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24-Hour ABP Monitor

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Bluetooth Stops Spaghetti Syndrome

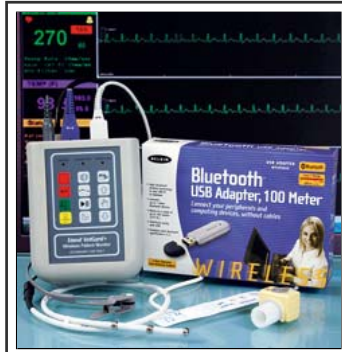
By D.H. DeForge, VMD

No veterinary hospital should perform anesthesia without patient monitoring.

It has been postulated that most anesthetic veterinary emergencies occur not in the critical care patient but in the routine anesthesia when a compromise in monitoring occurs because the procedure is classified "routine."

It is easy to make an excuse to compromise monitoring, not monitor at all, or fail to chart variations in blood pressure and ventilation.

Quality monitors allow the anesthesia technician and the surgeon to review blood pressure and ventilation parameters simultaneously. The surgeon can concentrate on the procedure while the nurse anesthetist charts the parameters and tells the values to the surgeon.



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Today, Bluetooth technology has helped eliminate the "Spaghetti Syndrome."

Michael Imhoff, MD, Ph.D., wrote of the problem in 2004 in the journal Anesthesia & Analgesia: "With advances in monitoring and life support, our most critically ill patients have become trapped in a sheer impenetrable net of wires and tubes, often resembling a plate of spaghetti. This problem is not only a nuisance for the caregiver but can seriously compromise patient safety when cables are inadvertently disconnected or infusion lines snapped off."

Mats Wallin, MD, Msc, and Samson Wajntraub, Msc, outlined the solution in the same publication: "Bluetooth is a modern radiotechnology developed to replace cables between different pieces of communication equipment. It can transfer audio and data with a maximum speed of 720 kbit/s. It transmits in the license-free open ISM [Industrial Scientific Medical] band between 2.4 and 2.48 GHz with a power of 1 mW, which is much less than a modern mobile phone. A higher frequency with a lower transmitting power and robust configuration indicate that it should be possible to use a Bluetooth radiolink in an environment with several medical devices."

Wallin and Wajntraub tested 44 medical devices for Bluetooth interference during their study. These devices were operated while Bluetooth was monitoring continuous simulated samples for ECG, SaO2, invasive blood pressure and PCO2. The investigators concluded that none of the 44 electronic devices affected Bluetooth communication in the human operating theater.

Conversely, Bluetooth did not interfere with or change the operation of the medical devices. Their study confirmed that Bluetooth has the technical capabilities necessary to be part of a patient monitoring system.

Wireless Local Area Network transmitters also are available but are larger than Bluetooth modules and are more expensive. The authors caution that the simultaneous use of WLAN and Bluetooth makes interference possible. This does not seem to be a substantial problem in most veterinary operatories because WLAN is not being utilized.

Regardless, the point is that communication protocols and systems must be carefully designed. The authors conclude that Bluetooth technology can significantly decrease the number of cables around the patient.

Veterinary Bluetooth

One Bluetooth device, the PC-Vetgard+, is a 10-ounce, battery-operated, palm-size multi-parameter patient monitor that has been tested at the Silver Sands Primary/ER/Critical Care Center in Milford, Conn. It records ECG, SpO2, respiratory rate, temperature, non-invasive blood pressure (NIBP), and airway gas monitoring of O2, CO2, and anesthetic gases. Patient records can be saved for future recall and examination, ECG measurement, and telemedicine e-mail transmission from patient files.

The wireless Bluetooth radiotransmitter operates at 2.4 GHz. Bluetooth transmissions are omni-directional, operate at low power, and travel through walls and around corners to a radius of 100 yards. The system is characterized by excellent graphics, digital information, real-time waveforms, trending and most importantly, provides wireless links on a Window-based computer monitor.

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The Bluetooth computer and printer can be in a separate room. This is important in the ICU setting when recording an ECG in an examination room or in the decongesting of the operating room during surgical procedures.

Veterinary PC-Vetgard+ is powered by a rechargeable lithium-ion battery offering five hours between charges. AC power is always available.

A Comparative Study

Wireless Bluetooth technology applies directly to the small general practice or medium multi-doctor private practice.

The Bluetooth NIBP was compared at Silver Sands Primary to another high-quality cable system along with a Doppler NIBP monitor.

The systolic pressures from all three systems showed no significant variance. PC-Vetgard+ was perfect in all NIBP mappings.

On patients less than 5kg, the Doppler was the most consistent NIBP monitor. This is a common finding in multiple NIBP monitoring systems tested by me at multiple specialty centers in the last six years.

Interpretative Software

Vmed's PC-VetGard+ also has a special feature: computerized ECG interpretation (i.e. Vmed Interpreter).

"Computerized ECG interpretation programs are well-established in the human field," says Larry Tilley, DVM, Dipl. ACVIM (Internal Medicine). "The new Vmed Interpreter now makes computerized interpretation a reality in veterinary medicine. The computer reading provides a second opinion and is especially helpful for inexperienced clinicians.

"When the ECG Interpreter identifies an ECG as abnormal, the analysis software can then be used to further clarify the diagnosis. The Vmed system also makes it easy to store the Interpreter Report on clinic computers and e-mail this report to a specialist if further confirmation is needed."

In your year-end 2008 and 2009 initial new-equipment budget, allocate improvements in anesthesia monitoring systems. Place new monitoring equipment at the top of your priority purchase list. It is a purchase that will greatly augment your surgery department, bring confidence to your staff, and reassure your clients of your commitment to anesthetic safety. <HOME>

D.H. DeForge, DVM, is a fellow of the Academy of Veterinary Dentistry. He is an adjunct instructor at Northwestern Connecticut Community College in oral radiology and periodontology, co-editor of "An Atlas of Veterinary Dental Radiology" and has authored more than 200 articles on veterinary oral medicine, oral surgery and advanced dentistry.

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