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# Outcomes of using telehealth for the provision of healthcare to Aboriginal and Torres Strait Islander people: a systematic review

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The Overview of Australian Indigenous Health Status report identified that Indigenous Australians have a life expectancy of 10-11 years less than non-Indigenous Australians.<sup>1</sup> Compared with the general population, Aboriginal and Torres Strait Islanders (A&TSI) have high mortality rates due to cardiovascular disease, cancer, diabetes, kidney disease and suicide. Furthermore, Indigenous Australians experience a high prevalence of chronic health conditions including diabetes, chronic respiratory disease and social and emotional wellbeing disorders.

Improving the accessibility of mainstream health services has been adopted as a policy initiative to reduce the disparity in health status of Indigenous Australians.<sup>2</sup> Efforts to improve accessibility to healthcare have targeted Aboriginal community-controlled health services (ACCHSs). ACCHSs provide the majority of primary healthcare services to Indigenous Australians<sup>3</sup> however, specialist services are required for many health problems experienced by Indigenous Australians.<sup>4</sup> Consequently, the goal of improving access to mainstream services now encompasses both primary and specialist care.<sup>5</sup> Previous work has demonstrated specialist healthcare services delivered from Indigenous-specific primary healthcare services improve accessibility and use of these services by Indigenous Australians.<sup>6</sup> However, because of economies of scale, establishing and maintaining specialist health services in such a setting is costly and alternative models of service delivery need to be considered. Telehealth is one such model.

## Abstract

**Objective:** To examine reported outcomes of health services delivered by telehealth to Indigenous Australians.

**Methods:** Systematic review of the literature. Searches were conducted to identify articles that reported a telehealth service used to provide clinical services to Indigenous Australians. Articles were screened for inclusion using pre-defined criteria. Findings were synthesised narratively and reported using the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines.

**Results:** 14 articles, describing 11 distinct telehealth services, were selected based on the inclusion criteria. Authors of included studies report that telehealth has improved social and emotional wellbeing, clinical outcomes and access to health services for Indigenous Australians. Further, it has reduced travel and improved screening rates. Indigenous people report positive perceptions of their telehealth interaction.

**Conclusion:** Telehealth is used to address poor accessibility to health services and for targeted screening programs for at risk populations. Reported outcomes from existing services demonstrate the potential of telehealth for health service delivery for Indigenous Australians. Confidence in the findings of this review is reduced by the predominance of descriptive studies and small sample sizes in many of the included articles.

**Implications:** Telehealth models of care facilitated through partnerships between Aboriginal community-controlled health services and public hospitals may improve both patient outcomes and access to specialist services for Indigenous people.

**Key words:** Aboriginal and Torres Strait Islander, Aborigine, Indigenous, Australia, telehealth, telemedicine, health services

Telehealth is the delivery of healthcare at a distance using information communication technologies.<sup>7</sup> Telehealth may use video conferencing for real-time consultations. Alternatively, store-and-forward technologies may be used to send information such as still images, patient history and the results of diagnostic tests for specialist review and subsequent diagnosis and management advice. Teledermatology and teleophthalmology for diabetic retinopathy screening are two specialties that are

amenable to store-and-forward consultations. A third form of telehealth involves patient transferal of biometric information such as weight, blood glucose levels or blood pressure thereby allowing remote monitoring by a clinician. This type of telehealth service is most often used for in-home monitoring of patients with chronic diseases.

Telehealth potentially provides a number of advantages for Indigenous healthcare service delivery. Firstly, Indigenous people have reported that poor access to culturally

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appropriate health services, dislocation from cultural support systems, exposure to racism and poor communication with healthcare professionals negatively affect their health and well-being.<sup>8</sup> Specialist services delivered by telehealth to a patient located within an ACCHS may obviate these negative effects,<sup>9</sup> especially if communication with the healthcare provider is aided by a local Aboriginal Health Practitioner accompanying the patient during a teleconsultation. Secondly, Indigenous people are more likely than non-Indigenous people to live in remote Australia.<sup>10</sup> The use of telehealth has been demonstrated to increase accessibility to specialist care particularly for rural and remote populations.<sup>11,12</sup> Thirdly, a large evidence base supports the use of telehealth for the management of chronic diseases<sup>13,14</sup> that are highly prevalent in the Indigenous population. Finally, there is remuneration available through the Medicare Benefits Schedule (MBS) for telehealth video consultations. Generally, this funding allows only for specialist consultations when the patient is at least 15 km by road from the specialist or consultant physician. However, MBS claims can be made irrespective of distance, when a telehealth consultation involves a patient of an eligible Aboriginal medical service. Furthermore, the MBS provides remuneration if an Aboriginal Health Practitioner (or practice nurse or general practitioner) accompanies the patient during teleconsultation.

To date, the use of telehealth for delivering specialist health services for Indigenous Australians has not been formally examined. It is important to identify what outcomes have resulted from the use of telehealth in order to determine the efficacy of this mode of service delivery. This review examines and reports on outcomes of health services delivered by telehealth to Indigenous Australians.

## Methods

### Search strategy

We searched the PubMed, Embase, A&TSI Health (Informit), Scopus and cumulative index to nursing and allied health literature (CINAHL) databases. For the PubMed search we used the LIT.search filter that retrieves Indigenous Australian health literature that was developed and validated by the Lowitja Institute.<sup>15</sup> The following search terms were

used to identify relevant literature: (Aborigine OR 'Torres Strait Islander' OR Indigenous) AND (telemedicine OR telehealth OR teleconsultation OR videoconsultation OR videoconference OR 'video consultation' OR 'video conference' OR 'remote consultation').

To obtain grey literature we searched the websites for the National Aboriginal Community Controlled Health Organisations (NACCHO)<sup>16</sup> and Australian Indigenous HealthInfoNet.<sup>17</sup> We also searched the Australasian Telehealth Repository<sup>18</sup> which is hosted by the Australasian Telehealth Society. Searches were not time constrained. However, as telemedicine was added as a medical subject heading (MeSH) term in 1993 this would serve as a time constraint. Searches were conducted in April 2015 and repeated in January 2016.

### Inclusion and exclusion criteria

We included articles that studied the use of telehealth to provide direct clinical services to Australian Indigenous people. Studies on all telehealth modalities (video consultation, store-and-forward, remote telehealth monitoring and hybrid technologies) were included. Telephone services and non-clinical services (education and administrative services) were excluded. Articles that did not report an actual telehealth service and articles in languages other than English were also excluded. Any objective outcome measures of the telehealth intervention including: health outcomes (clinical outcomes, quality of life, social and emotional well-being indicators, patient knowledge or empowerment), process outcomes (quality of care, satisfaction, appropriateness, screening rates, accessibility, avoided travel, adherence to standards) or economic outcomes (cost and resource utilisation) were considered as valid outcome measures. Articles that described mainstream telehealth services were excluded if they did not stratify findings to Indigenous Australians.

### Selection process

Two reviewers screened the title and abstract of studies to determine eligibility for inclusion. Full text of articles was screened if the abstract did not provide sufficient information to judge eligibility. Uncertainty of inclusion was resolved by discussion.

### Data extraction and quality assessment

The full text of articles that met inclusion criteria was obtained and read to validate inclusion eligibility. For included articles, data were extracted and recorded on a data extraction form. Data extraction were undertaken by one study author. One-third of included articles were randomly selected, and a second reviewer extracted data. The results of data extraction between the two authors were compared for congruence. The data extraction fields were: (i) author, (ii) year, (iii) type of article (journal article, conference abstract, letter to the editor, report), (iv) study design, (v) patient-end location and Australian Standard Geographical Classification (vi) patient-end participants, (vii) clinician-end location, (viii) modality, (ix) medical specialty, (x) function (screening, consultation, therapy), (xi) outcome measures, (xii) outcome and (xiii) secondary observations.

Quality assessment was undertaken on included articles using the criteria identified in the Joanna Briggs Institute (JBI) Levels of Evidence FAME (feasibility, appropriateness, meaningfulness, effectiveness and economic evidence) framework.<sup>19</sup> One reviewer independently performed the quality assessment. A second reviewer validated the recorded information. Articles that did not contain sufficient information to assign Joanna Briggs Institute (JBI) level of evidence were excluded from the review.

### Review procedures

The protocol for this systematic review was registered (CRD42015017942) with the international prospective register of systematic reviews (PROSPERO).<sup>20</sup> The University of Queensland ethics committee exempted the review from formal ethics approval because it was a review of existing published literature. Reporting of the findings of this review followed the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines.<sup>21</sup> Due to heterogeneity of included studies synthesis of findings was performed narratively. We did not conduct formal assessment of bias as outcome measures were not pooled.

## Results

We identified 14 studies that met our inclusion criteria. The results for each stage of our search and screening processes are shown in the PRISMA flow diagram (Figure 1).

### Study characteristics

The articles included in this review were from peer-reviewed journals (n=9, 64%), published conference abstracts (n=2, 14%), conference proceedings (n=1, 7%), a letter containing a description of a telehealth service (n=1, 7%) and a report evaluating a remote telehealth monitoring service (n=1, 7%). The letter was published in a journal that routinely publishes case series as letters. The included articles studied 11 distinct telehealth services —there were multiple publications on the *Health-e-Screen4kids* service,<sup>22-24</sup> and the Townsville hospital tele-oncology service.<sup>25,26</sup> Articles were published between 2006 and 2015.

Most of the included studies (n=11, 73%) were descriptive, observational studies and resultantly ranked at the lower levels (Level 4 and Level 5) of the JBI levels of evidence. These studies included service descriptions and case studies. The remaining 27% used pre- and post-study designs and resultantly were ranked as JBI Level 2. One of the Level 2 studies was an evaluation report that did not undergo peer-review.<sup>27</sup> Study characteristics are summarised in online supplementary material.

### Telehealth service characteristics and patient interactions

The telehealth modalities of store-and-forward, video conferencing and remote telehealth monitoring were all represented in the included articles. Store-and-forward services were used in screening programs for ear health,<sup>22-24,28</sup> and diabetic eye disease.<sup>29,30</sup> Video conferencing was used to: provide medical consultations,<sup>25,26,31-35</sup> for the supervision of chemotherapy administration,<sup>25,26,35</sup> and for the delivery of speech rehabilitation therapy.<sup>36</sup> Remote telehealth monitoring was used for in-home/in-hub monitoring of chronic diseases in the *Staying Strong* pilot project.<sup>27,37</sup> Video consultations were undertaken in the following medical specialities: mental health,<sup>31,32</sup> oncology,<sup>25,26,35</sup> palliative care,<sup>33</sup> and anaesthetics.<sup>34</sup>

Patient-end services (when classified according to the Australian Standard Geographical Classifications)<sup>38</sup> had the following distribution: very remote (n=4, 36%), remote (n=6, 55%), outer regional (n=5, 45%), inner regional (n=2, 18%) and major city (n=1, 9%). Some services had multiple geographical classifications. Most

authors report that telehealth was used to address poor accessibility to health services. This reasoning is supported by the high proportion of patients in remote and very remote areas.

For all video consultations the patient attended a regional public hospital. Whereas, screening services were either provided in the community (n=3) or in an Indigenous-specific health service (n=1). The *Staying Strong* pilot project provided in-home and in-hub remote telehealth monitoring. The telehealth hubs were located in both Indigenous-specific health services and mainstream health centres. Clinician-end services were mostly located in tertiary public hospitals in major cities (78%) or tertiary public hospitals in large regional centres (22%). During video consultation the patient was accompanied by family members, primary health practitioners (health workers, nurse, and medical officer) and on one occasion a traditional healer.<sup>26</sup> The two ear screening programs were targeted at paediatric patients.<sup>22,23,28</sup> The remote telehealth monitoring was a service for older Indigenous people and the remaining services were aimed at adult patients.

Figure 1: Preferred reporting items for systematic reviews and meta-analyses flow diagram.

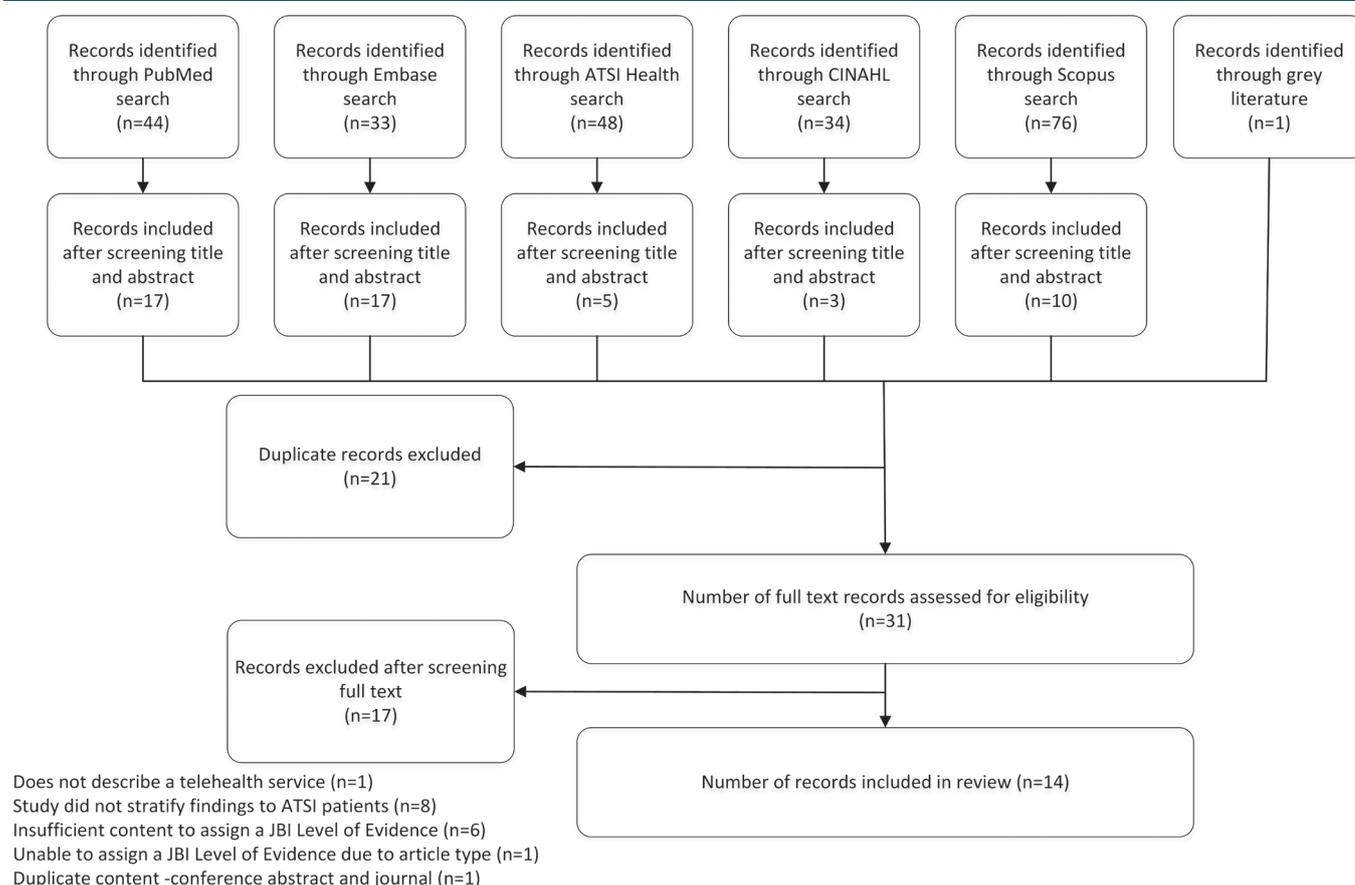


Table 1: Reported outcomes.

Author	Study population (service)	Reported outcomes of telehealth
Alexander J, Lattanzio A <sup>31</sup> 2009	Rural and remote Indigenous patients, South Australia (Mental Health)	<ul style="list-style-type: none"> <li>• Telepsychiatry improves utility of mental health services for Indigenous South Australians living in small remote communities</li> <li>• Number of telepsychiatry consultations with ATSI patients (2006, n=28; 2007, n=78; 2008, n=94; 2009 YTD n=71)</li> </ul>
Barry et al. <sup>29</sup> 2006	Rural and remote Western Australia (ophthalmology – diabetic retinopathy screening)	<ul style="list-style-type: none"> <li>• Increased access to screening (compliance to annual or biannual screening rates up to 58% of the Aboriginal population)</li> <li>• Decreased cost per consultation (\$260 face-to-face, \$107 tele-ophthalmology)</li> </ul>
Buckley D, Weisser S <sup>32</sup> 2012	Regional and remote NSW (Mental Health) Pre-/post-: N(Indigenous admissions)=79/43	<ul style="list-style-type: none"> <li>• There was a small but not significant reduction in the number of Indigenous mental health patients transferred from outlying facility to regional mental health facility after the introduction of VC between the two facilities [reduction not quantified]. A significant reduction in transfers was observed in the general population [Pre: N=770 (66.8%) Post: N=471 (59.6%)]</li> </ul>
Hannig et al. <sup>33</sup> 2011	Kimberley, WA (palliative care) Not stated	<p>Descriptive study reporting the following observation:</p> <ul style="list-style-type: none"> <li>• Facilitated palliative patients to die in country</li> </ul>
Integrated Living <sup>27,37</sup> 2015	Multisite trial with hubs in Toowoomba, Goodna, Coffs Harbor and Armidale (in home monitoring of chronic diseases) n=136	<ul style="list-style-type: none"> <li>• Qualitative study reported telehealth increased patient empowerment due to increased health literacy</li> <li>• Personal well-being index for health showed a small but not statistically significant increase in any of the subdomains (Pre- /Post- : Health satisfaction 57/63 points; Future security: 68/72 points)</li> <li>• Relative cost reduction telehealth versus face-to-face (estimated to be 40%)</li> </ul>
Kanagasigam et al. <sup>30</sup> 2015	Multisite trial with Torres Strait Island, Queensland and Goldfield and Great Southern, Western Australia (ophthalmology – diabetic retinopathy screening) N(Queensland)=189; N(WA) = 155;	<ul style="list-style-type: none"> <li>• Prevalence of DR in Indigenous / non-Indigenous population. Queensland 17% / 0% and Western Australia 10%/3%</li> <li>• Increased likelihood of early detection of sight threatening conditions</li> </ul>
Mooi et al. <sup>25</sup> 2012	Far-north Queensland (Oncology) N(patients)=9; N(family members)=2;	<p>The percentage of Indigenous patients (n=9) who had a teleconsultation and reported agreement (strongly agree or agree) in the following domains:</p> <ol style="list-style-type: none"> <li>1. Positive perception of the quality (technical quality and interpersonal communication) of the teleconsultations [N=8, (97%)]</li> <li>2. Ability to establish positive rapport with the specialist during teleconsultation [N=8, (97%)]</li> <li>3. Preference to use video-consultation over face-to-face [N=9, (100%)]</li> <li>4. Positive satisfaction with level of care via teleoncology [N=8, (97%)].</li> </ol>
Muir et al. <sup>36</sup> 2013	Not stated (speech and language therapy) n=1	<p>Clinical outcomes using the Australian therapy outcome measures (AusTOMs) for a single patient undergoing speech and language telerehabilitation were reported as:</p> <ol style="list-style-type: none"> <li>1. Impairment improved from moderately severe to mild-moderate;</li> <li>2. Activity limitation improved from severe to mild-moderate;</li> <li>3. Participation improved from severe to mild; and</li> <li>4. Distress/wellbeing improved from moderate to mild-no difficulties.</li> </ol>
Reeve et al. <sup>28</sup> 2014	Fitzroy Valley, WA (ENT screening) Pre-/post-: N(screenings)=148/710 N(ENT referrals)=32/66	<p>Post intervention of an ear health pathway including:</p> <ul style="list-style-type: none"> <li>• Telehealth improved the number children screened and the number of children subsequently referred to an ENT specialist</li> <li>• Number of children screened (Pre: N=148 Post: N=710) [rates not reported]</li> <li>• Number of ENT referrals (Pre: N=32 (22%) Post: N=66 (9%))</li> <li>• Time to ENT review decreased (141 to 22 days)</li> <li>• Improved quality of referral leading to more efficient ENT clinics. Efficiency measures reported: <ul style="list-style-type: none"> <li>a. Decrease in number of clinic appointments needed for an episode of care</li> <li>b. Store-and-forward of screening test results allowed clinical decision making when patient failed to attend</li> </ul> </li> </ul>
Roberts et al. <sup>34</sup> 2015	Katherine, NT (Pre-anaesthetic clinic) N(patients)=5	<p>The perceptions of Indigenous patients who used telehealth were positive in all domains surveyed. When corrected for negative scoring the cohort of Indigenous patients (n=5) rated:</p> <ol style="list-style-type: none"> <li>1. Technical quality (3.73/5);</li> <li>2. Perceived efficacy (3.77/5);</li> <li>3. Affective patient experience (3.87/5); and</li> <li>4. Patient preferences for telehealth (3.8/5).</li> </ol>
Sabesan et al. <sup>26</sup> 2012	Far North Queensland (Oncology) N(patients)=18;	<p>Descriptive study reporting the following observations:</p> <ul style="list-style-type: none"> <li>• Avoided travel and inter-hospital transfers.</li> <li>• Improved cultural appropriateness of care by allowing patient to remain in local community and have attendance of family members and traditional healers at consultations.</li> <li>• Improved access to specialist care.</li> </ul>
Smith AC et al. <sup>22</sup> 2013	South Burnett, Queensland (ENT screening) N(outpatients) pre- /post:329/105; N (surgeries) pre/post: 118/160	<ul style="list-style-type: none"> <li>• Reduction in the number of patients referred to Brisbane for outpatient appointments over three year study period (329 to 105)</li> <li>• Decrease in failed to attend (FTA) rates for outpatients [Pre: N=166 (51%) Post: N=40 (38%)]</li> <li>• Increased completed surgical procedures [Pre: N=100 Post: N= 160 (43 performed at tertiary centre, 117 performed at patient location)]</li> </ul>
Smith AC et al. <sup>23</sup> 2012	South Burnett, Queensland (ENT screening) N(patients)=1,053 N(screenings)=2,111	<ul style="list-style-type: none"> <li>• Increased ear health screening rate (40% to 85%)</li> <li>• Detection of hearing abnormalities (78% of screened cases were abnormal)</li> <li>• Improved access to ear, nose and throat (ENT) specialist services. (Number of ENT reviews: 2009, N=99; 2010, N=204; 2011, N=226)</li> <li>• Appropriate referral (GP, audiologist, ENT specialist)</li> <li>• Reduced patient travel (treatment within community)</li> </ul>
Smith AC et al. <sup>24</sup> 2015	South Burnett, Queensland (ENT screening) N(screening)=5,539	<ul style="list-style-type: none"> <li>• Decrease in prevalence rates of ear disease based on the number of failed screenings from 33% in 2009 to 26% in 2014. Time period corresponds to the time in operation of ENT screening program.</li> </ul>

ATSI: Aboriginal and Torres Strait Islander; DR: diabetic retinopathy; YTD: year to date; VC: videoconferencing.

## Outcomes

All authors reported beneficial health, process and economic outcomes that have resulted from using telehealth to deliver healthcare to Indigenous Australians. No adverse outcomes were reported. Outcomes are summarised in Table 1.

## Discussion

This review identified a small number of studies (n=14) that reported using telehealth to deliver healthcare to Indigenous Australians. These studies reported a range of outcomes resulting from the use of telehealth. The social and emotional well-being benefits of receiving care in community,<sup>23,26</sup> attendance of family during care,<sup>26</sup> choice for palliative patients to die in country,<sup>33</sup> greater patient empowerment due to increased health literacy,<sup>27,37</sup> and improvements in the personal well-being index<sup>27,37</sup> were all reported. For Indigenous people, transferring from local community to regional centre for treatment has been shown to increase mental distress and alienation which may be reduced or avoided when telehealth is used.<sup>39</sup> A reduction in patient travel and greater access to specialist care was also frequently reported in the included studies.<sup>22,23,26,31,32,35</sup> The cost of providing services by telehealth was reported to be less than providing similar face-to-face services.<sup>27,29,37</sup> Process improvements such as decreased failed to attend rates and improved screening rates were also reported.<sup>10,22,23,28</sup>

Two studies explored the Indigenous patient's perspective on the use of telehealth. One study reported a 75% preference for teleconsultations over face-to-face consultations,<sup>34</sup> whereas Mooi et al.<sup>25</sup> reported that 100% of Indigenous patients preferred telehealth. The higher preference in the latter study may be explained by service type. It reported on a tele-oncology service that included the remote supervision for the administration of chemotherapy, where the alternative to telehealth delivery may have been a protracted stay at a tertiary centre.

The modality of telehealth influences a patient's technology interface and interaction with a healthcare provider. Video consultations alter the way an Indigenous patient traditionally interacts with providers. Indigenous Australians reported positive interpersonal interactions and the ability to develop rapport with the consulting clinician.<sup>25</sup> Positive clinical

outcomes resulting from telerehabilitation via video conferencing<sup>36</sup> may also indicate the appropriateness of this modality. From a clinician's perspective, video consultation was perceived as equivalent to face-to-face consultation in quality and accuracy of psychiatric assessments for Indigenous patients.<sup>31</sup> Good technical quality was viewed as crucial for video consultations with Indigenous patients.<sup>40</sup>

Store-and-forward services for ear screening and diabetic retinopathy screening may expose the patient to a new examination – for example, retinal photography – but the interaction with the healthcare provider remains face-to-face. Hence, the *tele* component of the service is transparent to the patient. The store-and-forward services included in this review were operated from Indigenous-specific health services or the local community. The use of Indigenous-specific health services gave participants confidence in the telehealth service, which may have contributed to the screening rates achieved (up to 85% of target population)<sup>23</sup> in the reported studies.

For all video consultations the patient attended a regional public hospital. This would appear to represent under-utilisation (or an under-reporting) of video consultations in Indigenous-specific health services and may present an opportunity to increase access to specialist care for Indigenous people.

There is some evidence that health outcomes for Indigenous patients and access to care both improve when ACCHSs partner with mainstream service providers.<sup>41</sup> In Australia, the majority of specialist outpatient care<sup>42</sup> and the majority of telehealth services are provided by public hospitals.<sup>43</sup> Public providers also reduce affordability barriers to healthcare access. Furthermore, Indigenous people are more likely to attend a specialist appointment at an ACCHS than a mainstream facility.<sup>6</sup> Hence, a partnership arrangement where an Indigenous patient attends a video consultation at an ACCHS and consults with a specialist located in a public hospital may be a practical way of improving access to and utilisation of specialist healthcare services for Indigenous patients. This model could be adopted by regional, remote and metropolitan ACCHSs.

## Limitations

There were only a small number of primary studies included in this review. It is likely

there are telehealth services not reported in the scientific or grey literature and so do not contribute to this review. This demonstrates a lack of formal, scientific evaluation on telehealth for the provision of healthcare services to Indigenous Australians.

Evaluation may be hampered not only by incomplete reporting of services but also incomplete reporting of Indigenous status in datasets and the availability of appropriate datasets. For example, a number of published telehealth studies do not report or stratify findings by Indigenous status, even when the patient population is likely to be Indigenous.<sup>44</sup> Further, there are no datasets that can be used to rigorously demonstrate the use of telehealth by Indigenous people. The MBS telehealth item numbers do not discriminate between patients being accompanied by a practice nurse and an Aboriginal Health Practitioner.<sup>45</sup> Hence it is challenging to gain further insight into actual telehealth services provided to Indigenous people from the MBS data. Creating a separate Aboriginal health practitioner accompanied telehealth item number may in the future elucidate further information on the use of telehealth to provide health services to Indigenous people.

Most of the available evidence on the outcomes of telehealth for the provision of healthcare to Indigenous people is descriptive. Further, a number of the included studies potentially lacked rigorous peer-review (conference abstracts and reports) and very small sample sizes (as few as one) were used. This means the evidence is weak and the reported outcomes may be better used as an indicator of the potential of telehealth. The lack of reported negative outcomes raises concerns of publication bias.

## Conclusion

Authors of all primary studies reported beneficial health, process and economic outcomes that have resulted from using telehealth to deliver healthcare for Indigenous Australians. The predominant reason for using telehealth for Indigenous healthcare was to address poor accessibility to health services and for targeted screening. Telehealth has resulted in improved social and emotional wellbeing, improved clinical outcomes, improved access to specialist services, reduced travel and improved screening rates for Indigenous Australians. Indigenous people report positive perceptions of their interaction with

telehealth. These findings are often based on studies which lack rigour and are of variable methodological quality. Hence the outcomes may be better used as an indicator of the potential of telehealth rather than as an evidence-base. Telehealth for the delivery of specialist health services appears to be either under-reported or under-utilised by Indigenous-specific health services. Further work in this area is necessary to show if telehealth can demonstrate further gains in Aboriginal and Torres Strait Islander health.

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## Supporting Information

Additional supporting information may be found in the online version of this article:

**Supplementary Table 1:** Study Characteristics.