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The broadband-enabled innovation program

A working demonstration of the effective use of technology in community-based patient care

Background
Given the socioeconomic demands of the Australian society, both now and in the future, the Royal District Nursing Service (RDNS) has identified the importance of exploring suitable commercial forms of telehealth technologies to enable robust and sustainable models of care for their clients.

Objective
The aim of this article is to illustrate the practical application of technology in community-based patient care through an overview of a project that the RDNS has trialled to provide remote medicines management.

Discussion
The results of this project demonstrate that technology can be successfully applied in community-based patient care to enhance the capacity of RDNS to deliver medications management for clients. It showed benefits in terms of increasing the efficiency of service delivery as well as staff and patient satisfaction. On the basis of this success, the program is being expanded and undergoing further evaluation to assess its impact.

Keywords
telemedicine; health informatics; care coordination

CPD

The Royal District Nursing Service (RDNS) has trialled a number of telehealth pilot projects in recent years, to assist in the management of clients with chronic diseases. These telehealth initiatives have arisen in response to the increasing demands that are being placed on the RDNS as the provider of home nursing and healthcare to clients in Australia and New Zealand. RDNS nurses travel over 10 million kilometres each year to visit more than 40 000 clients, providing them with more than 2 million visits.[1] In greater Melbourne alone, RDNS make over 430 000 visits for medicines management each year.[1]

The ageing population (>85 years population forecast to increase from 365 000 to 1 800 000 over next 40 years)[2], the reduction in workforce (noted by the average age of an RDNS nurse currently being 45 years and increasing) and increasing chronic health conditions[3] have led RDNS to trial the use of telehealth technologies to enable clients to remain in their homes. This project, piloted in 2011–2012, utilised telehealth technologies to provide remote care to support clients with medicines management in the community.

Broadband-Enabled Innovation Project (BEIP)

In 2011, the Victorian State Government, Department of Business and Innovation, funded the *Healthy, Happy and at Home National Broadband Network-Enabled Medicine Management for Older Adults Living Independently at Home*. This project is known as the Broadband Enabled Innovation Project (BEIP).

BEIP objectives

The aims of the project were to:

- Create a medicine management service delivery model by incorporating remote videoconference technologies.

- Gauge the suitability, appropriateness and limitations of utilising technology, such as videoconferencing, to facilitate medicines management for RDNS clients.
- Establish the potential cost/savings of remote videoconference nurse visits to RDNS clients.
- Evaluate the project benefits to determine the feasibility of rolling out a suitable blueprint across the entire RDNS network to accommodate RDNS current and future growth strategies.

Ethics approval

An application for this trial was approved in February 2012 by the RDNS Human Research Ethics Committee (HREC), a National Health and Medical Research Council (NHMRC)-approved body, which sits within the RDNS Institute of Community Health.

Client eligibility

Two distinct groups of clients were identified as requiring assistance to be compliant with medicines administration for the management of their chronic diseases:

- Group 1 clients experienced varying degrees of cognitive impairment.
- Group 2 clients had mental health issues.

Clients were recruited from the existing RDNS client database. A mini mental state examination (MMSE) was taken into consideration to assess cognition but was not exclusive in defining eligibility.

The recruited clients were English-speaking and able to:

- recall how to turn on and use the videoconferencing unit
- recall the location of their pharmacy-filled dose administration aid (DAA)
- be oriented with respect to dates, time of day and the recurrence of daily contact
- receive assistance with prompting only to take their medicines – medicines were oral, injectable (insulin) and topical.

Recruitment

Sixty clients were recruited to the BEIP project. A total of 46 clients received remote medicines management via video consultation using the Intel Health Guide, connected to the internet via ADSL2+ or 3G/4G. The average age of clients was 77 years; 82% of clients were aged over 70 years.

Model of care

Daily face-to-face visits were substituted for video calls (*Figure 1*) for six visits per week while one face-to-face visit continued weekly. During the weekly face-to-face visit by the nurse, the client's DAA and general practitioner's (GP's) medication authority were reviewed, the environment was assessed for dropped or overlooked medicines, any changes to medicines were checked, and the client's ability to manage the telehealth videoconferencing device was assessed.

Figure 1. BEIP client attending video call for medicines management

The client's oral medicines were packaged in a DAA, to ensure the safe administration of medicines. Compliance during the video call was ensured by the client counting the number of oral medicines being taken in conjunction with the telehealth nurse referring to the current medication authority, not by the appearance of medicines, as it is hard to identify specific medicines via a video call. Clients were also observed attending blood glucose monitoring and correct insulin dialling-up and administration during video calls for diabetes management, and using inhalers for respiratory conditions or applying topical patches for chronic disease management.

Clients were called by telehealth-trained nurses based in telehealth pods at the RDNS customer service centre (CSC) at an allocated time each day. Initially, doubling occurred in the home with the client and visiting nurse to educate clients on how to use the telehealth device (ie answers call, holds DAA to camera, disconnects from call) until the client was deemed capable of 'going solo', by either themselves or the nurse.

Once clients were attending video call 'solo', the interaction with the telehealth nurse via video call would follow a process of questioning and observation to assess whether the client had any changes to their medicines, had a visit to their GP/specialist since the last video call, and to assess the client's general wellbeing and health. The nurse then reviewed the DAA and/or other medicines to ensure that correlation between day/time/number of compartments empty was correct, before prompting the client to take medicines.

Key findings and discussion[4]

Family/carer/GP awareness was crucial in ensuring full support for BEIP clients

- As current ongoing medication orders and dispensing of DAAs need to be maintained for safe and accurate medicines administration by a registered nurse, it was important to have regular contact with the client's GP and pharmacist.
- As carers' involvement was essential to allow clients with cognitive impairment to remain at home, it was necessary to liaise with carers regarding clients receiving this model of care.

Internet connections

Appropriate broadband connections included:

- ADSL2+ (delay of >2 weeks often occurred with these connections)
- 3G/4G mobile, which was used to expedite connection to the internet when necessary.

The above connections fully met the audio, visualisation and operational needs of nurses, clinicians and clients for effective videoconferencing.

Client and staff evaluation

Client and staff evaluation occurred before and after implementation of the BEIP project. Evaluation was achieved through qualitative and quantitative data, which:

- highlighted a healthy appetite and acceptance of the BEIP service delivery model of care
- demonstrated that clients' confidence regarding use of technology improved, from 34.2% before they commenced on the project to 80.7% at the conclusion of the project.

Evaluation of staff included two aspects of the BEIP project, which are summarised in *Tables 1* and *2*. Pre-implementation results were the responses from staff who were surveyed prior to the commencement of the project. These responses reflect the opinions of the staff in relation to the impact that they thought the BEIP would have on themselves and their clients. The pre-implementation results were unknown as RDNS had not trialled anything like the BEIP before. Further evaluation reviewed the positive and negative outcomes for clients and staff as listed in *Table 3*.

Consistent with the endorsement of beneficial effects of the BEIP project on client care and service delivery, staff had positive impressions of videoconferencing for medicines management overall.

Table 1. Staff evaluation of impact of BEIP on RDNS clients

	Pre-implementation survey	Post-implementation survey
Allowed clients more flexibility	87.1%	95.3%
Helped clients to live independently	91.9%	94.1%
Helped clients to manage their medicines at home	82.2%	94.1%
Videoconferencing was a positive experience	70.5%	74.7%

Table 2. Staff evaluation of impact of BEIP on RDNS nurses

	Pre-implementation survey	Post-implementation survey
Helped supplement home-nursing visits	83.9%	90.3%
Improve RDNS workforce utilisation	82.0%	81.0%
Managed workforce shortages	80.6%	72.0%
Provided care to more clients	77.4%	76.2%

Table 3. Positive and negative outcomes for clients and staff

What did staff feel were positive outcomes for clients?	What did staff feel were negative outcomes for clients?
Greater independence/confidence	Loss of confidence and frustration when technical issues occurred
Greater flexibility in their day	Potential medication errors – dropped tablets, hoarding, drug charts and Webster packs not matching
Increased capacity to manage own medicines	Reduction in face-to-face contact for socially isolated clients
Opportunity to learn new skills (technology)	Decrease in routine assessment of client and their environment
Greater number of clients could access RDNS services	
Positive outcomes for staff	**Negative outcomes for staff**
Diversification of role	Initially time consuming (client training)
Increased knowledge and skills (new technology)	Increased callouts
Alternative service options to assist clients to be independent	Technical issues
Decreased time spent on daily medicines management	Inappropriateness of clients for BEIP

Staff strongly agreed that:

- the RDNS should continue to offer videoconferencing for medicines management (84.6%)
- they were more positive about videoconferencing than before the project (75.6%)
- the benefits of videoconferencing outweighed any negative aspects (73.5%).

Summary

The trial shows that the BEIP model of care had the following benefits:

- savings in travel times for clients, as seen in the reduction in visits/travel time from 4.2 hours per week client time (face-to-face and travel time) to 2 hours with BEIP
- savings obtained from streamlined BEIP service delivery practices, as shown by an increase in time spent directly on medication management from 72% to 90%, corresponding to a reduction in travel time from 28% to 10%
- safe clinical practice for medicines management
- reduced travel-associated expenses
- age is not a barrier to technology.

Final comments from clients were generally positive, consistent with previously reported results. Some clients liked videoconferencing and the contact with staff, and considered this the future of medicine management. Other clients reported that videoconferencing was of no benefit when the technology did not work and that the technology could be disconcerting.

The intended outcome of the model was expressed by RDNS as follows: 'The BEIP team estimated that circa four out of five clients (80%) will respond via client surveys that their medicine management experience via videoconference facilities will provide them with a greater sense of control and provide active participation in their own medicines management regime.' More than 80% of survey respondents agreed or strongly agreed that medicines management, delivered via the videoconferencing unit, helped them to manage their medicines and live independently in their own home, was more convenient than having daily visits from a nurse and made them feel confident that they were taking their medication correctly.[5]

Conclusion

The results of this trial show that technology can be successfully applied in community-based patient care to enhance the capacity of the RDNS to deliver medications management for clients. The BEIP project won the Outstanding 'ICT' Innovation Award in the Asia Pacific Eldercare Innovation Awards 2013 in Singapore. Because of the success of the BEIP trial, the RDNS continues to provide remote medicines management via videoconferencing for 18 clients now using Samsung tablets, supported by Tunstall software to enable video calls. Further analysis is currently taking place regarding the interoperability and technology, integration, scaling and sustainability aspects of telehealth in relation to the present and future delivery of medicines management at the RDNS, with the plan that this model of care will be implemented as business as usual in the foreseeable future.

For more information you can view the BEIP video via the following link: http://youtu.be/pWEg3OcLNu8 or http://youtu.be/xiQeNOzwn98

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