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The perceptions of translation apps for everyday health care in healthcare workers and older people: A multi-method study

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Title: The perceptions of translation apps for everyday healthcare in healthcare workers and older people: a multi-method study.

Running title: Technology for everyday health conversations

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Author contributions:

AP, SW, TWHC, DL, BH, XL, EZ, MMM, AMYG, EY, and FB contributed to the conceptualisation and design of the study. AP and FB led the study. Data collection and data analysis was completed by AP, KH and SW, and all authors contributed to the interpretation of the findings. AP, KH, SW and FB drafted the manuscript. TWHC, DL, BH, XL, EZ, MMM, AMYG, and EY contributed to proofing and further revisions of the manuscript.

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Monita Mascitti-Meuter was involved in the initial development and testing of the TalkToMe app. Monita was not involved during the consultation stages in order to avoid potential conflicts of interest. All other authors declare that they have no competing interests.

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The perceptions of translation apps for everyday healthcare in healthcare workers and older people: a multi-method study.

Abstract

Aims and objectives: Our aim was to understand the attitudes and perceptions of older people with limited English proficiency (LEP) and healthcare workers to using mobile translation technology for overcoming language barriers in the healthcare setting.

Background: Australia's cohort of people aged 65 and over has a sizeable population with LEP. In healthcare settings, difficulties with communication may potentially result in inadequate care. Mobile language translation applications have been identified as a potential way to improve communication between patients and healthcare staff when used as an adjunct to professional interpreters in low risk scenarios, however the perceptions of the use of mobile translation applications for such communication is unknown.

Methods: A multi-method design was used. Focus group discussions were conducted with older people from culturally and linguistically diverse (CALD) backgrounds and nursing and allied health professionals to understand their perceptions of translation technology. Qualitative data were analysed using inductive content analysis. Qualitative findings were reported using the Standards for Reporting of Qualitative Research (SRQR) checklist. Participants also appraised three existing translation apps via survey and results were analysed using descriptive statistics.

Results: Overall, older people from CALD backgrounds (n=12) and healthcare staff (n=17) agreed that translation technology could play a role in reducing communication barriers. There was enthusiasm amongst older people to learn and use the technology, while healthcare staff saw the

32 potential to address communication barriers in their own work. Barriers identified by older people
33 and healthcare staff included: accuracy of translation and phrases, possible technological learning
34 curves, risk of mistranslation in high-risk conversation and inability to check accuracy of translation.
35 Fixed phrase translation apps were seen as more favourable than real-time voice-to-voice mobile
36 translation applications.

37 **Conclusions:** Older people from CALD backgrounds and healthcare staff were open to the use of
38 mobile translation applications for everyday healthcare communications.

39 **Relevance to clinical practice:** Translation applications may have a role in reducing language barriers
40 in everyday healthcare communication but context, accuracy and ease of use need to be considered.

41

42

43 **Keywords:** communication, healthcare, language, technology, translation, multi-method

44 **What does this paper contribute to the wider global clinical community?**

- 45
- 46 • Older people and nursing staff see the potential of using healthcare related translation apps
for overcoming language barriers if an interpreter was unavailable.
 - 47 • Some staff already report using translation apps to overcome language barriers in the
48 workplace, despite limited evaluation of its use and widespread promotion of using
49 interpreters for all aspects of healthcare.

50

51 **Introduction**

52 Australia is one of the most culturally diverse countries in the world, with almost half of the
53 population (49%) either born overseas or with at least one parent born overseas (Australian Bureau
54 of Statistics, 2016b). With this comes a diversity of languages spoken. In 2016, 21% of Australians
55 spoke a language other than English at home, totalling over 300 languages spoken in Australian
56 homes (Australian Bureau of Statistics, 2016b). Older people make up the majority of those born
57 overseas or who speak a language other than English at home (Australian Bureau of Statistics,
58 2016a). Of those, 27% have limited English proficiency (LEP) because they do not speak English well
59 or at all (Australian Bureau of Statistics, 2014). Even for those who do speak English, proficiency may
60 decline with increasing age or with the onset of cognitive impairment or dementia (Access
61 Economics, 2009; De Bot & Clyne, 1994; Jefferies, 2006; Rao, Warburton, & Bartlett, 2006).

62 Furthermore, recently arrived older migrants to Australia from countries where English is not the
63 main language are likely to have very limited English proficiency(Smart, De Maio, Rioseco, &
64 Edwards, 2017).

65 Clear communication is an essential component of safe and high quality healthcare. Those from
66 culturally and linguistically diverse (CALD) backgrounds with LEP may not receive equitable care if
67 their healthcare workers do not speak their primary language(Houston & Cowley, 2003). In Australia,
68 the provision of interpreters is enshrined in healthcare policies in facilitating communication when
69 there is a language barrier (Victorian Government Office of Multicultural Affairs and Citizenship,
70 2014). A recent Australian study found that less than a quarter of hospital patients identified as
71 needing an interpreter receive an interpreter(Blay et al., 2018). To overcome this, healthcare
72 workers “get by” with gestures, facial expressions, and increased volume or by using minimal key
73 words in the target language(Diamond, Schenker, Curry, Bradley, & Fernandez, 2009; Villarruel,
74 Portillo, & Kane, 1999). The “getting by” approach has the potential for miscommunication, which
75 could result in inappropriate or inadequate care provision. Family members or bilingual colleagues
76 are often used to interpret in healthcare situations in lieu of a trained professional interpreter (Gray,
77 Hilder, & Donaldson, 2011). Family members may be suitable in some aspects of healthcare
78 translation(Hilder et al., 2017; Pines, Jones, & Sheeran, 2019), however they are at risk of being
79 exposed to highly sensitive information(Nielsen, Abdulkadir, Lynnerup, & Sodemann, 2019), and may
80 not be able to adequately translate technical medico-legal phrases or words(Attard et al., 2015).
81 There are similar challenges when bilingual colleagues are used(Ali & Johnson, 2017). For instance,
82 they may not always be available, they may be uncomfortable acting in the interpreter role yet may
83 be reluctant to express this to colleagues(White et al., 2018), and there is an increased risk to the
84 patient due to potential mistranslation(H. Chang, Hutchinson, & Gullick, 2019).

85

86 Although there have been improvements in access to and use of interpreters(Hlavac, Beagley, &
87 Zucchi, 2018), there are still times when interpreters are not available, and using interpreters for
88 everyday communication is not always possible such as for basic low-risk conversation. As it is
89 recognised that it is not appropriate nor feasible to use an interpreter in every healthcare situation
90 and “getting by” is not considered a safe and effective solution, there is a need to explore
91 alternatives. The use of mobile translation applications is one potential way to improve
92 communication between patients and healthcare staff, not to replace interpreters, but to support
93 everyday communication and enable communication of care needs(D. Chang, Thyer, Hayne, & Katz,
94 2014). The literature exploring mobile translation applications is in its infancy and studies to date

95 have only explored its in more acute settings, for example in emergency settings(Khoong,
96 Steinbrook, Brown, & Fernandez, 2019; Spechbach et al., 2019; Turner et al., 2019). There are
97 generally two types of translation apps; fixed-phrase translation apps, and open translation apps.
98 Fixed phrase translation apps, which translate only fixed phrases, have been shown to aid healthcare
99 workers in communicating in a language discordant situation(Albrecht, Behrends, Matthies, & von
100 Jan, 2013), and have a high level of acceptability when an interpreter is not available in a timely
101 manner(Day & Song, 2017). Google Translate is an example of an open translation app, which
102 enables free translation between two languages. Evidence indicates that Google Translates accuracy
103 level differ between language groups(Chen, Acosta, & Barry, 2016; Khoong et al., 2019; Patil &
104 Davies, 2014), and that only short simple phrases are more accurately translated(Miller, Harvey,
105 Bedrick, Mohan, & Calhoun, 2018). As a result there is caution against its use in acute settings, as
106 these conversations typically involve consent or complex medical information where a high degree
107 of accuracy is needed(Beh & D., 2015; D. Chang et al., 2014; Patil & Davies, 2014). In sub-acute
108 settings, such as rehabilitation or specialised geriatric care, the role of mobile translation
109 applications in enabling everyday healthcare conversations is unexplored. It is also unknown how
110 older people from CALD backgrounds and healthcare workers perceive the use of translation
111 technology in healthcare settings.

112 Since little is understood about the perceptions and attitudes of older CALD Australians and
113 healthcare workers about the use of mobile translation in everyday healthcare communication, this
114 study aimed to explore the perceptions and attitudes towards mobile translation applications for
115 low risk healthcare conversations. We aimed to explore: 1.) the current experiences of mobile
116 translation applications amongst older people from CALD backgrounds and healthcare workers, and
117 2.) the perceived barriers and facilitators to the use of mobile translation applications for everyday
118 healthcare conversations.

119

120 **Methods**

121 This multi-method research involved a consultation comprising of the following components: a focus
122 group, and a brief survey collecting demographic information and an appraisal of each translation
123 app using a rating scale. Ethical approval was attained from the St Vincent's Health Melbourne
124 Human Research Ethics Committee (ref: HREC17SVHM228). We report the findings in the paper
125 using the Standards for reporting qualitative research (SRQR) checklist(O'Brien, Harris, Beckman,
126 Reed, & Cook, 2014) (See supplementary file 1).

127 **Participants**

128 There were two groups of study participants: older people from CALD backgrounds and healthcare
129 staff (nursing and allied health). Both types of study participants participated in the consultations in
130 a group format.

131 For the CALD group, we recruited a convenience sample of older people from Greek and Chinese
132 local ethno-specific community groups. Eligible participants were aged 65 years and over, living in
133 the community, and without significant self-reported visual or auditory impairment that would
134 preclude their ability to take part in a consultation or impact their ability to use and appraise
135 translation apps. One consultation session was conducted with each of the ethno-specific
136 community groups, lasting approximately 60-90 minutes.

137 The nursing and allied health staff were recruited from three large public hospitals in metropolitan
138 Melbourne, Australia. They were invited to the consultations if they were working in a subacute or
139 aged care hospital setting. One consultation session was conducted at each of the three hospitals,
140 lasting approximately 60 minutes.

141 **Consent**

142 All participants provided written informed consent. For those with LEP, information was provided
143 using professional interpreters and bilingual staff, and consent forms were translated into Greek or
144 Chinese.

145 **Data collection**

146 *Focus Group Discussion*

147 The focus groups consisted of short semi-structured questions exploring participants' experiences
148 with mobile translation applications, perceptions of using mobile translation applications in the
149 healthcare setting, and the perceived barriers and facilitators to using mobile translation
150 applications in the healthcare setting. An accredited interpreter helped to facilitate the discussion
151 with the older Greek and Chinese participants. Focus groups were conducted at two community
152 centres within Metropolitan Melbourne, to ensure that the participants were in a familiar
153 environment, and to facilitate participation. Nursing and allied health staff consultations were
154 conducted at three hospital sites to improve the likelihood of nursing and allied health staff
155 attending from each site. The focus group questions included six key questions: (1) "Have you ever
156 used technology to translate information from one language to another before?" (2) "Have you ever
157 used or experienced a healthcare worker using technology to translate information? Please provide
158 some information about how this experience was for you." (3) "What role do you see technology
159 playing in communicating everyday healthcare conversations between older people from CALD

160 backgrounds and their healthcare workers?" 4) "Do you think technology could be used in
161 healthcare settings for everyday communication?" 5) "Can you think of any barriers that could
162 prevent the use of technology being helpful for communicating everyday healthcare conversations?"
163 (6) "Can you think of some strategies to address these barriers?" Two members of the research
164 team (S.W and A.G) scribed the discussion during the focus groups.

165

166 *Appraisal of Language Translation Apps*

167 Three iPad compatible translation apps were selected for demonstration and appraisal by the
168 participants – CALD Assist, TalkToMe and Google Translate™. CALD Assist and TalkToMe contained
169 pre-set health phrases that could either be translated into different languages through a
170 combination of audio, text and image output. Google Translate™ allowed for real-time audio or text
171 translation and required an internet connection. The were selected on the basis of their suitability
172 for enabling everyday conversations in healthcare settings evaluated in a previous study (Panayiotou
173 et al., 2019) and on the basis of their familiarity and pre-existing use in the study sites. Apps were
174 included if they were developed for language translation purposes, were available at no cost, were
175 available on an iPad (Apple Inc., California, USA), and enabled translation to or from Mandarin and
176 Greek. These translation apps were demonstrated by the research team, and participants spent
177 approximately 5-10 minutes interacting with and appraising each app on iPads provided by the
178 research team.

179 After the demonstration, participants completed a survey that asked about their basic demographic
180 information, confidence and experience of using smart technology (e.g mobile and tablet devices,
181 laptops and computers), and the ease of use and satisfaction of the three translation apps in the
182 demonstration. The survey was translated into Greek and Chinese to allow the CALD participants to
183 complete. Estimated confidence, ability and usage of smart technology was measured using a rating
184 scale (0=no confidence/ability/usage, 10= high confidence/ability/usage). The translation apps were
185 appraised using rating scales regarding the ease of use (0=not at all easy to use, 10 very easy to use)
186 and for satisfaction, on a scale of 0 – 5 (0=not satisfied at all, 5=very highly satisfied). Open-ended
187 questions asking participants to describe design features that were particularly liked or disliked were
188 also included. Rating scales in the questionnaires were based on the System Usability Scale (Brooke,
189 1996), with the questions simplified to accommodate participants of all education and literacy
190 levels. Content validity of the surveys was ensured by developing the survey in consultation with
191 researchers on the team who were subject matter experts, and translated surveys were read by

192 bilingual researchers to ensure accuracy. In addition, researchers noted any comments made about
193 the translation apps during the demonstration, interaction and appraisal phases.

194

195

196 **Data Analysis**

197 Quantitative data from the surveys was managed using SPSS v23 (IBM, NY) and summarised through
198 descriptive statistics. We used inductive content analysis(Elo & Kyngäs, 2008) to analyse the
199 qualitative data from the focus groups and open ended questions. Focus group responses were
200 transcribed verbatim and managed using Microsoft Word (Microsoft, Seattle). Open-ended
201 questions from the surveys were transcribed in English after translation, and managed using
202 Microsoft Excel (Microsoft, Seattle). Two research members (A.P and K.H) who attended the
203 consultations analysed each response to determine meaning and generate codes. The codes derived
204 from the initial analysis were inductively refined into categories. Both researchers reviewed the
205 categories for similarities, and then the categories were then summarised into themes. We factored
206 in the backgrounds of the researchers analysing the data, including professional discipline (AP-
207 clinical neuropsychologist, KH-epidemiologist) and cultural background (AP-Greek, KH-Chinese) on
208 how this may influence the content analysis. Trustworthiness was ensured using data source
209 triangulation(Carpenter & Suto, 2008). For the community groups, we compared the focus group
210 notes and surveys for similarities and differences between culture group and experience of usage of
211 translation technology. For the nursing and allied health staff consultations, focus group notes and
212 surveys were compared to observe similarities and differences between workplace policies and
213 attitudes towards use of translation apps. Two researchers independently assessed the focus groups
214 and discussed their perceptions and findings from each focus group. This ensured that data was
215 saturation was reached prior to content analysis.

216

217 **Results**

218 *Participant Characteristics*

219 Nine older people from the Chinese community and five older people from the Greek community
220 took part in the consultations. One Chinese participant withdrew due to visual impairments affecting
221 the ability to appraise the translation apps, while one Greek participant withdrew as he was not able
222 to use the device. No data were collected from the withdrawn participants, and the final sample size

223 was eight older Chinese and four older Greek participants. The mean age of the participants was
224 76.3 (7.6 SD) years and more were male (n=7; 58.3%). The average time participants had lived in
225 Australia was 24.9 (15.1 SD) years and educational attainment varied from no formal education to
226 tertiary level. The demographic data of participants from the community consultations are
227 summarised in Table 1.

228 -----INSERT TABLE 1 HERE -----

229 Seventeen healthcare staff from three Melbourne metropolitan public health services took part in
230 the consultations. The mean age of participants was 43.2 (10.5 SD) years and most were female
231 (n=14; 82.4%) and had a nursing background (n=14; 82.4%). Over half (n=10; 58.8%) of respondents
232 had worked in healthcare for 11 years or more. The demographic data of participants from the
233 healthcare staff consultations are summarised in Table 2.

234 -----INSERT TABLE 2 HERE -----

235 Participants from the CALD community groups reported using smart technology an average of 3.2
236 (6.1 SD) hours per week. On a Likert scale from 0-10, median ability to use smart technology was
237 rated at 3.0, and confidence was rated at 4.5 (Table 3).

238 Healthcare staff reported using smart technology (e.g. smartphone, tablet device, laptop) an average
239 of 24.4 (18.7 SD) hours per week. On a Likert scale from 0-10, median ability to use smart
240 technology was rated at 8.0, and confidence was rated at 8.0 (Table 3).

241 -----INSERT TABLE 3 HERE -----

242

243 **Focus Group Findings**

244 *Role of translation technology for facilitating communication in healthcare*

245 Participants in both consultations believed that language translation technology had a role in
246 facilitating communication in healthcare settings. The older participants from CALD communities
247 reported that technology could assist them to overcome language communication barriers with their
248 healthcare providers and reduce their dependency on adult children who are often required to
249 translate information:

250 "Every time I go to hospital I have to bring my daughter. It's difficult to bring my daughter.
251 Technology would be useful in this situation." (participant from Chinese community
252 consultation)

253 “It’s the worst thing which happens when you are in a place when you can’t understand and
254 express yourself. It would be good [to use technology]” (participant from Greek community
255 consultation)

256 Healthcare staff reported that technology would aid their clinical duties by playing a role in
257 communicating basic instructions or questions and identifying care needs when patients do not
258 speak the same language (e.g. simple introductions and greetings, to ask patients if their family
259 member can be called, or to ask if a patient is in pain).

260 Staff also identified that technology could help to build rapport with patients, and help both parties
261 learn a few keywords in the other person’s language, but were cautious regarding the accuracy of
262 language translation technology, particularly for different language dialects. They also questioned
263 the suitability of translation apps for complex or important communication.

264

265 *Experiences with translation technology for communication*

266 Older participants from CALD communities indicated that they had experience using technology for
267 communication. However, most of these instances were not related to healthcare. These included
268 instances in retail, or at home when an electrician was engaged for repairs or when receiving written
269 information in the mail:

270 “I had an electrician come to fix things. I said to the electrician I have no English. He used
271 his phone.” [Facilitator asked: “How did that make you feel?”] “It solved the problem.”
272 (participant from Chinese community consultation).

273 “A letter arrives in English, without asking my children I use Google to find out what it
274 vaguely means.” (participant from Greek community consultation).

275 One participant described an experience in which the language translation technology was not
276 suitable as the information was highly complex:

277 “A [medical] report was sent to me, I used my device to translate it. I got more confused as
278 it didn’t make sense. I did not want to bother my children. The words used are even
279 difficult for my children.” (participant from Greek community consultation).

280 Healthcare staff reported a variety of experiences and levels of success with using translation
281 technology. Outside of healthcare, participants had used it to communicate with overseas relatives
282 and during their travels to non-English speaking countries. Typically voice-to-voice translation apps
283 were used and the most commonly cited app was Google Translate™. Overall, the success of these

284 experiences was mixed. Staff reported success when using the translation apps to communicate
285 with relatives overseas, however, some participants struggled between the spoken and written form
286 of languages, and described issues relating to grammar and syntax that made the translation
287 difficult.

288 In healthcare settings, staff described instances in which they had used language translation apps
289 with patients who did not speak their language with mixed success. Google Translate™, TalkToMe
290 and iTranslate were the most frequently cited apps. One participant described a positive experience
291 of using the real-time voice-to-voice translation feature of Google Translate™ to communicate basic
292 needs with a Spanish speaking patient who was unable to read:

293 “I didn’t want to wait for (an) interpreter, and I didn’t want to always ring the
294 daughter. She was happier because it [the technology] made her comfortable.”
295 (participant from healthcare staff consultation).

296 Another participant described using the TalkToMe translation app to help to identify that a patient
297 tended to call out more when in pain or needed more help:

298 “It [TalkToMe] helped us [nurses] to establish [the patient’s] care needs.”
299 (participant from healthcare staff consultation).

300 Not all experiences with language translation apps were positive. There were instances in which
301 real-time voice-to-voice translation using apps such as Google Translate™ had not recognised the
302 words accurately due to background noise or different dialects spoken by patients:

303 “Sometimes it brings up gibberish.” (participant from healthcare staff consultation).

304 However, healthcare staff indicated that despite not always working, they felt that the effort was
305 appreciated by their patients and that it often helped to build rapport.

306

307

308 *Current communication practices*

309 Healthcare workers described a range of current practices when communicating with patients who
310 did not speak the same language. These included relying on the patient’s family members to
311 translate conversations, asking other bilingual/multilingual staff members for assistance, using cue
312 cards or pictures to communicate key words, using body language and gestures, and using remaining
313 interpreter time booked for other patients or by other healthcare professionals.

314 “Usually I will ask the family, or ask the family to write a list of basic commands in their
315 language and how to pronounce it.” (participant from healthcare staff consultation).

316 Nursing staff in the consultations reported that they were generally unable to or discouraged from
317 booking an interpreter due to limitations related to time and cost.

318 “[...Nursing] staff can’t book interpreters...” (participant from healthcare staff consultation).

319

320 *Barriers to using translation technology to communicate*

321 For the older participants from CALD communities, the major barrier to using translation technology
322 for communication was an unfamiliarity with, or lack of skills in using the technology. Many
323 participants indicated that their children had given them smart phones to use, however many did
324 not have time to learn how to use it, nor did their children have time to teach them. Participants
325 indicated that learning how to use translation technology would overcome this barrier.

326 “I have no ideas about technology. I would like to. It would be good, even to pay a bill – it
327 all involves technology. My children are busy so it would be good to do myself.” (participant
328 from Greek community consultation).

329 “If you can’t read, it’s like being blind [...] we feel technology blind.” (participant from
330 Chinese community consultation).

331 Healthcare staff identified four broad barriers to using translation technology to communicate in the
332 healthcare setting: *patients, language, workplace* and *technology*. Participants identified that
333 translation technology may not be suitable for use with particular types of patients, such as those
334 with delirium, significant sensory impairments or those who are verbally or physically aggressive.

335 “On this ward, [translation technology has] a small role as patients are too cognitively
336 impaired.” (participant from healthcare staff consultation)

337

338 Issues related to language included the tendency for language translation apps to omit rare
339 languages or particular dialects and the concern regarding translation accuracy. Staff reported that
340 workplace policies prevented the use of personal devices (e.g. smartphones) during work hours or
341 explicitly prevented the use of language translation apps with patients. Additional workplace
342 barriers included access to a stable internet connection and infection control as staff were unsure
343 how to safely use the technology with multiple patients. Participants also considered unfamiliarity

344 with or limited ability to use technology by both patients and staff would affect the potential use in
345 healthcare settings.

346 “Nurses need to be confident using the app, as not everyone is ‘tech-savvy’.” (participant
347 from healthcare staff consultation).

348 Healthcare staff provided some potential strategies to address the barriers to using translation
349 technology. These included using an amplifier, headphones or relying on pictures within the
350 language translation apps for patients with a hearing impairment, and to avoid their use with
351 agitated or cognitively impaired patients. For rare languages or dialects, participants suggested
352 determining whether the patient could speak another language that was available within the app.
353 To address infection control, participants suggested either to have a device (e.g. iPad) allocated for
354 each patient, or to protect each device with a case that could be easily cleaned or regularly changed.
355 Healthcare staff also indicated that education to increase familiarity with technology would be
356 welcomed, and that the use of language translation technology could be led by the healthcare
357 worker, rather than the patient.

358

359 *Perception and appraisal of translation apps*

360 There was enthusiasm amongst the older community members when interacting with the
361 translation apps.

362 “I want to use it, I never want to let it out of my hands.” (participant from Greek community
363 consultation).

364 In general, older community members thought that the translation apps were fairly easy to use and
365 that they would help to overcome language barriers. Participants liked that the translation apps
366 could convey their native language audibly and visually using text. Participants also indicated that
367 they could learn English phrases using the apps.

368 “Now I am officially Australian Chinese.” (participant from Chinese community consultation).

369

370 “I can speak English pretty good but when I can’t express myself this would work.”
371 (participant from Greek community consultation).

372 There was some frustration expressed regarding the menu options and pre-set phrases of two of the
373 apps (TalkToMe and CALD Assist) only being available in English. However, participants accepted

374 that these apps were designed to be led by staff in a healthcare setting. While participants enjoyed
375 the real-time voice-to-voice translation function of Google Translate™, several participants found it
376 difficult or confusing to use, and accuracy of the translation was a problem.

377 “It’s not coming out right. I said ‘I can’t see clearly because of the old age eyes’ and it
378 [Google Translate™] said ‘I spent my eyes’ ...” (participant from Chinese community
379 consultation).

380 “It might be good but it is very confusing.” (participant from Chinese community
381 consultation).

382 Similarly, there was enthusiasm amongst the healthcare staff when interacting with the apps.
383 Features that the staff particularly liked were the suitability of the pre-set phrases for their line of
384 work, the inclusion of pictures to support the translation, and the search function that enabled
385 phrases to be identified on the basis of key words (e.g. pain, falls). However, participants also
386 highlighted that some key information they would normally communicate with their patients was
387 not included as pre-set phrases, and some languages they encountered in the course of their work
388 (e.g. African languages) were absent in TalkToMe and CALD Assist. Although Google Translate™ was
389 seen as a more flexible option, the need for a stable internet connection to enable real-time
390 translation was seen as a negative, and there was concern regarding the accuracy of the
391 translations.

392

393 *Appraisal of Demonstrated iPad Compatible Apps*

394 Participants from the CALD community groups rated the three apps similarly in terms of their
395 perceived ease of use and overall satisfaction. On a Likert scale from 0-10, median ease of use
396 ranged from 4.5-5.0, with TalkToMe and Google Translate™ both receiving the highest ratings. On a
397 scale from 0-5, median overall satisfaction ranged from 3.5-4.0, with CALD Assist and TalkToMe
398 receiving the highest ratings.

399 Healthcare staff reported higher perceived ease of use and similar levels of overall satisfaction.
400 Median ease of use ranged from 7.5-9.0, and median overall satisfaction ranged from 3.0-4.0, with
401 CALD Assist receiving the highest ratings on both of these.

402 -----INSERT TABLE 4 HERE -----

403 **Discussion**

404 The results of our study demonstrate that both healthcare workers and older people from CALD
405 backgrounds identify the use of translation apps as a potential method of overcoming
406 communication barriers in the healthcare setting. Both older community members and healthcare
407 staff reported being familiar with language translation technology. However, this was predominately
408 in settings outside of healthcare. Those who had used the technology reported positive experiences
409 when used for translating simple conversations, such as those in retail, however, experiences that
410 involved translation of more complex information, such as translating a medical letter, were less
411 favourable.

412 While some staff identified using interpreters, the use of interpreters was often limited to excess
413 time that was not being used by other professionals, and some healthcare workers revealed that
414 they were generally discouraged from booking interpreters themselves. In Australia, policies and
415 legislation ensure that interpreters are provided free of charge should they be required (Hlavac,
416 Gentile, Orlando, Zucchi, & Pappas, 2018). Although the provision of interpreting services has
417 improved, our findings indicate that there is still minimal use of interpreters. Nurses and interpreters
418 are still using sub-optimal methods of overcoming language barriers, in the absence of timely access
419 to interpreters when required. In lieu of interpreters, healthcare staff indicated that they used
420 primarily 'getting-by' methods to overcome communication barriers. This suggests that despite
421 interpreters being provided under policy and legislation, staff still face barriers in accessing
422 interpreters when required.

423

424 To overcome these barriers, some healthcare staff reported using translation apps with patients in
425 the healthcare setting. The most commonly used apps were Google Translate™, TalkToMe and
426 iTranslate, which healthcare workers reported using on their own personal devices. Some
427 participants reported positive experiences where the app worked to quickly identify care needs,
428 whereas others reported negative experiences marked by poor accuracy or poor functioning of the
429 real-time voice-to-voice translation feature. Yet, despite experiences where the app did not work,
430 there were no reported adverse impacts on rapport. In fact, healthcare staff reported that their
431 patients had appreciated the effort and that it helped to strengthen the relationship even if the
432 technology had failed. This concurs with previous studies outlining level of satisfaction in clinical
433 settings when using translation apps for overcoming language barriers (Albrecht et al., 2013;
434 Sreekanth, 2010). The use of personal devices raises issues that may contravene hospital policies
435 and procedures. However, there is little evidence about the suitability of personal devices for the
436 purposes of work, with the literature mostly focused on their use for non-work related purposes

437 (Bautista, 2019; Brandt, Katsma, Crayton, & Pinget, 2016), and attitudes towards their
438 use(Koehler, Vujovic, & McMnamin, 2013). Future studies exploring the suitability of personal
439 devices in the delivery of healthcare is needed. While older community members in our study
440 described past and mostly positive experiences with translation apps, it was not clear whether these
441 experiences were using the own devices. Health information technologies can reduce racial and
442 ethnic disparities in the healthcare setting(Lopez, Green, Tan-McGrory, King, & Betancourt, 2011),
443 and there is a potential to promote older CALD Australians to use translation apps in low risk
444 healthcare communication to reduce such disparities.

445

446 Other barriers perceived by healthcare staff and older people that would limit the use of translation
447 apps in healthcare settings included unfamiliarity with technology, limited availability for less
448 common languages or dialects, unsuitability for particular patients, insufficient infrastructure, and
449 stipulations in workplace policies. These perceived barriers are aligned with the challenges reported
450 by nursing staff during a six-week trial of translation technology in the hospital setting(Albrecht et
451 al., 2013), who described difficulties using the technology with older patients who were unfamiliar
452 with technology, patients with visual impairment or illiteracy, and when the desired target language
453 was not available. Given these barriers, the use of translation apps for everyday communication may
454 not be suitable for everyone.

455

456 Google Translate™ has multiple features for translation, including real-time voice-to-voice
457 translation feature. In this study, shortcomings in the accuracy and functionality of Google
458 Translate™'s voice-to-voice translation function were revealed by participants during the appraisals.
459 This is consistent with previous studies that identified limitations with the text-based language
460 translation function(Beh & D., 2015; Patil & Davies, 2014). The evaluation of voice-based translation
461 in the current study is considered a more suitable feature in a dynamic environment such as a
462 healthcare facility where faster and direct translation can occur. In contrast, translation using fixed
463 phrases were generally considered easy to use, and the addition of pictures was considered a useful
464 addition to aid in convey information. The findings from participants' appraisal suggests that despite
465 the flexibility of Google Translate™, fixed-phrase translation apps with audio-visual features were
466 preferred by both older people and nursing and allied health staff.

467

468

469 **Limitations:**

470 There were a few limitations with our study. Firstly, we only conducted consultations with two older
471 migrant communities of Australia, and subsequently the findings from our focus groups and surveys
472 may lack generalisability to other older migrant communities of Australia. In addition, we recruited
473 through ethno-specific organisations, and thus may have an unrepresentative sample of participants
474 accessing community services. Our healthcare consultations were conducted with nursing and allied
475 health staff working in sub-acute aged care settings, and some of the consultation findings may not
476 generalise to other areas of aged care or healthcare. Small sampling sizes also meant that we were
477 unable to evaluate differences between cultures and healthcare professionals. While the surveys
478 used in this study were based on the system usability scale, with questions simplified to enhance
479 readability, they were ultimately designed to be explorative and we did not assess their validity.

480

481 **Conclusion:**

482 The use of mobile translation apps was considered to be a method of overcoming communication
483 barriers for simple information, especially when apps with supporting images and pre-set health
484 phrases were initiated by healthcare workers. Concerns were identified in relation to the translation
485 accuracy for more complex information and issues related to familiarity, infrastructure and policy
486 were recognised as barriers that would impact on use in healthcare settings. Further research may
487 involve evaluating translation apps for this purpose in healthcare settings, or changing policies and
488 procedures on the use of translation apps in healthcare settings for everyday conversations where
489 an interpreter may not be feasible. Furthermore, future studies may explore differences in
490 perceptions of language translation technology between different cultural groups and within
491 different healthcare professionals.

492

493 **Definitions and Abbreviations**

494 Apps - applications

495 CALD – Culturally and linguistically diverse

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Table 1: Demographic characteristics of participants in the community consultations.

Participant characteristics	Participants (n=12)	
	<u>n of participants</u>	<u>Percentage</u>
Community		
Greek	4	33.3%
Chinese	8	66.7%
Age (years)	76.3; 7.6 (mean; SD)	65-86 (range)
Gender		
Male	7	58.3%
Female	5	41.7%
Highest Level of Education		
No formal education	1	8.3%
Primary school	4	33.3%
Secondary school	2	16.7%
Certificate or diploma	1	8.3%
University degree	4	33.3%
Lived in Australia (years)	24.9; 15.1 (mean; SD)	8-58 (range)
Age when learned English (years)	25.6; 13.2 (mean; SD)	17-49 (range)
Confidence in speaking English (Likert scale 0-10 ^a)	1.0 (median)	0-7 (range)

^a0= not confident at all, 10= completely confident.

Table 2: Demographic characteristics of participants in the healthcare staff consultations.

Participant characteristics**Participants (n=17)**

	<u>n of participants</u>	<u>Percentage</u>
Age (years)	43.2; 10.5 (mean; SD)	24-62 (range)
Gender		
Male	3	17.6%
Female	14	82.4%
Country of birth		
Australia	8	47.1%
Elsewhere	9	52.9%
Duration worked in healthcare		
<2 years	2	11.8%
2-4 years	0	0%
5-10 years	5	29.4%
11-20 years	5	29.4%
21-35 years	4	23.5%
>36 years	1	5.9%
Profession		
Nurse	14	82.4%
Social Worker	2	11.8%
Occupational Therapist	1	5.9%

Table 3: Experience and perceptions of technology.

	CALD community (n=12)		Healthcare staff (n=17)	
	<u>Median</u>	<u>Range</u>	<u>Median</u>	<u>Range</u>
Estimated use of smart technology (hours per week)	3.2; 6.1 (mean; SD)	0-20	24.4; 18.7 (mean; SD)	4-70
Ability to use smart technology (Likert scale 0-10 ^a)	3.0	0-7	8.0	5-10
Confidence using smart technology (Likert scale 0-10 ^b)	4.5	0-7	8.0	5-10

^a0= not confident at all, 10= completely confident; ^b0= not able to use, 10= very able to use.

Table 4: Appraisal of translation apps

	CALD community (n=12)		Healthcare staff (n=17)	
	<u>Median</u>	<u>Range</u>	<u>Median</u>	<u>Range</u>
Ease of using TalkToMe (Likert scale 0-10 ^a)	5.0	0-9	8.0	1-10
Ease of using CALD Assist (Likert scale 0-10 ^a)	4.5	0-10	9.0	7-10

Ease of using Google Translate™ (Likert scale 0-10 ^a)	5.0	0-10	7.5	4-10
Overall satisfaction with TalkToMe (Likert scale 0-5 ^b)	4.0	3-5	3.0	2-4
Overall satisfaction with CALD Assist (Likert scale 0-5 ^b)	4.0	3-4	4.0	3-5
Overall satisfaction with Google Translate™ (Likert scale 0-5 ^b)	3.5	3-5	3.5	2-5

^a0 = not easy to use, 10 = very easy to use; ^b0 = not satisfied at all, 5 = very highly satisfied

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