

Monitoring Parameters – Part 5

Pulse Oximetry

Angel Rivera, CVT, VTS(ECC)

Pathophysiology

Pulse oximetry is a quick and reliable noninvasive method of measuring arterial oxygen saturation (SaO₂). Oxygen saturation is the percentage of hemoglobin sites that are chemically combined with oxygen. Oxygen saturation and pulse rate are determined by passing two wavelengths of light, one red and one infrared, through body tissue to a photo detector. The signal strength resulting from each light source determines the SaO₂. Pulse oximetry can be affected by the color and thickness of body tissues, the probe placement, the intensity of the light source, and the absorption of the arterial and venous blood in the body tissue.

Procedure

There are several types of probes that can be placed. The probes that are clamps can be placed on the tongue or on a shaved, nonpigmented skin surface. The rectal probe is placed against the rectal mucosa, which has been cleared of feces. The oximeter is turned on and the SaO₂ and pulse rate is digitally reported.

Assessment

Animals requiring oxygen therapy or under anesthesia should have their SaO₂ monitored as well as monitoring for physical signs of hypoxia (e.g. decreased LOC, tachycardia, arrhythmias, restlessness, altered blood pressure, increased respiratory rate, and changes in MM color). The use of pulse oximetry for monitoring oxygen saturation and pulse rate can provide early warning of pulmonary or cardiovascular deterioration before it is clinically apparent. Normal SaO₂ is 98%. Values below 90% are correlated with PaO₂ <60 mmHg and cyanosis is eminent. It is of most value when the arterial oxygen saturation is between 90% and 95%.

Limitations of pulse oximetry include its inability to differentiate carboxyhemoglobin (seen with carbon monoxide poisoning) from hemoglobin. The pulse oximeter can not distinguish a declining PaO₂ that is above 100mmHg (e.g. a fall from 330 mmHg to 100 mmHg will still report an SaO₂ of 100%) or the presence of methemoglobin. Results can be erroneous in animals with poor peripheral perfusion, heavily pigmented skin, hypothermia, icterus, and anemia.

Intervention

Any sudden decrease in the oxygen saturation with proper probe placement requires immediate notification of the veterinarian and rapid assessment of the animal's cardiopulmonary function. The oxygen concentration may need to be increased or the method of ventilation improved.