



Effect of Common Nursing Interventions on Cerebral Oxygenation and Perfusion in the Premature Infant

A joint clinical research project:

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COGNITIVE

SENSORIMOTOR

LANGUAGE

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Outcomes of 23- and 24-weeks gestation infants in Wellington, New Zealand: A single centre experience

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Optimal perinatal care of infants born less than 24 weeks gestation remains contentious due to uncertainty about the long-term neurodevelopment of resuscitated infants. Our aim was to determine the short-term mortality and major morbidity outcomes from a cohort of inborn infants born at 23 and 24 weeks gestation and to assess if these parameters differed significantly between infants born at 23 vs. 24 weeks gestation. We report survival rates at 2-year follow-up of 22/38 (58%) at 23 weeks gestation and 36/60 (60%) at 24 weeks gestation. Neuroanatomical injury at the time of discharge (IVH \geq Grade 3 and/or PVL) occurred in 3/23 (13%) and 1/40 (3%) of surviving 23 and 24 weeks gestation infants respectively. Rates of disability at 2 years corrected postnatal age were not different between infants born at 23 and 24 weeks gestation. We show evidence that with maximal perinatal care in a tertiary setting it is possible to achieve comparable rates of survival free of significant neuroanatomical injury or severe disability at age 2 in infants born at 23-week and 24-weeks gestation.

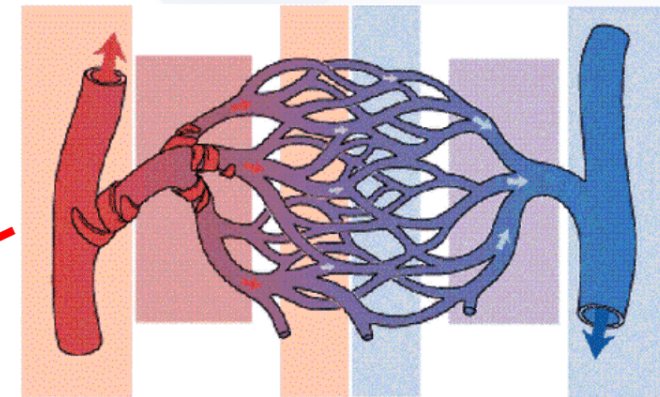
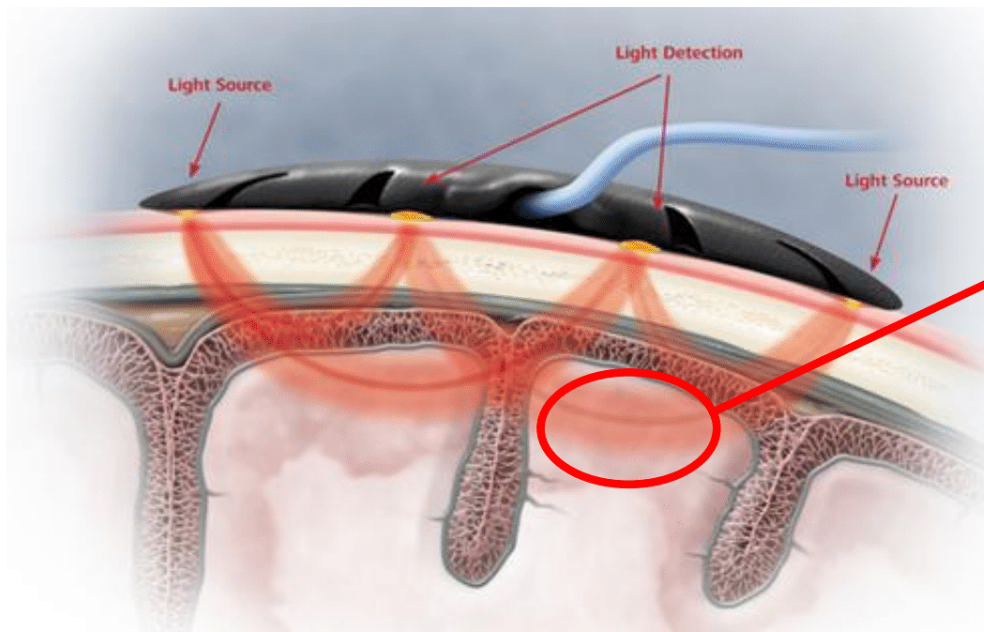
Advances in perinatal medicine have led to a dramatic improvement in overall survival rates for extremely pre-

Wellington NIRS research

- NIRS first introduced as a research tool in 2016
- Expanding team of clinicians and nurses using NIRS for research



'Regional Tissue Oxygenation (rSO_2)'



Arterioles

Capillaries

Venules

rSO_2 is determined by oxygen availability, perfusion & oxygen consumption within the organ of interest

NIMO prem



- Two-centre observational study
- 120 infants <30 weeks GA & <1000g



Aims:

- To understand $crSO_2$ ranges associated with significant neurovascular injuries
- Role of cerebral autoregulation & fluctuations in cerebral perfusion
- Effects of common neonatal interventions on $crSO_2$

Birth (<4hrs) → 72hrs



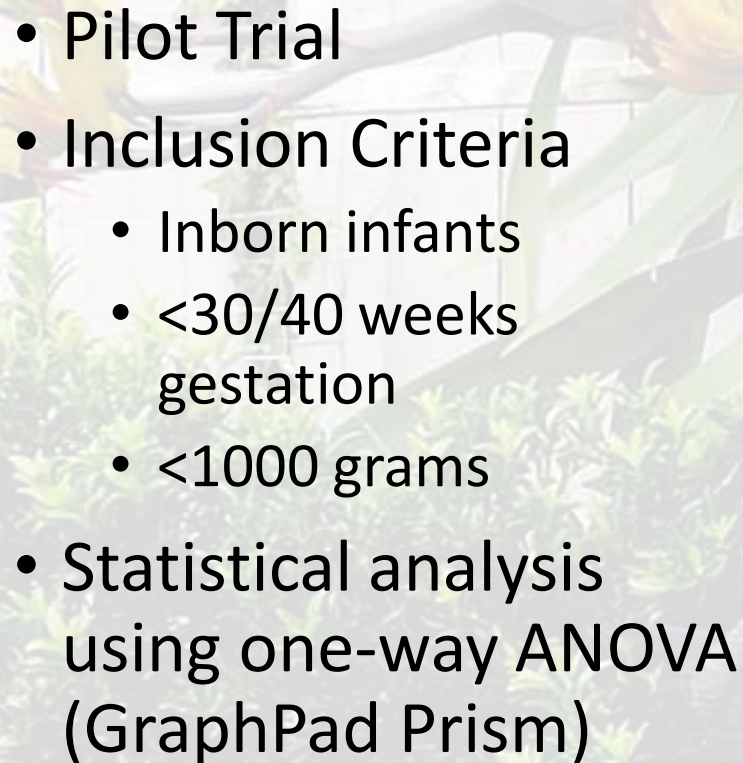
Effect of Common Nursing Interventions on Cerebral Oxygenation



Aim of Study

- The current study aimed to characterize the effects of common nursing care interventions on the cerebral regional oxygenation (crSO_2) during the first 72hrs of life of infants born extremely preterm, and/or with extremely low birth weight
 - PRIMARY AIM of study is to determine the effect of handling during normal cares on cerebral oxygenation / perfusion
 - SECONDARY AIMS are to examine the effect of other common nursing interventions on cerebral oxygenation / perfusion.
 - Brief periods of handling
 - Extended periods of handling >10min
 - Arterial blood sampling
 - Somewhat more invasive handling – CPAP / Heelprick bloods
 - ETT / Oral suctioning

Methods

- 
- Pilot Trial
 - Inclusion Criteria
 - Inborn infants
 - <30/40 weeks gestation
 - <1000 grams
 - Statistical analysis using one-way ANOVA (GraphPad Prism)

[illegible]

METHODS

- Prospectively examined the average cerebral oxygenation
 - 5min before nursing intervention
 - Duration of the intervention
 - 5min immediately following the intervention
 - Average of each of these periods of time
- Interventions:
 - “nursing cares” – nappy change, reposition, temp, resite probe
 - Brief handling episodes – resite probes, reposition baby, temp alone
 - Handling episodes >10min (clustering of interventions – cares, blds, Sx)
 - Arterial blood sampling (taking and returning of blood)
 - CPAP relief and Heelprick bloods
 - Suctioning, both ETT and oral

RESULTS



DEMOGRAPHICS

TOTAL

- 14 INFANTS (274 Interventions)

GENDER

- 10 MALE / 4 FEMALE

GESTATION

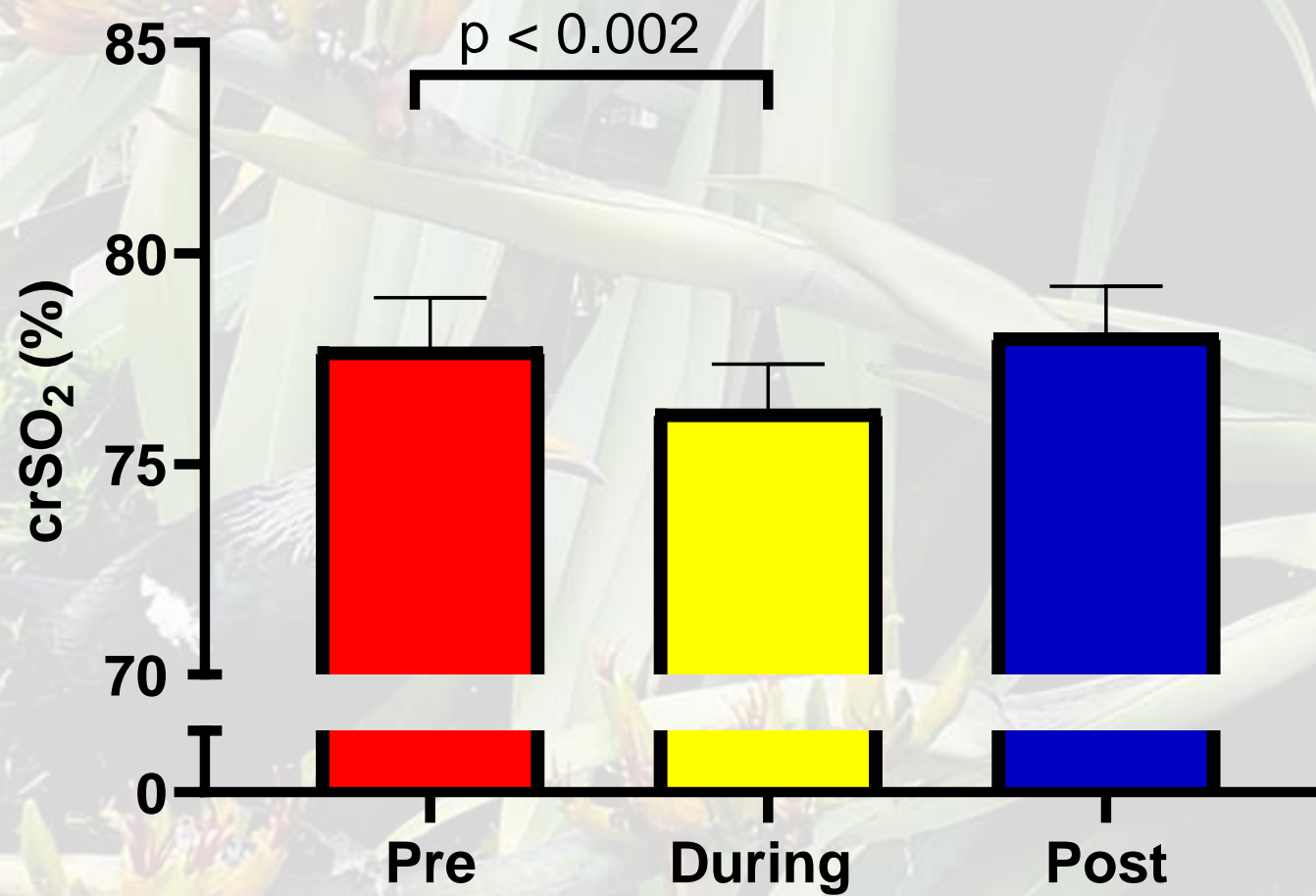
- Mean 25+2 weeks gestation (24+0 – 28+0)

WEIGHT

- Mean 712grams (588 – 983grams)

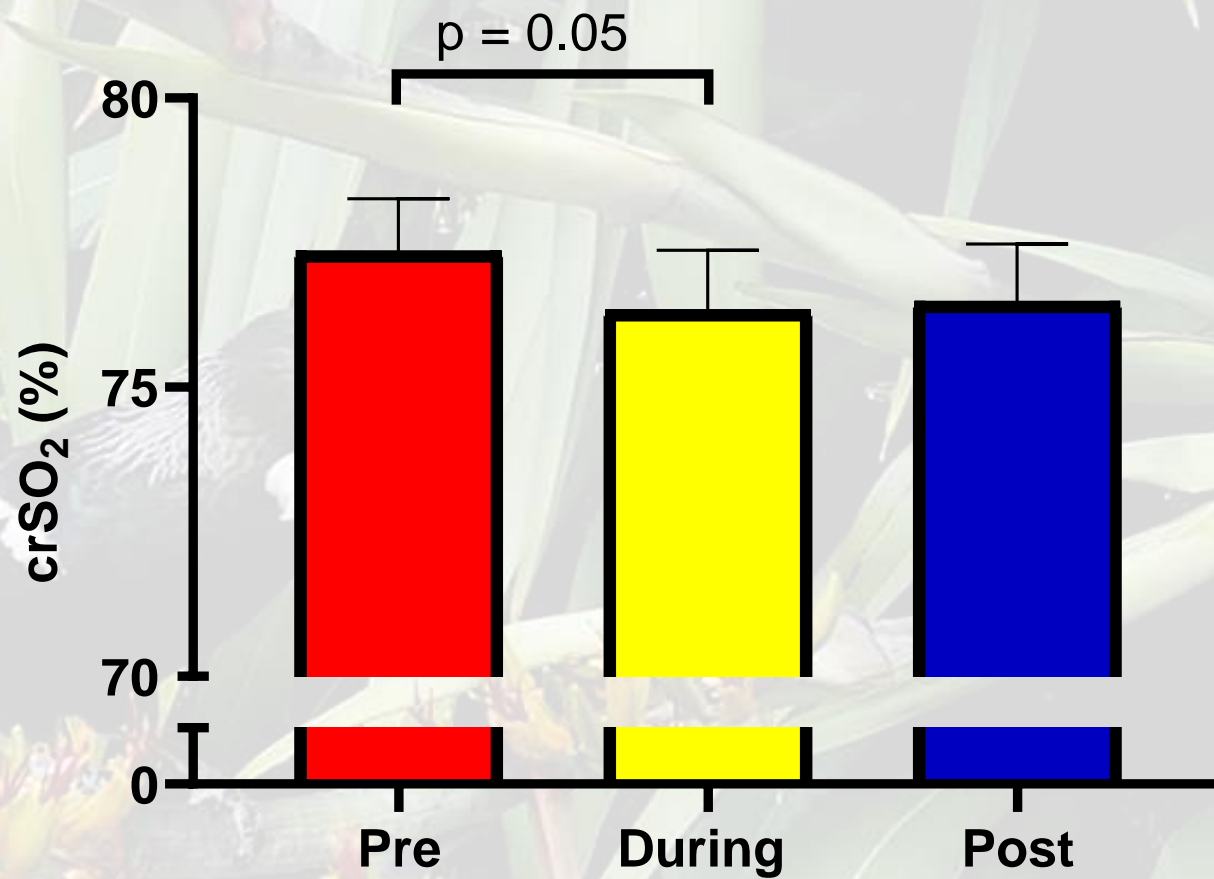
NURSING CARES

N=54
Average 18min



BRIEF HANDLING OF INFANT

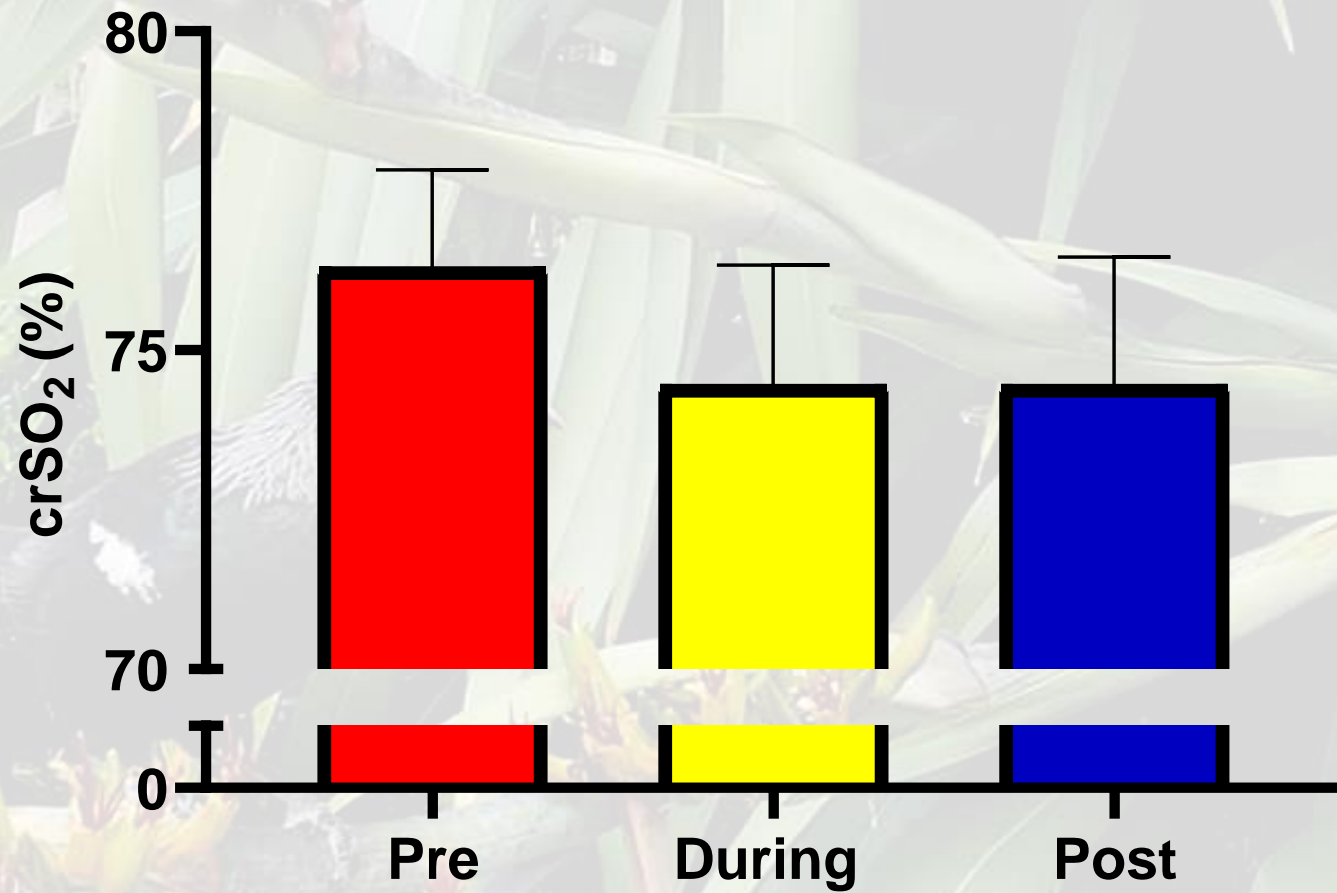
N=86
Average 2min



HANDLING >10 Min

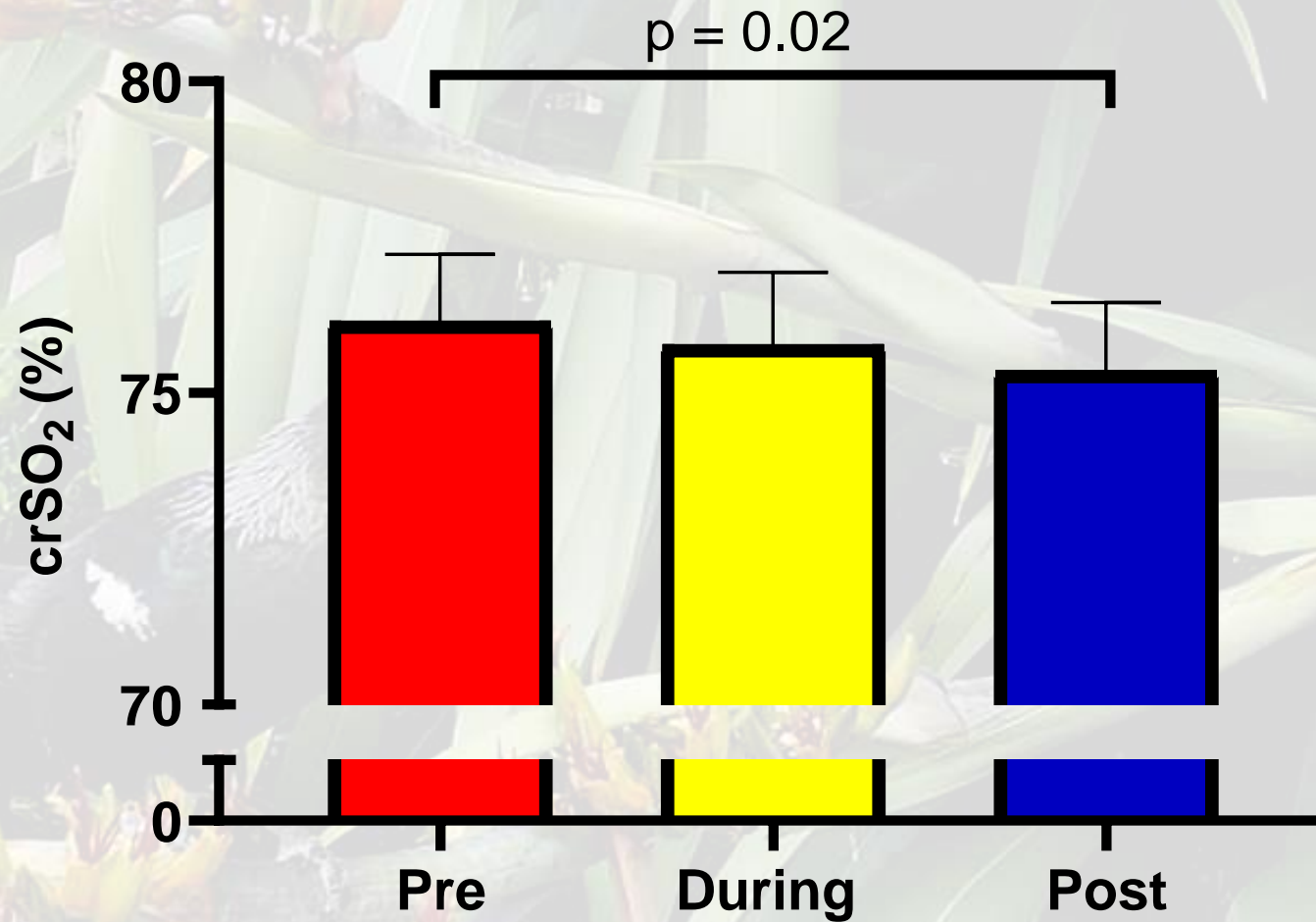
N=24

Average 20min



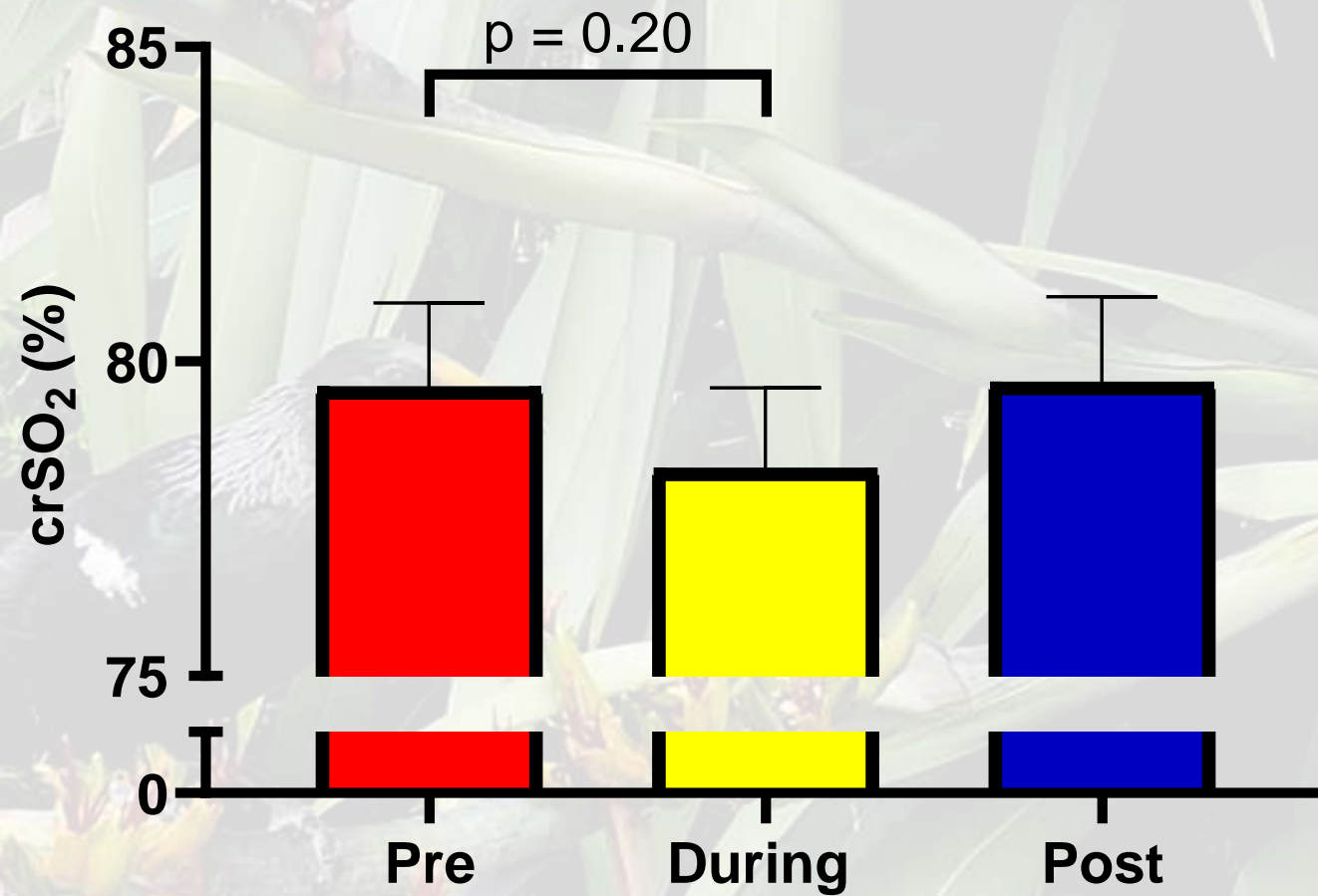
UMBILICAL ARTERIAL ACCESS

N=74
Average 3min



CPAP RELIEF / HEEL PRICK BLOODS

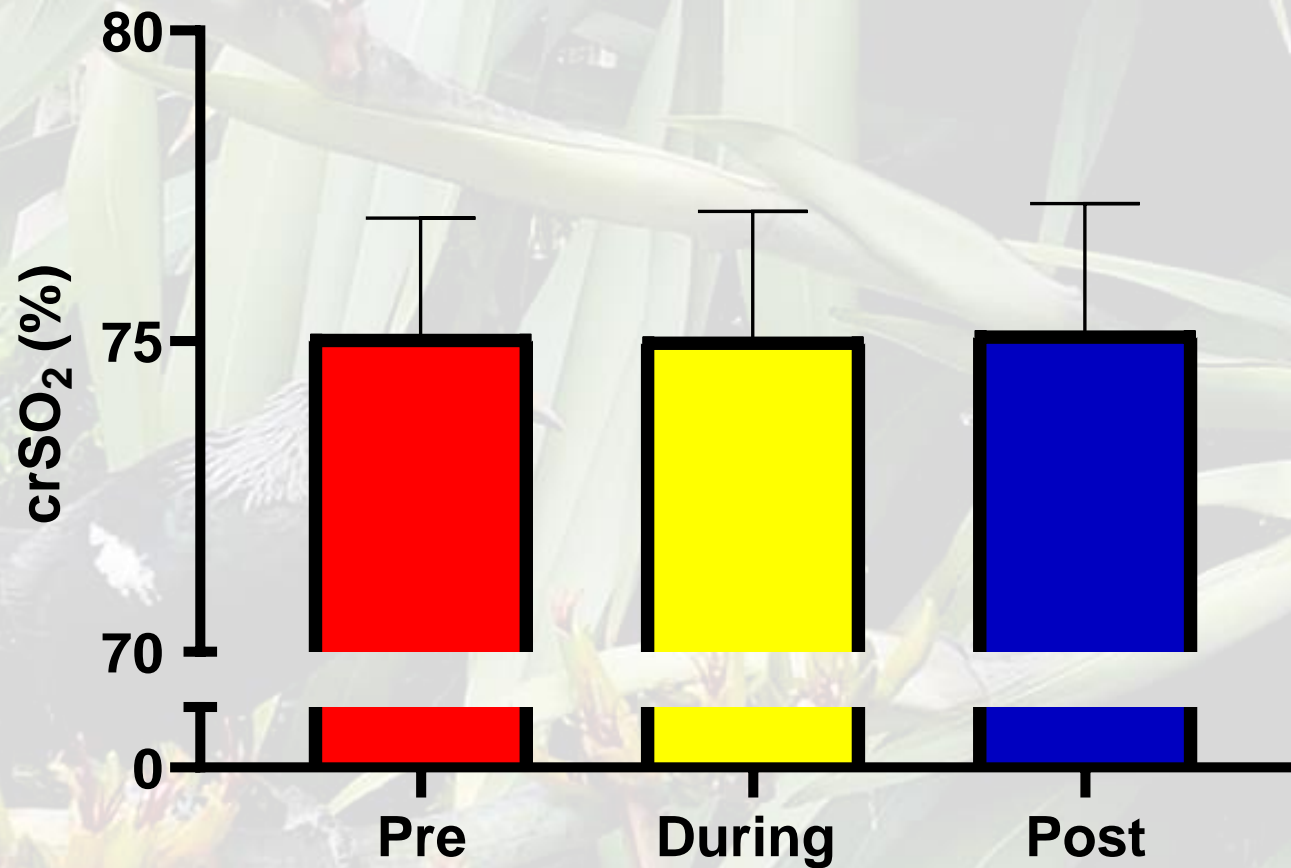
N=19
Average 5min



ETT / ORAL SUCTION

N=25

Average 4min



Discussion

- Common nursing cares do significantly influence cerebral oxygenation and perfusion
- Taking & returning of bloods through the umbilical catheter also affected crSO₂ to a significant level, although was a slightly more delayed result following the intervention itself
- Less significant changes with more invasive interventions



Strengths and Limitations

- Pilot Project – preliminary results
- Limitations:
 - low numbers
 - inaccuracy of documenting time of intervention
- Strength:
 - Novel approach – limited data, if any, on effect of nursing interventions on crSO₂
 - correlation between nursing intervention and crSO₂
 - help to guide how we manage nursing interventions in the future
 - long-term outcomes for the extreme premature infant

What does the future bring?

- Ongoing research
- Sub group analysis based on infants particularly at risk ... Gestational age / weight
- Design future study using current pilot data for a robust sample size calculation
- Combining cerebral oxygenation data with systemic parameters including (pulse oximetry, HR, mean BP) to look at the bigger picture of what is occurring
- Increase knowledge on effect end-organ cerebral oxygenation has on brain injury in the extreme premature infant – what level is too low
→ NIMO-PREM

Acknowledgements

- Wellington Neonatal Nursing staff
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Thank you

