

## Patient Monitoring

*Reading Assignment: Tasks for the Veterinary Assistant, pages 467-473, Appendix L, O and P*

Patient monitoring during surgery is an extremely important task that is commonly the responsibility of the veterinary assistant. It begins once the patient is anesthetized and ends when the patient returns to sternal recumbency. The patient should ideally be monitored every five minutes unless he/she is at a higher risk due to more severe illness or injury, when monitoring must occur even more often. While machines are set up to monitor the patient, the technician and/or assistant must pay attention to these machines and note any changes in the animal's vital signs. The monitoring machines should be set to produce loud sounds when correct measurements vary significantly so that everyone in the surgery room can hear. *Please see Appendix L for a chart on normal patient values and familiarize yourself with them. It can be a matter of life or death!* Vital signs that are commonly monitored are:

- Cardiac function and blood pressure
- Respiratory rate and depth
- Depth of anesthesia & central nervous system reflexes
- Body temperature

Rate and flow of IV fluids should also be monitored if the patient has had an IV installed.



### Video

To view more information about **patient monitoring**, please visit [http://www.animalbehaviorcollege.com/VeterinaryAssistant/students/video/video\\_player.asp?VideoID=17](http://www.animalbehaviorcollege.com/VeterinaryAssistant/students/video/video_player.asp?VideoID=17).

*Please note: You must first be logged in to the ABC Student Center before entering the above website into the address bar of your internet.*

## Cardiac Function and Blood Pressure

Blood pressure is measured by a **Doppler or oscillometric device**, which is an instrument that is used to measure blood pressure in the arteries. As with humans, this is done with a cuff around the animal's leg, so these come in a variety of sizes for a variety of patients.

Cardiac function can be measured through several different methods:

- **Stethoscope** – an instrument used to listen to body sounds
- **Esophageal stethoscope** – a stethoscope which is inserted into the esophagus, down to heart level; the heart sounds can then be heard from within the chest.
- **Pulse oximeter** – a non-invasive instrument that monitors heart rate, pulse and oxygen saturation.
- **Electrocardiogram (ECG, EKG)** – measures electrical impulses that monitor contraction of the heart's muscles
  - For surgical monitoring, **lead II** is commonly used. Lead II are the electrodes in an electrocardiogram that are placed on the right front leg and left hind leg.\*
  - NOTE: *Before placing lead II electrodes, the assistant should check with the veterinarian to ensure that this is his/her preference.*
- **Palpitating the pulse** – feeling the femoral artery (for most patients) for pulse
  - NOTE: *Palpitating the pulse cannot be done once the patient is draped.*



**Capillary refill time (CRT)** is the time in seconds in which the capillaries or minute blood vessels connecting the arterioles and the venules refill with blood after pressure is applied to them.<sup>†</sup> This evaluation is simple to complete and will also help to confirm healthy cardiac function and blood flow to the capillaries. To accomplish this, expose the patient's gums and apply moderate pressure with a fingertip for two seconds to the gum line above the canine tooth. The space in which the pressure was applied should become unpigmented temporarily. Upon removing pressure, count how long it takes for the pigment to return to the same color as the surrounding areas. It should take less than one second, so if it takes longer, the patient may have poor or impaired circulation.

Cyanosis, which indicates lack of oxygen in the blood, can be a glaring indicator of poor circulation. When mucous membranes are discolored, it is a warning sign that must be attended to.

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\* Paula Pattengale, *Tasks for the Veterinary Assistant*. Ames, Iowa: Blackwell Publishing 2006

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- Pink = healthy, normal
- Pale or white = anemia or shock
- Blue = cyanosis, or lack of oxygen in the blood. Can be very serious. The bluer the membrane, the worse the condition is.
- Brownish = **methemoglobinemia**, which is a lack of oxygen or presence of **methemoglobin** in the blood resulting in cyanosis. Can be caused by blood poisoning and the overdose of some medication.

A pulse oximeter may also be utilized to prevent cyanosis; it is clipped to the patient's tongue, flank, or **interdigital space** (between the toes). Normal oxygen value is approximately 98%, and values of 90% and lower indicate near cyanosis. The veterinarian should be immediately informed if oxygen values drop to or below 90%.

### **Respiratory Rate and Depth**

Respiratory function must be monitored to ensure that the patient is breathing properly during the procedure. It may be watched in several different ways as well:

- Observation – the assistant palpates the patient's chest to note the rate and depth of breathing, or observes the movements of the re-breathing bag on the anesthesia machine. (*See Anesthesia Machine for more information.*)
- Esophageal stethoscope – as mentioned earlier, this device contains a tube that is inserted down into the esophagus to the level of the heart. It allows monitoring staff to hear respiratory sounds as well as cardiac sounds.
- Respiratory monitor – a coiled band wraps around the patient's chest and is measured for rate and depth as the patient breathes.\*

### **Body Temperature**

Although the patient is normally lying on a heating pad, **hypothermia**, or decreased body temperature, is a constant concern. **Hyperthermia**, meaning increased body temperature, is less common but still possible. The best way to prevent either is through an electronic rectal probe that displays an updated record of the patient's body temperature on a screen.

### **Depth of Anesthesia & Central Nervous System Reflexes**

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\* *Paula Pattengale, Tasks for the Veterinary Assistant. Ames, Iowa: Blackwell Publishing 2006*

No machine can sufficiently detect the depth of anesthesia, so this responsibility rests solely on the veterinary assistant. This is done by checking the patient's involuntary reflexes. Checking the **palpebral reflex**, or eyelid reflex, can be deciphered by touching the eyelid lightly. A strong blink reflex signifies a low level of anesthesia. In this state the patient can hear, feel pain and sometimes struggle due to hallucinations. Another way to evaluate the level of anesthesia of the patient is the **pedal** (pertaining to the feet\*) **reflex**. This reflex requires pinching the patient's toe. If the patient tries to pull away, he/she is too light and requires a higher level of anesthetic. Reflexes should lessen as the level of anesthesia brings the patient deeper. Coughing and swallowing reflexes will decrease. Muscle tone should also lessen as anesthesia levels increase.

The more painful the procedure, the more the anesthetic level will need to be increased. For example, orthopedic surgeries require a higher level of anesthesia because bone surgeries are more painful than soft tissue surgeries. Mainly, the level of anesthetic is dependant upon the individual patient, hence the monitoring of reflex, cardiac function, respiration, blood pressure and all other monitoring parameters are crucial for proper anesthetic depth.

Stages of anesthesia are as follows:

1. **Stage I:** Amnesia. The patient is disoriented. This stage is short.
2. **Stage II:** Excitement or delirium. The patient can show involuntary movements and even vocalize. This stage is also brief.
3. **Stage III:** Anesthesia. Blood pressure, pulse, respiration, and pupil size are normal during this stage. Muscle relaxation is moderate. Pedal, corneal, and anal reflexes are still present, although there will be variations depending on the administration of particular medications. This stage is divided into four planes:
  - a. **Plane I:** light anesthesia
  - b. **Plane II:** surgical anesthesia
  - c. **Plane III:** deep anesthesia
  - d. **Plane IV:** overdose
4. **Stage IV:** Danger! The patient is dying if he/she reaches this stage of anesthesia. Reflexes are absent, pupils are fixed, dilated and unresponsive to light, blood pressure

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\* Ray V. Herren, Janet Amundson Romich. *Delmar's Veterinary Technician Dictionary*. New York: Delmar. 2000

## Stage 5: Surgical Preparation and Assisting

falls, the pulse is weak and respiration is abdominal and ceases. The heart goes into arrest, and there is no muscle tone.

All medical monitoring machines should be cleaned, disinfected and stored after each use. Remember that monitoring via machines, or by physically testing reflex are reliant on observation, so a keen eye and attention to detail are vital. *For more information on Stages and Planes of Anesthesia, please see Appendix P in the Tasks for the Veterinary Assistant textbook.*