



ORIGINAL ARTICLE

Decreasing neonatal intubation rates: Trends at a community hospital

Anastasia Marx, DO, Emergency Physician^a,
Cynthia Arnemann, RNC, Clinical Supervisor – Neonatal
Intensive Care Unit^b, Rose L. Horton, MSM, RNC,
Director Professional Development & Education^b,
Kim Amon, BSN, MSN, MBA, LCCE, CHCQM, CB, Maternal
Child Health Educator^b, Nicole Joseph, BS, Research
Assistant^a, Justin Carlson, MD, MSc, Emergency Physician^{a,*}

^a Department of Emergency Medicine, Saint Vincent Hospital, Erie, PA, USA

^b Neonatal Intensive Care Unit, Saint Vincent Hospital, Erie, PA, USA

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KEYWORDS

Neonatal;
Airway management;
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Abstract *Background:* Endotracheal intubation (ETI) is a technically complex skill, critical in resuscitation of the neonatal patient. Decreasing rates of ETI have been noted in several patient populations, requiring providers to seek additional training to maintain proficiency. Previous work has been conducted in large academic centers, but little is known about ETI in the neonatal population in smaller community hospitals, where a substantial amount of neonatal care is provided.

Objectives: We sought to identify intubation rates over time in the community neonatal intensive care unit (NICU) setting.

Methods: We performed a retrospective analysis of a prospectively collected database on neonatal intubations from January 1, 2010 through December 31, 2014. We identified patient and intubation characteristics and calculated the rate of intubation per number of NICU admissions per year. The change in ETI rates was analyzed using the χ^2 test for trend.

Results: Over the 5-year period, NICU staff performed ETI on 255 patients. The study population was 37% female and had a mean gestational age of 33 weeks. African American patients made up 13% of the study population, 6% were Hispanic,

* Corresponding author. Department of Emergency Medicine, Allegheny Health Network, Saint Vincent Hospital, 232 West 25th St Erie, 16544, PA, USA.

E-mail address: jcarlson@svhs.org (J. Carlson).

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78% were Caucasian, and 3% were other races. Annual intubation rates declined over the course of the study: 32% in 2010, 28% in 2011, 25% in 2012, 22% in 2013, and 16% in 2014 ($p < 0.01$).

Conclusion: NICU ETI rates in the community setting have decreased from 2010 to 2014. As the landscape of neonatal intubation changes, it will be vital to maintain practitioners' intubation skill-set through other methods.

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Introduction

Endotracheal intubation (ETI) of the neonate is a vital skill in critically ill patients. Resuscitation efforts are required in 5–10% of live births, and 1–10% of hospital births require assisted ventilation (American Heart Association, 2000). Of the 4 million yearly births in the United States, 7–12% of these infants require admission to a neonatal intensive care unit (NICU) (Harrison and Goodman, 2015; U.S. Department of Health and Human Services, 2013). Because of the complex nature of this critical procedure, providers must remain consistently proficient with ETI.

While ETI with direct laryngoscopy has traditionally been the gold standard for airway management in the critically ill patient, alternative techniques for oxygenating neonates have developed, such as video laryngoscopy and expanded the use of non-invasive ventilation techniques (De Winter et al., 2010). Broadening options offer practitioners the use of nasal continuous positive airway pressure and high-flow nasal cannula. These techniques may now spare patients from intubation, avoiding risks such as oropharyngeal injury, bronchopulmonary dysplasia, and infection (De Winter et al., 2010). Changing recommendations also may spare patients from intubation. Vigorous neonates who, in the past, would have been intubated due to the presence of meconium, now may be allowed to forgo intubation based on clinical exam (Wiswell et al., 2000).

As the landscape of neonatal intubation changes over time, these myriad factors may impact the frequency of neonatal intubation. ETI is a technically challenging skill with a significant learning curve. Decreasing rates of ETI could impact skill with this critical procedure and necessitate alternative education and practice for providers to maintain proficiency. Although many pediatric studies are conducted in large, academic, pediatric centers, a substantial portion of children are born and receive initial care in

community hospitals. However, little is known about ETI in the NICU population in community hospitals. We sought to identify intubation rates over time in the community neonatal intensive care unit (NICU) setting.

Methods

Setting and selection of patients

Our study was performed at a community-based, level III NICU that admits between 150 and 300 patients annually. Our 21-bed NICU historically admits 10–15% of infants delivered in the hospital and acts as a referral center for the surrounding area with an available transport team and flight crew. We included all infants intubated by our NICU staff during the study period. We excluded infants intubated at referring hospitals prior to transfer if the intubation was not performed by our transport team.

Study design

We performed a retrospective review of a prospectively collected database on NICU intubations performed at our hospital from January 1, 2010 through December 31, 2014. This was approved by our hospital's Institutional Review Board. Our hospital participates in the Vermont–Oxford Expanded Database (Vermont Oxford Network, E, 2015) and prospectively tracks neonatal intubations for this database with the goal of improving care for high-risk newborn infants. Using this prospectively collected list, we then accessed the original medical record to abstract additional relevant data.

Data elements and definitions

Collected data included specific variables: date of intubation, location, indication for intubation,

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