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Are Heart Failure and Coronary Artery Bypass Surgery Patients Meeting Physical Activity Guidelines?

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Abstract

Purpose—The purpose of this study was to describe subjective and objective physical activity (PA) levels of two groups of cardiovascular patients who were either post-coronary artery bypass graft (CABG) surgery or diagnosed with heart failure (HF).

Design—A descriptive comparative design was used for this secondary analysis of data from two prior studies.

Methods—A convenience sample of 62 outpatients was used to examine PA objectively (Actiheart accelerometer) and subjectively (PA interview).

Findings—Objectively, 33% of CABG patients and no HF patients met PA recommendations of 150 min/week. Subjectively, 56% of CABG and 38% of HF patients reported meeting PA recommendations.

Conclusions—Few patients in the current study met PA recommendations.

Clinical Relevance—Innovative rehabilitation nursing practice strategies are needed (e.g., use of activity trackers, making PA a vital sign) to assist patients in gaining the knowledge and skills to be more active and adhere to PA recommendations.

Keywords

Physical activity; accelerometer; heart failure; coronary artery bypass graft

Physical inactivity is an important independent risk factor for coronary heart disease (Strath et al., 2013). In primary and secondary prevention of coronary heart disease, it is recommended that individuals achieve 150 minutes/week of moderate intensity physical activity (PA) accumulated in at least 10 minute bouts (Lindenfeld et al., 2010; Strath et al., 2013). Although this amount is recommended, few studies have examined how many community-dwelling cardiovascular patients achieve this recommendation. In this study, we are reporting on PA levels of two community-dwelling cardiovascular populations: patients diagnosed with heart failure (HF) and post-coronary artery bypass graft surgery (CABG). Studies indicate that between 40% - 91% of patients with HF do not engage in any regular exercise (Gary, 2005; van der Wall et al., 2010). Similar results have been found in patients with coronary heart disease (Moore et al., 2006).

Most of the clinical assessments of community-dwelling cardiovascular patients are done by self-report of PA in an outpatient setting. It is likely that the majority of individuals overestimate the amount of time spent in PA (Dhurandhar et al., 2014); however, few studies have examined this in cardiac patients. In a systematic review of self-reported versus objective measurement of PA (e.g., accelerometers, pedometers), 60% of respondents self-reported higher values of activity than what was measured by objective methods (Prince et al., 2008). Further, they found that self-reported PA was 44% greater than objective measures of PA in men and was 138% greater than objective measures of PA in women (Prince et al.). These findings suggest that there are inaccuracies in self-reporting PA and that percentages of individuals who meet PA recommendations is low. Thus, the purpose of this study was to describe subjective and objective PA levels and to examine how many HF and CABG patients meet the recommended PA guidelines of 150 minutes per week of moderate-vigorous PA.

Methods

A descriptive comparative design was used to conduct a secondary analysis of data from two prior studies. The combined convenience sample included 62 community-dwelling outpatients from two studies that examined physical activity behaviors in cardiovascular patients. All subjects were either diagnosed with HF or were post-CABG, were stable, and had received optimum medical therapy for the past 30 days. All subjects were able to read, speak, and write English and were oriented to person, place and time. Common exclusion criteria were orthopedic or neuromuscular disorders preventing PA. Both studies were approved by Institutional Review Boards at the university and hospitals where the studies were conducted.

CABG sample (n=33)

CABG patients were recruited from the cardiac rehabilitation programs of an academic medical center and a community hospital. In addition to the common inclusion criteria, all CABG patients had completed cardiac rehabilitation (CR) 3 months earlier, had no history of psychiatric illness, and were classified as low to moderate risk for cardiac events during exercise (Cameron, 2014). Additional exclusion criteria were debilitating non-cardiac diseases such as renal failure, anemia, chronic obstructive lung disease, and poorly controlled diabetes.

Heart failure sample (n=29)

Patients were recruited from an outpatient heart failure specialty clinic. In addition to the common inclusion and exclusion criteria above, all HF patients were 60 years of age and had a resting left ventricular ejection fraction of 40%. They were excluded if they had unstable angina pectoris, myocardial infarction, CABG surgery, or biventricular pacemaker within 3 months prior to the study.

Subjective PA in CABG patients was measured by the Modifiable Activity Questionnaire (Kriska et al., 1990). This is an interviewer-administered survey that assesses the time spent in 38 leisure physical activities, common among this population (i.e., walking, biking,

elliptical), over the past 7 days. Only time spent in those activities that were moderate intensity or greater (≥ 3 METs) were summed for a total number of minutes/week. METs (Metabolic Equivalent of Task) are a physiological measure expressing the energy cost of physical activities. One MET is equal to the energy costs of sitting quietly. METs can be thought of as an index of the intensity of activities; the higher the MET level, the higher the intensity. The interclass correlation coefficient of this survey administered on two occasions over one week was 0.77 suggesting substantial reproducibility (Pettee Gabriel, McClain, Schmid, Storti, & Ainsworth, 2011). The validity was supported by a significant correlation between self-report and accelerometer measured moderate to vigorous PA ($\rho = 0.76$, $p < 0.0001$) (Pettee Gabriel).

Subjective PA in HF patients was measured by the Modified 7-day Physical Activity Recall Questionnaire (Hellman & Williams, 1996-1997). This is an interviewer-administered survey where participants report minutes of light, moderate, hard, and very hard activities for the past 7 days. Only time spent in those activities that were moderate intensity (≥ 3 METs) were summed for a total number of min/wk. Construct validity was confirmed in a population of 64 older CR participants (mean age=70.6 years) demonstrated by significant increases in daily energy expenditures over a 12 week time frame; and by significant differences between active and inactive groups of older adults demonstrating discriminant validity ($z=-6.14$, $p<.0001$) (Hellman & Williams). Although two different surveys were used to calculate PA variables, both surveys obtained very similar information about physical activity allowing us to calculate the same summary score from both measures (amount of time spent in moderate/vigorous physical activity [MVPA] per week). Both surveys are commonly used measures of physical activity, and have comparable reliability and validity.

The Actiheart (www.camntech.com/products/actiheart/actiheart-overview; CamNTECH Company, United Kingdom) was used to measure objective PA in both studies. It is a compact accelerometer that records the frequency and intensity of the subject's movement and heart rate although only movement was used in this analysis. The Actiheart was attached with two standard ECG electrodes on the chest for 7 days. PA data were constructed similarly for both studies. Data from the accelerometer were downloaded and screened for wear time using standard methods. For adults, at least 3-5 days of monitoring are required to estimate habitual PA. We selected one week-end day and 3 week-days for the 4 days needed to compute the average daily amount of PA (time and intensity). Time spent in light (1.6 – 2.9 METs) and moderate-vigorous physical activity (MVPA) (≥ 3.0 METs) were computed based on cut-off points from Freedson, Melanson, and Sirard (1998). Time spent in PA was summed across 4 days and divided by 4 for an average daily duration of PA (in minutes). Because PA recommendations are based on the number of minutes per week, we computed the weekly amount of time spent by multiplying daily time by 7 (min/week). The Actiheart has established reliability and validity and is an acknowledged standard for field-based activity measurement.

Light intensity activities range from 1.6 – 2.9 METs, moderate intensity activities range from 3.0 – 5.9 METs, and vigorous intensity activities are > 6.0 METs (Freedson et al., 1998). We combined moderate and vigorous intensity activities because so few patients in

either sample were engaged in vigorous intensity activity. Time spent in in light activities (1.5 – 2.9 METs) and moderate-to-vigorous activities (> 3 METs) were summed across the 4 days and divided by 4 for an average daily duration of PA (minutes). We also examined daily activity counts and daily activity EE in kilocalories. Because the PA recommendations are based on the number of minutes per week, we computed the weekly amount of time spent in moderate-vigorous physical activity (MVPA) by multiplying the daily time by 7.

Data analysis

SPSS Version 21 (IBM) was used to analyze the data. Descriptive statistics (medians, ranges) were computed for demographic characteristics and subjective and objective activity levels in both patient samples. The samples were compared using chi-square statistics for categorical data and Mann Whitney U statistics for ordinal/continuous data.

Results

On average, HF patients were older and had a lower ejection fraction than CABG patients (see Table 1). The CABG patients were also more likely to be employed. The majority of patients in both groups were male (65% HF patients; 82% CABG patients), Caucasian (100% HF patients, 94% CABG patients), and similar in BMI (Mdn = 28 in HF patients; 29 in CABG patients).

Based on accelerometer data, HF patients engaged in < 1 minute of MVPA per day (see Table 2). They engaged in more light activities (1.6 – 2.9 METs) than moderate-vigorous activities (18.2 min/d). Thirty eight percent of HF patients met the national guidelines of 150 min/wk by self-report; however, none met the guidelines based on accelerometer data.

CABG patients engaged in 18.5 minutes of MVPA per day (129.5 min/wk) based on accelerometer data. They also engaged in more light than MVPA (146.8 min/d). Fifty-six percent of CABG patients met the national guidelines of 150 min/wk based on self-report; however, only 33% met the guidelines based on accelerometer data. CABG patients were significantly more active than HF patients as evidenced by significantly greater minutes spent in light and moderate-to-vigorous activities (MVPA) (see Table 2).

Discussion

It is important to interpret the findings in light of the study limitations. One of the limitations of the study was using two different scales to measure PA which may have contributed to the lack of differences between the two samples in self-reported PA. We think the lack of differences though is most likely due to the difficulties in measuring PA by self-report. The small sample size, convenience sampling, and a sample comprised of primarily Caucasian males limit the generalizability of the study findings to patients similar to those in this study. Moreover, HF patients were about 10 years older, on average, than post-CABG patients which contributed to the lower PA levels in the HF group. In this study, we gave patients “credit” for all MVPA and this may have overestimated MVPA levels in these patients. Typically, when calculating minutes of PA, individuals are only given “credit” for 10 minute bouts of activity which is considered the minimum amount of time needed for PA to have

health benefits (Strath et al., 2013). However, in a recent study, there was evidence that bouts less than 10 minutes could have a positive effect on cardiovascular health outcomes (Glazer et al., 2013). Future studies need to measure MVPA in patient populations using a variety of objective measures including accelerometers that are able to capture multiple body movements (trunk, waist, upper and lower extremities).

The main finding of this study was that community-dwelling, stable cardiovascular patients, who were either diagnosed with HF or post-CABG, did not engage in sufficient levels of PA, on average, to reduce their risk of cardiovascular disease. By objective measures (accelerometer), 33% of the CABG patients and none of the HF patients met the PA recommendations of 150 min/week of MVPA. By subjective measures, 56% of CABG patients and 38% of HF patients met PA recommendations. Thus, patients were over estimating their level of PA by self-report. Due to the inaccuracies in self-reporting PA and the low percentages of individuals who met PA recommendations, it seems vital to have patients use objective PA devices (e.g., wireless activity trackers), during and after exercise rehabilitation to ensure they are obtaining sufficient MVPA to reduce their cardiovascular risk.

On average, CABG patients spent 129.5 min/wk in MVPA. Only 33% met PA guidelines of > 150 min/wk based on objective data. These findings are similar to results from earlier studies of CABG patients. Moore et al. (2006) found that approximately 25% of patients (55% CABG) in a lifestyle exercise intervention met the minimum weekly MVPA guideline one year after a cardiac event. Similarly, Griffo et al. (2012) found that 46% of revascularized patients were exercising > 3 days/week whereas before surgery only 6% were exercising > 3 days/week. However, these data were collected by self-report which may be an overestimation of how active they were. In the current study, the majority of CABG patients' exercise time was spent in light activities with MET levels ranging from 1.6-2.9 METs. One reason for engaging primarily in light activity may be due to the type and intensity of activities they participate in during CR. Much of the time in CR is spent in activities that are 2.25 – 2.5 METs (Macken, 2012); thus, patients may become accustomed to this level of activity. Macken found that although CABG patients improved significantly in their functional capacity (MET levels) during CR, the majority of their exercise activities were spent at fairly low MET levels (< 3 METs). These light intensity activities may not provide patients with a realistic sensation (perceived exertion) of how hard they are supposed to be working once they are exercising outside of the CR environment. Further, the discrepancy between what patients report they are doing vs. what they actually do may contribute to their feelings of fatigue and activity intolerance.

In this study, none of the HF patients met the PA recommendations of 150 min/week of MVPA based on objective data. HF patients in this study were primarily engaging in light activities but even minutes of light activity were low (total time in activities was about 20 min/day). These results are comparable to the findings in earlier studies where HF patients spent 48 minutes per day in movement related activities and up to 96% of activity was sedentary (van den Berg-Emons, Bussmann, Balk, & Stam, 2005). In a prior study, a majority (61%) of patients with HF reported that adherence to an exercise regimen was more difficult than any of the other required behavioral changes for HF including diet,

medications, smoking cessation, or keeping appointments (Evangelista, Berg, & Dracup, 2001). Patients identified lack of motivation, lack of energy, and the presence of physical symptoms as the primary reasons for non-adherence to exercise. Patients report reluctance to initiate exercise due to a lack of skills for exercise and a fear of increasing PA with a “bad heart” (Evangelista et al., 2001). Future studies need to examine the role of fear and other barriers to exercise (i.e., lack of energy, dyspnea, etc.) as confounding factors particularly for patients to implement a home exercise program. Now that CR is reimbursable by the Centers for Medicare and Medicaid for stable HF patients, these patients would benefit from participation in CR programs to reassure them that exercise is safe and to guide them in knowing how much exercise to do. Even though it is reimbursable, many patients are still not being referred and CR staff may lack the specialized training related to exercising patients with HF (Pozehl, McGuire, & Norman, in press).

Clinical Implications

In clinical situations, we rely on cardiovascular patients to provide accurate information about their daily PA levels. Yet we know, from this and earlier studies (Prince et al., 2008), that the majority of patients self-report higher levels of activity than what is measured by objective methods. To counteract the issues associated with self-report measures, it is necessary to explore alternative methods for patients to use to monitor their PA that do not rely on their ability to recall activity. Having cardiovascular patients monitor their activities using an objective measure such as a pedometer, a multi-sensor activity tracking device (Fitbit, Body Media Fit, Jawbone, etc.) (Lee, Kim, & Welk, 2014), or a cellular phone pedometer device has the potential to eliminate the problems of self-report and has the potential to inform patients with real time information about whether they are active enough both in relation to PA time (150 min/week) and intensity (3.0 METS). Furthermore, rehabilitation nurses can provide follow-up once exercise rehabilitation is completed to keep patients accountable and provide ongoing motivation for their PA behavior.

Additional intervention strategies include the Exercise is Medicine (EIM) initiative which requests that health care providers encourage patient involvement in PA (Lobelo, Stoutenberg, & Hutber, 2014). This initiative, coordinated by the American College of Sports Medicine, has the goal of having health care providers assess every patient's level of PA with every clinic or rehabilitation nursing visit and providing patients with an exercise prescription at each visit. Having a ready list of qualified health and fitness professionals for further counseling and /or health and wellness centers in the community for referring patients to can also be very useful. Each clinical site could designate their own physical activity champion who could pledge to implement EIM in their own healthcare setting (www.exerciseismedicine.org).

The National Physical Activity Plan described multiple strategies to get people moving (Kraus et al., 2015). Strategies specifically focused on the health care system include making PA a patient “vital sign” that would be checked along with blood pressure, heart rate, temperature, and respirations that all health care providers would review with their patients at each rehabilitation nursing visit or clinic visit (<http://www.physicalactivityplan.org/healthcare.php>). This information should also be recorded in the electronic medical record

for assessing patients' PA on a regular basis. Another strategy is to provide low-cost, evidence-based cognitive and behavioral interventions to patients. The intervention strategies that have the strongest theoretical and empirical support in promoting PA in a rehabilitation setting were behavioral strategies of: Self-monitoring, setting specific goals, identifying barriers, feedback on performance, and developing plans for relapse prevention (Ferrier, Blanchard, Vallis, & Giacomantonio, 2011; Greaves et al., 2011). Additional methods to assist with self-monitoring and goal setting can include high-tech approaches, such as activity monitors (i.e., Fitbit, Sensa arm bands) and "smart phone" applications or low-tech approaches such as an activity log or the online activity tracker at the American Heart Association (AHA) website.

There are several excellent educational resources available at the American Heart Association (AHA) website that can be printed off and shared with patients undergoing rehabilitation nursing care (http://www.heart.org/HEARTORG/GettingHealthy/PhysicalActivity/Physical-Activity_UCM_001080_SubHomePage.jsp). The AHA advocates walking as the simplest positive change to make to improve cardiovascular health. One of the frequent barriers to PA is boredom but exercise does not need to be boring with the many active-play video games such as balance boards, dance pads, gym equipment, and other games that keep the player moving to play and win the game (Lieberman et al., 2011). Finally, one of the best strategies that health care providers can do is to be a role model for active lifestyles and this enthusiasm will be readily apparent and infectious to patients.

Conclusions

In conclusion, physical inactivity is an important independent risk factor for coronary heart disease yet few patients in the current study met PA recommendations to reduce cardiovascular risk. No HF patients and only 33% of CABG patients met the recommended guidelines of 150 minutes per week of MVPA. Using objective PA measures, CABG patients were found to be significantly more active than HF patients as evidenced by significantly greater minutes spent in light and moderate-to-vigorous activities (MVPA). Using subjective PA measures, there were no differences between CABG and HF patients in the proportion of patients who reported meeting physical activity guidelines. Innovative rehabilitation nursing intervention strategies (e.g., activity tracker, making PA a vital sign, providing a written exercise prescription with each clinic visit) are needed to assist patients to be more active and adhere long-term to PA recommendations.

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References

- Cameron, JJ. Modifiable cardiovascular disease risk factors. In: Williams, MA., Roitan, JL., editors. Guidelines for Cardiac Rehabilitation and Secondary Prevention Programs. 5th. Champaign, IL: Human Kinetics; 2014. p. 89-142.

- Dhurandhar NV, Schoeller D, Brown AW, Heymsfield SB, Thomas D, Sørensen TI, et al. The Energy Balance Measurement Working Group. Energy balance measurement: When something is not better than nothing. *International Journal of Obesity*. 2014; :1–5. DOI: 10.1038/ijo.2014.199
- Evangelista LS, Berg J, Dracup K. Relationship between psychosocial variables and compliance in patients with heart failure. *Heart Lung*. 2001; 30(4):294–301. [PubMed: 11449216]
- Ferrier S, Blanchard CM, Vallis M, Giacomantonio N. Behavioural interventions to increase the physical activity of cardiac patients: A review. *European Journal of Cardiovascular Prevention and Rehabilitation*. 2011; 18(1):15–32. [PubMed: 20502341]
- Freedson PS, Melanson E, Sirard J. Calibration of the computer science and applications, inc. accelerometer. *Medicine and Science in Sports and Exercise*. 1998; 30(5):777–781. [PubMed: 9588623]
- Gary R. Exercise self-efficacy in older women with diastolic heart failure: Results of a walking program and education intervention. *Journal of Gerontological Nursing*. 2006; 32(7):31–39. [PubMed: 16863044]
- Glazer NL, Lyass A, Eslinger DW, Blease SJ, Freedson PS, Massaro JM, Vasan RS. Sustained and shorter bouts of physical activity are related to cardiovascular health. *Medicine and Science in Sports and Exercise*. 2013; 45(1):109–115. [PubMed: 22895372]
- Greaves CJ, Sheppard KE, Abraham C, Hardeman W, Roden M, Evans PH. The IMAGE Study Group. Systematic review of reviews of intervention components associated with increased effectiveness in dietary and physical activity interventions. *BMC Public Health*. 2011; 11:119. [PubMed: 21333011]
- Griffo R, Ambrosetti M, Tramarin R, Fattirolli F, Temporelli PL, Vestri AR, Tavazzi L. Effective secondary prevention through cardiac rehabilitation after coronary revascularization and predictors of poor adherence to lifestyle modification and medication. Results of the ICAROS Survey. *International Journal of Cardiology*. 2012; 160:12–17.
- Hellman EA, Williams MA, Thalken L. Construct validity of the modified 7-Day Activity Interview with older adults with cardiac problems. *Rehabilitation Nursing Research*. 1996-1997; 5(4):126–133.
- Kraus WE, Bittner V, Appel L, Blair SN, Church T, Després JP, et al. The National Physical Activity Plan: A Call to Action From the American Heart Association A Science Advisory From the American Heart Association. *Circulation*. 2015; 131doi: 10.1161/CIR.0000000000000203
- Kriska AM, Knowler WC, LaPorte RE, Drash AL, Wing RR, Blair SN, Kuller LH. Development of questionnaire to examine relationship of physical activity and diabetes in Pima Indians. *Diabetes Care*. 1990; 13(4):401–411. [PubMed: 2318100]
- Lieberman D, Chamberlin B, Medina E, Franklin BA, McHugh Sanner B, Vafiadis DK. The power of play: Innovations in getting active summit 2011: A science panel proceedings report from the American Heart Association. *Circulation*. 2011; 123:2507–2516. [PubMed: 21518980]
- Lindenfeld J, Albert NM, Boehmer JP, Collins SP, Ezekowitz JA, Givertz MM, Walsh MN. Heart Failure Society of America 2010 comprehensive heart failure practice guideline. *Journal of Cardiac Failure*. 2010; 16(6):e1–194. DOI: 10.1016/j.cardfail.2010.04.004
- Lobelo F, Stoutenberg M, Hutber A. The exercise is medicine global health initiative: A 2014 update. *British Journal of Sports Medicine*. 2014; 48(22):1627–1633. [PubMed: 24759911]
- Moore SM, Charvat JM, Gordon NH, Pashkow F, Ribisl P, Roberts BL, Rocco M. Effects of a CHANGE intervention to increase exercise maintenance following cardiac events. *Annals of Behavioral Medicine*. 2006; 31(1):53–62. [PubMed: 16472039]
- Macken, L. Partners together in health: Health-related quality of life outcomes in coronary artery bypass patients and partners. University of Nebraska Medical Center; Omaha, NE: 2012. Unpublished doctoral dissertation
- Pettee Gabriel K, McClain JJ, Schmid KK, Storti KL, Ainsworth BE. Reliability and convergent validity of the past-week Modifiable Activity Questionnaire. *Public Health Nutrition*. 2011; 14:435–442. [PubMed: 20843404]
- Pozehl B, McGuire R, Norman J. Team-based care for cardiac rehabilitation and exercise training in heart failure. *Heart Failure Clinics*. in press.
- Prince SA, Adamo KB, Hamel ME, Hardt J, Connor Gorber S, Tremblay M. A comparison of direct versus self-report measures for assessing physical activity in adults: a systematic review.

International Journal of Behavioral Nutrition and Physical Activity, 5. 2008; 56doi: 10.1186/1479-5868-5-56

- Strath SJ, Kaminsky LA, Ainsworth BE, Ekelund U, Freedson PS, Gary RA, et al. Guide to the assessment of physical activity: Clinical and research applications: A scientific statement from the American Heart Association. *Circulation*. 2013; 128(20):2259–2279. DOI: 10.1161/01.cir.0000435708.67487.da [PubMed: 24126387]
- van den Berg-Emons RJ, Bussmann JB, Balk AH, Stam HJ. Factors associated with the level of movement-related everyday activity and quality of life in people with chronic heart failure. *Physical Therapy*. 2005; 85(12):1340–1348. [PubMed: 16305272]
- van der Wal MH, van Veldhuisen DJ, Veeger NJ, Rutten FH, Jaarsma T. Compliance with non-pharmacological recommendations and outcome in heart failure patients. *European Heart Journal*. 2010; 31(12):1486–1493. [PubMed: 20436049]

Table 1
Comparisons of Demographic and Illness Characteristics by Patient Groups

	HF Patients N = 34 Median (range)	Post-CABG patients N = 33 Median (range)	Mann Whitney U statistics (Z)
Age	74.0 (61-85)	64.5 (33-77)	-4.27 *
Ejection fraction	30.0 (20-40)	57.5 (37.5-67.5)	-6.73 *
BMI	28.0 (20-46)	29.0 (23-45)	-0.38
Number of CABGs	NA	3.0 (1-5)	----
	Frequency (%)	Frequency (%)	χ^2 (df=1)
Gender (males)	22 (65%)	28 (82%)	2.72
Race (Caucasian)	34 (100%)	31 (94%)	p = 0.24
Work status (employed)	5 (15%)	24 (71%)	20.66 *

Legend. CABG = Coronary artery bypass graft

*
p < 0.001

Table 2
Comparisons of Physical Activity Levels by Patient Groups

Physical activity (PA) variables	HF patients (N = 29) Frequency (%)	CABG patients (N = 33) Frequency (%)	Statistics χ^2 (p)
Percent of subjects meeting PA recommendations (self-report)			
Patients engaged in 150 min/wk of MVPA	11 (38%)	19 (56%)	2.39 (p=0.12)
Percent of subjects meeting recommendations (accelerometer)			
Patients engaged in 150 min/wk of MVPA	0%	11 (33%)	Exact p <0.0001
Minutes of MVPA (accelerometer)	Median (range)	Median (range)	Mann Whitney U
Min/day in MVPA (3 METs)	0.78 ^a (0-8.38)	18.5 (0-128)	-6.41 *
Min/wk in MVPA (3 METs)	5.5 (0-58.6)	129.5 (0-896)	-6.41 *
Min/day in light PA (1.6-2.9 METs)	18.2 (0.7-176.8)	146.8 (31.3-386.5)	-6.26 *

Legend. HF = heart failure; CABG = coronary artery bypass graft surgery; MVPA = moderate and vigorous physical activity

^aFor HF patients, the median for min/day of MVPA was 0 so the mean was reported and used to calculate min/wk of MVPA

*
p<0.001