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REVIEW ARTICLE

Cardiac Rehabilitation — Challenges, Advances, and the Road Ahead

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۲۲ اردیبهشت ۱۴۰۳

- ✓ Each year in the United States, more than 1 million persons enter the turbulent waters of recovery after a cardiovascular event
- ✓ Surprisingly, only approximately 25% of patients who have had a cardiovascular event participate in cardiac rehabilitation despite its multiple proven benefits
- ✓ Cardiac rehabilitation is a secondary prevention therapy for persons with cardiovascular disease.
- ✓ This review addresses the current science and practice of cardiac rehabilitation, as well as the lessons learned from the past that will guide future directions in cardiac rehabilitation

History of Cardiac Rehabilitation

VI. *Some Account of a Diſorder of the Breaſt. By* WILLIAM HEBERDEN, *M. D. F. R. S.*

Read at the COLLEGE, JULY 21, 1768.

THERE is a diſorder of the breaſt, marked with ſtrong and peculiar ſymptoms, conſiderable for the kind of danger belonging to it, and not extremely rare, of which I do not recollect any mention among medical authors. The ſeat of it, and ſenſe of ſtrangling and anxiety with which it is attended, may make it not improperly be called Angina pectoris.

As early as 1772, Heberden noted a possible role for exercise as a therapy for CVD, reporting that a patient with angina who sawed wood 30 minutes daily for 6 months “was nearly cured”

- ✓ Until the **1950s**, physical activity was generally prohibited
- ✓ In 1952, Levine and Lown reported

that armchair exercise was both safe beneficial for hospitalized patients AMI.(chair Therapy).

- ✓ Wenger introduced a progressive physical activity regimen initiated in the intensive care setting

  Hellerstein and Ford extended cardiac rehabilitation to the outpatient setting a move that drew serious criticism because of safety concerns.

- ✓ In 1978, Haskell reported that in a study of 30 outpatient cardiac rehabilitation centers, severe cardiovascular complications were rare.

Around this same time, the Centers for Medicare and Medicaid Services (CMS) began to provide coverage for outpatient cardiac rehabilitation services, and guidelines were published in 1995.

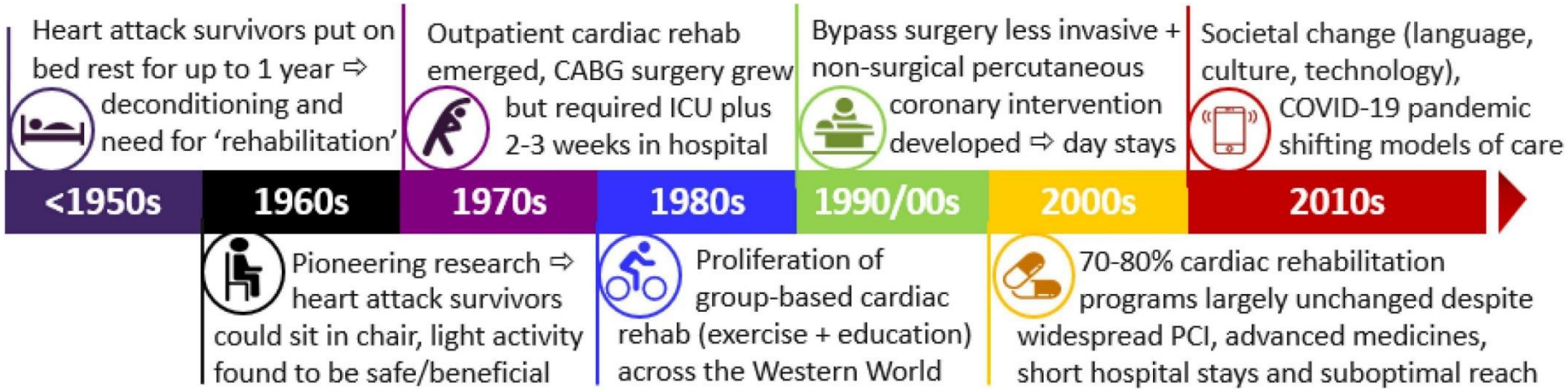
تعریف بازتوانی قلبی (سازمان بهداشت جهانی، ۱۹۶۴)

- مجموع فعالیت ها و مداخلات مورد نیاز برای ایجاد**بهترین شرایط جسمی، روانی و اجتماعی** ممکن، به طوری که بیماران بتوانند با تلاش خود، مکان عادی خود را در جامعه را حفظ کرده یا به دست آورند و زندگی فعالی داشته باشند.

"... the sum of activity required to ensure cardiac patients the best possible physical, mental and social conditions so that they may, by their own effort, regain as normal a place in the community, and lead an active life."

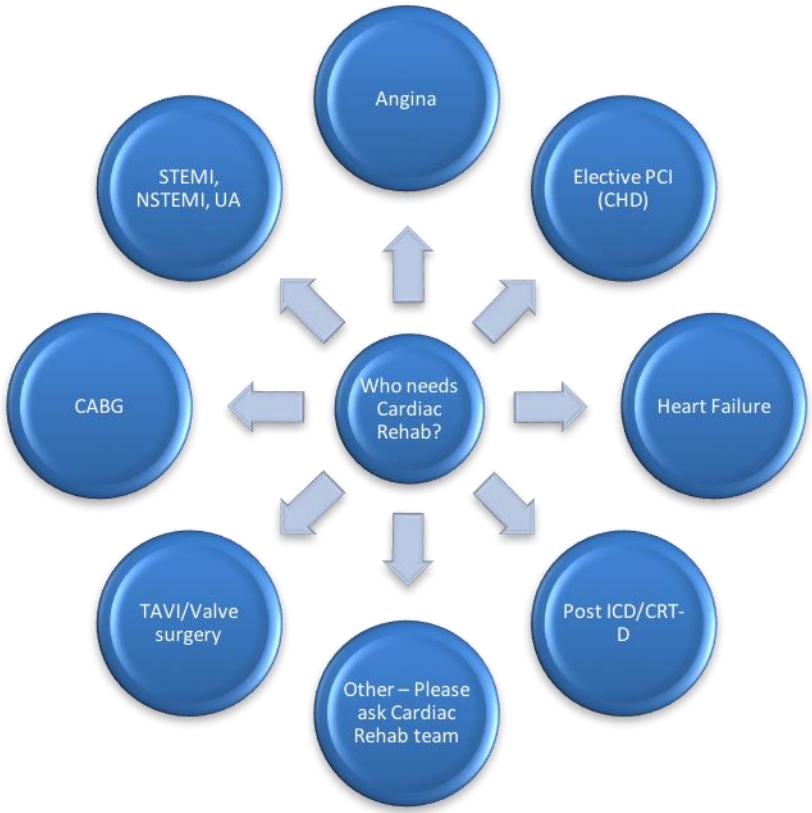
World Health Organization, 1964

CR Evolution



CR Programs

- ✓ The science and practice of CR have continued to grow over the past three decades.
- ✓ The current aim of cardiac rehabilitation is to help patients achieve the best possible cardiovascular health.



Clinical practice guideline for CR

Table 1. Clinical Practice Guideline Recommendations for Center-Based Cardiac Rehabilitation (CR) and Supervised Exercise Training.*

Clinical Practice Guideline	Recommendation	Class of Recommendation (Level of Evidence)†
Center-based CR		
ACC–AHA: coronary-artery revascularization[31]	Among patients who have undergone a revascularization procedure, a comprehensive home- or center-based CR program should be prescribed before hospital discharge or during the first outpatient visit, with the goal of reducing the risks of death and hospital readmission and improving quality of life	I (A)
ACC–AHA: STEMI[30]	Exercise-based CR and secondary prevention programs are recommended for all patients who have had STEMI	I (B)
ACC–AHA: unstable angina or NSTEMI[29]	All eligible patients with an acute coronary syndrome or NSTEMI should be referred to a comprehensive CR program, with the referral made either before hospital discharge or at the first outpatient visit	I (B)
ISHLT: heart transplantation[32]	CR with aerobic exercise training is recommended after heart transplantation; short-term benefits include improvement in exercise capacity and modification of CVD risk factors A total of 150 min of moderate-intensity exercise per week or 75 min of vigorous-intensity aerobic exercise per week is encouraged for long-term cardiovascular health	I (B)
ACC–AHA: chest pain[26]	For patients with obstructive coronary artery disease who have stable chest pain despite GDMT, exercise treadmill testing can be useful for selecting management strategies, including CR	IIa (B)
ACC–AHA: heart failure[27]	In patients with heart failure, a CR program can improve exercise tolerance, functional capacity, and health-related quality of life	IIa (B)
Supervised exercise training		
ACC–AHA: symptomatic peripheral-artery disease[28]	In patients with claudication, a supervised exercise program is recommended to reduce leg symptoms and improve functional status and quality of life	I (A)
ACC–AHA: heart failure[27]	For patients with heart failure, exercise training is recommended to improve functional status, exercise performance, and quality of life	I (A)

CR Programs

- ✓ Eligible patients enter the cardiac rehabilitation pathway when referred after a qualifying event or diagnosis, ideally beginning within 1 to 2 weeks after the event .
- ✓ Prompt enrollment in cardiac rehabilitation appears to improve patient participation in the program; **participation is 1% lower for every 1-day delay in enrollment.**
- ✓ Early enrollment also improves outcomes, with a 67% greater improvement in exercise capacity among patients enrolled in a program within 15 days after hospital discharge than among patients enrolled 30 or more days after discharge.

CR Pathway

Qualifying CVD Event or Diagnosis (inpatient or outpatient setting)

Identify patients who are eligible for CR
Initiate secondary CVD prevention therapies
Refer to outpatient CR program
Assist with prompt CR enrollment

↓

CR Components

Attention to coexisting conditions
Risk factor control
Psychological support
Nutrition therapy
Physical activity
Patient assessment and monitoring

↓

Long-Term Follow-up

Assess need for CVD risk reduction
Provide updated treatment plan
Encourage long-term maintenance
Connect with long-term care provider

Figure 1. Cardiac Rehabilitation (CR) Pathw

Important factors are listed for the three p
CR pathway, including steps to help patien
CR, components of an effective CR progra
to help patients maintain progress over tin
notes cardiovascular disease.

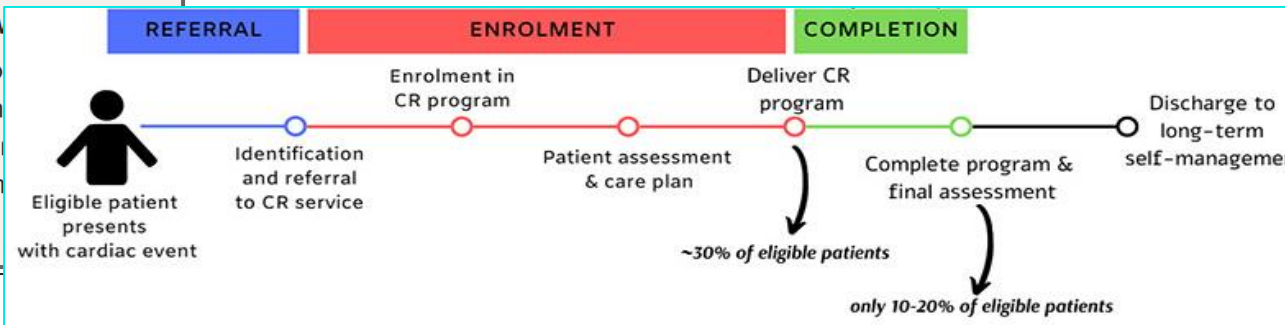
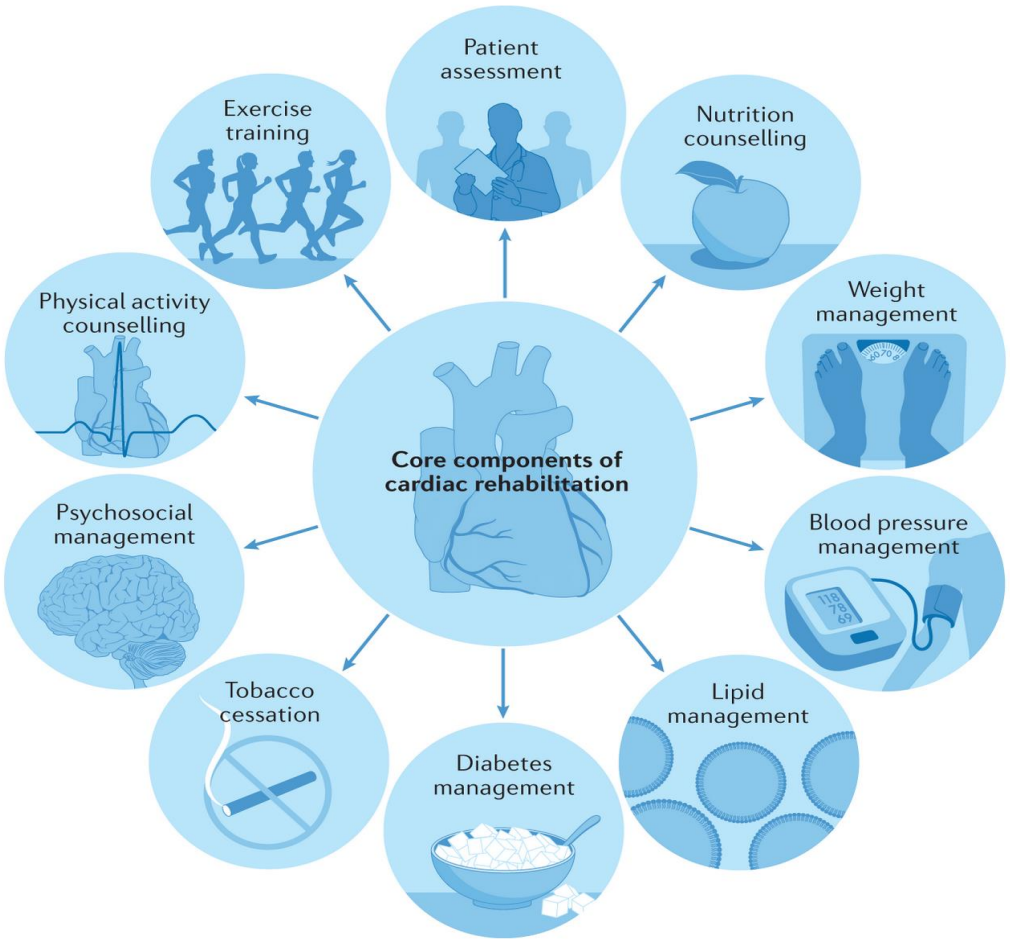


Figure. Clincial pathway and associated steps of Cardiac Rehabilitation (CR) engagement in Australia

CR Programs

Fig. 1: Components of comprehensive cardiac rehabilitation.

From: The role of cardiac rehabilitation in improving cardiovascular outcomes



trained, multidisciplinary cardiac rehabilitation team that generally consists of **physicians, nurses, exercise physiologists, dietitians, social workers, and psychologists.**

an individualized treatment plan for each patient that is based on applicable evidence-based treatment strategies, as well as the patient's needs, goals, and preferences

✓Patients attend 36 CR sessions,
✓ each lasting 1 hour
✓ over a period of 12 weeks

At the beginning of each CR session, patients are assessed for signs or symptoms of unstable disease, and vital signs are monitored before, during,and after exercise.

CR Programs

Components		Assessments and Plans at Program Entry		
Exercise		**Assessments**		
	Aerobic exercise capacity	6-Minute walk test: 357 m		
	Strength	1 Rep maximum leg press: 60 kg		
	Flexibility	Sit and reach: −5.08 cm		
	Balance	Single leg stance: 3 sec (right), 7 sec (left); tandem walk: 9 steps		
	Fall risk	Low		
	Symptoms	None		
		Plan		
		Aerobic exercise	Strength exercise	Flexibility
	Patient goals	Increase exercise capacity so I can walk up hills in my neighborhood each day without stopping	Increase my strength so I can shovel snow in the winter	Increase my flexibility so I can bend over to lift something off the floor
	Interventions: Mode	Walk on treadmill	Hand weight routine	Stretching routine
	Interventions: Frequency	3 days/wk in center 2 days/wk in home	3 days/wk in center	3 days/wk in center 2 days/wk in home
	Interventions: Duration	15 min/day	8–10 exercises 5–10 repetitions 1 set, 10–15 min/day	10 min/day
	Interventions: Intensity	Moderate (rate of perceived exertion 10–11/20)	Moderate weight, fatigued after 10 repetitions	Stretch/hold to count of 5, increase to count of 10 over next month
	Interventions: Progression	Increase by 1–5 min/day each wk to 40 min/day	Increase 1–5 lb/wk Increase sets to 2–3	Perform to point of tension, avoid pain
	Education	*Basics of Exercise Training* (video and booklet)	*Basics of Strength Training* (video and booklet)	*Basics of Flexibility Training* (video and booklet)
Nutrition		**Assessments**		
	Height/weight	165 cm/85 kg		
	Body composition	Fat: 24.5 kg (35%); lean: 43.4 kg (62%); bone tissue: 2.1 kg (3%)		
	Waist/hip circumference	86.4 cm/92.4 cm		
	Body-mass index	31.2		
	Dietary habits	Diet score: 52 (optimal >60)		
		Plan		
	Patient goals	Increase my intake of fruits and vegetables to 5 servings each day Decrease my waistline by 1 inch in the next 3 mo		
	Interventions	Meet with dietitian and develop dietary plan Track progress at home, report each week to my care team		
	Education	*Basics of Healthy Nutrition for the Heart* (video and booklet); *Basics of Healthy Weight* (video and booklet)		
Psychosocial Support		**Assessments**		
	Anxiety	Mild		
	Depression	Low		
	Quality of life (overall health)	Good (3/5)		
	Social determinants of health	Transportation problems		
		Plan		
	Patient goals	Reduce my feelings of anxiety about exercise Have a strong support group around me to help me		
	Interventions	Meet with social worker each week to discuss stress reduction Connect with my family more often for help with transportation		
	Education	*Basics of Stress Management* (video and booklet); *Basics of Mental Health after Heart Surgery* (video and booklet)		
Other Core Factors (cardiovascular risk factors and other factors that apply to the patient)		**Assessments**		
	Tobacco use	No tobacco exposure		
	Hypertension control	Hypertension: yes; 6-hr blood pressure average: 124/76 mm Hg		
	Lipid control	Dyslipidemia: yes; LDL cholesterol: 45 mg/dl; triglycerides: 87 mg/dl; non-HDL cholesterol: 75 mg/dl		
	Diabetes control	Diabetes: no		
	Guideline-directed medication therapy	Aspirin: 81 mg daily ACE/ARB: lisinopril, 20 mg daily (EF 45%) Beta-blocker: metoprolol succinate, 50 mg daily (EF 45%) Statin: rosuvastatin, 20 mg daily (baseline LDL cholesterol, 115 mg/dl) Nitroglycerin: SL tablets to use as needed for chest symptoms		
	Other coexisting conditions	Sleep apnea (on CPAP therapy); central obesity		
		Plan		
	Patient goals	Hypertension: weekly average blood pressure <130/80 mm Hg Dyslipidemia: LDL cholesterol <55 mg/dl Medications: take daily as directed Sleep apnea: use CPAP each night		
	Interventions	Hypertension: lifestyle and medication therapies prescribed Dyslipidemia: lifestyle and medication therapies prescribed Medications: use daily reminder system to take pills on time daily Sleep apnea: CPAP, follow-up with Sleep Medicine Center		
	Education	*Basics of Hypertension* (video and booklet); *Basics of Dyslipidemia* (video and booklet); *Basics of Taking Medication as Prescribed* (video and booklet); *Basics of Sleep Apnea Management*		

✓Patients attend **36** CR sessions,
✓ each lasting **1 hour**
✓ over a period of **12 weeks**

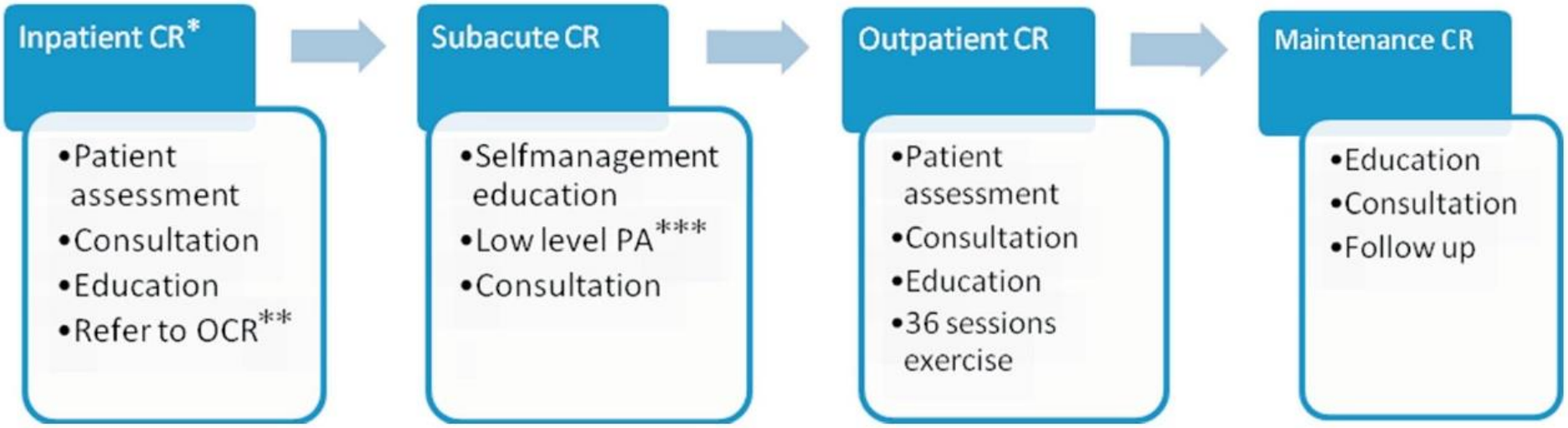
At the **beginning of each CR** session, patients are assessed for signs or symptoms of unstable disease, and vital signs are monitored before, during,and after exercise.

Table 2. Goals of CR and Examples of Actions to Help Meet Goals.*

CR Goal	Examples of Actions to Meet Goals
Optimize recovery after a cardiovascular event or procedure	Learn and effectively apply principles that promote the following goals: Physical healing and recovery (e.g., proper wound care if indicated, safe and gradual increase in physical activity) Emotional and psychological healing (e.g., understanding normal vs. abnormal feelings and symptoms after a cardiovascular event) Return to work and other meaningful activities
Optimize functional capacity	Safely and effectively apply an individualized exercise plan that includes the following components: Aerobic exercise training (gradually progressing to 5–6 days/wk, ≥30 min of vigorous activity) Resistance training (gradually progressing to 2–3 sets of 8–10 exercises of moderate-intensity resistance training, 2–3 days/wk, ≥15 min/day) Flexibility training Balance training
Optimize cardiovascular health	Adopt and maintain guideline-directed dietary and exercise recommendations focused on the following goals: Reduce risk of future cardiovascular events Maintain tobacco-free living Optimize control of modifiable cardiovascular risk factors (elevated lipids, blood pressure, blood glucose, tobacco use, obesity) Adhere to guideline-directed medical therapies that reduce risk of future cardiovascular events Identify any noncardiovascular coexisting conditions that may be barriers to cardiovascular and general health (e.g., obstructive sleep apnea, musculoskeletal disorders) and refer patient for treatment
Optimize psychological health	Identify and treat clinically significant psychological disorders (e.g., anxiety, depression)
Optimize quality of life	Establish or strengthen sources of social support (e.g., family, friends, church group) Identify and address adverse social determinants of health that may be barriers to one or more CR goals

* Listed are general goals and examples of related actions that are included in a patient's treatment plan for CR and tailored to the patient's specific conditions, needs, and preferences. The patient and the rehabilitation team work in partnership to carry out the goals.

CR phase



* Cardiac Rehabilitation

** Outpatient Cardiac Rehabilitation

*** Physical Activity

Recent Challenges and Advances in Cardiac Rehabilitation

Recent Challenges and Advances in CR

- ✓ Despite the myriad changes and challenges in cardiovascular medicine today, advances in CR by the growth in scientific publications in the field over the past 20 years .
- ❖ some of which are highlighted below.
- ✓ **Benefit of CR Today**
- ✓ **Bridging the Participation Gap in CR**
- ✓ **Home-Based Cardiac Rehabilitation**

Benefit of CR

- ✓ Although reductions in mortality have been reported previously in randomized trials, a systematic review suggests little or no effect of cardiac rehabilitation on all-cause mortality.
- ✓ **This finding may be due to improvements over time in the usual care of patients or to quality issues in the trials themselves.**

Exercise-based cardiac rehabilitation for coronary heart disease

Grace Dibben, James Faulkner, Neil Oldridge, Karen Rees, David R Thompson, Ann-Dorthe Zwisler, Rod S Taylor
Authors' declarations of interest

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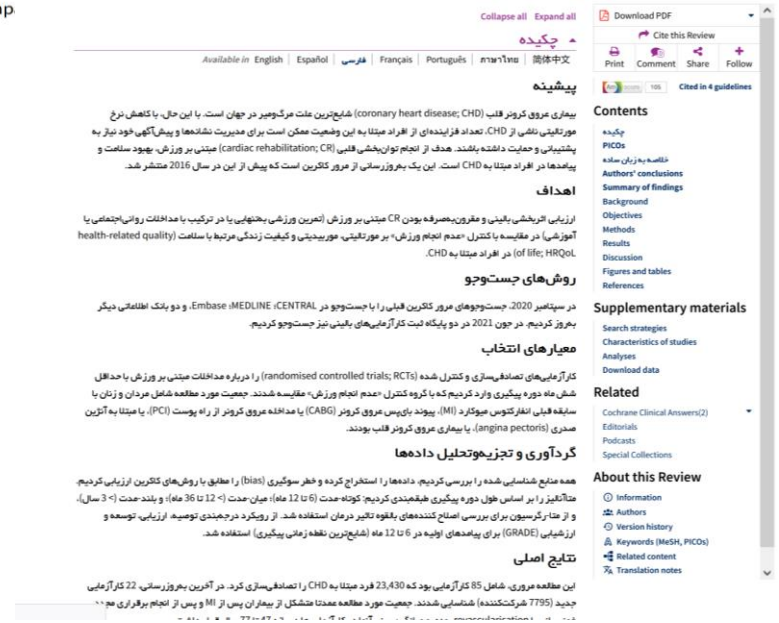
Abstract

Background

Coronary heart disease (CHD) is the most common cause of death globally. However, with falling CHD mortality rates, an increasing number of people living with CHD may need support to manage their symptoms and prognosis. Exercise-based cardiac rehabilitation (CR) aims to improve the health and outcomes of people with CHD. This is an update of a Cochrane Review previously published in 2016.

Objectives

To assess the clinical effectiveness and cost-effectiveness of exercise-based CR (exercise training alone or in combination with psychosocial or educational interventions) comp
quality of life (HRQoL) in people with CHD.



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چکیده

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پیشینه

بیماری عروق کرونر قلب (coronary heart disease; CHD) شایع‌ترین علت مرگ‌ومیر در جهان است. با این حال، با کاهش نرخ مورتالیتی ناشی از CHD، تعداد فزاینده‌ای از افراد مبتلا به این وضعیت ممکن است برای مدیریت نشانه‌ها و پیش‌آگهی خود نیاز به پشتیبانی و حمایت داشته باشند. هدف از انجام توان‌بخشی قلبی (cardiac rehabilitation; CR) مبتنی بر ورزش، بهبود سلامت و پیامدها در افراد مبتلا به CHD است. این یک به‌روزرسانی از مرور کاکرین است که پیش از این در سال 2016 منتشر شد.

اهداف

ارزیابی اثربخشی بالینی و مقرون‌به‌صرفه بودن CR مبتنی بر ورزش (تمرین ورزشی بتنهایی یا در ترکیب با مداخلات روانی‌اجتماعی یا آموزشی) در مقایسه با کنترل «عدم انجام ورزش» بر مورتالیتی، موربیدیتی و کیفیت زندگی مرتبط با سلامت (health-related quality of life; HRQoL) در افراد مبتلا به CHD.

روش‌های جست‌وجو

در سپتامبر 2020، جست‌وجوهای مرور کاکرین قبلی را با جست‌وجو در CENTRAL، MEDLINE، Embase، و دو پایگاه اطلاعاتی دیگر به‌روز کردیم. در جون 2021 در دو پایگاه ثبت کارآزمایی‌های بالینی نیز جست‌وجو کردیم.

معیارهای انتخاب

کارآزمایی‌های تصادفی‌سازی و کنترل شده (randomised controlled trials; RCTs) را درباره مداخلات مبتنی بر ورزش با حداقل شش ماه دوره پیگیری وارد کردیم که با گروه کنترل «عدم انجام ورزش» مقایسه شدند. جمعیت مورد مطالعه شامل مردان و زنان با سابقه قبلی انفارکتوس میوکارد (MI)، پیوند بای‌پس عروق کرونر (CABG) یا مداخله عروق کرونر از راه پوست (PCI)، یا مبتلا به آنژین صدری (angina pectoris)، یا بیماری عروق کرونر قلب بودند.

گردآوری و تجزیه‌وتحلیل داده‌ها

همه منابع شناسایی شده را بررسی کردیم. داده‌ها را استخراج کرده و خطر سوگیری (bias) را مطابق با روش‌های کاکرین ارزیابی کردیم. متاآنالیز را بر اساس طول دوره پیگیری طبقه‌بندی کردیم: کوتاه‌مدت (6 تا 12 ماه)؛ میان‌مدت (> 12 تا 36 ماه)؛ و بلندمدت (> 3 سال). و از متا-رگرسیون برای بررسی اصلاح کننده‌های بالقوه تاثیر درمان استفاده شد. از رویکرد درجه‌بندی توصیه، ارزیابی، توسعه و ارزشیابی (GRADE) برای پیامدهای اولیه در 6 تا 12 ماه (شایع‌ترین نقطه زمانی پیگیری) استفاده شد.

نتایج اصلی

این مطالعه مروری، شامل 85 کارآزمایی بود که 23,430 فرد مبتلا به CHD را تصادفی‌سازی کرد. در آخرین به‌روزرسانی، 22 کارآزمایی جدید (7795 شرکت‌کننده) شناسایی شدند. جمعیت مورد مطالعه عمدتا متشکل از بیماران پس از MI و پس از انجام برقراری مج

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نتیجه‌گیری‌های نویسندگان

این مرور به‌روز شده کاکرین از نتیجه‌گیری‌های نسخه قبلی پشتیبانی می‌کند، که CR مبتنی بر ورزش مزایای مهمی را برای افراد مبتلا به CHD فراهم می‌کند، از جمله کاهش خطر MI، کاهش اندک احتمالی در مورتالیتی به هر علتی، و کاهش زیاد در موارد بستری در بیمارستان به هر علتی، همراه با هزینه‌های مراقبت سلامت مرتبط، و بهبودی در HRQoL تا 12 ماه پیگیری. در پیگیری طولانی-مدت‌تر، مزایای آن ممکن است شامل کاهش در مورتالیتی قلبی‌عروقی و MI باشد. طی دهه گذشته، کارآزمایی‌ها بیشتر شامل زنان بوده، و در LMICها انجام می‌شدند، که تعمیم‌پذیری یافته‌ها را افزایش می‌داد. انجام RCTهایی با طراحی و گزارش‌دهی از CR در افراد مبتلا به CHD که نماینده بهتری از عملکرد بالینی معمول باشند، مورد نیاز است. این کارآزمایی‌ها باید به صراحت پیامدهای بالینی را گزارش کنند، از جمله مورتالیتی و موارد بستری در بیمارستان، و شامل معیارهای معتبری از HRQoL باشند، به ویژه در طول دوره پیگیری طولانی-مدت‌تر، و هزینه‌ها و هزینه-اثربخشی مداخلات را ارزیابی کنند.

Supplementary materials

Benefit of CR

- ✓ **All-cause mortality benefits** are clear in large observational studies ; and show a dose–response association, 1 to 2% reduction in mortality for each CR session .
- ✓ Although this relationship may be due, in part, to healthy participant bias, the cardiac rehabilitation session dose–response is consistent with the dose response effects of individual components of a cardiac rehabilitation program, such as exercise training and statin therapy.
- ✓ **Cost–benefit studies** : a savings of $2,920 (Canadian dollars) per year in medical expenditures for CVD persons who completed CR , as compared with those who were not referred to CR .

- ✓ A systematic review showed that cardiac rehabilitation is cost-effective, with an incremental cost-effectiveness ratio ranging from $1,065 to $71,755 per quality-adjusted life-year gained .

Value of Cardiac Rehab

Interventions	NNT	Lives saved per 1000 patients
Anti-platelets	153	
ACE inhibitors	108	
Statins	94	
Beta blockers	42	
Cardiac rehab	37	

Sources: Created by Kaiser Permanente using the following sources. For anti-platelets, statins, beta blockers: HT Ong. "Beta Blockers in hypertension and cardiovascular disease", BMJ 2007. For ACE inhibitors: HT Ong, "Angiotensin-Converting Enzyme Inhibitors (ACEIs)...: A Meta-Analysis of 10 Randomised Placebo-Controlled Trials", ISRN Cardiology, 2013.

https://michiganvalue.org/tag/cardiac-rehab/

Million Hearts® Cardiac Rehabilitation

Saving Lives ♥ Restoring Health ♥ Preventing Disease

Benefits

Benefits to People

Individuals who attend 36 sessions have a **47%** lower risk of death and a **31%** lower risk of heart attack than those who attend only **1** session.

Benefits to Health Systems

Costs per year of life saved range from **$4,950 to $9,200** per person.

Cardiac rehab participation also reduces hospital readmissions.

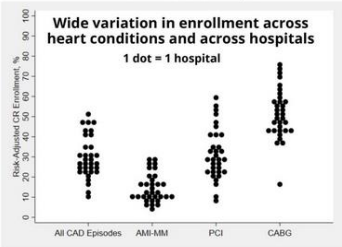
Figure 1.

The Michigan Cardiac Rehabilitation Network (MiCR): A Statewide Collaboration To Improve Cardiac Rehabilitation Participation

Michael P. Thompson, Ph.D., Co-Director - Michigan Value Collaborative (mthomps@med.umich.edu); Jessica Yaser, MPH; Analyst - Michigan Value Collaborative (jyaser@med.umich.edu); Devraj Sukul, MD, MS; Associate Director - Blue Cross Blue Shield of Michigan Cardiovascular Consortium (dsukul@med.umich.edu); Annemarie Forrest, RN; Program Manager - Blue Cross Blue Shield of Michigan Cardiovascular Consortium MS, MPH (avassalo@med.umich.edu)

Background

There is currently wide variation in patient enrollment in cardiac rehabilitation (CR) across providers and heart conditions (see figure below). Regional quality improvement collaboratives may provide one solution to improving CR participation through performance benchmarking and provider engagement. The objective of this descriptive study was to evaluate the feasibility of the Michigan Cardiac Rehabilitation Network (MiCR) to improve CR.



Components of MiCR Collaboration

1 Benchmarking Hospital CR Participation

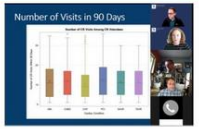
MVC registry data are used to create hospital-specific reports to track and benchmark CR participation.

2 Resource Development & Dissemination

MiCR partners developed and disseminated a best practices toolkit to aid quality improvement efforts that improve CR participation.

3 Opportunities for Collaborative Learning

A combination of virtual sessions and in-person meetings are organized to foster a community of trust and collaborative learning.



Insights from Collaborative Learning

MiCR partners completed site visits with Michigan hospitals, which generated insights on barriers and facilitators to improvement.

Communication is Key
Early patient contact, the use of CR liaisons, and automatic referrals all boost CR enrollment.

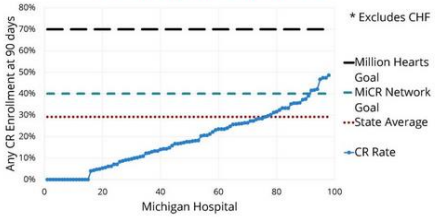
Build Capacity
Constraints from limited staff, physical space, and other resources prohibit CR facilities from meeting demand.

Leaders Accelerate CR Use
Strong physician endorsement and support from administrative leadership can help a program flourish.

Some Patients Need Help
Patients face additional barriers to CR participation, including costs of attending CR, difficulty scheduling, and transportation challenges.

MiCR Network Statewide Goal

40% CR participation by 2024 for all eligible conditions*



What will success look like?

2,237
Additional Michiganders receiving the benefits of CR

60
Lives saved

$11,000,000
Cost savings

Conclusion

This study demonstrated the feasibility of a statewide collaboration centered around the goal of equitably improving CR enrollment for all eligible patients. Future work will seek to continuously improve and evaluate the impact of this consortium on CR participation in Michigan.

LHSCollaboratory
Putting Data, Knowledge, and Practice into Motion at the University of Michigan

low participation in CR

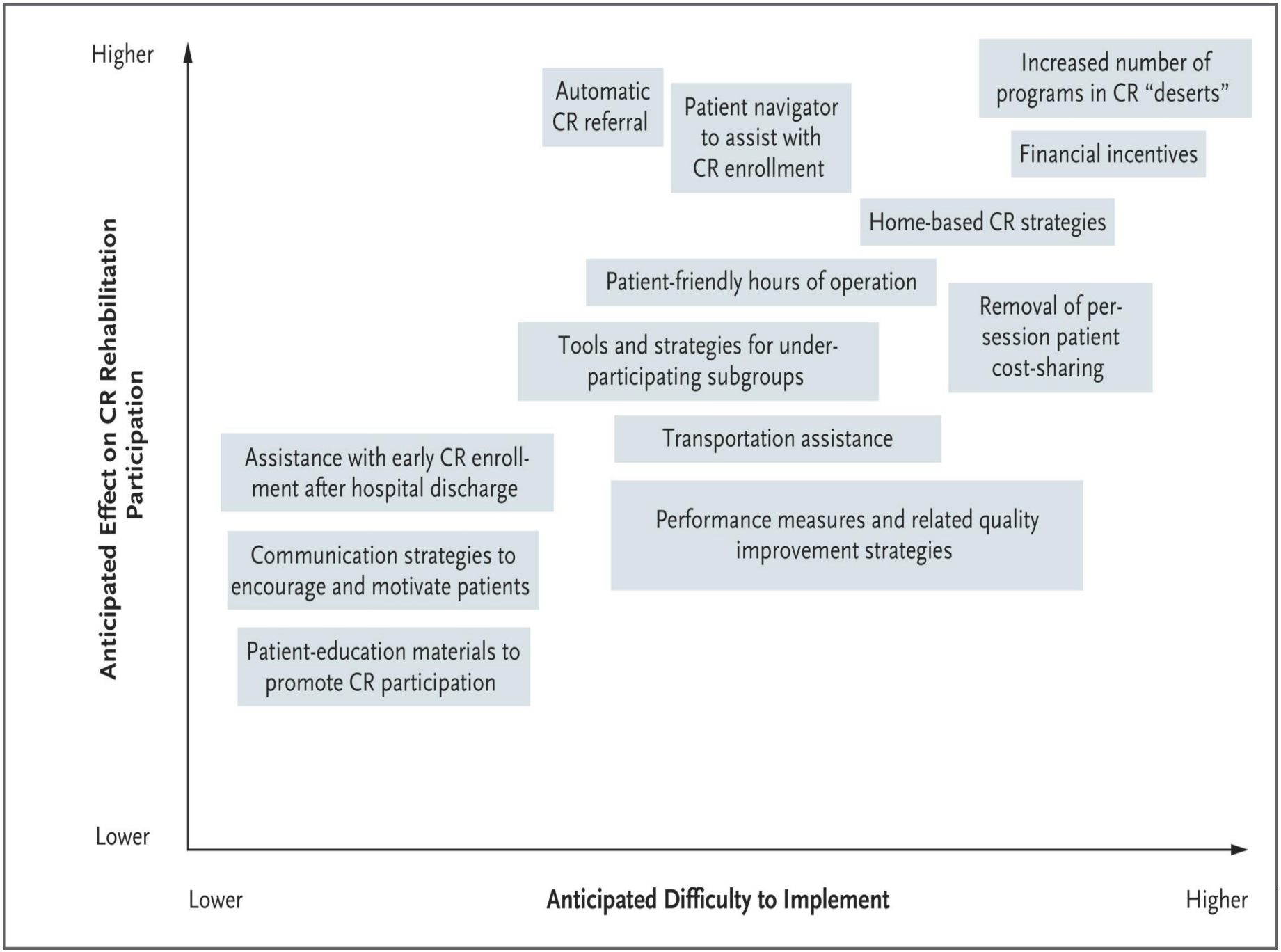
- ✓ A 2020 report : participation in CR increased in post PCI ,CABG 31% in 1997 to 55% in 2020.
- ✓ For AMI with PCI : **increased from 21 to 33%.**
- ✓ For AMI without PCI : **Dropped from 11% to 7%.**
- ✓ Overall, only **24%** of **eligible p**atients participated in CR in 2020.
- ✓ only **24%** of eligible patients who began cardiac rehabilitation did so within **21 days after** the qualifying event,
- ✓ only **27% completed** a full course of CR .

low participation disparities in CR

- ✓ disparities are most :**women**, **older patients**, **racial** or ethnic minority groups, patients in **lower** Socioeconomic groups, and those **living in areas** with limited numbers of cardiac rehabilitation programs.
- ✓ Only 18.9% of women, 9.8% of patients older than 85 years of age, 13.6% of non-Hispanic Black patients, 13.2% of Hispanic patients participate in CR
- ✓ Although 39% of eligible patients participate CR in the West North Central Census Division, only 20% participate in other **regions** of the country.

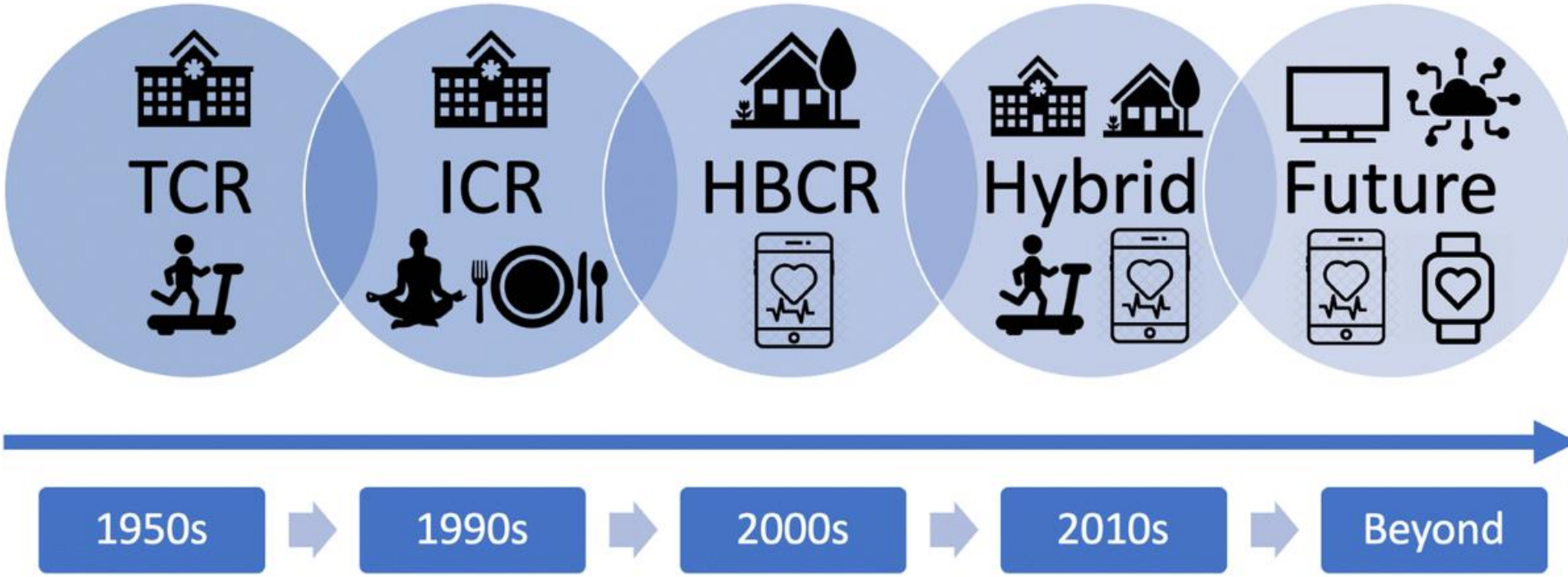
Discovery of effective solutions

- ✓ **automatic** referral systems and patient navigators. (boost from 30 to 74%).
- ✓ the **capacity** of existing CR programs in USA is low (only sufficient for 37% of eligible patients)
- ✓ **Financial** and **insurance** constraints are potentially correctable barriers doubling of the program completion rate)
- ✓ **national** clinical practice guidelines (70%)
- ✓ **Quality** improved strategy


Higher
Lower
Anticipated Effect on CR Rehabilitation Participation
Automatic CR referral
Patient navigator to assist with CR enrollment
Increased number of programs in CR "deserts"
Financial incentives
Home-based CR strategies
Patient-friendly hours of operation
Removal of per-session patient cost-sharing
Tools and strategies for under-participating subgroups
Transportation assistance
Assistance with early CR enrollment after hospital discharge
Performance measures and related quality improvement strategies
Communication strategies to encourage and motivate patients
Patient-education materials to promote CR participation
Lower
Anticipated Difficulty to Implement
Higher

Home-Based Cardiac Rehabilitation

Evolution of Cardiac Rehabilitation

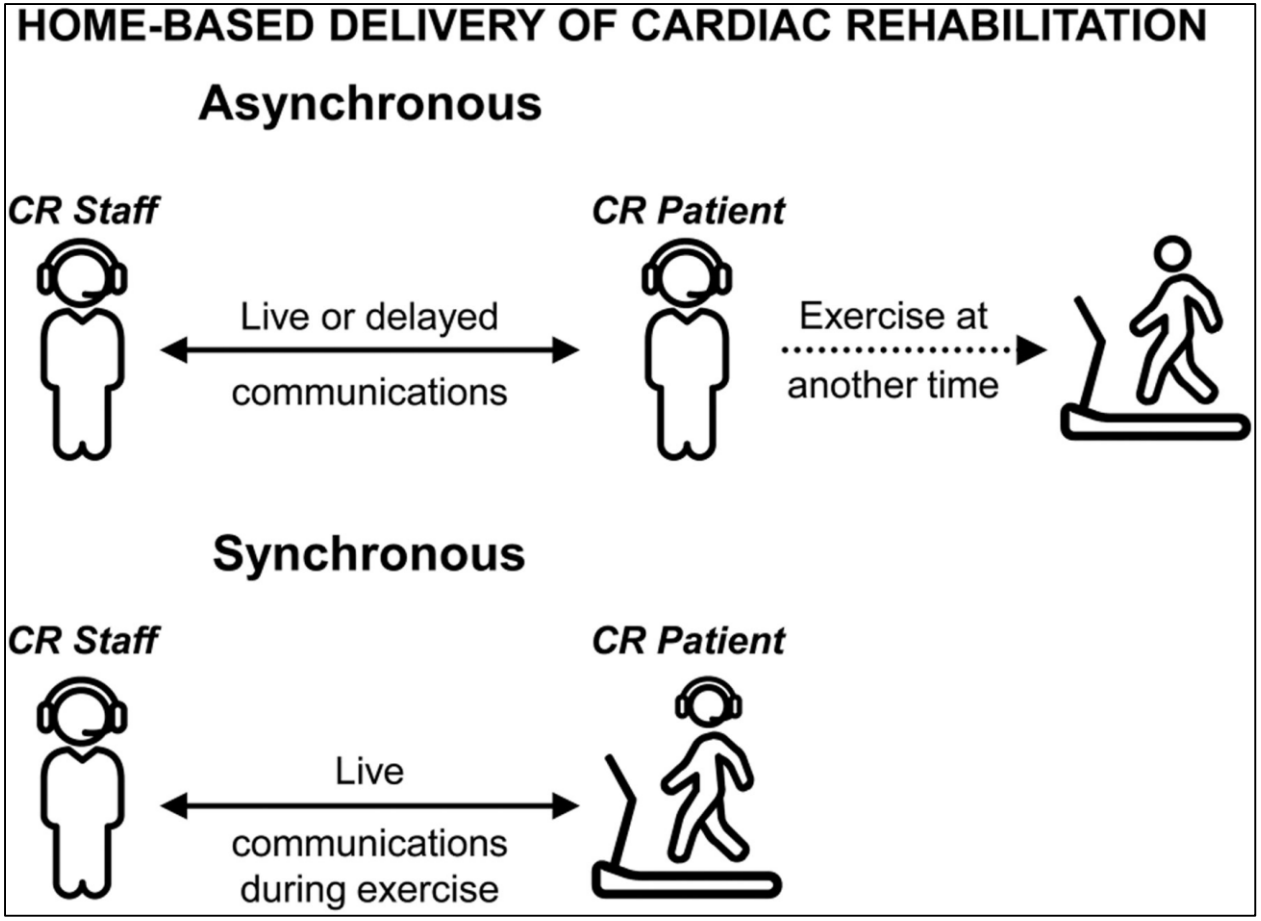


TCR = traditional cardiac rehabilitation (CR), ICR = intensive CR, HBCR = home-based CR

Home-Based Cardiac Rehabilitation

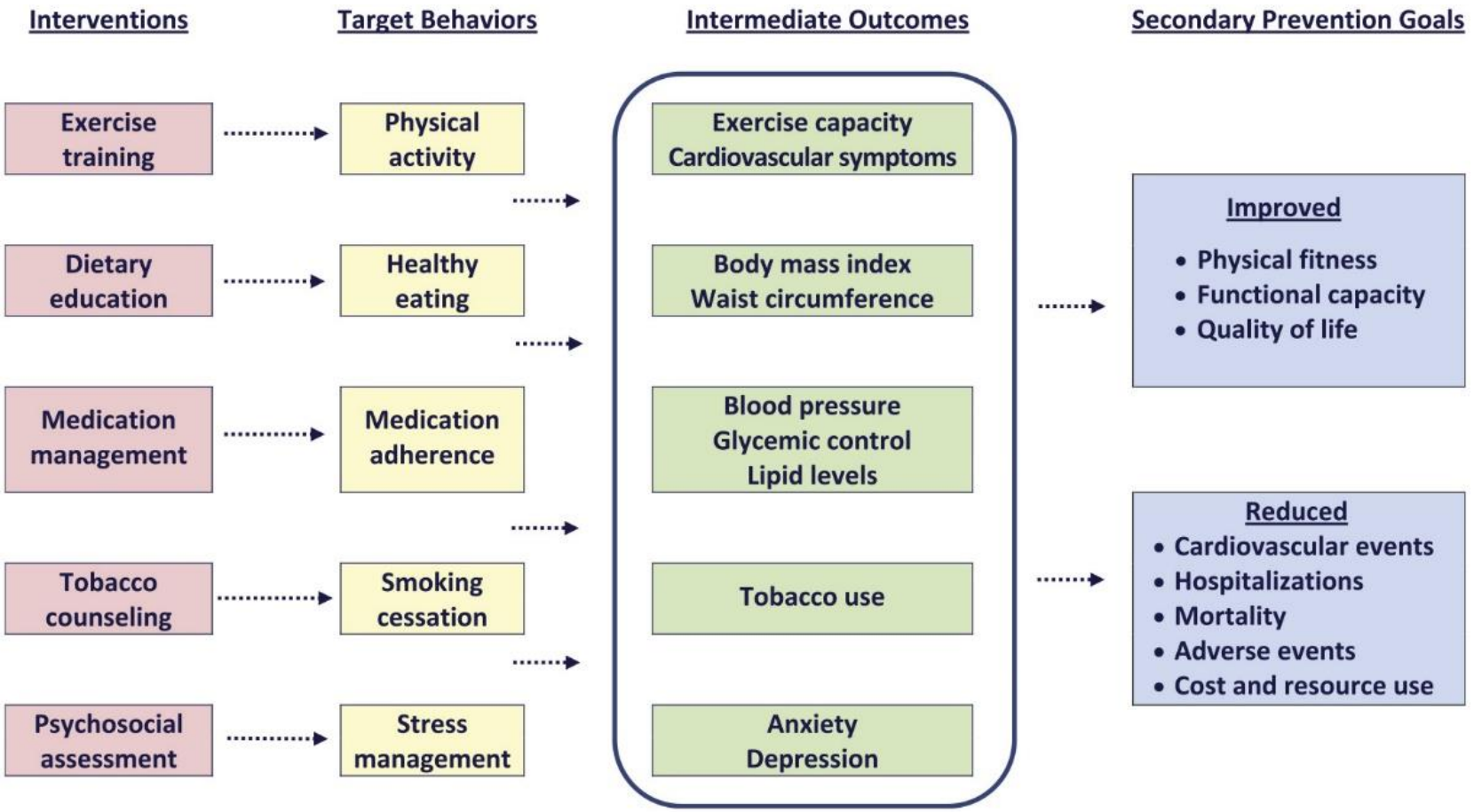
- ✓ the **same** clinical components and trained personnel
- ✓ differing only in the **location** where the program occurs
- ✓ Patients **communicate** with CR sf members through telephone,video, or other messaging options either

- ✓ Hybrid programs



✓when they are exercising (synchronous communication) or at a time when they are not exercising (asynchronous communication).

Structure, process, and outcome metrics for home-based CR



Benefits of home-based CR

- ✓ **Adherence** to HBCR higher than CBCR.
- ✓ Mortality was 36% **lower** among patients who chose HBCR than no CR
- ✓ The **cost effectiveness** of HBCR is favorable.

Future Directions

Future Directions

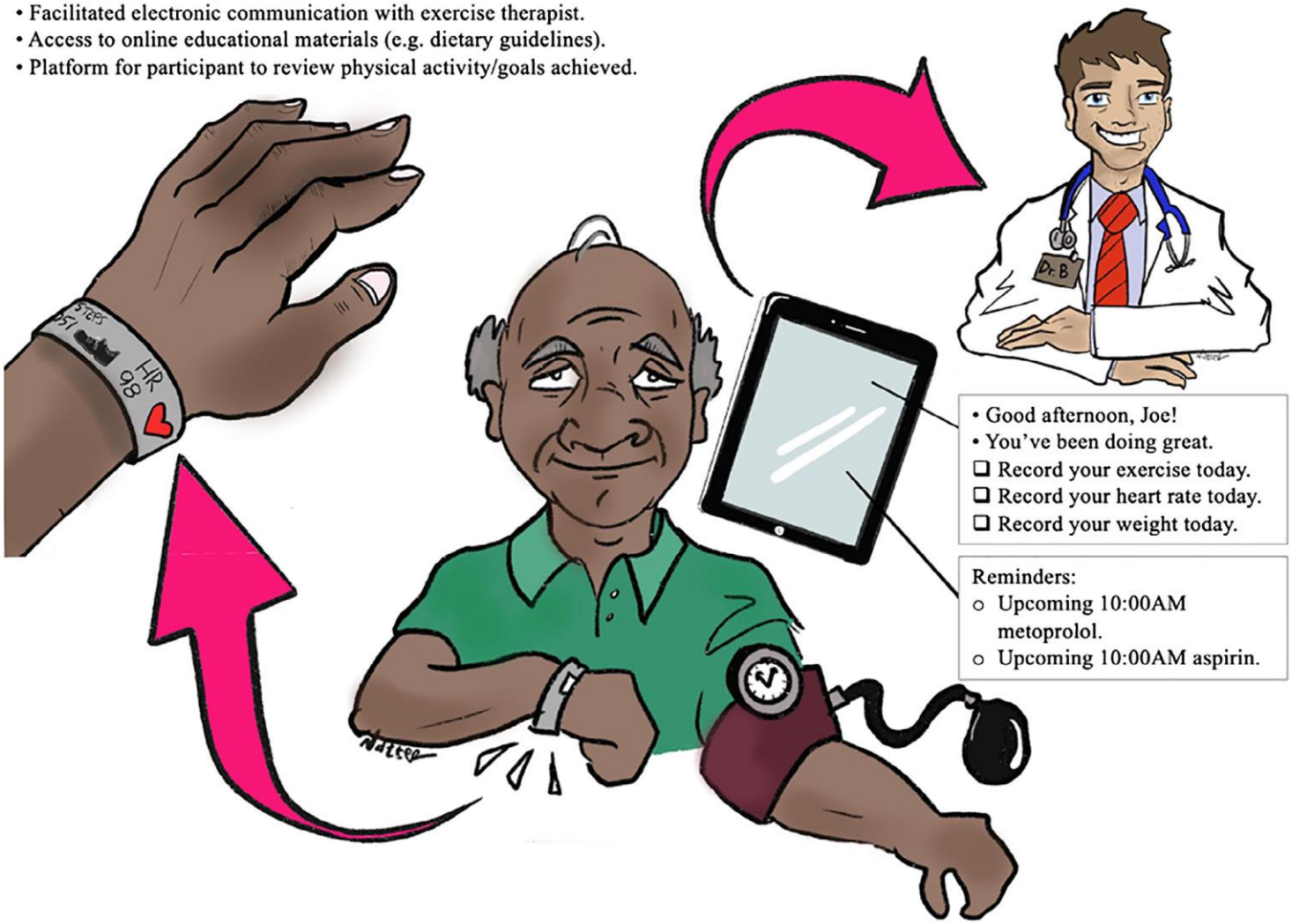
- ✓ an array of tools and strategies to help deliver **effective** CR.
- ✓ in various **locations** — from centers to homes to anywhere (at work, traveling,…)
- ✓ **new** intervention strategies and interactive tools, including wearable technologies….
- ✓ expanded to **other CVD** (cardio-oncology ,AF ,Congenital HD)
- ✓ **Before** procedure (prehabilitation)

Future

state of “**new and improved**” — CR with **high value** and **high utilization**.

mHealth CR enables:

- Frequent capture of physiologic metrics.
- Facilitated electronic communication with exercise therapist.
- Access to online educational materials (e.g. dietary guidelines).
- Platform for participant to review physical activity/goals achieved.



Conclusions

به طور خلاصه توانبخشی قلبی پیشگیری ثانویه مبتنی بر شواهد را پس از یک رویداد قلبی عروقی برای بیماران فراهم می کند.

اما درصد مشارکت بیماران با وجود پیشرفت روزافزون این برنامه بسیار پایین است و باید تمامی گروه هایی که با بیماران در ارتباط میباشند،
در جهت استقبال هرچه بیشتر بیماران از این برنامه به وسیله تعدیل هزینه ها و همچنین فراهم آوردن دسترسی آسان و راه اندازی توانبخشی در منزل و سایر روش ها برنامه ریزی و کوشش نمایند.


emotion
FITNESS