



Service Priorities and Programmes
Electronic Presentations

Convention ID: 1142

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Post title: Physiotherapist II, TMH, NTWC

Ventilator Hyperinflation-A safe physiotherapy technique for critically-ill ventilated patients-A pilot program

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Keywords:

Physiotherapy

Ventilator hyperinflation

Intensive Care Unit

Introduction

Hyperinflation is a recruitment maneuver used in patients on mechanical ventilation which aims to improve lung compliance and encourage secretion mobilization. Manual hyperinflation (MHI) can be achieved by using a manual resuscitation bag whereas ventilator hyperinflation (VHI) by modifying the ventilator settings. VHI was a newer technique and had been introduced to Tuen Mun Hospital in 2016. Although the use of VHI may minimize the adverse effects of disconnection from the ventilator, there are possibilities of volutrauma and cardiovascular instability caused by increased intra-thoracic pressure.

Objectives

To explore the feasibility and safety of application of VHI on patients in Intensive Care Unit (ICU) requiring mechanical ventilator support

Methodology

Patients who required mechanical ventilator support were recruited from ICU in TMH from September 2016 to April 2017. Patients with unstable haemodynamic, undrained pneumothorax and acute pulmonary edema were excluded. VHI was delivered by 3 trained physiotherapists. The upper airway pressure was limited at 40cmH₂O. The ventilator settings were adjusted to deliver a slow and larger breath until 150% of baseline tidal volume was reached. Chest vibration was performed during expiration phase. 5 sets of 6 breaths were applied with suction given as indicated. Comment and feedback from the physiotherapists to the use of VHI was collected at the end of program. Heart rate, respiratory rate, blood pressure, oxygenation, dynamic lung compliance and tidal volume were documented before, 5 minutes and 30 minutes after VHI. Paired-t test was used for statistical analysis.

Result

14 patients (10 males and 4 females), mean age of 67.6 were recruited in this study. A total of 53 sessions of VHI were applied. There was no significant difference in hemodynamic parameters before and after VHI treatment (p=0.12). There was no

adverse event reported after VHI. The dynamic lung compliance measured at 5-minute post treatment was significantly higher before the application of VHI ($p=0.04$). All physiotherapists ($N=3$) reported that there was no additional equipment needed, no disconnection of ventilator circuit and given a real time monitoring of the respiratory parameters in performing VHI. The pilot study showed that VHI is a safe technique without any observable adverse effect. This provided a basis for continued investigation to its effectiveness and further development in application.