How much monitoring in anaesthesia is enough?

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In mid 2012 in the course of consulting with a veterinarian on management of an older dog for dentistry with airway disease, I suggested that they could use their pulse oximeter during anesthesia and recovery to ensure that the airway was not obstructed and that that the animal was ventilating sufficiently to ensure adequate oxygenation. The reply was "we don't own a pulse oximeter". Considering that this consultation was from a larger metropolitan veterinary hospital and the proposed anaesthetic caused either them or their client enough concern to seek a consultation prior to anaesthesia, I was surprised at their answer. In 2012 a good quality hand-held pulse oximeter could be obtained for less than $1000. This monitoring tool would provide them with an excellent continuous peripheral pulse monitor, a measure of changing perfusion during anaesthesia and specifically monitor haemoglobin saturation with oxygen in a peripheral tissue capillary bed. This device would warn them that the animal was becoming either bradycardic or hypoxic several minutes before it might become a crisis or emergency resuscitation event.

Over the last 10 years there has also been a rapid increase in the availability of multi-parameter monitors designed for application in adult humans that may not work well particularly in small animals. Furthermore, the information coming from these multi-parameter devices often exceeds the knowledge and skill level of the operators who need to troubleshoot to see if the measurements are correct, then understand the implication of this information as it relates to the anaesthetised animal. So there is a balance as to what information is most critical, which if any monitors can provide this information rapidly, simply and reliably and how do we improve the knowledge and skill of the operators (in anaesthesia this must include veterinary nurses) to be able to recognise changes, their importance and to respond appropriately.

The American College of Veterinary Anesthesiologists (2009) have noted that the benchmark for successful anaesthesia outcome has moved from lack of anaesthetic mortality toward decreased anaesthetic morbidity. It is commendable that the profession has put a great effort into the promotion of dental care for older animals, but have we put the same effort into improved anaesthesia management of these sometimes geriatric patients and what kinds of specific risks do they face with anaesthesia? Is it helpful to have clean teeth but then have vestibular problems, be deaf, blind, have a CNS infarct, or die 2 weeks later of cardiac, renal or hepatic dysfunction? As specialists we see all these complications after anaesthesia of geriatric animals.

How do we improve the standard of care?

First we should recognise that most anaesthesia mortality occurs either in the first 15 minutes of anaesthesia (generally from the time of intubation) or from the time anaesthesia administration ceases till the animal as recovered. Half of anaesthesia mortality occurs in recovery! Therefore anaesthesia monitoring and support must extend for some time into the recovery period.

Second we should acknowledge that if these are critical periods in anaesthesia, generally it is veterinary nurses who are providing the anaesthesia care at this time. Therefore we need to focus training in use of newer modalities, problem recognition and management methodology and planning on the anaesthesia TEAM which must include veterinary nurses. Over the last 5 years of working with veterinarians and nurses in China, my experience is that such training is far more effective if it is "hands-on" rather than solely didactic. Furthermore it becomes effective team training if given in the work environment

on client animals. However this is slow and costly. At Advanced Anaesthesia Specialists in mid-2012 in Sydney we instituted an in-hospital anaesthesia training program directed towards the anaesthesia team, specifically including veterinary nurses with training from nurses highly skilled in anaesthesia and teaching. This is a different approach to the 1 and 2 day seminars I have run in the past. It will take time to see if this is more effective than didactic teaching.

Third we need to consider what changes we can or should make to our "standard" anaesthesia care and the implications, particularly as far as client expectations are concerned. For example if you had to advertise that you use no anaesthesia monitoring equipment at your hospital, that your nurses have no advanced training in anaesthesia or that you do not provide specific pain management for surgical procedures, would it effect the client's decision to leave their animals in your care for anaesthesia and surgical procedures.

What should be a reasonable standard of care?

Frequent and continuous monitoring and recording of vital signs during anaesthesia and the recovery period by trained personnel and the incorporation of better monitoring equipment that may include newer monitoring modalities by skilled, attentive personnel during anaesthesia are requirements for advancing the quality of anaesthesia care of veterinary patients.

The American College of Veterinary Anesthesiologists (2009) acknowledges that it is possible to adequately monitor some physiological functions (e.g. heart and respiratory rate, mucous membrane colour and physical movement) and manage many anaesthetised patients without specialised equipment and that some newer modalities may be impractical in certain clinical settings e.g. movement of an anaesthetised patient to a different area of the hospital. The American College of Veterinary Anesthesiologists (2009) does not suggest that using any or all the modalities will ensure any specific patient outcome, nor does it suggest that failure to use them will result in a poor outcome.

On the basis of simplicity, speed of application, reliability, performance, value of the information obtained and relatively low cost of the equipment, I believe there is a strong argument that use of pulse oximetry should be considered standard monitoring in veterinary anaesthesia. The many applications of pulse oximeters are described in the American College of Veterinary Anesthesiologists (ACVA) Anesthesia Monitoring Recommendations. The Small Animal Monitoring Guidelines published by the ACVA can be downloaded from their website www.acva.org

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The ACVA Small Animal Monitoring Guidelines (American College of Veterinary Anesthesiologists 2009) provide advice and recommendations for monitoring circulation, oxygenation, ventilation and temperature and emphasise the value and importance of record keeping, the presence of adequately trained personnel and monitoring during the recovery period.

The Guidelines also emphasise the importance of monitoring the sedated patient, who has lost control of protective airway reflexes, as you would monitor a patient under general anaesthetic (American College of Veterinary Anesthesiologists 2009).

References

American College of Veterinary Anesthesiologists 2009, ACVA monitoring guidelines update 2009, Recommendations for monitoring anesthetized veterinary patients, ACVA, viewed 27 November 2012, <www.acva.org>.