Research Innovation of mobile health in Metro North Health and Hospital Services, Queensland

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THE AUSTRALIAN E-HEALTH RESEARCH CENTRE
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Outcomes of a Mobile Health delivery of Cardiovascular Disease (CVD) Management

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Affects more than 3.5 million Australians-35% of all deaths
Kills one Australian every 10 minutes
1.4 million people have reduced quality of life because of disability caused by the disease.
The total burden is likely to increase with rising numbers of morbid obesity, diabetes and elderly
Similar experience in other developed nations

Cardiovascular Disease is the most common cause of death in Australia
Represents single large burden of any disease
More than $5.5 billion is spent annually

Source: National Heart Foundation of Australia 2006
The incidence can be modified

Modifiable environmental and patient specific factors:
Smoking
Diabetes
High blood pressure
High blood cholesterol
Obesity
Physical inactivity
Depression
Social isolation and lack social supports

*Cardiac Rehabilitation can reduce risk by influencing these factors*

*Education, ‘prescribed exercise’ risk factor modification, counselling*
Prevention of Cardiovascular disease

Primary prevention

Healthy Lifestyle
• reduces risk of cardiac events

Cardiac events
• treatment at hospital

Secondary prevention

Stage-1
• post-operation
• 1 week inpatient rehabilitation

Stage-2
• 6-8 weeks outpatient rehab programme
• facility based supervised exercise
• aims to regain functional ability

CAST focus: Outpatient care

Sustain Healthy Lifestyle

“Cardiac rehabilitation describes all measures used to help people with heart disease return to an active and satisfying life and to prevent recurrence of cardiac events”

National Heart Foundation of Australia
Cardiac Rehabilitation programs should offer a multifaceted approach to overall cardiovascular risk reduction— not only exercise training!


Core components of secondary prevention programs:
- Nutritional counselling
- Risk factor management: lipids, blood pressure, weight, diabetes, and smoking
- Psychosocial interventions
- Physical activity and exercise training
- Baseline patient assessment
Traditional Cardiac Rehabilitation

Lack of Referrals (< 11%) in Australia

Uptake and Completion: (of eligible patients)

QLD: 16%; NSW: 19%

USA: 18.7%
Problems with cardiac rehabilitation

Low rates of referral

Low rates of utilisation

Low rates of completion

Fewer than 11% of patients across Australia were referred to phase II cardiac rehabilitation at discharge.

* D.L.Walters et.al. “Variation in the application of cardiac care in Australia” MJA 2008; 188(4)

There is a significant underutilisation of Cardiac Rehabilitation programs. Only 16% of all the eligible patients complete a program in QLD.

* I.A.Scott et.al. “Utilisation of outpatient cardiac rehabilitation in Queensland”, MJA 2003; 179(7)

In the USA 18.7% of the eligible patients participate in rehabilitation programs.
WellnessDiary Web Portal

Mentoring via video and teleconferencing

Home measurements and entry of health factors in WellnessDiary software

Web portal access via internet

Diary and data synchronisation via 3G

Community Care Team

Individual at home

Measuring devices

Daily motivational SMS, educational video and relaxation - multimedia

Multimedia material

Mobile phone

Software applications

CAP model of Cardiac Rehabilitation

- Diary data
- Measurement data
- Messaging
- Educational material
- Health reports

What is a Heart Attack

StepCounter

WellnessDiary

Blood clot

Medical
Results of Mobile Health Delivery of Cardiac Rehab - RCT

Participation in Cardiac Rehabilitation

- **Uptake**: TCR - 60%, CAP-CR - 70%  
  - *p < 0.05
- **Adherence**: TCR - 70%, CAP-CR - 90%  
  - *p < 0.05
- **Completion**: TCR - 50%, CAP-CR - 80%  
  - *p < 0.05

*CSIRO MoTER & MoTER-MD HLT*
Clinical Outcomes – 6 Weeks

Δ Six Minute Walk Test distance (m)

Δ Weight (kg)

Δ DASS score (median)

Δ EQ5D index score (median)
6-month outcomes

**6 Minute Walk Test**

- Mean meters walked over time:
  - Baseline
  - 6 Weeks
  - 6 Months

- Legend:
  - TCR (n=25)
  - CAP-CR (n=43)

- Statistical significance:
  - * p < 0.05 from Baseline

**LDL and HDL profile**

- LDL and HDL levels over time:
  - Baseline
  - 6 Weeks
  - 6 Months

- Groups:
  - TCR (n=13)
  - CAP-CR (n=29)
Novel approach to cardiac rehabilitation and chronic disease management.

One size doesn’t fit all

Tailored approach to the provision of Cardiac Rehabilitation

Home based vs Community vs Mobile vs Landline vs Internet

- Access
- Personalised
- Convenient
- Available
- Cost effective
- Time efficient
Achievements

1\textsuperscript{st} clinically validated innovative home-based CR program (HEART 2014)

2014: Systematic review in Cochrane

\textbf{Winners:}

e-Health
e-Inclusions & e-community
MoTER platform

MoTER Data

- Diary data
- Measurement data
- Health Reports
  - Educational material
  - Discussion, messaging

Community Care Team

Motivational/educational/relaxation multimedia

Measurements Monitored

SMS
Rollout

- Currently Implemented in CR services
  - Metro North HHS
  - West Moreton HHS

Research Innovation to Extend...

- CVD Screening/CR for Indigenous Health
- COPD
- Heart Failure
- Virtual clinic for specialist consultation
CVD Screening/CR for Indigenous Health
Changes to Technology

Indigenous Cardiovascular Health
CVD risk & CR delivery @Yarrabah

Post-Cardiac Event

Gurriny HS/ Mentors

QAIHC Health Tracker

CVD Risk factor management

Meeting Place

Cardiac Risk and Rehab App@ Yarrabah

6-12 weeks

Patients at Community/Home

Indigenous Cardiovascular Health
Pilot Study (M-COPD)

- Before AECOPD – ↑ combined score of major symptoms*

- Healthcare service (6-mths match period 2010 vs. 2011 with M-COPD):
  - Hospitalisation: 11.0±0.9 vs 6.0±0.9*
  - ED presentations: 9.0±1.0 vs 4.0±1.0*
  - GP visits 22.0±5.0 vs 14.0±3.1 *

* (p<0.05)
MoTER-COPD Study

Clinical issues to address
Poor patients’ knowledge in the self-management of COPD.
Low concordance with the COPD guidelines.
Paper based clinical assessment and management records.

Objective
To enable patients and clinicians to use mobile phones to receive educational materials by Lung Foundation Australia, access COPD action plans and guidelines, and monitor risk factors and COPD symptoms.
MoTER-COPD

CSIRO Clinical Portal

Lung Foundation Australia

Patients use the mobile app to view educational materials, answer assessment questionnaires, and look up action plans.

Care providers prescribe educational programs, and review outcomes, and treat patients according to clinical guidelines.
RCT of MoTER-COPD

**Intervention for clinicians**

Electronic COPD Stepwise Management Guide

Electronic table of COPD inhaled medicines.

**Intervention for patients**

Automated educational session

Electronic COPD action plan

Physical activity plan

Smoking cessation plan

Inhaler technique.
MoTER for Heart Failure
State of problem with Heart failure

50% of HF patients re-hospitalised within 6 month after discharge. These frequent instabilities result because of several factors including lack of compliance with dietary, medication and fluid restrictions regimen, delay in seeking care when symptoms of deterioration occur, lack of knowledge and information about the condition and feeling isolated and depressed.

Objectives:

To enable patients to use the mobile phones and to receive multimedia education, take a more active role in their own self-care and receive feedback from healthcare professionals.
Congestive Heart failure Project
- PHD student

A patient at home

CSIRO mobile app

Education videos/sms

Weight, BP measurements

Health reports, Measurement data, educational materials

Clinical assessment and follow-ups
Outpatient - Virtual Clinic
Post Acute Coronary Syndrome

Model for Chronic Disease Management

Needs based follow up Vs Temporal Follow up

- System overwhelmed
- Long waits
- Increasing review to new ratios
- Arbitrary time frames for review
- Limited short consultations
Post Acute Coronary Syndrome

Model for Chronic Disease Management

• Symptoms assessment
• Physiological parameters
• Medical Therapy
• Secondary Prevention Maintenance Phase
  – Nutritional counselling
  – Risk factor management: lipids, blood pressure, weight, diabetes, and smoking
  – Psychosocial interventions
  – Physical activity and exercise training
  – Baseline patient assessment

Escalation and Early Intervention
Integration of MoTER – Outpatient Virtual Clinic

- Patients at Home
  - Registration
  - CR Administrators
  - CR Referral
- CR Coordinators
- Mobile devices
- Individualized care plan
  - Graphic plots of CR progress
- Motivation & education
- Medical & health data
- Mobile devices

- MoTER-MD
  - ED & Inpatient Cardiology
  - Cardiology outpatients
  - Telemedicine
  - Follow-up
  - Visit
  - Care planning
- Medical & health data
- Multidisciplinary care planning & coordination
- Counseling
- CR Coordinators
- MoTER

1. Report
2. Collaborative care
3. Improvement

Primary care

CSIRO/QH Portal
Summary

• Innovative solutions are required
• to address increasing burden of disease
• in new ways that are tailored to the changing needs and expectations
• of patients who are increasingly technologically enabled.
• Great opportunities exist for ICT based interventions to support ambulatory care models for cardiorespiratory disease
• International leaders in evidenced based information technology interventions
Thank you

ICT Centre/AEHRC

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