

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Cardiac Rehabilitation

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Agenda

- **Benefits of CR**
- **Barriers**
- **How to overcome barriers**
- **Clinical performance & quality measures**

Current Indications for Cardiac Rehabilitation

Indications

Myocardial infarction

Coronary artery bypass graft surgery

Percutaneous coronary intervention

Stable angina

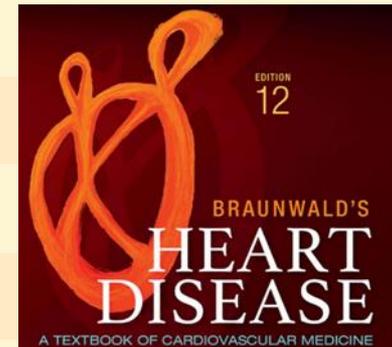
Heart valve repair/replacement

Heart transplantation

Heart failure with reduced ejection fraction

*Peripheral artery disease with claudication

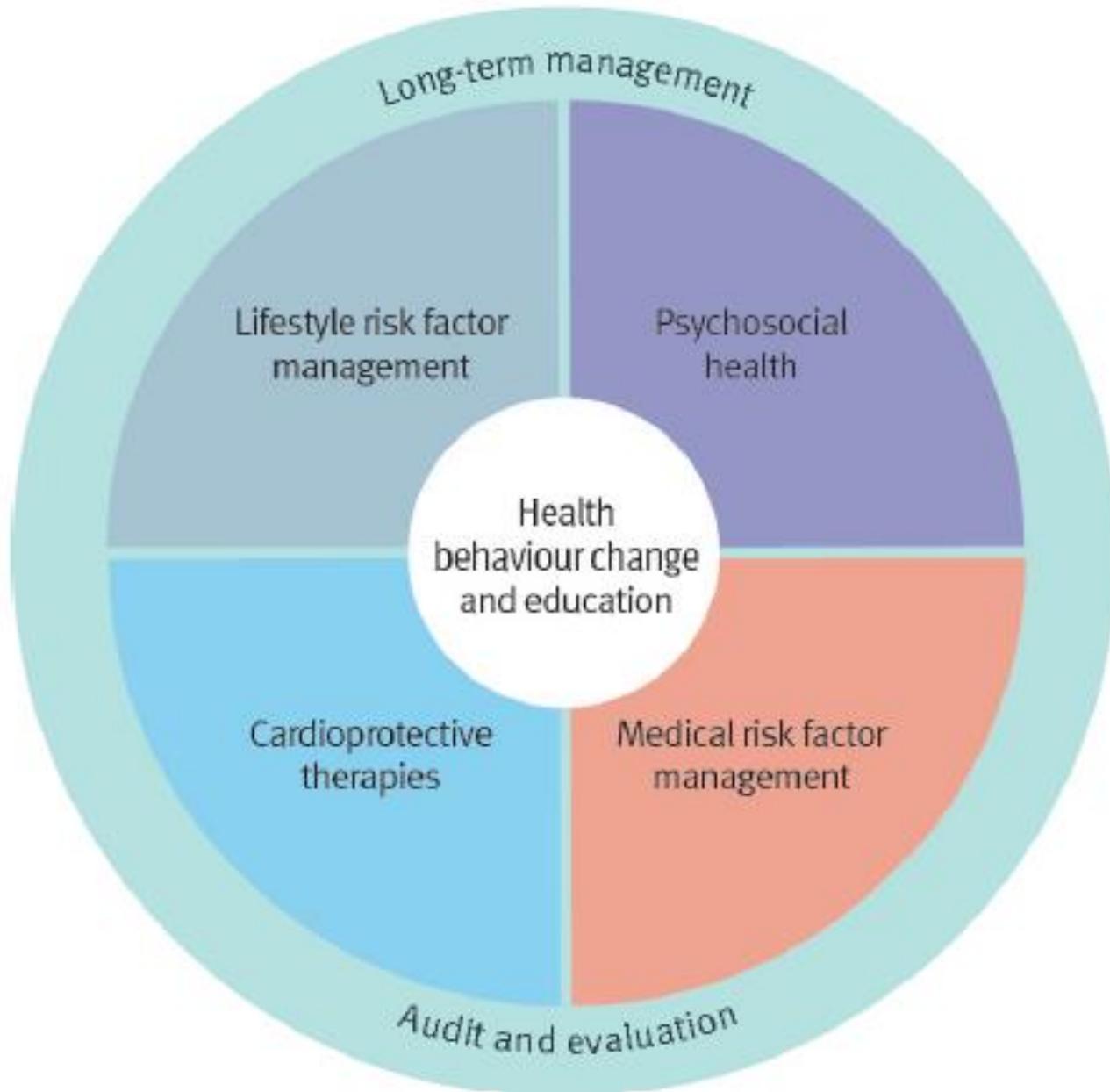
2022



Phases of care

Phase I	in-hospital (3-5 days)
Phase II	post discharge (2-6 weeks)
Phase III	outpatient programme (6-12 weeks)
Phase IV	long-term maintenance in community

Core components of cardiac rehabilitation



What is **CARDIAC REHABILITATION?**

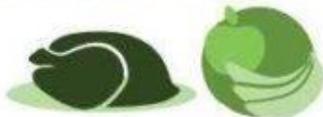
1 Regular Exercise

From supervised activities, to a daily walk in the park, the idea is to get moving.



2 Adopt a Heart Healthy Diet

This includes meals that are low in salt and rich in whole grains, fruits, vegetables, low-fat meats and fish.



Cardiac Rehabilitation Programs Typically Consist Of The Following **5** Components

3 Reduce Stress

Learn to control your daily stress through relaxation techniques, recreation, music and other various methods.



5 Stop Smoking

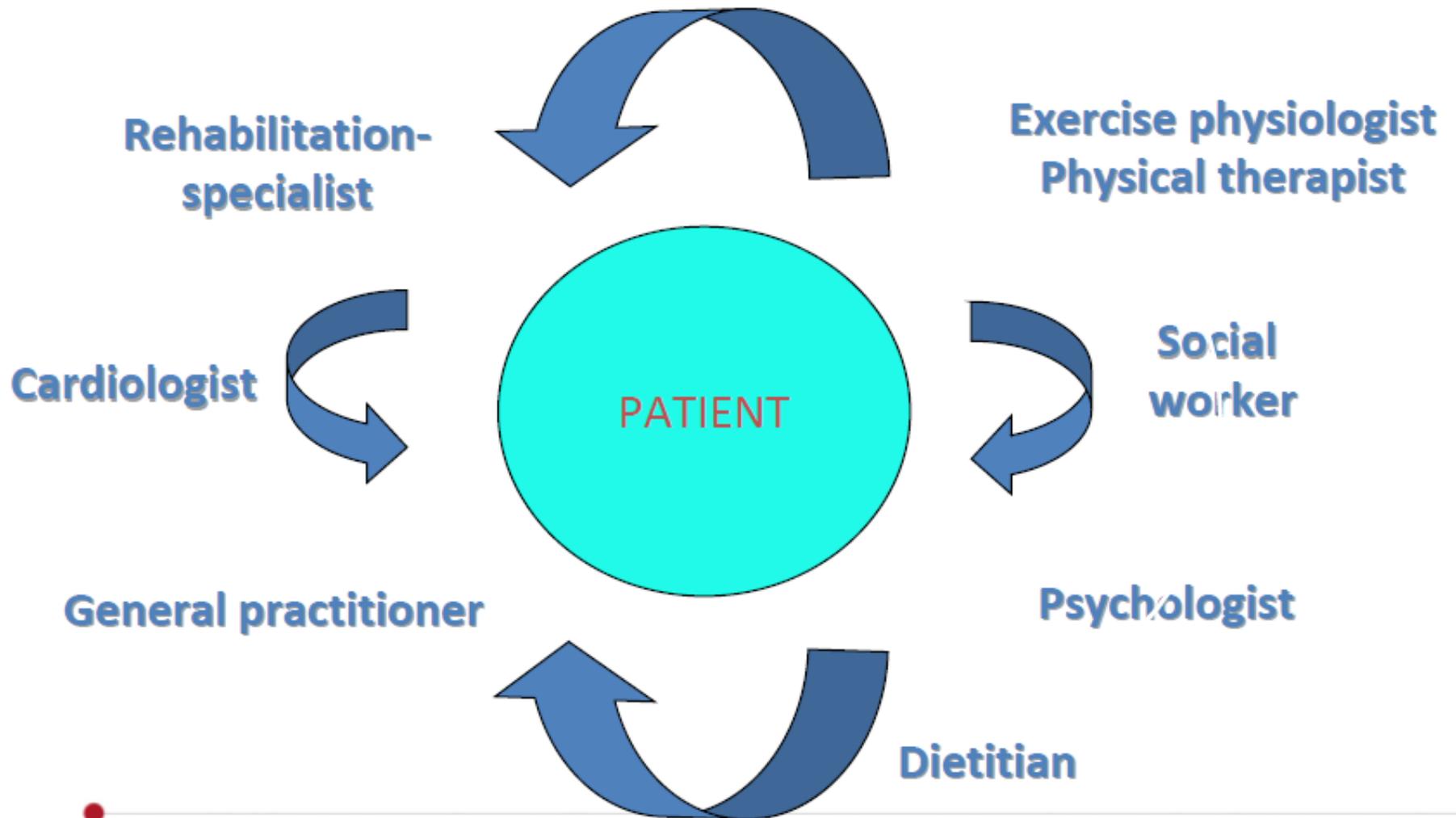
Most cardiac rehab programs offer methods to help you kick this harmful habit.



4 Medical Therapy

Follow your doctor's instructions carefully and take your medications as directed.





Cardiac rehabilitation



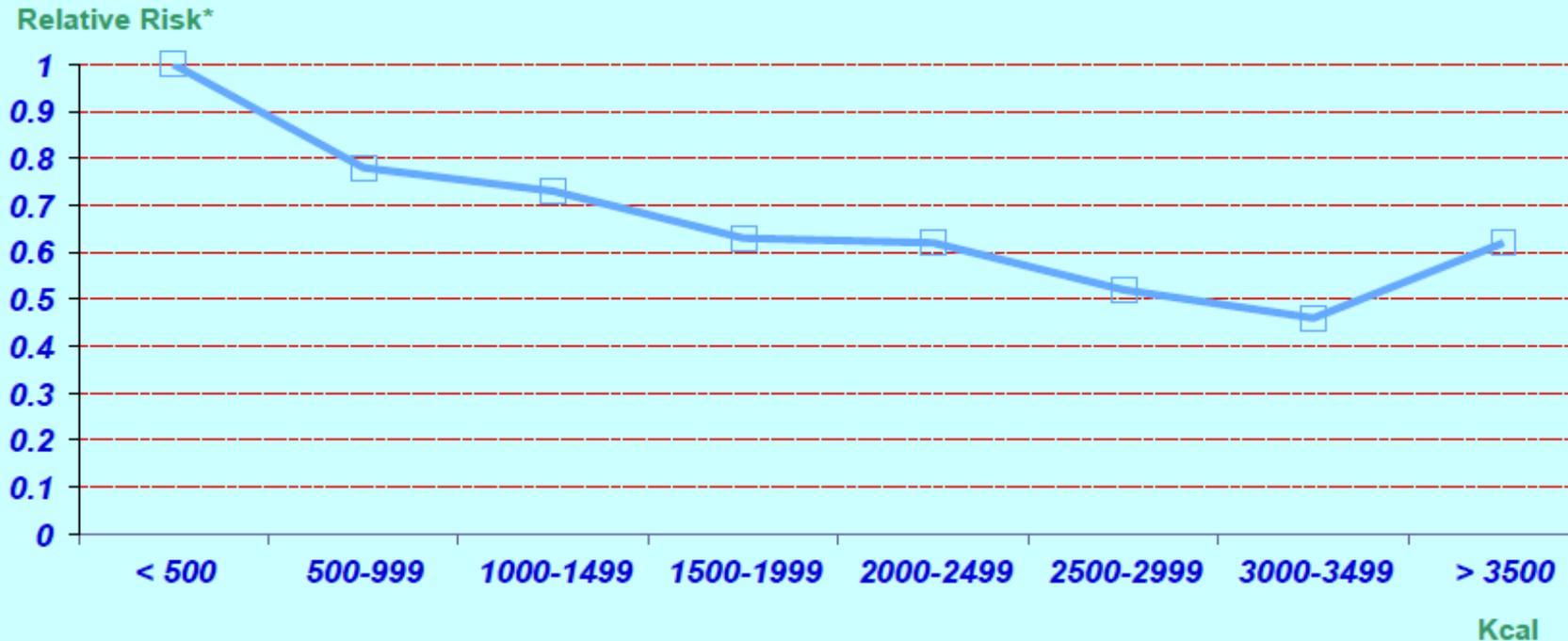
For all cardiac patients who would benefit



Interdisciplinary team of professionals involved in rehabilitation

Physical activity and mortality

Paffenbarger et al, 1986



* Adjusted for Age

Benefits of CR

- **Improved functional abilities**
- **Improved Quality of Life**
- **Reduction of lifestyle related risks**
- **Increased knowledge of disease process and prevention strategies**

American Heart Association Consensus Panel Statement. Preventing heart attack and death in patients with coronary disease. *Circulation*. 1995;92:2-4.

Benefits of CR

- **Improved compliance with medical regimen**
- **Improved metabolic profile**

Malbut-Shennan, K. and Young, A. The physiology of physical performance and training in old age. *Coronary Artery Dis.* 1999;10:37-42.

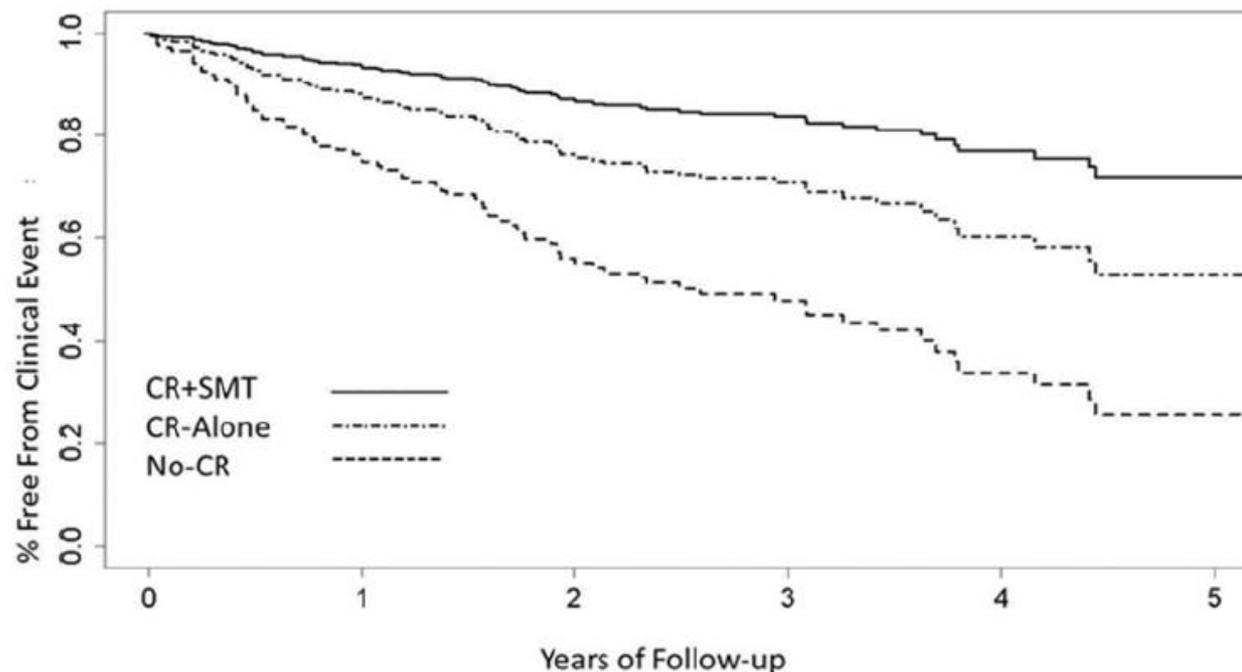
Gottlieb, S.S., Fisher, M.L., and Freudenberger, R. et al Effects of exercise training on peak performance and quality of life in congestive heart failure patients. *Journal of Cardiac Failure*, 1999;5:188-194.

Lavie, C.J., Milani, R.V., and Littman, A.B. Benefits of cardiac rehabilitation and exercise training in secondary coronary prevention in the elderly. *J Am Coll Cardiol.* 1993;22:678-683.

Agency for Health Care Policy and Research, U.S. Department of Health and Human Services. Cardiac Rehabilitation Clinical Practice Guidelines. Publication No. 96-0672, October 1995.

Enhancing Cardiac Rehabilitation With Stress Management Training: A Randomized Clinical Efficacy Trial

SMT= stress management
12 weeks
group therapy
1,5 h



No. at risk			
Overall	226	111	27
CR+SMT	76	49	9
CR-Alone	75	37	11
No-CR	75	25	7

*Blumenthal et al,
Circulation 2016;
133(14):1341-50*



Maintenance



Original Scientific Paper

Maintaining physical fitness of patients with chronic heart failure: a randomized controlled trial

Paul J. Beckers^{a,b}, Johan Denollet^{b,c}, Nadine M. Possemiers^a, Kurt Wuyts^a,
Christiaan J. Vrints^{a,b} and Viviane Marie Conraads^{a,b}

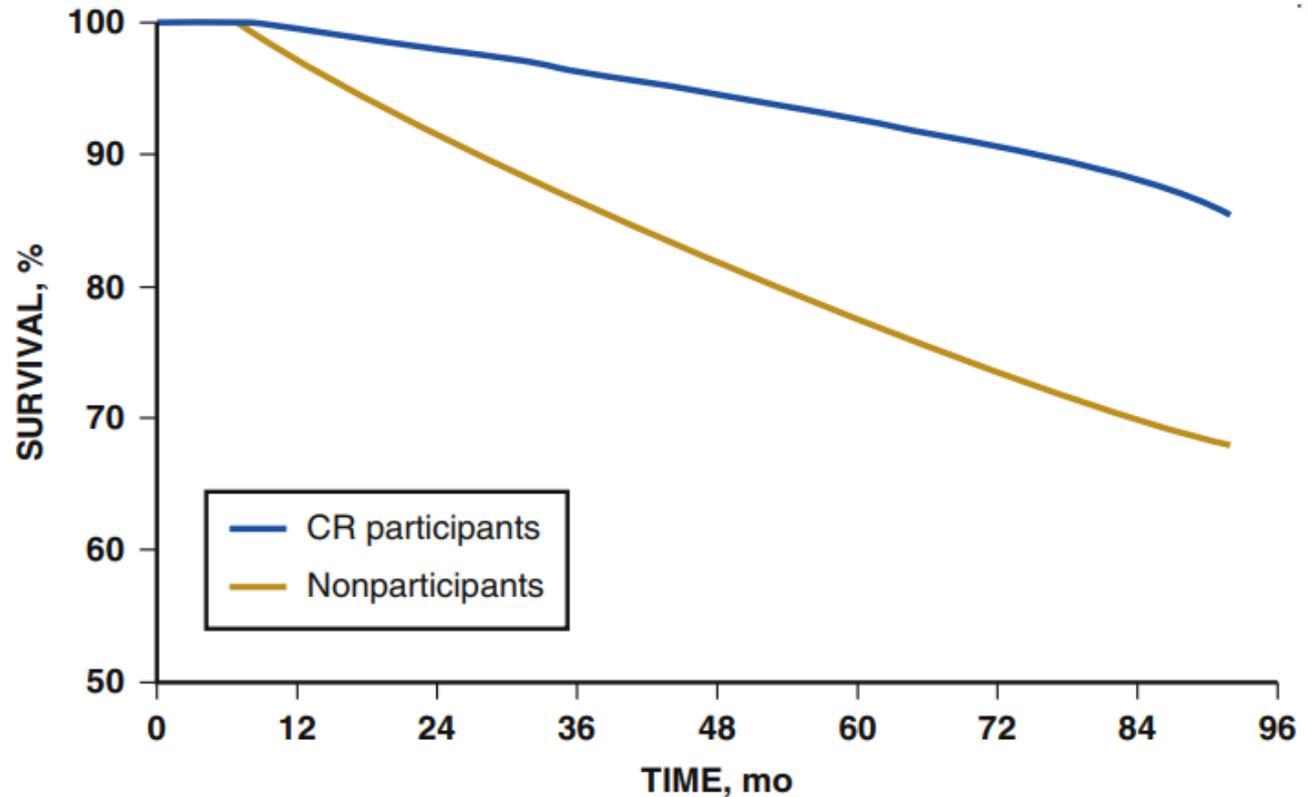
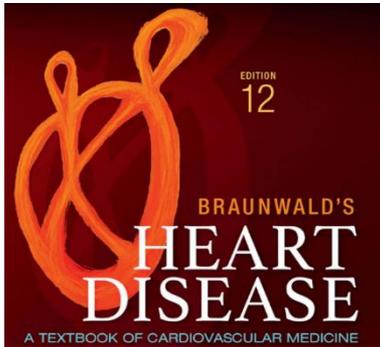
^aDepartment of Cardiology, Antwerp University Hospital, Edegem, ^bUniversity of Antwerp, Antwerp, Belgium and ^cCoRPS-Center of Research on Psychology in Somatic Diseases, Tilburg University, The Netherlands

Received 3 February 2010 Accepted 13 March 2010

Event-free survival comparison for patients eligible for CR who did and who did not participate in CR

(log-rank test comparing curves, $P < 0.001$ for overall survival). (From Eijsvogels TMH, Maessen MFH, Bakker EA, et al. Association of cardiac rehabilitation with all-cause mortality among patients with cardiovascular disease in the Netherlands. JAMA Netw Open. 2020;3:e2011686.)

2022



No. at risk	0	12	24	36	48	60	72	84	96
Nonparticipants	57516	56116	52864	44830	35222	26467	17584	7805	
CR participants	26171	26055	25683	21609	16328	11487	7400	3309	

Benefits of CR

it is cost effective

- Reduced risk of fatal MI ($\leq 25\%$).
- Decreased severity of angina & need for anti-angina medications .
- Decreased hospitalizations.
- Decreased cost of physician office visits & hospitalizations ($\leq 35\%$).
- Decreased ER visits.

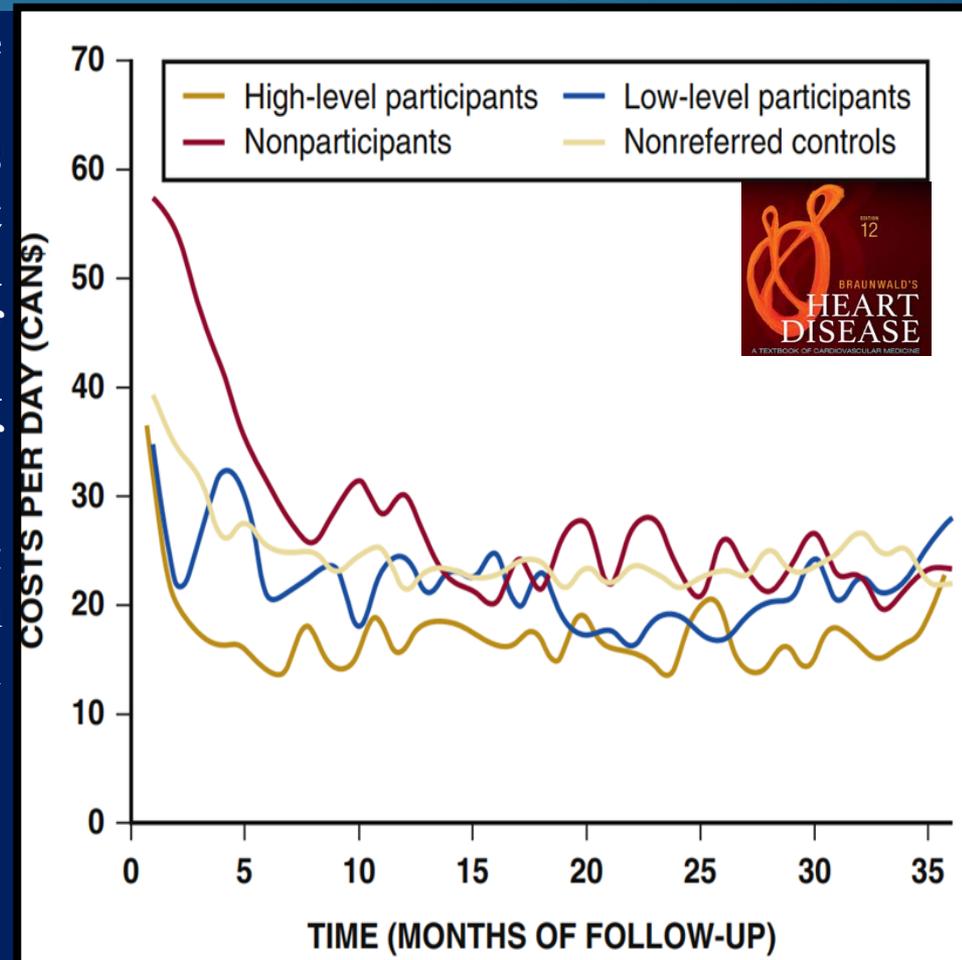
Ades, PA, et al (2000) Medical Clinics of North_America

Sudlow, C, et al (1999) Clinical Evidence

Lavie, CJ, et al (1999) Cardiology Clinics

Health service utilization costs per patient per day in 36 months of follow-up

- involving four groups of patients eligible for cardiac rehabilitation (CR): (1) patients not referred to CR, (2) patients referred to CR but who did not participate, (3) patients referred to CR and who participated in a low level of sessions, and (4) patients referred to CR and who participated in high level of sessions. (From Alter DA, Yu B, Bajaj RR, et al. Relationship between cardiac rehabilitation participation and health service expenditures within a universal health care system. *Mayo Clin Proc.* 2017;92:500–511.)



Risk factor modification

The factors that contribute to disease, can influence progression and future events.

Exercise in healthy people cause:

- Raised metabolic rate
- Increased synthesis of HDL
- Improved insulin sensitivity
- Decreased blood pressure

Exercise reduces triggers in cardiac events:

- Prevents thrombus formation
- Improves endothelial function
- Reduces potential for serious arrhythmias

Successful Cardiac rehabilitation (CR)

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graph LR; A[Referral] --> B[Enrollment]; B --> C[Completion/Adherence];
```

Referral

Before discharge

Enrollment

Within weeks

Completion/
Adherence

Lifelong

Determinants of participation and risk factor control according to attendance in cardiac rehabilitation programmes in coronary patients in Europe: EUROASPIRE IV survey

European Journal of Preventive Cardiology
2018, Vol. 25(12) 1242-1251
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DOI: 10.1177/2047487318781359
journals.sagepub.com/home/ejpc
SAGE

Kornelia Kotseva^{1,2} David Wood¹ and Dirk De Bacquer²; on behalf of EUROASPIRE investigators

Design: cross-sectional

Population: <80 yrs + ACS/revasc. procedure
N=7998 from 24 European countries,
interviewed min. 6 months after their event

	EUROASPIRE III	EUROASPIRE IV	
Advised to attend CR	46%	47%	P=0.44
Participation in CR	37%	39%	P=0.40

Barriers

- **Healthcare system**
- **Healthcare professionals**
- **Patient-related**

Healthcare System

- **Lack of unified policy or guidelines for CR**
- **Absent or deficient patient registry or database**
- **Limited number of centers or hospitals offering CR**

Barriers to CR

Physician

Lack of
referral

- The patient will not benefit
- Not important
- Forgotten

Barriers and suggested solutions

Physician

Lack of referral

Automatic referral

Emphasize the importance

- Minimize psycho-social disparities
- Minimize enrollment delay

Each day of enrollment delay → 1% ↓ likelihood of enrollment

Adherence faces many barriers

European Journal of
Heart Failure



Position Statement |  [Free Access](#) |

Adherence of heart failure patients to exercise: barriers and possible solutions

A position statement of the Study Group on Exercise Training in Heart Failure of the Heart Failure Association of the European Society of Cardiology

Viviane M. Conraads , Christi Deaton, Ewa Piotrowicz, Nuria Santaularia, Stephanie Tierney, Massimo F. Piepoli, Burkert Pieske, Jean-Paul Schmid, Kenneth Dickstein, Piotr P. Ponikowski, Tiny Jaarsma, ... [See fewer authors](#) ^

First published: 18 February 2014 | <https://doi.org/10.1093/eurjhf/hfs048> | Cited by: 91

Non-adherence = the Achilles heel
of exercise training programmes



Barriers to CR

Patient

Older age

Female gender

Comorbidities

Unemployed

Uncoupled

Less educated

Depression (anxiety)
Physical limitations
Familiar responsibilities



Busting the biggest exercise excuses

- I hate exercising
- I'm too busy
- I am too tired
- I'm too fat, too old, my health isn't good enough
- Exercise is too difficult and too painful
- I'm not athletic

Vivian Conraads, Tiny Jaarsma et al EurJHF 2014

Table 3 Barriers for exercise in heart failure reported in literature

Barriers	
Patient related	Older age Low level of education Low socio-economic status Minority status Anxiety and depression Logistical problems Lack of motivation Lack of insight into benefits Lack of time
Social and economic	Lack of resources and support Lack of reimbursement Transportation issues
Healthcare team/system	Lack of expertise with heart failure Lack of capacity Lack of heart failure expertise in programmes Lack of referral Lack of education on the importance of exercise
Condition related	Severity of symptoms Level of disability Rate of disease progression Impact of co-morbidities, including depressive symptoms/cognitive problems
Therapy related	Lack of relevance of some exercise activities for daily life Difficulty to incorporate exercise into daily life

Safety of Cardiac Rehabilitation

- Despite the inclusion of patients with relatively high CVD risk in CR programs and the use of exercise training as part of the program, the use of standardized safety protocols has helped CR programs maintain an excellent safety record, reporting very low rates of serious events (including in-center cardiac arrest, MI, or death). One study involving 65 CR centers reported one cardiac arrest, and no MI or deaths during 1.3 million patient-hours of CR

Home-based CR



Cochrane Database of Systematic Reviews

2017

**Home-based versus centre-based cardiac rehab
(Review)**

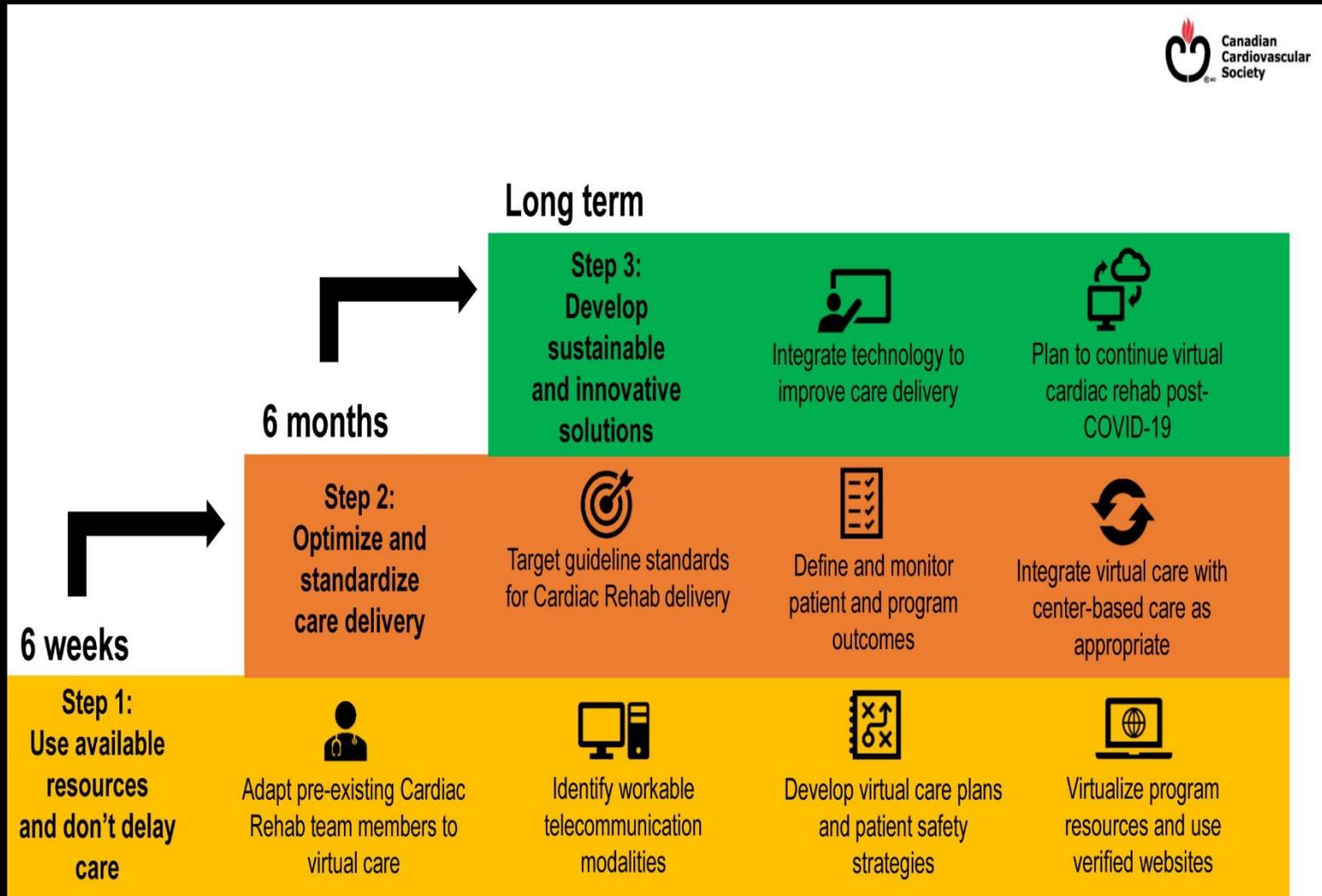
Smartphone-based home care model improved use of cardiac rehabilitation in postmyocardial infarction patients: results from a randomised controlled trial

Anderson L, Sharp GA, Norton RJ, Dalal H, Dean SG, Jolly K, Cowie A, Z:

Marlien Varnfield,^{1,2} Mohanraj Karunanithi,^{1,3} Chi-Keung Lee,⁴ Enone Honeyman,¹ Desre Arnold,⁴ Hang Ding,¹ Catherine Smith,² Darren L Walters^{3,5}

Heart 2014;100(22):1770-79

The steps of virtual cardiac rehabilitation delivery.



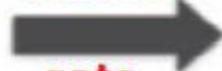
Tele-medicine based monitoring

HEART RATE MONITORING

Exercise training



Heart rate



iPhone

Physical activity



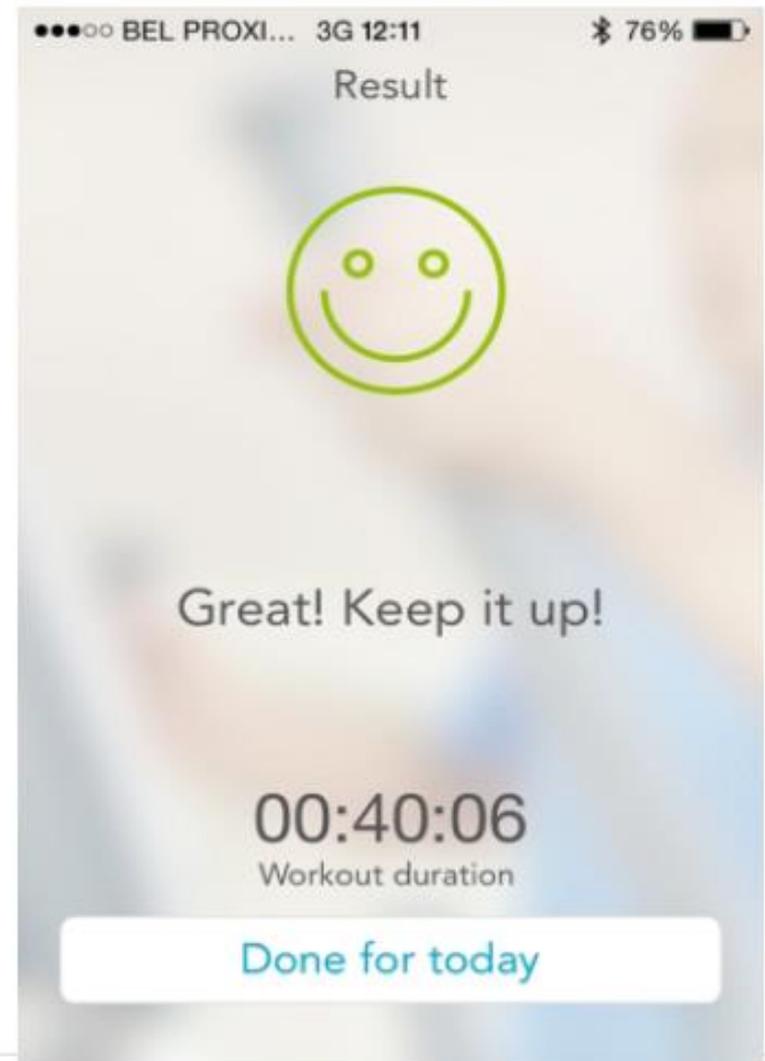
ACCELEROMETRY



vitaphone
health solutions



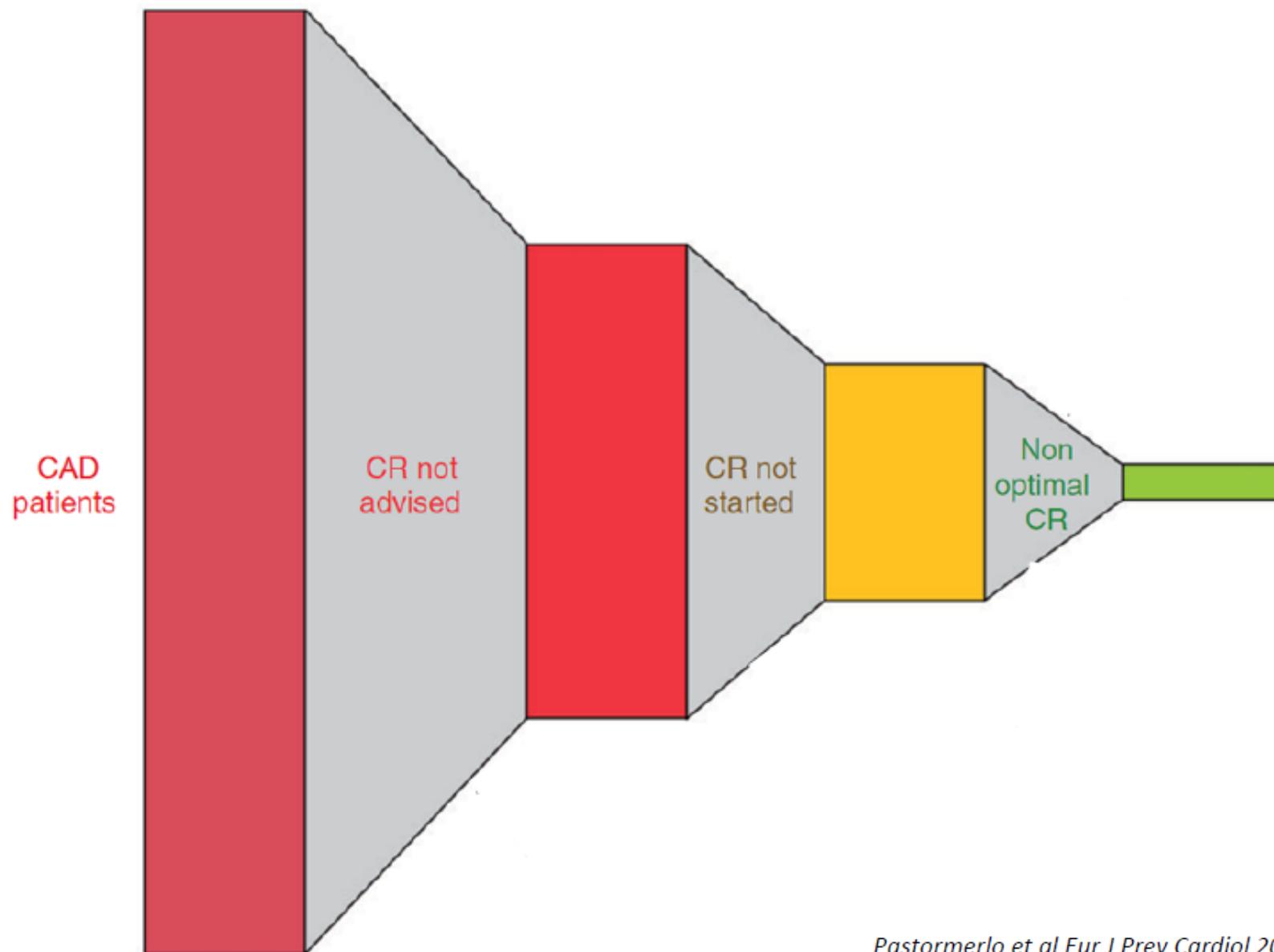
Messages after training



Conclusions

- Patients need **encouragement** from the start to participate in exercise.
- Patients will only proceed and **adhere** when they are doing their **preferred** kind of **exercise**
- Regular updates of their physical capacities and **regular encouragement** will motivate them to continue

The bottleneck of Cardiac Rehabilitation



LIVING TO 100

Not exercising worse for your health than smoking, diabetes and heart disease, study reveals



By [Wayne Drash](#), CNN

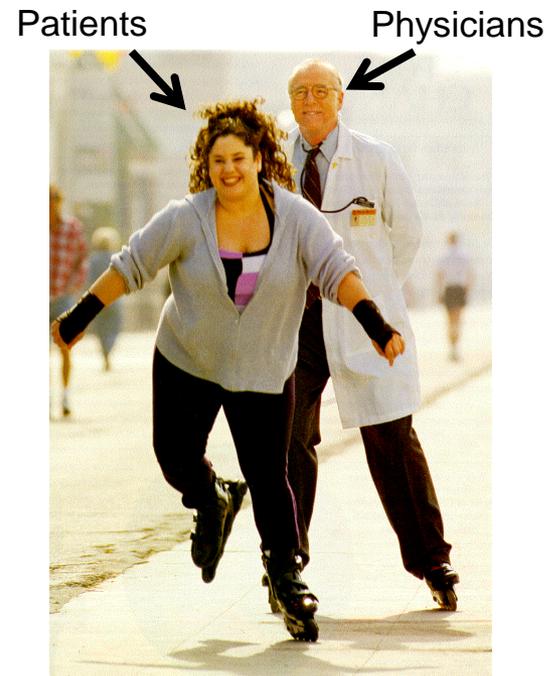
Updated 1700 GMT (0100 HKT) January 11, 2019



Do You Really Think We have a Chance Without Exercise?

- Obesity
- Coronary artery disease
- Diabetes
- Hypertension
- Cancer
- Depression and anxiety
- Arthritis
- Osteoporosis
- Etc, etc, etc...

NO!





Exercise is Medicine



If exercise could be packed in a pill, it would be the single most widely prescribed and beneficial medicine in the nation.

*Robert N. Butler, M.D.
Former Director,
National Institute on Aging*

0 3 5 140 5 3 0

People who stay healthy tend to have certain characteristics:

- 0** No tobacco
- 3** Walk 3 km daily, or 30 mins any moderate activity
- 5** Portions of fruit and vegetables a day
- 140** Blood pressure less than 140 mm Hg systolic
- 5** Total blood cholesterol <5 mmol/l
- 3** LDL cholesterol <3 mmol/l
- 0** Avoidance of overweight and diabetes

More personalized CVD prevention in the guidelines, instead of a one-size fits all. Also the introduction of a stepwise approach to intensify preventive treatments



Gamela Nasr

Thanks