

Benefits Realised by the EHRC Ambulatory Monitoring Project

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ABSTRACT

It is becoming increasingly important to ensure ICT projects produce the projected benefits claimed in project cost-benefit analyses. Until recently, greater use of ICT has often been seen as useful in itself as part of the process of modernisation. This is unlikely to be the case in future and appropriate use of ICT will have to be argued for and supported with evidence that spending on ICT will deliver real benefits. This is an additional requirement beyond traditional project management, where success is typically achieved by delivering a capability on time and to budget. This paper identifies benefits arising from a recent trial of accelerometer-based monitoring devices, which may assist others undertaking evaluations of ICT projects in the health sector. As a result of this review, we conclude that ambulatory monitoring can play a significant role in the achievement of health system objectives and there is value in pursuing further development and assessment of these technologies.

Keywords:

Benefit realisation, ambulatory monitoring, accelerometers, ICT health benefits

Introduction

In 2005, the E-Health Research Centre, a joint venture between CSIRO and the Queensland Government, undertook a prospective observational non-randomised study on the use of ambulatory monitoring devices designed to record patient movement. The trial was conducted within the Acute Geriatric and Rehabilitation Programme of The Prince Charles Hospital, Queensland. Three accelerometer devices were evaluated for their efficacy in measuring patient information relevant for falls assessment. Over the 95 day trial, there were four falls experienced by two patients, and hence statistically insufficient data to develop an algorithm to predict a fall or falls risk. However the trial indicated that the devices were able to accurately and reliably capture data about a rehabilitation patient's motion at successive points in time, with minimal discomfort to the patient.

This paper identifies several service benefits that were realised by the study. Many of these benefits contribute directly to the achievement of Queensland and wider government policy, and CSIRO strategic objectives. We conclude the paper with recommendations for others considering implementing similar ICT projects, including designing well controlled randomised controlled trials, where evaluations are clearly linked to the stated aims of the project objective under examination in order that their level of success can be determined.

Purpose

The purpose of this paper is to highlight the benefits of the EHRC ambulatory monitoring project. Although the project has met the expectations of stakeholders and resulted in a number of

achievements, the benefits realised by the project need to be documented in order to justify future expansion and implementation of the services and monitoring processes used in the project.

Recent reviews by the Productivity Commissionⁱ (the Australian Government's principal review and advisory body on microeconomic policy and regulation), and the Queensland Governmentⁱⁱ emphasise the need for benefits to be realised from health ICT projects. In particular, there should be ongoing evaluation of IT systems, particularly new systems, to ensure that the systems are operating as planned, benefits are being realised and the systems are not negatively impacting on staff.ⁱⁱ The findings from such evaluations should be used in future IT purchase/development and implementation decisions.

What is Benefits Realisation?

Benefits Realisation is the practice of ensuring that projects produce the projected benefits claimed in the project's cost/benefit analysis.ⁱⁱⁱ It is central to the Benefits Realisation approach that benefits come only with change, and equally, change must be sustained by benefits.^{iv} People must change how they think, manage and act in order to implement the Benefits Realisation approach. This relates to those responsible for developing policy, clinicians applying the technology and the end users embracing the monitoring device technology.

Many ICT project benefits are the result of reforms in business processes that are enabled by the project, rather than being directly attributable to a successful implementation of the project itself.² Benefits Realisation can assist other organisations similar to the EHRC in demonstrating the link between the benefits that projects deliver and wider government policy priorities and ICT directions.

Specific health outcomes (eg. reduced hospital admissions, increased patient Quality Adjusted Life Years) were not targeted through this project. It is recommended that future ICT trials be run as Randomised Controlled Trials with established baseline measurements to provide evidence of improved health outcomes for patients and wider cost and service benefits. It is widely agreed that well conducted Randomised Controlled Trials are the most reliable method for comparing health technologies^v.

Project Achievements

The following achievements of the ambulatory monitoring project have been identified:

- Collaboration & relationship building with Queensland Health staff specialists (rehabilitation), physiotherapists & trial nurses;
- Expertise in the protocol/methodology to establish clinical trials of physiological monitoring technologies; similar technologies have not been widely trialled;
- Technical evaluation of medical devices designed to measure movement/activity and vital signs
- Demonstrated ability to characterise human movement/activity;
- Wireless monitoring of patients in clinical environment – the *first* controlled use by Queensland Health;
- Physiological signal 'Bio-Viewer' tool developed, with annotation and basic signal processing tools.

However, how these achievements translate to benefits requires further illustration. The approach contrasts with a traditional project orientation, where success is typically achieved by delivering a

capability on time and to budget. The benefits in the following section have been identified retrospectively as opposed to at the commencement of the project.

Benefits Realised by this Project

The project delivered several benefits related to service improvements.

1. Improved expert support for clinical decision making by doctors / Improved provider access to evidence-based information at the point of care

Clinical processes are underpinned by information flows used to support clinical decision making. The provision of timely and accurate information to enhance clinical decision making is critical to increasing both the efficiency and the capacity of the Australian health system.

Clinicians have indicated that ambulatory monitoring increases support in diagnoses and management by having access to information about gait smoothness and vital signs. Clinicians involved with this study have been able to quantify for the first time whether there has been an improvement in gait as a result of the rehabilitation program and contribute this to care planning. Improvements in the processes used by clinicians in diagnosis and ongoing patient management should, through improved access to key information, lead to increases in health system capacity, and safety and quality more generally. This ultimately contributes to the achievement of improved health outcomes. Ambulatory monitoring technology has a key role in process efficiency improvement and in contributing to improved health outcomes.

Previously, there were no measures to identify how active patients were within the ward in relation to exercise routines. Physiotherapists relied on verbal reports from patients and subjective observations of daily activity levels. For example, one physiotherapist described the difficulties in verifying a patient's claimed walk of one hour after lunch. Analysis of monitoring data indicates exact times, durations, speed and smoothness of walking episodes. The project has provided a measure to classify activity and determine how much of the day is lying, sitting/standing, or walking. Comments from clinicians included those shown in Box 1.

Box 1 - Clinician Comment:

"Instinctively I believe this is the beginning of groundbreaking technology and potential. Already this preliminary data has given me valuable information in treatment planning and progressions and has expanded my thought processes re goals and strategies – very exciting"

The value of the study was rated "High" by all post trial evaluation questionnaire respondents, including:
"stimulating – can hardly wait to be involved in further work – important to the future of at risk patients."

This benefit clearly supports key recommendations from the recent independent review of Queensland Health's Information Management systemsⁱⁱ, specifically that clinicians need to be more closely involved in the development/acquisition of IT solutions.

2. Improved staff morale, staff satisfaction, greater involvement of specialist nurses

This is an intangible outcome, related to staff turnover, but represents a source of project value. Historically, clinicians have been reticent toward accepting new technology solutions into their practices due to factors such as cost, ease-of-use and potential obstacles to productivity.^{vi} However, the devices evaluated in this project were embraced by the clinicians due to the improvements in

support for clinical decision making and also that significant research support was provided by the e-Health Research Centre. In this instance it is the clinical staff of the Division of Geriatric and Rehabilitation Medicine who are driving the desire for mobile patient monitors to improve efficiencies. This is a competitive advantage for Queensland Health in attracting and retaining staff.

3. Improved patient self-management

Improving the flow of information to clinicians improves communication between providers and consumers, and enables consumers to participate in the management of their health care. A growing body of research finds that a consumer with a deeper understanding of the diagnosis, treatment, and recovery and who has support from others, is much better equipped to cope with the illness, by using the health system more effectively and changing their health-related behaviours to influence their course of illness and reduce psychological distress.^{vii}

4. Improved patient confidence and satisfaction

Patient confidence and satisfaction is related to quality and convenience of care. Comments from patients participating in the trial is an important indicator for patient satisfaction. Patient comments concerning the monitoring devices were favourable (Box 2).

Box 2 – Patient Comment:

Patient A: “Because after strokes you tend to fall over a lot, and you need someone to keep watching you”

Patient B: “You feel a little bit more protected because you know its being monitored so that if you do have a fall you know that somebody knows about it”

A related indicator for satisfaction with the service is the number of complaints received from patients fitted with monitoring devices. 13 of the 15 patients (87%) were willing to wear devices continuously 24hours/day until they were discharged or until the end of the study.

5. Improved health services

Community expectations

This relates to the extent and type of treatment that should be expected for people of certain age groups or with particular conditions. Patients see a modern, IT-enabled health service when they come into contact with the health service. The patient community has an expectation that health services will be delivered via new technologies similar to other sector services.

Wider range of services

Patients have access to an additional tool to assist in their rehabilitation. When compared with previous care arrangements for patients undergoing rehabilitation, geriatric services have increased in quality of care.

Tailored service

Health care systems must be patient-centric. By its nature, analysing gait patterns of individuals achieves a patient-focussed service through tailoring service delivery.

Better utilisation of assets

Patient data was transmitted or downloaded to laptops and PDAs for display within the ward. This application increases the utilisation of hospital computer assets, and compliments other rehabilitation and assets, such as treadmills and pressure sensitive matting.

6. Improved Research and Practice

Secondary use of gait data for research purposes can contribute to the evaluation of various clinical interventions for specific population groups and assist in providing evidence for the cost effectiveness of disease prevention strategies. For example a patient’s gait profile can be compared

against norms for their condition, such as stroke patients, Parkinsonism, +75 age groups. Wider adoption by rehabilitation providers and patients will lead to more comprehensive data sets being available. This provides an invaluable evidence base for rehabilitation policy, planning and research activities, leading ultimately to more effective and efficient rehabilitation and aged care delivery nationally.

7. *Improved health research interactions*

Giving health care professionals the tools and information they require to provide quality care is not enough: they also need support to help them integrate the technology into their regular activities. This pilot trial has facilitated future interactions between hospital departments and external research organisations and technology vendors. Future trials involving wireless patient monitoring, and additional trials outside of the hospital environment (eg. patient's home) may run more smoothly as a result of this pilot trial. The trial has also contributed to enhanced knowledge for improvements and advances in medical technology.

8. *Achievement of policy objectives*

Many of the service benefits delivered by the ambulatory monitoring project contribute directly to the achievement of state and federal government policy, and CSIRO strategic objectives. For example, Queensland Health's Chronic Disease Implementation Initiative and Strategic Plan, the Federal Government's Strategy for Community Care: The Way Forward, and CSIRO corporate policy. This is consistent with the Government's increasing emphasis on performance management reporting and increased accountability for all program and service delivery activities.

Discussion and Future Directions

This project did not involve assessing ambulatory monitoring as an intervention against control patients without monitoring. ie. there was no intervention trialed. Consequently the full potential of ambulatory monitoring devices has not been assessed by a technology observational trial.

In order to clearly demonstrate benefits from ICT projects, we make the following recommendations to other organisations undertaking related ICT projects in health:

- A randomised controlled trial should be performed, where evaluations are clearly linked to the stated aims of the project objective under examination in order that their level of success can be determined;
- Adequate time and resources should be allocated for the evaluation;
- Appropriate data should be gathered with which to examine the effectiveness of the project objective, including the setting of baselines before implementation against which the project can be judged.

This evaluation should be performed prior to wider implementation throughout hospital, community and home environments.

Conclusion

Recent reviews of ICT projects in the health sector have identified that there should be ongoing evaluation of IT systems to ensure that the systems are operating as planned, benefits are being realised and the systems are not negatively impacting on staff.

Our Benefits Realisation assessment of the ambulatory monitoring project identified several benefits related to service improvements. Although, clinical benefits were realised, the outcomes

for patients were not significantly impacted by the project. This project did not involve assessing ambulatory monitoring as an intervention against control patients without monitoring. ie. there was no intervention trialled. Several suggestions were made to explore the full potential of ambulatory monitoring devices through carefully conducted Randomised Controlled Trials.

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