Comparison of Active Cycle of Breathing and High-Frequency Oscillation Jacket in Children With Cystic Fibrosis

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Introduction
When working with pediatric patients with CF experiencing acute exacerbations, it is imperative to provide effective airway clearance techniques (ACT) that will clear sputum and increase their lung function. This article analyzes two of the various ACT proposed in order to accomplish this goal. These ACTs are the Active Cycle Breathing Technique (ACBT) along with the High Frequency Chest Compressions (HFCC) using an oscillation jacket.

Methods
Participants: 10 children with known CF
- 7 males and 3 females
- Age range 9-16 years, median age was 14
- Children were classified as having CF if they had a sweat chloride > 60 mmol or positive genotype.

This study was administered during the second 24 hours of hospital admission. Randomization occurred when assigning subjects to treatment A (oscillation jacket) or treatment B (ACBT). A cross over occurred the following day between the groups.

Measurements
The constructs used to measure the effectiveness were the weight of wet sputum produced immediately after treatment and 24 hours after, forced vital capacity (FVC) and forced expiratory volume in one second (FEV₁).

Clinical Relevance
When working with this pediatric population, a Physical Therapist should choose to use the active cycle breathing techniques (ACBT) to help clear patients’ airways or recommend ACBT treatments for clearing sputum and to increase their pulmonary function. This article does not support the use of high frequency chest compressions (HFCC) as an effective treatment option for airway clearance in the pediatric population, instead recommending ACBT treatments for children with CF experiencing acute exacerbations.

Conclusion
This study showed that children experiencing pulmonary exacerbation with CF were acutely able to clear more sputum with ACBT than with HFCC. A significant improvement in pulmonary function following ACBT, whereas there was no improvement in lung function following the HFCC. Also, some children received ACBT following the HFCC due to the poor clearance performance. All children reported that the ACBT were comfortable to perform while 80% of the participants reported that the oscillation jacket was uncomfortable. Therefore, HFCC was not proven to be an effective alternate ACT in children with CF experiencing acute exacerbations.

Summary
The ACT that proved to be most effective in improving pulmonary function and in some cases, increasing the quality of life in children with CF is the Active Cycle Breathing Techniques above HFCC and PEP masks.