University of Prince Edward Island

Faculty of Veterinary Medicine
Summary of Dissertation

Submitted in Partial Fulfilment
of the Requirements for the

DEGREE OF MASTER OF SCIENCE

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Investigation of pain in equine patients using heart rate variability, salivary cortisol concentration, and behavioural pain scores.

Equine pain assessment is challenging as horses minimize the display of pain and are unable to self-report. There is no universally accepted pain assessment tool in equine patients. Heart rate variability (HRV) is a non-invasive measure and indicator of physiological stress. This study had two objectives, first to compare measures of HRV, salivary cortisol, and pain scores in pain assessment of equine patients; and to compare physiological and behavioral responses perioperatively in equine patients receiving surgery. Data collected included HRV measurements, salivary cortisol concentration, and behavioural pain scores using three pain scales. Horses were classified on admission as painful or not painful by a priori classification based on clinical perception. Data was collected on hospital admission and twice postoperatively in surgical patients. A total of 59 horses were included, with 39 horses receiving surgery. Painful horses had higher pain scores, SDNN and salivary cortisol concentrations than not painful horses. All pain scales positively correlated with SDNN, and one scale each correlated with MnHR and salivary cortisol. Variables altered perioperatively were MnRR, MnHR, and salivary cortisol. Anesthetic recovery was the most different perioperative data point (highest salivary cortisol and MnHR, and lowest MnRR), indicating higher physiological stress. This may be due to general anesthesia or the recovery experience, however pain scores trended upwards postoperatively, suggesting pain at this time. Study limitations include the high variability of equine patients and clinical conditions, and the inability to separate stress from pain. The lack of a gold standard pain assessment tool restricted pain evaluation to a subjective scale. Both SDNN and salivary cortisol were significantly higher in the painful group of horses, suggesting that these parameters may be useful in detecting pain. Having objective non-invasive measures of pain could improve recognition and treatment of equine pain, with the goal of benefiting equine patient welfare.

Presentations

Kaufman J, McDuffee L, William M. Comparison of perioperative heart rate variability, salivary cortisol, and pain scores in equine veterinary teaching hospital surgical patients. 2020 ACVS Virtual Sessions, Scientific Abstracts Presentations. On-demand webinar recording. Nov 2020.

Kaufman J, Montelpare W, McDuffee LA. Associating Heart Rate Variability, Salivary Cortisol and Pain Scores in Equine Veterinary Teaching Hospital Patients. 2019 ACVS Surgery Summit, Equine/Large Animal Scientific Abstracts. Las Vegas, NV, USA. Oct 19, 2019.

Kaufman J, Montelpare W, McDuffee LA. Can Heart Rate Variability Detect Pain in Equine Veterinary Teaching Hospital Patients? UPEI Graduate Studies and Research Conference. Charlottetown, PE, CA. May 15, 2019

Awards

G. Murray & Hazel Hagerman Scholarship, Graduate Studies (2019)

Presentation Award – Annual UPEI Graduate Studies and Research Conference (2019)

Vetoquinol Award in Pain Management (2018)