Impact analysis of assessment, consultation and education services to support the adoption of smart home technologies, innovations for chronic disease prevention and solutions for independent living

James Barrientos[1], Jeffrey Soar[2] and Ying Su[3]

[1] LifeTec Queensland, PO Box 3241
Newmarket, Qld, AUSTRALIA 4051
[2] School of IS, Faculty of Business & Law,
University of Southern Queensland
AUSTRALIA 4350
[3] Institute of Scientific and Technical Information of China,
15 Fu Xing Rd, Beijing 100038, CHINA

Abstract

Aims: To review the impact of the services of LifeTec, a NFP (not-for-profit) state-wide community-funded provider of assessment, consultation and education services to support the adoption of smart home technologies, innovations for chronic disease prevention and solutions for independent living.
Methodology: a review of service data collected by LifeTec and independently evaluated
Findings: LifeTec and other similar ILCs (Independent Living Centres) in Australia and other countries, provide an assessment, consultation and education service that is critical for people with disabilities, the frail aged and others needing support. The services are accessed by consumers, their families, care provider organisations, clinicians and educators; the needs for these services are far greater than currently-funded capacity and there will be a need for greater capacity as baby-boomers move into the ages when needs for support will spiral upwards.
Summary: The disability support and aged care sectors have not to date taken advantage of assistive and other relevant technologies; there is a massive unmet need for greater support and a significant level of issues that are not addressed. There will need to be a significant increase in funding of ILCs to meet both existing needs as well as to surge at appears to be changing and there is now significant investment in clinical systems and other systems to assist staff in providing care.

Key Words: information technology, assistive technology, disability support, independent living, aged care, seniors, workforce

1. Introduction

There is growing interest in the adoption of ICT to assist in the delivery of care for people with disabilities and the frail elderly [1]. Challenges associated with demographic changes include rising consumer demand, workforce availability and skill levels, and providing services across the vast geographical spread of the disability services and aged care population and location of services. These challenges promote the need to investigate and implement new models of care delivery through ICT[2] and previous research has identified opportunities for ICTs [3] [4].

2. Ageing and disability

Australia shares the concerns of most countries of the world that are experiencing the impact of an ageing population and its associated illness, disability, and needs for support.

Technology is anticipated to offer significant potential for equipping societies to respond to these pressures [5], [6]. Applications include assisting older people in extending active and independent lives, maintaining consumer productivity, better managing and supporting the care workforce and in delivering and increasing the quality of care in home, community and residential care settings. Globally there is an increasing level of activities, strategy development, research projects, and adoptions of telecare, telehealth, smart homes and assistive technologies by consumers and care provider organisations [7]. Technologies offer an array of benefits including a reduction in hospital admissions and length of stay. [8], [9].

3. Smart home and assistive technology

There is recognition of the potential for technology to enhance the safety and independence of older people, enable access to care services, extend their ability to remain in lower levels of care such as their own home, and to address workforce productivity and availability. Intelligent monitors can keep a continuous watch on vital signs, activity patterns, their safety and security, and provide early warnings of potential problems [10]. Automation is expected to enhance security, safety and independence [11]. This could help maintain quality of life and decrease the demand for carer support hours.

There is much research or demonstration models with the aim of promoting the adoption of ICT for care [12], [13]. In the state of Queensland, Australia, a model for referrals of suitable people away from hospital admission to community disability services and aged care has been evaluated indicating that such systems could significantly reduce avoidable hospital admissions [14]. There are similar initiatives around most Australian health jurisdictions for managing Emergency Department demand.

Research into technology adoption issues, return on investment, realisation of benefits, integration and interoperability is required to ensure a sustainable system. Current evidence indicates that the level of adoption of technology in disability services and aged care services remains low. There appears to be many factors influencing this and these are seen to include low awareness, attitudes to technology, design issues, telecommunications capacity, technical support, overall cost and uncertainty that benefits will be realised.

An indication of the extent of new technologies available to ageing services and related research is available from the web-site of the Center for Aging Services Technologies [15]. A new centre in Ireland, Technology Research for Independent Living (TRIL) is using ethnographic approaches to better understand seniors' attitudes to technology [16].

4. LifeTec

LifeTec is a leading provider of specialist information, consultation, and education on assistive technology that can help individuals improve their quality of life and remain independent. Through a health professional service delivery model, LifeTec provides advice on the range of available solutions regardless of a person's age or level of ability. LifeTec assists a wide range of people from all walks of life. Its clients include older people who wish to remain independent in their homes for as long as possible, as well as children and adults with chronic conditions or a disability.

Some of LifeTec's clients have health issues as a result of ageing or illness and simply want to make life easier. LifeTec's health professionals assist people to maximise their independence and their ability to manage everyday tasks whether in the home, workplace, or out in the community. They specialise in matching peoples' needs and wants with the most appropriate assistive technologies by applying clinical reasoning in different contexts, including human, technology and activity contextual factors.

The majority of LifeTec's funding is from the government at both a Commonwealth and State level. It receives funding from the Australian government's Home and Community Care (HACC) scheme as well as from state government: Disability Services Queensland and Queensland Health. LifeTec also derives income from its private consultation and education services.

LifeTec also works closely with Indigenous and culturally and linguistic diverse (CALD) communities to tailor services and promote the unique needs of different groups. LifeTec's access to cutting edge assistive technology enables it to provide up-to-the-minute advice and practical, hands-on experience of the latest equipment, devices and aids to suit individual needs. LifeTec operates display centres in Brisbane and Townsville and also has a state-wide outreach service across Queensland.

5. Specific services and stakeholders

LifeTec provides a number of services to the community. These include information, consultation and education on assistive technology. Information services are provided via face to face, email, phone, or

from one of its display centres located in Brisbane and Townsville. These displays feature more than 2500 assistive technology items. Consultation services are provided in instances when an assessment of a person's assistive technology needs and wants is required. This involves an in-depth assessment and trial of technology solutions to meet a person's goals. Education services include raising awareness of assistive technology and its benefits, and targeted workshops for health professionals in specific areas of technology. In addition, LifeTec provides a range of Information, Consultation and Education services on an outreach basis across the vast area of the Australian state of Queensland.

Of interest to this research, was LifeTec's Consultation services which is provided to consumers and their families and carers. This involves a consultation between a consumer and a LifeTec health professional as the consultant. The consultant undertakes an assessment of the consumer's clinical conditions, goals, and other contextual factors. The consultant is able to select and trial different technologies with the consumer to see if it meets their wants and needs. At the end of the consultation, the consumer is usually provided with a prescriptive report of recommended smart home and other assistive technologies with details of suppliers. A specific area of focus to this research, was LifeTec's access and home modification tele-consultation services. This specialist service assesses the access and safety of peoples' homes in rural areas by using Skype. A local officer facilitates a tele-consultation process by using a tablet directly from the person's home and communicating in real time with one of LifeTec's health professionals situated in one of its centres. Using different home modification apps, the consultant can often make recommendations and send these to the facilitator on site. Modifications to the person's home can then be performed with minimal delay.

LifeTec's stakeholders include relevant federal and state government agencies, aged and disability care provider communities, consumer bodies, carer associations, clinicians, researchers and the community generally. There are almost 3 million Australians aged 65 and above; most of these are healthy and independent but around 1 million people of all ages, mostly seniors, receive some types of care and support in their own homes. These are the core target group for LifeTec's services as well as carers, families and care provider organisations.

6. Methods

LifeTec records service and client data as part of its client records. The units recorded in Table 1 were occasions of service provided by LifeTec health professionals to a member of the public or other professionals. Consultations cover all assistive technologies available that might assist the consumer. These included ambient, wearable, remote monitoring, universal design, as well as speech pathology, occupational therapy and physiotherapy. Consultations focused on

specific areas of functional independence that improved the ease and safety with which people undertake daily activities. These include residential, vocational, educational and recreational activities and goals.

The research showed there was a rapid continuing increase in the use of LifeTec for consultations.

The data gathered over the two calendar years 2010 and 2011 was gathered, reviewed and compared (Table 1).

Table 1: LifeTec service statistics 2010 and 2011

Data Collected	**2010**	**2011**
Total number of service delivery units	22,496	24,858
Client gender	56% female 44% male	54% female 46% male
Client location	83% metropolitan 17% rural	72% metropolitan 28% rural
Average waiting time for rural client consultations	52 days	17 days
Indigenous and CALD clients	4%	7%

Service delivery units include consultations or other occasions of service to clients. The data shows:

- The total number of service delivery units increased from 2010 to 2011by 2362 (24,858 – 22,496), representing a 10.5% increase in services
- A slight increase in services to male clients from 44% in 2010 to 46% in 2011
- A significant increase in services delivered to rural clients from 17% of total services in 2010, to 28% of services in 2011
- Average client waiting times for LifeTec services reduced by a significantly from 52 days in 2010 to 17 days in 2011
- Indigenous and CALD (culturally and linguistically diverse) client numbers grew from 4% in 2010 to 7% in 2011

7. Findings and discussion

The data shows that LifeTec service delivery has continued to grow by over 10% per annum. To meet this growing need, LifeTec has implemented the following strategies:

- Established Smart Homes in Brisbane and Townsville
- Introduced specialist tele-consultations
- Established an additional assistive technology centre in Townsville

The response of LifeTec management has included:

- The provision of specialist services to an additional 2362 Queenslanders as a result of the strategies introduced.
- An increase in the percentage of male clients accessing LifeTec services (44% in 2010 to 46% in 2011). This is likely to be a result of the holistic provision of AT solutions under an ambient living model by utilising Smart Homes for the prescription of AT. This approach has increased uptake of AT for wider range of disabilities, chronic conditions and even recreational activities.
- A significant increase in the number of services provided to rural clients across Queensland (17% in 2010 to 28% in 2011). The introduction of specialist tele-consultations was the main cause in the increase of service provision to rural clients. Tele-consultations also resulted in increased continuity of care, improved access and reduced waiting times. The establishment of a second LifeTec AT centre in Townsville (1,400 km north of Brisbane), also contributed greatly to the increase in service provision to rural clients.
- Tele-consultations also resulted in very large reductions of client waiting times. Waiting times for specialist LifeTec services vary significantly in metropolitan and rural areas. Average client waiting times were reduced by 67% (52 days in 2010 to 17 days in 2011). LifeTec's second AT centre in Townsville also contributed to this significant reduction in waiting times.
- LifeTec grew its service delivery to Indigenous communities from 4% in 2010 to 7% in 2011. We attribute this primarily to the establishment of LifeTec's second AT centre in Townsville in north Queensland. This area has a higher Indigenous population than southern Queensland, which has enabled our health professionals to network and establish more effective relations with Indigenous communities.

8. Conclusion

Most people have become familiar with and have adapted to technologies that are now pervasive across industries. This research set out to refresh previous research and to determine the degree of change in investment in ICT in disability support and disability services and aged care services in Queensland. A review of data collected by LifeTec, the state's independent living centre was undertaken.

The research found that client demand for AT services continued to grow at over 10% per year. To meet this growth, LifeTec introduced new initiatives including smart home delivery models, specialist tele-consultations and established a second AT centre in north Queensland. In 2011, these initiatives resulted in 2362 additional service delivery units, an 11% increase in rural services, a 67% reduction in average client waiting times and an increase in Indigenous services from 4% to 7%.

Acknowledgements: The authors would like to thank LifeTec for their support and access to their data; we also thank the National Soft Science Program (Grant No. 2011GXQ4K029), and the State Key Program of National Natural Science of China (Grant No. 70831003) which supported Professors Su and Soar in their research.

10. References

1. Essen A and Conrick M, Visions and realities: developing 'smart' homes for seniors in Sweden, eJHI - electronic Journal of Health Informatics, Vol 2(1), e2

2. Soar, J. and Eley, R. (2010) Changing ICT for /Client/Patient Management and Clinical Information in Residential and Community Aged Care Services in Regional Australia: Structured Interviews with Service Managers, in Lee, Y., Zenn Bien, Z., Mokhtari, M., Kim, J., Lee, Heyoung, and Khalil, I. (eds.) Aging Friendly Technology for Health and Independence. Lecture Notes in Computer Science 6159, Springer, Berlin

3. Eley, Robert and Fallon, Anthony Bruce and Soar, Jeffrey and Buikstra, Elizabeth and Hegney, Desley (2008) Nurses' confidence and experience in using information technology. Australian Journal of Advanced Nursing, 25 (3). pp. 23-35.

4. Eley, Robert and Fallon, Anthony Bruce and Soar, Jeffrey and Buikstra, Elizabeth and Hegney, Desley (2008) Barriers to use of information and computer technology by Australia's nurses: a national survey - Journal of Clinical Nursing, 18, 1151–1158

5. Bowes A and McColgan G, 2005 *West Lothian Interim Report*, West Lothian Council and the Department of Applied Social Science, University of Stirling

6. Soar J (2008) Information Management in Modern Healthcare Organisations, Proceedings IBIMA, 4-6 January 2008, Marrakesh, Morocco

7. CSCI 2006, Time to Care? An overview of home care services for older people in England, report published by Commission for Social Care Inspection, London, www.csci.org.uk, October 2006

8. Jeffrey Soar, Anne Livingstone and Szu-Yao Wang (2009) A Case Study of an Ambient Living and Wellness Management Health Care Model in Australia, in Mounir Mokhtari, Ismail Khalil, Jeremy Bauchet, Daqing Zhang and Chris Nuget (eds.) Ambient Assistive Health and Wellness Management in the Heart of the City, Refereed Proceedings of the 7th International Conference On Smart homes and Health Telematics (ICOST2009) 1-3 July, 2009 – Tours, France, Springer.

9. Darkins, A., Ryan, P., Kobb, R., Foster, L., Edmonson, E., Wakefield, B., and Lancaster, A.E. (2008) Care Coordination/Home Telehealth: The Systematic Implementation of Health Informatics, Home Telehealth, and Disease Management to Support the Care of Veteran Patients with Chronic Conditions, TELEMEDICINE and e-HEALTH DECEMBER 2008 1118-1126.:

10. Soar J and Seo Y, (2007) Health and Aged Care Enabled by Information Technology, Annals of the New York Academy of Sciences, Volume 1114 Page 154-161, October 2007

11. Philipson G and Roberts J, (2007) Caring for the future: The impact of technology on aged and assisted living (Invited Paper), *eJHI - electronic Journal of Health Informatics*, Vol 2(1), e3.

12. Alison Bowes and Gillian McColgan, Smart technology at home: users' and carers' perspectives, Interim report February 2005, by Department of Applied Social Science, University of Stirling

13. SOPRANO - Service-oriented Programmable Smart Environments for Older Europeans, http://www.soprano-ip.org/ (accessed 5 December 2008)

14. Soar J, Yuginovich T and Whittaker F (2007): Reducing avoidable hospital admissions of the frail elderly using intelligent referrals *eJHI - electronic Journal of Health Informatics*, Vol 2(1), e3.

15. CAST, Center for Ageing Services Technologies, www.agingtech.org (accessed 28 January 2009)

16. TRIL, Technology Research for Independent Living, http://www.trilcentre.org/ (accessed 28 January 2009)