Research

EDITORIAL

Checklists in veterinary anaesthesia: why bother?

Matthew McMillan

ANAESTHESIA underpins modern veterinary medicine by enabling invasive diagnostic, surgical and medical interventions to be carried out in a humane way (Taylor 2014). As veterinary interventions continue to advance and public awareness of pain and safety increases, anaesthesia will become even more pivotal to our profession. Despite this, little is known about the quality and safety of the anaesthesia that we, as a profession, provide to our patients.

In general terms, anaesthesia should be concerned with keeping animals safe and maintaining welfare during procedures by identifying, minimising and managing risks and by ensuring that pain is recognised and treated as appropriate. However, anaesthesia can often be viewed as a means to an end; a necessary step performed merely to facilitate the performance of another procedure. With this mindset, it is easy to undertake anaesthesia with little care and attention, cutting corners in the name of efficiency and economy or in the belief that certain tasks are not always necessary.

We often consider the biggest threat to the anaesthetised patient to be adverse effects of drugs. These drugs, by definition, are potent depressors of the central nervous system and therefore affect cardiovascular, respiratory, neurological and metabolic function. Such effects are often exacerbated and more pronounced in sick patients. Derangement in one, several or all of these physiological systems has the potential to cause harm to the patient and could lead to death. We do what we can to recognise, reduce and manage these complications, but our efforts have their limitations and it would therefore appear, superficially at least, that death due to the administration of anaesthetic drugs is an inevitable, inherent component of anaesthesia that we can do little about. So, case by case and day by day, we accept this 'risk of anaesthesia' in the light of the vast array of diagnostic and treatment options anaesthesia can offer. We warn owners of the dangers, and often blame

Matthew McMillan, BVM&S, DipECVAA, MRCVS, Queen's Veterinary School Hospital, Department of Veterinary Medicine, University of Cambridge, Cambridge CB3 0ES, UK
On behalf of the Association of Veterinary Anaesthetists' Practice Standards Subcommittee
e-mail: mwm32@cam.ac.uk

anaesthesia for any complications that arise in the perianaesthetic period; after all, it is something over which we have limited control. However, alongside these patient and pharmacological factors there are other factors that we have the ability to control more rigorously and herein lies the real issue; the risk of anaesthesia often lies not with the anaesthetic per se but with the anaesthetist.

In human medicine, evidence suggests that some form of medical error is a significant contributing factor in the majority of anaesthetic fatalities (MacIntosh 1949, Buck and others 1987, Lagasse 2002). In fact, some authorities consider the definition of an anaesthetic fatality to be 'a perioperative death to which human error on the part of the anesthesia provider had contributed' (Lagasse 2002). A failure to apply knowledge correctly; a lack of care and attention (including inadequate monitoring/vigilance and poor standards

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of practice); failure to provide appropriately trained staff; and a lack of experience or knowledge were all found to be more common contributing factors to anaesthetic deaths than drug effects in the Confidential Enquiry into Peri-Operative Death (CEPOD) (Buck and others 1987).

This type of finding is not only implicated in fatalities but also in lesser, but nonetheless significant, events. Simple errors, such as missed steps in the preparation of anaesthesia, appear to be commonplace in human anaesthesia, occurring at a significant and measurable rate, despite the far more sophisticated systems used to provide anaesthetic care (Demaria and others 2011). Errors of judgement, failure to check equipment, inattention, haste, poor communication, inadequate preanaesthetic patient assessment, inadequate preparation and lack of skilled assistance or supervision were among the most common contributing factors in the first 2000 patient safety incidents reported to the Australian Incident Monitoring Study (Runciman and others 1993, Webb and others 1993, Williamson and others 1993). Patient safety incidents such as this occur at a much higher frequency than fatalities and, although they may not cause harm, they can easily lead to non-fatal injury or morbidity, prolonged recoveries and extended hospitalisation.

Reflecting on the literature, it appears that human error is also involved in complications occurring in veterinary anaesthesia; a retrospective assessment of the causes of death in healthy dogs and cats reported in Clarke and Hall's (1990) audit of over 41,000 small animal

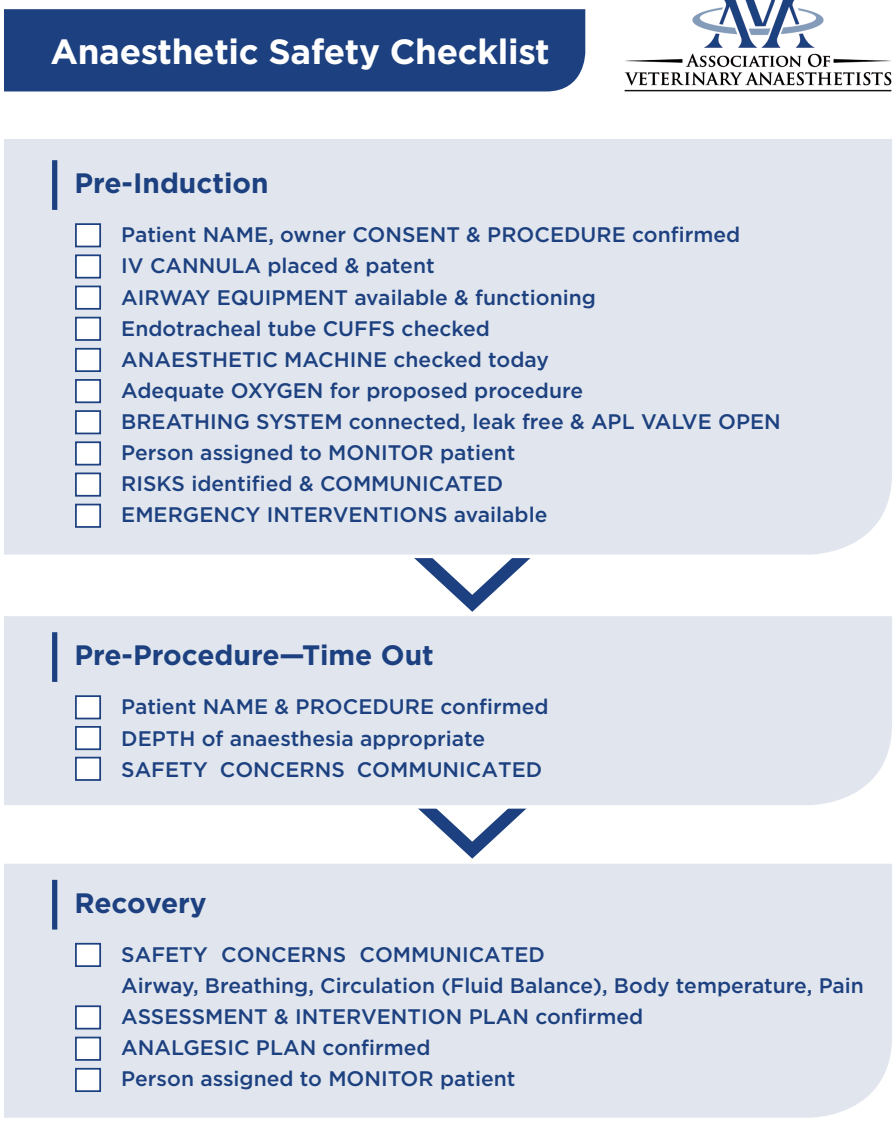

FIG 1: The first page of the Anaesthetic Safety Checklist developed by the Association of Veterinary Anaesthetists (AVA 2014a,b). The checklist has been designed to improve safety in anaesthesia by reducing the frequency of errors associated with the omission of critical tasks

anaesthesias suggests that over 70 per cent had a significant element of human error or poor clinical judgement. In fact, many of the healthy animals that died primarily as a result of anaesthesia were considered to be 'not under close observation' (Clarke and Hall 1990). The results of the Confidential Enquiry into Peri-Anaesthetic Small Animal Fatalities found that patients were four to five times less likely to die if pulse monitoring (either manual or with the aid of pulse oximetry) was performed, suggesting that a considerable number of anaesthetic procedures were performed without even basic monitoring (Brodbelt and others 2008). Exactly how frequently these factors occur remains unknown, especially in veterinary anaesthesia; however, their significance to adverse outcomes appears undeniable. So, the questions we should be asking are how can we reduce these controllable factors and how can we improve the safety of the patients we anaesthetise?

Often, the prevailing thought is that safety in anaesthesia involves costly multiparameter monitoring but, although such monitoring can be advantageous, this sentiment is somewhat misplaced. Monitoring technology can help to identify a problem during an anaesthetic

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procedure but can do little to help avoid it happening in the first instance. Even modern monitoring technology is plagued by the potential for human error, especially if the user has limited knowledge of its functions and limitations; after all, the anaesthetist still has to interpret and act on the data the monitor produces (Gaba 2000). Unfortunately, despite an increasing

availability of multiparameter monitors, it appears that training of veterinary teams about such equipment is often suboptimal. In this situation, complicated monitoring equipment can be problematic as it can distract attention away from the patient. In fact, it is probable that the most important features of anaesthetic safety truly relate to the skills, knowledge and experience of individual anaesthetists, teamwork, communication and ensuring that critical procedures and tasks are performed appropriately. So, although monitoring devices play an important role in safe anesthesia, they do so 'as extensions of the anaesthesia team's senses and clinical skills, not as their replacement' (Merry and others 2010).

Among other factors (such as ensuring appropriate anaesthesia training, knowledge and skills in staff, developing a culture of safety in veterinary medicine and reporting, analysing and learning from our mistakes), safe anaesthesia requires us to bridge the gap between best practice and the care actually given to patients (Weller and Merry 2013). Guidelines, recommendations and standards set by governing bodies such as the RCVS or professional associations such as the Association of Veterinary Anaesthetists (AVA) can be used to define and outline best practice. Unfortunately, defining standards does not necessarily relate to them being implemented or to improved safety. In fact, to achieve best practice standards we need to find more specific safety tools to assist us in their implementation.

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One of the safety tools that has received significant publicity over the past decade is the humble checklist. Checklists are cognitive aids performed during a process (in contrast to guidelines and protocols which are designed to outline how a process should be performed before it is undertaken) that attempt to provide protection against the failings of human cognitive processing, primarily memory and attention (Jenkins 2014). A checklist is a list of actionable tasks which need to be performed and verified before moving on to the next stage of a process. It is not an itemised step-by-step list but rather a condensed list containing all the critical tasks that are required at specific times during a process. The classic example would be preflight, take-off and landing checklists in aviation.

In medicine, checklists have been used to ensure that: basic standards of care are employed; stages of a process are performed in a systematic and recognised or evidence-based way; crucial tasks are performed before moving through the phases of a process; and vital communications are made between team members (Shekelle and others 2013).

There is strong evidence that checklists reduce complications in human medicine. One particular checklist has caught the imagination of the world due to its impact and scope and warrants discussion. In 2007, the World Health Organization's (WHO) 'Safe Surgery Saves Lives' campaign defined 10 core principles of safe surgery and then set about designing a checklist to help healthcare professionals throughout the world achieve these standards (World Alliance for Patient Safety 2008). As a result of this endeavour, the WHO Surgical Safety Checklist (SSC) was born. This checklist is intended to be performed at three key timepoints during surgery: (1) before induction, (2) before first incision and (3) before recovering the patient. The original checklist contained 19 checks spread over these three 'junctures in care' which included verifying that the correct patient is operated on and at the correct site, recognising the risk of blood loss and patients at risk of airway compromise and confirming interventions are available, and providing specific times and prompts for preoperative briefing and postoperative debriefing to be performed (Haynes and others 2009).

The checklist was initially trialled in eight hospitals across the world which were chosen as they represented a diverse set of socioeconomic environments (Haynes and others 2009). Data on major complications (for example, wound infection, acute renal failure, major haemorrhage, cardiac arrest and coma) and 30-day mortality were collected before and after introduction of the checklist (Haynes and others 2009). The results were staggering: there was a reduction in major complications from 11 per cent to 7 per cent (a 36 per cent reduction) and a reduction in 30-day mortality from 1.5 per cent to 0.8 per cent (a 47 per cent reduction) following the introduction of the checklist. Since then, a number of other studies have been performed, most of which have shown an impressive effect on patient safety outcome measures (Treadwell and others 2014).

The reason for the success of the SSC is unclear. However, the improvements in teamwork and communication and the empowerment of nursing staff and development of a non-hierarchical team approach to patient care appeared to play a significant role, above and beyond the effect of ensuring that the other safety-critical steps are performed (Shekelle and others 2013).

The positive effect of checklists has not been universal (Urbach and others 2014), although it should be noted that a checklist has never been found to be detrimental (Treadwell and others 2014, Thomassen and others 2014). In fact, there are a number of reasons why implementing a well-designed safety checklist can fail. First, compliance to the checklist is vital. A checklist is not merely a box-ticking exercise; as Leape (2014) states, 'it is not the act of ticking off a checklist that reduces complications, but performance of the actions it calls for'. Just one person not partaking fully or communicating properly undermines the checklist and jeopardises the outcome. Subsequently, a checklist requires commitment from the entire team, especially those in leadership roles (Shekelle and others 2013).

Secondly, a checklist needs time and practice to be implemented properly (Leape 2014). It is unrealistic to expect any shift in practice or workflow not to require some effort. Continual education, training and evaluation of all staff involved are required to make a checklist a success within a healthcare environment.

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Thirdly, no checklist is universal. Although most safety checklists have been designed to be applicable in a wide range of scenarios, there may be tasks that become less relevant in given circumstances. Continuing to verbalise these checks can destabilise the checklist and weaken the other checks. Nor can a checklist encompass all aspects of safety within a complex process and, therefore, checklists cannot be expected to prevent all possible mishaps. Checklists will probably require local adaptation to suit specific local needs and to encompass other safety practices being employed.

Finally, there is the question of attitude. There are always going to be people who believe the checklists are not applicable to them; that they are an insult to a clinician's clinical freedom and autonomy. Checklists are, after all, a sign of weakness, lack of experience and competence, a method confined to students and trainees (Gaba 2013). From this standpoint, it is undeniable that the use of checklists challenges the traditional view of medical professionalism; one of infallibility and omnicompetence (Armitage-Chan 2014). However, over recent years the view of professionalism has shifted and evolved to incorporate the need for judgement in the face of uncertainty,

effective communication, being thorough and recognising one's limitations (Armitage-Chan 2014). Seen in this light, the use of a checklist would appear to be fully in accordance with professional behaviour.

Checklists are beginning to work their way into veterinary practice. Adaptations of the SSC have been reported (Gasson 2011). Hofmeister and others (2014) demonstrated that a simple two-point checklist could reduce the incidence of oesophageal intubation and closed adjustable pressure limiting valves by 75 per cent when implemented as part of a larger safety initiative.

In recognition of the role checklists can play in anaesthetic safety, the AVA (2014a) has recently launched an Anaesthetic Safety Checklist (Fig 1). This checklist is aimed at improving safety in all levels of general practice and incorporates the key safety features of: securing intravenous access; maintaining a patent airway; the ability to provide supplemental oxygen and intermittent positive pressure ventilation via a fully functioning anaesthetic machine and breathing system; and the ability to respond to the most common anaesthetic emergencies (AVA 2014a). Alongside recommended procedures for checking anaesthetic machines and preanaesthetic patient assessment, it also recognises the importance of planning, preparation, teamwork, communication between team members, and allocating a person to continuously monitor anaesthesia, to positive anaesthetic outcomes (AVA 2014b).

In conclusion, safe anaesthesia is more than just applying our knowledge and technical skills; it requires us to take account of the complexity of the anaesthetic process, the potential for errors and equipment failures, and to be fully aware of the current state of the team including their skills, knowledge, and physical and psychological condition. Maintaining patient safety should be of universal importance to all veterinary practitioners performing anaesthesia, and the evidence suggests that the barriers to success are less dependent on available resources than on passion, understanding and commitment (Flick and Pronovost 2012). Checklists have the potential to be a cost-effective, efficient and sustainable method to help improve patient safety but they require a wholesale change in attitude and practice for them to be actioned properly (Treadwell and others 2014, Thomassen and others 2014). That said, given their simplicity, affordability and adaptability, we perhaps have a moral and ethical obligation to attempt to implement them in our practice.

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Matthew McMillan

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Errata An erratum has been published regarding this article. Please see next page or:
http://veterinaryrecord.bmj.com/content/175/24/622.full.pdf

Notes

Correction

Checklists in veterinary anaesthesia (*VR*, December 6, 2014, vol 175, pp 556-559; doi: 10.1136/vr.g7515). The legend for Figure 1 should have read 'The first page of the Anaesthetic Safety Checklist developed by the Association of Veterinary Anaesthetists, with design and distribution support from Jurox UK (AVA 2014a,b)'. The error is regretted.

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