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Veterinary Anesthesia

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Introduction to Veterinary Anesthesia

Veterinary anesthesia is a fundamental discipline within the broad field of veterinary medicine that deals with anesthesia (local and general) and analgesia of all animals. Many aspects of veterinary anesthesia directly relate to the aims of an oath of ethics (oaths or credos are country dependent) that a veterinarian or veterinary technician (nurse) must take before being allowed to practice veterinary medicine. An example of such an oath is the American Veterinary Medical Association Veterinarian's Oath:

“Being admitted to the profession of veterinary medicine, I solemnly swear to use my scientific knowledge and skills for the benefit of society through the protection of animal health and welfare, the prevention and relief of animal suffering, the conservation of animal resources, the promotion of public health, and the advancement of medical knowledge.

I will practice my profession conscientiously, with dignity, and in keeping with the principles of veterinary medical ethics.

I accept as a lifelong obligation the continual improvement of my professional knowledge and competence.”

Furthermore, many of these oaths address the five freedoms of animal welfare, which are as follows: the freedom (1) from hunger and thirst, (2) from discomfort, (3) from pain, injury and disease, (4) to express normal behavior, and (5) from fear and distress. Specifically, practicing anesthesia and providing analgesia in animals facilitates a wide range of procedures (e.g., surgery and many diagnostic imaging procedures) and prevents discomfort and pain. Furthermore, for example, treating painful age-related

disease processes, such as providing analgesia to an old dog suffering debilitating osteoarthritis, addresses the freedom to express normal behavior. Pain-free animals are also more likely to eat and drink which addresses the freedom from thirst and hunger. Thus, the practice of veterinary anesthesia can address all freedoms, enabling veterinarians and technicians to meet their ethical obligation to uphold their oath.

Anesthesia (as in general anesthesia) is defined as a state of controlled, temporary loss of sensation or awareness that is induced for medical purposes.

Local anesthesia is defined as administering a local anesthetic drug, using various techniques, to induce the absence of sensation in a specific part of the animal's body. Generally, the aim of inducing local anesthesia is to provide a local insensitivity to pain but often other local senses (feeling of sensations such as touch, heat, pressure, etc.) may also be lost.

Analgesia is defined as the inability to feel pain. However, many drugs that are used to treat pain (opioids, nonsteroidal anti-inflammatory drugs, etc.) are more accurately described as “hypoalgesics,” as they decrease the sensation of pain rather than abolishing it completely. Local anesthetic drugs provide loss of sensation and are thus considered true analgesics.

The anesthetist is the person administering the anesthetic and providing analgesia. An anesthetist could be a veterinarian or a veterinary technician. *Note:* The role of technicians will vary according to local regulations.

Though not strictly defined, it is generally accepted that the term “anesthesiologist” is restricted to a veterinarian, and it is often, though not always, assumed that they have completed postgraduate, discipline-specific clinical training and are registered by their country's veterinary professional body, or board-certified by a college, conferring specialist status as a veterinary anesthesiologist.

The Stages of Learning and Developing Skills in Veterinary Anesthesia

There are three major areas that require development to become proficient at practicing anesthesia and analgesia (Figure 1.1). These are focused on (1) your development (knowledge and practice of anesthesia, to achieve proficiency as a new graduate through practice and situational awareness), (2) understanding your patient, and (3) understanding the drugs.

Your development begins with building your knowledge and understanding. This involves enrolling into a veterinary degree course where fundamental aspects of veterinary anesthesia are taught in a classroom environment.

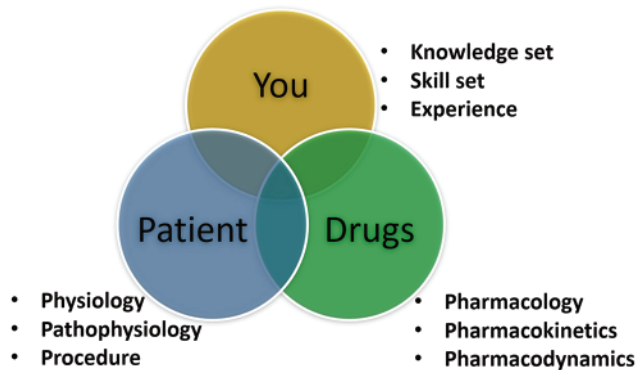


Figure 1.1 The three major fields that require development to become proficient at practicing anesthesia and analgesia. These fields are focused on your development, your understanding of the patient, and an understanding of the drugs used during the peri-anesthetic period.

At this early stage of development, you are classified as a *novice* on the learning and development staircase framework (Figure 1.2). Many of the aspects of veterinary anesthesia will be foreign to you because you have not necessarily been exposed to clinical practice. This makes the initial learning of this subject a challenge. As you progress through classroom learning, some faculties have a skills laboratory where you will be exposed to the practical aspects of performing certain procedures on purpose-built training models (simulators). Once that phase of learning is completed you are considered an *apprentice* and you will be ready for clinical training with live patients (academic hospitals or at private practice rotation programs, depending on your school). During this period of training, you will gain practical experience and begin to develop your skill set while applying the theory from the classroom. Upon graduation from the veterinary program, you are considered *proficient* at veterinary anesthesia.

Over and above learning the fundamental principles of veterinary anesthesia is the need to incorporate knowledge gained from other courses, such as physiology (species-specific and disease pathophysiology). Understanding and integrating this knowledge is essential to practicing anesthesia at an acceptable level. In most anesthesia courses, there is not enough time to review physiology and pathophysiology so it is therefore expected that a student recalls and integrates this knowledge during the course. This also applies to the core concepts of pharmacology (such as receptor function and location, and principles of pharmacokinetics and pharmacodynamics).

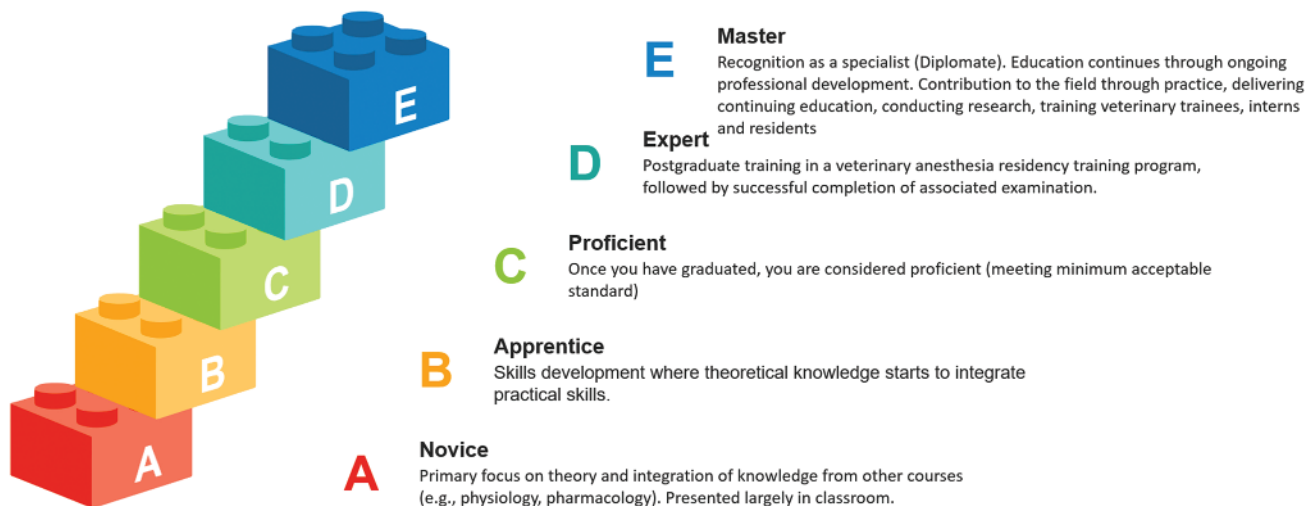


Figure 1.2 The hypothetical learning and development staircase that starts in the lecture halls (A), graduating from a degree in veterinary science (C), and then specializing in veterinary anesthesia (D and E).

Colleges and Associations

There are a number of colleges and academies where a veterinarian or veterinary technician can enroll for postgraduate training with the goal of becoming a specialist. Acquiring this status will classify you as an *expert* (specialist) in veterinary anesthesiology. The differentiation between expert and *master* is not formally structured, but Diplomates would be expected to achieve master status with experience. However, veterinarians or veterinary technicians who have a keen interest in anesthesiology but do not want to pursue a specialist degree can join an association to keep up to date with developments in the field or gain additional knowledge at their own pace and level of interest. Table 1.1 lists a few internationally recognized organizations that offer specialist

training or information to interested persons. Your country may offer some regional organizations where advanced training or information can be found; it is best to consult your local associations or schools for information.

Referral and Advice Considerations

There are specialists in veterinary anesthesiology all over the world who will accept a case referral or be prepared to consult on a case if physical referral is not an option. The ACVAA and ECVAA websites have directories listing board-certified veterinary anesthesiologists. If that approach is unsuccessful, then phoning your local region's registering body or association could be helpful.

Table 1.1 A list of some internationally recognized organizations that offer specialist training in veterinary anesthesia or provide a source of information to an interested person.

Entity	Criteria for membership	Description	Website
ACVAA	Membership requires diplomate status. Diplomate status is achieved by completing a residency and passing the board-certifying examination.	The American College of Veterinary Anesthesia and Analgesia. The ACVAA exists to promote the highest standards of clinical practice of veterinary anesthesia and analgesia and defines criteria for designating veterinarians with advanced training as specialists in the clinical practice of veterinary anesthesiology. The ACVAA issues certificates to those meeting these criteria, maintains a list of such veterinarians, and advances scientific research and education in veterinary anesthesiology and analgesia.	www.acvaa.org
ECVAA	Membership requires diplomate status. Diplomate status is achieved by completing a residency and passing the board-certifying examination.	The European College of Veterinary Anaesthesia and Analgesia. The mission of the ECVAA is to contribute significantly to the maintenance and enhancement of the quality of European Veterinary Specialists in Anaesthesia and Analgesia across all European countries at the highest possible level so as to ensure that improved veterinary medical services will be provided to the public.	www.ecvaa.org
AVTAA	Veterinary technician specialist (anesthesia and analgesia) status is achieved by completing credentials and passing a certifying examination.	The Academy of Veterinary Technicians in Anesthesia and Analgesia. The AVTAA exists to promote interest in the discipline of veterinary anesthesia. The Academy provides a process by which a veterinary technician may become credentialed as a Veterinary Technician Specialist (Anesthesia and Analgesia). The Academy provides the opportunity for members to enhance their knowledge and skills in the field of veterinary anesthesia.	www.avtaa-vts.org
AVA	All professions and animal caregivers with an interest in veterinary anesthesia, analgesia, and associated animal welfare can join the association.	The Association of Veterinary Anaesthetists. The AVA is an active, enthusiastic group of veterinary surgeons and others (e.g., researchers, technicians, and pharmacologists) who share an interest in animal anesthesia, analgesia, and animal welfare. The AVA promotes the study of, and research into, the subject of anesthesia and analgesia in animals; and to promote collaboration between anesthetists in all places, and actively encourage the establishment and taking of diplomas and degrees in veterinary anesthesia.	www.ava.eu.com
NAVAS	All professions and animal caregivers with an interest in veterinary anesthesia, analgesia, and associated animal welfare can join the society.	The North American Veterinary Anesthesia Society. The NAVAS helps veterinary professionals and caregivers advance and improve the safe administration of anesthesia and analgesia to all animals through development of standards consistent with recent findings documented in high-quality basic and clinical scientific publications and texts. The NAVAS encourages discussion and disseminates information to all those interested in veterinary anesthesia and analgesia, including the general public. The NAVAS strives to be a community of, and an accessible resource for, all veterinary caregivers and interested individuals within the general public on matters relevant to veterinary anesthesia, analgesia, and related animal welfare.	www.mynavas.org

When to Consider Referral

A good rule of thumb is to consider the predicted risk of peri-anesthetic mortality for the patient's physical status classification (see Chapter 2 for a description of the American Society of Anesthesiologists physical status classification). As physical status classification increases, the risk of mortality increases. A further consideration is veterinarian familiarity with the species to be anesthetized. For example, it is not unreasonable to consider that a veterinarian who primarily works with cats and dogs will be less proficient anesthetizing a pet reptile. This lack of familiarity will increase the anesthetic risk as it is likely to impact the quality of anesthetic management. Another consideration for referral is access to a specialist. Some anesthesiologists are prepared to travel and assist with a case at your practice.

Asking for Advice when Referral Is Not an Option

While referral may not always be an option, with potential financial and geographic limitations, modern communications increase the options available for specialist consultation, such as teleconsulting/telemedicine. Other sources of free advice can be found on professional networks (often hosted by associations and controlling bodies), invited email lists (ACVA-L), social media groups (e.g., interest groups on Facebook), and in some cases anesthesiologists employed at local veterinary specialty/academic hospitals. Information provided by those without recognized advanced training is not subject to any form of quality control and practitioners should be aware of the associated risks.

Interpreting the Science

How to Find Quality Information in a Hurry

When looking for information quickly most of us turn to an internet search engine; however, information available on websites is often inaccurate and incomplete. This explains the commonly held misconception that there are a large number of dog and cat breeds that are especially "sensitive" to anesthetic drugs (see Further Reading). Unfortunately, distinguishing between reliable and unreliable sources may not be obvious. A helpful approach is to examine the credentials of the person/group providing information. At an individual level, only Diplomates of the

American College of Veterinary Anesthesia and Analgesia or European College of Veterinary Anaesthesia and Analgesia are entitled to use the post-nominal "DACVAA" or "DECVAA," respectively. The terms "specialist," "anesthetist," and "anesthesiologist" can be misleading as these are not necessarily defined or protected terms in all countries. Any association or group producing anesthesia resources should include Diplomates within its membership. Such groups include the ACVAA, ECVAA, and the Association of Veterinary Anaesthetists and Continental/National Anesthesia Associations (e.g., NAVAS, North American Veterinary Anesthesia Society).

Evaluating Scientific Articles

A detailed description of interpreting scientific articles is beyond the scope of this chapter. Interested readers are referred to the Further Reading section. Research quality can be viewed as a hierarchy, ranging from personal opinion and case reports to systematic reviews and meta-analysis (Figure 1.3). Based on this, some of the more popular means for veterinarians to gain new information, such as through conference (congress) presentations, should be assessed based on the credentials (qualifications and relevant experience) of the speaker and quality of evidence (including a description of strengths/weaknesses) presented.

In general, much of the reporting of research in veterinary medicine falls below well-established guidelines. This reflects a risk of bias and weak study design in published articles, highlighting that publication is not a guarantee of the quality of work. For example, in a study to compare treatment A versus treatment B, if the treatment an animal receives is not randomly assigned it is possible that some other factors biased the allocation of treatments. Similarly, if the outcome of treatment depends on a researcher evaluation (e.g., pain assessment), researcher awareness of the treatment given to an animal could affect subsequent evaluation. A particularly common limitation in veterinary clinical research is insufficient sample size, i.e., too few animals were studied to identify an important difference between treatments on an outcome of interest (e.g., pain relief). Therefore, when assessing the results and conclusions from an article it is helpful to confirm if comparable articles reported similar findings, whether research findings have been successfully applied, and the interpretation of research results by independent experts.

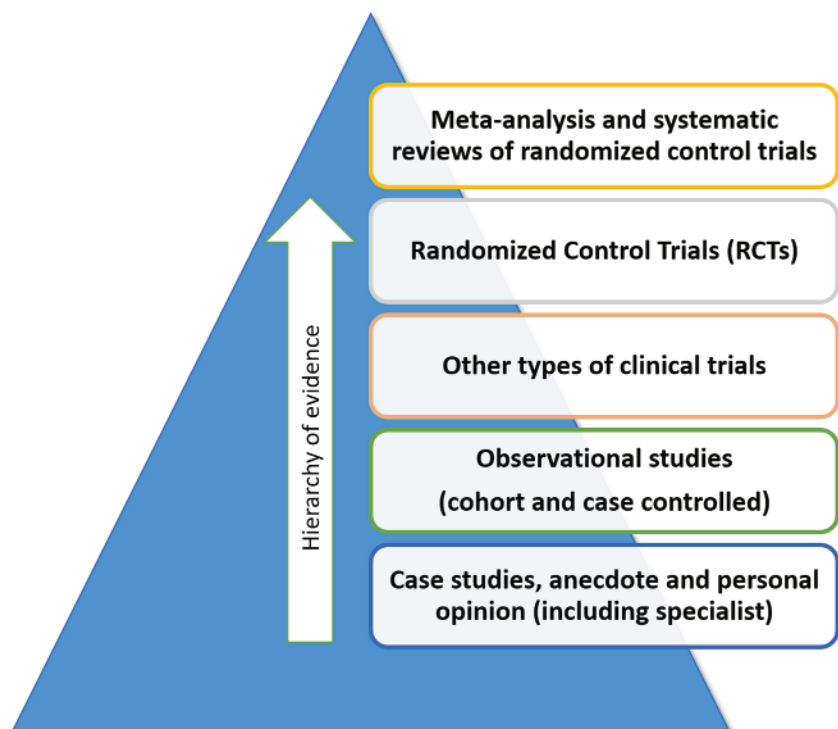


Figure 1.3 Hierarchy of evidence, ranging from low quality (bottom layer of pyramid) to high quality (top layer of pyramid). *Note:* Quality varies within individual layers, such as may occur with strengths/weaknesses in the design and reporting of clinical trials. *Source:* Figure adapted from Greenhalgh (2019).

Further Reading

Cockcroft, P. and Holmes, M. (2003). *Handbook of Evidence-based Veterinary Medicine*, 1e. Wiley-Blackwell. ISBN: 1405108908.

Greenhalgh, T. (2019). *How to Read a Paper: The Basics of Evidence-based Medicine*, 6e. Wiley-Blackwell. ISBN-10: 1119484745.

Hofmeister, E.H., Watson, V., Snyder, L.B.C., and Love, E.J. (2008). Validity and client use of information from the

World Wide Web regarding veterinary anesthesia in dogs. *J Am Vet Med Assoc* 233: 1860–1864.

Rufiange, M., Rousseau-Blass, F., and Pang, D.S.J. (2019). Incomplete reporting of experimental studies and items associated with risk of bias in veterinary research. *Vet Rec Open* 6: e000322. <https://doi.org/10.1136/vetreco-2018-000322>.

