Assesment of Successful Extubation Predictors in Neonates

Thesis

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SUMMARY AND CONCLUSION

Summary:

Mechanical ventilation should be discontinued as soon as the patient can sustain spontaneous breathing with adequate gas exchange. Many studies have shown that children can be weaned from mechanical ventilation after a trial of spontaneous breathing trial (SBT). Since unsuccessful extubation increase mortality, it would be important for clinicians to be able to identify those patients who are likely to succeed a trial of extubation.

This study was conducted on 30 neonates who were considered ready for extubation. Spontaneous breathing trial (SBT) was done for 30 minutes (endotracheal CPAP trial).

According to the results of SBT was successful in 20 mechanically ventilated patients (70%) from which 19 (95%) patients were successfully extubated and one patient (5%) failed extubation although successful SBT, the trial was failed in 10 patients (30%) from which 8 (80%) who failed extubation and 2 patients (20%) succeeded extubation

Therefore this study found that 95% of ventilated neonates can be disconnected from ventilator support after a trial of spontaneous breathing trial lasting 30 minutes, and sensitivity 90.5%, specificity 88.8%, positive predictive value 95% and negative predictive value 80%.

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List of Abbreviations

A/C	**:**	Assist control
CDP	**:**	Continuous distending pressure
CMV	**:**	Continuous mandatory ventilation
CPAP	**:**	Continuous positive airway pressure
Et CPAP	**:**	Endotracheal continuous positive airway pressure
FiO2	**:**	Fraction of inspired oxygen
FO	**:**	Foramen ovale
HFOV	**:**	High frequency oscillatory ventilation
HFPPV	**:**	High frequency positive pressure ventilation
HFV	**:**	High frequency ventilation
IMV	**:**	Intermittent mandatory ventilation
IPPV	**:**	Intermittent positive pressure ventilation
LV	**:**	Left ventricular
$M\dot{V}$	**:**	Minute ventilation
MAP	**:**	Mean airway pressure
MAS	**:**	Meconium aspiration syndrome
MV	**:**	Mechanical ventilation

NCPAP : Nasal continuous positive airway pressure

NIPPV : Non invasive positive pressure ventilation

NIV : Non invasive ventilation

NO : Nitric oxide

O2 : Oxygen

PaCO2 : Arterial carbon dioxide tension

PaO2 : Arterial oxygen tension

PCV : Pressure control ventilation

PDA : Patent ductus arteriosus

PEEP : Positive end expiratory pressure

pH : Power of hydrogen

PIP : Peak inspiratory pressure

PPHN : Persistent pulmonay hypertension of the newborn

PSV : Pressure support ventilation

PVR : Pulmonary vascular resistance

RDS : Respiratory distress syndrome

RV : Right ventricle

SaO_2 : Hemoglobin Oxygen Saturation

SBT : Spontaneous breathing trial

SIMV : Synchronised intermittent mandatory ventilation

SpO_2 : Saturation of Peripheral Oxygen

SVR : Systemic vascular resistance

TV : Tidal volume

VAPS : Volume-assured pressure support

VG : Volume guarantee

VLBW : Very low birth weight

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INTRODUCTION

Mechanical ventilation is considered one of the most important life saving supporting intervention for neonates by supporting pulmonary functions until the patient can breathe adequately without help **(Goldsmith and Karotkin, 2003).**

Although mechanical ventilation is a life saving intervention for pediatric patients suffering from acute respiratory failure, it is associated with numerous grave complications and should be discontinued at the earliest possible time **(Chavez et al., 2006).**

Mechanical ventilation should be discontiued as soon as the patient can sustain spontaneous breathing with adequate gas exchange **(Farias et al., 2002).**

So the need for accurate prediction of weaning failure has been identified while the patient is still under mechanical ventilation **(Farid et al., 2008)**.

The capacity of ICU practitioner to clinically predict extubation outcome is limited, and studies have reported a range of success at predicting extubation failure using a variety of respiratory and/or integrated indexes of respiratory function **(Chavez et al., 2006).**

AIM OF THE WORK

The aim of this work is to evaluate some data as predictors of successful extubation in neonates.

These tested predictors include; birth weight, gestational age, duration of mechanical ventilation, ventilator settings and response to spontaneous breathing technique (SBT) in neonates: changes in heart rate (HR), respiratory rates (RR), oxygen saturation, work of breathing (WOB), blood pressure values and arterial partial tension of carbon dioxide ($PaCO_2$).

Chapter 1
Indications for Assisted Ventilation in Neonates

Hippocrates was the first investigator to record his experience with intubation of the trachea to support pulmonary ventilation. In 1806 Vide chaussier described his experiments with the intubation and mouth-to-mouth resuscitation of asphyxiated and still born infants. The work of his successors led to the development in 1879 of the aerophore pulmonaire; the first device specifically designed for the resuscitation and short-term ventilation of the newborn. The modern era of mechanical ventilation for infants can be dated back to 1953 report of Donald and Lord, who described their experience with a patient-cycled, servocontrolled respirator in treatment of several newborn infants with respiratory distress**. Assisted ventilation** can be defined as the movement of gas into and out of the lung by an external source connected directly to the patient **(Goldsmith and Karotkin, 2011).**

A ventilator is an automatic mechanical device designed to move gas into and out of the lungs **(Khilanani, 2006).**

Types of mechanical ventilation:

1. Positive–pressure ventilators:

Lungs are distended by applying an intermittent positive pressure to the airways. Ventilation may be:

Pressure targeted: Gas flows into the lungs until the preset pressure limit is reached. All modes are designed to ensure a constant tidal volume delivery regardless of peak airway and alveolar pressure.

Volume targeted: Gas flows into the lungs until the preset volume is delivered. All modes are designed to ensure a constant peak airway and alveolar pressure regardless of tidal volume delivery.

2. Negative-pressure ventilators:

The patient's chest wall is exposed to sub atmospheric pressure during inspiration **(Raoof and Khan, 2003).**

- The best clinical approach is to define a mechanical ventilator by cycling mechanism (i.e. that parameter which ends the inspiratory phase and allows exhalation to begin) **(Uttam and Khilnani, 2004).**

Thus we have:

- Pressure-cycled ventilators.