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Impact of wearable devices with feedbacks for increasing daily walking activity and physical capacities in cardiovascular patients: a meta-analysis of randomized controlled trials

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Background: Despite the known benefits of physical activity, patients with cardiovascular disease do not practice enough nor maintain a regular physical activity for their health [1-4]. Walking is one of the easiest ways to stay physically active and can be implemented easily in everyday life [5]. Wearable physical activity monitoring devices have the potential to help increase physical activity through self-monitoring and feedback.

Purpose: To review randomized controlled trials using wearable physical activity monitoring device as an intervention to increase daily walking activity and improve physical capacities in cardiovascular diseases (CVD) patients.

Methods: Design: Systematic review and meta-analysis of randomized controlled trials (RCTs).

Data Sources: PubMed, Embase, Web of Science.

Eligibility criteria: Randomized controlled studies including patients over 18 years of age with CVD comparing an intervention group using a wearable physical activity monitoring device with feedback to usual care or to a control group receiving no feedback on their physical activity and reporting a change in the daily number of steps and/or a change in the distance covered in the 6-minute walking test (6MWT) or a change in peak oxygen uptake (VO₂ peak).

Outcomes: Primary outcome was daily number of steps, secondary outcomes were distance covered in the 6-minute walking test (6MWT) and/or peak oxygen uptake (VO₂ peak).

Results: Sixteen RCTs were included. The intervention of wearing a physical activity monitoring device with feedback significantly improved daily number of steps compared with controls (standardized mean difference ((SMD) 0.85; 95% CI [0.42; 1.27], $p < 0.01$). The effect was greater when the duration of the intervention was less than 3 months (SMD 1.0; 95% CI [0.18; 1.82], $p < 0.01$) than when the duration of the intervention was 3 months or longer (SMD 0.71; 95% CI [0.27; 1.16], $p < 0.01$) but no significant interaction was found between subgroups ($p = 0.55$). Six MWT distance and VO₂ peak showed only small effects (SMD 0.34 (95% CI [-0.11; 0.80], $p = 0.02$) and SMD 0.53 (95% CI [0.03; 1.03], $p = 0.07$), respectively).