Virtualising Care in Future Health Services Delivery

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History

• 1876: Bell’s invention of telephone

• 1879: Doctor successfully diagnosed a child via telephone at night \textit{(Lancet)} – concept of remote patient care

• 1906: Einthoven’s invention of ECG – tested ECG via telephone

• Early 1900s: Royal Flying Doctor Services – wireless radios

• Mid-1900’s -1980’s: NASA and space exploration
Traditional delivery of telehealth - Limitation

• Technology maturity and uptake (tailored design)
• Connectivity – remote & rural
• Evidence and outcomes
• Reimbursement models
Recent Advances in Technology

Digital Technologies transforming Healthcare | David Hansen
Trends in Telehealth

• Transformation from increasing access to convenience and reducing cost

• Expansion from addressing acute to episodic and chronic conditions

• Migration from hospitals and satellite clinics to home and mobile devices

Dorsey and Topol, State of Telehealth, 2016, NEJM
Key areas for the success of virtualising care

- Co-design and development—consumer and provider engagement
- Translation of current delivery to new care models
- Evidence based for Policy and Practice
Co-design & development
Smarter Safer Homes

ICT platform

Family/Relative Portal

Clinical Portal
Care delivery model ....

& Evidence ....
MoTER

MoTER Data

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<th>Diary data</th>
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Discussions, messaging, educational material

Motivational/education al/relaxation - multimedia

Community Care Team

Measurements Monitored

SMS
World's first, clinically validated smartphone based Cardiac Rehab

Smartphone-based home care model improved use of cardiac rehabilitation in postmyocardial infarction patients: results from a randomised controlled trial

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ABSTRACT
Objective Cardiac rehabilitation (CR) is pivotal in preventing recurrent events of myocardial infarction (MI). This study aims to investigate the effect of a smartphone-based home service delivery (Care Assessment Platform) of CR (CAP-CR) on CR use and health outcomes compared with a traditional, centre-based programme (TCR) in post-MI patients.

Methods In this unblinded randomised controlled trial, post-MI patients were randomised to TCR (n=60; 55.7±10.4 years) and CAP-CR (n=60; 55.5±9.6 years) for a 6-week CR and 6-month self-maintenance period. CAP-CR, delivered in participants’ homes, included health and exercise monitoring, motivational and educational material delivery, and weekly mentoring consultations. CAP-CR uptake, adherence and completion rates were compared with TCR using intention-to-treat analyses. Changes in clinical outcomes (modifiable lifestyle factors, biomedical risk factors and health-related quality of life) across baseline, 6 weeks and 6 months were compared within and between groups using linear mixed model regression.

Studies have demonstrated a 15–28% decrease in all-cause mortality. Despite demonstrated benefits and guideline recommendations, CR use has been poor, particularly in women, older patients and ethnic minorities.

Patients and system barriers have hampered CR uptake and adherence, traditionally delivered through group-based exercise programmes in centre-based settings.4–8 Recent advances in information and communication technologies, such as smartphones and the internet, have shown potential to address some of these barriers through home-based CR programmes.8,9 Remote health monitoring and communication.10 One such model, the Care Assessment Platform (CAP-CR), was recently described.11

The objective of this study is to investigate whether CAP-CR is effective in improving CR use in post-MI patients compared with a traditional, centre-based programme, while demonstrating equivalent health outcomes, through a randomised controlled trial (RCT).
Convenient cardiac rehabilitation
Enhancing relationship between patient and mentor
Digital data collection
Equitable access
Current Activities in Mobile Health

- Community & Home Care
- Chronic Disease
- Indigenous CVD
- Kidney Dialysis
- Gestational Diabetes
- Cancer eg. Leukemia
- Post-surgical management
- Diet Intervention
Home Monitoring of Chronic Disease for Aged Care

Initiative Funded by the Australian Government
National Telemonitoring Trial

- Total project size $5.4m ($3.02m Telehealth Pilots Program)
- CSIRO is lead organisation
- Six trial sites in five states (revised 5 Trial Sites in 5 States)
- Focus on chronic disease management in the community
- Four different models of care represented
- Trial duration 18 months

**Design:** Case Matched controls, Before-After-Control-Impact (BACI)

**Aims of Trial**

- To demonstrate how Telehealth services can be successfully deployed Nationally by piloting services in six different settings across five states

- To gather evidence on how Telehealth services can be scaled up to provide an alternative cost effective health service for the management of chronic disease in the community

- Development and deployment of an Automated Risk Stratification System for triaging patients according to their health status
Results

- 46.3% reductions in rate of MBS expenditure (savings $611-$657)
- 25.5% reduction in rate of PBS expenditure (savings $44-$354)
- 53.2% reduction in the rate of admission to hospital (reduction of 0.22 – 1.0 hospital admissions)
- 75.7% reduction in the rate of length of stay (reduction in LOS of 7.3 – 9.3 days)
- > 40% reduction in mortality
- > 83% user acceptance and use of telemonitoring technology
- > 89% of clinicians would recommend telemonitoring services to other patients
- Return on investment of between 4.9 and 6.0
Evidence-based towards practice
Clinical Trials towards faster adoption

• Traditional clinical trial RCT: to determine efficacy

• Pragmatic RCT: to show real-world effectiveness of the intervention in broader patients groups - to inform decisions about practice
  • Complex interventions
  • Involve skill and experience or more than one health care professionals to deliver interventions

• Adaptive clinical trial: medical device and treatment evaluation
  • changes of trial protocol on prescribe schedule based on observed participant outcomes
  • aim to more quickly identify intervention that have a therapeutic effect, and to zero in on patient populations
  • Engage regulatory body eg. FDA through the design
Future

• Co-design and development applications with Consumer/Provider/Regulatory body

• Care delivery models with Individualised health programs

• Pragmatic evidence based trials - for policy and guidelines – creating reimbursement models

• Health Internet of things – predictive analytics – moving from structured/memory to empathy – based delivery of care
Tele-Smooching

If you can’t be with your loved ones, perhaps you’ve told them that you’re sending a kiss. But if you could really do just that—send a kiss by smashing your lips against a rubber pad that’s attached to your smartphone—would you want to? The Kissenger (so named because it’s a “mobile kiss messenger”) could give you that awkward option. The brainchild of Emma Yann Zhang and colleagues in London, the Kissenger is a silicone pad, containing force sensors and actuators, that links to a smartphone. With the prototype now built, Zhang is planning a Turing test for kissing, among other experiments.
Thank you

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