

companion animal update

Inside this issue:

Intervention during
Anesthesia

Monitoring Behaviors to
Implement Immediately

The Power of the Anesthetic
Record

A Note on Shelter Medicine

Anesthesia Closed Claims

The Importance of Anesthetic Monitoring and Documentation in Veterinary Practice

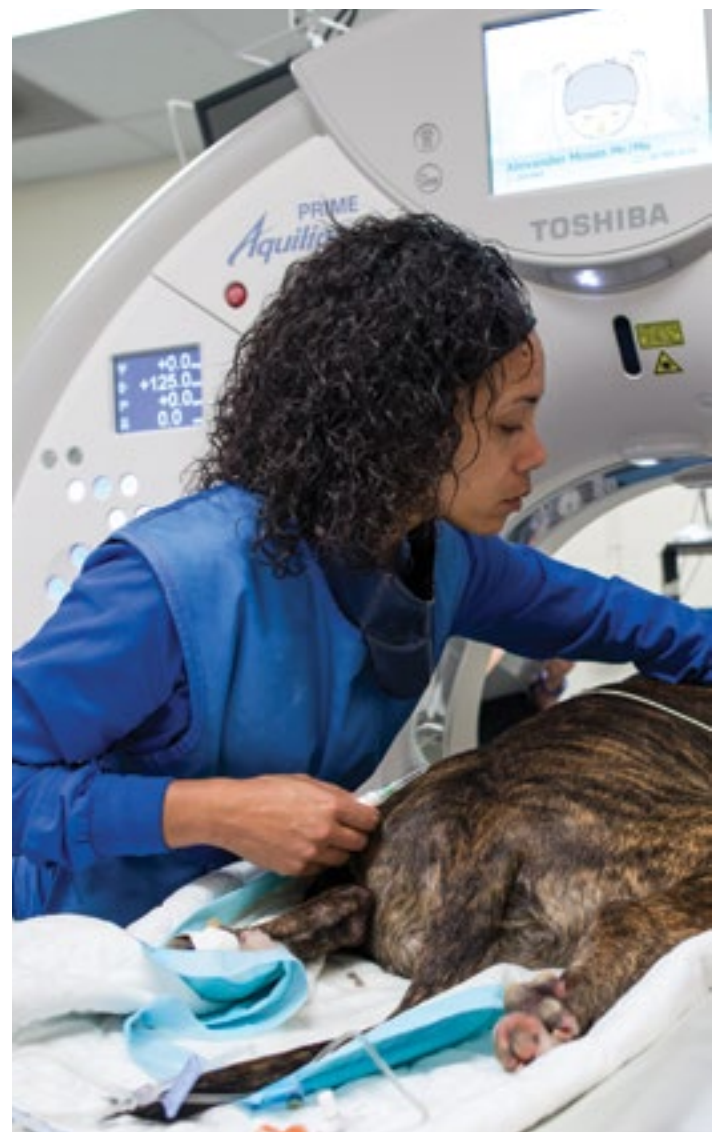
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Traditional teaching of the goals of general anesthesia (GA) for any patient discusses ensuring unconsciousness, amnesia, analgesia, and akinesia (lack of movement). A fifth and arguably at-least-as-important goal that is not routinely emphasized is physiologic stability: more specifically, stability of the cardiovascular, respiratory, thermoregulatory, and autonomic nervous systems.

These systems are drastically altered in their ability to function during GA. Their functions are disrupted due to the medications required to achieve the “traditional four goals of anesthesia” in our patients, leaving every anesthesia provider in a situation where they must be able to identify deviations from normal and intervene, as needed, to ensure that physiologic stability is maintained (e.g., adequate circulation, oxygenation, ventilation)—all while documenting each step throughout the anesthetic event.

Intervention Requires Identification

Administration of routine GA to any patient encompasses three general phases of care: pre-anesthesia, intraoperative/intraprocedural anesthesia, and post-anesthetic care. These phases are on a continuum; however, each comes with unique considerations. In this newsletter, we will largely focus on the post-op period.





Consider the post-anesthetic period. During this phase, the anesthetic event is often considered complete. However, patients may enter this phase still anesthetized. It is important to remember that just because a vaporizer dial is turned to zero, a patient's physiology does not normalize immediately, and their risk of morbidity and mortality remains high. **In fact, most anesthetic-related mortality events in dogs and cats is in the post-operative period.**¹

Risk of anesthetic-related death in people in the 1940s was as high as 1:1000, and in the 1970s as high as 1:10,000.² Similar trends in anesthetic-related mortality were seen in human practice of anesthesia, compared to veterinary anesthesia (i.e., occurring in the post-operative period, involving oxygenation and/or ventilation). In 1989, a retrospective analysis revealed that up to 88% of anesthetic-related mortality events in people were preventable³ if certain monitoring practices were employed. Soon after, standard monitoring practices were implemented, and current risk in some human populations may be lower than 1:250,000 anesthetic events.^{2,4}

Monitoring Guidelines to Implement Right Now

Every patient recovering from anesthesia should have a pulse-oximeter on them. Hypoventilation can readily progress to hypoxia and hypoxemia. This change may occur due to residual gas anesthetic effects and/or redosing of opioids prior to patients entering "recovery," producing respiratory depression.

Hypoventilation-induced hypoxemia is a commonly suspected cause of "sudden death" in the post-operative phase of anesthesia care. Hypoventilation is often tolerated when a patient is connected to a circuit breathing close to 100% oxygen; however, once a patient is breathing "room air" (i.e., 21% oxygen), then they are at risk.

Pulse-oximeter guidelines:

- Patient's SpO₂ ≥ 95% = continue to monitor for at least 5-10 minutes
- Patient's SpO₂ < 95% = provide flow-by supplemental oxygen
 - Recheck patient's SpO₂ in 5 minutes "off" of oxygen
 - Monitor for at least 5-10 minutes more to ensure SpO₂ remains ≥ 95%
- Post-operative hypoventilation improves as the gas anesthetic is ventilated out (can take 5-15+ minutes, and even longer in severely hypothermic patients)

No single monitoring device or behavior can guarantee safety and/or survival of all patients perianesthetically. It is the author's viewpoint that, like in people, most perioperative mortality events are likely preventable. Thus, creating routine and standard monitoring practices in your clinic will save lives. Having a dedicated and trained anesthetist has been shown to be associated with reduced anesthetic-related mortality events.¹ The American College of Veterinary Anesthesia and Analgesia has published recommendations regarding monitoring practices of anesthetic patients.⁵

References:

1. Brodbelt, D.C., Blissitt, K.J., Hammond, R.A., Neath, P.J., Young, L.E., Pfeiffer, D.U. and Wood, J.L., 2008. The risk of death: the confidential enquiry into perioperative small animal fatalities. *Veterinary anaesthesia and analgesia*, 35(5), pp.365-373.

2. Li, G., Warner, M., Lang, B.H., Huang, L. and Sun, L.S., 2009, April. Epidemiology of anesthesia-related mortality in the United States, 1999–2005. In *The Journal of the American Society of Anesthesiologists* (Vol. 110, No. 4, pp. 759-765). The American Society of Anesthesiologists.

3. Eichhorn J.H. Prevention of intraoperative anesthesia accidents and related severe injury through safety monitoring. *Anesthesiology*. 1989;70:572–577.

4. Eichhorn J.H. ASA adopts basic monitoring standards. *APSF Newsletter*. 1987; 2:1. <https://www.apsf.org/article/asa-adopts-basic-monitoring-standards/>

5. <https://acvaa.org/veterinarians/guidelines/>

The Power of the Anesthetic Record

It is impossible to know how each patient will respond to GA or to medications administered perioperatively. Up to 30-40% of "healthy" dogs and cats experience hypotension, with a greater incidence in "sick" patients. With such a potentially devastating side-effect of anesthetic medications being so common in "healthy" patients, it is imperative that it be identified, so that it can be treated.

The anesthetic record serves as a real-time catalog of how a patient responds to GA, surgical events, or anesthetic interventions. It provides the anesthetist with a visual aid with which to identify insidious trends over time (e.g., progressive downward trend in blood pressure with increasing heart rate, potentially suggesting hemorrhage). If DEA-controlled medications are administered during the anesthetic event, it serves as the prescription, legally describing the drug, dose, and route.

What to Include in the Anesthetic Record:

- Patient identifying information
- Surgical/anesthetic indication
- All medications administered pre-/intra-/post-operatively (including drug, dose, time administered, and route)
- Maintenance anesthetic technique (e.g., isoflurane, intermittent propofol boluses)
- Physiologic monitoring, ideally recorded every five minutes. Best practices include blood pressure, pulse-oximetry, continuous electrocardiogram (heart rate/rhythm), capnography and respiratory frequency, temperature
- Unusual or noteworthy events at the time of occurrence (e.g., circuit disconnect, re-intubation) and what was done to address the event, if necessary

NOTE: The monitoring period should include both intraoperative and post-operative phases, at least until the patient is clearly oxygenating normally for at least five minutes off oxygen.

**Consult your state practice act for minimum record-keeping requirements.*

Lastly, this record informs future anesthetic care of a patient and provides the veterinarian with an avenue to document the high-quality and safe care rendered to a patient, especially if this care is challenged due to a board complaint or malpractice claim.

Anesthesia-Related Claims

Incomplete Anesthesia Record Results in \$3,500 Settlement

A 7-month-old female Persian cat presented for an ovariohysterectomy (OHE). Pre-operative physical exam was normal, and pre-operative bloodwork was declined. The cat was given a premedication combination of butorphanol, dexmedetomidine, and ketamine. The cat was intubated and placed on inhaled isoflurane. The cat was also given injectable maropitant and ketoprofen. An IV catheter was placed and LRS fluids were started. Shortly after intubation, the pulse-oximeter reading dropped, and the technician repositioned the endotracheal tube. Six minutes into the anesthesia record, the cat was deemed not to be in a good plane of anesthesia due to increased respiratory rate, and the isoflurane was turned up to 5% for two minutes, then decreased to 3% for two minutes, then decreased to 2%. Shortly after and towards the end of the procedure, the cat started breathing more heavily, then its heart stopped. The isoflurane was turned off, a dose of atipamezole and a dose of epinephrine were given, and CPR was started. Despite the CPR efforts, the cat died.

The owners were notified and demanded reimbursement for the price of the purebred cat. After reviewing the case, there were several concerns. Although Dr. A and staff were monitoring the patient, the anesthetic event was not well documented. Specifically, the medical record did not note the time that the premedication drugs were given, did not indicate that the tracheal tube was readjusted or why, and did not document doses or routes of administration for the emergency drugs. There were also concerns with the monitoring. Blood pressure was not being measured, nor was the end-tidal CO₂, which likely would have immediately indicated an issue with the tracheal tube. In addition, the record did not mention that the cat was connected to an ECG monitor or document the exaggerated breathing at the beginning, which may have been agonal breathing. The cat was likely hypoxemic throughout since the respiratory recordings were consistently at 4. Dr. A's insurance carrier recommended



settlement due to these concerns, and Dr. A agreed and consented to settle. The insurance company negotiated a settlement of \$3,500.

Absence of Anesthetic Record Results in \$6,000 Settlement

A 4-month-old female French Bulldog presented for umbilical hernia repair. No complications were noted with surgery but near the end, irregular breathing was noted, followed by an erratic asynchronous heartbeat then cardiac arrest. Chest compressions and oxygen were delivered but the dog died. The owners requested compensation for their loss. A review revealed an absence of documentation of the anesthetic event or monitoring. Without the anesthesia report, it was not possible to support the care that was provided and to prove that the dog's vitals were stable prior to cardiac arrest. Additional concerns existed due to the lack of administration of emergency drugs once the heartbeat was noted to be erratic and throughout the next 10 minutes after arrest. Based on review of the case Dr. B's insurance carrier recommended settlement, and Dr. B consented to settle the claim. The insurance carrier and the owner agreed on a settlement of \$6,000.

Complete Medical Record Shows Unexpected Death Was an "Inherent Risk"

A 10 year-old MN DLH presented for a CT of the skull and nasal passages and a rhinoscopy. The cat was fractious and was given butorphanol and dexmedetomidine IM for catheter placement. The cat was induced with propofol and intubated.

A Note on Shelter Medicine

Efficiency of care is an important consideration in a shelter's daily operations. However, it must not supersede patient safety. Patients with systemic disease or undergoing more "involved" surgical procedures (e.g., amputation, enucleation) should be monitored as any other patient in a standard non-shelter environment.

Reliance on any single parameter is not recommended (e.g., respirations, patient's mucuous membrane color). Objective monitoring should be built into the workflow. A pulse-oximeter is useful as this device conveys pulse rate, evidence of peripheral perfusion/mechanical cardiac function, whether gas-exchange is occurring, and indirect information regarding ventilation in recovery. When used, this device should be in eyesight throughout each procedure.

The Association of Shelter Veterinarians Task Force to Advance Spay-Neuter has published [guidelines regarding anesthetic care](#) for patients in a shelter environment, this document should be reviewed for complete recommendations.

Thoracic radiographs were taken, then the CT and rhinoscopy were performed. During anesthesia, BP (mean, systolic, and diastolic), pulse, RR, temperature, SpO₂, and ETCO₂ were measured every five minutes. The patient was extubated to pass the bronchoscope and then re-intubated, at which time cardiac arrest occurred. CPR was started and the appropriate dosages of emergency medications were administered. Despite the efforts, the cat died.

The owner retained an attorney to recover damages. A review of the case showed complete medical records, including a complete and accurate anesthesia report documenting monitoring, times, and drug dosages. All drug dosages were correct. The CT and rhinoscopy revealed rhinitis and sinusitis with turbinate atrophy consistent with fungal lesions. Thoracic radiographs had been sent for radiologist review and showed nodules that were also suspected to be fungal in origin. The review found that the anesthetic death was an inherent risk. The insurance carrier denied liability on the claim, and due to the medical records supporting the treatment and care, the owner did not pursue the matter further.

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