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TITLE PAGE

Validation of the Kimberley Indigenous Cognitive Assessment short form (KICA-screen) for Telehealth

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Disclosure Statement

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ABSTRACT

Introduction: Studies show Aboriginal and Torres Strait Islander people are at increased risk of dementia. Whilst there have been several studies evaluating the use of telehealth for improving Aboriginal and Torres Strait Islander health outcomes and studies validating telehealth dementia screening tools for the wider community, none have addressed the pressing need for culturally appropriate telehealth dementia screening for this at-risk population. The aim of the study was to examine the utility of using a culturally appropriate dementia screening tool (KICA-screen) in a telehealth setting.

Methods: A prospective field trial was used to compare administration of the short version of the Kimberley Indigenous Cognitive Assessment (KICA-screen) face to face and via telehealth. A total of 33 Aboriginal and Torres Strait Islander medically stable inpatients or outpatients participated. Stability of KICA-screen scores administered across face to face and via telehealth for each participant was measured.

Results: The two types of test delivery showed not only a good correlation (Pearson's $r = 0.851$; $p < 0.01$) but also good agreement (ICC = 0.85; $p < 0.01$).

Discussion: Results of the assessment showed that the KICA-screen can be reliably administered via videoconference and resulted in comparable scores to face-to-face testing in the majority of cases. The telehealth process was acceptable to participants who were able to understand the process and complete the full screen via telehealth conditions.

INTRODUCTION

One of the major barriers to equitable healthcare delivery in Australia is the limited availability of health services in rural and remote areas¹. Telehealth has been demonstrated to increase accessibility to specialist medical care in rural and remote areas². Unfortunately, those in greatest need are also those with the poorest access to services. Aboriginal and Torres Strait Islander people living in remote areas of Australia have poorer health and more complex health needs and lower life expectancy than the wider Australian population³. They also have poor accessibility to health services and targeted screening for health conditions². Several studies have shown that telehealth is an effective and acceptable method of health care delivery for Aboriginal people. Improvements have been documented in clinical and socio-emotional wellbeing and improved access to health services resulting in higher screening rates^{2, 4-6}. In a recent teleoncology trial in Far North Queensland, all Aboriginal and Torres Strait Islander participants reported satisfaction with videoconferencing. The main benefits included reduced waiting times, costs and burden of travel for patients, remaining within the community, and having family attend appointments⁶.

Several studies have evaluated the efficacy of using telehealth for chronic disease screening and management for remote Aboriginal and Torres Strait Islander communities^{2 7 8} but none have specifically targeted dementia, despite the increased dementia risk identified in these communities. Rates of up to five times higher than the general population being reported in people aged 45 and over together with high rates of vascular risk factors and earlier onset⁹⁻¹¹. Studies show that people with dementia and carers living in Aboriginal and Torres Strait communities are less likely to access dementia services than the wider community or present when the dementia is more advanced^{12 13, 14}. This means they miss out on the benefit so early diagnosis which is critical in dementia, as many of the medications now available provide greater benefit when targeted early in the disease process. Early diagnosis also allows the person with dementia to be actively involved in making decisions and planning for their future and provides patients and carers with access to nonpharmacological interventions and support. Finally, early diagnosis can lead to better management and support for people with dementia and their families to remain at home on country rather than early admission into residential care. Screening can also identify and treat potentially reversible causes of cognitive impairment¹⁵. Diagnosis is a complex and often lengthy process taking around three years on average for people living in mainstream communities¹⁶. Diagnosis may be further delayed in Aboriginal and Torres Strait Islander communities due to the lack of access to

specialist services to assess and diagnose dementia¹⁶ and appropriate assessment tools. With the population of older Aboriginal and Torres Strait Islander people growing and the proportion aged over 65 years projected to nearly double by 2026¹⁷, dementia rates are set to increase exponentially in these communities. This highlights the need for models that will address accessibility to specialist dementia services that includes targeted screening using culturally appropriate assessment tools through a telehealth delivery.

Until recently, there has been a lack of culturally appropriate assessment tools for dementia screening of older Aboriginal and Torres Strait Islander people. The Kimberley Indigenous Cognitive Assessment (KICA-cog) was developed to address this gap¹⁸. The KICA-cog is a pencil and paper test, administered face to face, comprising 16 questions (total score 0 to 39) assessing orientation, free and cued recall, language, verbal fluency, copying sequence pattern and ideational praxis. The test uses simple English to facilitate translation into other languages and items include culturally appropriate pictures (e.g. emu, Aboriginal people, and boomerang) and commonly used objects (matches, comb, and cup). Initially developed for use in remote Aboriginal communities, the KICA has been modified for use in urban settings with a shortened 10-item version for busy primary health settings (KICA-screen) validated for Aboriginal and Torres Strait Islander adults living in Far North Queensland¹⁹.

Geriatrician assessments and dementia screening tools such as the Mini Mental State Examination and Rowland Universal Dementia Assessment Scale have already been validated for telehealth for older adults with or without cognitive impairment and dementia²⁰⁻²³. Having a culturally appropriate screening tool for dementia validated for use via videoconferencing would be a useful tool for health professionals working with rural and remote Aboriginal and Torres Strait Islander communities that do not have direct access to specialist health services. The aim of this study was to evaluate the reliability of the KICA-screen as a dementia screening tool when used via telehealth.

Prior to commencement, ethics approval was obtained from the James Cook University and Cairns and Hinterland Hospital and Health Service Far North Queensland Human Research Ethics Committees. Each participant provided informed consent.

METHODS

Participants

Participants were a convenience sample of Aboriginal and Torres Strait Islander people aged 45 years and older recruited from two local rural health care settings. Firstly, attendees at an outpatient memory clinic outreach service were invited to participate when they attended their memory clinic appointment. These participants either lived in the local Aboriginal community or resided in the local nursing home. Secondly, inpatients of a local hospital, who were identified by hospital staff and invited to participate in the study. Exclusion criteria included severe hearing or visual impairment and being medically unstable.

Materials

The KICA-screen comprises 10 questions assessing orientation, verbal comprehension and fluency, visual naming, executive functioning, memory and praxis. It takes between 5-10 minutes to complete and results in a score ranging from 0 to 25. A cut off score of 21 has been shown to have a sensitivity of 82.4% and specificity of 88.5% for the diagnosis of dementia with the area under the ROC (receiver operating characteristic) curve of 0.87 (95% CI 0.77–0.97)¹⁹. Queensland Health Cisco videoconferencing equipment comprising two 40 inch television screens was used within the hospital setting. Two Apple 9/7 inch iPADS were used in the outreach memory clinic setting as videoconferencing equipment was unavailable.

Procedure

Five researchers trained in administering the KICA-screen conducted the assessments. The KICA screen was administered to each participant twice, once face to face and once using videoconference equipment or two iPads set up in two separate rooms by the same researcher. Order of presentation was alternated between participants to reduce practice effects. Sixteen of the patients received the face to face KICA administration first and 17 received the videoconferencing administration first. Both administrations were completed on the same day to reduce the effect of fluctuating cognitive state, but with a minimum of one hour separation to reduce influence of learning. Administration of the KICA-screen was identical in both administrations. One of the research team sat in the room during telehealth assessments to hand participants a pencil and paper for the praxis task and ensure that vision and hearing aids were used when necessary but did not assist with the actual screen.

Analyses

Standard uni- and bivariate procedures were applied, supplemented by the calculation of an intraclass correlation coefficient (ICC)¹ to measure *agreement* (as opposed to correlation alone) between the numerical KICA scores achieved by the two delivery modes.

RESULTS

A total of 33 Aboriginal and Torres Strait Islander medically stable inpatients or outpatients participated in the study. Mean age of the sample was 62.9 (SD 9.8, range 45-81) and mean education was 9.4 years (SD 1.4, range 7-12). Of these, 21% (n=7) had a previous diagnosis of dementia, 21% (n=7) had mild cognitive impairment, and 57% (n=19) had normal cognition. All eligible participants who were invited to participate agreed to take part in the study.

The median KICA-screen score for the sample was 23 for both face to face and videoconference modes of presentation. Mean scores were 21.36 (SD 3.6, range 8-15) face to face and 21.67 (SD 3.4, range 11-25) via videoconference. The two types of test delivery showed not only a good correlation (Pearson's $r=0.851$; $p<0.01$) but also good agreement (ICC = 0.85; $p<0.01$).

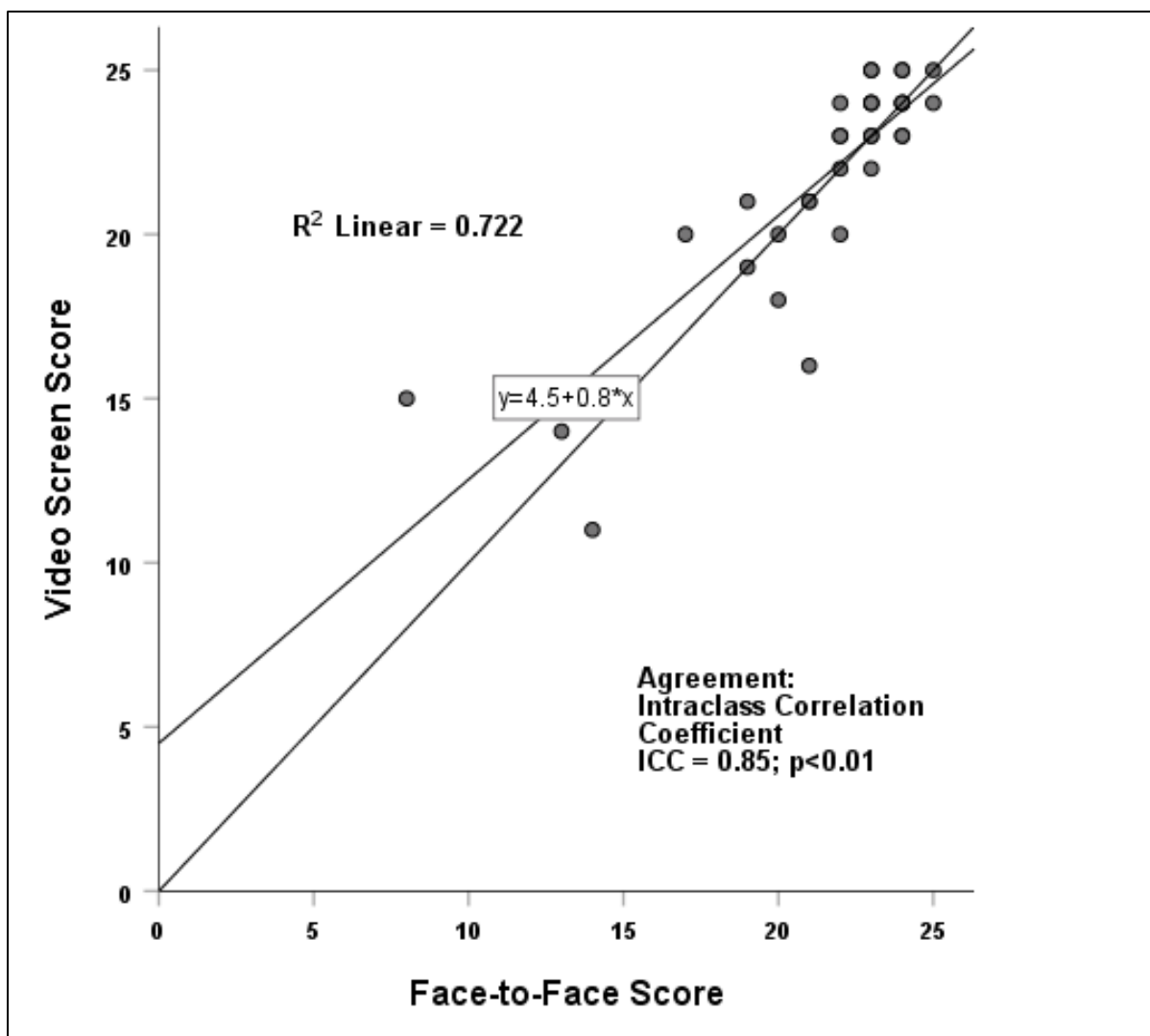


Fig 1. Scatterplot of KICA-screen scores across face to face and videoconference presentations

The scatterplot (Fig 1 above) indicates no systematic difference; the linear regression line is close to the line of identity. The average *absolute* difference of the overall scores between the delivery modes was 1.24 points with a 95% CI of (0.70-1.79). The average *absolute* differences of the single items was generally below 0.4 points – except for the free recall item where an average absolute difference of close to 0.9 was found.

Within individual test scores, there was agreement between face to face and VC scores of +/- 2 in 29 (87.8%) of cases. In 12 of these cases, there was absolute agreement. Three cognitively impaired participants improved by 3-7 points across administrations mainly on delayed free and cued recall items. Nevertheless, their overall scores were consistently below

the cut off of 21. One participant with dementia dropped three points on the second administration, which was the VC administration.

After completing the study, participants were asked to rate their level of satisfaction with the telehealth experience on a visual analogue scale from 1 (strongly disagree) to 5 (strongly agree). Twenty-eight participants completed the questionnaire. All items had a median score of 5. The physical aspects of using telehealth including being able to see and hear () the person clearly on the video technology were rated positively. Two participants preferred face to face, one because it was more personable and another because they could see and hear properly. Nevertheless, most participants felt as comfortable with the video technology as face to face and would be happy to use it again (). Participants were also given the opportunity to provide general comments on their experience with the telehealth process. Three participants identified that not having to travel from communities as being a benefit of telehealth and one participant noted that telehealth would be good for people who are shy around non-Indigenous people and those who have not travelled much from their communities. Only one participant rated the experience negatively, stating that “old people would not understand and do not like video, like a culture thing. It can take the spirit”.

DISCUSSION

The aim of this study was to evaluate the reliability of the KICA-screen as a dementia screening tool when used via telehealth. Despite several studies evaluating the use of telehealth for improving Aboriginal and Torres Strait Islander physical and mental health outcomes and other telehealth studies validating dementia screening tools for the wider community, none have addressed the pressing need for culturally appropriate telehealth dementia screening for this at-risk population.

This study has demonstrated that the KICA-screen can be reliably administered via videoconference and resulted in comparable scores to face-to-face testing for people with dementia, mild cognitive impairment and normal cognition. Overall means of KICA-screen scores for the sample showed not only a good correlation but also good agreement across face to face and via videoconference. These results were comparable to previous studies evaluating other dementia screening tools such as the Mini Mental State Examination²² and Rowland Universal Dementia Assessment Scale²³.

In the majority of cases, participants either obtained the same score across administrations or performed slightly better, as would be expected as counterbalancing may reduce but cannot eliminate the influence of practice effects across the sample. The three cognitively impaired participants that demonstrated more than 2-point difference across administrations all improved the most on the delayed memory recall items. As these participants had low memory scores on the first trial, as expected given their diagnosis, they had room to improve on practice not seen in those who performed better on memory testing initially. Nevertheless, as they had low baseline scores and despite improvement in overall performance, they would still have been identified through the KICA screening process as requiring further evaluation as their scores remained below the cut off of 21. One participant with dementia scored lower on the second administration, which was videoconferencing. Whilst this may be due to factors such as fatigue and reduced attention, it is possible that the mode of presentation influenced the results. This highlights that video conferencing may not be appropriate for everybody. Responses to the evaluation showed that the telehealth process was acceptable to participants, although the importance of adequate hearing and vision was highlighted. When transferring this into clinical practice it is important to ensure availability of someone to sit in the room with the client to hand them test items during telehealth administration and ensure hearing and vision aids are used where required.

The main limitation of the study was the small sample size, which prohibited further analysis across the different diagnostic groups and between items on the KICA-screen. Another limitation was the potential influence of practice effects given that both administrations were within a couple of hours on the same day. However, this was partly due to restrictions within the clinical setting where the study was run, including completion before discharge or ensuring participants did not fluctuate in their cognition due to medical complications.

In conclusion, this study has demonstrated the validity of a culturally appropriate dementia screening tool for telehealth. This is a valuable addition for clinicians working with Aboriginal and Torres Strait Islander clients in remote communities. Dementia screening via telehealth has the potential to reduce the inequitable access to timely dementia diagnosis and care that many rural and remote Aboriginal and Torres Strait Islanders experience.

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