Delivery Room Respiratory Care of Very Preterm Infants

The Problem

Chronic lung disease remains one of the most common and serious long-term complications of very preterm birth. Numerous factors are thought to contribute to lung injury in these infants, including inflammation, barotrauma and volutrauma, and excessive oxygen. It also appears that this lung injury can begin with the initial resuscitation provided in the delivery room (DR).

Aim/Goal

We sought to modify our practices for the DR resuscitation of very preterm infants to reduce the risk of lung injury. In particular, we sought to limit over-ventilation caused by traditional bag-mask ventilation and hyperoxia caused by use of 100% FiO2.

The Team

- NICU: Nina Koyama MS, RRT; Glen Housefield, RT; Susan Young RNC, MS; Jane Smallcomb, RNC, BSN, MS; Munish Gupta, MD; and the NICU Emergency Preparedness, Safety and Resuscitation Committee.
- L&D: Barbara Stabile RN, MS; Susan Crafts RN, MS; Tina Pierro RN, MSN; Earl Stephan, BA; and Menrika Louis MHA, MPA.

The Interventions

Implementing revised protocols for the DR management of very preterm infants required changes in equipment and technology, drafting of new policies and guidelines, and education of staff. The protocols were designed based on guidelines from the American Academy of Pediatrics Neonatal Resuscitation Program.

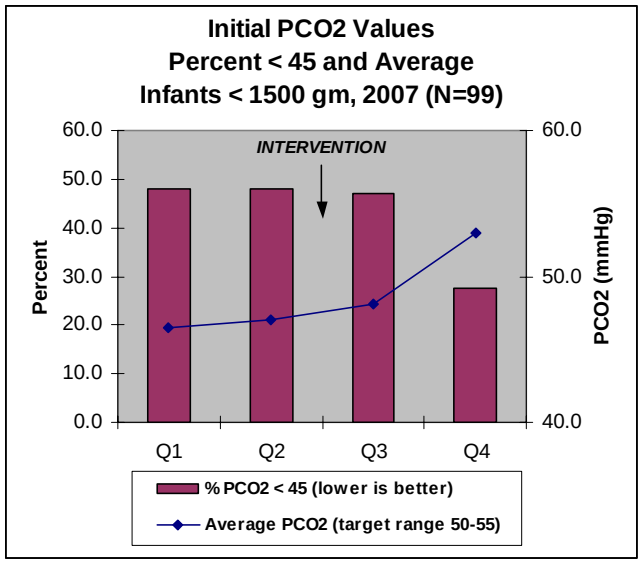
- Oxygen/air blenders were installed in all L&D rooms.
- Portable oximeters were obtained for use in the delivery room.
- T-piece resuscitation device (NeoPuff) were obtained to provide means of positive pressure ventilation without using a bag-mask.
- Guidelines were drafted by a multi-disciplinary committee including respiratory therapists, nursing leadership, and physicians.
- Target population: gestational age < 32 weeks, birthweight < 1500 grams.
- Staff education was performed by in-services led by respiratory therapy.

Protocols were drafted in spring 2007, in-services were performed in June 2007, and practice changes were implemented in July to August, 2007.

Results/Progress to Date

Although some staff have expressed discomfort with the new equipment, overall feedback has been positive and adherence to the protocols appears to be increasing.

To assess one aspect of the intervention, we examined blood gas pCO2 values on admission to the NICU for infants with birthweight under 1500 grams. Of note, initial target pCO2 values for ventilated preterm infants are approximately 45-55 ("permissive hypercapnea"). We believed that use of the T-piece device rather than the bag-mask could allow for more controlled ventilation in the DR, leading to more pCO2 values in target range and fewer low values due to over-ventilation.



T-Piece Device (NeoPuff)

Conclusions, Next Steps

- The implemented changes in DR respiratory care may be reducing the rate of over-ventilation in very preterm infants.
- Changing clinical practices requires multi-disciplinary planning and 'buy-in' from staff; even then, changing well-established practices is difficult.
- Adherence to the new guidelines needs to continue to be measured, and ongoing barriers to their use need to be identified.
- The impact of the implemented changes on longer-term outcomes such as chronic lung disease needs to be measured.

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