Accuracy of Pulse Oximetry Readings in an Animal Model of Low Perfusion Caused By Emerging Pneumonia and Sepsis.

Objective

To test the effects of low perfusion caused by emerging sepsis on the performance of two new pulse oximetry techniques: Masimo SET in comparison with Nellcor Oxismart XL.

Methods

Design: Cohort study with random allocation of two pulse oximetry devices to two sensor sites. *Setting*. University animal research facility. *Subjects*: Twenty-five adult, anesthetized, ventilated rabbits. *Interventions:* Pneumonia/sepsis was induced by tracheal instillation of E. coli.

Results

Oxygen saturation was measured by pulse oximetry (SpO2) and recorded continuously until death. Arterial oxygen saturation (SaO2) was measured hourly by CO oximetry and whenever a difference of >5% between the devices occurred. SpO2 sensors were positioned at both forelegs and switched hourly. There was no difference in total signal dropout time [median 3.8 min (range 0.4-66.6 min) vs 3.3 min (range 0-94.5 min), Masimo SET vs Oxismart XL]. There were fewer episodes with a false SpO2 reading [1 (range 0-7) vs 2 (range 0-17)] using the Masimo SET vs the Oxismart XL as verified by CO oximetry; $p<0.05$. Average bias (SpO2-SaO2) was significantly different between the two devices, and variability of bias values increased across time with both devices.

Conclusions

Both devices were capable to measure SpO2 during most of the experimental time in this model of low perfusion and therefore appear to be highly sensitive to pick up a signal; however, low perfusion caused by emerging sepsis may result in inaccurate measurements with both devices. These episodes were less common with the Masimo SET vs the Oxismart XL.