Journal of Clinical Anesthesia 50 (2018) 48–56

Contents lists available at ScienceDirect

Journal of Clinical Anesthesia

journal homepage: www.elsevier.com/locate/jclinane

Original Contribution

Analysis of adverse outcomes in the post-anesthesia care unit based on anesthesia liability data

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ARTICLE INFO

Keywords:
Anesthesia
Perioperative care
Liability
Complications
Closed claims
PACU

ABSTRACT

Study objective: The aim of this study is to provide a contemporary medicolegal analysis of claims brought against anesthesiologists in the United States for events occurring in the post-anesthesia care unit (PACU).
Design: In this retrospective analysis, we analyzed closed claims data from the Controlled Risk Insurance Company (CRICO) Comparative Benchmarking System (CBS) database.
Setting: Claims closed between January 1, 2010 and December 31, 2014 were included for analysis if the alleged damaging event occurred in a PACU and anesthesiology was named as the primary responsible service.
Patients: Forty-three claims were included for analysis. Data regarding ASA physical status and comorbidities were obtained, whenever available. Ages ranged from 18 to 94. Patients underwent a variety of surgical procedures. Severity of adverse outcomes ranged from temporary minor impairment to death.
Interventions: Patients receiving care in the PACU.
Measurements: Information gathered for this study includes patient demographic data, alleged injury type and severity, operating surgical specialty, contributing factors to the alleged damaging event, and case outcome. Some of these data were drawn directly from coded variables in the CRICO CBS database, and some were gathered by the authors from narrative case summaries.
Results: Settlement payments were made in 48.8% of claims. A greater proportion of claims involving death resulted in payment compared to cases involving other types of injury (69% vs 37%, $p = 0.04$). Respiratory injuries (32.6% of cases), nerve injuries (16.3%), and airway injuries (11.6%) were common. Missed or delayed diagnoses in the PACU were cited as contributing factors in 56.3% of cases resulting in the death of a patient. Of all claims in this series, 48.8% involved orthopedic surgery.
Conclusions: The immediate post-operative period entails significant risk for serious complications, particularly respiratory injury and complications of airway management. Appropriate monitoring of patients by responsible providers in the PACU is crucial to timely diagnosis of potentially severe complications, as missed and delayed diagnoses were a factor in a number of the cases reviewed.

1. Introduction

Over 36 million surgical procedures are performed in operating rooms in the United States annually [1]. Most of these patients will be transferred to a post-anesthesia care unit (PACU) postoperatively. PACU care is characterized by a high volume of patients following protocolized post-operative pathways while experiencing relatively few high acuity complications. Complications may arise as sequelae of surgical procedures, the use of anesthetic and analgesic medications, exacerbations of existing medical conditions, or errors in communication or drug administration [2–4]. A handful of studies from the 1980s and 1990s report overall incidence of adverse events in the PACU ranging from 23.7% to 39.9% [5, 6, 8]. While these figures largely represent minor complications such as postoperative nausea and vomiting, pain, and minor basal lung atelectasis, the immediate post-operative period also entails increased risk for significant respiratory and cardiovascular events, even in patients who are otherwise relatively healthy [6]. Additionally, even relatively minor post-operative events are associated with longer post-operative time to discharge and increased burden on the medical system [9].

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https://doi.org/10.1016/j.jclinane.2018.06.038
Received 2 April 2018; Received in revised form 13 June 2018; Accepted 15 June 2018

Recent studies of adverse events in the PACU have focused on causative and predictive factors associated with specific complications, such as critical respiratory or cardiac events [3, 4, 7, 10], with few studies examining complications in the PACU as a whole. In 2002, Kluger, et al. produced one such study using records from the Australian Incident Monitoring Study (AIMS), a voluntary incident reporting database. Of the 419 PACU incidents analyzed, 43% involved respiratory/airway compromise, 24% were cardiovascular events (including pulmonary edema), and 11% resulted from drug administration errors. Among reported cases, 29% led to major physiological disturbance, defined as the need for transfer to an intensive care unit (ICU) or similar setting, and nearly half occurred in patients who were classified as American Society of Anesthesiologists (ASA) physical status I or II [2].

Several factors identified as causes of adverse events in the PACU are directly related to the delivery of anesthetic care, including residual neuromuscular blockade, emergence from general anesthesia, and opioid-induced respiratory depression [3, 7, 10]. Additionally, initial management of complications resulting from surgery (e.g., post-operative bleeding) often falls to anesthesiologists in the PACU. Past analyses of both the Australian Incident Monitoring System and the ASA Closed Claims study have suggested that somewhere between 5 and 7% of adverse events involving an anesthesiologist occur in a PACU setting [2, 5, 11]. However, much of the literature characterizing these events is over 15 years old. Since then, numerous developments including increasing use of capnography, standardized use of pulse oximetry, video laryngoscopes, newer anesthetic and cardiovascular agents, and increasing use of bedside ultrasound have significantly changed patient management and monitoring in the peri-operative setting. As such, an update to the literature on adverse events in the PACU will be useful in informing contemporary anesthesia practices and minimizing patient harm.

Advantages of closed claims analysis include the tendency to highlight rare but serious complications, the availability of narrative descriptions of contributing factors, and reporting of long-term patient outcomes allowing for risk mitigation and quality improvement [12, 13]. In this study, we queried a large, multi-institutional closed claims database for cases brought against anesthesiologists for events occurring specifically in the PACU within a recent five-year period.

2. Methods

The present study involves analysis of closed claims data from the Controlled Risk Insurance Company (CRICO) Strategies Comparative Benchmark System (CBS). CRICO is a liability insurance carrier founded to serve hospitals in the Harvard medical system. Since 1979, the Risk Management Foundation within CRICO has utilized CRICO's experience providing malpractice services to improve patient care and safety. The Comparative Benchmark System (CBS) is a proprietary database compiled from over 400,000 malpractice claims from institutions insured by CRICO as well as over 400 other healthcare facilities across the United States. This database represents approximately 30% of malpractice cases brought in US courts during the time period represented. CRICO does not participate in the Anesthesia Closed Claims Project. Methods in the present study are modeled on our prior published analyses of CRICO data [14, 15, 31, 32].

The CBS database was queried for cases closed between January 1, 2010 and December 31, 2014 in which an anesthesiologist was the primary defendant and the site of the alleged injury was listed as the PACU. The database contains 1428 cases from this time period with anesthesiology named as the primary responsible service, 50 of which list the PACU as the site of the damaging event. Of these, 7 were excluded when manual inspection of case summaries made it clear that the injury resulting in the claim actually occurred elsewhere (typically the operating room). As a result, data from 43 cases were analyzed. These claims represent approximately 3% of all claims in the CRICO database brought against anesthesiologists during the study period.

The summary of each claim in the CBS consists of numerous coded variables as well as a narrative summary describing the alleged damaging event and the circumstances leading up to it. Variables provided for each case included pertinent dates (year of injury, year of assertion of legal claim, year of claim closure), case disposition (dismissed, dropped/denied, settled), amount of indemnity, claimant age, and injury classification (e.g., cardiac, neurologic, airway).

Additionally, each case is coded with a severity score corresponding to the National Association of Insurance Commissioners (NAIC) outcome severity scale [16]. This is a 0–9 scale where a score of 9 indicates death. Other outcomes are assigned a value based on a combination of injury severity and degree of permanence. For the purposes of this study, cases coded with a value of 6–9, indicating major permanent outcomes, were considered “high severity.” Cases coded with values 3–5 were considered “medium-severity” and those receiving 0–2 were considered “low-severity” outcomes.

The coded variables, including NAIC severity scores, are compiled by registered nurses who are trained clinical taxonomy specialists. This process is overseen by a taxonomy governance committee composed of attorneys, physicians, and other analysts. The narrative summary is compiled by the clinical taxonomy specialists based on available medical records, claims files, expert testimony, and depositions.

Based on the narrative summaries, the authors (DK, RU, EB) were also able to identify additional relevant elements of each case, including the surgical service responsible for operating on the claimant, site of the operation, anesthesia procedural complications, airway management complications, and (where applicable) major cause of death or brain injury. Additionally, study authors analyzed case summaries in order to identify factors contributing to each adverse event (e.g., delayed diagnosis, communication, technical knowledge/performance). Multiple contributing factors may be cited in a single case, and not all cases had a clear contributing factor identified.

3. Results

An overview of PACU claims naming anesthesiology as the primary service is shown in Table 1. Forty-three claims were included for analysis. Mean patient age was 48.5 years with a standard deviation of 17.5 years. Among all claims, 37.2% involved patient death, with another 18.6% involving allegations of severe injury other than death. The most common types of injury resulting in claims were respiratory (32.6%) and nerve injuries (16.3%). Technical knowledge/performance was the most commonly cited contributing factor (37.2% of cases), followed by documentation error (25.6%) and missed diagnosis (18.6%).

Table 1 also includes basic claims data disaggregated by final claim status. Indemnity payments were made in 48.8% of claims. Among settled claims, the median value of indemnity was $257,500 with a range of $1120–$3916,000 (interquartile range: $50,000–750,000). Of these, 52.4% involved patient death and 33% involved claims of severe injury other than death. Respiratory injuries were alleged in 47.6% of settled claims. Missed and delayed diagnoses were cited in a combined 42.8% of cases resulting in indemnity payment.

3.1. Claims involving death of a patient

Table 2 compares cases resulting in the death of a patient with cases involving outcomes other than death. Of the claims involving patient death, 69% resulted in settlements compared to 37% in cases with outcomes other than death ($p = 0.04$). Half of these claims involved respiratory complications with a further 18.8% involving airway complications. Fatal airway complications were seen in cases where reintubation was challenging for reasons such as a compressing hematoma following thyroid surgery, limited cervical mobility following occipital-cervical fusion, or significant airway edema following incision