Cardiac Rehabilitation Quality: Variation by Region and Country Income Classification

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AHA/AACVPR Scientific Statement

Core Components of Cardiac Rehabilitation/Secondary Prevention Programs: 2007 Update
A Scientific Statement From the American Heart Association
Exercise, Cardiac Rehabilitation, and Prevention Committee,
the Council on Clinical Cardiology; the Councils on Cardiovascular Nursing,

Circulation: Cardiovascular Quality and Outcomes

PERFORMANCE MEASURES

2018 ACC/AHA Clinical Performance and Quality Measures for Cardiac Rehabilitation
A Report of the American College of Cardiology/American Heart Association Task Force on Performance Measures
Review of CR Guidelines/Statements- 18 countries = Variation

<table>
<thead>
<tr>
<th>Country</th>
<th>Type of exercise</th>
<th>Intensity of exercise</th>
<th>Duration and frequency of sessions</th>
<th>Programme length</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South America</strong></td>
<td>Aerobic endurance training</td>
<td>60–80% HR_{max} or 50–70% HRR (beginning at lower limit of range)</td>
<td>30–60 minutes per session</td>
<td>1–5 months</td>
</tr>
<tr>
<td>(South American Society of Cardiology, Inter-American Committee of Cardiovascular Prevention and Rehabilitation)</td>
<td>Aerobic interval training</td>
<td>At an anaerobic threshold</td>
<td>2–5 sessions per week</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resistance training</td>
<td>Load sufficient to cause fatigue for final 3 reps</td>
<td>6–15 reps per muscle group at an interval of 20–60 seconds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexibility training</td>
<td>Not specified</td>
<td>2–3 sessions per week</td>
<td></td>
</tr>
<tr>
<td><strong>World Health Organization</strong></td>
<td>Aerobic endurance training</td>
<td>High intensity (60–75% peak work capacity or 70–85% HR_{peak})</td>
<td>At end of each session</td>
<td>≥6–8 weeks</td>
</tr>
<tr>
<td>(emphasis on developing countries)</td>
<td>Low/moderate intensity</td>
<td></td>
<td>20–30 minutes per session</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(e.g. stationary cycle, rowing, stepping as part of a circuit)</td>
<td></td>
<td>≥3 sessions per week</td>
<td></td>
</tr>
</tbody>
</table>

Price, 2016 EJPC
32 Associations of the International Council of Cardiovascular Prevention and Rehabilitation (ICCPR)
Our review of national surveys of CR programs, n=28

50/111 or 45% of countries offering CR

Fig 1 – World Map depicting countries where surveys of cardiac rehabilitation programs have been undertaken.
CONSENSUS STATEMENT

Cardiac rehabilitation delivery model for low-resource settings

Sherry L Grace,¹ Karam I Turk-Adawi,² Aashish Contractor,³ Alison Atrey,⁴ Norm Campbell,⁵ Wayne Derman,⁶ Gabriela L Melo Ghisi,⁷ Neil Oldridge,⁸ Bidyut K Sarkar,⁹ Tee Joo Yeo,¹⁰ Francisco Lopez-Jimenez,¹¹ Shanthi Mendis,¹² Paul Oh,¹³ Dayi Hu,¹⁴ Nizal Sarrafzadeh¹⁵

Heart, vol 102; 2016 & Prog in CVD; vol 59

Endorsed by 10 national/international cardiac societies
Donabedian’s Quality Framework

- **Structure**
  - Characteristics of institutions & providers

- **Process**
  - What is done to the patient

- **Outcomes**
  - What happens to the patient
Objectives

1. Characterize CR program quality globally

2. Compare by:
   • WHO region
   • World Bank Country Income classification

Methods

• Design
  • Quantitative
  • Cross-sectional
Procedure: Reaching Programs in Countries with CR

1. List of countries (N=203)
2. Literature Review - countries w CR
3. National CR/Cardiology Society
4. Champion in the field
5. KTA & SLG; NR:C
6. To reach CR programs
7. International Assoc. & Google

Global Heart

Available, Use, and Barriers to Cardiac Rehabilitation in LMIC

Loheetha Ragupathi, Strybing, Yuliya Yakunina, Valent Rajesh Vedanthan

AACVPR

American Association of Cardiovascular and Pulmonary Rehabilitation

World Heart Federation
Procedure

- Confidential, online survey administered to CR programs around the world
- Repeat emails to optimize response rate
- Random sub-sample of 250 programs surveyed in the U.S

Sample

- CR programs that offered services to patients following an acute cardiac event (i.e. Phase II)
  - Inclusion criteria:
    - Offers initial assessment
    - Structured exercise
    - One other strategy to control risk factors
Measures

Availability and Characteristics of Cardiovascular Rehabilitation Programs in South America

European Journal of Cardiovascular Prevention & Rehabilitation

Cardiac rehabilitation in Europe: results from the European Cardiac Rehabilitation Inventory Survey

BMC HSR 2015

JCRP 2013
Measures: 20 Quality Indicators

- Time to Enrolment: median ≤ 4 weeks
- Risk Factors Assessed:
  - Physical Inactivity
  - Diet
  - Blood Pressure
  - Lipids
  - Glucose
  - Tobacco use
  - Adiposity
  - Depression

- Components Offered:
  - Initial Assessment
  - Risk Assessment
  - Risk Factor Mgmt
  - Patient Education
  - Structured Exercise
  - Nutrition counselling
  - Stress Management
  - Tobacco Cessation Int.
  - End of program re-assessment
  - Communication with primary care provider
  - R2W / vocational

≥75% programs
Statistical Analysis

• Descriptive

• Responses were compared by WHO region and World Bank country income classification using generalized linear mixed models where possible
  • to take into consideration the hierarchical nature of data
Results: Response Rate

Data were collected in 93/111 (83.8%) countries with CR

N=1082 surveys, 32.1% response rate

Mean 9.7 ± 17.3 surveys / country
### Response by WHO Region

<table>
<thead>
<tr>
<th>Region</th>
<th># programs</th>
<th># responses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>32</td>
<td>18 (56.3%)</td>
</tr>
<tr>
<td>Americas</td>
<td>677</td>
<td>261 (38.6%)</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>49</td>
<td>24 (49.0%)</td>
</tr>
<tr>
<td>Europe</td>
<td>1590</td>
<td>484 (30.4%)</td>
</tr>
<tr>
<td>South East Asia</td>
<td>47</td>
<td>32 (68.1%)</td>
</tr>
<tr>
<td>Western Pacific</td>
<td>978</td>
<td>263 (26.9%)</td>
</tr>
</tbody>
</table>

### Response by Income Classification

<table>
<thead>
<tr>
<th>Income Class</th>
<th># programs</th>
<th># responses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>5</td>
<td>2 (40.0%)</td>
</tr>
<tr>
<td>Lower Middle</td>
<td>72</td>
<td>54 (75.0%)</td>
</tr>
<tr>
<td>Upper Middle</td>
<td>549</td>
<td>279 (50.4%)</td>
</tr>
<tr>
<td>High</td>
<td>2,742</td>
<td>747 (27.2%)</td>
</tr>
</tbody>
</table>
QUALITY: Wait Time to Enrolment* (wks) by WHO Region

<table>
<thead>
<tr>
<th>Region</th>
<th>AFR  (n=18)</th>
<th>AM  (n=261)</th>
<th>EMR (n=24)</th>
<th>Euro (n=484)</th>
<th>SEAR (n=32)</th>
<th>WP  (n=263)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>6.8 ± 4.0</td>
<td>4.2 ± 4.3</td>
<td>5.2 ± 5.8</td>
<td>3.6 ± 3.7</td>
<td>2.4 ± 1.4</td>
<td>2.6 ± 1.9</td>
</tr>
<tr>
<td># programs meeting 4 wk recommend’n (%)</td>
<td>5 (31.3%)</td>
<td>183 (77.9%)</td>
<td>15 (71.4%)</td>
<td>322 (77.4%)</td>
<td>26 (92.9%)</td>
<td>221 (91.3%)</td>
</tr>
</tbody>
</table>

*from hospital discharge  
p=n.s.
# Waits* by Country Income Classification

<table>
<thead>
<tr>
<th></th>
<th>HICs (n=747)</th>
<th>LMICs (n=335)</th>
<th>Global (N=1,082)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean ± SD</strong></td>
<td>3.7 ± 3.8</td>
<td>3.1 ± 3.1</td>
<td>3.5 ± 3.6</td>
</tr>
<tr>
<td><strong># programs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>meeting 4 wk</td>
<td>520</td>
<td>252</td>
<td>772</td>
</tr>
<tr>
<td>recommendation (%)</td>
<td>(78.2%)</td>
<td>(86.0%)</td>
<td>(80.6%)</td>
</tr>
</tbody>
</table>

*from hospital discharge to 1st CR visit.  

p=n.s.
Risk Factors Assessed by WHO Region

- BP
- Tobacco
- Adiposity
- Physical Inactivity
- Diet
- Lipids
- Glucose
- Depression

% of population for each region:

- **Africa**: n=18
- **Americas**: n=261
- **EMR**: n=24
- **Europe**: n=484
- **SEAR**: n=43
- **WP**: n=251

p=n.s.
Risk Factors Assessed by Income Class

![Bar chart showing risk factors by income class](chart.png)

- **BP**
- **Tobacco**
- **Adiposity**
- **Glucose**
- **Lipids**
- **Diet**
- **Physical Inactivity**
- **Depression**

LMIC, HIC, Global

(n=335) (n=747) (N=1082)

**p< 0.01**
Core Components by WHO region

- Initial Ass.
- Risk Factor Mgmt
- Pt Edu
- Risk Assess.
- Nutrition counselling
- End of program reassess
- Comm. w primary HCP
- Stress Management

All p=n.s.

n=43
n=484
n=24
n=261
n=18
n=251
n=43
For pairwise comparisons *†‡§: one symbol=p<.05; two symbols=p<.01; 3 symbols=p<.001
Core Components by Income Classification

- Initial Assessment
- Risk Factor Mgmt
- Patient Education
- Structured Ex
- Risk Assess
- Nutrition Counseling
- End of program re-assess
- Stress management
- Tobacco Cessation Int.
- Vocational counseling

- LMIC
- HIC
- Global

(n=335)  (n=747)  (N=1082)

***p< 0.001; **p< 0.01; *p< 0.05
# Overall Quality Rank by WHO Region

<table>
<thead>
<tr>
<th>Region</th>
<th>AFR (n=18)</th>
<th>AM (n=261)</th>
<th>EMR (n=24)</th>
<th>Euro (n=484)</th>
<th>SEAR (n=32)</th>
<th>WP (n=263)</th>
</tr>
</thead>
<tbody>
<tr>
<td># Quality / 20</td>
<td>16.0</td>
<td>17.0</td>
<td>17.0</td>
<td>20.0</td>
<td>18.0</td>
<td>19.0</td>
</tr>
<tr>
<td>Quality Rank</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

p=n.s.
## Overall Quality Rank by Income Class

<table>
<thead>
<tr>
<th></th>
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<th>HICs (n=747)</th>
<th>Global (N=1082)</th>
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</thead>
<tbody>
<tr>
<td># Quality / 20</td>
<td>16.0</td>
<td>18.0</td>
<td>18.0</td>
</tr>
</tbody>
</table>

*p=.06*
Limitations

1. Generalizability:
   a. 30% program response rate
      • But country response was high
   b. Selection bias
      • Higher quality programs through societies

2. Socially-desirable responding, therefore findings may reflect higher quality than reality

3. Items not validated against actual delivery

4. No evidence that the quality indicators are associated with better patient outcomes
   • Only structure and process indicators assessed
Discussion

• Where available, CR delivery around the world is generally consistent with guideline recommendations

• Significantly longer wait times and less tobacco cessation interventions in Americas

• Low-income countries require support to deliver more comprehensive services
Acknowledgements

Co-Investigators: Karam Turk-Adawi, Marta Supervia, Francisco Lopez Jimenez

Trainee: Ella Pesah

US Champions: Tom Draper, Randy Thomas

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Contact Information: sgrace@yorku.ca

Protocol Endorsement: World Heart Federation

Study Sponsorship: http://globalcardiacrehab.com/
FOR MORE INFO: Multinational Papers from Global CR Program Survey


- Turk-Adawi, K., Supervia, M.,......, & Grace, S.L. Global cardiac rehabilitation availability, volume, capacity and density. *Circulation.* (under review)