**Perinatal Academic Group (PAG) Study Review Template**

Title:

Thresholds for Phototherapy in Newborns (<320+ weeks GA)

Researcher Affiliations:

Dr Srinivas Bolisetty (MD, FRACP) - The Royal Hospital for Women Neonatal Intensive Care Unit

Keshini Nanthakumar - University of New South Wales (Independent Learning Project)

Professor Kei Lui (MD, FRACP) - The Royal Hospital for Women NICU

Dr Tim Schindler - The Royal Hospital for Women NICU

Brief Study Summary:

**Background**

Jaundice is the most common complication in newborns with 50% of term and 80% of preterm babies developing clinical jaundice within the first week of life.

The exact level of bilirubin to induce neurotoxicity is contested. Phototherapy is the recommended treatment as it effectively lowers the bilirubin concentration. However, a reduction in bilirubin levels alone is not adequate to substantiate a clear relationship between phototherapy and neurotoxicity as it is not a simple function of bilirubin but involves an interaction with the blood-brain barrier.

Brown, 1985, an RCT comparing phototherapy against a control group, found no statistically significant differences in neurodevelopmental outcomes at 1 and 6 years of age. Similarly, Morris, 2008 conducted a comparison of aggressive vs conservative phototherapy in extremely low birth-weight infants and found no significant difference in the rate of death or neurodevelopmental impairments. However, aggressive phototherapy did reduce the rate of neurodevelopmental impairment and significantly reduced the mean peak bilirubin level.

However, this reduction was offset by a 5% increase in risk of death with aggressive phototherapy in infants weighing 501-750 grams. While it was not statistically significant, a post-hoc analysis estimated a 93-99% probability that mortality was increased in this subgroup. The mechanism is unclear but evidence suggest an increased probability of oxidative injury as these infants have gelatinous, thin skin which readily transmits light. The antioxidant properties of bilirubin are also reduced in aggressive phototherapy.

Additionally, short-term side effects of phototherapy include lack of neonate-parent interaction, dehydration and increased risk of patent ductus arteriosus, retinal damage and oxidative stress. Long-term side-effects include increased risk of allergic diseases and childhood cancer.

The existing guidelines on phototherapy in our neonatal intensive care unit (NICU) are based on historical consensus and not thoroughly evidence based. The recent findings by Morris et al suggest that aggressive, as followed in our existing guidelines, may pose an increased risk of mortality in extremely low birth-weight infants. However, it is important to note that neurotoxicity is still a very concerning issue and thus, a careful compromise should be reached to create effective guidelines with bilirubin thresholds for phototherapy initiation.

**Study**

PICO: Does higher threshold for phototherapy worsen the rate of rise in bilirubin in the first 72 hours of life?

Hypothesis:

1. Higher threshold for the commencement of phototherapy will result in similar trends in bilirubin levels in the first 72 hours in comparison to standard threshold group.
2. Total duration of phototherapy and the number of infants reaching TSB levels 25umol/L below Exchange threshold will be similar in both groups.

Primary Aim: To study the effect of higher threshold to commence phototherapy in the first 72 hours of life on (1) rate of rise in bilirubin in the first 72 hours, (2) total duration of phototherapy and (3) TSB level reaching 25 umol/L below exchange threshold.

Secondary Aim: Compliance to the new protocol.

Methodology:

1. Prospective observational study of all infants less than 32+0 weeks GA admitted to NICU between 15th February and 15th August 2017.
2. All these infants are regularly monitored for rise in bilirubin levels in the first few days of life as per the routine standard care.
3. Phototherapy will be commenced as per the new guidelines. New guideline uses NICE guideline graphs but moves the thresholds by 20 mmol/L between 0 to 72 hours of age. Subsequent monitoring and management will be done as per the guidelines and standard practice.
4. All the data required for this study are collected routinely as part of clinical care.
5. Infants less than 32 weeks GA and admitted to NICU between 1st July to 31st December 2016 will act as historical controls for the study. They would have been managed using the previous phototherapy guidelines. All relevant data for the study will be collected from the case notes and electronic power chart.

Place Of Recruitment:

Royal Hospital for Women NICU

If recruitment is planned from RHW Antenatal clinic- please state preferred days and times:

N/A

Resource Utilization:

This study requires the medical records of infants fitting the criteria from July to December 2016. It is a quality improvement study evaluating the effectiveness of clinical practice introduced as standard practice in the NICU. Thus, all the data and resources are collected and used as part of standard care.

Time Frame:

15th of February - 31st of August 2017

Reviewed by: