Mobile Technology in Promoting Community Based CR

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Disclosures

• Cardiatrics: Co-founder and Chief Medical Officer
• Fruitstreet health: Advisory board, hold minimal shares
CVD is the leading cause of death worldwide.

CR is an evidence-based, cost-effective, multidisciplinary program.

CR programs reduce mortality by 12-34%.

14-31% of eligible patients are overlooked and underutilized.
Barriers to Entry

Provider factors
Lack of physician referrals

Systemic factors
Lack of availability
Geographical inaccessibility

Patient factors
Dislike of group based classes
Competing demands
Lack of motivation
Female gender
Older age

Longer term adherence rates

Access
Cost
Ignorance
Reengineer the process

AHA Presidential advisory called for a reengineering of CR to enhance access, adherence and effectiveness
Promise of mHealth

Increase participation
Enhance the experience
Create social networks
Encourage the behavioral change process
Allows risk factor modifications to be carried out in their regular environment in the community and influence health behaviors real time.
DID YOU MAKE SURE TO TAKE TWO PICTURES

SO YOU CAN GIVE ONE TO ME?
Fact 1: The tsunami of wearable devices is coming!

Mobile Technology Capabilities

- Receive and interact with information
- Record and review data
- Receive automated feedback
- Connect with other users or healthcare providers

Sales of wearable wireless medical devices are expected to reach 100mln units or $2.9bln in 2016.
Mobile Phone Apps to Increase Motivation and Physical Activity

- High degree of acceptability and reasonable efficacy for increasing PA and weight loss
- In DM, improvements in blood glucose control demonstrated
- Evidence for mhealth use in CR is limited
## mHealth Studies

### Table 2. Completed Studies of Mobile Technology for Cardiac Rehabilitation for Ischemic Heart Disease

<table>
<thead>
<tr>
<th>Author/Year/Country</th>
<th>Design/Duration</th>
<th>Theoretical Foundation</th>
<th>Non-mHealth Components</th>
<th>mHealth Components</th>
<th>Intervention</th>
<th>Control</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Worthingham(^2) 2011 Australia</td>
<td>Observational 6 weeks</td>
<td>None</td>
<td>Telephone contact pre- and postexercise session with provider.</td>
<td>Smartphone, smartphone application, single-lead ECG, GPS with real-time transmission to providers.</td>
<td>Monitored exercise training (walking) 3 times weekly assisted by smartphone application. (N=6)</td>
<td>None</td>
<td>Usability: 80% of sessions no technical problems. Ease of use rated 4.8/5 (95% CI 4.6 to 5.0). Participation: Completed 80% of scheduled exercise sessions. Exercise Capacity: 6MWT improved from 524 to 637 m (P=0.009). Health Status: SF36 Physical Health increased from 50.0 to 78.4 (P=0.03), Mental Health unchanged. Events: None</td>
</tr>
<tr>
<td>Korzeniowska-Kubacka(^2) 2011 Poland</td>
<td>Nonrandomized clinical trial 8 weeks</td>
<td>None</td>
<td>Supervised exercise sessions at outpatient clinic. No additional intervention specified as adjunct to home sessions.</td>
<td>Mobile device with preprogrammed exercise training sessions with audio and visual cues for training intensity and 3-lead ECG monitor. Data transmitted via mobile phone.</td>
<td>10 clinic supervised exercise sessions followed by 14 home exercise sessions with mobile application (3 sessions per week). (N=32)</td>
<td>24 clinic supervised exercise sessions (3 sessions per week). (N=30)</td>
<td>Exercise Capacity: 17.6±16.1% improvement mobile vs 11.5±35.9% control (P&gt;0.05). Risk Factors: BP not significantly changed in either group. Events: not reported</td>
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<td>Blasco(^2) 2012 Spain</td>
<td>RCT 12 months</td>
<td>None</td>
<td>In person assessment. Lifestyle counseling. Intervention participants also supplied with blood pressure cuff, glucose and lipids as well as education on use.</td>
<td>Mobile phone with structured questionnaires for entry and transmission of blood pressure, heart rate, weight, glucose, and lipids. SMS messaging of recommendations.</td>
<td>Lifestyle counseling, mobile intervention, devices for home monitoring. (N=102)</td>
<td>Lifestyle counseling (N=101)</td>
<td>Usability: mHealth group completed 89% of entries. 5/102 dropped out due to difficulty with mHealth intervention. Physical Activity: 75% met goals in mHealth group vs 73% control. Risk Factors: mHealth group more likely to improve at least 1 risk factor (RR 1.4, 95% CI 1.1 to 1.7) (primary outcome). mHealth group more likely to achieve goals for BP (62.1% vs 42.9%), hemoglobin A1c (86.4% vs 54.2%), and BMI (0.37 kg/m(^2) decrease vs 0.38 increase). No significant differences in smoking cessation, cholesterol, medication adherence. Events: 5 deaths in control group, 0 in mHealth group</td>
</tr>
</tbody>
</table>

6MWT indicates 6-minute walk test; CI, confidence interval; BMI, body mass index; BP, blood pressure; ECG, electrocardiogram; GPS, global positioning system; RCT, randomized clinical trial; RR, relative risk; SF-36, short form 36; SMS, short message service.
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The HEART programme was considered likely to be cost-effective for leisure time activity and walking. A mobile phone intervention was not effective at increasing exercise capacity over and above usual care. The intervention was effective and probably cost-effective for increasing physical activity and may have the potential to augment existing cardiac rehabilitation services.

Maddison et al, European Journal of Preventive Cardiology June 2015 vol. 22 no. 6 701-709
Conclusion: Multi-component behavioural intervention increases physical activity, and improves body composition, physiological and psychological outcomes in CHD patients not attending structured rehabilitation programmes.

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<td>Walters23 2010 Australia</td>
<td>RCT 6 weeks (intensive) 6 months (follow-up)</td>
<td>None</td>
<td>In-person assessment. Individual goal setting with Mentor. Weekly mentoring sessions. Recommendation for walking-based exercise program.</td>
<td>Smartphone application with step counting, goal setting, diaries (weight, blood pressure, physical activity), visual feedback, text message reminders, educational videos, web portal. Subset will also have ECG and HR monitoring.</td>
<td>Smartphone application plus counseling (N=100), Smartphone application with ECG and HR monitoring plus counseling (N=15)</td>
<td>Outpatient center-based CR (N=100)</td>
<td>Usability: survey  Participation: dropout rates  Physical Activity: self-reported and objectively measured (primary outcome).  Exercise Capacity: 6MWT  Risk Factors: BMI, BP, smoking, alcohol, lipids, HbA1c, med adherence, Diet habits questionnaire  Health Status: EQ-5D, Health Outcome Questionnaire, SAQ, Psychologic functioning  Cost: facility, technology, return-to-work  Events: hospitalizations and death</td>
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**CAP model of cardiac rehabilitation**

- **Community Care Team**
- **Motivational/educational/relaxation multimedia**

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*ISQua 2013* | Marien Varnfield | Page 6
At 6 weeks
- Improved 6MWT
- Improved nutrition & Depression
- Sig. reduction in wgt
- Improved anxiety & QOL
What’s an Ideal App for CR?

• Should address the core components of CR
• Based on behavior change theory
• RCTs available to compare mobile application delivered program to usual care and assessing important patient centered outcomes
• Optimal combination of core components for mobile delivered CR is unknown
• Tailoring to the individual
• Highly usable
Mayo Clinic Study

3 months intervention
25 vs 19 post first AMI and acute PCI
Meant to be a patient self monitoring and tracking tool
App intervention had better diet, were 9lbs lighter, more physically active, lower BP 8mmHg
Control arm 60% readmission or ED visit
within 90 days vs. ~20% for app intervention

Results of the Mayo Clinic study were presented in a press conference Saturday, March 29, at the American College of Cardiology’s 63rd Annual Scientific Session in Washington, D.C.
Potential for mHealth in CR
Impact of use of mobile technology is unclear
Mobile devices & wireless services are getting cheaper
Potential further savings on travel costs, fewer lost
wages and reduced rates of hospitalization
“Tailor” CR to needs of the individual based on their
personal preferences, clinical needs and environmental
and social/cultural situations
Summary

New strategies for promoting participation in CR needed
Initial evidence supports feasibility and acceptability
Potential to improve access, increase participation and improve outcomes in heart patients remains to be seen
Future CR Model?

Proposed organizational structure for new cardiac rehabilitation (CR) models. ECG, Electrocardiography.
Singapore’s first heart disease prevention program based on risk reduction through behavioral interventions
DOCTORS WHO PRESCRIBE LIFESTYLE CHANGES WITH A CLINICAL IMPACT

We take a scientific approach to changing your lifestyle; so you can see a sustainable reduction in your risk of heart disease. Partner with a designated Doctor and Coach Team who will develop and guide you through personalized solutions including:

- Prescribed Nutrition
- Programmed Exercise
- Stress Management
- Sleep Management
- Smoking Cessation Advice*

*Additional consultations with a smoking cessation specialist outside of the regular program may be required.
4-MONTH PERSONALIZED PATHWAY
The program is made truly immersive through our proprietary tech-based solution, allowing individuals to always be able to:

1. Track progress/monitoring
2. Keep motivated
3. Stay connected to your Cardiatrics Team

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The End

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