Nurses' Compliance with Neonatal Care Protocol Regarding Mechanical Ventilator

Thesis

Submitted for the Partial Fulfillment of the Requirements Master Degree in Pediatric Nursing

By

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List of Abbreviations

ARF : Acute Respiratory Failure

CBGs : Capillary Blood Gas

CCNN : Critical Care Neonatal Nurse

CMV : Control Mandatory Ventilation

CPAP : Continuous Positive Airway Pressure

ETT : Endotracheal Tube

Fi02 : Fraction of Inspired Oxygen

HFV: High-Frequency Ventilation

I: E : Inspiratory: Expiratory

IMV : Intermittent Mandatory Ventilation

IMV : Intermittent Mandatory Ventilation

NICU: Neonatal Intensive Care Unit

NIF : Negative Inspiratory Force

NNP : Neonatal Nurse Practitioner

PaCO2 : Carbon Dioxide

PaO2 : Partial Pressure of Arterial Oxygen

PEEP : Positive End Expiratory Pressure

PIP : Peak Inspiratory Pressure

PSV: Pressure Support Ventilation

RF : Respiratory Failure

RR : Respiratory Rate

SIMV : Synchronized Intermittent Mandatory Ventilation

SNN : Specialized Neonatal Nurse

Tv : Tidal Volume

Vc : Vital Capacity

Abstract

Intubation and Mechanical ventilation are frequently necessary to treat critically ill neonate who develop hypoxemia and respiratory failure. The purpose of compliance with neonatal care protocol regarding mechanical ventilator is to improve the quality of care for neonates. The **aim** of the current study was to assess nurses' compliance with neonatal care protocol regarding mechanical ventilator. Research design: A descriptive analytical design. Settings: this study was conducted in Neonatal Intensive Care Units at Maternity and Gynecological Hospital & Children Hospital affiliated to Ain Shams University Hospitals and Abo El-Reash Hospital affiliated to Cairo University. Subjects: A purposive sample was comprised eighty nine neonatal nurses under the following criteria: Working in the previously mentioned setting, from different categories and regardless their age, education and experience. Tools: A structure questionnaire format to assessment of nurses' knowledge as regard care of neonates on mechanical ventilators and observational checklist to assess nurses' compliance toward care of neonates on mechanical ventilator. The **result** revealed that, more than half of the studied nurses had satisfactory total knowledge regarding care of neonate on mechanical ventilation. The study also clarified that the majority of studied nurses were compliance regarding care of neonate on mechanical ventilation. According to the results of the current study, the researcher. **Conclusion:** More than half of studied nurses in neonatal intensive care unit were complied with Neonatal Care Protocol. Where, more than half of studied nurses had satisfactory total knowledge and the majority of them had compliance total performance regarding care of neonate on mechanical ventilation. Regarding the relation between nurses' total knowledge and nurses total practice concerning the care of neonatal on mechanical ventilation; it was notice that there was statistical significant differences between nurses' knowledge; and their performance, where the great majority of studied nurses who had satisfactory knowledge done procedure in a compliance way, while less than half of the studied nurses who had unsatisfactory knowledge done procedure in an non compliance way. Recommendations: The study recommend that, periodical educational program for nurses working at neonatal intensive care unit is mandatory, for the purpose of raising and updating the knowledge of nurses regarding care of ventilated neonates to reach the highest possible degree of competency with neonatal care protocols.

Keywords: Nurses' Compliance, Neonatal Care Protocol, Mechanical Ventilator

Introduction

The neonatal period is defined as the first 28 days of life. Sometimes it is broken down into early (<7 days) and late (8-28 days) (*Barry et al., 2010*). The Neonatal Intensive Care Unit (NICU) constitutes a therapeutic environment appropriate for treatment of the neonate in a serious condition (*Montanholi et al., 2011*).

The constellation of signs and symptoms can be the result of pulmonary, cardiac, metabolic, infectious, renal, and neurologic disorders. Neonates with disorders involving anyone of these organ systems may present with varying degrees of tachypnea, retractions, grunting, cyanosis, lethargy, and tachycardia, moreover, the spectrum of inspiratory distress in neonates includes, pneumonia, transient tachypnea of the newborn, hyaline membrane disease, meconium aspiration syndrome, birth asphyxia, and hypoxic - ischemic encephalopathy (*Rotta and Wiryawan*, 2015).

Approximately 1.5 million neonate in the United States receive mechanical ventilation outside operating rooms and recovery rooms every year, about 30 to 64 % of neonates admitted to the NICU is intubated and require ventilator support (*Friedman et al.*, 2012 & Robinder et al., 2013) and Egypt (57.1%) (Mohamed et al., 2011).

Neonates most commonly require mechanical

ventilation for respiratory failure (RF) or impending RF (Arnold et al., 2010 & Edmunds et al., 2011) as substantially mechanical ventilation has improved outcomes of neonate suffering from respiratory failure. Respiratory failure is a fatal syndrome in which the respiratory system fails in one or both of its gas exchange functions: oxygenation and carbon dioxide elimination. In general, neonates with respiratory failure may be classified into two groups, depending on the component of the respiratory system that is involved: Primary respiratory failure (hypoxemic) and secondary respiratory failure (hypercapnic) (Stucki et al., 2013 & Rotta and Wiryawan, *2015*).

Neonatal mechanical ventilation is a rapidly advancing technology intensive science that can create a flow of gas into and out of the lungs by the manipulation of airway pressures. The main goal of the ventilator may be achieved by improving alveolar ventilation, arterial oxygenation, increasing lung volume and reducing the work of breathing (James et al., 2012 & Riyas et al., 2013).

Neonatal intensive care should have agreed written protocols for medical and nursing staff, which also contain details of practical procedures. This must be regularly reviewed through discussion and audit (*Miller & Kearney*, 2014). The use of protocols simplifies processes, standardizes care, facilitates neonates' safety, and reduces

costs. Conversely, lack of compliance by practitioners can hinder the success of any protocol (*Schanler et al.*, 2012).

The neonatal nurse is responsible for documenting frequent respiratory assessments. This usually means documenting ventilator setting and spontaneous respiratory parameters every hour, with a full respiratory assessment, including lung sounds, at least every four hours. The neonatal nurse also performs suctioning and provides oral and site care around the artificial airway. Also, the competence of qualified and well- trained Specialized Neonatal Nurse (SNN) and Critical Care Neonatal Nurse (CCNN) in management of ill neonates makes them not only an excellent alternative care provider, but their nursing experience, knowledge and skills make them invaluable members of health care team whose focus is on provision of high quality of care (Walls et al., 2012).

Significance of the study:

Neonatal nurses need to be well equipped with an appropriate level of knowledge and practices to enable them in giving a professional care; this could be met by staff education or having protocols with update topics related to neonatal care.

Aim of the Study

The aim of this study was to assess nurses' compliance with neonatal care protocol regarding mechanical ventilator through:

- Assess nurse's knowledge with neonatal care protocol regarding mechanical ventilator.
- Assess nurse's performance with neonatal care protocol regarding mechanical ventilator.

Research questions:

This study will be carried out to answer the following questions:

- 1- Are nurses' compliance with neonatal care protocol regarding mechanical ventilator?
- 2- What is the level of nurse's knowledge and performance with neonatal care protocol regarding mechanical ventilator?
- 3- What are the factors that affecting the relation between nurses knowledges, performance and their compliance with neonatal care protocol regarding mechanical ventilator

Review of Literature Part I: Mechanical Ventilation

Definition of Mechanical Ventilation:

Mechanical ventilation is an invasive life support with multiple effects on the cardio-pulmonary system, which offers great benefits to replace or support normal ventiliatory lung function. Ventilator support may be intermittent or continuous, short or long and uses in positive or negative pressure with or without neonate's effort (*Orlando Regional Health Care*, 2014).

Purposes of Mechanical Ventilation:

Aims to maintain alveolar ventilation appropriate for neonate's metabolic needs, improve ventilation and/or oxygenation while providing rest and pulmonary muscle reconditioning (*Woodrow*, 2010), maintain adequate hemoglobin saturation (Sao2 > 90 %) to keep the neonate on friction of inspired oxygen (Fio2) < 50 %; to return the arterial blood gases to the neonate's baseline; to improve the ventilation-perfusion ratio (*Slutsky and Tremblay*, 2010), and administer gases under positive pressure which functions to increase lung volumes and reduce areas of atelectasis, and reduce the work of breathing (*Amato et al.*, 2014).