Remote, Smart Device Based Cardiac Rehabilitation After Myocardial Infarction. Smart Rehab Study

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Benefits of exercise-based CR after MI

- Cardiovascular mortality reduction by **26%**[1]
- Hospital admission reduction by **18%**[1]
- Improves QoL[1]

- only **25%** of eligible patients attend even 1 session of CR[2]

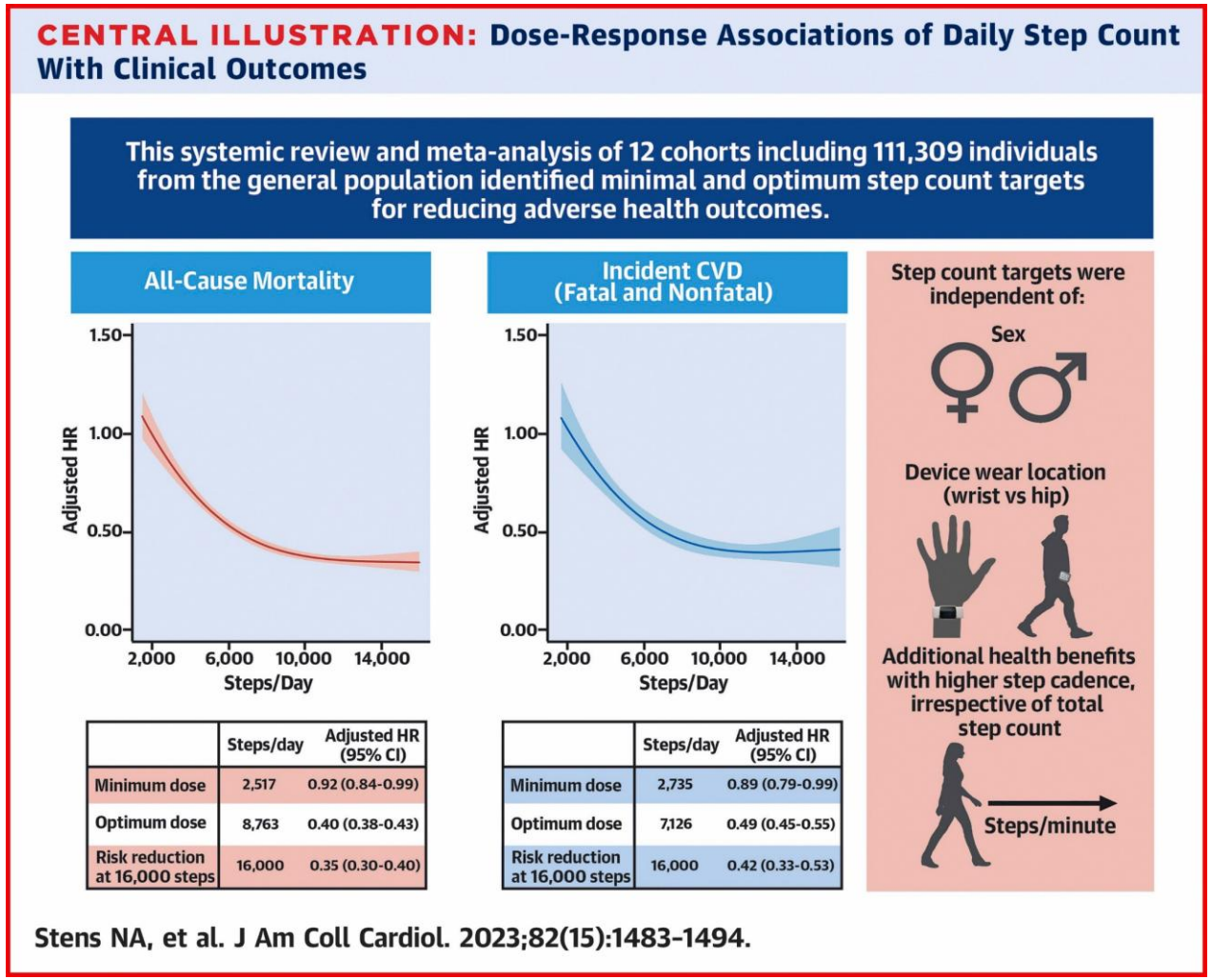
Novel models of CR delivery are needed

IK+E M

CR: cardiac rehabilitation

[1]*Anderson L et al., JACC 2016;**67**(1):1-12.*
[2]*Duncan MS et al., JACC 2023;**81**(11):1049-1060.*

Walking - the most accessible form of exercise



Hypothesis

Among patients after MI not attending traditional CR, increasing number of steps a day can improve functional status (VO_2peak)

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CR: cardiac rehabilitation

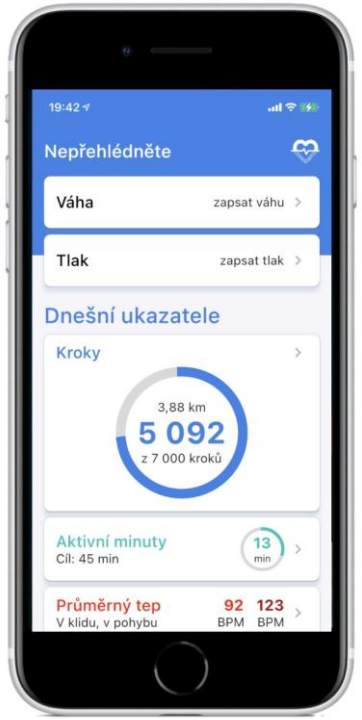
Telemonitoring – a tool to improve compliance

No of steps a day based on 6MWT

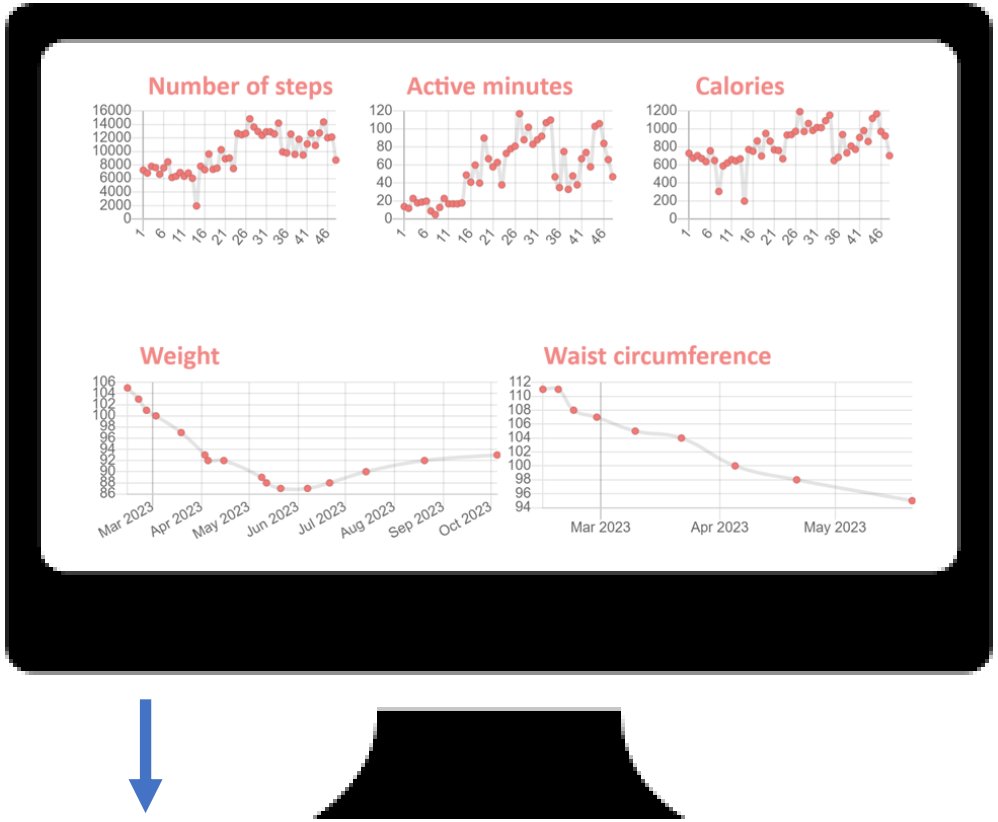
Apple watch

Apple Health

Proprietary app



Data integrated into Hospital Information System



Motivational talk if non-compliance

IKEM

Methods

- Pilot single center randomised **cross over study** with 3 months of intervention

Hospitalization for MI

Inclusion Criteria:

1.Signed informed consent with the study
2.Men and women >18 years of age
3.Physical inactivity before MI defined as the absence of moderate to vigorous exercise for at least 30 minutes 5 or more days a week

Exclusion Criteria:

1.Heart failure NYHA IIIB-IV
2.Planned coronary revascularization
3.Planned major surgery within the next 12 months
4.Inability to walk for any reason
5.Comorbidities that would preclude adherence to the rehabilitation program (e.g. arthrosis, active malignancy, major depression or other significant psychiatric disorder, cognitive impairment)
6. Life expectancy less than 12 months
7. Pregnancy
8. Inability to operate the smart-watch

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Hospitalization for MI

1. Outpatient visit

1 month after MI

1:1 Randomisation

CPET

Blood tests

KCCQ

6-minute walk test

1:1 Randomisation

Control group

Intervention group

Number of steps a day:– **GOALS:**

- 0.9 x 5 x 6MWT number of steps
- 25% during brisk walk
- 5% increase every 14 days
- compliance monitored by study nurse

1:1 Randomisation

Control group

Intervention group

Cross over

Intervention group

Control group

2. Outpatient visit
3 months after V1

CPET

Number of steps a day – GOALS:
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Number of steps a day:
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Cross over

Intervention group

Control group

3. Outpatient visit
3 months after V2

CPET

Blood tests

KCCQ

6-minute walk test

Study population

- 64 patients recruited – 3 patients stopped at their request

	Intervention first (N=31)	Control first (N=30)
Age	51.6 ± 10.2	51.2 ± 10.5
Male gender	28 (90%)	27 (90%)
STEMI	20 (65%)	22 (73%)
Killip I	25 (81%)	26 (87%)
direct PCI	30 (97%)	29 (97%)
EF at discharge	46.6±8.7	49.3±10.5
BMI	29.9±4.2	30.5 ±4.3
VO2 peak	22.6±5.6	23.2±5.1
VO2peak≤80% predicted	14 (45%)	12 (40%)

Primary endpoint: VO2 peak

Inter-group difference at 3 months
1.80 (95% CI 0.37 to 3.23), p=0.014

Generalized linear mixed model with gama regression adjusted for baseline values. Data are estimated means with 95% CI

Primary endpoint: VO2 peak

Cross-over

Generalized linear mixed model with gama regression adjusted for baseline values. Data are estimated means with 95% CI

VO2peak in patients with $VO2_{peak}$ at baseline ≤80%

Cross-over

Inter-group difference at 3 months:
3.59 (95% CI 1.84 to 5.34), p<0.001

Generalized linear mixed model with gama regression adjusted for baseline values. Data are estimated means with 95% CI

Secondary outcomes

Cross-over

Inter-group difference at 3 months
-1.53 kg (95% CI 0.07 to -3.13), p=0.06

Secondary outcomes

Cross-over

6-minute walk test

Inter-group difference at 3 months
7.7m (95% CI -11.8 to 27.1), p=0.44

Secondary outcomes

Cross-over

Inter-group difference at 3 months
2.64 (95% CI -1.30- 6.57), p=0.187

Summary

Pilot data (61 patients):

- Smart device-based CR **improves functional capacity** in patients after MI not attending in-person CR
- The benefit and carry-over effect is larger in patients with **decreased functional capacity**
- No difference in effect between early (first 3M after MI) vs. late (after 3M) intervention
- It leads to weight reduction
  - adequately powered study needed