Research Article

Barriers to the use of Information and Communication Technology by occupational therapists working in a rural area of New South Wales, Australia

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Background/aim: *This qualitative study formed part of a large-scale, multi-phase study into the delivery of therapy services to people with a disability, living in one rural area of New South Wales, Australia. The study's purpose was to identify the impact of Information and Communication Technology on the workforce practices of occupational therapists' working in a rural area of New South Wales.*
Methods: *Individual semi-structured telephone interviews were conducted with 13 occupational therapists working in disability, health and private practice in a rural area of New South Wales. Participants were asked about access to, skills and limitations of using Information and Communication Technology. A modified grounded theory approach, based on thematic analysis and constant comparison, was used to analyse the interview transcripts.*
Results: *This study found widespread use of technology by rurally based occupational therapists working in the disability sector in New South Wales. However, Information and Communication Technology was primarily used for client contact, professional development and professional networking rather than therapy provision. The study identified individual, workplace and community barriers to greater uptake of Information and Communication Technology by this group. The individual barriers included: age cohort, knowledge and personal preferences. The workplace barriers included: support and training and*
availability of resources. The community barriers included: infrastructure and perceptions of clients' acceptance.
Conclusion: *The potential exists for Information and Communication Technology to supplement face-to-face therapy provision, enhance access to professional development and reduce professional isolation thereby addressing the rural challenges of large distances, travel times and geographic isolation. To overcome these challenges, individual, workplace and community Information and Communication Technology barriers should be addressed concurrently.*

KEY WORDS *allied health personnel, communication, rural health, technology.*

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Introduction

In recent years, Information and Communication Technology (ICT) has had widespread impact on national and international communication, innovation and on social and economic factors (Nelson, 2011; Yousefi, 2011). The International Standard Industrial Classification (ISIC) defines ICT as any product using electronic processing to transmit and display information (United Nations: Statistical Division, 2008). The end result of this process has a physical form that can be seen, recorded, heard or measured, including all types of audio and video processing and transmission: for example, personal, handheld and laptop computers, fixed line and mobile telephones and video-conferencing. In 2009, the Australian Federal government announced the rollout of a National Broadband Network (NBN) with expected benefits for the health system through improved access and provision of health-care services to all Australians regardless of where they live (Australian Government – Department of Broadband Communications and the Digital Economy, 2010). ICT has the potential to create instant communication channels across geographic distance, thus facilitating access to health services for people living in rural and remote areas.

Over the past decade, international and national studies reporting on the use of ICT in health-care provision have primarily demonstrated its use and effectiveness for education, follow-up sessions, demonstration of physical exercises and mobility tasks (Gray et al., 2011; Kairy, Lehoux, Vincent & Visintin, 2009; Kraetschmer, Deber, Dick & Jennett, 2009; Magnusson et al., 2002; Moffatt & Eley, 2011; Peddle, 2007). However, these studies also showed that ICT use in health-care provision has limitations especially when active participation between the client and the health service provider is needed. These needs are accentuated in allied health professions such as occupational therapy. Occupational therapists work with individuals across the lifespan to promote health, wellbeing and independence through meaningful occupations (World Federation of Occupational Therapists, 2004). An occupational therapist working with a person with a lifelong disability works collaboratively with the person and their family using long-term adaptive interventions to address their physical, mental, social and environmental needs throughout their life course (Occupational Therapy Australia, 2012; Sabata, Shamberg & Williams, 2008). The interaction and active engagement between the occupational therapist and the person with a disability within the assessment and intervention phases is an essential part of building a therapeutic relationship (Palmadottir, 2006; Radomski & Latham, 2008). When geographic or environmental barriers limit the opportunities available for regular face-to-face contact, ICT may provide an alternative means to facilitate interaction between the therapist and the person with a disability.

Even though ICT has great potential, there is a lack of literature describing its current uses in occupational therapy practice or describing the use of ICT by occupational therapists working solely with people with lifelong disability. The use of ICT by occupational therapists working with the general population has been described in Australia, Ireland and Canada (Gupta, 2010; Hoffmann & Cantoni, 2008; Law, 2010; Schaper & Pervan, 2007; Taylor & Lee, 2005). These studies reported that ICT was primarily being used by occupational therapists for access to professional development, research, administration and for professional and client contact. The studies highlighted the barriers to ICT use as inadequate access to technology, a lack of ICT training and support and poor connection speeds. Schaper and Pervan also identified the acceptance of technology by occupational therapists as a major facilitator or barrier to its use. The literature is consistent in identifying that ICT is used by occupational therapists for administrative and organisational purposes rather than service delivery. Given the rapidly changing field of ICT, and the widespread use of technology in the general population, including through small, portable devices and pervasive social media, there is a need to better understand the role occupational therapists may play in enabling their clients to utilise these technologies in their everyday lives.

Even though 30% of the Australian population lives in non-metropolitan areas, the Australian Institute of Health and Welfare (AIHW) reported a concerning discrepancy between the number of OTs working in metropolitan (91.1%) compared with non-metropolitan areas (8.9%) (Australian Institute of Health and Welfare, 2006). Furthermore, the increasingly ageing population is likely to result in a greater demand on occupational therapy services in both metropolitan and rural areas (Millsteed, 1999). Occupational therapists working in rural areas face particular challenges related to geographic distance and professional isolation (Lannin & Longland, 2008). Boshoff and Hartshorne (2008) designed an open-ended questionnaire to collect data about occupational therapists working in rural and remote areas of South Australia. Eighteen participants reported as challenges vast geographical areas, travelling times, limited human resources, specialist versus generalist approaches and poor retention of rural staff. In a qualitative study into the professional support provided to new graduate occupational therapists in rural New South Wales (NSW), Australia, Steenbergen and Mackenzie (2004) identified resources and access to information technology as key factors in providing support for rural occupational therapists. The findings of these studies highlighted the need for appropriate recruitment and retention strategies, networking and collaboration, local and regional meetings and professional associations to address the issues of professional isolation, lack of professional development opportunities, limited support systems, travelling time, vast distances and the wide range of services and clientele (Boshoff & Hartshorne, 2008; Devine, 2006; Lannin & Longland; Mills & Millsteed, 2002; O'Toole & Schoo, 2010). The authors of these studies concluded that, if used effectively, ICT could assist with the implementation of these strategies. The study described here aimed to explore the use of ICT by rural-based occupational therapists working with people with a disability in NSW, Australia.

Methods

Ethics approval for this study was obtained from the University of Sydney Human Research Ethics Committee (Protocol N: 07-2011/13998). This study was carried out in conjunction with a large-scale, multi-phase study into the delivery of therapy services to people with a disability living in one rural and remote area of NSW, Australia (Veitch et al., 2012).

Recruitment and participants

Participants were recruited using a stratified systematic sampling process utilising networks from the larger study to identify 49 occupational therapists working in government, non-government and private practices with

people with a disability in western NSW (Patton, 2002). These occupational therapists were sent an information sheet and consent form via email. A reminder email was sent two weeks after the initial email. Thirteen of these 49, all female occupational therapists, agreed to participate in a semi-structured telephone interview lasting approximately 30 minutes. The majority (*n* = 8) were employed by government departments, two by non-government organisations (NGO) and three were private practitioners. Participants worked in a variety of disability specialities, including paediatrics, physical rehabilitation and vocational rehabilitation. Table 1 presents participants' background information.

Data collection

Individual telephone interviews were selected as the data collection method due to the geographic distribution of participants. Informed consent was obtained

TABLE 1: *Demographic characteristics of participants*

Characteristic	N = 13
Age range (years)	
20–30	5
31–40	2
41–50	4
51–60	2
Length of time working in Western Region	
Range	1–26 years
Mean	12 years
Length of time working as occupational therapist	
Range	1–34 years
Mean	17 years
Sector	
Government	8
Non-government	2
Private	3
Geographical location†	
Highly accessible	4
Accessible	8
Moderately accessible	0
Remote	0
Very remote	1
Work environment	
Sole practitioner‡	9
Team§	4

†The Accessibility/Remoteness Index of Australia (ARIA) was used to classify geographical location (Australian Institute of Health and Welfare, 2004).

‡Sole practitioner – only occupational therapist working at workplace.

§Team – more than one occupational therapist at workplace.

from all participants prior to data collection. The semi-structured interview guide was developed using literature and responses about ICT use extracted from the transcripts of the focus groups with 97 service providers, including 17 occupational therapists, conducted as part of the larger study. The interview guide was trialled with an experienced occupational therapist and feedback incorporated into the final interview guide. The interview guide, a copy of which can be obtained from the first author, included questions about: use of ICT in the daily work of occupational therapists in rural settings, problems occupational therapists encountered when using ICT, how ICT could help address rural challenges for occupational therapists, the impact of technology on job performance and the future uses of ICT for occupational therapists in rural settings.

Data analysis

With participants' permission, interviews were audio-recorded and transcribed verbatim. Modified grounded theory, based on the work of Glaser and Strauss (1967), is a systematic yet flexible method, in which data collection, data analysis and the identification of themes are mutually related (Charmaz, 2006). Using this approach, the first author generated initial codes by identifying, naming, categorising and describing keywords or phrases in the data (Goulding, 2002). To maintain consistency in the coding process across all transcripts, these codes were reviewed by the second author. Using constant comparison (Braun & Clarke, 2006) and thematic analysis within and across transcripts, three barriers to ICT use were identified: the influence of the (i) individual; (ii) workplace and (iii) community. Figure 1 summarises the process of data analysis to identify the first barrier: the influence of the individual on ICT use. The same data analysis process was used to identify the other two barriers.

Results

Participants reported using a wide range of ICT to perform their roles as occupational therapists working in rural NSW, including computer software programs, email and internet on personal computers and laptops. There was also widespread use of fixed line and mobile telephones, including for teleconferences. Ten participants had access to video-conferencing facilities and reported the use of this technology as a cost-effective and practical method for accessing professional development. Other recent technologies being used by a few occupational therapists included touch-screen tablet computers. However, some participants reported that their workplaces did not provide these recently released items due to a current lack of empirical evidence as to their usefulness in occupational therapy interventions. Table 2 highlights how the participants used the different ICT resources at their workplaces. The table also
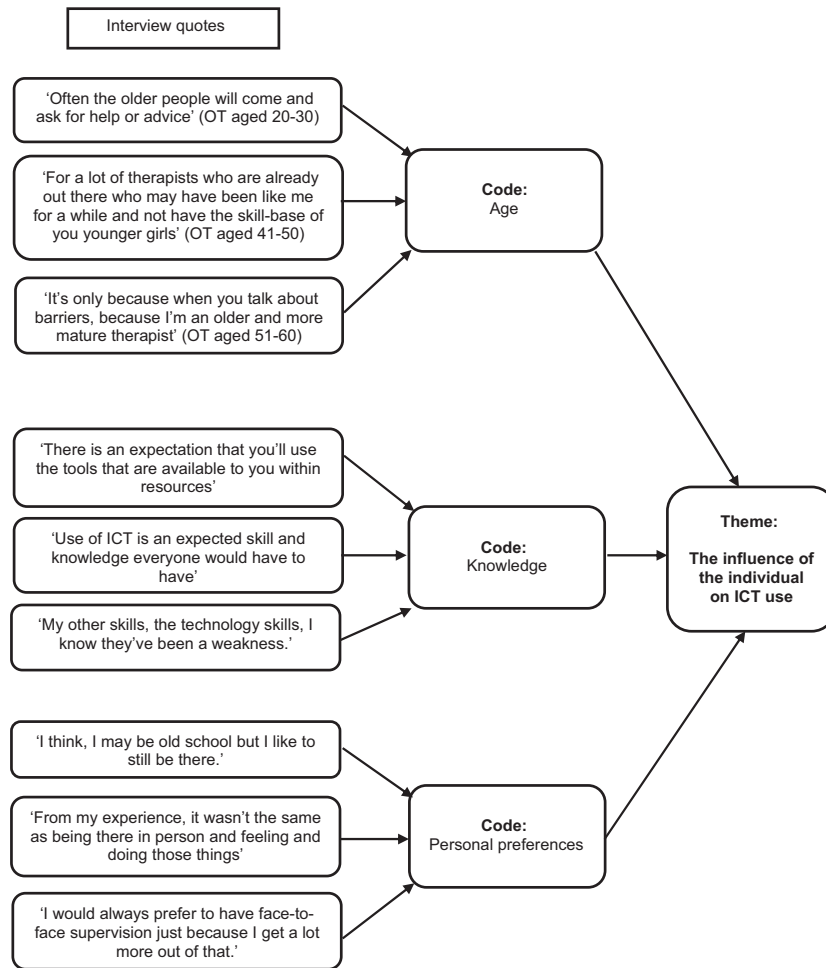
Interview quotes

'Often the older people will come and ask for help or advice' (OT aged 20-30)

'For a lot of therapists who are already out there who may have been like me for a while and not have the skill-base of you younger girls' (OT aged 41-50)

'It's only because when you talk about barriers, because I'm an older and more mature therapist' (OT aged 51-60)

Code:
Age

'There is an expectation that you'll use the tools that are available to you within resources'

'Use of ICT is an expected skill and knowledge everyone would have to have'

'My other skills, the technology skills, I know they've been a weakness.'

Code:
Knowledge

Theme:
The influence of the individual on ICT use

'I think, I may be old school but I like to still be there.'

'From my experience, it wasn't the same as being there in person and feeling and doing those things'

'I would always prefer to have face-to-face supervision just because I get a lot more out of that.'

Code:
Personal preferences

FIGURE 1: *Summary of steps for thematic data analysis and constant comparison of individual interviews.*

shows how ICT resources were used to address the challenges identified by both the literature and the participants in this study as problematic for occupational therapists working in rural areas: vast geographic distances involving extensive travelling time, professional isolation and lack of professional development opportunities.

Although the occupational therapists in this study used ICT for a variety of purposes, the extent and nature of ICT use was influenced by individual, workplace and community barriers, as demonstrated in Figure 2.

Individual barriers

Three individual barriers influenced occupational therapists' use of ICT: age cohort, ICT knowledge and personal preferences for using ICT.

Age cohort

Occupational therapists less than 30 years old were more accustomed to using technology compared with their older peers. For example, a younger occupational therapist said, 'I am fairly used to computers so it is not

such an issue'. In contrast with their younger colleagues, many of the older occupational therapists reported stepping out of their comfort zone to use technology. For example a comment from an older occupational therapist included, 'I'm an older therapist, I don't find finding my way around the computer and the internet as easy to do.' Despite their computer skills limitations, the older occupational therapists were adapting to the changes. An older occupational therapist said, 'IT for me is still a struggle. I don't find it easy, but I do find that it's useful.' An older therapist, who has been working in the field for more than 20 years, was positive about the advantages of technology: 'I can see it has made a big difference and it's going to make a bigger difference in the future.'

ICT knowledge

Even though ICT use may not be specified in an occupational therapist's job description, the knowledge of and the use of ICT is an expected skill as reported by this participant: 'Certainly there is an expectation that you'll use the tools that are available to you within

TABLE 2: *Use of Information and Communication Technology (ICT) by occupational therapists working with people with a disability in a rural area of NSW*

ICT	Uses
Computer	
Software programs	• Microsoft suites (Access, Excel, Word, PowerPoint) – for report-writing, preparing presentations, preparing case audits
	• Note taking programs for client records
	• Statistics program
	• Photo-editing software
	• Home modifications sketching
	• Incident logging software program
	• Book-keeping software programs
	• Calendar function
Laptop	• Editing photos and making DVDs
	• Presentations at meetings
	• Storing large amounts of information
Internet	• Video-conferencing
	• Professional development – education days, access to research journal articles and online libraries
	• Searching and ordering equipment
	• Google searches
	• Skype for communication between therapists
Email	• Formal and informal networking and receiving referrals between colleagues and other service providers
	• Clients to organise appointments
	• Equipment suppliers
Telephone/Mobile phone	• Making appointments and organising clinic visits
	• Contacting parents and other service providers to discuss clients
	• Providing/receiving supervision
	• Receiving referrals
Video-conferencing	• Contacting clients in remote areas
	• Adding visual component when seeking advice or supervision
	• Professional training and skills development
Other technologies	
Touch-screen tablets	• Recording and evaluating sessions
	• Training tool for families
	• Therapy and communication: for fine motor skills therapy, for developing communication and sequences for the child
Digital camera	• Taking photos for referral and reports
	• Home assessments: photos of environment

resources'. However, more emphasis is placed on rural-based occupational therapists having a driver's licence with the expectation that occupational therapists will travel to meet with clients or colleagues face-to-face.

Nine occupational therapists emphasised the positive impact of ICT on the occupational therapy field as reflected in the comments of two participants: 'It [ICT] is a big part of the occupational therapists work', and 'I think I am more effective with what I'm doing for the amount of time I'm actually employed because of the use of ICT.' Participant comments indicated that acceptance

of ICT is no longer the main issue. However, this comment from one participant warns against complacency in relation to ICT knowledge: 'I think I have to try and keep up with what's there.' The ICT knowledge of most occupational therapists, whether they worked in government, non-government or private practice resulted from personal effort rather than formal ICT training.

ICT personal preferences

Ten participants said they believed using ICT to contact colleagues and clients was not as personal as face-

Individual
- Age cohort
- ICT knowledge
- ICT personal preferences

Workplace
- ICT support & training
- Availability of resources

Community
- Infrastructure
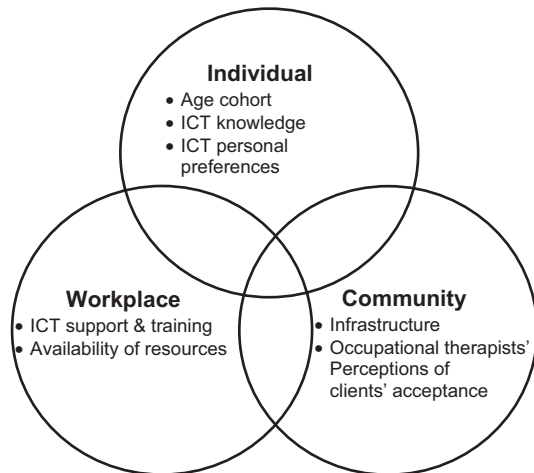- Occupational therapists' Perceptions of clients' acceptance

FIGURE 2: *Barriers to Information and Communication Technology use by occupational therapists working in a rural area of NSW.*

to-face contact, was time consuming and may lead to dependency on ICT resulting in frustration when technology fails. A participant reported, 'I think when you're there one-on-one you actually get a deeper, greater depth in the therapy relationship and, in a lot of situations, that creates a much better outcome.' Therefore, some occupational therapists were ambivalent about using ICT as a means for delivering therapy compared with a 'hands-on' approach. Two participants said, 'I think, I may be old school but I like to still be there. I think you miss out on a lot of information if you use the phone, but it can save you a trip', 'I don't think it's [using ICT for therapy] as good as face-to-face … but it definitely could open the door for people who are really isolated.' While participants emphasised the importance of personal contact with families, clients, supervisors and other therapists, they still found ICT useful for arranging appointments, for follow-up and keeping in touch. The participants' ICT preferences are related to their personal experiences of ICT use. Their preferences are directly affected by the two other 'individual' barriers identified in this study: age cohort and ICT knowledge.

Workplace barriers

Two workplace barriers reportedly influencing ICT use were support and training, and availability of resources.

ICT support and training

Occupational therapists working in government facilities reported reasonable ICT support: 'The IT help desk are being very prompt with responding to queries and now we have our local IT person who does travel out to the site', 'I wouldn't say it was immediate but you log a call and you have to wait. And when you're travelling, it is not ideal.' On the other hand, private

practitioners tried to solve problems for themselves or sought ICT support from family members. Two private practitioners said, 'But mostly it is trying to work it out myself or asking my children how to help me, because they're a great resource because they're younger', 'I have a husband who helps. He's [ICT] savvier than me.'

All government and non-government workplaces reportedly provided initial but not on-going ICT training. Two participants from the government sector reported, 'I have had some training, but more you pick up things as you go along', and 'There's not really any push and training in using new technologies… they're not providing any training in the new technologies because the system is not yet really set up'. A participant from the non-government sector stated, '[ICT training is] a one off, tick the box, get it done kind of training.' In contrast, a participant from private practice said, 'I haven't had any ICT training and I just have to try and problem-solve it myself'.

Availability of resources

Another reported barrier within rural workplaces was the availability of ICT resources. Four participants reported they were still using 'old technology' which cannot support new software. Some participants reported that their workplaces provided shared equipment per department or office, which was often impractical. As a result of the lack of equipment, a few participants reported using their personal mobile phones or laptops for work purposes. Another discrepancy in rural settings was the greater availability of resources in the larger regional towns, compared with less availability in smaller towns and rural areas. In contrast with those employed in the government sector, participants working in non-government organisations reported their workplaces as proactive in providing technological resources and equipment. A participant working in an NGO reported that it is 'an organisation that is already aware of the benefits of technology', whereas a participant working in a government service said, 'Because the manager probably doesn't know too much about technology, she doesn't realise those barriers [of lack of adequate software and hardware].' In some settings the software was available but it sometimes took months before it was installed. In other settings, the software was installed but no training was provided in its use. Furthermore, participants reported that, given the amount of time they spent travelling, they needed technologies that could be accessed when on the road: a 'moving office'. Indeed, one participant stated that she had 'no mobile technology, even though we are a mobile workforce'.

Community barriers

Two community barriers influencing ICT use were infrastructure and occupational therapists' perceptions of clients' acceptance.

ICT infrastructure

ICT infrastructure is an external 'community' barrier that has a considerable impact on the use of technology in rural areas. One participant said internet coverage is 'reasonable and useable, but not fantastic'. However, in some rural areas, there is no internet access and satellite internet coverage is used that is less reliable and more expensive. One participant reported, 'If we have to travel between sites, it [mobile phone coverage] can be patchy… so in terms of occupational health and safety of staff, we can't necessarily rely on the mobile phone to be the answer to meeting that need'. Many participants were anticipating the introduction of the NBN as a solution to the issue of coverage. However, one participant did not think that the NBN would reach her area, 'We don't have that (NBN); the communication doesn't seem to come out this way.'

Occupational therapists' perceptions of clients' acceptance

Participants perceived clients' acceptance of the use of ICT in health care as having a significant impact on occupational therapy workforce practices. Therapists believed they will be expected to incorporate their clients' use of technology. For example, occupational therapists employed in the health sector reported 'We can embrace it [ICT] to make that part of our day-to-day practice with patients', and 'our interventions are not reflecting the changing skill sets of our patients'. Another participant suggested the need for ICT help to support occupational therapists using technology with clients, 'I still could not emphasise enough the need for those core people on the ground or who are controlling, or quality assuring, the whole process so that it works and the various parties are linked up'.

Discussion

Overcoming ICT barriers

This study highlighted the influence of individual, workplace and community barriers on the use of ICT by rural-based occupational therapists working in the disability sector. This study indicates that despite the considerable potential of ICT, it may fall short due to lack of knowledge and resources, as found in previous studies (Steenbergen & Mackenzie, 2004; Taylor & Lee, 2005). Schaper and Pervan (2007) and Hoffmann and Cantoni (2008) reiterated the impact ICT training has on the acceptance, knowledge and personal preferences of ICT by occupational therapists. The current study found that therapists working in rural settings received initial ICT training but lacked follow-up. Occupational therapists, especially those over 30 years old, asserted their need for on-going training but acknowledged that workplace barriers, such as costs, time constraints and staff shortages may prevent this from happening. In addition to training, as pointed out by Hoffmann and Cantoni, Steenbergen and Mackenzie and Taylor and Lee, adequate computer hardware, infrastructure and resources are necessary for occupational therapists working in rural areas to make the best use of ICT. Without these inputs, ICT will not be used to maximum advantage and occupational therapists will continue to be reluctant to use new ICT applications such as web-based technologies.

This study complements the findings by Boshoff and Hartshorne (2008) and Steenbergen and Mackenzie (2004) in confirming the role ICT can play in supporting professional networking between occupational therapists. All participants in this study saw the possibilities of ICT for supervision and staff interaction, but at the same time mentioned its limitations as a less personal method of communication. A common opinion expressed by rural occupational therapists about ICT was that it was better than nothing but it was not the complete answer in addressing rural challenges. In other words, it can enhance service delivery, but not overcome the reality of distance when face-to-face support is required. While ICT is viewed as an alternative to face-to-face interactions, it likely will continue to have poor uptake by rural occupational therapists. Some of these concerns may be alleviated by increasing access to visual technologies such as video calls, video-conferencing and social media that provide a more personal and engaging communication channel than the currently used telephone or email communication methods. Given the constraints of geographic distance and time spent travelling, face-to-face contact might be supplemented, rather than replaced, by innovative ICT applications.

Impact on occupational therapy practice

Although technology may not change 'what' occupational therapists do, it has the potential to change 'how' they do it by incorporating it into client assessment processes, planning interventions and client follow-up for people with a lifelong disability in rural areas. The suggested model outlines barriers to ICT use in one rural area of NSW (Fig. 2) and provides a practical framework for change to increase the uptake of ICT. For example, an 'individual' may reflect on their own work practices and how they are incorporating and accepting technology. The 'workplace' team leader may identify a lack of uptake of particular technologies and instigate training and support to rectify this. Therapists may be influenced by the 'community' in their uptake of ICT by responding to client and carers' requests to use technologies such as touch-screen tablet computers. Therapy 'over-a-distance' has the potential to address rural challenges in ways that have not yet been realised and we suggest that it would be a useful adjunct to face-to-face service delivery methods. This model identifies the main barriers of ICT use and provides an innovative framework to guide changes to occupational therapy practice in rural areas through the use of ICT.

Further research is needed to explore ways in which occupational therapists can incorporate technology into their interventions, how they respond to the growing technological knowledge of their clients and how these factors can extend access to therapy interventions to people with a disability living in rural and remote areas. Research is also required with rural people with a disability and their carers to better understand the technologies people use and how these can be adapted to deliver occupational therapy interventions.

Limitations

This study was conducted in one region of NSW and the findings may be different in other Australian states and other countries. Moreover, the aim of the study was to explore the barriers to ICT use by rural occupational therapists working with people with a disability and so the findings may not apply to other allied health professions and those working with other client groups. Nonetheless, given the similarity in findings with other Australian and international studies of ICT use by occupational therapists, it may be that the experiences of the small number of participants in this study have applicability to other allied health professions and other geographic locations.

Conclusion

Future research is needed to explore the potential of ICT to provide occupational therapists working with people with a disability in rural and remote locations with supplementary modes for clinical service. Evidently, ICT has the potential to extend and expand the role of occupational therapists in delivering services to people living in rural and remote areas yet there is a lack of research showing how this can be done. In particular, there is considerable potential for community-based occupational therapists, who work with people with a disability using a collaborative model over the life course, to use ICT to maintain contact, provide advice and monitor progress when regular face-to-face intervention is difficult due to geographic distances. However, to do so, occupational therapists need access to adequate equipment, software, infrastructure and training. A major strength of this study lies in the identification of the individual, workplace and community barriers influencing ICT use. This study showed how each of the three barriers needs to be addressed concurrently for successful ICT uptake. By addressing these three barriers, ICT use has the potential to enhance the workforce practices of occupational therapists who work with people with a lifelong disability living in rural and remote areas and make occupational therapy more accessible for them.

Acknowledgements

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