

## 2015/2016 Summer Studentship Project Application Form

Send to: Research Office, University of Otago Christchurch, PO Box 4345, Christchurch, by 5pm on **3 July 2015**

<b>Supervisor Information (First named supervisor will be the contact):</b>		
Supervisor's Name and Title(s): Dr Sarah Harris (Co-Supervisor: Assoc Prof Nicola Austin)		
Department: Neonatal Unit, Christchurch Women's Hospital	Institution: UOC	
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<b>Research Category (Choose one category only – to be used for judging the students' presentations):</b>		
<b>Clinical</b>	<b>Laboratory</b>	<b>Community</b>
<b>Project Title (20 words MAXIMUM):</b>		
Oxygen saturation targeting in premature infants and respiratory outcome.		
<b>Project Description:</b>		

### Introduction:

The Neonatal Intensive care unit admits acutely unwell neonates born at a range of gestations. Infants born at less than 28 weeks gestation have an underdeveloped cardiorespiratory system. The lungs are at the sacular stage of embryological development. The myocardium and pulmonary vasculature are immature. Extremely low gestational age neonates (ELGANs) are at risk of respiratory distress syndrome (RDS), bronchopulmonary dysplasia (BPD), cardiac insufficiency and pulmonary hypertension. Many of these infants require oxygen therapy or respiratory support to combat the well-established deleterious effects of hypoxia. Considerable high quality evidence has also been published in recent years identifying the harmful effects of excessive oxygen therapy especially on underdeveloped preterm organ systems<sup>1,2,3</sup>.

Current recommendations suggest babies should have oxygen saturation targets that are determined not only by their clinical condition but also their gestational age. Our unit has clear policy guidelines for nursing and medical staff around oxygen saturation targeting. However there are observational reports in our unit of inappropriate alarm settings being noted which may put babies at risk from unrecognised hypoxia or hyperoxia. Published reports also suggest that preterm infants spend a significant proportion of their time outside their target saturations. Laptok et al demonstrated preterm infants spent <60% of time within oxygen saturation targets with 26% spent in hypoxic state.<sup>4</sup> Phelps et al of the AVIOx study demonstrated preterm infants were maintained within their oxygen saturation targets 16-64% of the time.<sup>5</sup> The first 24 hours of life represent a critical time of physiological transition for a pre-term infant. Exposure to periods of hypoxia or hyperoxia can damage the premature lung acutely and may set up maladaptive pathways for alveolar and pulmonary vascular development. This study will look critically at oxygen saturation targeting during this period.

### Aim:

1. To review recommendations in current literature regarding oxygen saturation targeting in premature infants and strategies to improve this.
2. To analyse oxygen saturation targeting data of a cohort of infants born at < 30 weeks gestation in the first 24 hours after delivery.
3. To correlate a variety of measures of oxygen saturation instability with in-hospital respiratory outcomes.
4. To review the outcome of an audit that has been conducted into oxygen saturation alarm limits on unit monitors.
5. To review current unit practice and education around oxygen saturation targeting.
6. To make recommendations on how our unit might improve our oxygen saturation targeting for premature infants.

### Method:

1. The student will be taught how to conduct a targeted search of PubMed to review current literature. (In the interests of time key articles on this topic have already been identified by the supervisor).

2. The student will use an established research database to analyse oxygen saturation data previously collected as part of the BOPP study (B-type natriuretic peptide and Occult Pulmonary hypertension in Preterms). This is a cohort of 51 infants born at < 30 weeks gestation.
3. Oxygen saturation variables such as desaturation index, time spent in target range, time spent hypoxic, time spent hyperoxic) will be correlated with short term respiratory outcomes such as duration of oxygen therapy, duration of respiratory support, bronchopulmonary dysplasia and need for home oxygen. Analyses will be adjusted for known confounders such as gestational age, birthweight. This will involve work with SPSS – statistical software that the student will be guided in using. A University of Otago statistician is supporting the BOPP trial and may be called on for statistical advice.
4. The student will report the results of a unit audit of oxygen saturation alarm settings. This audit will have completed data collection by the time the studentship commences.
5. The student will meet with senior nurses involved in education to discuss current education and nursing practice around oxygen saturation targeting on our unit.
6. With the support of the supervisors the student will make recommendations on how we may improve our oxygen saturation targeting for preterm infants.

Scientific Method Experience:

This project will expose the student to

- Literature review and synthesis of this data
- Data collection and using a research database (EXCEL and ACCESS)
- Simple statistical analysis
- Application of research findings to clinical practice
- Preparation of a manuscript to submit for publication

References:

1. Bhandari V. Hyperoxia-derived lung damage in preterm infants. *Seminars in fetal & neonatal medicine*. 2010;15(4):223-229. doi:10.1016/j.siny.2010.03.009.
2. Jones R, Zapol WM, Reid LM. Oxygen toxicity and restructuring of pulmonary arteries: a morphometric study. *Am J Pathol* 1985;121:212–23
3. Roberts RJ, Weesner KM, Bucher JR. Oxygen-induced alterations in lung vascular development in the newborn rat. *Pediatr Res* 1983;17:368–75
4. Laptook AR, Salhab W, Allen J, Saha S, Walsh M. Pulse oximetry in very low birth weight infants: can oxygen saturation be maintained in the desired range? *J Perinatol* 2006 Jun;26(6):337-41
5. Phelps D, Pillers D, Cole C, Hagadorn J, Furey A, Nghiem TH, Schmid C. Achieved versus intended pulse oximeter saturation in infants born less than 28 weeks gestation: The AVIOx Study. *Pediatrics* 2006;118;1574-82

**Student Prerequisites (eg. Medical Student) if applicable:**

**Medical Student**