

Citation

Cheney FW: The changing pattern of anesthesia-related adverse events. *ASA Newsletter* 60(6):10-13, 1996.

Full Text

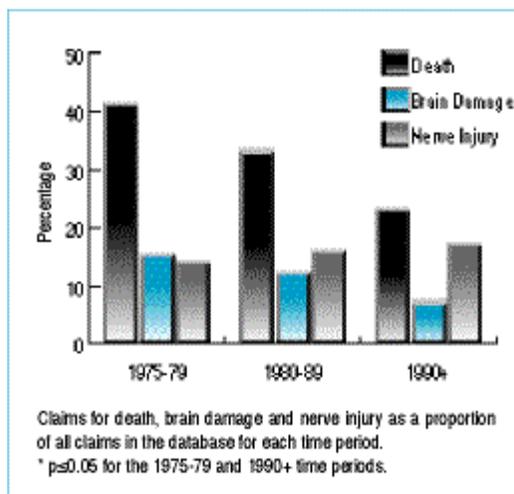
The ASA Closed Claims Project database is a standardized collection of case summaries of adverse anesthesia-related outcomes derived from professional liability closed claims files. This project, which has been ongoing since 1985, reflects to some extent the safety of anesthesia practice in the United States.

Presently, there are 3,533 closed claims collected from 35 insurance organizations that insure approximately 14,500 anesthesiologists.

Claims for Death, Brain Damage and Nerve Injury [Figure 1]

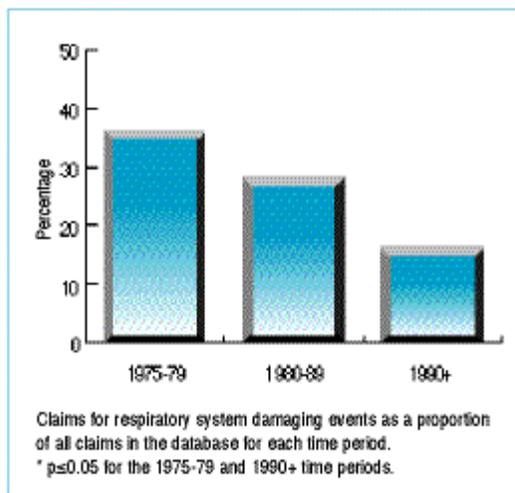
In the overall database, the most frequent complications are death (34 percent), nerve damage (16 percent) and patient brain damage (12 percent). If claims for death and brain damage are taken as an indication of the severity of injury, analysis of the data by the year the adverse outcome occurred makes it apparent that the severity of injury has been decreasing over time. In the 1970s, 56 percent of claims were for death and brain damage as compared to only 45 percent in the 1980s and 31 percent in the 1990s. The incidence of nerve injury, a far less serious complication than the other two, has remained relatively constant over the years.

Figure 1



Claims for Respiratory System Damaging Events [Figure 2]

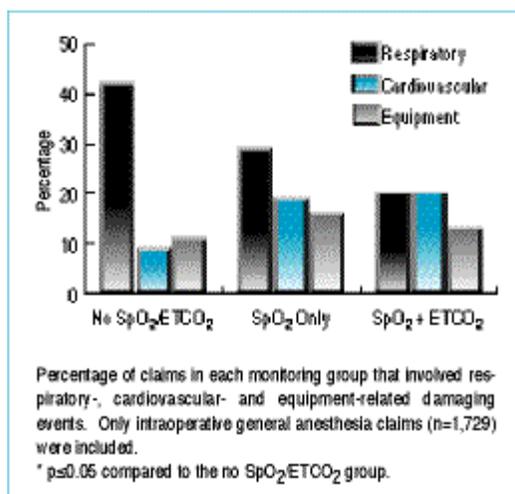
The most common damaging events or mechanisms of injury are those involving the respiratory system. These data are also changing over time. In the 1970s, 36 percent of the injuries were respiratory in nature. The incidence of respiratory-related damaging events decreased to 27 percent in the 1980s and 15 percent in the 1990s.

Figure 2

Since pulse oximetry (SpO_2) and capnography ($ETCO_2$) have been in use since the mid-1980s, we further analyzed the data to determine if we could identify an early trend of the impact of these monitoring modalities on the decrease in respiratory system damaging events. In order to focus on circumstances where SpO_2 and $ETCO_2$ would be expected to have the most impact, we examined only 1,729 claims in which the adverse event occurred intraoperatively during general anesthesia. In 8 percent ($n=138$) of these 1,729 claims, SpO_2 (without $ETCO_2$) was in use, and in another 8.2 percent ($n=142$), both SpO_2 and $ETCO_2$ were in use. In the remainder of the claims (83.8 percent), neither monitor was in use.

Claims Related to Respiratory, Cardiovascular and Equipment Damaging Events [Figure 3]

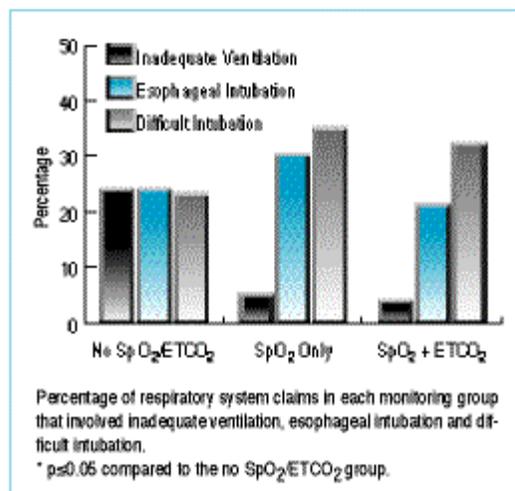
Respiratory-related damaging events led to the injuries in 42 percent of the no $SpO_2/ETCO_2$ claims, 29 percent of the SpO_2 claims and 20 percent of the $SpO_2 + ETCO_2$ claims. The next most frequent but far less common damaging events in the no $SpO_2/ETCO_2$ claims were cardiovascular- and equipment-related. Cardiovascular damaging events were more common in both the SpO_2 and $SpO_2 + ETCO_2$ groups, compared with those claims in which neither monitor was in use. In the 142 claims in which both monitors were in use, respiratory and cardiovascular damaging events each represented 20 percent of claims, compared with 42 percent for respiratory claims and 9 percent for cardiovascular claims in the no $SpO_2/ETCO_2$ group. The occurrence of equipment-related damaging events was not influenced by the use of SpO_2 and $ETCO_2$ monitoring.

Figure 3

Claims Involving Inadequate Ventilation, Esophageal Intubation, Difficult Intubation [Figure 4]

Among the claims in the respiratory system category in which SpO₂ and ETCO₂ were not monitored, the most common specific damaging events were inadequate ventilation, esophageal intubation and difficult intubation. These three damaging events combined to represent 71 percent of the claims in that group. In the SpO₂ group, there were 40 respiratory-related damaging events, most of which were due to difficult intubation and esophageal intubation. Of the 12 esophageal intubations in the SpO₂ group, hypoxemia was apparent in most cases, but the correct diagnosis was made too late to prevent brain damage or death.

Figure 4



In most cases, over-reliance on auscultation of the lungs, disregard of the SpO₂ values or failure to observe the pulse oximeter with the alarms turned off were the reasons for the adverse outcome. There were only two damaging events attributed to inadequate ventilation in the SpO₂ group.

Of the 28 respiratory-related damaging events in the SpO₂ + ETCO₂ group, there were six esophageal intubations and one claim due to inadequate ventilation. In the SpO₂ + ETCO₂ group, as in the SpO₂ group, difficult intubation was the most common damaging event. The esophageal intubations in the claims in which ETCO₂ was in use were due to a combination of factors, including misinterpretation of an ETCO₂ reading of zero as machine failure or disregard of the capnographic readings.

The incidence of severe injury (brain damage and death) in the three most frequent respiratory system damaging events was comparable between the no SpO₂/ETCO₂ group (83 percent) and the two groups in which some combination of these monitors was in use (77 percent). Therefore, when adverse outcomes occurred with these monitors in use, the monitor did not seem to reduce the severity of injury.

The almost total lack of inadequate ventilation damaging events in claims in which either SpO₂ or SpO₂ + ETCO₂ were in use suggests that these two monitors may have an impact on this mechanism of patient injury. The near absence of any inadequate ventilation claims in the SpO₂ group suggests that most of the adverse outcomes attributed to inadequate ventilation in the group with no SpO₂ monitoring may have been due to inadequate "oxygenation."

The relative increase in cardiovascular system damaging events and decrease in inadequate ventilation damaging events in the groups where SpO₂ or SpO₂ + ETCO₂ were in use also suggests that many of the adverse events attributed to inadequate ventilation in the no SpO₂/ETCO₂ group may well have been cardiovascular in origin. The fact that difficult intubation is still a frequently cited respiratory damaging event in a group of claims where SpO₂ and/or ETCO₂ monitors were in use is not surprising since the monitors themselves do not intubate tracheas.

Conclusion

The preliminary data presented may reflect a changing profile of anesthesia-related injury due to adverse respiratory events. This profile may change as more claims for injuries occurring in the 1990s are processed. From the data available to date, it is obvious that in order to be effective, the monitors must be properly used and interpreted. Utilization of the ASA Practice Guidelines for Management of the Difficult Airway may lead to a reduction in patient injury due to this mechanism of injury.

Whatever the reason, it is encouraging that severe-injury claims for death or brain damage seem to be decreasing. Because of this, nerve injury may well assume the position as the leading cause of anesthesia-related injury for which a malpractice claim is made. Since preventative strategies for nerve injury are not apparent, claims for this injury may be expected to remain constant while those for death and brain damage are concurrently decreasing.

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