Deploying New Technology in Residential Aged Care: Staff Members' Perspectives

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ABSTRACT

Residential aged care facilities (RACFs) provide full-time, permanent care for older adults who are no longer able to live at home independently. In these facilities, new technology such as tablets, virtual reality, and social robots are increasingly being deployed with the aim of providing engaging and fun activities for residents. Although HCI research has examined the design and use of technology in aged care, there is limited understanding of the role staff members play in its deployment in RACFs. To address this gap, we interviewed five workers from one Australian RACF about new technology use within their facility. We found that its implementation was part of a complex, decision-making hierarchy in which issues such as marketing potential and staff members' roles and capacity, created tensions about the use of new technology. Drawing on our findings, we identify issues HCI researchers should consider when introducing new technology in this complex environment.

CCS CONCEPTS

• **Human-centered computing** → *Empirical studies in HCI*;

KEYWORDS

HCI; Ageing; Older adults; New technology; Residential aged care

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1 INTRODUCTION

Human Computer Interaction (HCI) has a history of designing and deploying new technology to support people as they age [2, 8, 21]. While new technology is often designed to support care, it can also be leveraged to foster social and emotional wellbeing [16, 21]. For example, the use of social technology to alleviate loneliness among older adults who live independently [16, 22]. There is also growing recognition that new technology has the potential to enrich the lives of older adults living in RACFs [5, 10, 14]. Despite this, there is limited knowledge of the role RACF workers play in mediating the deployment of new technology.

In Australia, RACFs provide full time care for older adults who are unable to live in their homes independently. They are often mixed-level settings offering low and high level care [13] where “both living and dying occurs” [15, p.2]. For residents, the facility environment is ‘home’, while for staff members, it is their ‘workplace’ [6] where staff ratios are “generally considerably lower than [in] hospitals” [7, p.173]. Furthermore, RACFs can be seen as “rigidly defined not by those who live there but by those who define the space as a ‘working’ space” [15, p.32]. Introducing new technology into such a complex environment, where the heterogeneity of both the resident and staff member cohorts is seldom considered in the design process, presents challenges for effective deployment.

Given these challenges, this paper explores the following question: What factors influence staff members when deploying new technology in residential aged care facilities? We present findings of a study that investigated how workers in one Australian RACF engaged with various new technology, including two types of immersive commercial VR systems. The research used qualitative inquiry within a critical realist framework to identify some of the deeper and often-unseen

structures RACF workers must navigate daily. Tensions between job role and worker capacity were apparent, as were differing perspectives about new technology, and its use and function in the aged care space.

Our findings deepen our understanding of how the deployment and ongoing use of new technology in RACFs can be mediated by staff members' roles, capabilities and attitudes towards technology. This knowledge has implications for the future use of new technology in RACFs. Increased understanding of workers' responsibilities, organisational structures, and views about new technology can lead to more effective implementation. Drawing on our findings, we identify factors that HCI researchers need to consider when researching the use of new technology in this complex environment.

2 METHODS

Study Design

The study was conducted over nine days in October 2017 in a mixed-level suburban RACF in Australia. The facility had previously implemented a variety of new technology, including social robots such as Paro the seal [12, 17], iPads, and a commercial VR system (which we refer to as VR system A). During our time at the facility, we also piloted a second VR system (VR system B) that used a headset, two 3D cameras, and two hand controllers. It was chosen for its active participation (move things), rather than the passive viewing (view things) characteristic of VR system A.

This paper reports the findings of an analysis of interviews conducted with five RACF staff members. These interviews addressed staff members' views about VR system B, and examined more broadly attitudes staff members had towards the use of new technology in the RACF.

Recruitment

Five staff members from across the facility were recruited once ethics approval was granted through the university (ID 1749713.1). Table 1 summarises staff participant demographics. All participants provided written consent.

Data collection

We conducted semi-structured interviews with each participant. Questions followed a similar sequence: background, relationship with technology, experience with new technology within the RACF, resident suitability criteria, resident feedback about using VR system B, and issues relating to the ongoing deployment of this system. The aim of the study was to interview all participants twice, but due to the dynamic environment, two participants were unavailable for their second interview. Interviews were recorded at the facility and later transcribed verbatim. Each participant was given a pseudonym to ensure anonymity.

Participants

Four females and one male aged 27 to 50 years (see Table 1) participated in the study. All participants had been working in aged care for more than five years and worked in the following roles: management (Centre manager), clinical care (Clinical care coordinator and Physiotherapist), personal care (Carer), and facilitator of resident group and one-on-one activities (Leisure and Lifestyle assistant).

Data analysis

Interview transcripts were thematically analysed using the process outlined by Braun and Clarke [3]. To ensure internal validity, two researchers co-coded one interview and compared codes and themes. The analysis was then reviewed and the resulting codes and themes were found to be analogous.

3 FINDINGS

Our analysis identified four central themes in relation to the use of new technology deployment in the RACF: (1) staff members' relationship with technology, (2) capacity in relation to job responsibilities, (3) use of new technology in an aged care setting, and (4) factors influencing resident suitability.

Staff members' relationship with technology

The five participants had varying relationships with technology in general (see Table 1). While Bron was the most technologically experienced participant, Lyn was the most challenged by technology: "Technology and me don't always go hand in hand," she said. "I'm a bit old school." Conversely, Bron was trained to use VR system A. She then became 'the trainer', introducing the system to some of the facility's staff members and residents. Once the Lifestyle and Leisure team was tasked with its ongoing implementation, Bron, the Centre manager, shifted her focus to the marketing potential of the technology in the facility. She talked about one female resident with dementia who "couldn't tell you a lot of things about what's going on [in the offline world], but every time she has a go on VR she absolutely loves it... and we've actually used her, we've recorded her for our marketing... and things like better practice... She's been really good at giving feedback, so we've done some work with her."

Capacity in relation to job responsibilities

The participants talked about how their roles often determined: (a) their ability to engage with new technology, (b) how they ascribed value to new technology in the RACF, and (c) their capacity to use new technology themselves and with residents. For example, three of the five participants had never used VR system A despite it having been deployed at the facility for many months. As Craig, a physiotherapist, said: "Currently VR is [part of Leisure and] Lifestyle...[but] I would

Pseudonym and age	Participant Role	Participant Education	Working in aged care	Relationship with new technology
Bron (47)	Centre manager	Undergraduate (Degree in Nursing)	"I've always worked in aged care"	Very good
Cath (27)	Clinical care coordinator	Undergraduate (Degree in Nursing)	"I went straight from uni to aged care"	Neutral
Craig (37)	Physiotherapist	Master of Physiotherapy & Neurology	Eight years	Good
Fay (32)	Care worker	Certificate (Carer)	Nine years	Neutral
Lyn (50)	Leisure & Lifestyle Assistant	Certificate (Carer)	Seven years	Challenging

Table 1: Participant demographics

like to join in... I want this experience because I'm pretty sure this will come into rehab... into treatment areas... This is the future" [18, 19]. Later when talking about how VR system B programs might be used in rehab for particular residents, he commented: "I could really see it helps [with] hand dexterity and also... reaching... You can ask [residents] to pop bubbles, pop balloons or draw something on it with their finger and it [could] really help... [And] it's not just exercise, it's quite a relaxing thing..."

For Lyn and the leisure and lifestyle group of staff members, facilitating activities using new technology was often challenging. Having a resident who is "able to help" set up VR system A, said Lyn, alleviated time pressures for workers who were running activities almost every hour. "Otherwise you can find it can be time consuming." Indeed, the availability of staff members to supervise VR sessions was "one of the biggest barriers" in terms of deployment according to Cath. This comment stood in stark contrast with the view of centre management with Bron commenting that she believed VR was "integrated into the lifestyle program because they have the capacity." Interestingly, Lyn later made the observation that she believed VR deployment was "across the board... I mean carers can come and get it. It's not just a lifestyle thing. It's there for everyone to use." Again, management viewed VR deployment differently, with Bron stating: "It would be lovely to have enough staff that you could do that activity for as many people [as possible]. We've encouraged the care staff to know how to do the VR... but they... don't really have a lot of extra time to be able to do that and say, 'Oh, I'm done with my care job, now I'm just gonna do a little bit of fun' [with the residents], which... is part of our principles - we do like people having fun as well, but you have to get your work done."

Use of new technology in an aged care setting

The participants talked about the various types of new technology that had been used in the facility. This included social

robots such as Paro and Matilda [11], VR systems A and B, and iPads. General comments by participants about types and function of new technology in the RACF were positive. Said Fay, a carer: "I think it's [new technology] fantastic if it can improve their quality of life and give them something else to do because day-to-day [life] can be quite mundane." Participants with a clinical background were more cautious in their evaluations, however, for as much as some residents needed the benefits of "stimulation and interaction," said Cath, there were other residents who "need to have less stimulation because of their advanced dementia and Alzheimer's." For Cath, finding safe ways to trial new technology with each resident, and monitor its ongoing use, was crucial.

For Lyn, new technology offered different ways to connect with residents, from understanding their personal interests, and emotional states to improving communication, movement and behaviour. It also introduced play into their everyday lives. When asked about the potential benefits of VR system B, Lyn said the system could give residents "something that's purposeful for them to do and that's probably one of the biggest advantages with technology. Is giving them something that they feel that they can accomplish." Lyn also talked about Paro, the social robot shaped like a seal. Not just given to residents as 'something to cuddle', "it can also be used as a calming tool for residents with behavioural issues," she said. "It's calming and can be [used] to engage in conversation." One female resident responds to Paro like it was "a dog". In fact the social robot is used in the facility as part of the pet therapy program.

The facility also trialled Matilda, a small social robot that can communicate, dance and play. Said Lyn: "It was a novelty the first time we tried Matilda facilitating bingo. But the residents soon lost interest because they couldn't work out where the number was being called and then [they had] to look at the screen for the number. They actually prefer human interaction." Matilda also did "a little bit of dancing in the memory support unit," Lyn added, "which [the residents] did

interact with... because they thought, 'Wow! It's something different.' Lyn felt Matilda "was probably more suited... for memory support rather than facilitating activities."

Factors influencing resident suitability

One of the main topics discussed in the interviews was how workers decided which residents should be offered opportunities to engage with the technology experiences.

Reasons for resident exclusion included: cognitive state, issues with vision and or hearing, poor hand dexterity, and general decline. "We've got some people [who] can't use both sides of their body, they might have had a stroke or some injury... so you're ruling out people who have got an actual physical thing," Bron commented. Cath said some residents might have difficulty using the hand controllers on VR system B: "[W]hile many residents are cognitively okay, there's comorbidities that come into play with their ability to do those kinds of things [use hand controllers] and coordination is often poor."

Interestingly, three of the five participants reported they were surprised when residents they believed could not engage with new technology used it successfully. Cath believed technology was "very individualised" and sometimes it was trial and error "as to who was suitable... because I can say, 'Oh, people would have trouble with this,' but then a resident could be so surprising, somebody you wouldn't think would be able to kind of interact might get something wonderful out of it."

4 DISCUSSION

It was evident from the data that the implementation of new technology was part of a complex, decision-making hierarchy incorporating macro (organisational), meso (policies, processes) and micro (how workers perform their daily tasks) routines [20]. Authors have previously identified that while these routines help organisations function, they can also be the "obstacles to change" [20]. New technology is often viewed as 'disruptive' because it butts up against such routines, and it was our experience in this study that the RACF protected its routines by adopting a siloed approach to new technology deployment. This approach limited staff member access to training and ongoing technical support, and placed pressure on the few staff members tasked with its ongoing deployment. In one instance, new technology languished in a cupboard due to workers lacking the training to resolve minor technical problems such as software updates.

Acknowledging these routines as structures within which RACF staff members work, offers new perspectives on the gatekeeper paradigm [1, 4]. Certainly, some participants were the frontline mediators of new technology deployment, but the limitations of structural supports could be seen as contributing to, or causing, gatekeeper behaviour. A good example is Lyn. Of the five participants, she had the most challenging

relationship with new technology yet she had the most responsibility for its ongoing deployment. Observers could view her 'old school' approach to the technology and her anxiety around its maintenance, as a form of 'gatekeeper' behaviour - a reluctance to change with the times. Certainly, Lyn's inability to install software updates or find quick solutions when faced with technical issues limited resident access. However, it was obvious that Lyn lacked proper training and ongoing technical support. She also alluded to the everyday challenges to perform her role effectively considering the number of hourly activities she was expected to facilitate. It is important to remember that while Lyn was tasked with new technology deployment, this was only part of her job, which she executed daily in a complex care environment.

Given these tensions, we recommend HCI researchers working in RACFs should:

(1) Consider organisational and staff member buy-in, which is critical to the success of implementation strategies. It is crucial that the benefits of the new technology to staff and residents are communicated early in the process, and that they have access to ongoing training and support [9]. It is also important to be transparent about challenges and risks.

(2) Be aware of corporate expectations about the use of new technology. For example, its marketing value may be at odds with the actual value and usability for residents.

(3) Clarify the functional needs of the technology. That is, what is needed to get the "technology to work as technically intended" [9, p.82]. Also be aware of the maintenance needs of the technology. For example, can staff members complete software updates within their limited time allowances?

(4) Consider how other RACF workers could use the new technology, and work with management to ensure they are invited into the conversation or included in research design.

(5) Be cognizant of human factors that can impact workers' decisions to use new technology, such as whether the new technology should replace or augment face-to-face contact with residents.

5 CONCLUSION

This study begins to address the gaps in our knowledge about how workers mediate the deployment of new technology in RACFs. Our findings build on recent research that examined stakeholder perspectives in the design of social technology for use in care environments [5], and contributes to an ongoing conversation in HCI on best practices for designing and deploying new technology to support people as they age [14, 16, 21]. Future research should be conducted with larger participant groups across several RACFs, and take place over longer periods of time, incorporating co-design and co-deployment opportunities, and long-term evaluations of deployment impacts across the RACFs in terms of processes, policies and the way participants perform their jobs [20].

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