as confirming the existing beliefs or theories of the clinician. ³⁵
Omission bias	“Preference for harm caused by omissions over equal or lesser harm caused by acts.” ³⁶
Commission bias	The tendency toward action rather than inaction, which is more likely in overconfident clinicians. May be less common than omission bias. ³⁷
Overconfidence	When clinicians are more confident in their own abilities than is objectively reasonable. ³⁸
Sunk costs	From the business world: a payment or investment (or clinical decision) that has already been made and cannot be recovered, so it should not be a factor in decisions moving forward because it cannot be recouped. ³⁹

Table 4. Leading Cognitive Errors in Anesthesia Practice

ventable adverse events. These results were consistent with the findings of other studies showing that communication failures commonly occur between different professional members of a team.²³ Results of one study demonstrated that communication breakdowns occurred across the continuum of care, resulting in injury of surgical patients. These breakdowns most commonly involved 1 transmitter and 1 receiver with either a failure to transmit information or inaccurate reception of information.²⁴ Ambiguity about responsibilities, roles, or leadership was also evidenced when communication breakdowns occurred.²⁴ Effective communication is a particularly important component of transfers of care and handoffs or “transition communications.”²⁵ Our study revealed cases in which communication deficits occurred during transitions of care.

• **Failure to Comply With Standards.** Violations of standards, defined as the AANA Standards for Nurse Anesthesia Practice,¹⁹ resulted in many situations wherein patients experienced adverse events. As CRNAs, we are expected to adhere to the standards established by the AANA for our practice. A 1981 study of 8,000 anesthesia-related safety events found that most of these events resulted from failure to complete preinduction equipment checks of equipment and medications—essentially, a failure to follow standards of practice.⁹ Standards, guidelines, and policies exist to help discourage active errors, also known as “human mistakes.”²⁶

The question as to why one would fail to follow standards likely has multifaceted answers, but it is unlikely that CRNAs do not understand the importance. Nor is it likely that a CRNA would knowingly practice in a manner that would cause a damaging event or adverse outcome. Rather, errors in judgment, such as those caused by production pressure, may contribute to failure to follow standards. When we feel pressured to save time

or improve productivity, we fall prey to deviant behaviors such as taking shortcuts. When deviant behaviors continue over time with no adverse events resulting, we develop a false sense of security, resulting in the normalization of these practices: “normalization of deviance.” Examples of this can be seen in the cases of incomplete preanesthesia assessments (Standard II) or failure to ensure that equipment is checked and in working order (Standard VI). Interestingly, when the standards violated in this dataset of “preventable” claims were compared with our original dataset, the only difference seen in frequency of standards violated was Standard II. More than 90% of the violations of this standard (19/21) occurred in preventable claims. This would support the expectation that we are inherently responsible for ensuring the safety of our anesthetized patients.

The failure to adhere to standards of practice may also be the result of the multiplicity of standards, guidelines, and policies at local or national levels, which makes one believe that these are “recommendations” vs rules that require strict compliance.²⁷ The entire clinical team may encourage violations of standards if it helps throughput of patients. This exertion of “peer pressure” by the rest of the team, and our complacency with such, places our patients in harm’s way.

• **Errors in Judgment.** Errors in judgment were evidenced by adverse events resulting from cognitive biases. Cognitive errors or biases are flaws or distortions in judgment and decision making resulting from “decisional short cuts.”²⁸ Research on the effect of cognitive errors in anesthesia is limited, although Stiegler and colleagues²⁹ cataloged 14 errors thought to be most relevant in anesthesia practice. The “top 10” cognitive errors in anesthesia practice that these authors identified included anchoring, availability bias, premature closure, feedback bias, framing effect, confirmation bias, omission bias, com-

mission bias, overconfidence, and sunk costs.²⁹ These 10 cognitive errors are described in Table 4.³⁰⁻³⁹ In this study, we found examples of most of the 14 cognitive errors, including anchoring, commission, and feedback bias.

Several factors can contribute to the presence of cognitive biases in medical decision making. Practitioners are more likely to make decisions based on cognitive biases when they are fatigued or rushed or when they lack sufficient information about the patient. Physicians have reported higher rates of medical error associated with feelings of burnout or lower perceived well-being.⁴⁰ A systematic review found that cognitive biases may likely lead physicians to errors in the diagnosis, management, or treatment of medical conditions.⁴¹ Many qualitative cognitive factors influence clinical decisions and may lead to errors. Those cognitive errors include use of heuristics (rule of thumb), preferences for certainty, overconfidence, affective influences, memory distortions, bias, and social forces including fairness or blame. Clinical anesthesia often requires complex decision making that occurs rapidly, with a high potential for decision errors resulting.⁴²

Other judgment errors included loss of situational awareness. Situational awareness is essential to allow the individual or the team to make appropriate decisions during patient care. During times of stress or crisis, situational awareness is the up-to-the-minute comprehension of task-relevant information that enables appropriate decision making.⁴³ Loss of situational awareness can lead to wrong decisions even when an individual is highly trained and skilled. Alternatively, an individual may have excellent situational awareness yet lack the knowledge or skills to make the right decisions.⁴⁴

Situational awareness requires the perception of elements in a current situation, comprehension of the situation/meaning, and the projection of their status in the future. These 3 steps then lead to a decision with subsequent actions. Past experience with similar situations, training, and skills/abilities will affect the individual's comprehension of a situation.⁴⁴ Repeated experience in an environment can help one develop expectations about future events, which is why simulation can be helpful in gaining clinical expertise.⁴⁵ Automaticity of certain decisions occurs without conscious awareness by the individual.⁴⁶ Authors of an ASA closed claims study determined that 74% of catastrophic outcomes in the ASA database were attributed to situational awareness error. The authors defined 3 levels of situational awareness errors: perception, comprehension, and projection.⁴⁷ Based on these definitions, it is likely that a considerable number of adverse events during anesthesia care are caused by a loss of situational awareness.

Successful situational awareness also depends on the maintenance of vigilance. This study found that some adverse outcomes may have resulted from a lack of

vigilance. The nature of anesthesia practice requires that providers constantly monitor and assess the patient's condition while administering or titrating medications to maintain ideal levels of anesthesia. Vigilance is the cornerstone of our profession. The profession of nurse anesthesia developed because of the need to have a dedicated clinician focused on the patient's anesthesia care, who maintained vigilance throughout the surgery. In fact, the Mayo brothers insisted that nurses administer anesthesia vs interns because nurses were more likely to remain focused on the safe administration of anesthesia.⁴⁸

Many factors can contribute to a failure to maintain vigilance during an anesthetic. Distractions are common and perhaps increasing because of the widespread availability of technology and electronics in an anesthetizing area. We may be interrupted by phone calls or texts, participate in conversations, engage in Internet activities, or be subjected to loud music or other loud noise while providing anesthesia care. A recent study has demonstrated that self-initiated distractions by anesthesia providers are common; however, these distractions most often occurred during times of idleness or low workload, were of short duration, and did not decrease vigilance.⁴⁹ Participating in a long or low-complexity case may lead providers to add tasks to alleviate boredom. Our ability to multitask may be overestimated, resulting in a lack of attention to the task at hand.⁵⁰ Failure of vigilance during critical periods of an anesthetic may be of particular concern because of the potential to delay a response to a patient's condition. This delayed response may represent a missed opportunity to prevent an adverse outcome.

• **Limitations.** Closed malpractice claims represent only a portion of adverse events that are seen during anesthesia care. Most adverse outcomes do not lead to initiation of legal action by a patient or the patient's family, and most adverse events are reviewed only at the departmental or institutional level. Therefore, in this study, the authors can evaluate only those characteristics present in a very small number of claims and make assumptions that may not be applied to all preventable anesthesia adverse outcomes. Many of the claims in this dataset lacked full information such as complete medical records, depositions from providers, or other legal documents that might have led to different conclusions regarding causality of adverse events resulting in poor patient outcomes.

A prospective multicenter study would yield valuable information on the genesis of preventable and nonpreventable damaging events and adverse outcomes in anesthesia. Mixed-methods research designs involving survey completion and interviews with clinicians who have had clinical near-misses or sentinel events occur could advance our understanding of the many contributory factors to adverse outcomes in anesthesia. However, the litigious nature of these cases and the legal nondiscoverability of quality assurance files mitigate against a pro-

spective study of damaging events and adverse outcomes. The study of closed malpractice claims, despite the associated methodologic limitations, is the principal alternative to real-time structured study of anesthesia mishaps.

Conclusion

Medical malpractice claims may arise from unavoidable adverse outcomes or situations in which an anesthesia provider had no control. This study focused on the review of claims in which an adverse outcome appeared preventable by the claimant CRNA. The AANAF CCRT examined 123 “preventable” closed malpractice claims. This subset of preventable cases represented a little more than half of all the cases included in the most recent AANA Foundation closed claims database. A qualitative analysis of these cases revealed consistent themes that provide the opportunity to identify factors contributing to adverse patient outcomes during perianesthetic care.

Contributory factors associated with these “preventable” closed malpractice claims have been identified. The potential next steps in this area are identification of strategies to minimize the occurrence of these events, perhaps through greater emphasis on human factors and clinical decision making in nurse anesthesia programs as well as in continuing professional competence activities.

Dissemination of these findings, through this article as well as poster and platform presentations at meetings, will help to enhance providers’ knowledge regarding the centrality of compliance with the AANA Standards for Nurse Anesthesia Practice in the prevention of damaging events and adverse outcomes. The importance of team communications and the avoidance of cognitive errors in practice can be reinforced through continuing education at the local, state, and national levels.

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