

Overcoming Barriers to Using Telehealth for Standardized Language Assessments

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Abstract

The clinical imperative to provide speech-language pathology services to families outside of the metropolitan area, while accounting for the barriers previously identified, was the impetus for a recent study conducted examining the use of telehealth in Australia (Sutherland et al., 2016). That study found that delivering standardized language assessments via telehealth using consumer grade equipment was feasible, reliable, and tolerated by students with language impairment. In the present article, a follow-up to Sutherland et al. (2016), the barriers to using telehealth are described, along with the steps taken to overcome these barriers in completing the original study. The current article also seeks to describe to the responses of the school-aged students and clinicians involved.

Australians living in rural and remote areas have poorer health and lower life expectancy on average than people living in urban areas (Australian Institute of Health and Welfare, 2008). The difficulties faced by those living in rural and remote areas are compounded by limited access to local health and education services. Speech-language pathology is one of the health professions with a known disparity in workforce distribution between urban and rural settings. A recent senate inquiry into speech pathology services in Australia (Community Affairs References Committee, 2014) found that while the exact number of speech language pathologists (SLPs) in Australia is unknown (given that registration is not currently mandatory), there is evidence to suggest a shortage of SLPs, particularly outside urban areas. The report established that the ratio of SLPs

to population falls as remoteness increases, from 25.9 SLPs per 100,000 people in urban areas to 5.9 per 100,000 people in the most remote areas of Australia. The findings indicated that people in regional centres, rural, and remote locations were more likely to have difficulty accessing speech pathology services, irrespective of whether those services were provided through government or non-government, or private practitioners. While the true picture of the unmet need for speech-language pathology is difficult to estimate, it is clear that services cannot meet all the current needs, and that this lack of services creates a significant risk that people with communication and swallowing impairments in rural and remote areas of Australia will miss out on timely, effective, and affordable assessment and intervention services.

There is evidence to suggest that telehealth is a possible solution to the challenges of distance in accessing speech pathology (Keck & Doarn, 2014). Telehealth is a broad term describing health care services that utilize information communication technology to deliver services. In this article, telehealth is defined as, “(telehealth) is about transmitting voice, data, images and information rather than moving care recipients, health professionals or educators” (Australian Government Department of Health [DoH], 2015). In general, the aim of telehealth services is to overcome the barriers associated with geography and time to bring together health practitioners and the communities that need them. Telepractice is mostly used as outreach to underserved communities (Mashima & Doarn, 2008), although examples of urban applications exist (e.g., Ciccia, Whitford, Krumm, & McNeal, 2011; O’Brian, Smith, & Onslow, 2014). Despite emerging research across both assessment and intervention in a number of areas of speech pathology (e.g., Grogan-Johnson et al., 2013; O’Brian et al., 2014; Sharma, Ward, Burns, Theodoros, & Russell, 2013; Waite, Theodoros, Russell, & Cahill, 2012), uptake of telehealth services has not been widespread in Australia (Nepal, Lim, Jang-Jaccard, Alem, & Dods, 2012) and the barriers to implementing these systems, including technological, financial, and cultural challenges (Jang-Jaccard, Nepal, Alem, & Li, 2014), need to be considered.

Barriers to Using Telehealth: Technological, Financial, and Cultural

The impact of technological and other barriers on the use of telehealth cannot be underestimated. Dunkley, Pattie, Wilson, and McAllister (2010), for example, surveyed SLPs and rural residents in Australia about their attitudes and access to information communication technology (ICT), and described the barriers to the uptake of telehealth services. The primary barriers nominated were the cost of ICT for both SLPs and rural residents along with the need for specific training and support to use the technology. Although numbers and response rates for rural residents were low (43 parent surveys, 42 SLP responses), an important finding was that the rural SLPs believed that the rural families would hold negative attitudes towards the use of telehealth speech pathology services. In fact, the rural residents expressed willingness to trial services provided in this way, in part because of their isolation and lack of alternative services. Families in rural areas also had more access to and regular use of ICT than expected by the authors based on previous research, while rural SLPs had limited access in their workplace. Similarly, Jang-Jaccard et al. (2014), following a review of barriers to delivering telehealth in rural Australia, identified limited access to technology and limited technology skills in both health professional and patient groups as substantial barriers to the uptake of telehealth, along with requirements for high capital expenditure from government stakeholders. In a review focusing on telehealth medical services, Moffatt and Eley (2011) reported on barriers to the use of telehealth which included funding, time, infrastructure, equipment, skills, and a preference for traditional, face-to-face approaches.

A recent study (May & Erikson, 2014) involving SLPs who self-identified as not engaging in telehealth identified similar barriers to its use. Four main barriers emerged from the interviews and telephone interviews of the 18 SLPs: lack of information, limited training, clinician attitude and perceptions, and organization and policy barriers. Many of the therapists had limited exposure to, and limited experience with, any telehealth systems. The authors reported confusion amongst participants about the various modes that telehealth may take, and fear of technology reportedly

played a role in some SLPs' reluctance to use telehealth. The SLPs based in metropolitan areas tended to see the need for telehealth as a rural and remote issue. The authors reported that most clinicians believed telehealth was limited to specialist research and university settings and questioned the ecological and clinical relevance of telehealth research conducted in well-controlled university settings. A number of SLPs expressed concerns that the use of telehealth may compromise their ability to engage, develop rapport, and build relationships with parents in the delivery of paediatric speech pathology services. For a number of therapists, limited access to equipment and the technology required to engage in telehealth was a barrier, particularly in the government sector.

Telehealth Language Assessments

Two previous studies have examined formal language assessments delivered via telehealth. For example, in the first study, Eriks-Brophy, Quittenbaum, Anderson, and Nelson (2008) delivered the *Clinical Evaluation of Language Fundamentals—4th Edition* (CELF-4; Semel, Wiig, & Secord, 2003) and other assessments via telehealth to two Aboriginal children in a remote area of Canada. The results of this study demonstrated the potential of telehealth for language assessments, but it was unclear what telehealth system was used and the very small numbers meant that replication was required. In the second study, Waite et al. (2010) also evaluated the delivery of the CELF-4 via telehealth to school-aged students, finding very good levels of inter- and intra-rater agreement on all measures. This team used a custom built internet-based telehealth application that allowed the use of both pre-recorded and live presentation of materials and included a touch screen at the student's end. The system was trialled between rooms in a university clinic. Waite et al. (2010) described high levels of agreement between the telehealth and face-to-face conditions, but the custom built equipment and completion of the study in a research setting limits its applicability to clinical settings.

Given the potential benefits of telehealth in speech pathology, but the limitations in previous research including the use of research, rather than clinical settings and the use of specialised equipment, a recent study examined the use of telehealth language assessments in a school setting using consumer grade equipment. The study was based in Sydney, New South Wales (NSW) on the east coast of Australia as part of the work of The NSW Centre for Effective Reading (known as "The Centre"). This service is a joint initiative between the NSW Department of Education and NSW Health, and provides assessment and intervention for school-aged students with significant reading difficulties who live in rural and remote parts of the state of NSW, Australia. The assessments include language, cognitive, and literacy assessments completed face-to-face with SLPs, psychologists, and teachers. The service consists of a metropolitan centre and three hubs, two of which are based in rural towns each approximately 400kms from Sydney, with the third in a beach side suburb of Sydney, about 40kms from the metropolitan centre.

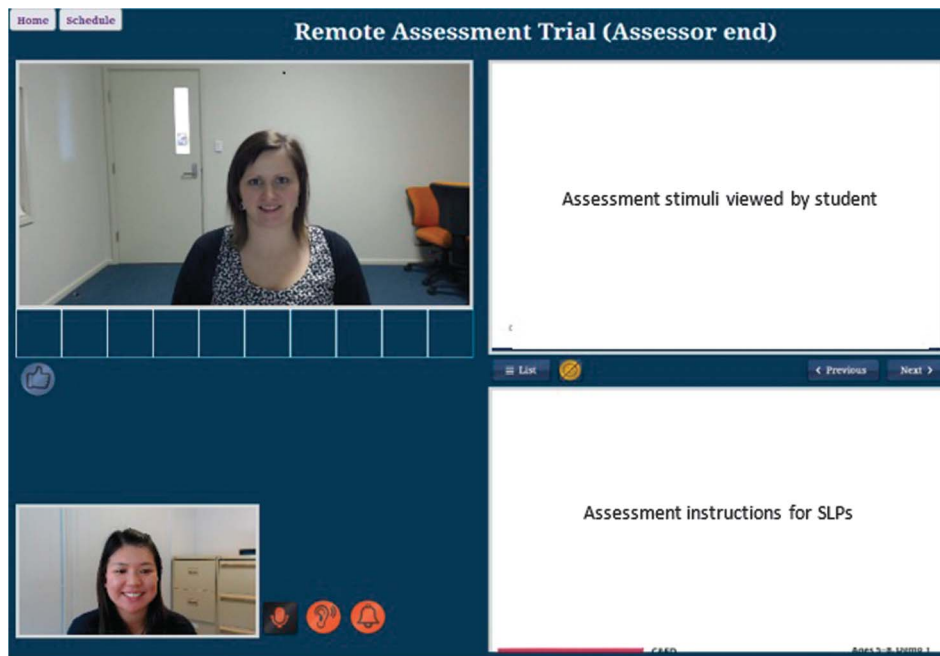
Prior to the study, and due to difficulties recruiting SLPs to work outside of the metropolitan area, The Centre's Sydney based SLPs were flying out to the rural hubs on a weekly basis in order to carry out language assessments for students with significant reading disorders. This model was not sustainable in terms of cost and convenience, as well as being vulnerable to unpredictable variables such as weather conditions affecting air travel. It was clear that an alternative service delivery model was required; one which was cost effective for the service provider (a state education department with budget constraints) and that also provided rural and remote students and families high quality services in their local area. Telehealth was identified as a possible solution; however, there was limited scope for complex or expensive telehealth systems in terms of both budget and expertise. A partnership with National ICT Australia (NICTA, now known as Data61) allowed the trial of a telehealth web-based application with consumer-grade equipment. This allowed for exploration of the possibility of remote language assessment using IT hardware and software typically available in remote community settings, and an opportunity to determine the feasibility and reliability of this approach for a range of students with diverse learning needs. Full data regarding the outcomes of the study in terms of reliability and how well the students tolerated the assessment are reported in Sutherland et al. (2016). In this article, information is presented on

the steps taken to overcome the barriers to the use of telehealth, as well as to describe the responses of students and clinicians.

Methodology

The methodology and quantitative results are described in full in Sutherland et al. (2016). In brief, a telehealth SLP delivered the core subtests of the CLEF-4 (Australasian edition) to 23 students (ages 8–12) in a remote hub using the telehealth interface (see Figures 1–3). A second SLP (i.e., local SLP) located in the same room as the student, facilitated the assessment (turning on the computer, logging into the site), and co-scored the subtests.

Figure 1. Remote Assessment Trial (Assessor End).



Note. Assessor view showing child's face in main screen, the page of the assessment the child can see (top right), the instruction page for the examiner (bottom right), and the examiner as she appears on screen to allow her to monitor her position (bottom left).

Figure 2. Remote Assessment Trial (Child End).

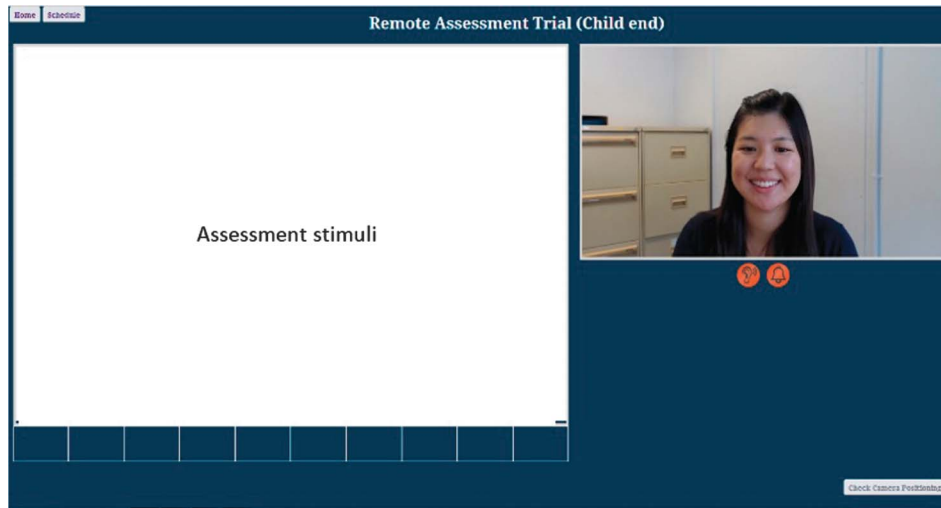
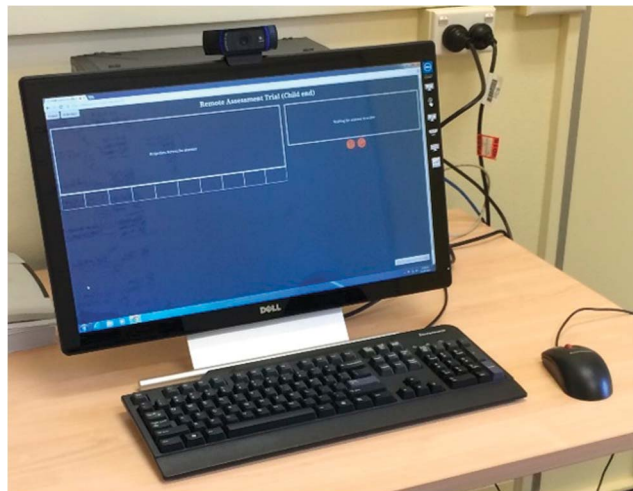


Figure 3. Remote Assessment Trial (Child End).



The local SLP observed and rated the students' behaviour during the telehealth assessment, then delivered the remaining subtests of the CELF-4 and noted the students' behaviour during the face-to-face assessment tasks. The observation rating scale used was adapted from the *Clinical Evaluation of Language Fundamentals–Preschool 2nd edition, Australian and New Zealand (CELF-P2)* behaviour checklist. This checklist contained relevant items for this population and other relevant items, including anxiety level and types of distractors (test equipment and non-test items) were added. Comparisons of the scores recorded by each SLP were made and statistically analysed for similarity. The behaviour scores in each condition were also compared and parents were asked to complete a satisfaction survey.

The face-to-face SLPs in the hubs were asked to provide feedback on a simple 3-point rating scale about their enjoyment of the session and that of the student they were observing and assessing. There were no attempts to elicit specific feedback from the students themselves via survey or questionnaire.

Results

Full results regarding reliability and how well the assessments were tolerated by the students are reported in Sutherland et al. (2016). In short, the study found strong inter-rater reliability in the telehealth and face-to-face conditions (correlation coefficients ranged from $r = 0.96$ – 1.0 across the subtests) and good agreement on all measures, including severity of the language disorders. Similar levels of attention, distractibility, and anxiety were observed across the two conditions. Parent reactions were largely positive.

Overcoming barriers

In order to overcome the perceived barriers to using telehealth and given the clinical, rather than research-based nature of this service, the following issues were addressed:

- *The system needed to be applicable in a real-world setting*, given that it would be implemented in a clinic-based service, not a research facility. It was surmised that implementing telehealth in this way would give confidence to staff within the service to use the system to conduct everyday assessments with students, and help to address clinician perceptions that the utility of telehealth is limited to research settings (May & Erikson, 2014). To this end, all assessments were conducted within the regular assessment centre with the face-to-face SLP taking the role of facilitator during the telehealth assessment condition.
- *There was a need to use consumer grade equipment and internet capacity* to reduce technological and financial barriers associated with bespoke systems reported in previous studies. Neither the metropolitan base nor the “hubs” had the financial capacity or staff expertise to manage complex technological equipment. To use this system, once trialled, staff would rely on facilitators such as teachers or teacher assistants in schools to manage the equipment and as such, simplicity, familiarity and usability were considered to be essential qualities.

The computers used, therefore, were standard issued Department of Education devices with consumer grade webcams (Logitech C920) and speakers (Logitech PC Z130). A commercially available touch screen from Dell (model S2240T) was used in the face-to-face sites. All four sites (online setting and the three face-to-face hubs) were located within the Department of Education public schools and used the Internet connection available to these sites.

- *The assessments needed to be able to be conducted in a public school setting* in order to address Internet access and technological barriers. For a number of therapists, limited access to equipment and the technology required remains a barrier, particularly in the government sector. Moffatt and Eley (2011) similarly identified that comparatively poor Internet access/quality in rural Australia and difficulty accessing computer equipment are significant issues. Internet access, a crucial component of telehealth services, varies according to geographical area (Australian Bureau of Statistics [ABS], 2011), thereby creating another potential barrier to the uptake of these services in rural areas. However, access to the Internet appears widespread, if not universal in schools in NSW (ABS, 2014), providing some potential solutions to the issues of access to technology and Internet services for speech pathology services delivered via telehealth.
- *Use of a web-based interface rather than Skype or similar* to help overcome policy, cultural, and technological barriers. Restrictions on the use of such software exist, particularly in government services and challenges including difficulties downloading

the software and concerns regarding privacy are common. The assessments were delivered via a telehealth application (known as “Coviu”) developed NICTA (now known as Data61). This is a secure specialist web application, and does not require specialised video-conferencing hardware. This enables it to be used securely in clinic and school-based settings. The web interface included synchronized image viewing and remotely visible click-markers for pointing at images as well as video conference functionality (see Figures 1–3). The interface’s technology was designed to prioritize real-time communication, without delays in visual or audio information. This was deemed crucial in building rapport with students and in accurately assessing language skills in real time.

Student and Clinician Experiences

Observations of behaviour were made using a rating scale that considered a range of areas including attention, physical activity level, fatigue and boredom, requests for help, and anxiety. Comparisons of the scores indicated high levels of similarity between the assessment conditions (face-to-face and telehealth) with some differences noted between the assessment hubs (see Sutherland et al., 2016 for full details).

One area of interest was attention and the distractions experienced by the students in each condition. Clinicians in the face-to-face setting were asked to observe whether the students were distracted by items related to test equipment (such as the touch screen or computer in the telehealth condition or the stimulus books in the face-to-face condition) and non-test equipment (such as chairs and environmental sounds) and in which condition these distractors were seen. Nine of the 23 students were rated as distracted in at least one condition. Of these, five were distracted only in the telehealth condition with three of these students distracted by the touchscreen and the remainder by non-test equipment (footstool and chairs). The remaining four students were distracted across both conditions; no students were rated as distracted only in the face-to-face condition. One of these students was distracted only by the chair in both conditions while the other three students were distracted by both test and non-test items. The list of distractors for one student included the webcam, the computer, a window, chair, footrest, environmental sounds, and the clinician’s recording device. The clinician’s feedback about the assessment of this student was that “it may have been beneficial for student to have been exposed to Skype/Facetime or videoconferencing before the assessment so the technology was more familiar to him and less distracting”.

Feedback from the face-to-face SLPs in all the remote hubs indicated that 22 of the 23 students enjoyed using the computer for the assessment. Student comments regarding the assessments were noted by the face-to-face SLP and included the following (names are pseudonyms):

Simon, 8: *(The telehealth SLP) is in Sydney. That’s cool. I love using the computer.*

Evan, 8: *It was fun.*

Kevin, 9: *Lots of fun.*

Evie, 9: *That was more fun than last time (comparing with a previous traditional CELF-4 administration).*

Robbie, 10: *I enjoyed it more than last time (comparing with a previous traditional CELF-4 administration).*

Leo, 10: *It was fun but [I] found it hard to understand what [the telehealth SLP] was saying sometimes. Probably because of her cold.*

The student who did not enjoy the session showed the greatest disparity in his behaviour scores in the telehealth and face-to-face conditions and had cognitive scores in the borderline range of

ability. There were, however, several students with a similar cognitive profile to this student who had positive experiences. It is therefore unclear why he did not enjoy the session.

Clinician Experiences. The local SLPs in two hubs indicated that they enjoyed all the telehealth sessions in which they participated; the third face-to-face SLP indicated that the sessions were “ok”. This hub had a slightly higher number of technical difficulties than the other two and this may have contributed to this less positive experience.

Discussion

This study investigated the possibility of using consumer grade equipment to complete standardized language assessments via telehealth with a particular focus on overcoming the barriers to implementing these types of assessments. Previously reported data from this study found that standardized language assessments delivered via telehealth using consumer grade equipment was feasible, reliable, and tolerated by students with language impairment. There is growing evidence that telehealth has the potential to connect people in remote communities with much needed medical, education, and allied health services, but that barriers to its uptake exist. The present study sought to identify and to mitigate some of these with strategies including the use of consumer grade equipment and Internet capacity, a user friendly system that can be operated with minimal training by support staff in the student’s setting and demonstrating the application of telehealth assessments in schools, rather than a research setting. Difficulties and limitations remain; however, some of which relate to technology such as occasional difficulties with visual or audio quality while others relate to the individual characteristics of the students and clinicians involved. A particular limitation relates to the level of distractibility of some students. While it is clear that some students were distracted in both conditions by a wide range of items, others were distracted by elements related particularly to the telehealth condition. It is possible that this could be mitigated by practice and exposure to a telehealth condition outside of the clinical setting to habituate students to the technology.

High levels of communication were required between the telehealth and face-to-face clinicians throughout the study in order to manage scheduling, parent and student expectations, and to trouble shoot during assessments. Parents and students were provided with written and illustrated information sheets about the process and the telehealth and face-to-face clinicians spoke to parents to ensure they were comfortable with the telehealth situation. The face-to-face SLPs were able to let the telehealth SLP know when minor technological difficulties arose (e.g., occasional sound dropouts, occasional screen freezing, etc.) and a prearranged process was used to resolve these issues. This level of communication was important to the functioning of the study. Moreover, it allowed for smooth administration of the assessments, ensuring that the outcomes were valid and the process positive and non-threatening for the students. Since completion of the study, a practical manual has been written and used by teachers and assistants in the remote to support teachers to facilitate the telehealth assessments in the absence of a face-to-face SLP. This manual includes basic information about setting up the telehealth assessment space and logging on to the website, as well as trouble –shooting hints to facilitate valid and positive assessments outside of the study.

Scope remains for further study of other assessment types delivered via telehealth as well as those that engage with diverse learners, including those on the autism spectrum.

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