

## Title page

### Journal: Rural and Remote Health

**Title:** Development and feasibility testing of an education program to improve knowledge and self-care among Aboriginal and Torres Strait Islander patients with heart failure.

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**Conflict of Interest:**

There are no conflicts of interest for any of the above authors

**Sources of support for this project:**

This project was supported by the Queensland University of Technology (QUT) and University of California San Francisco (UCSF) Atlantic Philanthropic Project Grant; an IHBI Collaborative Research Development Grant in 2011 and the Commonwealth Funded Health Collaborative Research Network (CQUniversity Australia & QUT) in 2013.

## **Abstract**

**Background/Aim:** There is a 70% higher age-adjusted incidence of heart failure (HF) amongst Aboriginal and Torres Strait Islander people, three times more hospitalisations and twice as many deaths than non-Aboriginal people. There is a need to develop holistic yet individualised approaches in accord with the values of Aboriginal community healthcare to support patient education and self-care. The aim of this study was to re-design an existing HF educational resource (Fluid Watchers-Pacific Rim©) to be culturally safe for Aboriginal and Torres Strait Islander peoples, working in collaboration with the local community, and to conduct feasibility testing.

**Methods:** This study was conducted in two phases and utilised a mixed methods approach (qualitative and quantitative). Phase 1 of this study used action research methods to develop a culturally safe electronic resource to be provided to Aboriginal HF patients via a tablet computer. A HF expert panel adapted the existing resource to ensure it was evidence-based and contained appropriate language and images that reflects Aboriginal culture. A stakeholder group (which included Aboriginal workers and HF patients, as well as researchers and clinicians) then reviewed the resources and changes were made accordingly.

In Phase 2, the new resource was tested on a sample of Aboriginal HF patients to assess feasibility and acceptability. Patient knowledge, satisfaction and self-care behaviours were measured using a before and after design with validated questionnaires. As this was a pilot test to determine feasibility, no statistical comparisons were made.

**Results:** Phase 1: Throughout the process of resource development, two main themes emerged from the stakeholder consultation. These were the importance of identity, meaning that it was important to ensure that the resource accurately reflected the local community, with the appropriate clothing, skin tone and voice. The resource was adapted to reflect this

and members of the local community voiced the recordings for the resource. The other theme was comprehension; images were important and all text was converted to the first person and used plain language. Phase 2: Five Aboriginal participants, mean age  $61.6 \pm 10.0$  years, with NYHA Class III and IV heart failure were enrolled. Participants reported a high level of satisfaction with the resource (83.0%). HF knowledge (percentage of correct responses) increased from  $48.0 \pm 6.7\%$  to  $58.0 \pm 9.7\%$ , a 20.8% increase and results of the self-care index indicated that the biggest change was in patient confidence for self-care with a 95% increase in confidence score ( $46.7 \pm 16.0$  to  $91.1 \pm 11.5$ ). Changes in management and maintenance scores varied between patients.

**Conclusion:** By working in collaboration with HF experts, Aboriginal researchers and patients, a culturally safe HF resource has been developed for Aboriginal and Torres Strait Islander patients. Engaging Aboriginal researchers, capacity-building, and being responsive to local systems and structures enabled this pilot study to be successfully completed with the Aboriginal community and positive participant feedback demonstrated that the methodology used in this study was appropriate and acceptable; participants were able to engage with willingness and confidence.

**Key words:** Heart failure, patient education, Aboriginal and Torres Strait Islander people

## 1 **Introduction**

2 Chronic health conditions are highly prevalent among Aboriginal and Torres Strait Islander  
3 peoples and this places significant strain on patients, their families, communities, and the  
4 health care system. Recent data demonstrated that 50% of all Aboriginal and Torres Strait  
5 Islander people have at least one chronic condition, and chronic disease contributes to 80% of  
6 the estimated 11.5 year life expectancy gap between Aboriginal and Torres Strait Islander  
7 peoples and other Australians<sup>1</sup>. Chronic conditions include diabetes, cardiovascular disease,  
8 heart failure (HF), renal disease, pulmonary disease and mental illness.

9 HF is the second leading cause of hospitalisation in Australia<sup>2, 3</sup>. There is a 70% higher  
10 prevalence of HF amongst Aboriginal and Torres Strait Islander peoples compared to non-  
11 Aboriginal Australians<sup>2</sup>. Their age-adjusted hospitalisation rates are three times higher and  
12 their HF mortality is twice as high of that of non-Aboriginal and Torres Strait Islander people  
13 with HF<sup>2, 3</sup>. However, most Aboriginal and Torres Strait Islander people who have HF have  
14 more than one chronic condition. These data highlight the need for holistic yet individualised  
15 approaches<sup>1, 4, 5</sup> in accord with the values of Aboriginal and Torres Strait Islander community  
16 healthcare. HF patients who effectively manage their symptoms through lifestyle  
17 modification and adherence to medications have fewer hospitalisations. Nurse-led programs  
18 that teach and support self-care have also been shown to reduce hospitalisations<sup>6</sup>.

19 Although evidence indicates that self-care improves outcomes compared to usual care, 50%  
20 of patients experience minimal benefit from these interventions.<sup>7</sup> The variance in effect on  
21 reducing hospital admissions (0%-45%)<sup>8, 9</sup> seems to indicate that one size does not fit all.  
22 The variance is undoubtedly partly attributable to differences in patient characteristics. Little  
23 is known about factors that distinguish patients who successfully manage their HF self-  
24 care from those who do not or which elements of self-care lead to optimal outcomes. Even

25 less is known about HF self-care strategies in Aboriginal and Torres Strait Islander peoples.  
26 Research has indicated that Aboriginal and Torres Strait Islander HF patients have  
27 significantly lower self-care behaviours ( $p < 0.001$ )<sup>10</sup>. Continuous quality improvement  
28 programs, such as The Audit and Best Practice for Chronic Disease (ABCD) project, have  
29 shown positive results in improving outcomes for chronic disease and implementing evidence  
30 based practice in urban and rural community clinics<sup>11</sup>.

31 Fluid management is a key component of symptom monitoring and management for HF  
32 patients. Telemonitoring data have shown that signs and symptoms of fluid overload begin  
33 around 8 days prior to an emergency hospital admission for acute decompensated HF<sup>12</sup>.  
34 These data suggest that there was sufficient warning time for action and prevention.

35 Current guidelines recommend patients weigh themselves daily and commence a prescribed  
36 fluid management plan if 2 kilograms over 2 days is gained with associated hand, ankle or  
37 abdominal swelling<sup>13</sup>. Monitoring and managing these simple signs of HF can prevent the  
38 deterioration that leads to acute decompensated HF and pulmonary oedema, and can prevent  
39 consequent readmission<sup>6, 12, 14</sup>.

40 Self-management programs assisted by information technology and telephone follow-up may  
41 assist in the effective management of HF patients. A systematic review and meta-analysis  
42 indicated that these programs are highly effective in reducing mortality and hospitalisation  
43 and in improving HF knowledge and medication adherence<sup>15</sup>. The use of tablet computers is  
44 one way of providing educational materials to help improve patient care<sup>16</sup>, and has the  
45 potential to be adapted for a range of different conditions and populations

46 The educational intervention called Fluid Watchers© developed in the USA by Caldwell and  
47 colleagues, educates patients about the signs, symptoms, causes and consequences of HF in  
48 their self-management and in particular, fluid monitoring by keeping a daily weight record<sup>14</sup>.

49 The intervention is specifically aimed to reduce the anxiety which many HF patients  
50 (especially women) associate with weighing themselves due to adipose weight gain<sup>17</sup>. The  
51 program gives patients an action plan in the case of fluid gain and addresses perceived  
52 barriers that would prevent adherence to this action plan. Fluid Watchers© has been shown to  
53 improve HF knowledge and self-care behaviour in rural patients and participation in this  
54 program has been shown to lead to reduced rates of hospital readmission and mortality  
55 among these patients<sup>14, 18</sup>.

56 Therefore, the purpose of this study was to create a tablet computer based educational  
57 resource, adapted from the Fluid Watchers© program to provide culturally safe HF education  
58 to Aboriginal and Torres Strait Islander peoples. There were two phases of this project which  
59 aimed to: 1) Engage expert HF stakeholders and the local Aboriginal and Torres Strait  
60 Islander community healthcare workers and patients to participate in the redesign of existing  
61 Fluid Watchers-Pacific Rim© HF educational materials to be culturally safe for the local  
62 Aboriginal and Torres Strait Islander community and; 2) Conduct a feasibility study with a  
63 purposeful sample of Aboriginal and Torres Strait Islander HF patients to gather feedback  
64 regarding the tools developed to improve HF knowledge and self-care behaviours.

## 65 **Methods**

### 66 *Study Design*

67 This study was conducted in two stages utilising a mixed methods design to create the  
68 educational resource and test its feasibility including action research and pre-intervention  
69 post-intervention knowledge and self-care questionnaires. The first stage was the  
70 development of a culturally safe version of Fluid Watchers-Pacific Rim© HF educational  
71 materials for use on a tablet computer.

72 The Queensland University of Technology University Human Research Ethics Committee  
73 approved the study and written, informed consent was provided by all participants.

74 Community consent was sought through initial discussions with local Elders before initiating  
75 the study or contacting participants. Aboriginal and Torres Strait Islander HF patients were  
76 sent letters inviting them to participate in the study. The letters stated study objectives and  
77 intended outcomes, participant inclusion criteria, a prompt to participate, incentives,  
78 notification to receive a call in the next few days and contact details for further information  
79 and explanation.

#### 80 *Development of Educational Resource*

81 Action research methods were used to develop the new resource using materials provided by  
82 Fluid Watchers<sup>©19</sup>. Two working groups were established to accomplish this. An expert HF  
83 panel, consisting of a cardiologist, a HF nurse practitioner, HF research academics, and a  
84 cardiac nurse, Aboriginal researchers and community nurses as well as an IT team provided  
85 advice on appropriate modification of the resources. A Following the action research cycles  
86 of Plan, Act, Observe and reflect.

87 During the planning phase the expert panel took the Fluid Watchers resource and proposed  
88 modifications to ensure that 1) the curriculum was delivered according to evidence-based  
89 guidelines provided by the Australian National Heart Foundation and American Heart  
90 Association Self-management Guidelines for patients<sup>13, 20</sup>; 2) the applicability of  
91 psychometric tools were appropriate; 3) the language and format was accommodating to  
92 Aboriginal and Torres Strait Islander patients' culture and literacy; 4) images and  
93 interactivity reflected Aboriginal and Torres Strait Islander culture and gender.

94 The IT team then actioned (Act) the proposed modifications into a new Aboriginal and Torres  
95 Strait Islander specific resource. The expert panel then reviewed the modifications (Observe)



96 and then proposed further modifications. Case notes were kept during the development stage  
97 for subsequent analysis. This was repeated through two cycles.

98 The resource was then taken to a broader group of stakeholders consisting of representatives  
99 including university and medical researchers, staff from the Aboriginal and Torres Strait  
100 Medical Service, technology developers and two Aboriginal and Torres Strait Islander HF  
101 patients. This was a key component of the reflection stage of action research. Bringing in  
102 Aboriginal and Torres Strait Islander medical staff and HF patients allowed for questions  
103 relating to cultural appropriateness and shared understanding to be addressed. The outcomes  
104 of these discussions were also fed back into the resource development to reach the final  
105 product.

106 The Fluid Watchers© program included an illustrated PowerPoint™ featuring a HF patient  
107 (male or female, whichever the patient chose) and patient diary for adaptation. The larger  
108 stakeholder group alongside the expert panel prepared the adaptations and gave feedback  
109 verbally, in written or electronic form. Information collected was integrated to produce the  
110 next version of the teaching tool. Specific feedback regarding illustrations of Aboriginal body  
111 shape, facial features, choice of clothing, colours, skin tone and environment were  
112 communicated to the graphic designer.

### 113 ***Feasibility and acceptability testing***

114 The second stage involved pilot-testing the feasibility and acceptability of the newly designed  
115 resource with a group of HF patients based at an Aboriginal and Torres Strait medical service  
116 in central Ipswich, Queensland, Australia. To be included in the feasibility study participants  
117 had to be of Aboriginal or Torres Strait Islander descent, aged over 18 years and have a  
118 clinical diagnosis with NYHA function class II-IV symptoms. Potential participants were

119 excluded if they were a resident of a nursing home or institution as these patients generally do  
120 not perform self-care.

121 Eligible participants identified by the Aboriginal healthcare worker were introduced to the  
122 researcher. An Aboriginal researcher explained to the HF patients the purpose of the study, an  
123 Aboriginal themed diary for recording daily observations and a Heart Foundation 'Living  
124 each day with my heart failure' booklet was given to each patient in appreciation for their  
125 time and contribution.

### 126 *Intervention*

127 Prior to viewing the resource, participants completed questionnaires on their knowledge of  
128 heart failure and self-management behaviours. Participants then spent approximately one  
129 hour trialling and reviewing the resource. After this, they then had one attempt to complete  
130 the knowledge and self-management questionnaires again as well as a satisfaction survey  
131 related to their experience with the resource.

### 132 *Instruments*

133 Three validated questionnaires were used in this study to evaluate Aboriginal HF patients'  
134 knowledge, self-management behaviour and satisfaction levels with receiving education via  
135 the adapted Fluid Watchers© program. All questionnaires were embedded in the program and  
136 appropriate permission to use the questionnaires was obtained from each of the original  
137 authors. Patients answered the questionnaires by touching their answers on the tablet  
138 computer. A HF knowledge questionnaire<sup>14</sup> and Self-Care Heart Failure Index (SCHFI) V6.2  
139 questionnaire<sup>21</sup> were used as pre- and post-intervention measures. Aboriginal HF patients'  
140 satisfaction level with the program and its contents was measured by satisfaction survey<sup>22</sup>  
141 adapted for heart failure. All questionnaires were converted into plain, conversational

142 language as advised by the Aboriginal and Torres Strait islander members of the expert panel.

143 A consistent layout with large text and images were used wherever feasible.

144 Examples of content adaptation of the questionnaires included “Symptoms are vague or come

145 on gradually” changed to “I feel this (symptom) all the time or don’t notice a change,”

146 “Overall how do you feel about keeping yourself free of heart failure symptoms?” changed to

147 “Do you feel you can look after you, so that your heart failure doesn’t give you trouble?” and

148 “How quickly did you recognise it as a symptom of heart failure?” changed to “When did you

149 know it (the symptom) was because of your heart failure?”

### 150 ***Heart Failure Knowledge***

151 The questions for assessing HF knowledge were initially developed based on the Rapid Early

152 Action for Coronary Treatment (REACT) study in the acute myocardial infarction

153 population<sup>23</sup>. The questionnaire was modified for a HF population<sup>14, 19</sup> and content validity of

154 the modified questionnaire was established by HF experts. Internal consistency and reliability

155 for the modified questionnaire was 0.83<sup>14</sup>. The modified HF knowledge questionnaire

156 covered basic HF physiology, recognition of HF signs and symptoms and barriers to seeking

157 care<sup>14</sup>. The 20-item questionnaire allowed patients to choose what they perceive as the correct

158 answer from multiple choice, yes / no or true / false options. In this survey, the correct answer

159 for each question accrued one point (the wrong answer has zero points). Therefore, the

160 questionnaire had a minimum score of 0 and a maximum score of 20 points<sup>14</sup>.

### 161 ***Self-Care Heart Failure Index (SCHFI)***

162 Self-management behaviours were measured using the Self-Care Heart Failure Index

163 (SCHFI) V6.2 questionnaire<sup>21</sup>. The SCHFI evaluates patient self-management behaviour by

164 assessing the following skills: frequency of self-care behaviours such as daily weighing,

165 physical activity, medication concordance (maintenance), ability to confidently manage HF  
166 (confidence) and the ability to evaluate the importance of symptoms, recognise changes in  
167 health status, take required actions to relieve symptoms and to evaluate the effectiveness of  
168 self-management and treatment (management). Each of these components has been tested for  
169 reliability (Maintenance: coefficient alpha=0.553, Confidence: coefficient alpha=0.827 and  
170 Management: coefficient alpha=0.597).<sup>21</sup> Scores for maintenance, confidence and  
171 management were calculated in accordance with the authors instructions<sup>21</sup>. Patients with  
172 higher scores are considered to have a greater ability to self-manage.

173 ***Satisfaction Survey***

174 To examine the level of satisfaction with receiving education via the adapted Fluid  
175 Watchers© program, a satisfaction survey was administered following exposure. This survey  
176 evaluated the ease of navigation and useability of the resource. A previously validated  
177 satisfaction survey<sup>22</sup> that determined participant satisfaction for receiving healthcare via  
178 telephone interaction was modified to be appropriate for the tablet computer based program.  
179 The finalised questionnaire included 29 items with a 5-point Likert scale (1=strongly  
180 disagree, to 5= strongly agree). Open ended questions were also asked to collect qualitative  
181 data on acceptance, comprehension and impact of the program.

182 ***Data Analysis***

183 Microsoft Excel 2010™ was used to collate and analyse data. To describe the process of  
184 resource development, summaries of field notes were used and data were reported using the  
185 method proposed by Huberman and colleagues, (1994) to identify emerging patterns and  
186 themes<sup>24</sup>.

187 Quantitative Data are reported using descriptive statistics, including means (standard  
188 deviations). Due to the small sample size, statistical comparisons for the pre- and post-  
189 knowledge and SCHFI questionnaires were not performed.

## 190 **Results**

### 191 *Stakeholder Feedback*

192 Two main themes emerged from stakeholder feedback while adapting materials for  
193 Aboriginal patients: identity and comprehension. Identity was an important concept to portray  
194 in the new teaching tools. Stakeholders felt that illustrations should accurately reflect  
195 Aboriginal people of the same gender as the patient and from the local community. Feedback  
196 was given to alter the skin tone, choice of clothing, facial features and body shape of original  
197 illustrations and the program was voiced by members of the local Aboriginal community. The  
198 environment in which the Aboriginal people appeared was also important and was changed to  
199 reflect one to which the community could relate. Finally, symbolism was added to reflect the  
200 Aboriginal cultures. Reviewers saw symbolism as necessary to reflect identity, and  
201 Aboriginal flags were featured where possible, and text and background colours changed to  
202 represent those of the flags. Figure 1 shows selected screen shots of the completed  
203 PowerPoint slides.

204 Comprehension was also a theme that emerged to be of importance to stakeholders.  
205 Reviewers considered it important that illustrations be created to portray an action; for  
206 example, additional fluid accumulation in the abdominal region was illustrated by a man  
207 having difficulty doing up his belt. Images complemented text and provided another aid to  
208 dependence upon reading ability and text was converted into plain language. Researchers also  
209 changed the tense of language; in most instances first person was used so as to closely  
210 identify with the person reading it. For example, in a questionnaire, the original wording  
211 read: “*A primary cause for symptoms of heart failure is too much fluid*” and this was changed  
212 to, “*Too much fluid in my body causes heart failure*”. Acronyms were removed and complex  
213 nouns and verbs were replaced with simple descriptive language. Simplifying language

214 therefore occurred in this manner within the PowerPoint™ and questionnaires, and  
215 illustrations were developed to aid comprehension.

216 IT experts constructed the technology interface with the following additional features: simple  
217 animated anatomy and physiology to teach concepts of the normal heart and HF; voice-over  
218 presented by members of the local Aboriginal community; user-friendly interface;  
219 simultaneous login; secure method of data retrieval and analysis to retrieve patient responses  
220 with a shortcut key to provide ease of searching and data categorisation; secure settings for  
221 patient confidentiality with data unable to be accessed in the public domain.

### 222 *Patient Feedback*

### 223 *Participants*

224 The Aboriginal medical clinic patient database produced a list of eleven potential  
225 participants. Five of these patients agreed to participate in the program and the other 6  
226 declined to participate due to an inability to commit the time to the project. All five  
227 participants that trialled the program were Aboriginal people, born in Australia and spoke  
228 English as their primary language. The mean age of participants was  $61.6 \pm 10.0$  years. Three  
229 participants had a NYHA classification of Class III and two participants had a classification  
230 of Class IV.

### 231 *Acceptance*

232 Two participants (female) expressed having enjoyed their experience stating “*I liked it all*”  
233 and thought the teaching tool was “*good*” and they “*enjoyed it*”. One patient (male, NYHA  
234 Class IV) became tired during the program and at the end stated that overall “*it was alright*”.  
235 Another (male) appreciated the concept of providing information via this teaching method

236 stating, *“That is a good idea, instead of just talking or asking about it, the iPad just tells*  
237 *you.”*

238 All five participants had never used a tablet computer before. One person (female) described  
239 the experience as having initially made her nervous – *“at first I was scared”* but then  
240 reflected that she found the experience *“enjoyable”*. Another participant (male) reflected  
241 upon the teaching tool as *“simply moving with technological advancements”* stating that *“we*  
242 *need to keep up”*. Most participants used the tablet computer touch screen with ease, however  
243 one participant (male) had repeated difficulty utilising a gentle touch and stated that it was  
244 not easy to use the touch screen. Another participant (female) stated the general organisation  
245 of the teaching materials was easy to navigate from the home screen and that the video was  
246 *“very helpful”*.

247 When asked, all participants agreed they would use this teaching tool on the occasion they  
248 visit the AMS. Three participants (two female, one male) stated they would like to use the  
249 teaching tool to refresh their knowledge in the future, stating *“I would use that again”*, *“I*  
250 *would like to watch it again”* and *“I would use something like that again”*.

### 251 ***Comprehension***

252 Participants commented that the teaching tool was very easy to understand with *“no big*  
253 *words”* (female) and another noting the message was *“not complicated with jargon”* (male).  
254 Another (female) stated that before, they did not know much about their HF, but *“seeing that*  
255 *really did make me realise”*. From this it appears that participants were able to comprehend  
256 the information presented.

257



258 ***Impact***

259 When referring to the overall message one participant stated, “*this is something I will never*  
260 *forget*”. One patient stated that exposure to the messages of the teaching tool “*came at a good*  
261 *time*” and described having begun a health overhaul in the New Year by participating in the  
262 local walking group, eating more fresh fruit and vegetables.

263 One participant was particularly motivated after participating, stating, “*its now up to me to do*  
264 *this*”. This participant returned to the clinic later in the day to show the research team  
265 alternative low salt items they had purchased.

266 ***HF Knowledge and SCHFI***

267 There was a 20.8% increase in HF knowledge (Table 1) with the percentage of correct  
268 responses increasing from  $48.0 \pm 6.7\%$  to  $58.0 \pm 9.7\%$ .

269 The results of the SCHFI questionnaire are described in Table 2. Despite the intervention and  
270 survey completion only taking 60 minutes two participants did not complete the follow-up  
271 questions on this survey related to maintenance as they became too fatigued to finish the  
272 questionnaire. Of the three participants that did complete this section there was a 26.1%  
273 increase in maintenance score (from  $46.7 \pm 6.7$  to  $58.9 \pm 25.5$  possible range 0-100). All five  
274 respondents completed the management and confidence questions and there was a 1.9%  
275 increase in management (from  $53.0 \pm 12.5$  to  $54.0 \pm 6.5$  possible range 0-100) and a 95.1%  
276 increase in confidence (from  $46.7 \pm 16.0$  to  $91.1 \pm 11.5$  possible range 0-100).

277 ***Satisfaction***

278 Participant satisfaction was 83.0% (Figure 2). Greatest satisfaction was with the inbuilt video  
279 demonstration and in having questions answered. All participants indicated willingness to  
280 adopt lifestyle changes (daily weighing) and endorse its use to educate others with HF.

281 **Discussion**

282 The results of the present study demonstrate that by working in collaboration with HF  
283 experts, Aboriginal researchers and patients, a culturally safe HF resource has been  
284 developed for Aboriginal and Torres Strait Islander patients. Engaging Aboriginal  
285 researchers, capacity-building, and being responsive to local systems and structures enabled  
286 this research to be successfully completed with the Aboriginal community and the positive  
287 participant feedback shows that the methodology used in this study was appropriate and  
288 acceptable; participants were able to engage with willingness and confidence.

289 Currently, limited information is available on health promotion using a tablet or computer  
290 that has been developed specifically for Aboriginal and Torres Strait Islander people with HF.  
291 Participants rated their satisfaction with the program at 83%. They commented that the  
292 information was easy to comprehend and all endorsed its use to educate others with HF.  
293 Previous researchers have expressed that existing teaching resources for Aboriginal and  
294 Torres Strait Islander peoples' HF self-management are unsuitable and practical self-care  
295 teaching resources are needed with key messages communicated simply and visually<sup>25</sup>. The  
296 stakeholder group emphasised that health promotion pictures and messages are needed to be  
297 contemporary and reflective of Aboriginal and Torres Strait Islander communities in the  
298 modern setting<sup>26</sup>.

299 Community organisations are viewed as vehicles for enhancing social connection and cultural  
300 expression among Aboriginal and Torres Strait Islander peoples<sup>27</sup>. The waiting room of an  
301 Aboriginal medical clinic has previously been described as creating opportunity for valued  
302 and important aspects of daily life to take place – sharing health information and spending  
303 time with friends and family<sup>28</sup>. During feedback time, all participants agreed they would be  
304 happy to use the tool upon subsequent visits to the clinic. Although all participants had never

305 used a tablet computer, most became familiar and confident in using it during the trial and  
306 only one participant displayed limited dexterity while using the touch screen. Utilisation rates  
307 of Internet-based programs are low among some Aboriginal and Torres Strait Islander  
308 communities with a notable 'digital divide'<sup>29</sup>. One participant stated that few persons of his  
309 generation used this type of technology on a daily basis; however all agreed that they would  
310 be happy to refresh their knowledge using the technology upon visits to the clinic.

311 Use of touch-screen technology can therefore be regarded as an alternative (or substitute)  
312 way of presenting health information to more conventional mechanisms such as verbal  
313 advice, posters, leaflets, books etc. in the appropriate health care provider setting<sup>29</sup>. The  
314 education tool has the potential to assist health professionals to provide a more positive  
315 experience for Aboriginal and Torres Strait Islander patients with HF through cultural  
316 recognition and consideration. After receiving the education, participants verbally expressed  
317 motivation to implement lifestyle changes and expressed gratitude; one participant positively  
318 stating, "*This is something I will never forget*". Most notably participants had greater self-  
319 efficacy, showing a measurable improvement of 95.1% in confidence to ably manage their  
320 symptoms.

321 Other studies that have measured changes in knowledge and self-care in Australian HF  
322 patients have shown similar results to the present study. Boyde and colleagues (2013)  
323 demonstrated improvements in HF knowledge (14% increase) as measured by the Dutch  
324 Heart Failure Knowledge Scale and increases in SCHFI maintenance (7% increase),  
325 management (28% increase) and confidence (11% increase)<sup>30</sup>. In addition, Caldwell and  
326 colleagues (2005) has demonstrated a similar (3 point) improvement in HF knowledge over  
327 three months along with significant improvements in self-care behaviour.<sup>14</sup>

328 *Limitations and future directions*

329 As this was a pilot program, the number of participants was not sufficient to allow for the  
330 determination of statistically significant differences. The small number of participants was  
331 due to the use of one clinic for recruitment. Instead, the results support the need for further  
332 research, with participant numbers which allow for greater analysis of effect, future studies  
333 will seek to recruit a greater number of participants.

334 Notwithstanding this limitation, it has been reported that changes in the SCHFI of  $\geq 0.5$  of a  
335 standard deviation may be considered clinically relevant<sup>21</sup> and thus scores on maintenance and  
336 confidence show improvements over and above 0.5 of the standard deviation and could be  
337 considered as clinically relevant, but this needs to be explored further in a larger population.

338 In addition, it is not known whether the results of this study will be transferable to wider  
339 community, which may have different levels of literacy.

340 Results may not necessarily equate to longer-term behaviour change or reduced hospital  
341 admissions. Prolonged effects were not measured as post-test questionnaires were distributed  
342 immediately after the education session<sup>19,30</sup>.

343 Further adaptations may be required for different Aboriginal and Torres Strait Islander  
344 communities, and in this case should utilise an Aboriginal and Torres Strait Islander  
345 Reference Group from the community for which they are developing the resource. Our  
346 findings support the need for future studies with longer follow-up time<sup>14</sup> in a larger cohort  
347 with administrative blinding to measure longer term behaviour change and the effect on  
348 clinical outcomes including quality of life, hospitalisations and health care utilisation.

349

350 **Conclusion**

351 This project utilised a mixed-methods design to adapt and evaluate educational tools for  
352 Aboriginal and Torres Strait Islander HF patients that incorporated interactive voice over and  
353 visual aids into a tablet computer-based resource. Consistent with previous studies in non-  
354 Aboriginal populations, favourable trends were observed in knowledge and self-care and  
355 participants expressed a high level of satisfaction with the resources. Further research is  
356 required to measure long-term behavioural change and effects on hospital admissions.  
357 Additional adaptation may be required to be transferable to other Aboriginal and Torres Strait  
358 Islander communities.

359 **Acknowledgments**

360 The research team would like to thank the following individuals: Vikki Blacka, Noel Hicks,  
361 Kay Mundraby for their input and fabulous voices for the app, Dr Johannes Moolman, Chris  
362 Horton and Nazli Bashi for their clinical heart failure expertise and research support.

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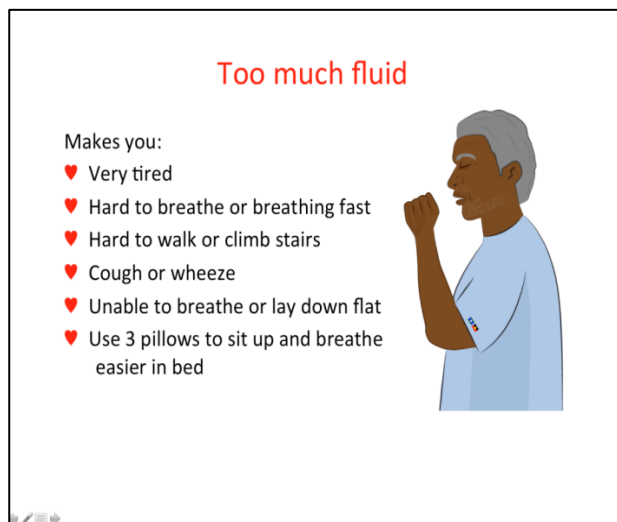
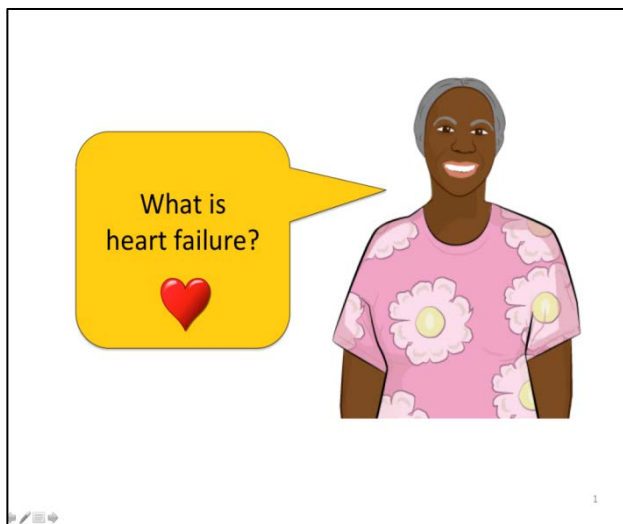
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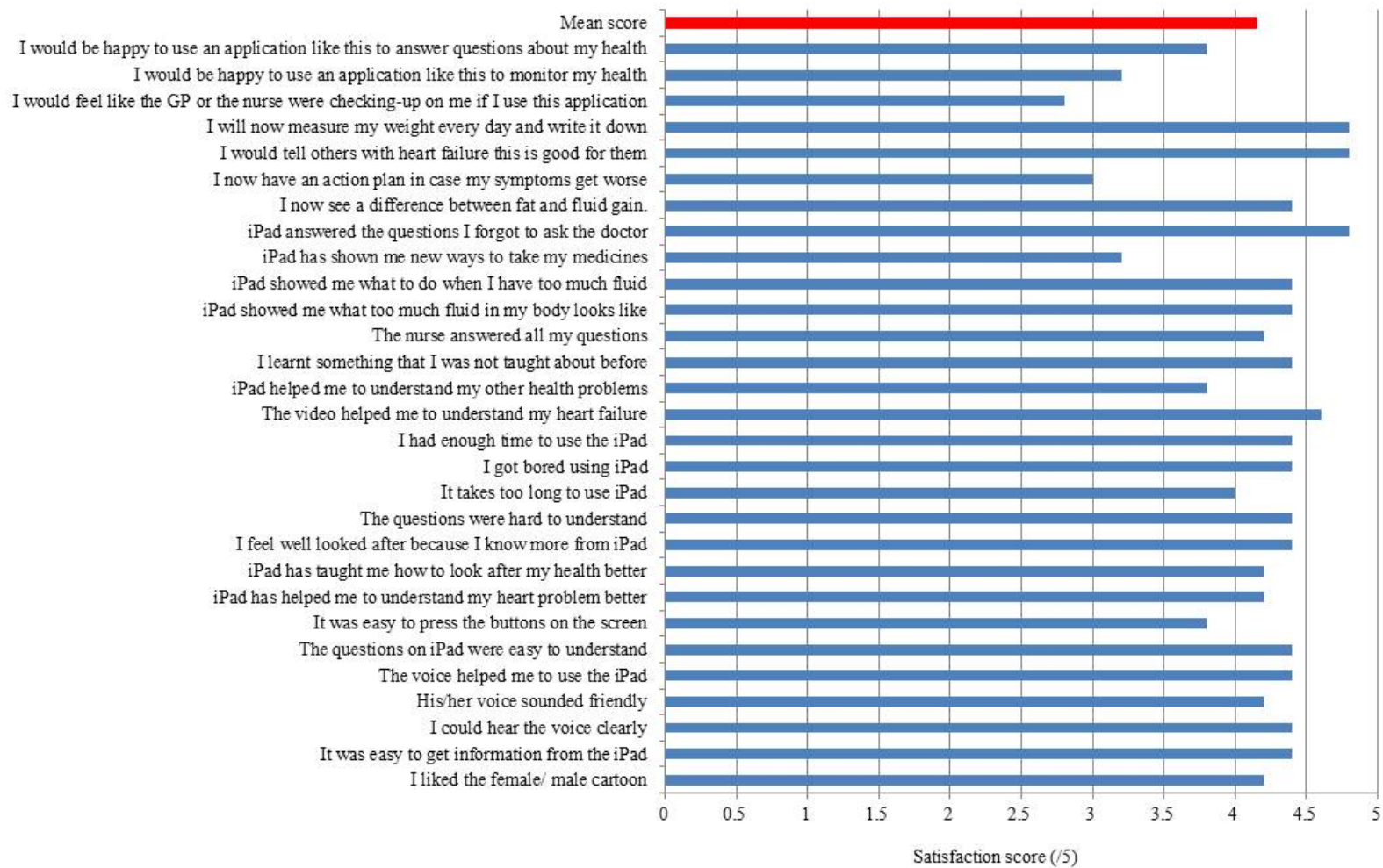
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**Figure 1:** Examples of slides from the patient education material for the tablet computer.



**Figure 2.** Results of patient satisfaction with the resource. Participants were asked to rate each of the following statements out of 5 is 1=strongly disagree, 2=disagree, 3= do not agree or disagree, 4=agree and 5=strongly agree. Where questions were negative, scores were reversed.



**Table 1.** Changes in Heart failure Knowledge score (out of a possible 20) for each participant.

| Patient          | Pre-Intervention |                 | Post-Intervention |                 | Percentage Change |
|------------------|------------------|-----------------|-------------------|-----------------|-------------------|
|                  | Score (/20)      | Percent correct | Score (/20)       | Percent correct |                   |
| 1                | 9.0              | 45.0            | 11.0              | 55.0            | 2.0               |
| 2                | 11.0             | 55.0            | 11.0              | 55.0            | 0.0               |
| 3                | 8.0              | 40.0            | 14.0              | 55.0            | 3.0               |
| 4                | 9.0              | 45.0            | 10.0              | 50.0            | 1.0               |
| 5                | 11.0             | 55.0            | 15.0              | 75.0            | 4.0               |
| <b>Mean (SD)</b> | 9.6 (1.3)        | 48.0 (6.7)      | 11.6 (1.9)        | 58.0 (9.7)      | 2.0 (1.6)         |

**Table 2.** Changes in Self-Care Heart failure Index (SCHFI) Questionnaire, possible range for scores was 0-100.

| Patient          | Management (/100) |            |            | Confidence (/100) |             |             | Maintenance (/100) |             |             |
|------------------|-------------------|------------|------------|-------------------|-------------|-------------|--------------------|-------------|-------------|
|                  | Pre               | Post       | Change     | Pre               | Post        | Change      | Pre                | Post        | Change      |
| 1                | 55.0              | 50.0       | -5.0       | 44.4              | 88.9        | 44.5        | 56.7               | -           | -           |
| 2                | 70.0              | 50.0       | -20.0      | 66.7              | 100.0       | 33.3        | 50.0               | -           | -           |
| 3                | 55.0              | 55.0       | 0.0        | 50.0              | 94.4        | 44.4        | 43.3               | 36.7        | -6.7        |
| 4                | 50.0              | 50.0       | 0.0        | 22.2              | 100.0       | 77.8        | 40.0               | 53.3        | 13.3        |
| 5                | 35.0              | 65.0       | 30.0       | 50.0              | 72.2        | 22.2        | 43.3               | 86.7        | 43.3        |
| <b>Mean (SD)</b> | 53.0 (12.5)       | 54.0 (6.5) | 1.0 (18.2) | 46.7 (16.0)       | 91.1 (11.5) | 44.4 (20.8) | 46.7 (6.7)         | 58.9 (25.5) | 16.7 (25.2) |

- = missing data