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ORIGINAL RESEARCH

Adapting "Listen N Talk": Developing a Personalized Communication App with Culturally and Linguistically Diverse Residents in Aged Care

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Background: Rich communication between staff and residents in aged care settings is essential. Digital communication devices used to support communication in aged care settings are often not well targeted to individual needs and contexts. In this pilot study, we investigate the adaptation of a phrase-based language learning app, to support communication between carestaff and residents in a residential aged care setting in Western Sydney, Australia.

Methods: An interdisciplinary team of researchers and aged care professionals worked with three aged care residents for whom English was not their first language, to co-design and trial a prototype digital language resource. Insights from carestaff members into communication issues they face in their roles were documented through focus group sessions. A database of phrases was developed and then loaded into the Listen N Talk app. Carestaff trialed the resource with the residents for six weeks. Feedback from carestaff was gathered through semi-structured interviews.

Results: Based on responses of carestaff to an initial focus group, the language content of the prototype was focused on the context of daily care. The residents who participated in the study were long-term residents already familiar with the daily routine of the facility and staff had already established communication strategies regarding residents' needs or preferences. Three contexts were identified in which an app of this kind could be useful to facilitate communication: in a medical emergency, as a tool to strengthen English language skills of residents and staff and in the transition to residential aged care to support the development of routines with the new resident.

Conclusion: This study identified three contexts in which a phrase-based app can facilitate communication with culturally and linguistically diverse residents and carestaff. Feedback suggested avenues for further development such as the use of more open-ended translation together with sets of personalized phrases.

Keywords: older adults, dementia, family, caregiver, multilingual, language technology

Introduction

Communication Challenges in Residential Aged Care

Residential aged care in Australia is a site of increasing linguistic and cultural diversity. Of the residents, 31% are born overseas and 20% in a non-English-speaking country.[1] Even for those who develop strong English skills as a second language, the onset of dementia can cause a reversion to their first language.[2] At the same time, many carestaff in Australia (26%) are from a non-English-speaking background. Lack of a common language is a significant barrier to engagement between residents and carestaff.[3] Aligning recruitment of bilingual and bicultural staff with the cultural makeup of a residential facility offers an avenue to meet the cultural needs of Culturally and Linguistically Diverse (CALD) residents. However, this is logistically difficult to manage particularly where residents come from diverse and

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heterogeneous linguistic backgrounds.[4] Site-specific staff rosters and changing demographics over generations result in quite different profiles for older aged care residents and (younger) aged carestaff.

As much as 43.9% of carestaff time in a residential aged care setting is spent on communication, depending on the level of care required, most often in conjunction with the provision of direct practical care to residents, eg, bathing, toileting and medication.[5] There are particular communication demands around the time of admission to residential aged care. Transition to residential aged care represents an acknowledged window of vulnerability for new residents in any facility,[6,7] during which quality of life can be enhanced for residents if communication is supported effectively, particularly for culturally and linguistically diverse (CALD) residents.[8] The scale of this challenge and opportunity is perhaps underappreciated.

Personalized Technologies in Residential Aged Care

Technologies currently hold out promise in supporting the personhood of older adults living in residential aged care.[9] Such technologies may be easier for individuals to use and offer efficiencies of time and less frustration for carestaff and caregivers. Personalization in communication technology matters because personhood is how we relate to others.[10] We share and build our identity through stories; we listen, react, respond; we reciprocate through gesture, intonation, words, eye contact, back channels. Such nuanced and complex aspects of communication are a widespread aspect of care work within residential aged care.[5] For people experiencing dementia or other communication challenges, relating to others is impaired, which brings risks to their care. Person-centered care, with this in mind, recognizes the older person receiving care as an active agent in a network of relationships.[11,12] Those relationships include not only the person's family and friends but also care workers and health professionals and may involve communication across one or more languages depending on the context. Personalization based on cultural background is one of the many possible dimensions upon which assistive technology may be customized for an individual.[13] Yet technology for aging is rarely personalized in terms of the individual's language needs or preferences, despite research showing the importance of choice and autonomy;[14] instead, personalization is usually about cognitive capacity.[15] This study investigates an existing phrase-based communicative app, Listen N Talk, with the aim of personalizing technology to support spoken language and relationships in residential aged care.

Phrase-Based Technologies for Personalized Communication

Increasing research focuses on the development and use of communicative technologies in aged care (and health contexts more generally) that are phrase-based in nature.[16] Communication in some situations, such as those found in the daily routine of aged care facilities, makes use of highly predictable vocabulary and linguistic structures.[17] The scope of direct care provided by carestaff in a residential aged care setting is broad, including hygiene (eg, bathing and toileting), nutrition (eg, administration and supervision of meals).

Phrase-based communication technologies are well placed to advance research into personalization and the lived experience of caring and living with communication difficulty. Instead of generic technology such as translation AI tools like Google Translate, which still bring risks of inaccuracy,[18] phrase-based apps can contain phrases targeted to the individual and their care context. This can include consideration of the individual's language repertoire, the carer's language repertoire, and communication needs in the specific care environment. Recent research in a residential care context in Australia carestaff reported positive experiences using translation apps containing preset health phrases to overcome language barriers with CALD residents.[19]

Listen N Talk is a digital shell abstracted from the Warrma Mangarrayi "Listen to Mangarrayi language" co-developed with Australian Aboriginal people using contextualized phrases as a strategy to maintain and revitalize knowledge of language and culture.[20,21] The design of Listen N Talk allows language content (phrases) to be tailored to individual contexts and user needs. This study explored the feasibility of the use of Listen N Talk as a personalized communication tool to support communication between carestaff and residents in an aged care setting in their preferred language. Listen N Talk enables phrases, from both a carer and resident perspective (see Table 1 and Table 2), in any language to be input as text and/or uploaded as audio files. Each communicative phrase (eg"would you like a drink?") is assigned to a category; the opening screen of Listen N Talk presents the user with several categories within which to

Table 1 Questions and Statement Around the Topic Daily Routines from a Carestaff Perspective

Daily routine: Carestaff	
Question / Statement	**Response**
Are you ready to get up?	Yes, please / not yet / a little later
Would you like a shower?	Yes please / No thanks / later / not now
Do you want to go to the toilet?	Yes please / No thanks
What would you like to wear today?	
Are you ready?	Yes please / No thanks / later / not now
Do you want to go into the day room?	Yes please / No thanks / later / not now
Do you want to go outside?	Yes please / No thanks / later / not now
Are you tired?	Yes / no
Would you like to go to sleep?	Yes please / No thanks / later / not now
Are you hot?	Yes / no
Do you want me to close the window?	Yes please / No thanks
Are you cold?	Yes / no
Do you want a blanket?	Yes please / No thanks
Do you want a jumper?	
You look great today!	
It's a lovely day today.	
It's a bit cold today.	

Table 2 Questions and Statements

Food & Drink: Resident	
Question / Statement	**Response**
Can I have a shower?	
I need to use the bathroom	
I am a bit hungry.	
Can I have something to eat?	
I am a bit thirsty.	
Can I have something to drink?	
Can I have some water, please?	
Can I have some juice, please?	
Can I have a cup of tea, please?	
Can I have a cup of coffee, please?	

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browse or search for phrases (see Figure 1). The Listen N Talk structure is flexible as to what kinds of categories these are. In the original Warrma Mangarrayi language learning app, the categories were topics or communicative domains eg, food, health.

This paper describes the first phase of a trial of a codesigned adaptation of Listen N Talk within a residential aged care context. The app was implemented as a personalized technology by an interdisciplinary research team collaborating with residents, family and carestaff within a residential aged care context in Western Sydney, Australia.

Materials and Methods

Aim of Study and Research Questions

This pilot study aims to investigate the use of the Listen N Talk communicative app to develop a personalized app for residents and/or carestaff in residential aged care and examine its use in context. An interdisciplinary team comprising researchers from language education, educational technology, linguistics, cognitive psychology, speech pathology, nursing, as well as aged care managers, collaborated with carestaff and residents in an aged care facility. In this early phase trial, two research questions were asked:

1. To what extent can Listen N Talk be used in a personalized way to support communication with aged care residents?
2. In which contexts, if any, is Listen N Talk acceptable and suitable to support communication with aged care residents?

In early 2022, university researchers met with senior managers from Fresh Hope Communities (FHC) to present the Listen N Talk resource and seek their perspectives on its potential for use in aged-care settings such as FHC. The managers saw a possible role as a tool to support communication particularly between residents and staff for whom English was not their first language. Subsequently, a meeting was set up with the Manager of Residential Services and the Clinical Care Manager (CCM) to discuss implementing a feasibility study based on their detailed knowledge of the context, staff and residents. A unit of the facility was chosen for the trial where staff indicated a broad range of communication issues including CALD residents who spoke little English and residents living with dementia and

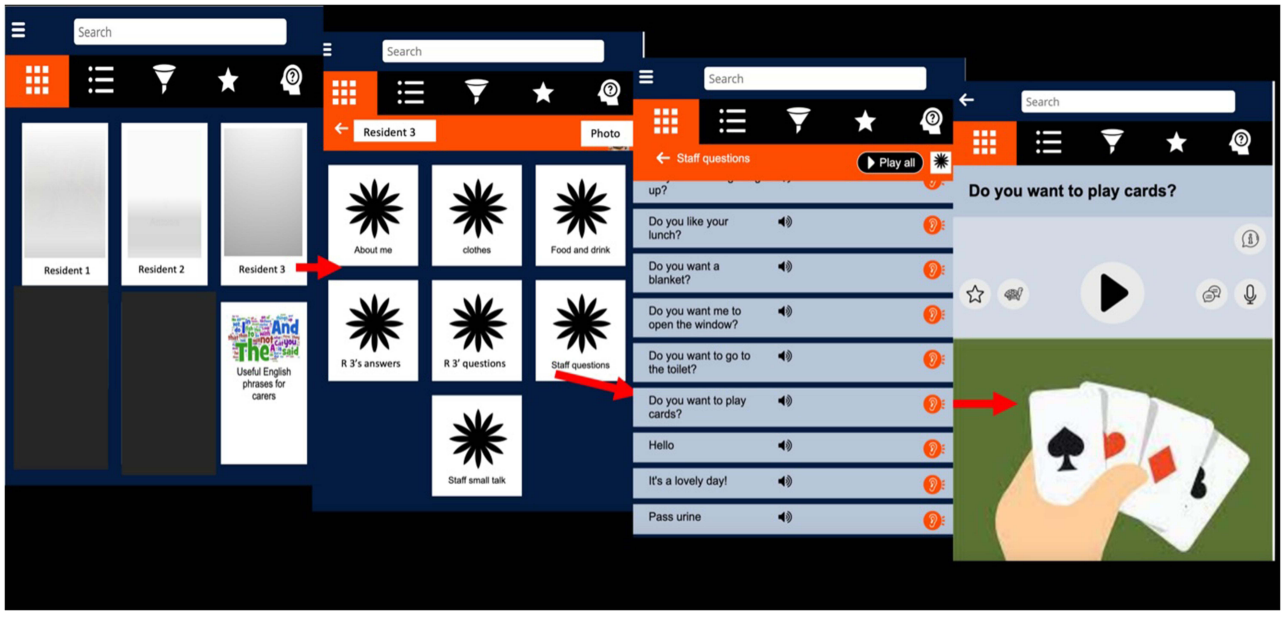

Figure 1 Prototype resource for trial with residents.

aphasia. The study received ethics approval from the Human Research Ethics Committee at Western Sydney University (H15080).

Co-design was the key principle guiding the development of the app. The purpose of co-design is to seek a shared understanding of what matters to the users (carestaff and residents) and to acknowledge and work with users "where they are at", consistent with many elements of several other contemporary approaches.[22,23]

The research consisted of three phases:

- Phase 1 Context-setting: A one-hour focus group to gain an understanding of the context and the communicative challenges from the perspective of five carestaff from Residential Care Service in Western Sydney, Australia.
- Phase 2 Co-design: Co-design personalized language content with three residents of Tamil, Chinese and Greek background in their preferred language that they felt would facilitate day-to-day communication with carestaff. This turned out to be Tamil, Chinese and Greek.
- Phase 3 Trial: a six-week trial of the prototype resource with the three residents and four carestaff (all except one had participated in Phase 1).

Phase 1: Carestaff Perspectives

Five carestaff members (referred to as CS1-5 from here on) agreed to participate in a one-hour focus group together with their local manager. Written consent was provided by each staff member. The session aimed to provide insights into their role in the unit and the communication issues they face in the course of their duties as well as documenting their thoughts on how a phrase-based resource might meet their needs. Carestaff shared insights into communication challenges and successes with current residents, prompted by scenario-based discussion. A thematic analysis of the carestaff responses in the focus group session identified four themes, discussed in turn below.

Results Phase 1

Communication Challenges in the Local Unit

Staff identified challenges in communicating with residents for whom English was not their first language and residents with disabilities who impaired verbal and/or written communication, eg, dementia, aphasia, stroke, and hearing loss. Carestaff reported that they found it difficult to understand some residents' pronunciation and accent, particularly those residents experiencing dementia, and identified particular CALD residents who find it hard to understand and/or express themselves in English.

Staff identified particular situations in the day when communication can be difficult, requiring different types of communication, eg, mealtimes (Eating & Drinking) and personal care. Suggested phrases included "Good morning", "Can I help you?", "How are you today?" and "Where is the pain?".

Perceived Usefulness

Staff felt that the app could encourage more meaningful participation by residents in daily activities as it would allow staff to better understand their needs and wants. Carestaff felt it would be useful to have the phrase written in English and thought it would be easy for staff to find the phrase they wanted. They thought listening to the recorded language version would be easier for most residents than reading a written version. They discussed whether the app could involve some form of sign language for those who were very hard of hearing. All felt the resource would be especially useful for CALD residents who were not comfortable speaking English.

Staff felt that involvement of family members in the co-design sessions would provide insight into the nuances of a resident's speech that have been difficult to interpret. One staff member referred to the app as being like a "jigsaw puzzle" as the design of the app allows it to be easily updated with new information about a resident over time or information for new residents as required.

Staff also brought up the fact that having some phrases about topics relating to everyday care could be useful for staff whose first language was not Australian English – how to say things using colloquial language familiar to Australian born residents.

Current Communication Strategies

CS2 reported that staff currently use A3 sized communication cards developed by the Centre for Cultural Diversity in Ageing (https://www.culturaldiversity.com.au/resources/multilingual-resources/communication-cards) relating to a range of daily activities and situations to facilitate communication. The cards have culturally appropriate images with a key word written in the target language. Having an image as well as the written text on the cue card is important for people hard of hearing. Having a spoken version could help if a resident cannot see well enough to read the written text.

Gesture and pointing were identified as other strategies that are particularly useful in direct care situations, eg, showering and eating. For residents who have had a stroke and provide only one-word responses, gesturing and pointing together with the use of facial expressions and tone of voice were used as a holistic strategy to aid communication. Staff reported that they sometimes write down their questions and/or responses for residents who are hearing impaired.

Staff reported that residents from a similar cultural background who shared a language were sometimes grouped together to help each other and translate when required. CS2 also reported trying to learn some words and expressions in a resident's home language and suggested the app could help with this.

Possible Issues with a Resource Such as Listen N Talk

There was discussion about the practicalities of carrying around and using a bulky device such as an iPad. It was suggested that the iPad could be placed in the resident's room. Staff pointed out that some residents may move or relocate items in their room. They felt that having the resident's name and a "please return to" sticker on the device could provide a solution. Other suggestions included placing the iPad in a locked cabinet in the resident's room with a key provided to the staff or placing it at the nurses' station. Both of these suggestions would limit the accessibility of the resource to residents as they would only be able to access it when supported by staff.

Phase 2: Co-Design of Personalized Language Content

Resident Participants

The carestaff suggested three residents (referred to from here on as R1, R2 and R3) as potential research participants. The invitation to participate and consent process was undertaken by the CCM who provided the three residents and family members, their son in all three cases, with the Participant Information Sheet and answered any questions they had. R1 signed the consent form himself, and the sons signed it on their behalf of the other two participants.

R1 (89 years, resident for 1 year 8 months): R1's first language is Mandarin Chinese. CS 2 reported that he does not speak English well but can read it. Carestaff use short utterances in English when speaking to him and his responses are also short or yes/no. Staff use a range of iconic gestures to help R1 understand, and he also uses this strategy in his responses.

R2 (91 years, resident for 2 years 4 months): R2's dominant language is Tamil and although she is not always comfortable understanding or expressing herself in English, there are several Tamil-speaking carestaff who are sometimes, although not always, available to help with communication.

R3 (91 years, resident for 6 weeks): R3 has Greek as her dominant language but communicates with carestaff in English. She has lived experience of mild dementia. R3 has a group of other Greek-speaking residents with whom she can converse. Her son visits regularly and speaks Greek rather than English with his mother.

Co-design sessions of 30–40 minutes were held in a large meeting room at the facility. The carestaff brought the residents for individual sessions and at least one carestaff member was present throughout the sessions. Residents R1 and R2 took part in 2 sessions one week apart in November 2022. R3 was only able to attend the second session. Family members were invited to attend the sessions but none were able to attend.

Materials

"Daily care" was a context identified by staff where a tool such as Listen N Talk could potentially be useful. A text document was prepared with statements and questions in English relating to a range of topics relating to the daily routine of an aged care facility together with some possible responses (see Supplementary Information). This document was used in the co-design sessions with residents to identify suggested responses to questions in English or their preferred

language. The phrases were organised from either a carestaff perspective (Table 1) or a resident perspective (Table 2). The majority of the questions required only yes/no or very short responses, mostly relating to direct care. Drawing on their own linguistic and cultural knowledge, the residents, family members or carestaff who were speakers of the residents' language could provide equivalent phrases in their language and add other questions or statements that they felt were culturally relevant to the context. The phrases were recorded as mp3 files by researchers using a Zoom recorder or in one case by a family member using their mobile phone.

A prototype app was developed using the recorded phrases and images to represent the phrases sourced from the Google search engine using the Creative Commons Licenses filter. This was then trialed for a six-week period. The trial was evaluated through semi-structured interviews with carestaff involved in the trial to identify their views about the effectiveness in supporting communication with the residents. As the number of participants was very small, statistical analysis was not appropriate.

Co-Design Sessions

Resident 1

CS2 was present for both sessions. The initial discussion was conducted by writing short phrases on paper, which R1 read out loud and gave a short answer response eg, Question: "What language do you speak?" Response: "Mandarin … I speak Mandarin". R1 expressed interest in learning to speak English and felt the app might be helpful in achieving this goal R1 was very keen to be involved in making the recordings. He read the English phrases out loud and gave the Mandarin equivalents, which were recorded. As the researchers were not Mandarin speakers the recordings were subsequently checked by another Mandarin speaker to ensure that the English prompt accurately represented a colloquial version of the Mandarin phrases. There were only a couple of discrepancies where R1 had perhaps misread the original.

Resident 2

CS2 was present for the first half of the first session with R2. R2 spoke very little English but often understood what was being said and gave short responses at times. CS2 facilitated communication using strategies such as gesture, tone of voice and facial expression. R2 often responded with long utterances in Tamil, which researchers and CS2 were not able to understand. About halfway through the first session, one of the Tamil-speaking carestaff (CS6) came past and began talking with R2 in Tamil. She stayed throughout the rest of the sessions, which greatly facilitated communication. After some discussion with R2 in Tamil, CS6 reported that R2 does not have trouble negotiating everyday activities as they are mostly routinised eg, the kitchen staff know to prepare a vegetarian curry for her each day so there is no need for her to state a preference. CS6 suggested that one potential area where the app could be helpful is in the case of a medical emergency where CS6 or other Tamil-speaking staff were not rostered on. In that case, targeted medical terminology (eg, "Do you have stomach pains?" could help non-Tamil speaking medical staff to communicate with R2 in this situation. CS6 wrote down phrases she thought would be useful in this context in Tamil and English. She was then recorded saying the Tamil phrases.

Resident 3

R3 was only able to attend the second of the two sessions. CS2 attended this session. R3 spoke mainly Greek during the session and it was difficult to identify whether she understood the purpose of the discussion. The responses R3 gave when asked how she might say certain phrases in Greek did not really relate to the phrases suggested. R3's son F1, himself a Greek speaker, had planned to be present at the session but was unavoidably detained. In a later discussion with him by phone, he agreed that some of the phrases in the document we had prepared (see Tables 1 and 2) translated into Greek would help communication with his mother as Greek language was more familiar to her than English. F1 was invited to record the phrases he felt were appropriate in Greek as hearing the familiar voice of her son could help her connect with the resource. The document with all the phrases was sent to F1 who selected those he felt would be most useful for her and recorded these in Greek.

Prototype App

A prototype app (Figure 1) was developed using Listen N Talk organised on four different levels. At the first level, a category was set up for each of the residents with their photo (Figure 1). As feedback from managers and carestaff had suggested, the resource could also serve as a useful tool to help CALD staff develop their colloquial Australian expression, a category called "Useful English phrases for carers" was also included at the first level. Clicking on one of these categories takes the user to the second level, organised into topics to which the phrases broadly relate. Clicking on one of these takes the user to level 3 containing a written version of the phrase in English together with an mp3 recording in the resident's language. By clicking on the ear/listen icon the user is taken to the fourth level with an image relating to the phrase. At this level, the user can also listen to the recording and read the English translation. There are also a number of other features targeting language learning (the original purpose of Listen N Talk). These were not used as part of this trial.

Phase 3: Trial of the Prototype Resource

The app was loaded onto three Apple iPads© and delivered to the unit in early December 2022 for trial with residents over a six-week period. Four staff (CCM, CS2, CS4 and CS6) tried out the digital resource developed through the co-design process with residents over the summer period. A semi-structured interview was held in early February 2023 with the four staff who had used the app to collect qualitative data about their use of the resource and any specific feedback or next steps that they would suggest. The trial was extended for two weeks to include a newly arrived resident (R4), and a further semi-structured interview was held with the CCM regarding the outcomes of this. (The original plan included interviews with residents as well, but due to time constraints this was not possible).

Results Phase 3

In the initial semi-structured interview, the four staff members provided feedback about the use of the app with the residents. The app was mainly used by staff, and there were no reports of residents using the app.

CS2 was the main staff member to use the app with R3. She reported using the app by finding a question in English and playing the Greek sound file. CS2 observed that R3 did not understand but seemed quite happy to listen "She listened for a while and smiled at me and said, 'I don't understand'". R3 regularly uses Greek with her family and other residents. CS2 felt that it was hard to use the app in this context because she (CS2) did not understand Greek. CS2 suggested that using the app when R3 is with the other Greek-speaking residents could be helpful.

CS6 reported they did not end up using the app with R1 as he is able to understand and make himself understood in most contexts within his daily routine such as basic medication, food and showering:

> He [R1] will understand and communicate slowly in simple language – no problem if I speak slowly (agreement from CS6). He can communicate [in English] in short sentences. I just have to remind him of the time and venue of activities and he is fine. (CS2)

R1 has his own iPad and regularly accesses websites such as "News in Mandarin".

Residential care facilities have a very structured daily routine. Many of the phrases in the app are in the form of questions or statements relating to daily routine. Once residents are familiar with the routine phrases of this type, the carestaff felt they are no longer really relevant:

> Muscle memory is the most important thing – the residents automatically do a number of the daily tasks without the need for a lot of communication. The routine helps this. No problem with R1 at the moment. He knows his own routine. He does his own exercise at a certain time, comes for food at a certain time etc. (CS6)

"For daily routines the app is not necessary for R2. She can follow simple English." (CS6).

Medical emergencies were one context where CS6 felt the app may have a role to play where residents' English language skills are not strong "I told one of my staff how to use the health section of the app for R2 but there were no health emergencies". CS6 feels it will help in an emergency eg, to find where the pain is.

No-one reported or was observed using the "Useful English phrase for carers" section. CS6 suggested this could be used to improve accent for carestaff that can be a barrier to communication. The CCM felt the phrases in this section were too basic for the level of English language skills of the staff in the unit.

CS2 and CS6 thought that R1 was "happy and interested [in the sessions] and that some kind of English language learning would be of interest to him" (CS2). They felt that these sessions were of little or no interest to R2 & 3. They could not think of other residents who might be interested.

Staff reported that the iPad was inconvenient to use during many daily activities such as showering and found it impractical to be carrying the iPad around all the time. All participants felt that gestures and body language were more effective at aiding communication in these contexts than the app. R1 was vomiting at one point and the CCM wanted to use the app to find out what was wrong but there was no question of this kind in Mandarin (we only had these in Tamil for R2).

Practical and Structural Issues

Three limitations of the app observed during the trial by the CCM that relate to the device and structure are reported below with their suggestions for possible ameliorations:

1. The iPad is too large and not practical for staff to carry. An iPhone-sized interface would be more workable.
2. Some of the residents have hearing impairment and even when the volume is at maximum, they still cannot hear. Use of headphones by residents might block out the surrounding noise more easily and allow more audio volume.
3. It is a bit time-consuming to use in its current format because the app has several "levels" and so staff are having to dig into those levels trying to find the words/phrases they need. She uses Google Translate sometimes and thought an interface where you talk into the app and it then translates could be helpful. She found that Google Translate could not be relied on to give them the phrase they need so they have looked in the app and were able to locate it.

Extension of Trial – New Resident R4

The CCM reported that many families of new residents whose English is not strong are concerned about communication. When she mentioned the app trial to these families, they seemed "re-assured" because they felt it showed that the facility was making an effort to tackle this issue. As new residents are not accustomed to the routine when they first arrive, the CCM felt that the app might be useful in this context to help staff facilitate the transition to a new environment with the associated routine, for example, understanding the resident's needs and preferences. At that time, there was a new Punjabi-speaking resident (R4) who spoke little English and was reported as feeling very disorientated. At the request of the CCM, a version of the app with Punjabi phrases was developed and made available to the unit to try with R4. They asked staff to take an iPad with the Punjabi instantiation of Listen N Talk when working with R4 over a period of 2 weeks.

Feedback on Trial Extension

A second semi-structured interview was conducted with the CCM about the use of the Punjabi resource with resident R4. The general assessment of the resource was that "overall, it's good" and the following example was given as a good context for its use with this resident (R4): "Sometimes if he's bored in his room, we can ask him what he wants [using the app]". One of the difficulties for staff in providing person-centered care for R4 is that they do not know yet what he likes to do in terms of activities. Although he can understand some English, he can be confused due to advanced Parkinson's disease. The facility does have a staff member who can speak Punjabi but when they are not on shift other staff report that they have found the app helpful. The staff play phrases to R4 in Punjabi and he responds in English. This has helped offer him choices. For example, R4 had been having a hard time explaining that he wanted them to put on YouTube, and the staff had been getting a little frustrated at not being able to communicate. The app was used to resolve this.

In light of the trial, the CCM considered that, in addition to medical emergencies, the app could be useful for new residents from the time of their admission to about one month afterwards, ie, for 3–4 weeks. They suggested that it would be best if all staff could be instructed and trained to use it. CCM said there were about 10–20 new

residents per year from a variety of cultural backgrounds with a concentration of Punjabi/Urdu speakers from Indian and Sri Lankan background. The unit has staff with those backgrounds as well as Filipino staff who, together with residents, could also help with the development of language content for the app. CCM suggested that the app could be trialed again in the "low care" unit because the residents staying in that unit for respite would provide another context where residents are newly arrived and need to adapt to a new routine.

Discussion

The co-design process resulted in the development of language content within the Listen N Talk app that was personalized to each of the residents by using different languages and different phrase lists. R1 engaged positively with the co-design sessions and played an active role in discussing and recording Mandarin phrases. Staff member CS6, based on her own professional experience, identified the potential for the resource to help communicate with R2 in the case of a medical emergency when Tamil-speaking staff are not on duty. She specified and recorded an appropriate set of phrases for this context. The phrases recorded for R3 were selected as appropriate to her context by her son. These findings highlight innovative ways in which technology personalization in aged care can be made idiosyncratic to the individual, consistent with a "bricolage" approach.[19] In the present study, the app was personalized to the resident's preferred language, interests and personal context, rather than just their cognitive level. The approach adopted here, tailoring assistive technology to a particular language and cultural context, works with – and helps maintain – what a person can do rather than focusing on cognitive limitations.[15]

The greatest amount of communication in an aged care facility occurs while providing direct care[5] and technology such as the My PATI app has been developed to support those living with dementia to communicate their daily care preferences.[24] Such contexts make use of a high proportion of yes/no or short answer questions and phrases developed for the app were primarily of this type (Table 1). In the present study staff reported that for long-term residents for whom daily routine was already well established, phrases of this type were not really necessary. Staff were mostly aware of residents' needs and preferences. Where communication about this was required, staff had developed other communication strategies that they felt were effective in this context, such as gestures and writing. However, the phase of transition to residential aged care was identified as a window where the tool might be of particular value to residents. According to Brooke,[6] the first phase of adjustment is disorganization (characterized by confusion and distress), and the second is reorganization when the resident begins to negotiate their care with staff in light of what they have learned about how the facility operates. Similarly, Wilson[7] delineated the Overwhelmed phase followed by the Adjustment phase. Having more communication strategies, eg, via an app, would conceivably tend to support a new resident to move into and through the Reorganization/Adjustment phase.

Beyond direct care, a key aspect of quality in modern residential aged care is the promotion of relationships and quality of life. Rich exchanges are needed to develop deeper interpersonal understanding and relationships requiring strong language knowledge. Unit staff reported using translation AI (Google Translate) to support more in-depth cross-linguistic communication. Google Translate provides translations of a broad range of language content for 133 languages (although still only a fraction of the world's roughly 7000 languages) in contrast to the very restricted set of phrases in four languages used in the Listen N Talk trial resource. In addition, Google Translate can be voice activated using a spoken search request with an audio output of the translation. While the accuracy of the translations provided by Google Translate have improved over time, they are still inconsistent across different languages.[18,19] This means that non-speakers cannot be sure of the accuracy of the translation output even for widely spoken languages. Greater accuracy is required before translation tools such as Google Translate can be used safely as a communication tool in aged care settings.[1] Despite the flexibility offered by Google Translate, fixed-phrase translation tools, particularly those with audio-visual features such as iTranslate, were preferred by nursing staff and older people in a health care context.[18] Like iTranslate, Listen and Talk allows a corpus of verified phrases to be developed. However, unlike other fixed-phrase translators, these can be targeted for particular contexts and individual residents. As some evidence of the advantages of phrase-based approaches in the present study, one staff member reported that on several occasions they were unable to find the phrase they were looking for using Google Translate but were able to find it using the Listen N Talk app.

The context of a medical emergency did not arise (thankfully!) during the trial, so we were unable to evaluate the effectiveness of the Tamil phrases developed for this situation. Another study investigated the use of two automated translation tools – Google Translate and translator with fixed-phrases in targeted domains (QuickSpeak) tool in a simulated medical emergency for speakers with low English proficiency. The results showed that although neither of the tools was satisfactory, QuickSpeak containing phrases targeted to a medical emergency showed the most promise.[25]

From the perspective of residents, the tool presented individual opportunities in their context. For R1, the tool presented an opportunity for learning English, a personal goal of this resident. This highlights how involving the resident in co-design can illuminate aspects of the aspirations for quality of life in the residential aged care context that go beyond care itself and beyond communication led by carers. In the case of R3, it had been thought that the use of a familiar voice (her son's) in recordings could be helpful in supporting communication difficulties associated with mild dementia. Despite communicating regularly with her son in Greek, R3 did not recognize his voice or understand the phrases used in the app, perhaps because the voice/phrases were disembodied.

The trial highlighted possibilities and perceptions regarding who might use the tool and who might benefit. Residents for whom English was a second or dispreferred language were identified as a clear priority throughout. The staff feedback post-trial suggests that a resource of this kind can be useful to facilitate communication with residents in some restricted contexts – in a medical emergency where no interpreter is available and to help carestaff get to know new residents and familiarize them with routines of the facility. Personalized language content can help new or casual staff in the facility develop relationships with residents through use of language that is appropriate to the needs and preferences of the resident. Staff workforce training was also identified as a possible application for the tool. Use of non-standard English expressions by carestaff can be a significant barrier to communication with residents.[1] A corpus of colloquial Australian expressions relevant to contexts in residential care could be developed. This could help staff for whom Australian English is not their first language deepen (or support) interaction with all residents using more standard forms of grammar and pronunciation.

The carestaff involved in the codesign reported that they already had gestures and written language in place and working well with residents to meet their basic care routines. Future work could usefully, however, delve deeper into the expertise and experience of the carestaff and residents, to find out more about the communication issues that unarguably do still arise in care contexts. Some messages and attitudes cannot be as easily communicated through gesture or written words, including language, which respects, reassures and calms residents, reduces their distress or de-escalates their agitation. Trial of a version of the app containing an updated corpus of phrases could test the impact on communication over time. Future work beyond this pilot could also take an educational and training approach, which might improve researcher-professional two-way understandings of the uses of communicative support tools like Listen N Talk in care contexts, in ways that this necessarily brief pilot was not able to expose.

Practical aspects were raised by users. In its current form, there are a number of impediments to effective use of the app, such as the size and location of the device. Staff suggested the device could be stored in a locked cabinet limiting residents' access to the app. Housing the app in a smaller, more portable device such as a smartphone was suggested as one way to address this technical challenge, although the smaller screen may be challenging for residents to use, especially those with some vision impairment.

A more fundamental structural problem identified by staff was that the tiered structure of the resource (as illustrated above in Figure 1) made it difficult to locate phrases, particularly in the course of caregiving tasks. The Listen N Talk architecture did contain a search function that would allow staff to find any phrase in the corpus of phrases regardless of the categories and topics in which they have been organised. This function was not used as part of this trial as it had been thought that the tiered structure would be more effective in guiding staff phrases relevant to specific contexts. Future research can investigate the most intuitive and useful way of organizing information contained in the app to facilitate its use, especially given the time-pressured nature of aged care.

Limitations of the Present Study

The number of residents involved in the study was small. The group was identified by staff as being most suited to this study within the selected site. The case study approach allowed researchers to gather rich data about a targeted and

diverse group of residents for whom this resource is potentially most beneficial. The time period for this study was necessarily short, constrained by the ethical precedence of care over research. The eventual time period for trialing the app was, at six weeks, nonetheless a realistic opportunity for staff and residents to explore its possibilities.

Conclusion

The focus of this pilot research was the development and trial of a tool to support communication between carestaff and culturally and linguistically diverse residents in an aged care setting through co-design with residents to ensure the language content is personalized to them and their circumstances. The present study is significant because it identifies for the first time three domains in which a communicative app like Listen N Talk would have value in promoting inclusive care: medical emergencies, language learning, and transitions to aged care. The language content in the current instantiation of the tool focuses on the context of direct care and personal interests. Development of a set of phrases to support richer more open-ended discussion would make this a more effective communication tool to develop deeper relationships between carestaff and CALD residents. Future research could investigate the use of AI translation tools including features such as speech recognition to develop rich sets of reliable and verified phrases to support communication across a broad range of contexts and topics. In line with its original purpose as a language learning resource, Listen N Talk also offers an opportunity for carestaff from a non-English background to develop their knowledge of colloquial Australian English to support communication with all residents. This may be increasingly important with an increasingly linguistically diverse workforce in the aged care sector.

Abbreviations

AAC, augmentative and alternative communication; CALD, Culturally and Linguistically Diverse; CCM, Clinical Care Manager; FHC, Fresh Hope Communities.

Data Sharing Statement

Language data included in the app database are included in supplementary information. All other data used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics

The study received ethics approval from the Human Research Ethics Committee at Western Sydney University (H15080). This study complies with the guidelines laid down in the Declaration of Helsinki and its amendments.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests in this work.

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