Cardiac Rehabilitation Outside “The Box”: Hybrid, Home-based and Telerehab Models

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What’s in a name: Center-based or ?

- **Home-based?** Implies exercise done at home without supervision: What about telemetry and “telerehab” applications? Other fitness facilities?

- **Independent?** Implies no input by CR program: What about initial and periodic review with CR staff?

- **Hybrid, Alternative, or “NO-BOX” CR:** Alternative methods of program service delivery. Degree of supervision and contact, monitoring and location of exercise determined by patient/program based on medical direction, proximity of CR center, and available resources of patient and program. May include non-center-based functions, transtelephonic, computer-based, and/or mobile technologies to provide support, education, and monitoring outside of CR center.
Why other models now?

CHANGES IN THE WORLD OF CARDIAC REHABILITATION OVER 30 YEARS
Changes in therapies

- **Then:** MI, CABS, or slow death with HF
- **Now:** Rapid-access PCI, stents, minimally-invasive CAB, catheter-based valve implants, improved medical therapy.
Changes in patient population

- **Then:** High-risk MI/CABS patients
- **Now:** “High-risk” HF patients, most other patients—PCI, NSTEMI, valves, transplant(!)—low-risk for recurrent events
Changes in patient monitoring
Changes in exercise-THEN
Full circle: Debusk (Stanford, 1984)

- MI patients, 6 month program
- Nurse case-management
- CAD RFs managed by RN and team (RD, health psych, etc.)
- *Home exercise* with HR monitors
- Phone calls every month to review and update
- Outcomes comparable to UC and no events
What’s wrong with “The Box”?

BARRIERS TO PARTICIPATION IN TRADITIONAL CR PROGRAMS
87% declined CR participation
Top 3 Reasons for not enrolling in CR:

- 38% Work schedule
- 27% No reason (?)
- 20% Self-exercise

Poh, Arch Phys Med Rehabil, 2015
Cardiac Rehabilitation Program

Barriers to Participation

System Factors
- Insurance issues
- Physician recognition/approval
- Referral processes
- Location

Patient
- Comorbidities
- Interest/understanding of rehab purpose
- Health literacy
- Cultural attitudes/beliefs
- Employment status
- Depression

Program
- “Rehab” as a descriptor
- Enrollment process
- Travel time/distance
- Limited parking
- Wait times
- Inconvenient class times
- Limited equipment
- Inflexible exercise programming
Missed opportunity

DOES TRADITIONAL CR STRUCTURE PROVIDE "VALUE" TO PATIENTS?
What is the “value” of CR?

Value =

Quality of life, confidence in fitness, return to work, safety of exercise

Travel time, expenses associated with CR, time from work, side-effects of exercise, ease of participation
What do CR patients value?

- Use of equipment?
- Monitored exercise and feeling of safety?
- Supervision and support of staff?
- Education and knowledge of staff?
- Communication with physicians?

What services of *value* can we provide patients who don’t want to exercise in a supervised setting?
Conclusions: Changes in the types of patients eligible for CR, treatments, external resources for exercise and real or perceived barriers have led to need for CR programs to provide more flexible services to a broader range of patients and to the broader needs of patients.
Evolution of new models

“NO-BOX” CARDIAC REHABILITATION
Rationale for No-Box CR

- Driven by patient preferences
- Decrease costs of healthcare to system
- Decrease “costs” to patient
- Promote independent physical activity
- Improve enrollment/participation in CR services
Potential Advantages of No-Box CR

- No wait list/capacity issues
- Customizable and individually tailored
- Flexible scheduling
- No travel/transportation issues
- Greater privacy
- Lower cost
- Integrated with patient’s regular home routine
- Possibly greater adherence and sustainability
Potential Disadvantages of No-Box CR

- Lack of reimbursement
- Less intensive exercise training
- Lower social support
- Less patient accountability
- Lack of standardization among programs
- Minimal patient monitoring
- Safety concerns for sicker patients
Who selects No-Box CR?

- Clinical features:
  - Younger age
  - Males or older females
  - History of PCI
- Currently employed
- Access to equipment or health club member
- History of exercise ("Exercise Fanatic")
- The “Exercise Hermit”
Safety of No-Box CR

- N Miller 1984—Home v group in MI pts
- Miller 1985—editorial about safety of HB-CR
- Debusk 1994—case management approach featured home exercise—no events
- Risks similar to center-based CR, ie, low.
Efficacy of No-Box CR

- Outcomes similar for NBCR and traditional center-based programs
- Possibly better adherence to exercise than traditional programs
- Improve self-confidence?
- Selection bias? (Healthy-adherers)
Costs of No-Box CR

- Costs to *health care system* (provision of services, health care utilization) versus costs to *patient*
- **Probable** cost savings to health care (**NOTE:** May decrease program *volume* due to fewer visits)
- **Possible** cost savings to the patient (health investment)
- Generally considered **cost-equivalent** to traditional CR but may be based on delivery model
- **Probably** cost-effective with regards to life-years saved
No-Box CR Models

- Graduated programs—intensive supervised sessions in CR center to occasional sessions in center
- Home-based programs with regular visits by clinical staff
- Home-based programs with occasional sessions at center
- “Tele-rehab”, “virtual rehab”, “mHealth” apps:
  - Trans-telephonic ECG monitoring
  - Telephone/Internet (smart phone or desktop)
  - Exercise, education, “coaching”, support
Evolution of new models

“NO-BOX” CR @ UW HOSPITAL
The University of Wisconsin Hospital and Clinics
Outpatient “Independent CR” Experience: Procedures

- Inpatient team meets with patient prior to hospital DC to **discuss options for CR**
- Patient referred to outpatient CR at hospital DC (**automated referral**)
- Patient scheduled for outpatient CR orientation **prior to DC**
The UW Experience: Procedures

- Orientation with **case manager**:
  - Discussion of services, current health history, etc, and brief exercise assessment

- 1-2 more individual assessment sessions
  - Emphasis on self-monitoring (home BP, WT, pulse checking, RPE for exercise intensity, symptom recognition)

- Independent CR offered as option for long-term program
The UW Experience: Procedures

- Risk stratification used but **NOT** to exclude patient
- ExRx for independent exercise provided:
  - Generally no concessions made re intensity, duration, frequency
  - Program designed to utilize home/health club equipment, patient preferences
The UW Experience: Procedures

- Program duration 3 months with reviews q 30 days
- Equal opportunities for RD, Health Psych, PharmD
- DC review at end of program
- Total of 5-6 sessions (4-5 ECG-monitored)
The UW Experience: Outcomes

- 30-40% take part in independent program
- Mean number of clinic visits: 6 vs 29 for C-CR
- Similar to C-CR for exercise behaviors, lipids, and BP
- Readmissions slightly higher in C-CR (17% vs 9%)
The UW Experience: Issues

- **Dropout common:** 41% vs 22% for C-CR
- **Why?**
  - Fewer educational opportunities
  - Less clinician and/or social support?
  - Perception of CR as “just exercise”
  - Possible lower motivation to change, less accountability to case manager
“Transitional” options for hybrid CR

- 2-4 weeks supervised CR with transition to independent exercise
- Gradual transition from supervised to independent program (3x/week first month, 1x/week 2\textsuperscript{nd} month, independent last month)
- Contact maintained with CR staff through monthly assessments in center
“Virtual”
“mHealth”
- >90% of US adults own a cell phone; 68% of adults use smartphones

(Pew Research Center, 2015)
Tele-, “virtual”, and mHealth CR

- Tele-rehab = ECG and BP monitoring, possible video conferencing during exercise
- Virtual rehab = Internet-based “coaching”, education, exercise not ECG-monitored
- mHealth = Smartphone-based applications, text messaging, activity/dietary monitoring; may or may not be managed by CR clinician
Smartphone-based home care model improved use of CR in post-MI patients

- 120 patients randomized to center-based traditional CR or home-based CR with smartphone
- Smartphone included apps for activity tracking, messaging, education delivery
- **Intervention pts contacted 1x/wk for ~15 mins**
- Improved enrollment and adherence; clinical outcomes similar between both groups
- Improved completion of program (defined as attending 6-wk assessment)
- **Technology still an issue with older adults**

Varnfield, 2014
Mayo Research Shows Cardiac Rehab Patients Who Use Smartphone App Recover Better

- **44 patients:**
  - 19 to usual CR (UC)
  - 25 to CR and smartphone app
- BP, WT, BS, PA and diet entered daily
- Educational materials provided

![Bar chart showing 20% in blue and 60% in red for 90-day readmission/ED visit](chart.png)
Healthy Eating

Home > Healthy Eating

Adopting a Heart Healthy Lifestyle with Longo’s

The UHN Cardiovascular Prevention & Rehabilitation Program is dedicated to helping people with cardiovascular disease—one of the leading causes of death in Canada. For over 45 years, the program has combined education and counseling on healthy eating, emotional wellbeing and exercise to improve the health of people with cardiovascular disease and lower their risk of having another cardiac event. Cardiaccollege.ca is a reliable source of heart health information for people living with cardiovascular disease.

Explore the newly updated Healthy Eating section for recipes, cooking videos and tips on how to eat healthy.

Presented By Longo’s
Continuing study...

**Smartphone Delivered In-home Cardiopulmonary Rehabilitation (Dec 2016, Emory University; clinicaltrials.gov)**

Behavioral: MULTIFIT Cardiac Rehabilitation: MULTIFIT is a cardiac rehabilitation program delivered by the Movn (Moving Analytics, San Francisco, CA) smartphone application that will provide risk factor modification, prescribed exercises, education and counseling. The application will track activity using a built-in accelerometer or through connected devices such as a Fitbit for daily physical activity and management. Weight and blood pressure (BP) will be tracked by manual input or through wireless scales and BP monitors. The program will last for 12 weeks.
Remote Delivered Exercise-Based Cardiac Rehabilitation: Design and Content Development of a Novel mHealth Platform

“...mHealth exCR platform, named REMOTE-CR, that integrates smartphones, wearable sensors, and custom smartphone and Web-based apps to provide real-time remote exercise monitoring, evidence-based exercise prescription and coaching, theory-based behavior change education, and social support to CHD outpatients in almost any location.”
Tele- and “virtual” rehab

- Studies have found good adherence, better outcomes than UC and equal outcomes to traditional CR, **but** these are research studies, small samples, and not “real world” experiences
- At core is **frequent contact** with health care professional
- Costs to health center may or may not be similar to center-based program but are more cost-effective than usual care; costs to patient?
- Technology still an issue for some older adults
- Security issues need to be considered
- Reimbursement?
Making No-Box CR work

INCORPORATING NO-BOX CR INTO TRADITIONAL CR MODELS
Provide programming options for patients

- I would prefer a:
  - [ ] Supervised program
  - [x] Graduated program
  - [ ] Tele-rehab program
  - [ ] Independent program
Case management to oversee patient progress and communication with providers and patient

Frequent contact with staff *required*
- Appropriate assessment for safety of independent exercise
- Appropriate prescription for independent exercise
Heart-Mind Connection: The psychological factors in heart disease and what you can do about it

You have heart disease. For both you and your family, that fact is having a major impact mentally, as well as physically. The psychological adjustments can be difficult. Are you experiencing confusion and disbelief? You may not yet be ready to break from the normal routine. This is a natural response. It may take some time and patience to come to grips with this challenging event. While the heart is a vital organ, it is not the only organ. If you need any help, do not hesitate to call your doctor at [phone number].

When do people feel better?

Cardiovascular patients with heart disease may experience any of the following:

- Confusion
- Disbelief
- Shock
- Fear
- Anger
- Grief
- Feelings of helplessness
- Changes in appetite
- Changes in sleep patterns
- Changes in energy levels
- Loss of interest in activities
- Changes in sexual function
- Unexplained chest pain
- Nausea
- Diarrhea
- Abdominal pain

There are many warning signs of heart disease. It is important to be aware of them and to take action if they occur. These signs may signal a heart attack or other serious condition. If you experience any of these symptoms, please contact your doctor immediately.
Conclusions: No-Box CR...

- Can offer patients alternatives to traditional, center-based CR programs
- Can be safe and cost-effective
- Can deliver same quality outcomes as center-based CR and *may* improve adherence to medical therapies and lifestyle behaviors
Conclusions: No-Box CR...

- Can be used in conjunction with center-based models of CR as transition to independent exercise
- May increase participation in CR but *may also decrease total visits/contacts.* (Model used depends on patient and program factors)
- **NOTE:** Coverage of these models not uniform—check with your MAC, insurance carriers, etc.
References: Reviews

References: Alternative programming models

- Home-Based Versus In-Hospital CR After Cardiac Surgery: A Nonrandomized Controlled Study. Scalvani, *Phys Ther*, 2013;93:1073-1083—telerehab model looking at changes in exercise capacity


Virtual/mHealth CR resources

- Randomized Trial of a Virtual CR Program Delivered at a Distance via the Internet. Lear, Circ Cardiovasc Qual Outcomes. 2014;7:952-959
- Remotely Delivered Exercise-Based Cardiac Rehabilitation: Design and Content Development of a Novel mHealth Platform. Rawstorn, JMIR mHealth uHealth 2016;4(2):e57.
AACVPR materials

Cardiac Rehabilitation Enrollment/Adherence Strategy

*Use of Text Messaging and Mobile Applications*

Questions should be directed to: [aacvpr@aacvpr.org](mailto:aacvpr@aacvpr.org)

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<td>Text messaging and mobile applications using smartphones to expand strategies to support Cardiac Rehabilitation (CR) Enrollment and Adherence.</td>
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THANK YOU!