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664. Clinician's Perspectives on What Influences Uptake of New Technologies into Rehabilitation Practice

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ABSTRACT From apps to gamification to robotic exoskeletons, rehabilitation technologies are being rapidly developed, yet many never find their way into routine clinical practice. While patients may be the primary end users, clinicians play a key role in introducing and supporting rehabilitation technologies. Conceptualizing clinicians as a key user group in the design process may be critical to future uptake. As such, we aimed to explore the experiences and perspectives of clinicians regarding the implementation and use of rehabilitation technologies.

We undertook a qualitative descriptive study using semi-structured focus groups and interviews with 27 rehabilitation practitioners. Data were analysed using conventional content analysis.

In this paper we will discuss our findings and their implications for the design and development of rehabilitation technologies.

Considering implementation at the outset and drawing on an in-depth understanding of all end user perspectives will likely lead to the development of rehabilitation technologies which are more tailored and responsive to the context of use.

Keywords: rehabilitation, technology, implementation

Introduction

A growing body of evidence showcases the value of new technologies in a rehabilitation context (Wolff et al. 2014). Potential benefits include minimizing access barriers, measuring improvements, reducing the burden on health care professionals, increasing patients' motivation, and increasing the opportunities for rehabilitation (Wolff et al. 2014; Ogourtsova, Archambault, and Lamontagne 2017). As a result, there is significant interest in the development of new devices for rehabilitation.

Despite this, many new technologies do not make their way into clinical practice, or if they do they are often not routinely used (Liu et al. 2015; Ogourtsova, Archambault, and Lamontagne 2017; Langan et al. 2017). Exploring why this happens is a growing area in the literature. A range of approaches have been used seeking to better understand the transition of a device into clinical practice including drawing on relevant theoretical frameworks (such as theories of normalization and integration) (May and Finch 2009) and exploring stakeholder perspectives.

Involving users throughout the design process can help make new technologies responsive to end user's needs (Hill et al. 2017). These participatory practices are hypothesized to overcome the issues around use and implementation (Wolff et al. 2014). However, typically the patient is seen as the primary end-user with little consideration of the clinician as end user (Liu et al. 2015; Hill et al. 2017; Langan et al. 2017). Often it is the clinician who evaluates, introduces and supports patients to use new technologies. As such, the clinician may play a critical role in successful uptake of rehabilitation technologies and their perspectives should be given explicit consideration in design and development.

The success of rehabilitation technologies may be enhanced through a better understanding of clinicians' perspectives and recognising them as another important user group. The intent and purpose of this research was to explore in-depth the perspectives of clinicians regarding their perceived constraints and opportunities for integrating new technologies into rehabilitation practice.

Methods

Design

This study used Qualitative Descriptive methodology which draws on the general tenets of naturalistic inquiry. It is argued to be a useful approach for exploring the perspectives and experiences of a phenomenon (Sandelowski 2000). The aim is to produce a rich description of events and the meanings people ascribe to those events which is argued to have pragmatic utility when wishing to produce research findings which can be formative to future practice (Sullivan-Bolyai, Bova, and Harper 2005). This was consistent with the ultimate goal of this research which was to inform the practices inherent in the design, development and implementation of new rehabilitation technologies. This research was conducted in several locations across Aotearoa New Zealand. Ethical approval was received from Auckland University of Technology's ethics committee (16/3480).

Sampling and recruitment

People were eligible to take part if they were currently working in the rehabilitation context, clinically or in a management role. Purposive sampling (Patton 2002) aimed to capture a breadth of experiences across a range of key characteristics including years of experience, profession, clinical setting, source of healthcare funding, geographic location, varied experiences of integrating new technologies and cultural perspectives. An invitation to take part was circulated to potential participants via professional networks. Those interested were encouraged to contact the research team, after which they were sent a participant information sheet and given the opportunity to ask further questions.

Data collection

Data were collected using semi-structured individual and focus group interviews. These interviews aimed to explore perspectives regarding what helps or hinders uptake of new technologies into rehabilitation practice and were conducted by two members of the study team (KS and NK). An interview guide supported the conversation, however the interviewer was responsive to the participant narratives exploring topics raised by participants. Examples of questions included 'how would you describe your experiences of trying to integrate new technology into rehabilitation practice?' and 'in your opinion, what are the key things that facilitate uptake of new technologies into practice? What gets in the way?' The interview guide was refined iteratively through the data collection process in response to earlier data. Interviews were audio recorded, then transcribed verbatim.

Data Analysis

Data was analysed using conventional content analysis (Hsieh and Shannon 2005). All authors engaged in data familiarisation by listening to a subset of audio recordings, and noting down key ideas and concepts present in the data. Following that, a meeting was held to discuss the range of key concepts identified to inform the development of a coding framework. All transcripts were coded by the first author using the coding framework, generating new codes when an existing code did not fit the data. Finally, a series of meetings were held to discuss codes and group them into meaningful clusters, each time checking against the raw data to ensure robust interpretation.

Findings

Twenty-seven people agreed to take part in the research. A summary of participant characteristics are included in Table 1. Of these, 19 took part in four focus groups and the remainder took part in an individual interview. Participant age ranged from 24 to 69 years (mean: 41 years) and years working in current role ranged from 3 months to 45 years (mean: 7 years). The majority of participants worked primarily with people with neurological injury or illness (n=20), including traumatic brain injury, spinal cord injury, stroke and concussion. A number of participants worked across a range of populations including neurological, musculoskeletal and cardiorespiratory conditions (n=6). One participant worked with people with visual impairment. Participants work spanned paediatrics to older persons' healthcare. Four participants were in managerial positions.

Table 1. Participant Characteristics

Characteristic		n
Ethnicity	NZ European	23
	Māori	2
	Other	7
Profession	Physiotherapist	13
	Occupational therapist	7
	Speech and language therapist	2
	Psychology student	2
	Clinical psychologist	1
	Rehabilitation assistant	1
	Nurse	1
Clinical Setting	Acute hospital	2
	Inpatient rehabilitation	4
	Outpatient rehabilitation	2
	Community rehabilitation	18
	Mixed	1
Receptive to technology	Strongly agree	17
	Agree	10
	Neutral	0
	Disagree	0
	Strongly disagree	0

(Note: people could self-identify with more than one ethnicity).

Cost, Evidence and Practicalities

Discussion centred around three key areas which at face value drove clinicians' decision to implement new rehabilitation technology into their clinical practice including; affordability, having evidence that a given technology is better than existing methods, and that it is practical and easy to use.

Cost was frequently mentioned as a barrier to implementing new technology and was referenced at a patient, service and funder level. People also commented on funding priorities in a resource-constrained healthcare environment.

'We [the service] just won't be able to afford really expensive technology, so it has to be affordable.' – Heather, managerial position, community.

Some clinicians reflected on how different healthcare funding structures impacted their ability to implement different technologies for different patients.

'I guess [accident compensation scheme] will get the best chair that meets the need of that person, and covers as many domains of their life as possible. Whereas somebody who is a [public healthcare] client, they will get the chair that is the right size and the chair that is,

you know, going to get them where they need to go. They will get that instead of a brand new custom chair.’ – Wendy, physiotherapist, inpatient rehabilitation

Clinicians described being ‘hamstrung by evidence-base’ (Simon, occupational therapist, community) before they were able to utilize new technological innovations. Others expressed a desire to wait for unbiased evidence of efficacy:

‘[Evidence for a gamified upper limb rehabilitation device] came from research fed into by the creators and so there’s the financial involvement in those studies to some extent. Which raises the eyebrows a little bit. So I think you are kind of waiting for it to either grow, and perhaps external researchers provide evidence of its success, and sometimes it seems to just fizzle away. So almost there’s a bit of a waiting... to see actually, has it been tested independently by researchers?’ – Mary, physiotherapist, outpatient

In some instances, a new piece of technology was perceived as too complicated to implement into practice, or more high-tech than was necessary. It was argued that if it was assessed as being too hard to work with, there was a tendency to revert to ‘old school’ (Julie, occupational therapist, community) methods to achieve the same thing. One therapist illustrated this reflecting on their experience of having a dynamic orthotic device for the wrist and hand given to the clinic which wasn’t used:

‘To be fair, we hadn’t done the training for [the device], but I could understand the principles in terms of using it. But I thought it was a complicated way to achieve something that might be able to be achieved in simpler ways.’ – Samantha, managerial position, community

As this participant summarized her experience of the device and watching other clinicians ‘not really try to engage’ with it, she encapsulated a number of the concepts contained in this theme:

‘Most people work in a [health board] and can you afford to pay \$4000 for a piece of equipment that might be used by 10% of your patient population and be more complicated to put on and use? [...] If things are too difficult, too complex, too expensive for the amount of use, those are almost insurmountable barriers for integration of the technology.’ – Samantha, managerial position, community

Interrogating Perceived Value

While at face value these findings provide guidance for developing new technologies for rehabilitation, they do not capture the complexity of the decisions clinicians were making. This theme was constructed to illustrate that a clinician’s wider context significantly affected their perceived value of technology in rehabilitation. There were a number of beliefs and underlying assumptions clinicians appeared to hold which contributed to this perception, and thus, the likelihood they would attempt to integrate it into routine clinical practice. This includes beliefs regarding what constitutes rehabilitation, their perceived role in that, and who and what is given priority in the decision.

Some clinicians saw their professional identity as one of expert, where they hold specialist knowledge. In this context technology supporting their perceived role as an expert was prioritized. Unfamiliar or complex technology was disregarded if it made clinicians 'feel like a substandard therapist' (Melissa, physiotherapist, inpatient rehabilitation). Similarly, there was tension between the clinical role of supporting autonomy, but wanting to maintain control of a clinical interaction or process:

'We have this sort of dichotomy where we want the patient to be independent, to be able to put the equipment on themselves, and operate it themselves, but for us to be able to lock it, set it, and control it. As a therapist if it's therapy equipment then you have to be able to adjust it so that it's personalized, so that you know you're still doing therapy for the person ... I think often as therapists we do like to control.' – Natalie, physiotherapist, inpatient rehabilitation

Some recognized this dichotomy and explicitly withheld their opinions about the value of a rehabilitation technology if it was something the client valued. 'I wasn't going to say anything critical, [about an app where evidence was perceived as refuting benefits] because if she is feeling that is helpful, great!' (Kimberly, occupational therapist, community). While in some cases, observing clients engage with technology helped to challenge the clinician's assumptions about the outcomes one might privilege in determining the value of technology.

'When I was looking at the [robotic exoskeleton], I was like "are you kidding? It takes 5 minutes to stand up and walk 10 metres! Why would you do that?" and the guy in the wheelchair looked at me and said "because you can" and I was like, "there you go - I will shut my mouth now", and I have to do that... because, like I said, I am quite critical with it all.' – Melissa, physiotherapist, inpatient rehabilitation

These perspectives provide insight into how different clinicians viewed legitimate rehabilitation in relation to new technology devices, including their roles and what outcomes are given precedence.

Discussion

This study provides an examination of clinicians' perspectives regarding what helps and hinders the uptake of rehabilitation technologies in clinical practice. These findings go beyond identifying barriers to implementation and interrogate what value clinicians place on technology in rehabilitation and how that is constructed. How they determine value appears formative to their decision to implement new technologies into practice.

Clinicians in this study articulated the need for new technologies to be affordable, have robust evidence supporting their use, and be easy to use in the clinical context. This is consistent with other literature in this area (Liu et al. 2015; Ogourtsova, Archambault, and Lamontagne 2017; Langan et al. 2017; Chen and Bode 2011).

However, the second theme augments this existing knowledge, offering insight into the broader context within which clinicians make the decision to implement new technologies into practice. It is clear from these findings there are a number of complex, often implicit, value-based decisions being made by clinicians when considering uptake of new technology. New technologies had the potential to lack fit with a clinician's

perception of rehabilitation or their clinical role, or force them to confront their differing priorities from their patients. Hill (2017) argues the meanings which patients attach to technologies can make or break their integration into everyday life. Our research shows clinicians also attach meanings to technologies, and more broadly rehabilitation, which play a decisive role in integration of technology into clinical practice.

Previous studies suggest the same technology features might appeal to both designers and clinicians (Wolff et al. 2014). While participatory design methods involving clinicians may capture these, if involvement is limited to discussing features and practicalities of use, they can fail to acknowledge the often critical role clinicians play in implementation. We argue that consideration of these complexities could influence design and development decisions to address issues relevant to implementation from the outset.

The strength of this study is in its in-depth exploration into the experiences and perspectives of clinicians. We aimed for diversity on a range of key sampling characteristics. While we achieved this on most criteria, we were not able to achieve the level of diversity we were hoping for in terms of cultural perspectives. In particular, we were seeking to involve more New Zealand Māori, the indigenous population, given they may have some unique and specific perspectives regarding the use of technology. Further, our participants had a range of perspectives regarding what constitutes rehabilitation technology which may have contributed to the reflections they shared. A high proportion of our participants worked with neurological populations which may limit the transferability of findings to other settings. As this research was conducted in Aotearoa New Zealand, the findings will be specific to that healthcare system and structure.

Conclusion

Despite evidence suggesting technology has the potential to improve outcomes and experiences of rehabilitation, many still do not find their way into routine clinical practice. This paper has presented two themes from a study exploring clinician's perspectives of integrating new technology into rehabilitation practice. While clinician's perceive affordability, robust evidence, and practicality as necessities in rehabilitation technology, this research shows that clinical decision making is much more nuanced. We conclude that technologies must also be designed to take into account the context, process, and values of clinicians in order to maximize the likelihood of becoming a part of routine clinical practice.

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