

# Cardiac Rehabilitation ... 2022

Steven J. Keteyian, PhD



Relevant conflicts: None; Disclosures: Funding from NHLBI R33HL143099

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## Outline

- Description of cardiac rehabilitation Cardiac Rehabilitation (CR)
- National landscape for CR: utilization, performance measures and targets
- Clinical effectiveness of CR
- Identification of key barriers and effective counter-strategies that target CR participation at the patient, provider and policy levels



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## Approximate Annual Occurrence for Common Qualifying Events and the Five Core Components for Cardiac Rehabilitation

- ~ 735,000 acute MI
- ~ 395,000 coronary artery bypass surgeries
- ~ 454,000 percutaneous interventions
- ~ 500,000 new cases of systolic heart failure discharged from hospital

**The 5 core components:**

1. Patient Assessment
2. Exercise Training
3. Dietary/Weight Management
4. Psychological Support/Management
5. Medication Adherence



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### Early Outpatient Cardiac Rehabilitation

- 36 supervised exercise visits
- Individualized treatment plan
- Behavioral-education sessions

**Who's Eligible?**

- STEMI/NSTEMI
- Coronary revascularization
- Heart valve replacement/repair
- Chronic, stable angina
- Cardiac transplant
- Stable heart failure
  - Medicare: only those with reduced ejection fraction (EF ≤ 35%)
  - BCBSM/HAP = both preserved and reduced ejection fraction




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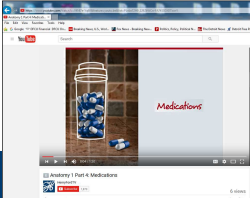
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### Patient Education

- Eight, 50 min educational-behavioral sessions
- These same sessions are broken down to 28 audio PowerPoint slide decks
  - Each file is 3-9 min in length
  - Accessed on-line via YouTube through Henry Ford Health System's web site

<https://bit.ly/2QfqQqs>


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AHA/ACC Recommendations for Cardiac Rehabilitation		
Class of Recommend.	Level of Evidence	Recommendations
I	A	All eligible outpatients with ... <b>coronary artery bypass surgery or PCI</b> within the past year should be referred to a comprehensive outpatient cardiovascular rehabilitation program. <sup>1</sup>
I	B	All eligible outpatients with <b>chronic angina</b> should be referred to a comprehensive outpatient cardiovascular rehabilitation program. <sup>1</sup>
I	B	All eligible patients with <b>NSTE-ACS</b> should be referred to a comprehensive cardiovascular rehabilitation program either before hospital discharge or during the first outpatient visit. <sup>2</sup>
I	B	Exercise-based cardiac rehabilitation/secondary prevention programs are recommended for patients with <b>STEMI</b> . <sup>3</sup>
IIa	B	Cardiac rehabilitation can be useful in clinically stable patients with <b>heart failure</b> to improve functional capacity, exercise duration, HRQL, and mortality. <sup>4</sup>

<sup>1</sup>Smith SC, Jr., Benjamin EJ, Bonow RO, et al. AHA/ACC secondary prevention and risk reduction therapy for patients with coronary and other atherosclerotic disease: 2011 update: a guideline from the American Heart Association and American College of Cardiology Foundation. J Am Coll Cardiol. 2011;58:2432-46. <sup>2</sup>Amsterdam EA, Wenger NK, Brindis RG, et al. 2014 AHA/ACC guideline for the management of patients with nonST-elevation acute coronary syndromes: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. 2014;64:e139-228. <sup>3</sup>O'Gara PT, Kushner FG, Ascheim DD, et al. 2013 ACCF/AHA guideline for the management of STEMI myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. 2013;61:e78-140. <sup>4</sup>Yancy CW, Jessup M, Bozkurt B, et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. 2013;62:e147-239.

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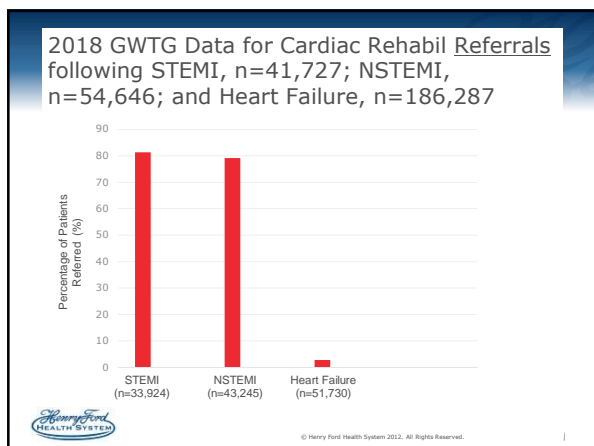
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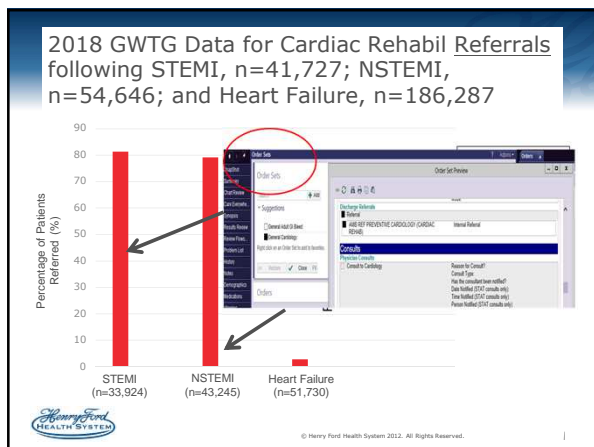
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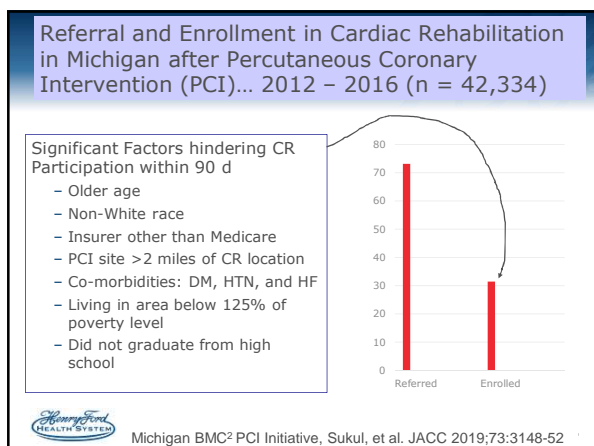
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The New England Journal of Medicine NEJM. 2000;342:454-60.

**EFFECT OF EXERCISE ON CORONARY ENDOTHELIAL FUNCTION IN PATIENTS WITH CORONARY ARTERY DISEASE**

RAINER HAMBRECHT, M.D., ANDREW WOLFF, M.D., STEPHAN GELEN, M.D., AXEL LINKE, M.D., JURGEN HOFER, B.S., SANDRA ERBS, M.D., NIKA SCHONE, M.D., AND GERHARD SCHULER, M.D.

*How Does Exercise Work?*

- RCT; n= 19
- Exercise: 80% peak HR, 10 min, 6 x/d, 4 wk

"Exercise training improves endothelium - dependent vasodilatation both in epicardial coronary vessels and in resistance vessels in patients with coronary artery disease."

The figure contains four line graphs arranged in a 2x2 grid. The top row shows the 'Exercise-Training Group' and the bottom row shows the 'Control Group'. The left column plots 'Change in Luminal Diameter (%)' and the right column plots 'Change in Coronary Blood Flow (%)'. Each graph shows individual data points connected by lines from 'Initial Study' to 'Follow-up at 4 Weeks'. In the exercise-training group, both metrics show a clear upward trend, while in the control group, they remain relatively flat.



**Exercise Training Partially Reverses Endothelial Dysfunction**

Standard: Moderate continuous training (80% of HRR)

Higher intensity aerobic interval training (90% HRR)

**Endothelial function**

The figure shows three line graphs for 'Endothelial function' (FMD (%)) comparing 'Baseline' and 'Follow-up' for three groups: 'Control', 'MCT' (Moderate Continuous Training), and 'AIT' (Higher intensity aerobic interval training). The Control group shows no significant change (NS). Both MCT and AIT groups show a significant improvement (P < 0.01) at follow-up. Two inset graphs show 'Change in Coronary Blood Flow' over time for the MCT and AIT groups, with the AIT group showing a higher peak response.

12 wk of training, n = 27, patients with HFREF; brachial artery. *Wisloff et al. Circulation. 2007;115:3086-3094*  
Copyright ©2007 American Heart Association



**Exercise Training and Sympathetic Activity in HFREF**

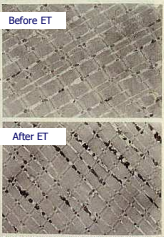
The figure is a line graph showing 'MSNA (bursts/min)' for three groups: 'HF exercise', 'HF sedentary', and 'Control exercise'. Each group has data points for 'Pre' and 'Post' training. The HF exercise group shows a significant decrease in MSNA (p = .0006). The HF sedentary and Control exercise groups show no significant change (p = NS).

*Roveda et al. JACC. 2003; n = 16. 4 mo of training, 60 min, 3x/wk. Peroneal N*




### Skeletal Muscle/Inflammation Adaptations to Exercise Training

- Improved sk. muscle size, strength and endurance
- Improved mitochondrial size and function (e.g., improved SDH, CS)
- No change or small, favorable re-shift in MHC I fibers
- No consistent shift toward normalization of capillary density



Cytochrome c Oxidase activity before and after 24 wk of exercise training (ET)





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### WHAT ARE THE BARRIERS IMPACTING PARTICIPATION IN CR?

**Patient -**

- Demographic (e.g., female, older age, socio-economic, race)
- Difficulty contacting patient after hospitalization
- Return to work issues
- Transportation
- Co-payment obligations
- Dependent care responsibilities

**Patient - medical**

- Multiple co-morbidities
- Depression

Modified from Balady, et al., Circulation 2011

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### WHAT ARE THE BARRIERS IMPACTING PARTICIPATION IN CR?

**Health care system / CR providers**

- Referral type and initial engagement (passive vs. liaison facilitated)
- Provider endorsement
- Program operations (e.g., decrease discharge to start time)

Generally, for each day that elapses between hospital discharge and first visit in cardiac rehabilitation, there is an ~1% decrease in patient enrollment

**Policy and payers**

- Non-coverage (atrial fibrillation; HFpEF for Medicare)
- High deductibles and co-payments

Modified from Balady, et al., Circulation 2011

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### Four Health System/Provider-Level Strategies for Improving Referral and Enrollment (and operations) in CR

- ✓ Refer patient .... Increased use of EMR-driven automatic referral (with opt-out mechanism??) is taking care of this
- Establish in-patient liaison/process visit from/for CR
- Overtly-stated provider endorsement
- Early start after hospital d/c




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### Establish In-Patient Liaison Strategy (example = HFH-Detroit)

- History: IPL in 2015 - 2017 was 2 days/week ... slowly deteriorated to 0-1 days/wk for much of 2018
- Nov-Dec 2018 held weekly meetings to address process/staff schedule changes to re-start and expand IPL to 5 d/wk, 4-5 hr/day
  - "Scripted essential talking points" for use across all staff
  - Refined our data tracking spread sheet
  - Refer back to local CR providers
  - Schedule first CR visit (orientation) prior to d/c
- Re-launched = Jan 2019




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### IPL ... other main elements to consider and address

- Patient streams... surgical/PT list, collaborative cardiology rounds, PCI 23 hr stay, general medicine for heart failure
- Materials needed: iPad for video, web access to AACVPR program directory, IPD tracking spread sheet, program brochures, business cards
- Clear introduction of reason for visit, with emphasis on "referral has been placed for the next step in care"
- Grab patient's back story and begin to identify barriers ... anticipate and react accordingly ... "meet them where they live"



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### IPL ... other main elements to consider and address

- Be sure order is placed in EMR
- SECURE ALTERNATE CONTACT INFORMATION
- Schedule first visit in CR (within 21 days)... no cost vs billable visit
- If feasible, briefly review expected benefits... including surveillance function and CR is the "confidence course"
- If feasible, broadly and briefly detail CR specifics



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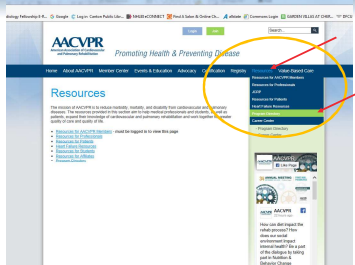
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### Use the AACVPR Program Directory to Help Patients Find a CR Program Near Them



<https://www.aacvpr.org/Resources>



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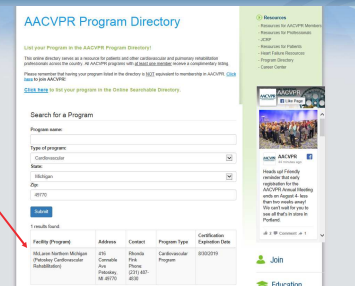
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### Use the AACVPR Program Directory to Help Patients Find a CR Program Near Them



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### Best Practices and Operations to Improve Efficiency in Cardiac Rehabilitation

- Titrate frequency of monitoring exercise blood pressures to clinical need (stop exercise blood pressure measurements on all patients ... for all exercise sessions)
- **After 3-6 ECG telemetry monitored exercise sessions, titrate its use to clinical need (stop ECG telemetry monitoring on all patients ... all the time)**
- Whenever possible, incorporate group orientations of 2 - 6 patients, instead of 1:1 initial visits
- *Institute option for electronic referral to CR within EMR*
  - Make referral part of an established, diagnosis-specific established order set
  - Establish the order using an opt out approach
- *Establish an in-patient liaison (real person or standard messaging)*
  - Connect with the patient
  - Schedule first visits prior to hospital discharge

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### Right-size Use of ECG Telemetry Monitoring Based on Clinical Need

#### Assumptions:

- Some ECG telemetry monitoring is likely expected from most patients and physicians
- Rare are changes in patient care that only ECG telemetry was able to detect (i.e, previously unknown and asymptomatic)
- Some commercial payers may specify a minimum amount of ECG monitoring; others may not even recognize CPT 93797



Merz, et al. *JAMA*, 2000;283:1476-1478. Keteyian, et al, *Chest*, 1995; 107:1242

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### Right-size Use of ECG Telemetry Monitoring Based on Clinical Need

- All patients receive 6 ECG-tele visits
  - Any observed meaningful abnormalities, add 3 to 6 ECG-TM visits
  - Maintain ECG-TM throughout for highest risk (VAD, dialysis, inotrope infusion) and those mandated by insurance
- Visits 7-36
  - Begin self monitoring using HR watch (titrating with RPE)
    - Use of HR to guide intensity is associated with achieving a higher MET levels<sup>1</sup>
    - Higher MET levels at d/c from CR are related to lower mortality risk<sup>2</sup>
  - Begin self-monitoring using RPE alone (no HR watch) for patients unable or not interested in performing moderate-vigorous exercise or not interested in using a HR-based approach
- Resume ECG-TM, as clinically indicated

1. Schley, et al. *J Cardiopulmonary Rehabil.* 2016;36:296 (abstract S210)  
 2. Brawner et al. *Am J Cardiol.* 2016;117:1236-41

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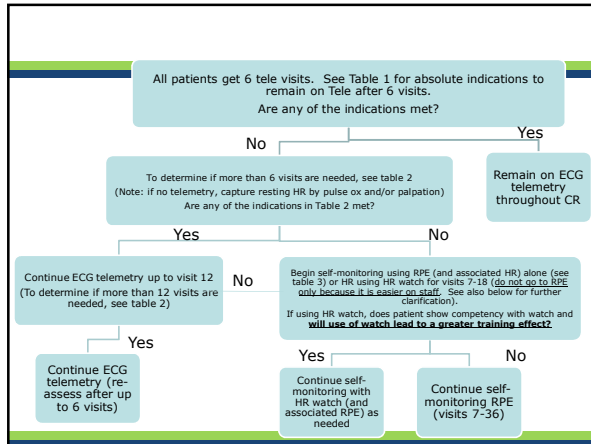
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### Best Practices and Operations to Improve Efficiency in Cardiac Rehabilitation

- Integrate data and technology
  - SMS messaging for appointment reminders and patient education
- Compute (and act on to improve) your enrollment rate using discharge (denominator) and billing (numerator) data
- Integrate higher and moderate intensity interval training
- Advance progression based on prioritized, weekly tracking of training METs... target 2 MET increase over 36 visits (12 weeks)
- Strive to shorten time from d/c to first visit to 21 days or less ...
- Involve your patients to develop your philanthropic base ... to help others unable to attend
- Offer an accelerated CR option ... 4 or 5 CR sessions per week
- Offer a home-based or hybrid-CR option, synchronous or asynchronous

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### A possible new problem looms on the horizon for CR ... Supply of CR < Demand for CR

- If all of the "brick and mortar" CR programs operating today reached full operational capacity, < 50% of the likely eligible patients could be cared for.<sup>1,2</sup>

We need:

- More programs
- Bigger programs
- More efficiently operated programs
- **Alternate delivery models**

<sup>1</sup>Pack et al, JCRP, 2014;34:318-26; <sup>2</sup>Balady et al., Circulation, 2011;124:2951-60

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## Home-Based Cardiac Rehabilitation (HBCR)

CR that "relies on remote coaching with indirect exercise supervision and is provided mostly or entirely outside of the traditional center-based setting."

**The 5 core components:**

1. Patient Assessment
2. Exercise Training
3. Dietary/Weight Management
4. Psychological Support/Management
5. Medication Adherence

**Circulation**

**ACC/AHA/AACVPR Scientific Statement**

**Home-Based Cardiac Rehabilitation**

A Scientific Statement From the American Association of Cardiovascular and Pulmonary Rehabilitation, the American Heart Association, and the American College of Cardiology

*(Note: The text in this box is very small and partially obscured by a watermark. It appears to be the beginning of a scientific statement.)*

**Million Hearts** Home-Based Cardiac Rehabilitation: A Scientific Statement From the American Association of Cardiovascular and Pulmonary Rehabilitation, the American Heart Association, and the American College of Cardiology is publicly accessible at <https://www.ahajournals.org/doi/10.1161/CIR.0000000000000663>

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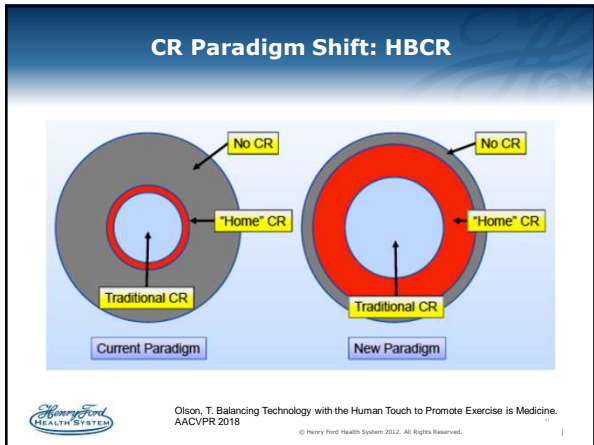
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## Henry Ford Hospital Home-based CR via Telemedicine

**Commercial Mobility**

**Henry Ford Health System**

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# The improving ATTENDance in cardiac rehabilitation (iATTEND) trial

**Primary Aim:** Assess the effect of HYCR on over-all patient adherence.

**Primary Hypothesis:** The NUMBER OF CR SESSIONS COMPLETED WITHIN 6 MO will be significantly greater in patients randomized to HYCR vs. patients randomized to traditional CBCR (usual care).



Funded by: NHLBI, R33 HL143099

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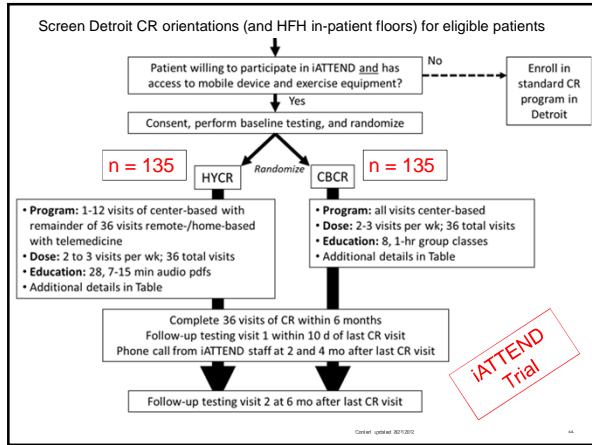
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## Key References/Suggested Readings

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