

Feasibility of monitoring physical activity in children using commercial activity trackers

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Objectives: Wearable activity trackers are increasingly used in daily life, but most devices are not yet validated for the use in children. They could be used to monitor the activity of children with congenital or acquired heart disease, and the data could be automatically transferred to the pediatric cardiologist. The objective was to assess the feasibility of physical activity tracking in healthy children before and after a standardized surgical intervention using a wearable physical activity tracker.

Methods: This single center, open-label, prospective feasibility study aimed at recruiting 24 healthy children aged 4-16 years undergoing elective tonsillectomy. A physical activity tracker (Withings® Go) was worn by the patients for 10 days before surgery and for 28 days after discharge from hospital. Data and activity diaries were transferred to the study center at the end of each study period. Primary endpoint of this study was the difference in proportions of patients having complete activity measurement data, comparing the tracker with the diary pre- and postoperatively. The study was powered to detect a 35% difference between tracker and diary completeness.

Results: 24 female patients with a median age of 6 (IQR 1) years, a median body weight of 20.5 (IQR 5.8) kg and a BMI percentile of 42 (IQR 55) participated in this trial. For the total duration of the study, 58% of the tracker datasets were complete, vs. only 12.5% of the diaries (difference 45.5%, $p < 0.05$), technical failure rate was 29.2%. In the preoperative period, completeness of tracker datasets and diaries was 91.7% and 62.5%, respectively. The tracker data correlated strongly with the parents' estimate during the whole study and after surgery (r^2 0.81 and 0.82, respectively, $p < 0.01$).

Conclusions: Tracker data and diary records correlated significantly suggesting that trackers could replace diaries in the future. Wearable physical activity trackers might be implemented in the at-home monitoring of children with heart disease and might be a useful tool of assessing the general wellbeing of a child after a therapeutic intervention or to detect clinical worsening of a chronic heart condition during long-term therapy, but still need to be validated in chronically ill children.