

# MONITORING PHYSICAL ACTIVITY IN A FREE-LIVING ENVIRONMENT IN CARDIAC REHABILITATION USING ACCURATE BODY DATA: A PILOT STUDY

B Hirons, M Fisher and K Tew · Royal Liverpool and Broadgreen University Hospitals NHS Trust · Ki Health Innovation Ltd.

## INTRODUCTION

Physical activity is a key component of cardiac rehabilitation (CR); however, provision is limited to weekly or bi-weekly structured exercise training and general advice on physical activity in a free-living environment.

The Association of Chartered Physiotherapists in CR (ACPICR; 2009) recommend that patients attend one hour of supervised exercise training once or twice per week throughout Phase 3 CR, and also achieve:

- Activity for Health Benefits - A minimum of 30 minutes of physical activity in bouts of 10-minutes or longer at an intensity equivalent to 40-60%  $VO_{2max}$  progressing to 70%  $VO_{2max}$  achieved daily.**
- At-home Training - A bout of 20-60minutes at an intensity equivalent to 40-60%  $VO_{2max}$  progressing to 70%  $VO_{2max}$  achieved 2-3 times per week.**

The emergence of sophisticated and accurate on-body monitoring means that it is now possible to deliver all three components of the ACPICR recommendations for physical activity in a free-living environment.

The pilot study aimed to establish the efficacy and feasibility of using on-body monitoring with CR patients.

## METHODS

Seventy-seven patients wore the Ki Monitor for 5-full days (midnight-to-midnight) in the first week, and 26 patients were provided the Ki Monitor in the final week of Phase 3 hospital-based CR.

Symptom-limited  $VO_{2max}$  and the metabolic equivalent (MET) corresponding to 40%, 60% and 70% symptom-limited  $VO_{2max}$  were calculated from the Incremental Shuttle Walking Tests (ISWT) to determine ideal intensity for each individual who returned sufficient data.

The minute-by-minute MET data from the Ki Monitor was passed through Ki's Proprietary algorithms and analysed in the context of the ACPICR standards.

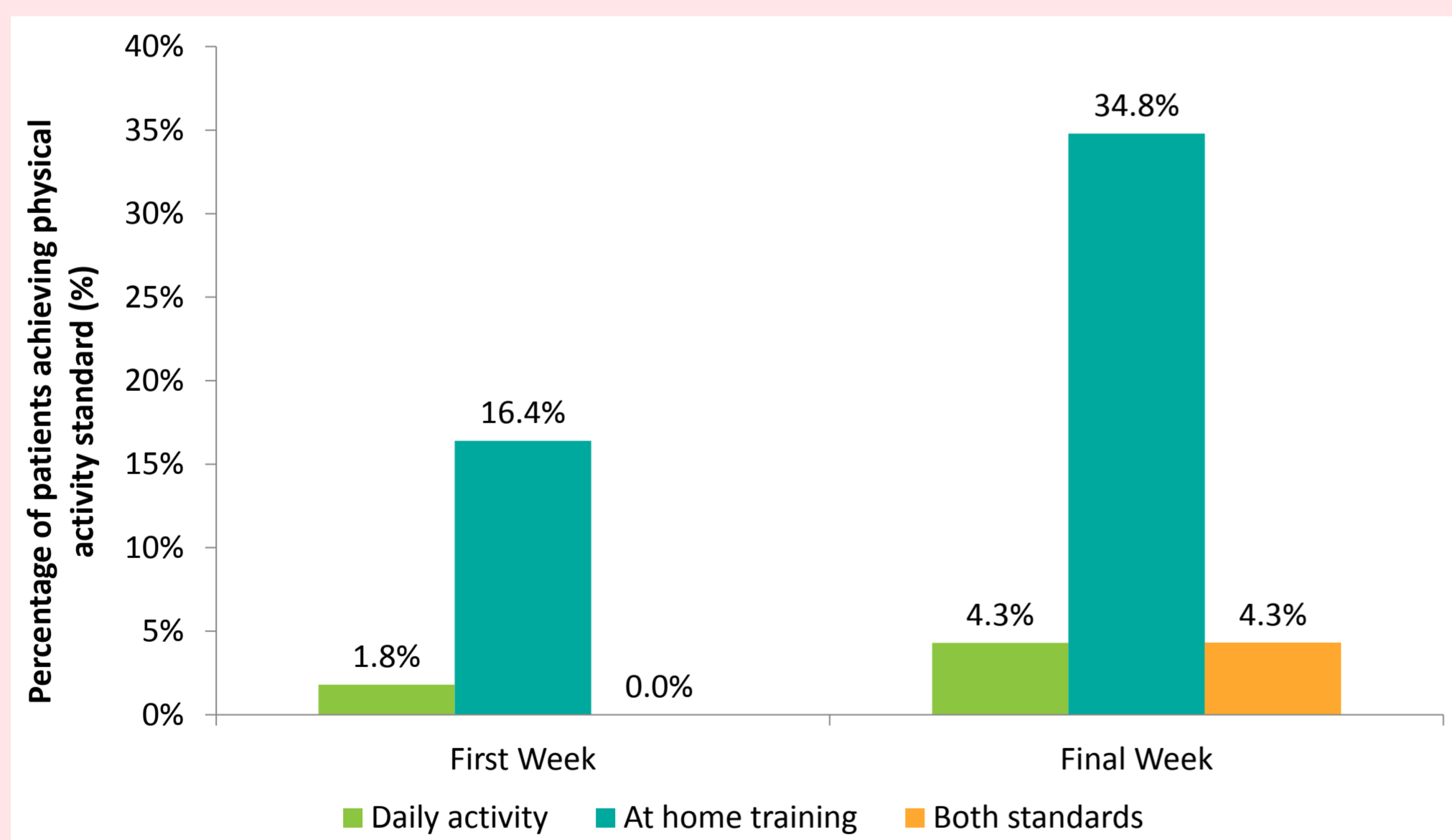
**Fifty-five patients from the first week and 23 patients from the final week of CR returned sufficient data and received a contextualised feedback report and advice on optimising their physical activity in a free-living environment from a cardiac nurse.**

## RESULTS

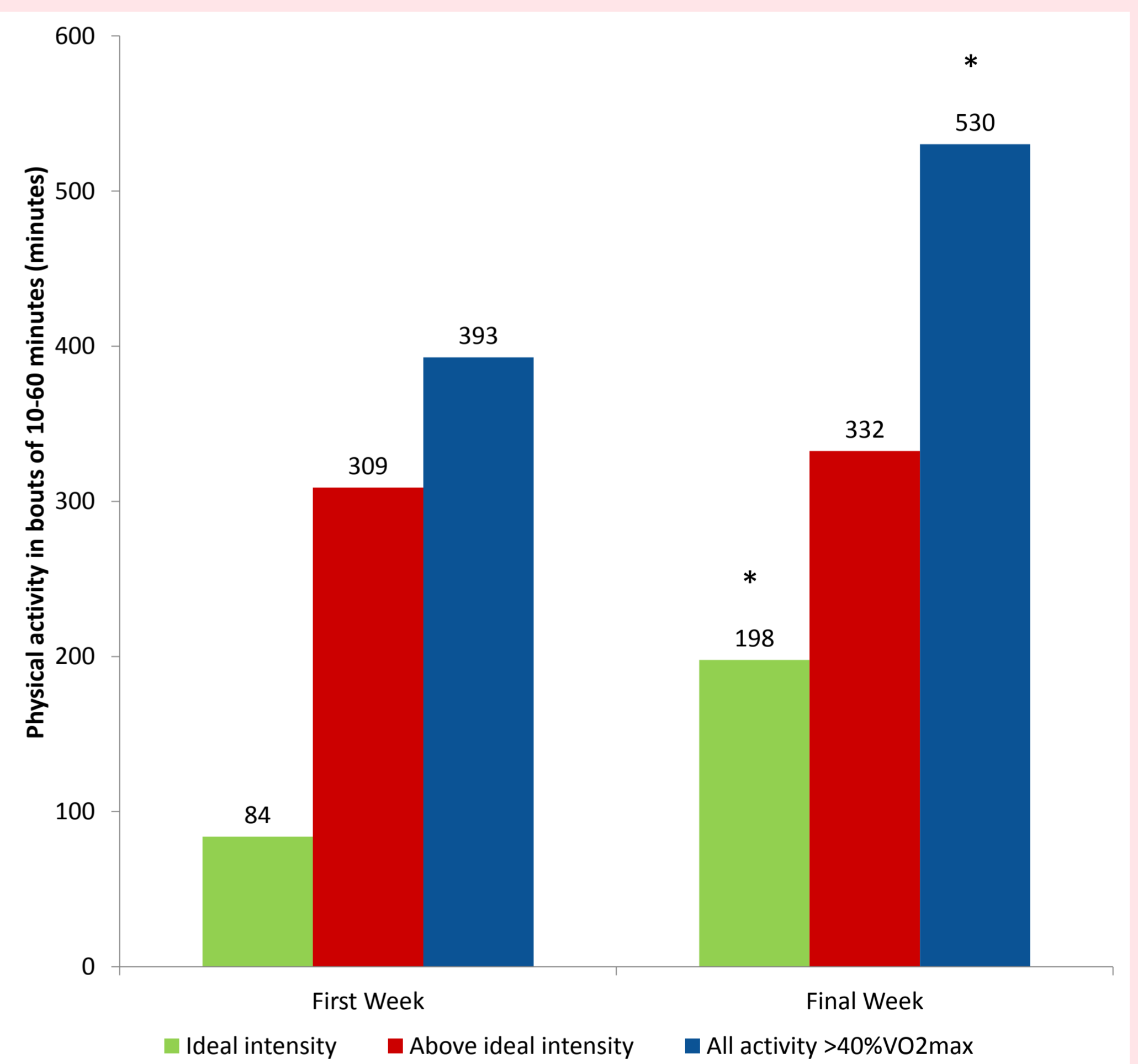
**PATIENT ACCEPTANCE:** Compliance to wearing the monitor was excellent; **wear time averaged 89.7% and 87.4% in first and final week, respectively.**

### PHYSICAL ACTIVITY

- Total physical activity increased between first and final week and was primarily due to a **significant increase in activity at an ideal intensity (Figure 2, right)**
  - 1st week: Average of 84-minutes**
  - Final week: Average of 198-minutes**
- Negatively, at both the first and final week patients completed an average of over 5-hours of activity above the ideal intensity.
- No patients achieved both the ACPICR standards for At-home Training and Activity for Health Benefits in the first week and only 1 patient achieved both these standards in the final week of CR (Figure 1, below).**



**Figure 1:** Percentage of patients achieving the ACPICR standards (2009) for physical activity in a free-living environment at the first (n=55) and final week (n= 23) of Phase 3 CR.



**Figure 2:** Total minutes of physical activity achieved in bouts of 10 to 60-minutes within the ideal intensity range, above ideal intensity and above the minimum threshold (40%  $VO_{2max}$ ) at the first (n=55) and final week (n= 23) of Phase 3 CR. \* = Significantly different for the first week of CR (P<0.05).

## CONCLUSION

- Continuous monitoring of free-living physical activity was shown to be feasible and highly acceptable to CR patients.
- Physical activity behaviour was selectively changed; patients increased physical activity at the ideal intensity and duration; contextualised feedback was associated with a 27% increase in the proportion of PA at the ideal intensity and duration.**
- Larger randomised trials of this methodology are now indicated to establish efficacy of this novel model for the delivery of CR.

### References:

Association of Chartered Physiotherapists in CR (2009) ACPICR Standards for physical activity and exercise in the cardiac population. UK: ACPICR.