

**BRITNEY BENOIT**

**BSc (Human Nutrition, Honours), St. Francis Xavier University, 2010**  
**MSc(A) (Nursing), McGill University, 2013**

**SCHOOL OF NURSING**

**TITLE OF THESIS:** THE INFLUENCE OF BREASTFEEDING ON PAIN-RELATED EVENT-RELATED POTENTIALS AND BIO-BEHAVIOURAL INDICATORS OF PROCEDURAL PAIN IN NEWBORNS: A RANDOMIZED CONTROLLED TRIAL

**TIME/DATE:** 1:00 pm, Wednesday, May 22, 2019

**PLACE:** Room 3107, The Mona Campbell Building, 1459 LeMarchant Street

**EXAMINING COMMITTEE:**

Dr. Liisa Holsti, Department of Occupational Science and Occupational Therapy, University of British Columbia (External Examiner)

Dr. Margot Latimer, School of Nursing, Dalhousie University (Reader)

Dr. Aaron Newman, Department of Psychology and Neuroscience, Dalhousie University (Reader)

Dr. Ruth Martin-Misener, School of Nursing, Dalhousie University (Co-Supervisor)

Dr. Marsha Campbell-Yeo, School of Nursing, Dalhousie University (Co-Supervisor)

**DEPARTMENTAL REPRESENTATIVE:** Dr. Marilyn Macdonald, School of Nursing, Dalhousie University

**CHAIR:** Dr. Margaret Walsh, PhD Defence Panel, Faculty of Graduate Studies

**ABSTRACT**

**Background:** Breastfeeding and oral sucrose have strong evidence for reducing infant bio-behavioural responses to pain, however, no studies have compared the effect of these interventions on pain-related electrophysiologic brain activity.

**Aims:** To examine the influence of breastfeeding on pain-related electroencephalographic activity in newborns during heel lance, compared to 24% oral sucrose. Secondary aims were to compare a) bio-behavioural pain scores (Premature Infant Pain Profile – Revised [PIPP-R]), b) physiologic recovery, c) maternal acceptance, and d) adverse events between groups.

**Methods:** Healthy full term normally breastfeeding infants ( $n = 39$ ) were randomly assigned to be breastfeeding or to receive 0.24 mL of 24% oral sucrose plus offered non-nutritive sucking two minutes prior to heel lance. Pain-related potential time-locked to heel lance was recorded on neonatal electroencephalogram and isolated using principal component analysis. Secondary outcomes of PIPP-R at 30-, 60-, 90-, and 120-seconds following heel lance and physiologic recovery were measured using continuous video and pulse oximeter recording. Maternal acceptance was measured using a study-specific questionnaire. Occurrence of adverse events were documented throughout study procedures. Data were analyzed per protocol as registered on ClinicalTrials.gov: NCT03272594.

**Results:** Twenty infants were randomized to the breastfeeding group and 19 infants to the oral sucrose group. Infants who received oral sucrose had an appreciably larger, yet not statistically significantly different ( $F[1,15.9] = 0.58, p = 0.64, SE = 11.79$ ), amplitude pain-related potential (peak amplitude  $8.97 \mu V$ ) following heel lance compared to breastfeeding infants (peak amplitude  $0.29 \mu V$ ). Mean PIPP-R scores were not statistically significantly different between groups following heel lance, however, they were indicative of low to no pain across groups. Mean time in seconds to physiologic recovery was faster in breastfeeding infants ( $M = 17.5, SD = 31.1$ ) compared to oral sucrose ( $M = 70.8, SD = 144.3$ ). Mothers reported positive perceptions of the interventions pain-reducing effects and study participation.

**Conclusions:** Breastfeeding and oral sucrose may differentially modulate pain response in the infant brain. Continued use of these interventions to reduce bio-behavioural pain scores during clinical procedures is warranted. Further research to advance measurement and interpretation of diverse indicators of procedural pain in infants is needed.