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Objectively Measured Adherence to Physical Activity Guidelines after Acute Coronary Syndrome

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Physical activity is a cornerstone of secondary prevention after acute coronary syndromes (ACS). Guidelines strongly recommend that post-ACS patients achieve 30 minutes of moderate aerobic activity such as brisk walking on at least 5 days per week within 2 weeks of discharge (1). Yet, little is known about the extent to which post-ACS patients are meeting physical activity guidelines. Prior studies assessing physical activity after ACS were limited by reliance on self-reports (2). The purpose of this study was to use an objective measure of physical activity to describe the proportion of ACS patients following physical activity recommendations in the high-risk post-discharge period.

Between 2009 and 2012, we enrolled patients hospitalized for myocardial infarction (MI) or unstable angina (UA) into the Prescription Use, Lifestyle, and Stress Evaluation (PULSE) study. Some patients participated in an ancillary study in which they were provided with an Actical accelerometer (Philips Respironics, Bend, Oregon) at or soon after discharge (3). Patients were asked to continuously wear the device on their non-dominant wrist and to return the device one month later. All patients provided informed consent. The institutional review board of Columbia University Medical Center approved the study.

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The accelerometer is a validated wristwatch-like, omni-directional accelerometer that provides ambulatory monitoring and quantification of activity levels. It records data in 1-minute epochs, and provides activity counts for each minute of the day that are classifiable by intensity level. For the current analyses, patients were required to have worn the device for 10 hours on 3 days in 1 week during the 35 days after discharge. Consistent with guidelines, patients were categorized into three levels of physical activity based on percent of valid wear days with 30 minutes of moderate-to-vigorous physical activity (MVPA) bout minutes [none; insufficient (1%–65% of days); met guidelines (66% of days) (4). The probability that patients met the guidelines each week was estimated using logistic regression with generalized estimating equations accounting for within-subject correlation and adjusting for covariates that influence physical activity [age, sex, ethnicity, race, partner status, GRACE score, Charlson comorbidity index, depression (Beck Depression Inventory score 10), decreased left ventricular ejection fraction (LVEF<40%), body mass index, regular exercise before ACS, ACS type (unstable angina, non-ST elevation MI, or ST elevation MI), and ACS treatment (medical management, percutaneous coronary intervention, or coronary artery bypass graft)]. Analyses were conducted using R version 3.2.4 (R Foundation for Statistical Computing, Vienna, Austria).

Of 620 patients provided with accelerometers, 330 (52.9%) returned devices with sufficient data. The mean age of patients was 62.9 ± 10.9 years, 31.2% were women, 38.7% were Hispanic, 20.1% were black, 14.7% had decreased LVEF, and 34.5% were depressed. There were no differences in demographic or comorbidity characteristics between those who did and did not return accelerometers with sufficient data. An increasing proportion of patients met the physical activity guidelines over time (P<0.001; Figure). Nevertheless, by the fifth week after discharge, only 16% of ACS patients met the guideline. No covariates predicted guideline adherence (P all >0.05).

Our data suggest that remarkably few patients are achieving targets for physical activity after ACS. Our estimates are substantially lower than those based on self-report (5). Limitations of our findings include the moderate sample size, enrollment from a single center, accelerometer noncompliance, and inability to assess physical activity during non-wear time. These limitations notwithstanding, our data reveal that in a diverse sample, there is an urgent need to implement interventions that increase physical activity after ACS. In prior decades, ACS survivors were counseled to remain in bed for weeks, and many current patients fear exercise after ACS. One approach to counteracting these fears and encouraging physical activity has been exercise-based cardiac rehabilitation. Yet, participation in these programs remains poor. Objectively monitoring physical activity and providing *real-time feedback* to patients and clinicians may be a disseminable approach for increasing physical activity in ACS survivors.

Acknowledgments

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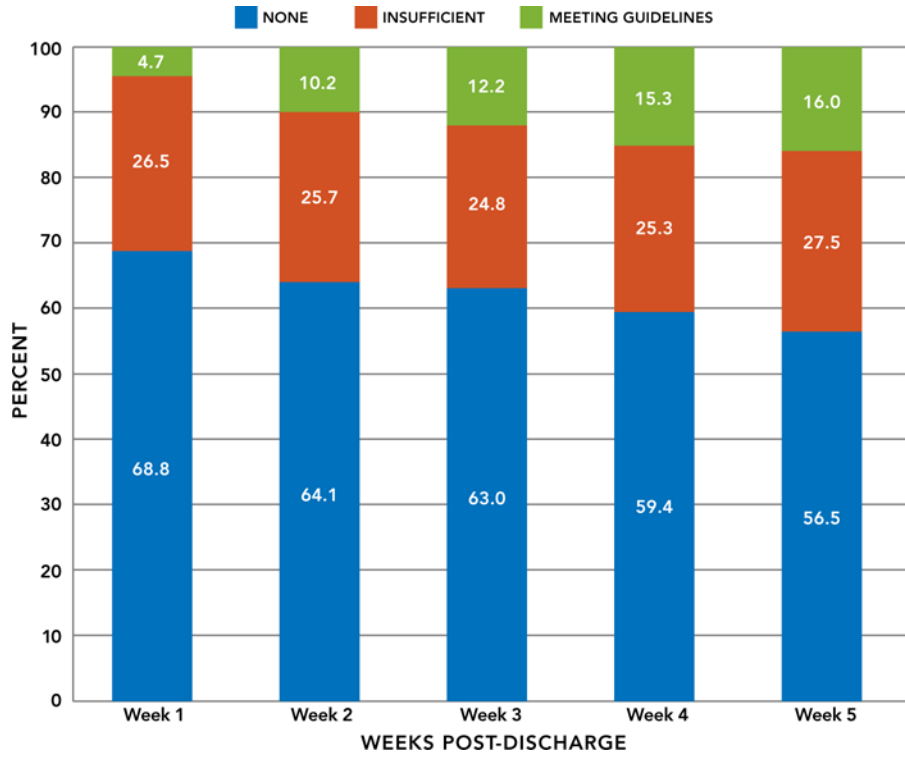
Figure 1. Percentage of Acute Coronary Syndrome Survivors Meeting Guidelines for Moderate-to-Vigorous Physical Activity (MVPA) by Weeks Post-Discharge (N = 333)
Participants' physical activity was categorized as "meeting guidelines" (30 minutes of moderate-to-vigorous intensity physical activity (MVPA) for 66% observed days [i.e., approximately 5 days/week]), "insufficient" (30 minutes of MVPA for 1%–65% observed days [i.e., approximately 1–4 days/week]), or "none" (0 days with 30 MVPA).