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Posters - Hall 1

THE EFFECTS OF PHYSIOTHERAPY ON RESPIRATORY OUTCOMES FOLLOWING CARDIAC SURGERY IN THE PAEDIATRIC POPULATION: A PROSPECTIVE, OBSERVATIONAL SERVICE EVALUATION

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Background: Congenital heart defects account for approximately 6 - 8 per 1000 live births and are the most frequent cause of infant deaths. Following cardiac surgery to address these defects, children are often mechanically ventilated. Chest physiotherapy is regularly provided for these children in the cardiac intensive care unit. Treatments aim to remove secretions from the childrens' airways, inflate areas of alveolar collapse and reduce postoperative respiratory complications. Literature addressing the effects of chest physiotherapy on mechanically ventilated children have generally used heterogenous populations. Although these included children who underwent cardiac surgery, it is unknown whether the unique problems encountered as a result of cardiac surgery could be successfully addressed with chest physiotherapy interventions.

Purpose: To observe normal practice amongst physiotherapists in cardiac intensive care, and record changes in haemodynamic outcomes and ventilatory requirements before and after interventions.

Methods: A prospective, observational service evaluation was conducted. The haemodynamic outcomes recorded at one minute intervals from the bedside monitor were: heart rate, blood pressures, respiratory rate, end tidal carbon dioxide and oxygen saturation. Ventilatory outcomes recorded from the ventilator at one minute intervals were expired tidal volume, respiratory rate, minute volume and peak inspiratory pressure. Comparisons were made in outcomes for the 15 minutes before and 30 minutes after treatments. During physiotherapy, individual treatment components were also observed and recorded.

Results: A total of 15 children (four males) were observed, who were aged between 5 days and 17 years (median [interquartile range] 5.03 [6.8] months). Physiotherapy interventions included saline instillation, manual hyperinflations with or without chest wall vibrations and endotracheal suction. There were no significant changes in haemodynamic outcomes following physiotherapy. There was a significant reduction in end tidal CO₂ following physiotherapy from mean (SD) 4.96 (0.8) to 4.7 (0.7) kPa, mean change (95% confidence intervals), -0.30 (-0.5 to -0.1), p=0.007. Mean (SD) tidal volume increased from 10.1 (2.2) L/min to 10.6 (2.4) L/min, mean change (95% confidence interval) 0.535, (-1.09 to 0.02), which approached statistical significance

($p= 0.057$). Individually, 12 children exhibited positive changes in end tidal CO_2 , and 11 showed a positive increase in tidal volume post physiotherapy.

Conclusion(s): Chest physiotherapy in children following cardiac surgery leads to positive changes in respiratory outcomes, without a detrimental impact on haemodynamic stability. The combination of treatment components (saline, manual hyperinflation, chest wall vibrations and suction), appeared to have a positive effect on end tidal CO_2 , and tidal volume in most children.

Implications: Generalisability cannot be assumed, since this was not a research trial. However, the findings suggest that physiotherapy is effective for children following cardiac surgery. It is unclear how these findings relate to longer-term outcomes such as liberation from the ventilator or length of hospital stay. Advances in technologies, and the use of 'big data,' could provide more constant and accurate measures of respiratory and haemodynamic outcomes, to form a more comprehensive picture of the impact of physiotherapy on the patient's overall recovery.

Key-words: 1. Cardiac surgery 2. Chest physiotherapy 3. Manual techniques

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Ethics approval: Did this work require ethics approval?: No

Institution: Great Ormond Street Hospital and the Health Research Authority

Ethics Committee: N/A

Please state the reasons why ethics approval was not required: This was an observation of normal clinical practice. There was no randomisation of participants, and no new interventions were introduced. Data were collected anonymously, with no identifying details (such as date of birth) sought. A letter was received from the Health Research Authority, stating that the study was not deemed 'research' and that ethical approval was not required. This was also confirmed by the hospital's research and development department, who registered it as a service evaluation.

All authors, affiliations and abstracts have been published as submitted.