



## **Supporting Information**

### **Supplementary material**

**This appendix was part of the submitted manuscript and has been peer reviewed.  
It is posted as supplied by the authors.**

Appendix to: Chelberg G, Goodman A, Musuwadi C, et al. Towards a best practice framework for eHealth with Aboriginal and Torres Strait Islander peoples — important characteristics of eHealth interventions: a narrative review. *Med J Aust* 2024; doi: 10.5694/mja2.52419.

## Appendix 1: Definitions used

### eHealth

The term eHealth captures a variety of digital modalities that enable two-way interactions between health care professionals and consumers.<sup>1</sup> The strength of eHealth goes beyond the challenge of separation by distance, by connecting consumers to healthcare who face barriers due to service availability or the impacts of certain health conditions (e.g. mental health challenges, infectious diseases).<sup>1-3</sup> Common forms of eHealth interventions include telehealth, mobile health (mHealth), remote monitoring and smart platforms.

### Aboriginal and Torres Strait Islander people of Australia

We acknowledge Australia broadly has two distinct Indigenous groups — the Aboriginal people of mainland Australia and the people of the Torres Strait Islands located at the northern tip of Queensland. Archaeological evidence confirms that Aboriginal people have lived and thrived on this continent for over 65,000 years.<sup>4,5</sup> We have referred to Aboriginal and Torres Strait Islander people throughout, except in the instance of First Nations peoples from across the globe.

### Aboriginal Community Controlled Health Organisations (ACCHOs)

The National Aboriginal Community Controlled Health Organisation (NACCHO) represents over 140 ACCHOs and is the peak body for Aboriginal and Torres Strait Islander health in Australia.<sup>6</sup> NACCHO is supported by 8 affiliate organisations, including Queensland Aboriginal and Islander Health Council (QAIHC) that represents more than 30 Aboriginal and Torres Strait Islander Community Controlled Health Organisations (ATSICCHOs). We respectfully use ACCHO when referring to all Indigenous community controlled health organisations including ATSICCHOs and Aboriginal Medical Services (AMS).

### Cultural Safety

Cultural safety is defined in Mackean et al. (2020, p 341)<sup>7</sup> as an approach that

“... explicitly recognizes impacts of colonization and racism on Indigenous peoples and resulting inequalities in power, socioeconomic position and health within neo-colonial societies. It asks how colonizing structures, processes or attitudes may manifest in healthcare settings and exacerbate inequalities between non-Indigenous healthcare practitioners and Indigenous service users.”

## **Appendix 2: Literature search strategy**

### **Inclusion criteria:**

1. English language full text
2. Participants of the intervention studies of all ages will be either Aboriginal and/or Torres Strait Islander people or health staff (either Aboriginal and Torres Strait Islander or non-Indigenous) who work with Aboriginal and Torres Strait Islander people; if the participants are culturally diverse - the outcomes specific to Aboriginal and Torres Strait Islander people are reported
3. Experimental, quasi-experimental, mixed methods, qualitative studies
4. Studies are published in peer-reviewed scientific journals
5. Studies report on one or more of the following outcomes of eHealth interventions: adoption, implementation, integration, user perspectives (eg, feedback, knowledge, level of support, barriers, enablers, accessibility, and acceptability)
6. The eHealth intervention aims to address a health challenge with Aboriginal and Torres Strait Islander people and involves interaction with a health professional or health worker (e.g. Diagnosis of disease, substance use, health behaviour/s, quality of life, health knowledge, self-efficacy, caregiver support etc.);

### **Exclusion criteria:**

1. Studies that relate to the use of eHealth interventions with other First Nation populations globally – where Aboriginal and Torres Strait Islander people are not included and reported
2. Studies where the intervention is a static, non-interactive platform, such as websites OR intervention does not have an eHealth component
3. Research protocols, editorials, abstracts, meta-analyses, systematic literature reviews, grey literature, technical or engineering reports
4. Studies with missing/unreported data
5. Study does not report on at least one outcome of an eHealth intervention
6. Not published in peer-reviewed scientific journal
7. Study reports eHealth usage data only

The following databases were searched directly or via EBSCOhost platform:

- Embase
- Scopus
- PubMed
- CINAHL
- PsycINFO
- Cochrane

The full set of databases were searched via Web of Science and the following databases yielded results:

- WOS - Web of Science Core Collection
- CCC - Current Contents Connect
- DRCI - Data Citation Index
- DDIDW - Derwent Innovations Index
- KJD - KCI Korean Journal Database
- MEDLINE - MEDLINE
- SCIELO - SciELO Citation Index

Limited to full-text papers published in English, with no limit regarding the publication date. Searches were conducted between November and December 2022.

Recommendations by UQ librarians refined the search terms and strings to capture all iterations of eHealth interventions with Aboriginal and Torres Strait Islander people.

eHealth search terms based on keywords including eHealth, telehealth, telemedicine, remote monitoring, mHealth, Internet of Things, virtual care and smart technology. To ensure the review captured all research materials relevant to Aboriginal and Torres Strait Islander people, additional searches were conducted within PubMed, CINAHL and PsycINFO databases using recommendations by the Lowitja Institute (Lit.Search tool). Where appropriate, use of proximity operators, truncation and phrase searching widened the search to capture all iterations of both the eHealth and themes relating to Aboriginal and Torres Strait Islander health.

### **eHealth Keywords**

e-mail, text messaging, mobile device, telenursing, telemedicine, telehealth, mobile phone, wireless device, touchscreen, e-health, e-mobile, mobile application, portable phone, cellphone, cellular phone, smartphone, mobile health, m health, m-health, tablet, physical tracker, remote monitoring, telerehab, telecare, video-conference, video consultation, therapy, wearable, instant message, smart sensors, smart home, Bluetooth, wi-fi, store-and-forward, internet of things, remote monitoring, self-management, remote consultation, digital technology, telephone, patient monitoring devices, personal digital assistants, internet-based, virtual care

### **Aboriginal and Torres Strait Islander keywords**

Aboriginal and Torres Strait Islander, First Nations, Indigenous, First Peoples

### **PubMed Search String**

((("aborigin\*" [Title/Abstract] OR "indigenous" [Title/Abstract] OR "first nation\*" [Title/Abstract] OR "torres strait islander\*" [Title/Abstract] OR "Native Hawaiian or Other Pacific Islander" [MeSH Terms] OR "health services,

indigenous"[MeSH Terms] OR "Indigenous Peoples"[MeSH Terms]) AND ("australia"[MeSH Terms] OR "australia\*"[Title/Abstract])) AND

("Electronic Mail"[MeSH Terms] OR "mail electronic"[Title/Abstract] OR "email\*"[Title/Abstract] OR "e mail\*"[Title/Abstract] OR "e mail\*"[Title/Abstract] OR "Text Messaging"[MeSH Terms] OR "messaging text"[Title/Abstract] OR "texting\*"[Title/Abstract] OR "text messag\*"[Title/Abstract] OR "message text"[Title/Abstract] OR "instant messag\*"[Title/Abstract] OR "Cell Phone"[MeSH Terms] OR "Smartphone"[MeSH Terms] OR "Cell Phone Use"[MeSH Terms] OR "cell phone\*"[Title/Abstract] OR "cellular phone\*"[Title/Abstract] OR "cellular telephone\*"[Title/Abstract] OR "telephon\*"[Title/Abstract] OR "portable cellular phone\*"[Title/Abstract] OR "portable phone\*"[Title/Abstract] OR "mobile phone\*"[Title/Abstract] OR "mobile telephone\*"[Title/Abstract] OR "smartphone\*"[Title/Abstract] OR "smart phone\*"[Title/Abstract] OR "cell phone use\*"[Title/Abstract] OR "mobile phone use\*"[Title/Abstract] OR "phone use\*"[Title/Abstract] OR "smartphone use\*"[Title/Abstract] OR "Telemedicine"[MeSH Terms] OR "Telemed"[Title/Abstract] OR "Tele medic"[Title/Abstract] OR "tele health\*"[Title/Abstract] AND "telehealth\*"[Title/Abstract] OR "mobile health\*"[Title/Abstract] OR "mHealth"[Title/Abstract] OR "m Health"[Title/Abstract] OR "eHealth"[Title/Abstract] OR "e Health"[Title/Abstract] OR "Digital technology"[Title/Abstract] OR "econsult\*"[Title/Abstract] OR "e consult\*"[Title/Abstract] OR "ediagnos\*"[Title/Abstract] OR "e diagnos\*"[Title/Abstract] OR "telediagnos\*"[Title/Abstract] OR "tele diagnos\*"[Title/Abstract] OR "Telenursing"[MeSH Terms] OR "telenurs\*"[Title/Abstract] OR "tele nurs\*"[Title/Abstract] OR "telecar\*"[Title/Abstract] OR "tele care\*"[Title/Abstract] OR "Remote Consultation"[MeSH Terms] OR "remote consult\*"[Title/Abstract] OR "teleconsult\*"[Title/Abstract] OR "tele consult\*"[Title/Abstract] OR "remote treat\*"[Title/Abstract] OR "remote medic\*"[Title/Abstract] OR "distance medic\*"[Title/Abstract] OR "video conferenc\*"[Title/Abstract] OR "videoconferenc\*"[Title/Abstract] AND "tele conferenc\*"[Title/Abstract] OR "teleconferenc\*"[Title/Abstract] OR "video consult\*"[Title/Abstract] OR "Remote Sensing Technology"[MeSH Terms] OR "remote monitor\*"[Title/Abstract] OR "remote patient monitor\*"[Title/Abstract] OR "remote manag\*"[Title/Abstract] OR "remote patient manag\*"[Title/Abstract] OR "tele monitor\*"[Title/Abstract] OR "telemonitor\*"[Title/Abstract] OR "remote record\*"[Title/Abstract] OR "store and forward\*"[Title/Abstract] OR "Telerehabilitation"[MeSH Terms] OR "telerehab\*"[Title/Abstract] OR "tele rehab\*"[Title/Abstract] OR "tele rehab\*"[Title/Abstract] OR "remote rehab\*"[Title/Abstract] OR "virtual rehab\*"[Title/Abstract] OR "Distance Counseling"[MeSH Terms] OR "e therap\*"[Title/Abstract] OR "e counsel\*"[Title/Abstract] OR "Mobile Applications"[MeSH Terms] OR "mobile app\*"[Title/Abstract] OR "electronic app\*"[Title/Abstract] OR "software app\*"[Title/Abstract] OR "smartphone app\*"[Title/Abstract] OR "Software"[MeSH Terms] OR "software\*"[Title/Abstract] OR "computer software\*"[Title/Abstract] OR "computer app\*"[Title/Abstract] OR "computer program\*"[Title/Abstract] OR "computers, handheld"[MeSH Terms] OR "tablet comp\*"[Title/Abstract] OR "mobile device\*"[Title/Abstract] OR "touch screen"[Title/Abstract] OR "touchscreen"[Title/Abstract] OR "wireless device\*"[Title/Abstract] OR "Internet of Things"[MeSH Terms] OR "Internet of Things"[Title/Abstract] OR "smart home\*"[Title/Abstract] OR "Internet-Based Intervention"[MeSH Terms] OR "internet bas\*"[Title/Abstract] OR "internet based interven\*"[Title/Abstract] OR "web based interven\*"[All Fields] OR "online interven\*"[Title/Abstract] OR "internet interven\*"[Title/Abstract] OR "Internet Access"[MeSH Terms] OR "internet access\*"[Title/Abstract] OR "web acces\*"[Title/Abstract] OR "Internet portal"[Title/Abstract] OR "web portal\*"[Title/Abstract] OR "Online portal"[Title/Abstract] OR "Internet based portal"[Title/Abstract] OR "Web based portal"[Title/Abstract] OR "social media"[MeSH Terms] OR "social

media"[Title/Abstract] OR "Social medium"[Title/Abstract] OR "twitter messag\*"[Title/Abstract] OR "Telephone"[MeSH Terms] OR "Telephone"[Title/Abstract] OR "Hotlines"[MeSH Terms] OR "telephone hotline\*"[Title/Abstract] OR "phone hotline\*"[Title/Abstract] OR "hotline\*"[Title/Abstract] OR "Fitness Trackers"[MeSH Terms] OR "fitness track\*"[Title/Abstract] OR "physical track\*"[Title/Abstract] OR "physical fitness track\*"[Title/Abstract] OR "activity track\*"[Title/Abstract] OR "personal physical\*"[Title/Abstract] OR "personal activity track\*"[Title/Abstract] OR "Wearable Electronic Devices"[MeSH Terms] OR "wearable electronic device\*"[Title/Abstract] OR "wearable electronic device\*"[Title/Abstract] OR "wearable tech\*"[Title/Abstract] OR "wearable device\*"[Title/Abstract] OR "smart sensor\*"[Title/Abstract] OR "monitoring, ambulatory"[MeSH Terms] OR "outpatient monitor\*"[Title/Abstract] OR "ambulatory monitor\*"[Title/Abstract] OR "Smart Glasses"[MeSH Terms] OR "smart glass\*"[Title/Abstract] OR "smartglass\*"[Title/Abstract] OR "head mounted display\*"[Title/Abstract] OR "google glass\*"[Title/Abstract] OR "head up display\*"[Title/Abstract] OR "digital health"[Title/Abstract])

AND (english[Filter])

## **Appendix 3: CONSIDER statement**

The conduct of this review was informed by the CONSolidated critERia for strengthening the reporting of health research involving Indigenous peoples (CONSIDER) statement.<sup>8</sup>

### **Governance**

This publication is a component of research underway to establish a best practice framework for development and deployment of eHealth with Aboriginal and Torres Strait Islander people.<sup>2</sup> We have employed a joint governance model alongside the eHealth Research Collaboration for Aboriginal and Torres Strait Islander Health (the Collaboration), established in 2019. The Collaboration is focused on establishing an evidence base for technology in health care specific to the interests and needs of Aboriginal and Torres Strait Islander people. Collaboration membership includes Indigenous and non-Indigenous people from: the Australian eHealth Research Centre (CSIRO); Queensland University of Technology's Australian Centre for Health Service Innovation, and School of Exercise and Nutrition Science; The University of Queensland's Centre for Online Health, and School of Public Health; Flinders University; Queensland Health and Queensland Aboriginal and Islander Health Council. Aboriginal researchers and founding members of the Collaboration, RM and AG provided governance and oversight of the publication.

### **Prioritisation**

eHealth research and translation across health settings is fast-growing with mobile apps, telehealth, and remote monitoring, offering significant opportunities to enhancing health access for Aboriginal and Torres Strait Islander people. Currently there is limited understanding of the 'why' eHealth is or is not an acceptable and, or sustainable solution for Aboriginal and Torres Strait Islander people. We believe this is the first review of the characteristics of the development, adoption, engagement, and evaluation of eHealth interventions within the Aboriginal and Torres Strait Islander health context. Three authors (AG, RM, SL) recently published a qualitative systematic review to identify the experiences and perceptions of mobile health (mHealth) with Indigenous populations globally.<sup>9</sup> Findings were that mHealth can meet the needs of both patients and service providers within Indigenous healthcare settings when the intervention is culturally relevant, accounts for digital and health literacy, incorporates interactive components, is supported by workplaces and meets security and confidentiality standards.

### **Relationships**

Our authorship reflects diverse perspectives driven by research and professional background, career-stage, gender, and race. The team includes Aboriginal researchers (RM, AG), public health academics (RM, SL, AG, LC, GC) qualitative researchers (SL, AG, GC), and implementation researchers (RM, LC, SL) working in Aboriginal and Torres Strait Islander health research. Author affiliations range between 5-10 years, with several members establishing the Collaboration in 2019. LC and RM supervised GC to PhD completion, in April 2023 at the University of Queensland with a thesis titled 'Digital health to enhance access and delivery of quality care with Aboriginal and Torres Strait Islander people, including persons living with dementia'.<sup>10</sup> RM and SL supervised AG to PhD completion in November 2023 at the University of Queensland. AG's PhD thesis titled 'Can an integrated mHealth platform assist in the management of hypertension for Aboriginal and Torres Strait Islander people?'<sup>11</sup> is a strengths-based exploration and assessment of mHealth for the management of hypertension within an Aboriginal and Torres Strait healthcare setting.

### **Methodologies**

Authors committed to this research process underpinned by Indigenous methodology that respects cultural protocols, while contributing an academic theoretic framework to inherent Aboriginal and Torres Strait values and principles. This is evident with Aboriginal researchers (RM, AG) being pivotal in conceptualising the study design, analysis, and interpretation of the research data on which the scholarly work is based. To ensure an ethical and culturally accountable approach to appraising the included papers, the authorship applied the Aboriginal and Torres Strait Islander Quality Appraisal Tool (QAT) to assess the cultural quality of the final papers.<sup>12,13</sup> This QAT is designed to counter the long history of health research that has resulted in limited direct benefit to Aboriginal and Torres Strait peoples by assessing the quality of research through the lens of Aboriginal and Torres Strait ways of knowing, doing and being.<sup>14</sup>

### **Participation**

This publication employs a joint governance model with eHealth discipline participation provided by the Collaboration, and cultural leadership participation provided by two Aboriginal researchers (AG, RM). The involvement of Aboriginal and Torres Strait peoples in research governance structures is a recognised quality indicator of best-practice research.<sup>12-14</sup>

### **Capacity**

The authorship includes a strong team of both Aboriginal and non-Indigenous researchers. The Principal Research Scientist (RM) provided guidance and mentorship for the early career Aboriginal and non-Indigenous members of the team. The Aboriginal researchers (RM, AG) committed to the support and cultural exchange with non-Indigenous collaborators. This publication includes Aboriginal people as authors, reflective of their role and respectful of the unique and valuable knowledges and experience they bring to this review. Moreover, Postdoctoral Fellow AG has gained valuable scholarly acknowledgement and research experience.

### **Analysis and interpretation**

Aligning with the research approach described, the methodology privileges Aboriginal and Torres Strait Islander worldviews in data analysis, and by having critically self-reflexive non-Indigenous authors skilled in their own cultural values and knowledge positioning. GC, AG, RM conceptualised the study design, GC prepared the protocol, and CM conducted searches. GC, CM screened and extracted data. GC, AG, CM, SL, and LC analysed and interpreted research data with oversight by RM. GC, CM, AG prepared the manuscript with significant input and critical review from RM, LC, SL.

### **Dissemination**

Critically, the results from the QAT provides evidence to the influence of Aboriginal and Torres Strait Islander worldviews and leadership in eHealth research and will have lasting impact beyond this publication. The significance of authentic co-design, governance and strong partnerships for sustainability and impact is the key theme of our findings. To our knowledge, this is the first review of its kind that provides an understanding of the determining factors in the development, adoption, engagement, and evaluation of eHealth interventions with Aboriginal and Torres Strait Islander people.



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