Reducing Unplanned Extubations in the Neonatal Intensive Care Unit with NeoBar Usage
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AIM: As part of a NICU QI initiative, we aimed to reduce our unplanned extubation rate by 20% within one year by implementing interventions to standardize endotracheal tube (ET) securement using the NeoBar (a commercially available ET holding device), with the ultimate goal of achieving the Vermont Oxford rates of unplanned extubations.

SETTING: Stony Brook University Hospital Neonatal Intensive Care Unit, a level IIIb NICU, from period of October 2012 to December 2013.

METHOD: We standardized our practice of ET securement using the NeoBar as a preferred method. We designed an online learning module for NeoBar usage, which was used for NICU staff training, followed by practice sessions on manikins. Protocols detailing the documentation of indication for intubation, reasons for extubation, holding device used and position of ET were implemented. Institute for Health Care Improvement (IHI) forms utilized by our institution for patient safety measures in all critical care units were used for gathering unplanned extubation rates.

MEASURES: Upon completion of staff training in summer 2013, we compared the following data before and after our interventions: (1) unplanned extubation rate (obtained from daily IHI forms) (2) NeoBar usage rate (prospective observation) (3) ET position documentation from patient records (4) x-ray confirmation of ET position (tip of ET at mid-trachea at least 1 cm above the carina) (5) nursing satisfaction with the use of Neobar for ET securement determined using a survey.

DATA/RESULTS: There were a total of 78 ventilator days during the same study period in Nov/Dec 2012 and 391 ventilator days in Nov/Dec 2013. Unplanned extubations decreased from 8.9 to 6.1 per 100 ventilator days. NeoBar usage increased from 76% to 90%. Nursing surveys showed increased acceptance of the NeoBar (from 23 to 50%) compared to standard taping, and 100% of our staff felt adequately trained in its use. Electronic documentation of respiratory care sets were implemented in 2013. The documentation compliance rate for ET positioning was over 90%, however details of reasons for reintubations and adjustment changes were inconsistently documented. X-ray confirmation of ET positioning (number of times in correct position/imaging of ET) increased from 67% to 71%, but correct positioning of the infant on x-rays (as defined by head and chest in midline) decreased from 80% to 65%.

DISCUSSION: Unplanned extubations are a major risk factor for immediate hemodynamic and respiratory instability, cardiopulmonary resuscitation and long term adverse outcomes in NICU patients. Unplanned extubations requiring reintubation are the fourth most common adverse event in NICUs in the United States. Vermont Oxford Network published rates for unplanned extubations within NICUs are between 2 and 4.8 per 100 ventilator days, whereas our NICU encountered 8.9 events per 100 ventilator days from Nov to Dec 2012.

Standardizing of ET securement using the NeoBar as the preferred method and conducting staff training decreased our extubation rates from 8.9 to 6.1 per 100 ventilator days by the end of 2013. However, in order to achieve the Vermont Oxford rates of unplanned extubations, ongoing staff training, detailed documentation of ET position, and improved x-ray techniques are needed. To improve quality of chest xray, a protocol driven practice will be implemented to further educate NICU staff and radiology technicians for proper positioning of infants.