



Service Priorities and Programmes
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Clinical Evaluation for Effective Parameters of Paediatric Supported Standing Program for Cardiopulmonary Training

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Introduction

Non-ambulatory paediatric patients with neurological conditions often developed painful and costly complications. Supported standing programs have been integrated into physiotherapy practice for several decades but there are no comprehensive and evidenced-based guidelines or recommendations defining the parameters of standing program for improving the cardiopulmonary functions to these patients. Besides, they are usually unable to tolerate upright standing due to problems in musculoskeletal or cardiopulmonary.

Objectives

To formulate clinical parameters for effective standing program for cardiopulmonary training to non-ambulatory paediatric patients with neurological conditions.

Methodology

9 children (5 male and 4 female) with mean age 2.7 years old categorized in Gross Motor Function Classification System level 5 were recruited in the standing program. The patients were positioned on the supine stander with different tilt angles from horizontal: 0 degree (baseline), 30 degrees, 60 degrees and 90 degrees. Oxygen saturation, heart rate and blood pressure were monitored continuously. The standing exercise intensity at different tilt angles with reference to the percentage of maximum heart rate was also calculated. The standing program would be ceased if the vital sign became unstable. Then 6 among the 9 children participated in further evaluation of supported standing program with the following parameters: tilt angle of 30 degrees, 30 minutes per session and 3 sessions per week for 12 weeks. Heart rate, oxygen saturation and blood pressure were measured at pre and post program.

Result

The mean heart rate of the children increased with the tilt angle from horizontal of the supine stander. The percentage change of the mean heart rate was +17%, +6% and +8% at tilt angle of 30 degrees with baseline, 60 degrees with 30 degrees and 90

degrees with 60 degrees respectively. The highest increase in mean heart rate was observed when patients were standing at tilt angle of 30 degrees. The percentage of maximum heart rate at different tilt angles was 47% (0 degree: baseline), 55% (30 degrees), 59% (60 degrees) and 64% (90 degrees). Therefore, the exercise intensity was light to moderate during standing in supine stander with tilt angle from 30 to 90 degrees. All patients tolerated to stand for at least 30 minutes while their oxygen saturation, blood pressure maintained steadily in all tilt angles. For the post standing program evaluation, the mean heart rate of the children during standing decreased 15% after the 12 weeks program while the oxygen saturation, blood pressure maintained steadily. The results demonstrated that the cardiopulmonary function of patients improved. In conclusion, non-ambulatory children standing on supine stander with tilt angle of 30 degrees, 30 minutes per session and 3 sessions per week can achieve exercise intensity that improve their cardiopulmonary function. These parameters are especially effective for children who cannot tolerate upright standing.