How to deliver cardiac rehabilitation to a patient with Acute Coronary Syndrome

STATE OF THE ART

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Former member of ESC/EACPR

Declaration of interest: None
Acute Coronary Syndrome (STEMI, Non-STEMI, UAP)

64 years old
Carpenter with 3 employees
Married, 2 children and 1 grand child

Smoker
Physical active as part of work

First time chest pain (calling 911)
ECG showed STEMI
KAG one vessel disease
Primary PCI
No angina, normal LVEF

Submitted after 5 days
Well information
Smoking cessation during admission
Medicated with 5 tablets according to guidelines

==>> Everything was ‘by the book’
Review

Secondary prevention through cardiac rehabilitation: from knowledge to implementation. A position paper from the Cardiac Rehabilitation Section of the European Association of Cardiovascular Prevention and Rehabilitation
Massimo Francesco Piepoli, Ugo Corrà, Werner Benzer, Birna Bjarnason-Wehrens, Paul Dendale, Dan Gaita, Hannah McGee, Miguel Mendes, Josef Niebauer, Ann-Dorthe Olsen Zwisler and Jean-Paul Schmid
Cardiac rehabilitation is a multifaceted and multidisciplinary intervention, which improves functional capacity, recovery and psychological well-being.

Adapted by WHO
### Evidence-based intervention

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Diagnosis</strong></td>
<td>AMI</td>
<td>CHD</td>
<td>CHD</td>
<td>CHD</td>
</tr>
<tr>
<td><strong>Trials</strong></td>
<td>19</td>
<td>34</td>
<td>48</td>
<td>47</td>
</tr>
<tr>
<td><strong>CR ex-only/CCR</strong></td>
<td>-</td>
<td>20/14</td>
<td>30/18</td>
<td>17/29</td>
</tr>
<tr>
<td><strong>Patients</strong></td>
<td>4347</td>
<td>7996</td>
<td>8940</td>
<td>10,794</td>
</tr>
<tr>
<td><strong>Age (mean)</strong></td>
<td></td>
<td>55 (48-71)</td>
<td>55 (48-71)</td>
<td>57 (46-84)</td>
</tr>
<tr>
<td><strong>Women %</strong></td>
<td>2,9%</td>
<td>9%</td>
<td>20%</td>
<td>20</td>
</tr>
<tr>
<td><strong>Outcome</strong></td>
<td>Survival</td>
<td>Survival</td>
<td>Survival</td>
<td>Survival</td>
</tr>
<tr>
<td></td>
<td>Riskfactors</td>
<td>Riskfactors</td>
<td>Riskfactors</td>
<td>Re-hospitalisations</td>
</tr>
<tr>
<td></td>
<td>HRQL</td>
<td>HRQL</td>
<td>HRQL</td>
<td>HRQL</td>
</tr>
</tbody>
</table>
Weakness of evidence

- Selected study-population (men, STEMI, <65 years)
- Quality of trials have been questioned
- Most trials conducted before 1995
- Duration, follow-up and interventions vary markedly
- No descriptions of the intervention
### Evidence-based intervention

<table>
<thead>
<tr>
<th>Effekt CHD</th>
<th>Alle forsøg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trials</strong></td>
<td>47</td>
</tr>
<tr>
<td><strong>Numbers of patients</strong></td>
<td>10,794</td>
</tr>
<tr>
<td><strong>Mortality (OR)</strong></td>
<td>0,87 (0,75-0,99)*</td>
</tr>
<tr>
<td><strong>Cardiovascular motality (OR)</strong></td>
<td>0,74 (0,63-0,87)*</td>
</tr>
<tr>
<td><strong>Re-hospitalisation (short term)</strong></td>
<td>0,69 (0,51-0,93)*</td>
</tr>
<tr>
<td><strong>Blood pressure dia. (WMD mmhg)</strong></td>
<td>-0,56 (-1,68-0,69)</td>
</tr>
<tr>
<td><strong>T- Colesterol (WMD mmhg)</strong></td>
<td>-0,36 (-0,60--0,12)*</td>
</tr>
<tr>
<td><strong>HDL Colesterol (WMD mmhg)</strong></td>
<td>0,04 (-0,03-0,11)</td>
</tr>
<tr>
<td><strong>LDL Colesterol (WMD mmhg)</strong></td>
<td>-0,19 (-0,47-0,08)</td>
</tr>
<tr>
<td><strong>Triglycerid (WMD mmhg)</strong></td>
<td>-0,20 (-0,35-0,07)*</td>
</tr>
<tr>
<td><strong>Smoking (OR)</strong></td>
<td>0,73 (0,60-0,89)*</td>
</tr>
<tr>
<td><strong>HQRL</strong></td>
<td>Improvement (7/10 trials)</td>
</tr>
</tbody>
</table>

Cochrane –review CHD 2001  
Cochrane-review 2011
Register-based 3 years follow-up

**Poisson (95% CI)* p-value**

**CR reference group** 1.00 (ref)

**Days receiving**

**Sickness benefits** 1.19 (1.16-1.22) <0.01

**Days of**

**Unemployment** 1.04 (1.01-1.07) <0.01

* Zero-inflated Poisson model

Hazard ratio = 1.21  
95% CI (0.72–2.02)  
$P = 0.47$

Keep working
### Phases of rehabilitation

<table>
<thead>
<tr>
<th>Phase</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I</td>
<td>Inpatient rehabilitation</td>
</tr>
<tr>
<td>Phase II</td>
<td>Early outpatient rehabilitation</td>
</tr>
<tr>
<td>Phase III</td>
<td>Long-term outpatient rehabilitation</td>
</tr>
</tbody>
</table>
Core components

- Individual assessment
- Physical counselling and exercise training
- Smoking cessation
- Dietary counselling
- Patient education and psychosocial support
- Risk-factor management, medication and clinical follow-up
• Clinical history, co-morbidity and current symptoms
• Adherence to medical regimes
• ECG, echocardiography, blood testing
• Physical activity level and measurement of exercise capacity
• Smoking habits
• Dietary habits
• Self-assessed health
• Screening for psychological distress
Physical counselling

• A 30–60 minutes/daily moderately intense aerobic activity life long

• Emphasize sedentary lifestyle as risk factor, and benefits of physical activity

• Recommend gradual increases in daily lifestyle activities over time, and how to incorporate it into daily routine

• Advise individualize physical activity according to patient’s age, past habits, co-morbidities, preferences and goals

• Reassure regarding the safety of the recommended protocol

• Encourage involvement enjoyable activities

Piepoli MF et al. EJCP 2010:1-17
Exercise training

- Prescribed on an individualized approach according to capacity and risk-factors

- Supervised 12 weeks of aerobic exercise training at least 3 times pr. week

- Starting at 50% of maximal work load or V02 peak and increasing to 70%

- Resistance training is recommended 1 h/week

Special recommendations for patients with CHF and low LVEF

Piepoli MF et al. EJ CPR 2010:1-17
Smoking cessation

- All smokers should permanently stop smoking
- Importance of structured approaches should be emphasized
- Should be advised by cardiologists and general practitioner
  (OR 1.69 ((1.45-1.98))
- Behavioral advice and counseling is corner-stone (3 – 4 visits)
- Pharmacotherapy 2-3 month
  - Nikotine (OR 1.73 (1.62-1.85))
  - Vareniclin (OR 3.22 (2.43-4.27))
  - BupropionSR (OR 1.97 (1.67-2.34))

>>> 1 year cessation rate 15-35 %

Piepoli MF et al. EJPR 2010:1-17
Smoking cessation – could we do better?

Kotseva K et al. Lancet 2009;373:929-40
Dietary counselling

- Daily caloric intake, content of nutrients (fat, vegetables, fruit and fish) should be assessed systematically.
- Caloric intake should be balanced by energy expenditure to avoid weight gain.
- Mediterranean diet with low level of saturated fat, high level of fibre, fruit, vegetables and fish (omega-3 fatty acids).

Piepoli MF et al. EJCPR 2010:1-17
Dietary counselling - does it matter?


* $P<0.05$
Effect of multiple lifestyle changes

Epidemiology and Prevention

Association of Diet, Exercise, and Smoking Modification With Risk of Early Cardiovascular Events After Acute Coronary Syndromes

Clara K. Chow, MBBS, FRACP, PhD; Sanjit Jolly, MD, MSc, FRCPC; Purnima Rao-Melacini, MSc; Keith A.A. Fox, BSc (Hons), MB, ChB, FRCP, FESC, FMedSci; Sonia S. Anand, MD, PhD, FRCPC; Salim Yusuf, DPhil, FRCPC, FRSC

Background—Although preventive drug therapy is a priority after acute coronary syndrome, less is known about adherence to behavioral recommendations. The aim of this study was to examine the influence of adherence to behavioral recommendations in the short term on risk of cardiovascular events.

Methods and Results—The study population included 18 809 patients from 41 countries enrolled in the Organization to Assess Strategies in Acute Ischemic Syndromes (OASIS) 5 randomized clinical trial. At the 30-day follow-up, patients reported adherence to diet, physical activity, and smoking cessation. Cardiovascular events (myocardial infarction, stroke, cardiovascular death) and all-cause mortality were documented to 6 months. About one third of smokers
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. of Patients</th>
<th>Odds Ratio for MI or Stroke or Death (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never smoker, diet &amp; exercise</td>
<td>2442</td>
<td>Reference category</td>
<td>-</td>
</tr>
<tr>
<td>Never smoker, either diet/exercise</td>
<td>3515</td>
<td>1.96(1.45-2.65)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Never smoker, No diet/exercise</td>
<td>2519</td>
<td>2.42(1.78-3.29)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Former smoker, diet &amp; exercise</td>
<td>1793</td>
<td>1.25(0.85-1.85)</td>
<td>0.2586</td>
</tr>
<tr>
<td>Former smoker, either diet/exercise</td>
<td>2529</td>
<td>2.46(1.80-3.37)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Former smoker, No diet/exercise</td>
<td>1590</td>
<td>2.36(1.68-3.30)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Quit smoking, diet &amp; exercise</td>
<td>972</td>
<td>1.62(0.96-2.75)</td>
<td>0.0732</td>
</tr>
<tr>
<td>Quit smoking, either diet/exercise</td>
<td>1143</td>
<td>2.03(1.32-3.13)</td>
<td>0.0014</td>
</tr>
<tr>
<td>Quit smoking, No diet/exercise</td>
<td>679</td>
<td>3.22(2.07-5.03)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Persistent smoker, diet &amp; exercise</td>
<td>379</td>
<td>1.95(1.00-3.82)</td>
<td>0.0502</td>
</tr>
<tr>
<td>Persistent smoker, either diet/exercise</td>
<td>590</td>
<td>2.97(1.83-4.82)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Persistent smoker, No diet/exercise</td>
<td>536</td>
<td>3.77(2.40-5.91)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
**Conclusions**—Adherence to behavioral advice (diet, exercise, and smoking cessation) after acute coronary syndrome was associated with a substantially lower risk of recurrent cardiovascular events. These findings suggest that behavioral modification should be given priority similar to other preventive medications immediately after acute coronary syndrome.
Patient education

- Patient education is an important part of rehabilitation and should approach the themes:

Information on the disease, treatment and medication, compliance, lifestyle changes, re-laps, coping with chronic disease, sexual dysfunction, social isolation, return to work, driving licence, insurance, travel etc.

Conclusion: There was some evidence to suggest that education may improve HRQL and reduce overall healthcare costs. Whilst our findings are generally supportive of current guidelines that CR should include not only exercise, lifestyle changes and psychological interventions, further research into education is needed.


13 RCTs involving 68,556 patients
Assessment of psychosocial parameters is recommended alongside intervention approaching anxiety and depression.

24 RCTs involving 9,296 patients

_CoCclusion:_ We found evidence that psychological interventions may produce small to moderate reductions in depression and anxiety, and may also reduce cardiac mortality. Uncertainly remains regarding the subgroups of patients who would benefit most from treatment and the characteristics of successful interventions.

_Cochrane review:_ Whalley et al. Psychological interventions for coronary heart disease. 2011
## Risk-factor management, medication and clinical follow-up

<table>
<thead>
<tr>
<th>Target</th>
<th>No T2DM</th>
<th>T2DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>CCS 0, NYHA I-II</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>130/80</td>
<td>&lt;130/80 (125/75)</td>
</tr>
<tr>
<td>Lipids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-cholesterol</td>
<td>&lt;4,5 (4,0) mmol/l</td>
<td>&lt;4,0 mmol/l</td>
</tr>
<tr>
<td>LDL</td>
<td>&lt;2,5 (2,0) mmol/l</td>
<td>&lt;2,0 mmol/l</td>
</tr>
<tr>
<td>Fasting glucose</td>
<td></td>
<td>Fasting glucose &lt; 6 mmol/l</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HbA1C &lt; 6,5%</td>
</tr>
<tr>
<td>Medication</td>
<td>ASA</td>
<td>ASA</td>
</tr>
<tr>
<td></td>
<td>B-blokker</td>
<td>Statin</td>
</tr>
<tr>
<td></td>
<td>Statin</td>
<td>B-blokker</td>
</tr>
<tr>
<td></td>
<td>(ACE-hæmmer)</td>
<td>ACE-hæmmer</td>
</tr>
</tbody>
</table>

Piepoli MF et al. EJCP 2010:1-17
Effect of goal setting

Life style

- Physical aktiv
- Eating less fat
- Eating more vegetables
- Eating more fruit
- Not smoking

Risk factor control

- BP sys mmHg
- BP dia mmHg
- Totale Cholesterol mmol/l
- HDL Cholesterol mmol/l
- LDL Cholesterol mmol/l
- Triglycerid mmol/l

Period I
Period III

CR UC

[Cardiac rehabilitation – a health technology assessment]. National Board of Health, Denmark, 2006
Effect of goal setting

Period I

Composite outcome of death, re-infarction and rehospitalisation

Period III

[Cardiac rehabilitation – a health technology assessment]. National Board of Health, Denmark, 2006
How to deliver cardiac rehabilitation in Acute coronary syndrome

Quality of care continuum

Research — Consensus

Guidelines

Accreditation /adherence — Education

Clinical practice

Quality of care continuum in cardiac rehabilitation

Zwisler et al. EJCPR, 2011
Adapted from the EuroHeart Survey Programme
Implementing ‘performance measures’

It is anticipated that the implementation of CR performance measure sets will

a) stimulate changes in the clinical practice

b) Improve patient participation

Piepoli et al. Secondary prevention through cardiac rehabilitation. EJCPFR, 2010
Patient participation
Underutilisation

Numbers of eligible patients participating in phase II cardiac rehabilitation

Bjarnason-Wehrens et al. Cardiac rehabilitation in Europe. EJCPR, 2010
Eligibility across Europe

Exclusion criteria for phase II cardiac rehabilitation

- Age limits
- Language limits
- Disability
- Funding
- Distance

By law or guideline  In practice

Bjarnason-Wehrens et al. Cardiac rehabilitation in Europe. EJCPR, 2010
No common definition

* Expert opinion

**Target population**

- **Eligible population**: 30-50%*
- **Referred (invited) population**: 67-78%
- **Uptaken population**: 15-73%
- **Adherent population**: 50-85%

Zwisler et al. [Cardiac Rehabilitation. A Health Technology Assessment]. National Board of Health, Denmark. 2006
Barriers to participation

- Societal / health care system barriers
- Provider oriented barriers
- Patient oriented barriers

How to deliver cardiac rehabilitation in Acute coronary syndrome

Patient-participation

Target population

Eligible population

Referred (invited) population

Uptaken population

Adherent population

Zwisler et al. [Cardiac Rehabilitation. A Health Technology Assessment]. National Board of Health, Denmark. 2006
Referred (invited) population

- > 22% of eligible patients were not invited\(^1\)
- Non-invited/referred tends to be older and female\(^1,2\)
- The main predictor of referral was the physician’s endorsement and attitude towards effectiveness of CR\(^2\)
- Referral rate varies from 10% to 60% with highest referrals rates in studies with automatic referral process\(^3\)

\(^1\)Beswick et al. Provision, uptake and cost of cardiac rehabilitation. Health Technology Assessment, 2004
\(^2\)Jackson et al. Getting most out of rehabilitation. Heart, 2005
\(^3\)Cortes et al. Determinants of referral to cardiac rehabilitation. Am Heart J, 2006
How to improve participation?

Positive results in non-randomised trials

<table>
<thead>
<tr>
<th>Provider-oriented approaches</th>
<th>Patient-oriented approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic referral strategies</td>
<td>Physicians endorsement</td>
</tr>
<tr>
<td>Optimisation of referral procedures</td>
<td>Former CR lay volunteers</td>
</tr>
<tr>
<td>Coordination of patient pathways</td>
<td>Written agreement on treatment goals</td>
</tr>
<tr>
<td>Physicians attitude toward CR</td>
<td>Spouse involvement</td>
</tr>
<tr>
<td>Motivational communication strategies</td>
<td>Psychosocial support</td>
</tr>
<tr>
<td></td>
<td>Gender-focused intervention</td>
</tr>
<tr>
<td></td>
<td>Focus on ethnicity (language, culture, religion)</td>
</tr>
</tbody>
</table>

1Beswick et al. Provision, uptake and cost of cardiac rehabilitation. Health Technology Assessment, 2004
Zwisler et al. [Cardiac Rehabilitation. A Health Technology Assessment]. National Board of Health, Denmark. 2006

7 RCTs involving 903 patients

Conclusion: Some evidence suggest that interventions to increase uptake of cardiac rehabilitation can be effective. Further high quality research is needed.

Davies et al. Promoting patient uptake and adherence in cardiac rehabilitation. Cochrane review, 2010
• Improvement in HQRL
• Reduction in days of sick leave
• Return to work
• Lower re-admission rate
• Lower mortality rates

=====> Living better lives