

Pulse oximeters are essential in a high-quality spay/neuter surgical suite, providing continuous monitoring of anesthetized patients' heart rates and oxygen saturation levels. It is recommended to use multiple pulse oximeters: one for each preparation table, one for each surgery table and one extra for the patient recovery area, to use when patients need prolonged monitoring.

With busy high-volume surgery schedules, working pulse oximeter alarms are helpful to alert a prompt response for a possible compromised patient. However, no machine is infallible and therefore high-quality patient care requires manual assessments at least once every two minutes. We call this the *two-minute loop*.

Paying Attention to Noises

Typically, every time your patient's heart beats, the pulse oximeter will beep in unison. It is very important to monitor for normal sounds while multi-tasking instead of tuning them out. Pulse oximeter alarms should be turned on to alert a potentially compromised patient. Always respond to an alarm and verify its accuracy to adjust anesthesia accordingly with consent from your doctor.

Every patient in our clinic gets attached to a pulse oximeter from induction until the end of surgery. We set each device to alarm under certain circumstances specific for canine or feline patients. For instance, a heart rate will alarm when the beats surpass 170 per minute. Correspondingly, it will alarm at low heart rate settings. An oxygen saturation reading that drops below 85% will alarm, however, we would prefer readings to consistently be above 95%. Individual clinics can decide what best to set their alarm values for, but it is important to understand that the numbers only tell part of the picture. There are some circumstances to be aware of that may cause inaccurate readings. These include patient movement, poor perfusion (caused by shock, hypothermia, or drugs such as dexmedetomidine), pigmented skin, very thin tissue and anemia. For these reasons, we practice two-minute loop manual monitoring where every patient gets a "hands on" check to verify pulse oximeter readings every two minutes.

Normal Temperature, Pulse & Respiratory Rate (TPR)

Normal TPR for Dogs

Temperature:	100-102.5°F
Resting heart rate/pulse:	
• Small dog:	90-120 bpm
• Medium dog:	70-110 bpm
• Large dog:	60-90 bpm
Respiratory rate:	18-24 rpm

Normal TPR for Cats

Temperature:	100-102.5°F
Resting heart rate/pulse:	150-200 bpm
Respiratory rate:	20-30 rpm

Closed-loop Communications

It is strongly recommend to practice closed-loop communications in response to alarms. This way, everyone in the suite can be confident that patients are being monitored properly. As a rule, if the pulse-oximeter alarms, verify the accuracy and announce to the whole team the reason it is alarming, so everyone knows exactly what is happening with that particular patient. Your team members should always respond to your announcement and then either continue with their individual tasks or come to assist you if needed. For example, a team member says, "High heart rate" or, "Low O₂" and, "The patient is (or isn't) pink and breathing." Following that announcement, other team members should reply with, "okay" or, "thanks" and may ask additional questions or give instructions on next steps. This keeps your whole team engaged and shows that everyone is paying close attention to the patient's anesthetic depth and overall status.

Troubleshooting Readings

If we do see a low oxygenation reading and there is no obvious reason for desaturation, it is typical to remove the pulse oximeter probe, massage the tongue and readjust the probe back on the tongue. The clamp-type probe may apply excessive pressure over time, decreasing arterial compliance and causing a false reading. Wetting the tongue or opening a dry gauze pad to place between the tongue and the probe have both proven to improve readings. Dry gauze will also help to maintain probe position if a patient is hypersalivating.



Maintenance

Our pulse oximeters are numbered, so as we perform our weekly and monthly equipment cleaning/checks, we can make note of any maintenance issues on our log. Typically, we clean and maintain clinic equipment every Friday. It is important to keep an updated maintenance log, so if you keep running into the same problems you can reach out to the manufacturer for additional assistance.

Probe Placement Sites

- Pulse oximeters work by shining a light through a relatively transparent area of the skin. Regardless of brand/type of pulse oximeter used, the most consistent and accurate readings come from placing the probes directly on mucous membranes such as the tongue, lip or cheek. Other options include hairless, minimally pigmented areas such as ear pinnae, toe or toe webbing.
- To get a solid reading on a toe, it is helpful to carefully shave each side of the toe and place the pulse oximeter probe lamp on each side.
- Dark skin or areas with moderate amounts of fur do not provide good readings.



Below are examples of how we use the Masimo RAD pulse oximeter unit's two probe types:



"Tongue Taco"

- Folding the tongue will help decrease the compression of capillaries and give you more accurate pulse oximeter readings. Fold the tongue on itself in either direction (to look like a taco shell), then apply the pulse ox probe clip.



Sanitization

To help prevent the spread of disease, sanitization of these probes can be conducted quickly and easily between patients. To do this, cut 4"x4" gauze squares into quarters and soak them in a cup of 78% calcium hypochlorite each morning. Place a new soaked gauze pad on the probe between patients.

This product, when diluted properly, can effectively sanitize between patients, works quicker than alcohol and is safe for contact with mucous membranes.

