

Citation

Mehta SP, Posner KL, Domino KB. Patient Injuries From Anesthesia Gas Delivery Equipment: A Closed Claims Update. *Anesthesiology*, A1072, 2012.

Abstract

Background

Anesthetic gas delivery equipment-related mishaps are rare events,¹ but continue to occur in the operating room despite improvements in equipment and alarms.² We analyzed patient injuries related to gas delivery equipment problems from the American Society of Anesthesiologists (ASA) Closed Claims Project Database.

Methods

After IRB approval, we reviewed the ASA Closed Claims Project Database of 9536 total claims. Inclusion criteria were general anesthesia for surgical or obstetric anesthesia care (n=5904). Gas delivery equipment was defined as any device used to convey gas to or from (but not involving) the endotracheal tube or mask.¹ All payments were CPI-adjusted to 2011 dollars. Comparisons between time periods were analyzed by Fisher's exact test and Mann-Whitney U test. P<0.05 was deemed significant.

Results

Anesthesia gas delivery claims represented 4% of claims from the 1970s, 3% from the 1980s, 1% from the 1990s, and 1% from the period 2000-2010 (p<0.01). The outcomes in anesthesia gas delivery equipment claims from 1990-2010 were less severe than earlier claims (Figure).

Anesthesia gas delivery claims from 1990-2010 included 13 vaporizer problems, 10 breathing circuit problems, 7 anesthesia machine problems, 5 ventilator problems, and 4 supplemental oxygen line events. The most common outcome from vaporizer problems was awareness (n=8, 62%). Pneumothorax (n=5, 50%) and death or permanent brain damage (death/BD, n=3, 30%) resulted from breathing circuit problems, most commonly from misconnections (6 of 10). Anesthesia machine problems resulted in death/BD (n=3), awareness (n=1), and cancellation of surgery (n=3), most commonly from malfunction of the expiratory and inspiratory valves (4 of 7, 57%). Death/BD was the outcome of all ventilator claims (3 during cardiac surgery, 2 during prone or lateral positioning for orthopedic surgery) from ventilator disconnects or disabled alarms. All supplemental oxygen events occurred outside of the OR (3 transport, 1 ICU), with 3 of 4 resulting in death/BD. In 2 of 4 claims, CO₂ was used instead of oxygen during patient transport.

Payments in the 1990 - 2010 claims reflected the lower severity of injury, with a median payment of \$199,000 (range \$932 - \$18,910,000) compared with \$802,750 (\$5,650 - \$13,687,354) for earlier gas delivery equipment claims (p<0.01). Thirty-two (82%) of the 39 post-1990 claims resulted in payment (no difference from earlier claims).

Conclusions

Claims related to anesthesia gas delivery equipment decreased in 1990-2010 compared to the earlier time period, most likely reflecting improvements in equipment design and alarms. While the severity of injury declined, death and permanent brain damage occurred in 38% of recent gas delivery claims. These poor outcomes can be minimized if anesthesiologists follow ASA recommendations for pre-anesthesia checkout procedures by ensuring monitors are functional, ventilator and flowmeters are properly working, vaporizers are adequately filled and positioned, and that backup equipment and supplies are readily available.³

1. Caplan et al. *Anesthesiology* 1997;87(4):741-8.
2. Cassidy et al. *Anaesthesia* 2011;66(10):879-88.
3. <http://www.asahq.org/For-Members/Clinical-Information/2008-ASA-Recommendations-for-PreAnesthesia-Checkout.aspx>

Figure 1

Outcomes in Anesthesia Gas Delivery Claims

