



## **The Trend Toward Telemedicine & the Impact on Veterinary Medicine**

**22** Overview: Telemedicine as a Tool in the Veterinary Practice

**22** Telehealth & Telemedicine: The Definitions

**25** Telemedicine: The Scale of Legal Implications

**27** Anesthesia: Monitoring Advances in Technology

**28** Emergency Medicine: Critical Help for Those Working Alone

**29** Teleradiology: The View Ahead

**30** Dental Teleradiology: Getting to the Root of the Problem



## Overview

# Telemedicine as a Tool in the Veterinary Practice

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## Definitions<sup>a</sup>

- **Telehealth** is the overarching term that encompasses all uses of technology geared to the remote delivery of health information or education. In other words, *telehealth* could be used to describe everything from websites to activity trackers for pets. If a veterinary team updates clients about their pets' health by using the phone, emailing, or sending and receiving text messages, images, and videos, they are using telehealth tools.
- **Telemedicine** is a subcategory of telehealth in which technology is used to exchange medical information about a patient's clinical health status from one site to another. The most obvious uses for telemedicine are for diagnosing cases and prescribing medications (eg, a client–veterinarian video call that replaces a physical visit to the practice).

<sup>a</sup> Definitions adapted from the AVMA Practice Advisory Panel's final report on telemedicine, published January 2017.

Telemedicine is currently a hot topic in the veterinary profession. But what is telemedicine, and what does it mean for veterinary professionals and their clients?

Telemedicine is just another tool that can be useful in daily practice to increase client communication, provide client convenience, promote the client's bond with the practice, and improve patient care. However, just as an ultrasound machine is not relevant to every case, not every case will be appropriate for telemedicine. Veterinarians will need to use good judgement to determine when telemedicine modalities will help them, their patients, and their clients.

At the AVMA Convention in Indianapolis, the AVMA House of Delegates voted to implement a new policy regarding telemedicine. (See **Key Highlights from the AVMA Policy on Telemedicine**.) See **Definitions** for the AVMA definitions of telehealth and telemedicine, which will help provide a framework for telemedicine discussions.<sup>1</sup> Simply communicating with a client via email, text, or other electronic means is using telemedicine.<sup>1</sup>

When using telemedicine tools, just as when using any other diagnostic or treatment tool, the veterinarian must have an established veterinarian–client–patient relationship (VCPR). The Federal Drug Administration (FDA), along with most states, has specific laws and regulations regarding the VCPR, and practitioners must know what is applicable in their state. In addition, legal

liability and responsibility extend to both the state where the practitioner is located and the state where the patient is located.<sup>1</sup> (See **Telemedicine: The Scale of Legal Implications**, page 25.) Outside an existing VCPR, any veterinary advice given via electronic means should be general in nature and not specific to the animal's medical condition, according to a personal communication with the AVMA Professional Liability Insurance Trust.

### **Common Components**

Teleconsulting (eg, sending radiographs to be reviewed by a radiologist or ECGs to be reviewed by a cardiologist) is a common component of telemedicine that most practitioners use regularly. Emergency teletriage is another important component of telemedicine. Animal poison control services are a prime example, as are potential heat stroke or drowning cases. Although the AVMA supports emergency teletriage until a veterinarian can see the patient, the organization is opposed to remote consulting offered directly to the public when the intent is to diagnose and/or treat a patient in the absence of a VCPR.<sup>1</sup> Telemedicine can also be used to monitor herd health or disease outbreaks (eg, avian influenza at a poultry farm) or in times of a natural or manmade disaster. During a disaster, clients and their animals may not have access to veterinary care because roads are impassable, transportation is shut down, or veterinary care is not available at the evacuation facility. A client and his or her veterinarian can use telemedicine tools to manage basic medical concerns (eg, stress-related diarrhea, treatment of minor wounds) until the client can gain access to veterinary care.

### **Applications**

Telemedicine is expected to become increasingly more common in practices,<sup>2,3</sup> especially because millennials, who typically prefer electronic

## **Key Highlights from the AVMA Policy on Telemedicine**

The AVMA Policy on Telemedicine was developed after 2 years of intensive study and input from members and stakeholders. The policy provides a balance between ensuring access to the convenience and benefits afforded by this tool and promoting the responsible provision of high-quality veterinary care. The policy also reinforces that telemedicine should only be conducted within an existing VCPR. The AVMA recognizes that future policies will be evaluated and informed by evidence-based research on the impact of telemedicine with regard to access to care and patient safety.

The AVMA recognizes the need for emergency teletriage services (eg, poison control) but is otherwise opposed to remote consulting offered directly to the public when the intent is to diagnose and/or treat a patient outside an established VCPR. A veterinarian who has an established VCPR, however, has the professional discretion to consult with specialists or other experts, and the consultant should not be required to hold a license in the state where the veterinarian with the VCPR practices or where the patient resides (ie, the veterinarian with the VCPR should be able to have a radiologist in another state read a patient's radiographs).

Telemedicine guidelines should be harmonized across the nation and strongly enforced to protect patient and public safety. The AVMA supports regulatory efforts to clarify where the actual practice of veterinary medicine occurs when offered through telemedicine modalities, who has regulatory enforcement and disciplinary authority, and what remedies are available in case of patient harm.

Eligibility to provide telemedicine services should be restricted to those people who are legally authorized to practice veterinary medicine in that state, and the credentials of all advice givers, as well as any disclaimers, should be unambiguous and clearly displayed. Clients should be aware of the advice giver's identity, location, licensure status, and potential privacy and security issues with electronic communications.

Finally, the AVMA policy states that the legal accountability, liability, and responsibility of the practicing veterinarian should be in both the state where the patient is located and the state where the veterinarian is located.

## **Telemedicine Toolkit**

The AVMA is creating a toolkit that practitioners can use to further incorporate telemedicine tools into their existing practices. The toolkit will include potential applications, various service model descriptions, case studies, legal and regulatory considerations, equipment resources, and monetization guidelines (ie, many smartphone apps will allow practitioners to charge for their time and services). Further details will be released when the full toolkit is rolled out at the July 2018 AVMA convention in Denver.

communication—particularly text-based—are the largest and fastest growing segment of pet owners.<sup>4,5</sup>

Various telemedicine platforms (eg, text, email, smartphone apps) can help veterinary professionals better communicate with clients. For example, consider sending postoperative surgery pictures to let a client know her pet came through with flying colors, or send a client a

text to let him know his pet’s urinalysis was normal and the previous urinary tract infection has cleared. These modalities can also be used to further build on the education the veterinary team provides in the examination room (eg, a refresher on new puppy housetraining, instructions for performing a glucose curve at home on a newly diagnosed diabetic cat).

Video, another useful aspect of telemedicine, can be pivotal in cases in which determining if the animal is having seizures or syncopal episodes is difficult. In addition, in those common, frustrating intermittent lameness cases, the client can video the pet’s limp and send the video to the veterinarian, who is then able to determine how to localize the problem and where radiographs should be taken to diagnose the cause.

### Conclusion

None of these problems preclude the need for an established VCPR, a physical examination, and potentially other diagnostics, but the tools of telemedicine can help enhance patient care. Many veterinary professionals are already using these tools every day without realizing they are practicing telemedicine. ■

## BENCHMARKS

### How Communication Pays Off

- Enhancing client communication, whether traditional or electronic, is one of the top changes that would have the most significant positive impact on the practice.
- What’s the financial payoff? Enhanced client communication often results in improved client compliance, leading to a stronger average invoice amount. Just a \$10 increase for a veterinarian generating 3000 invoices per year would grow revenue by \$30 000.

**SOURCE:** *Benchmarks 2017: A Study of Well-Managed Practices*. Columbus, OH: WMPB; 2017:61.

## TAKE ACTION

- 1 Be familiar with the definition of VCPR in the state where you practice.
- 2 Document any telemedicine services in the medical record in the same manner as traditional professional services.
- 3 Do not be afraid to add telemedicine services to your practice to improve patient care and bond clients to your practice.
- 4 Be familiar with your state’s legal telemedicine requirements.

### References

1. Final report on telemedicine. AVMA Practice Advisory Panel. <https://www.avma.org/KB/Resources/Reports/Documents/Telemedicine-Report-2016.pdf>. Published January 13, 2017. Accessed October 11, 2017.
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Telemedicine

# The Scale of Legal Implications

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Telemedicine is changing the world of veterinary medicine, and veterinary teams need to know the legal ins and outs.

The terms *telehealth* and *telemedicine* are sometimes used interchangeably, but they have different meanings. (See **Definitions**, page 22, and **Key Highlights from the AVMA Policy on Telemedicine**, page 23.)

## The Value

When clients have the potential to access veterinary healthcare over the internet or via an app, geographic boundaries could become irrelevant. Veterinary clients, the consumers of veterinary services, want access to better, less expensive, and more convenient solutions to their pets' health problems.

Technologies ranging from apps that enable video calling to smart litter boxes that analyze urine to at-home chemistry analyzers all have the potential to change the way veterinary practices deliver services and communicate with clients. Increased access to an individual

## The Veterinarian–Client–Patient Relationship Requirement

The requirement includes 4 subcategories.

### 1 TELEMEDICINE FOR NEW CLIENTS

Starting a VCPR through electronic communications (ie, displacing the physical examination in lieu of electronic communication) is the most contentious issue surrounding telemedicine. Before attempting this form of telemedicine, check your state's practice act and board regulations for language barring a VCPR from being formed by "electronic means" or language that requires a "physical" examination to form the VCPR.

### 2 TELEMEDICINE FOR EXISTING CLIENTS

After the VCPR is established, veterinary practices can communicate with their clients on a regular basis. The time, duration, and scope of the conditions that the continuing VCPR covers have not been fully decided in most states; however, in all cases, knowing what the state practice act allows is important. For example, in California, a new VCPR must be established for each condition (ie, a veterinarian cannot see an animal for a femur fracture and then use telehealth tools to diagnose and treat the patient's otitis externa), and the veterinarian must examine a patient at least once a year in order to write prescriptions for that patient.<sup>10</sup>

### 3 TELEMEDICINE BETWEEN VETERINARIANS

The consultant relationship has been long used in veterinary medicine for advice on specific cases. The veterinarian of the VCPR often transmits images or information (eg, radiographs) and receives advice on interpretation, diagnosis, and treatment. Some grey areas remain, including whether or not the consultant can communicate directly with the client and possible liability to the consultant veterinarian.

### 4 TELETRIAGE

Various poison control hotlines have been doing teletriage for years. In the context of private practice, the client receives general advice, applies the advice to his or her situation, and makes the decision whether to rush the pet to the emergency room or wait until the practice is open. Teletriage has been generally accepted by state boards, but there is a fine line when it becomes the practice of veterinary medicine, and the wording of the recommendation sentence becomes very important. General advice concerning the situation is permitted, but rendering advice to diagnose or treat becomes the practice of veterinary medicine. Some new services provide teletriage for practices, and these grey areas will need definition.

patient's data has the potential to increase client portability and access to a wide range of service providers. Telemedicine is frequently discussed because it has the potential to disrupt the veterinary profession.

### Legal Requirements

Standing somewhat in the way of this disruption are laws and regulations. Most states require that the practice of veterinary medicine start only after formation of the veterinarian–client–patient relationship (VCPR). Traditionally, this is when the veterinarian meets with the client and examines the patient.

Several states (eg, Texas,<sup>1</sup> Tennessee,<sup>2</sup> Utah,<sup>3</sup> Georgia,<sup>4</sup> Illinois,<sup>5</sup> Iowa,<sup>6</sup> Mississippi,<sup>7</sup> Washington<sup>8</sup>) have laws that prohibit forming the VCPR by electronic or telephonic means. Some states insert the word “physical” in front of “examination,” which could easily be interpreted to mean a face-to-face meeting. Other states (eg, Delaware, Washington DC, Alaska) have no VCPR requirement before a patient is diagnosed or treated.

Federal laws generally leave regulation regarding the practice of veterinary medicine to the states, but the US Food and Drug Administration controls the medications veterinarians use. Federal regulations limit a veterinarian's ability to prescribe a drug in an extra-label manner without first establishing a VCPR. Although more drugs are

becoming available with more labels, practicing veterinary medicine without reaching for extra-label drugs is still difficult. Even in states without a VCPR requirement, telemedicine providers cannot legally prescribe extra-label drugs.

Federal regulations also prevent telemedicine providers from writing veterinary feed directives for food animals, including backyard poultry and potbellied pigs kept as pets.

### Practice Implications

State veterinary boards are responsible for ensuring that veterinarians comply with the practice act. In most states, a veterinary professional who practices veterinary medicine without a valid VCPR is subject to state board action.

Board actions have led to at least one lawsuit concerning telemedicine in veterinary medicine.<sup>9</sup> The author expects state legislatures, state boards, and regulatory agencies to provide more detail in the future. Regardless, here are the author's recommended boundaries and best practices.

- Be licensed in the state where the client and pet live
- Know the difference between interactions in which a VCPR does and does not exist
- Remember that the same Standard of Care that applies to face-to-face medicine applies to telemedicine. Providing low-level

care is not an option just because the veterinarian and pet are not in the same room.

- The same record-keeping requirements apply to telemedicine as to face-to-face practice.

### The VCPR Requirement

The VCPR requirement includes 4 subcategories. (See **The Veterinarian–Client–Patient Relationship Requirement**, page 25.) Any potential telemedicine offerings in the practice should be separated into these categories.

### Conclusion

Telehealth already is changing veterinary medicine, and veterinary professionals must remain aware of their clients' needs as well as the laws and regulations that govern the profession. There is no doubt the laws will change, and veterinarians must help facilitate that change as more details and guidance emerge in telehealth and telemedicine. ■

### References

1. Texas Veterinary Licensing Act § 801.351(c).
2. Tennessee Veterinary Practice Act § 63-12-103.17(F).
3. Utah Veterinary Practice Act § 58-28-604(2).
4. Rules of Georgia State Board of Veterinary Medicine § 700-8(d)(3).
5. Illinois Veterinary Medicine and Surgery Practice Act 225 ILCS § 115(3).
6. Iowa Veterinary Medicine Board IAC Rule 811 § 12.1(169).
7. Mississippi Veterinary Practice Act MS Code § 73-39-59.
8. Washington Regulations of Veterinary Board WAC § 246-933-200.
9. *Hines v Alldredge*, 783 F3d 197 (5th Cir 2015).
10. California Veterinary Practice Act 16 § 2032.1(c).



## Anesthesia

# Monitoring Advances in Technology

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As in-house technology increases our ability to care for veterinary patients, so does the use of remote technology-based resources. Never before have so many resources been available to improve the health and care of all animals, even in the far corners of the world.

Traditionally, telemedicine consultations have been helpful, but the amount of information specialists can access is limited because they are not in physical contact with the patient. However, advances in technology mean advances in telemedicine in general and anesthesiology in particular.

### The Future

Currently, anesthesia telemedicine services include email or telephone consultations before anesthetizing patients with increased anesthetic risk or after adverse outcomes. Picture messages or short video clips can be transmitted during a case

when help is needed to interpret physiologic waveforms, provided the anesthesiologist is available at that moment to read them.

Advances in telemedicine currently enable remote monitoring of patient vital signs via Bluetooth, allowing veterinary team members and remote specialists to continuously monitor the vital signs of patients under anesthesia or in recovery. Cloud-based applications will be available in 2018. Physiologic data sent over the cloud can include pulse, respiratory rate, temperature, pulse oximetry, blood pressure, and glucose levels.<sup>1</sup>

Anesthesia services that telemedicine will bring also likely include:

- Real-time remote monitoring of anesthetized patients in 2018
- Continuous monitoring of patient status, which enables earlier recognition of downward physiologic trends and can facilitate earlier interventions and potentially decrease patient morbidity and mortality
- Continued observation of patients, allowing them to return home earlier after sickness or surgery instead of remaining in the practice

### Conclusion

Through telemedicine, the ability to easily transmit real-time physiologic data is an exciting new opportunity to better care for patients under anesthesia and those recovering at home. This capability will be available in 2018 and should help strengthen all team member–client–patient relationships. ■

### Reference

1. Sentier Vetcorder. Sentier. <http://www.sentierconnect.com>. Accessed September 2017.

## Looking for a Board-Certified Consultant?

To find a board-certified consulting anesthesiologist, visit the American College of Veterinary Anesthesia and Analgesia online ([acvaa.org](http://acvaa.org)).



## Emergency Medicine

# Critical Help for Those Working Alone

**Amy L. Butler, DVM, MS, DACVECC**

Critical Consults

Clarks Summit, Pennsylvania

As a young clinician fresh out of my internship, I worked for an overnight emergency practice. My internship had (mostly) prepared me for emergency work, but still, some horrible cases that were crashing and burning arrived in the middle of the night, leaving me struggling alone to decide what I should do.

Being alone, without a team member or someone more experienced to consult, was an isolated and scary feeling. Those early experiences inspired Critical Consults, the company I started in 2014 to help meet the needs of veterinarians faced with difficult emergency and critical care cases.

Feeling alone and not knowing what to do next is stressful, whether during a busy day or in the middle of the night. Hearing the relief in another team member's voice as we create a treatment plan together is one reason telemedicine is so important.

### How We Use Telemedicine

Here is how Critical Consults provides support.

- Veterinarians call our board-certified criticalists who are available at all hours, every day of the year. Six criticalists provide consultation on small animal emergency and critical care cases, with one consultant on call at any one time. All the consultants, who have academic backgrounds and private practice experience, are chosen for their ability to provide high-level service.
- Calls ring straight through to an experienced specialist.
- A board-certified anesthesiologist

provides consultations to specialty practices and general practitioners for difficult cases. We also help practices set up anesthetic protocols.

- We help direct the diagnostics and treatments that are most essential when the clock is ticking, allowing the consulting veterinarian to concentrate on the most important aspects of the case (eg, providing insight into management of unstable respiratory cases, helping the veterinarian in charge treat a case of shock and hypotension).
- We have removed any barriers that take up precious time—no account set-up is required and no credit card is needed. Case information and the practice address are recorded during the consultation, and the practice is billed directly each month.
- To ensure greater service, we work with a group of small, independently owned telemedicine consulting companies that provide a variety of specialty services (ie, radiology, neurology, oncology) and serve as a virtual referral practice.

### Conclusion

Our company's goal is to provide a lifeline to those in need. Our services allow veterinarians to be more efficient when minutes matter, improve the quality of care, and, most importantly, lower the team's stress level. If we can help point the team in the right direction, patient outcomes improve and treatment becomes more efficient and effective. We always hope our colleagues do not need us, but if they do, they know they are not alone. ■





## Teleradiology

# The View Ahead

**Amanda Crabtree, DVM, MS, DACVR**

Transparent Veterinary Imaging  
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Teleradiology sounds simple: Send radiographs to the radiologist and receive a report that explains exactly what the problem is and what to do next. However, getting a clinically relevant report requires more planning than simply sending a brief request.

Radiologists can interpret radiographs and other imaging modalities (eg, ultrasonography, CT, MRI, nuclear scintigraphy). The radiologist's comfort level with different species (eg, exotics) may vary, so be sure he or she is confident with the type of case to be submitted.

Some radiologists offer services in CE (eg, improving technique at practices, mobile ultrasonography). Teleradiology companies vary from an individual radiologist to large groups with multiple radiologists whose services are available all hours.

### Teleradiology Tips

When sending radiographs to the radiologist, these tips can help ensure he or she is able to provide the most

information possible.

#### Image Quality

- To make the most of the consult, images with ideal positioning (ie, straight, no legs superimposed over thorax or abdomen), collimated to the area of interest only, and with appropriate exposure are necessary.
- Rotated, under- or overexposed, uncollimated, or incomplete images will limit the amount of information that can be reported.
- Orthogonal views are ideal.
- If ideal views are not possible in the awake patient, sedation or anesthesia may be necessary.
- A complete study should include the full series of images (eg, all times and orthogonal views on an upper GI series).

### History & Examination Findings

To be most helpful, provide a concise but thorough history that summarizes the client complaint, examination findings, and any pertinent medical history or prior treatment, which allows the radiologist to rank differential diagnoses or suggest further studies. For example, instead of recording *lameness*, consider *non-weight-bearing lameness of the left thoracic limb, localized to the elbow, 2-week duration*.

### Licensing

The majority of states require the telemedicine specialist to be licensed only in his or her state of residence, as the referring veterinarian holds the primary VCPR. (See **The Veterinarian–Client–Patient Relationship Requirement**, page 25.)

At this time, 3 states require separate licensing (ie, Connecticut, Michigan, New York), where the telemedicine specialist must be separately licensed and have completed the CE these states require. This is particularly important in New York because not all CE is approved by the New York board. (See **The Scale of Legal Implications**, page 25, and **Key Highlights from the AVMA Policy on Telemedicine**, page 23.)

### Conclusion

Working with the chosen radiologist by providing ideal background and images will provide the best report and experience—for the clinician, the radiologist, and the client. ■



## Dental Teleradiology

# Getting to the Root of the Problem

**John Lewis, VMD, FAVD, DAVDC**

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Intraoral radiographs are essential for planning and assessing outcomes of dental treatment. Use of dental films in veterinary medicine was first documented in 1958,<sup>1</sup> and digital technology has made its use easier than ever.

### The Data

Studies of the diagnostic value of full-mouth dental radiographs in dogs and cats found that radiographs of teeth without clinical lesions yielded clinically important findings in 41.7% of cats and 27.8% of dogs, whereas radiographs of teeth with clinically visible lesions yielded essential information in 22.6% of dogs and 32.2% of cats.<sup>2,3</sup>

The diagnostic yield of full-mouth radiography is high in new canine and feline patients referred for dental treatment,<sup>2,3</sup> and routine use of full-mouth radiography is justified.

With the above data in mind, more practices are making intraoral dental radiography part of their dental procedures. Like most new diagnostic tools, there is a learning curve in determining normal from abnormal, which is where dental teleradiology comes into play.

### Dental Services

Like most dentists who provide dental teleradiology services, NorthStar VETS offers stat and non-stat interpretations of dental radiographs. The stat interpretation, when available, allows patients still under anesthesia to benefit not only from

a boarded diplomate's diagnostic interpretation but also from his or her treatment recommendations. It is like having a veterinary dentist looking over your shoulder.

### Conclusion

Dental teleradiology is likely to become increasingly important as the number of veterinary practices that adopt digital dental radiography as an essential diagnostic tool continues to grow. ■

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See **author biographies**, page 61



**LORI MASSIN TELLER**, DVM, DABVP (Canine/Feline), CVJ, is currently a veterinarian at Meyerland Animal Clinic, where she has worked in some capacity since she was 12 years of age. A graduate of Texas A&M University, Lori has special interests in internal medicine cases, particularly those regarding GI diseases and autoimmune problems, cytology, and pain management.

Lori serves extensively in the veterinary community, including as past president of both the Harris County and Texas Veterinary Medical Associations, and she has served on several committees and task forces for the AVMA, including the Animal Welfare Committee, the House of Delegates, the Board of Directors, and the State Advocacy Committee. Lori also serves as a mentor to many veterinary students, recent graduates, and young leaders, helping them navigate the complicated world of veterinary medicine and life beyond the boundaries of work.

**FUN FACT:** Lori married her high school sweetheart, Dr. Craig Teller, and they have one son and several pets. In her spare time, Lori loves to travel extensively to places where she can explore new things by day and enjoy great wine and food by night. She's also a sucker for chocolate chip cookies, corny jokes, and puppy breath.



**LANCE M. ROASA**, DVM, MS, JD, teaches veterinary law, business, and ethics at 12 US veterinary colleges and serves veterinarians' legal needs through his law practice. He earned his DVM from Texas A&M University and his law degree from University of Nebraska. Veterinary medicine is his favorite profession, and he continues to practice emergency medicine and

perform traveling surgery. Lance also owns and manages a group of veterinary practices in Nebraska. He is a coadvisor to the national Veterinary Business Management Association and president of the American Veterinary Medical Law Association.

**FUN FACT:** To keep up with a hectic travel schedule of teaching at veterinary schools and consulting with veterinary practices, Lance pilots his 1969 Cessna Skylane around the country. Look for him overhead!



**VICTORIA M. LUKASIK**, DVM, DACVAA, a board-certified veterinary anesthesiologist, earned her undergraduate degree from University of Arizona and her veterinary degree from Washington State University, and completed an anesthesiology residency at Cornell University. For the past 20 years, she has provided worldwide mobile anesthesia services through her private

practice, Southwest Veterinary Anesthesiology, and the Southern Arizona Animal Pain Center in Tucson. The National Institutes of Health and the National Cancer Institute have awarded her research grants, and she participates in total artificial heart and left ventricular assist device research at University of Arizona.

**FUN FACT:** Dr. Lukasik recently completed a 280-mile trek through the Grand Canyon.



**AMY L. BUTLER**, DVM, MS, DACVECC, is president and CEO of Critical Consults. Previously, she was assistant professor in small animal emergency and critical care at The Ohio State University. A graduate of Michigan State University College of Veterinary Medicine, Amy completed her internship at University of Minnesota and her residency at Colorado State University. In

addition to telemedicine, she has lectured nationally and internationally on topics related to small animal emergency and critical care and has provided locum services to academic and private referral hospitals across the United States.

**FUN FACT:** Amy is an avid catamaran sailor and her goal is to sail around the world soon!



**AMANDA CRABTREE**, DVM, MS, DACVR, earned her DVM from The Ohio State University School of Veterinary Medicine in 2006. She went on to earn a master's degree and complete residency training at Auburn University and then became boarded by the American College of Veterinary Radiology in 2010. Amanda is the owner and radiologist of Transparent Veterinary Imaging,

a member of TeleWebVet, which provides telemedicine services in a variety of specialties, and an independent contractor for PetRays. She has a particular interest in small-group education and teaches radiology services to general practices through lectures and laboratories.

**FUN FACT:** In her spare time, Amanda loves to play with her children and run with Roentgen, her champion agility dog.



**JOHN LEWIS**, VMD, FAVD, DAVDC, practices dentistry and oral surgery at NorthStar VETS in Robbinsville, New Jersey. He earned his VMD from University of Pennsylvania in 1997 and spent 5 years in general practice before returning to University of Pennsylvania for a residency in dentistry and oral surgery. John served University of Pennsylvania as associate professor of

dentistry and oral surgery and later as residency director and chief of surgery at University of Pennsylvania's small animal hospital. He is past president of the American Veterinary Dental Society (AVDC) and has served as examination chair of the AVDC, and he is also editor of the *Journal of Veterinary Dentistry*.

**FUN FACT:** John lives near Philadelphia with his wife, 6 young boys, 2 dogs, and 2 cats. He enjoys fishing with his boys whenever the opportunity arises.