

Cardiac Rehab

Increasing awareness for

▶ patients and providers

Presented by Tim Becker, DO, FACC



Cardiology likes to use a lot of acronyms. Please ask me if there is an acronym that I am using that is unfamiliar.

Why talk about cardiac rehab today?

- ▶ Cardiac rehab is on the most beneficial things for patients with heart disease, but is underutilized
- ▶ One of the biggest barriers to participation is low rates of referral
- ▶ You can make a difference!



Image from aacvpr.org

Outline

History of cardiac rehab

What is it?

Benefits

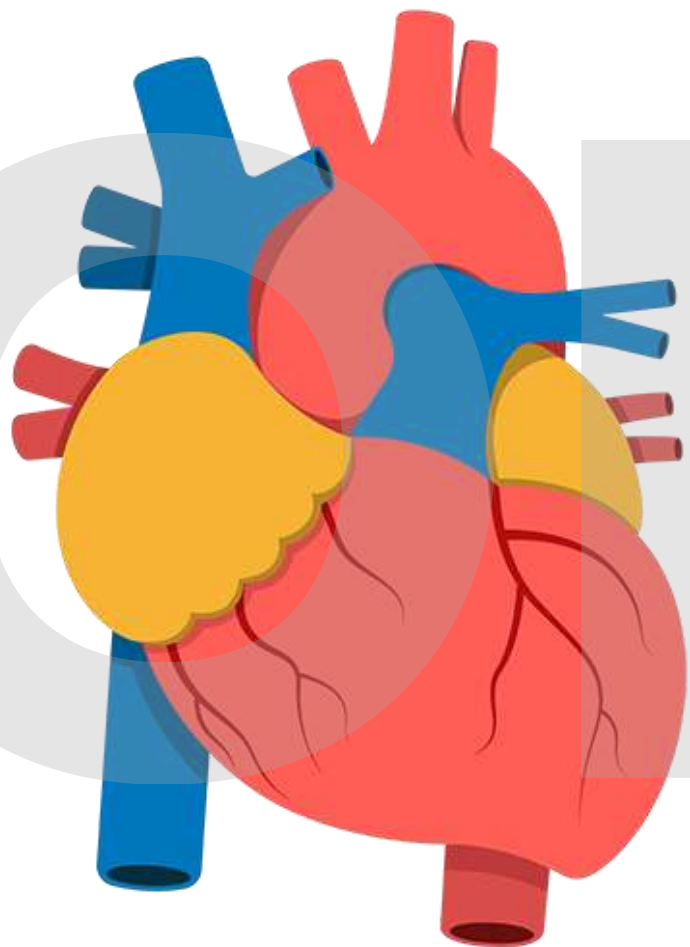
Barriers and underutilization

Novel programs

Future directions

Available resources

Is Exercise Good For your Heart?



Historical Context of Cardiac Rehabilitation: Learning from the past to move to the future

Redfern J, Gallagher R, O'Neil A, et al. Front Cardiovasc Med. 2022 Apr 27;9:842567

James Herrick published a paper describing “the importance of total rest as treatment” for myocardial infarction (MI).

1912

Recommendation for survivors of MI to be confined to bed for 6 weeks, and were prohibited from walking to the bathroom independently. Patients discharged from the hospital, severe physical limitations were recommended.

1950s

1938

Recommendation for bed rest for treatment of congestive heart failure.

Paradigm shift

Levine and Lown explored the possibility of patients sitting in armchairs for 1-2 hours per day post MI.

1950

Study published that survivors of MI benefited physically and physiologically from exercise without increased risk of death.

1968

1960s

Several studies published showing that light activity after MI was safe. There were also studies showing that supervised exercise could help prevent immobility and deconditioning.

Expansion of Cardiac Rehabilitation

Framingham Heart Study: Identified modifiable risk factors for cardiovascular disease including physical inactivity and psychosocial issues (along with high blood pressure, high cholesterol, diabetes, obesity, and tobacco use).

1970s

WHO Expert Committee - cardiac rehab identified as “essential part of care”.

1993

1980s

Group based cardiac rehab in 60 countries, and all continents.



What is cardiac rehab?

- ▶ A supervised outpatient group program with a focus on exercise, patient education, and lifestyle changes to help patients with heart disease.
- ▶ Traditionally done at a hospital location.
- ▶ Typically patients will attend 36 sessions:
 - ▶ 3 sessions per week over the course of 3 months

Cardiac Rehab Terminology

1

Phase 1: Inpatient introduction information and focus on mobilization.

2

Phase 2: Outpatient Hospital-based group program for 6-12 weeks.

3

Phase 3: Maintenance of risk factor modification routine.

- Patients have the options to continue participation.
- This may be out of pocket, or covered by insurance (silver sneakers benefit)

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

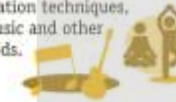
This includes meals that are low in salt and rich in whole grains, fruits, vegetables, low-fat meats and fish.



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.



TALK TO YOUR HEALTH CARE PROVIDER about enrolling in a cardiac rehab program **TODAY!**

CARDIAC REHAB can:



Lower the chances of a 2nd heart attack or heart surgery



Lessen chest pain, and in some cases, the need for medications

Control risk factors such as high blood pressure & cholesterol



Reduce overall risk of dying or having a future cardiac event



Help with weight loss



Information provided for educational purposes only. Please consult your health care provider regarding your specific health needs.

For more information, visit [CardioSmart.org/CardiacRehab](https://www.CardioSmart.org/CardiacRehab)

[@CardioSmart](#) [Facebook.com/CardioSmart](#)

If you would like to download or order additional posters or wallpin lights, visit [CardioSmart.org/Posters](https://www.CardioSmart.org/Posters)

▶ Image provided by CardioSmart.org

What can patients expect?

Developing an individualized exercise program that safely improves cardiovascular fitness.



Access to group classes and individualized counseling to help treat and prevent heart disease including:

Healthy eating

Smoking cessation

Weight loss

Diabetes management

Blood pressure management

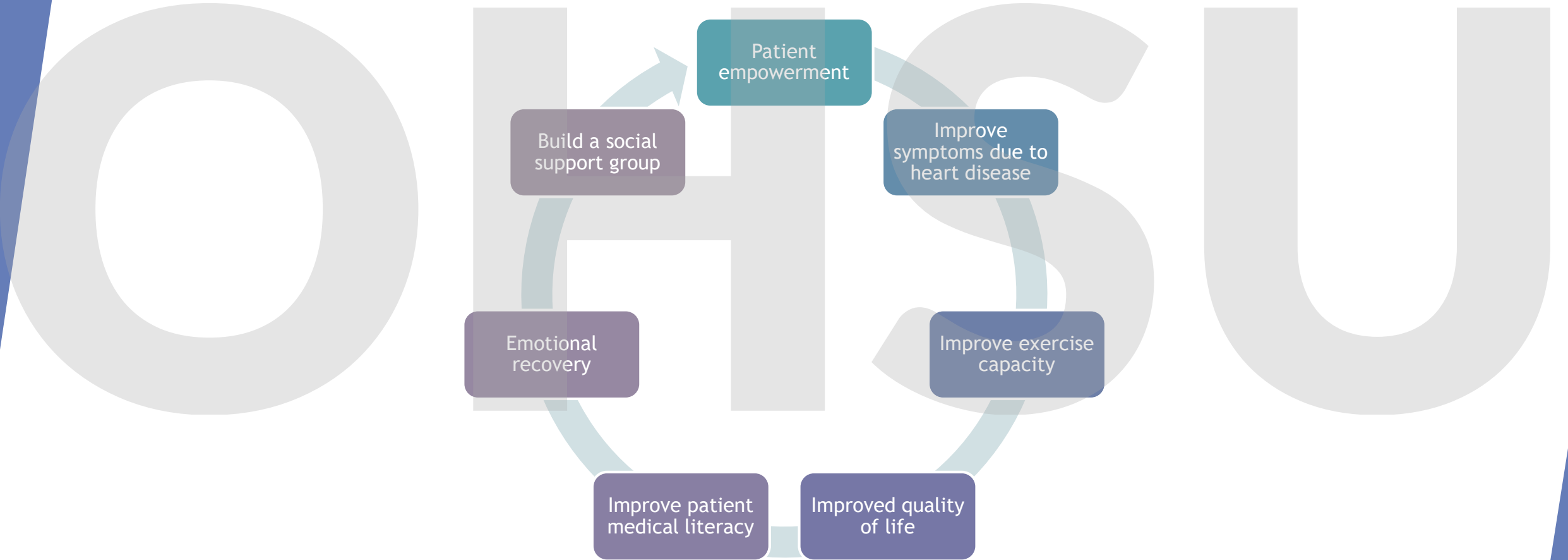
Cholesterol management

Psychological support

Why talk about
cardiac rehab
today?

Despite its long history, cardiac rehab continues to be an underutilized treatment for patients with cardiac disease.

Benefits of Cardiac Rehab



Benefits of Cardiac Rehab

- ▶ Decreased mortality and decreased cardiovascular events
- ▶ Improved medication adherence
- ▶ Patients are more likely to make lasting lifestyle changes

Who benefits from cardiac rehab?

Probably everybody?

- ▶ Current class I level of evidence indications (and what Medicare typically covers) for referral to cardiac rehab include:
 - ▶ Heart attack
 - ▶ Following Coronary Bypass Grafting (CABG)
 - ▶ Following percutaneous coronary intervention (PCI)
 - ▶ Following valve replacement or repair
 - ▶ Patients with chronic stable angina
 - ▶ Heart failure (specifically heart failure reduced ejection fraction (HFrEF))
 - ▶ Peripheral arterial disease (PAD)

What diagnoses are not typically covered?

- ▶ Arrhythmias (atrial fibrillation)
- ▶ Heart failure with preserved ejection fraction
- ▶ Obesity as a primary diagnosis

These diagnoses do not have the same of level of evidence supporting the benefit of cardiac rehab

Cardiac Rehab for patients with prior MI

Cardiac Rehabilitation and Survival in Older Coronary Patient

Suay JA, Stason WB, Ades PA, et al. JACC 2009; 54;25-33

- ▶ Retrospective analysis of 1-5 year mortality of Medicare patients eligible for participating in cardiac rehab in 1997.
- ▶ Compared patients that participated in cardiac rehab, versus those who did not.
- ▶ Also compared patients attending more than 25 sessions versus those who attended less than 25 sessions.

Participation matters

- ▶ At five years, there was a overall mortality relative risk reduction of 59% when comparing those that participated in cardiac rehab versus those that did not.
- ▶ What about patients that did more cardiac rehab?
 - ▶ Patients who completed >25 sessions had a relative risk reduction of 58% at 1 year and 19% at 5 years when compared to patient who did less than 25 sessions.

There is huge benefit, and the more the better!

What about
patients
following
stenting
procedures?

Impact on Cardiac Rehab on Mortality Following PCI

Geol K, Lennon RJ, Tilbury RT et al, Circulation. 2011; 2344-2352

- ▶ Examined association of cardiac rehabilitation with mortality, MI, and revascularization for patients after PCI (those receiving at least 1 stent).
- ▶ Retrospective analysis of 2395 patients from 1994-2008 who had PCI
- ▶ Patients were followed over 6.3 years.

Improved
mortality

For patients following PCI:

- ▶ Cardiac rehab participation was associated with clinically significant mortality reduction
- ▶ This study did not show a significant reduction of further MI, or additional need for revascularization

What about Cardiac Rehab for Elderly Patients?

Relationship Between Cardiac Rehabilitation and Long-Term Risks of Death and Myocardial Infarction Among Elderly Medicare Beneficiaries.

Hammill BG, Curtis LH, Schulman KA, Whellan DJ.
Circulation 121 (2010); pp 63-70

- ▶ Study included 30161 Medicare Patients who participated in at least 1 cardiac rehab session from year 2000 to 2005.
- ▶ Examined relation between number of sessions attended and MI and death at 4 years.

How much does participation matter?

- ▶ 36 sessions compared to 24 sessions:
 - ▶ 14% lower risk of death
 - ▶ 12% lower risk of MI
- ▶ 36 sessions compared to 12 sessions:
 - ▶ 22% lower risk of death
 - ▶ 23% lower risk of MI
- ▶ 36 sessions compared to 1 session:
 - ▶ 47% lower risk of death
 - ▶ 31% lower risk of MI

Attending all 36 sessions was associated with lower risk of death and MI at 4 years when compared to those attending less sessions.



Heart failure with reduced ejection fraction

Efficacy and Safety of Exercise Training in Patients With Chronic Heart Failure: HF-ACTION

O'Connor CM, Whellan DJ, Lee KL, et al. Randomized Controlled Trial. *JAMA*. 2009;301(14):1439-1450. doi:10.1001/jama.2009.454

- ▶ Large multicentered randomized control trial of exercise training for heart failure with reduced ejection fraction (HFrEF).
- ▶ Exercise training was associated with significant reduction for all-cause mortality, all-cause hospitalization, cardiovascular mortality, and heart failure hospitalization.

Heart failure with preserved ejection fraction (HFpEF) patients were not included

Additional Benefits of Cardiac Rehab

Taylor RS, Brown A, Ebrahim S, et al. AM J Med 2004;
116:682-92

Cardiac Rehab was associated with lower **all-cause mortality**
and **cardiac mortality**

- ▶ Cardiac Rehab was also associated with:
 - ▶ Lower cholesterol
 - ▶ Better blood pressure
 - ▶ Less smoking
 - ▶ Improved quality of life

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Studies Summary

Patients with significant benefits from cardiac rehab

- ▶ Old MI
- ▶ PCI
- ▶ Heart failure with reduced ejection fraction
- ▶ Older patients

Despite the known benefits of cardiac rehab,

Cardiac Rehab is Underutilized!

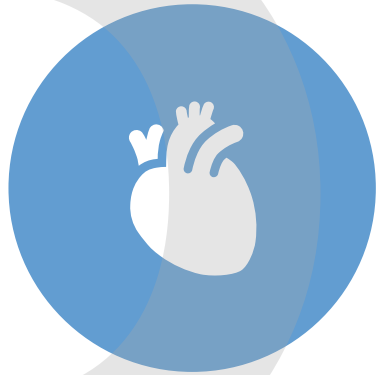
Cardiac Rehabilitation is Underutilized

Use of Cardiac Rehabilitation by Medicare Beneficiaries
After Myocardial Infarction or Coronary Bypass Surgery

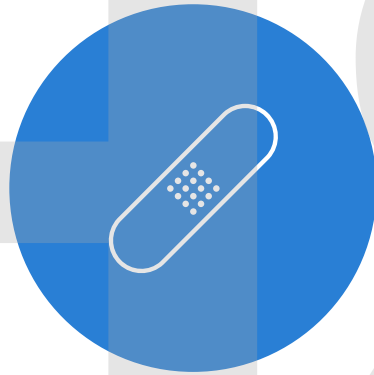
JA Suaya, DS Shepard, ST Normand, PA Ades, J Prottas, WB
Stason. *Circulation* 2007; 116; 1653-1662

- ▶ Study showed that only 14-35% of patients following MI and only 31% of patients following CABG participated in cardiac rehab.

Referral and Attendance Rates are Poor



ONLY 30-50% OF THOSE
ELIGIBLE ARE REFERRED (10-
30% FOR SOME DIAGNOSES)



10% OF PATIENTS ELIGIBLE
ACTUALLY ATTEND



<5% OF PATIENTS ELIGIBLE
COMPLETE A FULL PROGRAM

Who is least likely to attend Cardiac Rehabilitation?

Participation was lowest in:

- ▶ The elderly
- ▶ Women
- ▶ Minorities
- ▶ Low socioeconomic status

Equity and diversity

Populations underrepresented in cardiac rehab:

- ▶ Those who do not speak the language of the country in which they live
- ▶ Minority groups (37% less likely to enroll compared to white counterparts)
- ▶ Living in remote geographical areas
- ▶ Socioeconomically disadvantaged
- ▶ Women (41% less likely to enroll compared to men)

Why is cardiac rehab underutilized?

- ▶ Financial cost
 - ▶ (Some patients will have costly co-pay despite insurance coverage)
- ▶ Transportation
 - ▶ (Many eligible patients cannot drive)
- ▶ Cultural differences around exercise
 - ▶ (Generational, race, and gender related cultural views on exercise)
- ▶ Patients are simply not interested
 - ▶ (The program takes too much of their time)

Referrals to Cardiac Rehab Matter

*The **Biggest** reason patients don't participate in cardiac rehab, is that they were never referred in the first place*

- ▶ Many patients receive cardiac care at out-of-town tertiary centers
- ▶ It can be hard to know when the best time to send a referral is
- ▶ Providers forget to refer, or are unaware of what conditions qualify for cardiac rehab
- ▶ Providers assume patients will not be interested

Interventions to improve participation

Providers promoting cardiac rehab to patients, and sending referrals

Including referral to cardiac rehab as part of the discharge process

Patient educational materials availability

(Discharge order-sets, use of BPAs (best-practices-advisories))

(Packets, brochures, etc.)

The background features a large, semi-transparent watermark of the letters 'OHHSU' in a light blue color. The 'O' is on the left, followed by 'H', 'H', 'S', and 'U' on the right. The background is a solid dark blue with some abstract, lighter blue geometric shapes and lines on the left side.

Novel Cardiac Rehab Programs



Exercise programs for elderly patients with decompensated heart failure

- ▶ An Innovative Physical Function Intervention for Older Patients Hospitalized for Acute Decompensated Heart Failure (REHAB-HF)
 - ▶ Kitzman et al. NJEM 2021
 - ▶ Compared individualized exercise program versus standard of care (including cardiac rehab and physical therapy)
 - ▶ Program started during hospitalization and focused on improving strength, balance, endurance and mobility.
 - ▶ 36 outpatient group facility sessions and home sessions on non-facility days (required home safety evaluation prior to initiation)
 - ▶ Transitioned to home-based self-directed exercise

Results:

- ▶ Improved exercise capacity, improved quality of life, decreased Frailty scores, and decreased depression
- ▶ There appeared to be additional benefit of an integrated personalized exercise beyond standard cardiac rehab and standard physical therapy programs
- ▶ No statistical significance in rehospitalization or death

This program is novel, and does not yet exist for the general population

What about elderly patients with HF and Obesity?

Obesity Status and Physical Rehabilitation in Older Patients Hospitalized With Acute HF: Insights From REHAB-HF.

Peters A, Kitzman D, Chen H, et al. *J Am Coll Cardiol HF*. 2022 Dec, 10 (12) 918-927

- ▶ Compared elderly patients with acute decompensated heart failure with BMI ≥ 30 to those with BMI < 30
- ▶ Patients with greater BMI were typically younger, more frequently women, and had significant worse baseline QOL and physical function

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Results:

- # HRSU
- ▶ Demonstrated that Older patients with heart failure benefit from the rehabilitation therapy regardless of BMI
 - ▶ Patients with higher BMI typically did not have significant improvements of their 6-minute walk test but did have improvement of QOL and other exercise measurements.

Novel Virtual World-Based Cardiac Rehabilitation Program to Broaden Access to Underserved Populations: A Patient Perspective

Content V, Abraham H, Kaihoi B, et al. *J Am Coll Cardiol Case Rep.* 2022 Jul, 4 (14) 911-914)

- ▶ Destination Rehab - Novel world-based cardiac rehab program to improve access participation, and equity
- ▶ Effort to establish an alternative to CBCR (Center Based Cardiac Rehab)

Virtual Cardiac
Rehab
Programs

Destination Rehab Study Description

- ▶ Simulated an in-person experience through an online personal avatar
- ▶ Could be implemented in-home, anywhere with internet access.
- ▶ Developed with input from community based cardiac rehab patients
- ▶ Weekly CV health education sessions, and group virtual tours with cardiac rehab staff.
- ▶ Weekly virtual support groups allowing for real-time interactions between patients and cardiac rehab staff.



Example patient avatar: Image from Virtual World-Based Cardiac Rehab Program: Content et al

Weekly educational topics

TABLE 1 Virtual World Cardiac Rehabilitation Education
Session Topics

| Session | Topic |
|---------|---|
| 1 | Anatomy and physiology of the heart |
| 2 | Managing heart disease risk factors |
| 3 | Stress management and heart disease |
| 4 | Cardiac medications |
| 5 | Sexuality and heart disease |
| 6 | High blood pressure |
| 7 | Fitness concepts and implementation strategies (including fitness center tour with exercise physiologist) |
| 8 | Dining out the healthy way (including interactive restaurant tour with dietician) |
| All | Weekly peer social support group |

Table from Virtual World-Based Cardiac Rehab Program:
Content et al

Destination Rehab Study Results

- ▶ Patient attendance and retention was excellent
- ▶ 93% of patients attended at least 1 session
- ▶ 71% of patients attended 75% or more of sessions
- ▶ Participation was high among women, 84% attended each session
- ▶ Patients reported positive feedback regarding accessibility, convivence and social connectivity
- ▶ Mitigated many traditional barriers

Destination Rehab Study Results

Pros:

- ▶ Lower cost
- ▶ Easier participation
- ▶ Higher attendance when compared to CBCR (especially among women)

Cons:

- ▶ Requires broadband internet access
- ▶ Further studies needed to assess the effectiveness on cardiovascular outcomes
- ▶ Novel program, not widely available to all patients. Similar virtual programs are available in some systems (Kaiser Permanente).

What diagnoses are not typically covered?

- ▶ Arrhythmias (atrial fibrillation)
- ▶ Heart failure with preserved ejection fraction (HFpEF)

These diagnoses do not yet have the same level of evidence supporting the benefit of cardiac rehab and more research is being done.

Exercise Reduces the Burden of Atrial Fibrillation

Aerobic Interval Training Reduces the Burden of Atrial Fibrillation in the Short Term: A Randomized Trial

Malmo V, Nes BM, Amundsen BH, et al. Circulation 2016; Jan 5:

- ▶ Patients walked or ran on a treadmill 3 times per week for 12 weeks.
- ▶ Showed that exercise decrease arrhythmia burden, improved left ventricular function, improved lipids, and improved weight/body mass index for patients with atrial fibrillation.

Patients with Heart failure with preserved ejection fraction (EF >45%)

Rehabilitation Intervention in Older Patients with Acute Heart Failure with Preserved Versus Reduced Ejection fraction (REHAB-HF)

Mentz R, Whellan D, Reeves G, et al. *J Am Coll Cardiol HF*. 2021 Oct, 9 (10) 747-757.

- ▶ Among older patients with hospitalized with heart failure, those with heart failure with preserved ejection fraction had significantly worse impairments at baseline when compared to heart failure with reduced ejection fraction and may derive greater benefit from exercise intervention.

Future directions for cardiac rehab

- ▶ Developing lifelong prevention (non-time-limited) to optimize continuing care for patients
- ▶ Developing flexible cardiac rehab programs (home-based programs, including cultural and language preferences, physical, and cognitive impairment)
- ▶ Including cardiac rehab as part of hospital measures and doing automatic referral
- ▶ Emphasizing the inclusion of psychosocial health in programs
- ▶ Further studies on the effectiveness on virtual cardiac rehab, mobile apps, and personal health monitoring
- ▶ Working with policy makers to improve funding for non-traditional or flexible models of cardiac rehab
- ▶ Revisiting the name “rehabilitation” to be more inclusive and emphasize the need for ongoing lifestyle changes for secondary prevention of cardiovascular disease

Take Home Points

Cardiac rehab is one of the most important things a patient with heart disease can do for their health

Cardiac rehab is more than “just exercise” including patient education, lifestyle changes, and psychosocial health (connecting with others)

Take Action:

Refer your patients to Cardiac Rehab

Encourage them to keep going and complete the program

Additional Resources

AACVPR

American Association of Cardiovascular
and Pulmonary Rehabilitation

- ▶ www.aacpvr.org
- ▶ List locations of all the cardiac rehab programs



CardioSmart

American College of Cardiology

- ▶ www.cardiosmart.org
- ▶ Information for patients and providers
- ▶ Tips for getting the most out of cardiac rehab



**American
Heart
Association.**

- ▶ www.heart.org

American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR)

- ▶ Founded in 1985, the AACVPR is a multidisciplinary organization dedicated to reducing mortality, morbidity and disability from CV and Pulm disease.
- ▶ Includes exercise physiologist, physical therapist, respiratory therapist, dieticians, nutritionists, cardiologist and pulmonologist.
- ▶ Peer reviewed accreditation process for Cardiac and pulmonary rehab.



What Is Cardiac Rehabilitation?

Cardiac rehabilitation is a medically supervised program designed to improve your heart health after heart problems or surgery. It can take place at an outpatient clinic or in a hospital rehab center.

You don't have to face heart disease alone. Cardiac rehab is a team effort that may include doctors, nurses, exercise specialists, dietitians, nutritionists and others. Their goal is to help you make lifestyle choices to improve your heart health.

Ask your doctor if you're eligible for a cardiac rehab program. If you are, ask for a referral in your area.



Who needs cardiac rehab?

You may benefit from rehab if you have or have had a:

- Heart attack in the last 12 months
- Heart condition, such as coronary artery disease (CAD), stable angina or heart failure
- Peripheral artery disease
- Heart procedure or surgery, including:
 - Coronary artery bypass graft (CABG) surgery
 - Angioplasty and stenting
 - Heart valve repair or replacement
 - Pacemaker or implantable cardioverter defibrillator (ICD)
 - Heart transplant

What happens in a rehab program?

Many people find that rehab programs are very helpful after getting out of a hospital. They allow people to join a group to exercise and to get special help in making lifestyle changes. A cardiac rehab program usually includes 36 sessions over 12 weeks, but it can vary depending on your condition and your doctor's recommendations.

During rehab, you will:

- Have a medical evaluation to figure out your needs and limitations. The medical staff then tailors a program to your needs.
- Exercise on a treadmill, bike, rowing machine or walking/jogging track.
- Be monitored by a nurse or another health care professional for a change in symptoms.
- Follow a safe physical activity program that gradually improves your strength.
- Slowly move into a more intensive program that lets you work longer and harder.
- Begin strength training, if your doctor says you can.
- Have your heart rate, blood pressure and EKG monitored.

After you've completed the program, you may feel a lot better. It's important to continue to make these lifestyle changes a part of your everyday life after rehab.

Rehab can help you return to an active life, reduce your risk of further heart problems and improve your quality of life.

(continued)

Cardiosmart.org

American college of cardiology (ACC)
Patient and provider information on
cardiac rehab, heart conditions,
lifestyle modifications and more

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

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.



3 Reduce Stress

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



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► Image provided by CardioSmart.org

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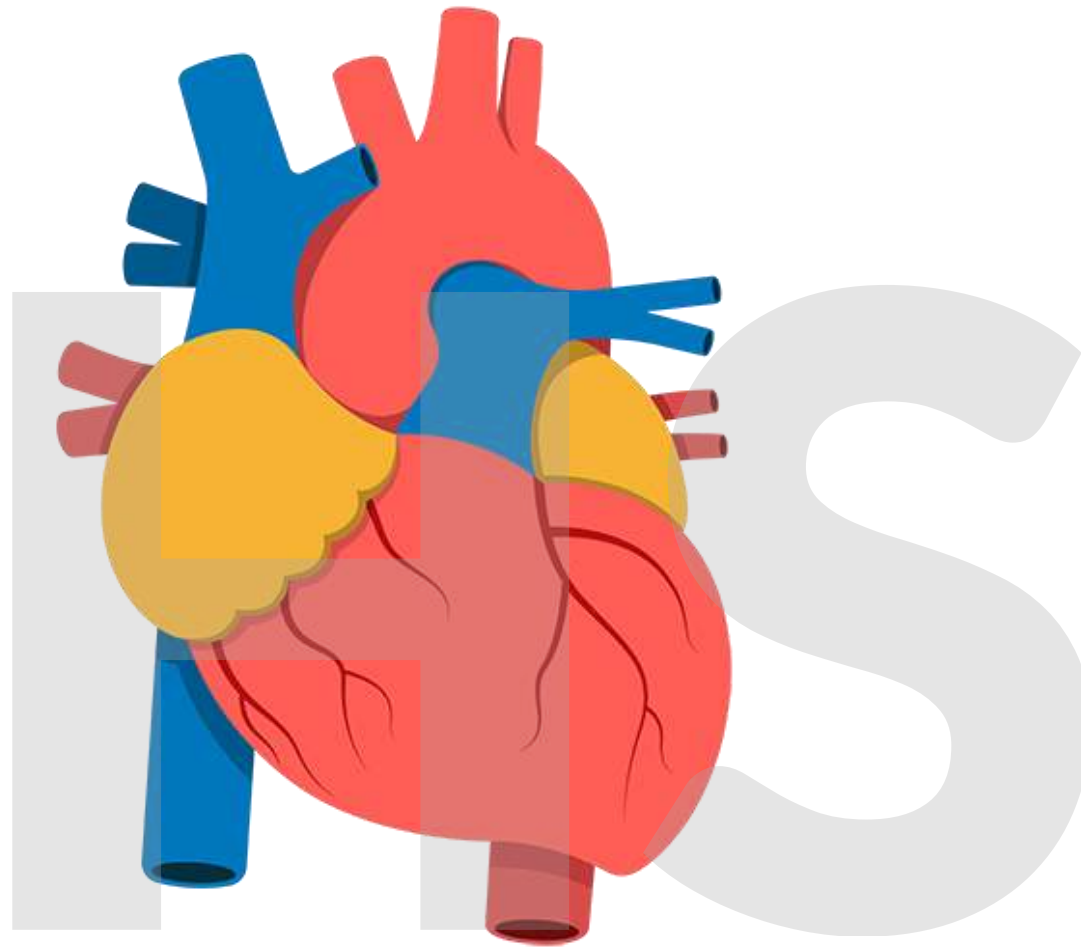
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Thank you!