Level 1/114 William Street
Me bourne Victoria 3000
T 61 3 9642 4899
F 61 3 9642 4922
office@speechpathologyaustralia.org.au
www.speechpathologyaustralia.org.au

Speech Pathology Australia

21 May 2020

Australian Competition and Consumer Commission
23 Marcus Clarke Street
Canberra ACT 2601
GPO Box 3131
Canberra ACT 2601

Sent via email: adjudication@accc.gov.au

Dear Sir/Madam,

Re: PHA – AA1000487 application for authorisation

Thank you for the opportunity to comment on the above application. Speech Pathology Australia is the national peak body for speech pathologists in Australia, representing over 10,000 members. Speech pathologists are university-trained allied health professionals with expertise in the assessment and treatment of communication and swallowing difficulties.

On 23 March 2020 Private Healthcare Australia contacted Speech Pathology Australia requesting evidence of clinical effectiveness of teleconsultations by both video and by telephone. Speech Pathology Australia provided the attached document outlining the clear need and efficacy of telehealth in speech pathology practice. We strongly support and endorse the move by PHA and its members to broaden private health insurance coverage to include COVID-19 treatments and modes of treatment that substitute for face-to-face interaction or admission to hospital. The introduction of telehealth services for speech pathology has been warmly welcomed by speech pathologists and many of their clients.

As our supporting evidence demonstrates, the provision of telehealth would be beneficial to continue beyond the current temporary measures introduced due to COVID-19, particularly for those in rural and remote communities and for clients with complex communication and/or swallowing needs that require specialised support from a speech pathologist with expertise and experience in the particular condition which may not be available locally.

We would be happy to discuss this further, but trust that the supporting document will provide adequate evidence of the benefits of telehealth for both practitioners and clients. If you do require anything further, please contact me at any time on [redacted] or [redacted].

Thank you for your consideration of this submission.

Yours faithfully,

[redacted]

Gail Mulcair
Chief Executive Officer

Level 1 / 114 William St
Melbourne Victoria 3000
T 61 3 9642 4899
F 61 3 9642 4922
office@speechpathologyaustralia.org.au
www.speechpathologyaustralia.org.au

Speech Pathology Australia

Policy paper on speech pathology and telepractice

This paper provides information and evidence regarding speech pathology service delivery via telepractice and its use during the current COVID-19 pandemic for individuals with communication and swallowing issues.

Summary of key messages:

- Speech Pathology Australia supports the use of telepractice as a service delivery model where telepractice is based on current evidence-based practice and is equivalent to the quality of services delivered onsite, and consistent with standards of clinical care. See the attached Association's Position Statement on *Telepractice in Speech Pathology.*
- There is a strong and further developing body of literature that provides evidence for the use of telepractice in the remote delivery of speech pathology services.
- Clinicians using telepractice are bound by professional practice documents and existing national and facility-based guidelines, ensuring that a telepractice service meets necessary ethical, technical and clinical standards.
- The decision to deliver services using telepractice must be made on a case-by-case basis considering individual client, technical, and environmental factors, with clients providing informed consent.
- Speech Pathology Australia supports the development and implementation of reimbursement and funding models to support the uptake and sustainability of telepractice services.
- Speech Pathology Australia strongly supports use of private health fund rebates to fund speech pathology sessions provided via telepractice.

About speech pathologists and Speech Pathology Australia

Speech Pathology Australia is the national peak body for speech pathologists in Australia, representing over 10,000 members. Speech pathologists are university-trained allied health professionals who specialise in assessing, diagnosing and treating speech, language, communication disorders and swallowing difficulties across the lifespan.

Communication problems encompass difficulties with speaking, hearing, listening, understanding, reading, writing, using social communication skills, and using voice. Communication problems arise from a range of conditions and may be present from birth (e.g. Foetal Alcohol Spectrum Disorder, Down syndrome), emerge during early childhood (e.g. Speech Sound Disorder, Developmental Language Disorder), or be caused by an injury or development of disease (e.g. traumatic brain injury, head or neck cancer). The Australian Bureau of Statistic's *2015 Survey of Disability, Ageing and Carers* (SDAC), estimated that 1.2 million Australians had some level of communication disability.[1]

[1] Australian Bureau of Statistics (2017) Australians living with communication disability, http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/4430.0Mainpercent20Features872015?opendocument&tabname=Summary&prodno=4430.0&issue=2015&num=&view

Swallowing disorders affect the ability to safely swallow food or liquids and can lead to medical complications including chest infections/pneumonia.

What is telepractice

Telepractice is the application of telecommunications technology to deliver clinical services at a distance by linking clinician to client, caregiver, or person(s) responsible for delivering care to the client, for the purposes of assessment, intervention, consultation and/or supervision. Telepractice is also known as telehealth or telerehabilitation. Telepractice has the potential to increase access to speech pathology services across the life span by delivering clinical services that are guided, monitored, or modified by a speech pathologist for each unique client or clinical purpose. As speech pathology services are primarily audio-visual in nature, they are well-suited to the online environment with the majority of assessment and treatment activities able to be digitised and delivered remotely.

Evidence for telepractice and speech pathology

Speech Pathology Australia supports the use of telepractice as a service delivery model where telepractice is based on current evidence-based practice and is equivalent to the quality and frequency of services delivered in person, and consistent with standards of clinical care.

Telepractice is currently being used in the assessment and treatment of a wide range of speech and language disorders, including the following: aphasia, articulation disorders, autism, fluency, language and cognitive disorders, motor speech disorders, neurodevelopmental disabilities and voice disorders, swallowing (dysphagia), hearing impairment and craniofacial and head and neck disorders.

The decision to deliver services using telepractice must be made on a case-by-case basis. As clinical services are based on the unique needs of each individual client, telepractice may not be appropriate in all circumstances or for all clients and candidacy for receiving services via telepractice should be assessed prior to initiating services. The client's culture, education level, age, and other characteristics may influence the appropriateness of speech-language services provided via telepractice.[2] Speech pathologists are well placed to make such decisions about when telepractice sessions are an appropriate method of service delivery. Clinicians providing service using telepractice are bound by professional practice documents including Speech Pathology Australia's Code of Ethics and Parameters of Practice.

Telepractice strategies present opportunities to re-engineer healthcare provision to improve clinical effectiveness, and increase service efficiency among health practitioners, in both cities and rural communities. Changes to healthcare delivery are likely to have positive effects on patient convenience and engagement.

Systematic reviews
A systematic review summarises the results of available research and evidence, this can then be used to inform decisions about the effectiveness, and appropriate use, of interventions.

Table 1 below outlines a sample of the body of research that has been undertaken in the use of telepractice in ***some*** key areas of speech pathology practice. This is not intended as an exclusive list of practice areas where using telepractice. Please refer to Appendix B (updated March 2020) in the Telepractice in Speech Pathology Position Statement for more detail of research studies in telepractice.

[2] The American Speech-Language-Hearing Association (ASHA) Telepractice: Key Issues
https://www.asha.org/PRPSpecificTopic.aspx?folderid=8589934956&section=Key_Issues

Table 1. A sample of research evidence for the use of telepractice in *some* key areas of speech pathology practice

Area of speech pathology practice	Research evidence
Childhood speech and language disorders	
• Assessment of childhood speech and language disorders - Validity and reliability has been established for the use of telepractice in a number of screening and formal language, oromotor, articulation and literacy assessments	Ciccia, Whitford, Krumm, & McNeal, 2011; Crutchley, Dudley, & Campbell, 2010; Eriks-Brophy, Quittenbaum, Anderson, & Nelson, 2008; Fairweather, Parkin, & Rozsa, 2004; Hodge et al 2018; Waite, Cahill, Theodoros, Busuttin, & Russell,2006; Waite, Theodoros, Russell, & Cahill, 2010a, 2010b, 2012
• Multidisciplinary team assessment of young children with multiple disabilities and following paediatric brain injury	Pearl et al, 2014; Kurowski et al., 2013, 2014; Rietdijk, Togher & Power, 2012; Wade S., Carey, J., & Wolfe, C, 2006; Wade et al., 2010
• Speech and language theory for school-aged children	Fairweather, Lincoln & Ramsden, 2016; Grogan-Johnson, Schmidt, Schenker, Alvares, Rowan, & Taylor, 2013; Gabel, Grogan-Johnson, Alvares, Bechstein, & Taylor, 2013; Grogan-Johnson, Alvares, Rowan, & Creaghead, 2010; Grogan-Johnson, et al., 2011
• Therapy for children with Autism Spectrum Disorder and their caregivers	Baharav & Reiser, 2010; Suess et al., 2014; Wacker et al., 2013; Vismara, McCormick, Young, Nadhan, & Monlux, 2013
• Treatment of children with childhood apraxia of speech	Thomas, McCabe, Ballard & Lincoln, 2016
Adult speech and language disorders	
• Feasibility and validity of telepractice for assessment of speech and language disorders for acquired neurological conditions (e.g. Stroke, Parkinson's Disease, traumatic brain injury)	Brennan, Georgeadis, Baron & Barker, 2004; Constantinescu et al., 2010; Georgeadis, Brennan, Barker & Baron, 2004; Hill et al., 2006; Hill, Theodoros, Russell, Ward & Wootton, 2008; Hill, Theodoros, Russell &Ward, 2009a, 2009b; Palsbo, 2007; Parmanto, Pulantara, Schutte, Saptono, & McCue, 2013; Theodoros, Hill, Russell, Ward & Wootton, 2008; Turkstra, Quinn-Padron, Johnson, Workinger, & Antoniotti, 2011
• Comparability between telepractice and in-person treatment of speech, language and cognitive communication disorders	Bergquist et al., 2009; Bergquist, Thompson, Gehl, & Pineda, 2010; Bourgeois, Lenius, Turkstra & Camp, 2007; Constantinescu et al, 2011; Dechene et al., 2011; Forduecy, Glueckauf, Bergquist, Maheu, & Yutsis, 2012; Goldberg, Haley & Jacks, 2012; Griffin, Bentley, Shanks& Wood, 2018; Kurland, Wilkins & Stokes, 2014; Man, Soong, Tam, & Hui-Chan, 2006a, 2006b; Mortley, Wade & Enderby, 2004; Ng, Polatajko, Marziali, Hunt & Dawson, 2013; Riegler, Neils-Strunjas, Boyce, Wade & Scheifele, 2013; Sander, Clark, Atchison & Rueda, 2009; Schoenberg et al., 2008; Soong, Tam, Man, & Hui-Chan, 2005; Theodoros, Hill & Russell, 2016
• Group therapy online – aphasia, speech	Pitt, Theodoros, Hill & Russell, 2019; Pitt, Theodoros,

disorder in Parkinson's Disease	Hill & Russell, 2018; Pitt, Hill, Theodoros & Russell, 2018; Quinn, Park, Theodoros & Hill, 2018.
Stuttering	
• Comparability between telepractice and in-person treatment for children and adults who stutter	Bridgman, Block, Onslow, O'Brian, & Jones, 2014; Bridgman, Onslow, O'Brian, Jones & Block, 2016; Block & Carey, O'Brian, Onslow, Block, Jones, & Packman, 2010; Carey, O'Brian, Onslow, Packman, & Menzies, 2012; Lewis, Packman, Onslow, Simpson, & Jones, 2008; O'Brian, Packman, & Onslow, 2008; O'Brian, Smith, & Onslow, 2014; Wilson, Onslow, & Lincoln, 2004
Swallowing disorders (Dysphagia)	
• Feasibility, reliability and validity of conducting adult clinical bedside swallowing assessments via telepractice	Sharma, Ward, Burns, Theodoros & Russell, 2011; Ward, Sharma, Burns, Theodoros, & Russell, 2012; Ward, Burns, Theodoros, & Russell, 2014
• Consideration of patient factors and management during telepractice	Ward, Sharma. Burns, Theodoros & Russell, 2012
• Clinical dysphagia service evaluation	Ward, Burns, Theodoros & Russell, 2013
• Patient and clinician perceptions of telepractice	Sharma, Ward, Burns, Theodoros & Russell,, 2013
• Feasibility of conducting Videofluoroscopic Swallowing Studies (VFSS) via telepractice	Burns, Ward, Hill, Phillips & Porter, 2016; Malandraki, Markai, Georgopoulos, Bauer, Kalogeropoulos & Nanas, 2013; Malandraki, McCullough, He, McWeeny, & Perlman, 2011
Head and Neck Cancer	
• Assessment and rehabilitation of speech and swallowing following head and neck cancer, most commonly in patients following laryngectomy	Burns, Ward, Hill, Malcolm, Bassett et al., 2012; Ward et al., 2007; Ward et al., 2009 **https://www.youtube.com/watch?v=I1TQ4QJ0Pcw**
• Successful models of care involving service outcomes and cost effectiveness: o Hub and Spoke specialist consultation o Home-based model of care	Hub & Spoke - Burns, Kularatna, Ward, Hill, Byrnes & Kenny, 2017; Burns, Ward, Hill, Kularatna, Byrnes & Kenny, 2017 Home-based - Collins, Burns, Ward, Comans, Blake, Kenny, Greenup & Best, 2017
• Effectiveness of asynchronous telepractice for screening for swallowing, nutrition, and distress in patients undergoing chemo-radiation treatment	Wall, Cartmill, Ward, et al, 2016
• Effectiveness of asynchronous telepractice for self-managed rehabilitation of swallowing disorders o Patient perceptions o Patient adherence o Cost effectiveness	Patient perceptions - Wall, Ward, Cartmill, Hill & Porceddu, 2017a Patient adherence - Wall, Ward, Cartmill, Hill & Porceddu, 2017b Cost effectiveness - Wall, Kularatna, Ward, Cartmill, Hill, Isenring, Byrnes & Porceddu, 2018
Hearing Impairment	
• Communication intervention to children with hearing impairment, and cost effectiveness of telepractice	Blaiser, Behlm, Callow-Heusser, & White, 2013; Constantinescu et al., 2014

Telepractice and Covid-19

Speech Pathology Australia supports the development and implementation of reimbursement and funding models to support the uptake and sustainability of telepractice services. This is particularly necessary to maintain continuity of care during the current COVID-19 pandemic and the disruption to access to speech pathology services it is causing.

For example, our members may not be able to follow appropriate social distancing measures,, as recommended by the Department of Health as parents will accompany children to speech pathology sessions and many of their clinic rooms are likely to be too small to accommodate people in line with directives regarding people to space ratios.

In addition, external service providers such as speech pathologists are no longer allowed to enter some aged care facilities, schools, childcare settings and clients' homes to deliver face to face supports. Therapy services have also ceased because some families are choosing to self-isolate.

It is likely more face to face services will continue to cease over the coming weeks which means there is significant risk that people who have been accessing services on a regular basis will have lengthy breaks in their therapy sessions that could prove detrimental. For example, families self-isolating their children with complex developmental problems such as Autism Spectrum Disorder, Developmental Language Disorder, Childhood Apraxia of Speech, where their support services are funded outside the NDIS, telehealth is not yet an option, any cessation or delay in treatment risks potential regression and long-term reduction in outcomes.

Patients with swallowing difficulties need to be assessed and monitored to ensure safety in eating and drinking, and to provide information for any changes to the texture consistency of food and fluids. These patients typically fall in the high-risk category due to previous stroke, illnesses such as Parkinson's or age-related frailty. If they can't be managed in the community through speech pathology, they will be at significant risk and may need to return to the acute hospital setting. Hospitals which are facing potentially unprecedented demand on their services due to the pandemic.

Telepractice References

Baharav, E., & Reiser, C. (2010). Using telepractice in parent training in early autism. *Telemedicine Journal and e-Health, 16*(6), 727-731.

Bergquist, T., Gehl, C., Mandrekar, J., Lepore, S., Hanna, S., Osten, A., & Beaulieu, W.(2009). The effect of internet-based cognitive rehabilitation in persons with memory impairments after severe traumatic brain injury. *Brain Injury, 23*(10), 790-799.

Bergquist, T., Thompson, K., Gehl, C., & Pineda, J. M. (2010). Satisfaction ratings after receiving Internet-based cognitive rehabilitation in persons with memory impairments after severe acquired brain injury. *Telemedicine Journal and e-Health, 16*(4), 417-423.

Blaiser, K.M., Behl, D., Callow-Heusser, C., & White, K.R. (2013). Measuring costs and outcomes of tele-intervention when serving families of children who are deaf/hard-of-hearing. *International Journal of Telerehabilitation, 5* (2), 3-10.

Bourgeois, M. S., Lenius, K., Turkstra, L., & Camp, C. (2007). The effects of cognitive teletherapy on reported everyday memory behaviours of persons with chronic traumatic brain injury. *Brain Injury, 21*(12), 1245-1257.

Brennan, D. M., Georgeadis, A. C., Baron, C. R., & Barker, L. M (2004). The effect of videoconference-based telerehabilitation on story retelling performance by brain-injured subjects and

its implications for remote speech-language therapy. *Telemedicine Journal and e-Health*, *10*(2), 147-154.

Brennan, D.M., Tindall, L., Brown, J., Campbell, M., Cason, J., Christiana, D., …. Theodoros, D. (2010). A blueprint for telerehabilitation guidelines – October 2010. Retrieved from: http://www.americantelemed.org/docs/default-source/standards/a-blueprint-for-telerehabilitation-guidelines.pdf?sfvrsn=4

Bridgman, K., Block, S., Onslow, M., O'Brian, S., & Jones, M. (2014). Webcam preschool stuttering treatment: outcomes and experiences from a clinical trial. Paper presented at the 10th Oxford Dysfluency Conference, Oxford, United Kingdom.

Bridgman, K., Onslow, M., O'Brian, S., Jones, M., Block, S. (2016). Lidcombe program webcam treatment for early stuttering: a randomized controlled trial. *Journal of Speech Language Hearing Research, 59*, 932-939.

Burns, C., Keir, B., Ward, E.C., Hill, A.J., Farrrell, A., Phillips, N., & Porter, L. (2015). A dynamic image quality evaluation of videofluoroscopy images: Considerations for telepractice applications. *Dysphagia, 30*, 473-481.

Burns, C., Kularatna, S., Ward, E.C., Hill, A.J., Byrnes, J., & Kenny, L. (2017). Cost analysis of a speech pathology synchronous telepractice service for patients with head and neck cancer. *Head and Neck, 39,* 2470-2480.

Burns C.L., Ward E.C., Hill, A.J., Malcolm, K., Bassett, L., Kenny, L.M., Greenup, P. (2012). A pilot trial of a speech pathology telehealth service for head and neck cancer patients. *Journal of Telehealth and Telecare,* 1-4.

Burns, C., Ward, E.C., Hill, A.J., Phillips, N., & Porter, L. (2016). Conducting real-time videofluoroscopic swallowing study via telepractice: A preliminary feasibility and reliability study. *Dysphagia, 31,* 473-483.

Burns, C., Ward, E.C., Hill, A.J., Kularatna, S., Byrnes, J., & Kenny, L. (2017). Randomized controlled trial of a multisite speech pathology telepractice service providing swallowing and communication intervention to patients with head and neck cancer: Evaluation of service outcomes. *Head and Neck.* DOI 10.1002/hed.24706.

Carey, B., O'Brian, S., Onslow, M., Block, S., Jones, M., & Packman, A. (2010). Randomized controlled non-inferiority trial of a telehealth treatment for chronic stuttering: the Camperdown Program. *International Journal of Language & Communication Disorders, 45*, 108-120.

Carey, B., O'Brian, S., Onslow, M., Packman, A., & Menzies, R. (2012). Webcam delivery of the Camperdown Program for adolescents who stutter: A Phase I trial. *Language, Speech, and Hearing Services in Schools, 43*, 370-380.

Ciccia, A.H., Whitford, B., Krumm, M., & McNeal, K. (2011). Improving the access of young urban children to speech, language and hearing screening via telehealth. *Journal of Telemedicine and Telecare, 17,* 240-244.

Collins, A., Burns, C., Ward, E., Comans, T., Blake, C., & Kenny, L. (2017). Home-based telehealth service for swallowing and nutritional management following head and neck cancer. *Journal of Telemedicine and Telecare, 23*, 866-872.

Constantinescu, G., Theodoros, D., Russell, T., Ward, E., Wilson, S., & Wootton, R. (2010). Assessing disordered speech and voice in Parkinson's disease: A telerehabilitation application. *International Journal of Language and Communication Disorders, 45*(6), 630-644.

Constantinescu, G. A., Theodoros, D., Russell, T., Ward, E., Wilson, S., & Wootton, R. (2011). Treating disordered speech and voice in Parkinson's disease online: A randomized controlled non-inferiority trial. *International Journal of Language and Communication Disorders,* 46 (*1*), 1-16.

Constantinescu, G. (2012). Satisfaction with telemedicine for teaching listening and spoken language to children with hearing loss. *Journal of Telemedicine and Telecare, 18,* 267-272.

Constantinescu, G., Waite, M., Dornan, D., Rushbrooke, E., Brown, J., McGovern, J., … Hill, A. (2014). A pilot study of telepractice delivery for teaching listening and spoken language to children with hearing loss. *Journal of Telemedicine and Telecare, 20,* 135-140.

Crutchley, S., Dudley, W., & Campbell, M. (2010). Articulation assessment through videoconferencing: A pilot study. *Communications of Global Information Technology*, *2*, 12-23.

Davis, A., Hopkins, T., & Abrahams, Y. (2012). Maximizing the impact of telepractice through a multifaceted service delivery model at the Shepherd Centre, Australia. *The Volta Review, 112,* 383-391.

Dechêne, L., Tousignant, M., Boissy, P., Macoir, J., Heroux, S., Hamel, M., . . . Page, C. (2011). Simulated in-home teletreatment for anomia. *International Journal of Telerehabilitation, 3*(2), 3-10.

Eriks-Brophy, A., Quittenbaum, J., Anderson, D., & Nelson, T. (2008). Part of the problem or part of the solution? Communication assessments of Aboriginal children residing in remote communities using videoconferencing. *Clinical Linguistics and Phonetics, 22*, 589-609.

Fairweather, C., Parkin, M., & Rozsa, M. (2004). *Speech and language assessment in school-aged children via videoconferencing.* In B.E. Murdoch, J. Goozee, B. Whelan & K. Docking (Eds.), Proceedings of the 26th World Congress of the International Association of Logopaedics and Phoniatrics (IALP) [CD-ROM]. Melbourne, Australia: Speech Pathology Australia.

Fairweather, G., Lincoln, M., & Ramsden, R. (2016). Speech-language pathology teletherapy in rural and remote educational settings: Decreasing service inequities*. International Journal of Speech-Language Pathology, 18,* 592-602.

Forducey, P. G., Glueckauf, R. L., Bergquist, T. F., Maheu, M. M., & Yutsis, M. (2012). Telehealth for persons with severe functional disabilities and their caregivers: Facilitating self-care management in the home setting. *Psychological Services, 9*(2), 144 -162.

Gabel, R., Grogan-Johnson, S., Alvares, R., Bechstein, L., & Taylor J. (2013). A field study for telepractice intervention using the ASHJA NOMS K-12 database. *Communication Disorders Quarterly, 35,* 44-53.

Georgeadis, A. C., Brennan, D. M., Barker, L. M., & Baron, C. R. (2004). Telerehabilitation and its effect on story retelling by adults with neurogenic communication disorders. *Aphasiology, 18*(5-7), 639-652.

Glazer, C.A., Bailey, P.J., Icaza, I.L., Valladares, S.J., Steere, K.A., Rosenblatt, E.S., & Byrne, P.J. (2011). Multidisciplinary care of international patients with cleft palate using telemedicine. *Archives of Facial Plastic Surgery, 13,* 436-438.

Goldberg, S., Haley, K. L., & Jacks, A. (2012). Script training and generalization for people with aphasia. *American Journal of Speech-Language Pathology, 21*(3), 222-238.

Griffin, M., Bentley, J., Shanks, J., & Wood, C. (2018). The effectiveness of the Lee Silverman Voice treatment therapy issued interactively through an iPad device: a non-inferiority study. *Journal of Telemedicine and Telecare, 24,* 209-215.

Grogan-Johnson, S., Alvares, R., Rowan,L., & Creaghead, N., (2010). A pilot study comparing the effectiveness of speech language therapy provided by telemedicine with conventional on-site therapy. *Journal of Telemedicine and Telecare, 16,* 134-139.

Grogan-Johnson, S., Gabel, R., Taylor, J., Rowan, L., Alvares, R., & Schenker, J., (2011). A pilot exploration of speech sound intervention delivered by telehealth to school-aged children. *International Journal of Telerehabilitation, 3*, 39-42

Grogan-Johnson, S., Schmidt, A.M., Shenker, J., Alvares, R., Rowan, L.E., & Taylor, J. (2013). A comparison of speech sound intervention delivered by telepractice and side-by-side service delivery models. *Communication Disorders Quarterly, 34,* 210-220.

Hill, A. J., Theodoros, D. G., Russell, T. G., Cahill, L. M., Ward, E. C., & Clark, K. M. (2006). An Internet-based telerehabilitation system for the assessment of motor speech disorders: A pilot study. *American Journal of Speech Language Pathology, 15*(1), 45-56.

Hill, A., Theodoros, D., Russell, T., Ward, E., & Wootton, R. (2008). The effects of aphasia severity upon the ability to assess language disorders via telerehabilitation. *Aphasiology, 23*(5), 627–642.

Hill, A.J., Theodoros, D.G., Russell, T.G., & Ward, E.C. (2009a). The redesign and re-evaluation of an Internet-based telerehabilitation system for the assessment of dysarthria in adults. *Telemedicine Journal and e-Health*, *15* (9), 840-850.

Hill, A., Theodoros, D., Russell, T., & Ward, E. (2009b). Using telerehabilitation to assess apraxia of speech in adults. *International Journal of Language and Communication Disorders, iFirst Article*, 1–17.

Hodge, M.A…….Silove, N. (2018). Literacy assessment via telepractice is comparable to face-to-face assessment in children with reading difficulties living in rural Australia. *Telemedicine and e-Health.* Doi: 10.1089/tmj.2018.0049.

Howell, S., Tripoliti, E., & Pring, T. (2009). Delivering the Lee Silverman Voice Treatment (LSVT) by web camera: a feasibility study. *International Journal of Language and Communication Disorders, 44* (*3*), 287-300.

Keck, C.S. & Doarn, C.R. (2014). Telehealth technology applications in speech-language pathology. *Journal of Telemedicine and e-Health, 20* (7), 1-7.

Kurland, J., Wilkins, A. R., & Stokes, P. (2014). iPractice: Piloting the effectiveness of a tablet-based home practice program in aphasia treatment. *Seminars in Speech and Language, 35*(1), 51-63.

Kurowski, B. G., Wade, S. L., Kirkwood, M. W., Brown, T. M., Stancin, T., & Taylor, H. G. (2013). Online problem-solving therapy for executive dysfunction after child traumatic brain injury. *Pediatrics, 132*(1), e158-166.

Kurowski, B. G., Wade, S. L., Kirkwood, M. W., Brown, T. M., Stancin, T., & Taylor, H. G. (2014). Long-term benefits of an early online problem-solving intervention for executive dysfunction after traumatic brain injury in children: A randomised clinical trial. *JAMA Pediatrics, 168* (6), 523-531.

Lalios, A.P. (2012). Connect*Hear* teleintervention program. *The Volta Review, 112*, 357-364.

Lewis, C., Packman, A., Onslow, M., Simpson, J. M., & Jones, M. (2008). A phase II trial of telehealth delivery of the Lidcombe Program of early stuttering intervention. *American Journal of Speech-Language Pathology, 17*, 139-149.

Malandraki, G. A., McCullough, G., He, X., McWeeny, E., & Perlman, A. L. (2011). Teledynamic evaluation of oropharyngeal swallowing. *Journal of Speech Language and Hearing Research, 54* (6), 1497-1505.

Malandraki, G.A., Markaki, V., Georgopoulous,V.C., Bauer, J.L., Kalogeropoulos, I., & Nanas, S. (2013). An international pilot study of asynchronous teleconsultation for oropharyngeal dysphagia. *Journal of Telemedicine and Telecare,* 19, 75-79.

Man, D. W. K., Soong, W. Y. L., Tam, S. F., & Hui-Chan, C. W. Y. (2006a). A randomized clinical trial study on the effectiveness of a tele-analogy-based problem-solving programme for people with acquired brain injury (ABI). *NeuroRehabilitation, 21*, 205-217.

Man, D. W. K., Soong, W. Y. L., Tam, S. F., & Hui-Chan, C. W. Y. (2006b). Self-efficacy outcomes of people with brain injury in cognitive skill training using different types of trainer-trainee interaction. *Brain Injury, 20*(9), 959-970.

Mortley, J., Wade, J., & Enderby, P. (2004). Effectiveness of computerised rehabilitation for long-term aphasia: A case series study. *British Journal of General Practice, 54,* 856-857.

NHMRC. (2008). NHMRC additional levels of evidence and grades for recommendations for developers of guidelines – Stage 2 consultation. Canberra: National Health and Medical Research Council.

National Initiative for Telehealth Guidelines. (2003). National Initiative for Telehealth (NIFTE) framework of guidelines. Ottawa: NIFTE.

Nelson, E-L., & Palsbo, S. (2006). Challenges in telemedicine equivalence studies. *Evaluation and Program Planning*, 29, 419-425.

Ng, E. M., Polatajko, H. J., Marziali, E., Hunt, A., & Dawson, D. R. (2013). Telerehabilitation for addressing executive dysfunction after traumatic brain injury. *Brain Injury, 27*(5), 548-564.

O'Brian, S., Packman, A., & Onslow, M. (2008). Telehealth delivery of the Camperdown Program for adults who stutter: A phase I trial. *Journal of Speech, Language and Hearing Research*, *51*, 184-195.

O'Brian, S., Smith, K., Onslow, M. (2014). Webcam delivery of the Lidcombe Program for early stuttering: A phase I clinical trial. *Journal of Speech, Language, and Hearing Research*, *57*, 825-830.

Palsbo, S. E. (2007). Equivalence of functional communication assessment in speech pathology using videoconferencing. *Journal of Telemedicine and Telecare*, *13*(1), 40-4.

Parmanto, B., Pulantara, I. W., Schutte, J. L., Saptono, A., & McCue, M. P. (2013). An integrated telehealth system for remote administration of an adult autism assessment. *Telemedicine journal and e-health, 19*(2), 88-94.

Pearl, P. L., Sable C., Evans S., Knight J., Cunningham P., Latrecchiano G.R., Gropman, A., Stuart S., Glass P., Conway A., Ramadan I., Paiva T., Batshaw M.L. & Packer R.J. (2014) International telemedicine consultations for neurodevelopmental disabilities. *Telemedicine Journal and e-Health,* Vol.20, No. 6.

Pitt, R., Theodoros, D., Hill, A. J., & Russell, T. (2017). The development and feasibility of an online aphasia group intervention and networking program – TeleGAIN. International Journal of Speech-Language Pathology, 1-14. i:10.1080/17549507.2017.1369567

Pitt, R., Theodoros, D., Hill, A.J., & Russell, T. (2018). The impact of the Telerehabilitation Group Aphasia Intervention and Networking program on communication, participation and quality of life in people with aphasia. *International Journal of Speech-Language Pathology.* doi.org/10.1080/17549507.2018.1488990

Quinn, R., Park, S., Theodoros, D.,& Hill, A.J. (2018). Delivering speech maintenance therapy to people with Parkinson's disease via telerehabiltiation: a pilot study. *International Journal of Speech-Language Pathology*. doi.org/10.1080/17549507.2018.1476918.

Riegler, L. J., Neils-Strunjas, J., Boyce, S., Wade, S. L., & Scheifele, P. M. (2013). Cognitive intervention results in web-based videophone treatment adherence and improved cognitive scores. *Medical Science Monitor, 19*, 269-275.

Rietdijk, R., Togher, L., & Power, E., (2012). Supporting family members of people with traumatic injury using telehealth: A systematic review. *Journal of Rehabilitation Medicine, 44*, 913-921

Sander, A. M., Clark, A. N., Atchison, T. B., & Rueda, M. (2009). A web-based videoconferencing approach to training caregivers in rural areas to compensate for problems related to traumatic brain injury. *Journal of Head Trauma Rehabilitation, 24*(4).

Schoenberg, M. R., Ruwe, W. D., Dawson, K., McDonald, N. B., Houston, B., & Forducey, P.G. (2008). Comparison of functional outcomes and treatment cost between a computer based cognitive rehabilitation teletherapy program and a face-to-face rehabilitation program. *Professional Psychology: Research and Practice, 39*(2), 169-175.

Sharma, S., Ward, EC., Burns, C., Theodoros, D. G., & Russell, T. (2011) Assessing swallowing disorders online: a pilot telerehabilitation study. *Telemedicine Journal and e-Health*, *17* (9), 688-695.

Soong, W., Tam, S. F., Man, W. K., & Hui-Chan, C. (2005). A pilot study on the effectiveness of tele-analogy-based problem-solving training for people with brain injuries. *International Journal of Rehabilitation Research, 28*, 341-347.

Suess, A., Romani, P., Wacker, D., Dyson, S., Kuhle, J., Lee, J., . . . Waldron, D. (2014). Evaluating the treatment fidelity of parents who conduct In-home functional communication training with coaching via telehealth. *Journal of Behavioral Education, 23*(1), 34-59.

Theodoros, D.G. (2008). Telerehabilitation for service delivery in speech-language pathology. *Journal of Telemedicine and Telecare*, *14* (5), 221-224.

Theodoros, D., Hill, A. J., Russell, T., Ward, E., Wootton, R. (2008). Assessing acquired language disorders in adults via the Internet. *Telemedicine Journal and e-Health, 14(*6), 552-559.

Theodoros, D.G. (2012). A new era in speech-language pathology practice: Innovation and diversification. *International Journal of Speech-Language Pathology*, *14* (3), 189-199.

Theodoros, D. G., Hill, A. J., & Russell, T. G. (2016). Clinical and Quality of Life Outcomes of Speech Treatment for Parkinson's Disease Delivered to the Home Via Telerehabilitation: A Noninferiority Randomized Controlled Trial. *American Journal of Speech-Language Pathology, 25*, 214-232.

Thomas, D., McCabe, P., Ballard, K., & Lincoln, M. (2016). Telehealth delivery of Rapid Syllable Transitions (ReST) treatment for childhood apraxia of speech. *International Journal of Speech-Language Pathology, 6*, 654-671.

Turkstra, L. S., Quinn-Padron, M., Johnson, J. E., Workinger, M. S., & Antoniotti, N. (2011). In-person versus telehealth assessment of discourse ability in adults with traumatic brain injury. *The Journal of Head Trauma Rehabilitation*, *27* (6), 424-432.

Vismara, L. A., McCormick, C., Young, G. S., Nadhan, A., & Monlux, K. (2013). Preliminary findings of a telehealth approach to parent training in autism. *Journal of Autism & Developmental Disorders, 43*(12), 2953-2969.

Wacker, D., Lee, J., Padilla Dalmau, Y., Kopelman, T., Lindgren, S., Kuhle, J., . . . Waldron, D. (2013). Conducting functional communication training via telehealth to reduce the problem behavior of young children with autism. *Journal of Developmental and Physical Disabilities, 25*(1), 35-48.

Wade, S., Carey, J., & Wolfe, C. (2006). The efficacy of an online cognitive-behavioral family intervention in improving child behavior and social competence following pediatric brain injury. *Rehabilitation Psychology, 51*(3), 11.

Wade, S., Walz, N. C., Carey, J., Williams, K. M., Cass, J., Herren, L., . . . Yeates, K. O. (2010). A randomized trial of teen online problem solving for improving executive function deficits following pediatric traumatic brain injury. *The Journal of Head Trauma Rehabilitation, 25*(6), 409-415.

Waite, M.C., Cahill, L. M., Theodoros, D.G., Busuttin, S., & Russell, T.G. (2006). A pilot study of online assessment of childhood speech disorders. *Journal of Telemedicine and Telecare, 12*(Suppl. 3), 92-94.

Waite, M.C., Theodoros, D.G., Rusell, T.G., & Cahill, L.M. (2010a). Assessment of children's literacy via an Internet-based telehealth system. *Telemedicine Journal and e-Health, 16,* 564-575.

Waite, M.C., Theodoros, D.G., Russell, T.G., & Cahill, L.M. (2010b). Internet-based telehealth assessment of language using the CELF-4. *Language, Speech, and Hearing Services in Schools, 41*, 445-458.

Waite, M.C., Theodoros, D.G., Russell, T.G., & Cahill, L.M. (2012). Assessing children's speech intelligibility and oral structures, and functions via an Internet-based telehealth system. *Journal of Telemedicine and Telecare, 18*, 198-203.

Wall, L., Cartmill B., Ward, E., Hill, A., Isenring, E., Byrnes, J., Chambers, S., Dunn, J., Nixon, J., Whelan, J., & Porceddu, S. (2016). “ScreenIT”: Computerized screening of swallowing, nutrition and distress in head and neck cancer patients during (chemo)radiotherapy. *Oral Oncology, 54*, 47-53.

Wall, L., Ward, E., Cartmill, B., Hill, A., & Porceddu, S. (2017). Examining user perceptions of SwallowIT: A pilot study of a new telepractice application for delivering intensive swallowing therapy to head and neck cancer patients. *Journal of Telemedicine and Telecare, 23*, 53-59.

Wall, L., Ward, E., Cartmill, B., Hill, A., & Porceddu, S. (2017).Adherence to prophylactic swallowing therapy program during (chemo) radiotherapy: Impact of service-delivery model and patient factors. *Dysphagia, 32*, 279-292.

Wall, L., Ward, E., Cartmill, B., Hill, A., Isenring, E., Byrnes, J., & Porceddu, S. (2018). Economic analysis of a three-arm RCT exploring the delivery of intensive prophylactic swallowing therapy to patients with head and neck cancer during (chemo) radiotherapy. Dysphagia. DOI 10.1002/hed.24706.

Ward, E., White, J., Russell, T., Theodoros, D., Kuhl, M., Nelson, K., Peters, I. (2007). Assessment of communication and swallowing function post laryngectomy: A telerehabilitation trial, *Journal of Telemedicine and Telecare*, *3* (3), 88-91.

Ward, E., Crombie, J., Trickey, M., Hill, A., Theodoros, D., Russell, T. (2009). Assessment of communication and swallowing post-laryngectomy: A telerehabilitation trial. *Journal of Telemedicine and Telecare*, *15* (5), 232-237.

Ward, E.C., Sharma, S., Burns, C., Theodoros, D.G., & Russell, T.(2012). Validity of conducting clinical dysphagia assessments with patients with normal to mild cognitive impairments via telerehabilitation. *Dysphagia, 27*(4), 460-472.

Ward, E.C., Burns, C., Theodoros, D.G., & Russell, T. G. (2014). Impact of dysphagia severity on clinical decision making via telerehabilitation. *Telemedicine Journal and e-Health, 20* (4), 296-303.

Ward, E.C. & Burns, C.L. (2014). Dysphagia management via telerehabilitation: A review of the current evidence. *Journal of Gastroenterology and Hepatology Research*, 3 (5), 1088-1094.

Wilson, L., Onslow, M., & Lincoln, M. (2004). Telehealth adaptation of the Lidcombe Program of early stuttering intervention: five case studies. *American Journal of Speech-Language Pathology, 13*, 81-93.

Woolfe et al (2016). A comparison of remote therapy, face-to-face therapy and an attention control intervention for people with aphasia: a quasi-randomised controlled feasibility study. *Clinical Rehabilitation, 30,* 359-373.

Level 1 / 114 William Street T 61 3 9642 4899 office@speechpathologyaustralia.org.au
Melbourne Victoria 3000 F 61 3 9642 4922 www.speechpathologyaustralia.org.au

Speech Pathology Australia

Position Statement

Telepractice in Speech Pathology

Acknowledgements

Project Officer

BURNS, Clare	Speech Pathologist – Advanced, Royal Brisbane & Women's Hospital, QLD & Doctoral student, School of Health and Rehabilitation Sciences, The University of Queensland, QLD.
HILL, Dr Anne	Postdoctoral Research Fellow, Centre of Research Excellence in Telehealth, School of Health and Rehabilitation Sciences, The University of Queensland, QLD.

Speech Pathology Australia

BALDAC, Stacey	Senior Advisor of Professional Standards & Practice Document Coordinator

Working Party

COOK, Melissa	Speech Pathologist, DARE Speech Pathology, Toowong, QLD.
ERICKSON, Dr Shane	Lecturer, Department of Human Communication Sciences, La Trobe University, VIC.
GARNETT, Robyn	Director, Clear Messages, Ballarat, VIC.
LOWE, Dr Robyn	Postdoctoral Research Associate, Australian Stuttering Research Centre, The University of Sydney, NSW.
MARTINOVICH, Julia	Implementation Project Officer (Telehealth), Agency of Clinical Innovation, Sydney, NSW.
MAY, Jodie	Private practitioner, JM Speech Pathology, Willunga, SA.
RIETDIJK, Rachael	Doctoral student, Faculty of Health Sciences, The University of Sydney, NSW.
WAITE, Dr Monique	STEPS Project Manager and Research Fellow, School of Allied Sciences, Griffith University, QLD.
WARD, Professor Liz	Professor, Centre for Functioning and Health Research, Queensland Health, and conjoint Professor, School of Health and Rehabilitation Sciences, The University of Queensland, QLD.

Contents

1. Background

The idea of using information and communication technology to enhance speech pathology practice is not new. Research into telepractice has been conducted since the 1970s. However, the rapid growth in inexpensive, sophisticated technology, coupled with expanding access to communication networks, has led to widespread professional interest in this service delivery model. In response to this, some professional associations are developing position statements and guidelines for the use of telepractice in speech pathology. Given Australia's geographically dispersed population and the consequent inequity of access to services, as well as the increasing demand for speech pathology services, Speech Pathology Australia has developed this position statement on telepractice.

This position statement has been produced to assist speech pathologists considering implementing telepractice in the Australian context. It may also be of use when lobbying for new service delivery models to meet increasing demand for speech pathology services. The position statement has been informed by current available evidence on the use of telepractice (published between 2004-2014), existing national and international position statements and guidelines (see ACCRM, 2012; ASHA, n.d; ATA, 2014; Brennan et al., 2010; CALSPA, 2006; National Initiative for Telehealth Guidelines, 2003) professional community consultation, and consensus opinion. A summary of the current evidence for the delivery of speech pathology services via telepractice is available in Appendix A. This summary is further supplemented by specific information regarding the levels of evidence. The Australian National Health and Medical Research Council (NHMRC) Evidence Hierarchy has been used to grade the evidence. This supplementary information is available in Appendix B.

2. Definitions

2.1 Definition of telepractice

Telepractice is the application of telecommunications technology to deliver clinical services at a distance by linking clinician to client, caregiver, or any person(s) responsible for delivering care to the client, for the purposes of assessment, intervention, consultation and/or supervision.

Integral to telepractice is the delivery of clinical services over any distance that are guided, monitored, or modified by a speech pathologist for each unique client or clinical purpose. Telepractice has the potential to increase access to speech pathology services across the life span.

"Telepractice" can also be known by these terms: *telehealth, telerehabilitation, telespeech, or teleSLP.*

Telepractice forms part of a larger concept known as e-Health which is a term given to electronic processes and communication technology which supports healthcare practice. E-Health includes, but is not limited to electronic medical records and technology-delivered self-guided consumer education and training (e.g. therapy software apps). While integral to the provision of healthcare, they are not within the scope of this document.

2.2 Telepractice models of service delivery

Telepractice may encompass individual sessions, group sessions, specialist clinical consultation, and clinical training/supervision. Telepractice service delivery may be provided between individual sites or multiple sites. Telepractice encompasses synchronous (real-time delivery) or asynchronous (delayed delivery/store and forward) formats. A hybrid model is also utilised which combines these two technologies (e.g. videoconferencing with store and forward capabilities) to optimise clinical decision making in the presence of unreliable infrastructure/connectivity (Keck & Doarn, 2014). The technologies that are associated with telepractice include the clinical use of videoconferencing (both hardware and software), teleconferencing, email, and store and forward of clinical data.

3. The Position of Speech Pathology Australia

The following statements articulate the position of Speech Pathology Australia (The Association) on regarding telepractice in speech pathology practice. These statements have been informed by current evidence, national and international aged care policy and recommendations, and consensus opinion.

3.1 Speech Pathology Australia supports the use of telepractice as a service delivery model where telepractice is based on current evidence-based practice and is at least equivalent to standard clinical care.

Telepractice services should be implemented based on current evidence and offered with at least the same level of access and frequency of intervention, such that the telepractice service is at least equivalent to the current clinical care. Endorsement should be obtained from the relevant service provider/organisation prior to implementing a telepractice service. Those clinical services with little existing evidence using telepractice should be developed and implemented utilising an approach that follows concept development, pilot testing, implementation, and evaluation of the new service against standard clinical care. Established telepractice services, as with standard care, should undergo routine review to determine if outcomes are being met and maintained.

3.2 Clinicians using telepractice are bound by professional practice documents and existing national and facility based guidelines as per standard clinical care, ensuring that a telepractice service meets necessary technical and clinical standards.

As with standard care, clinicians using telepractice are bound by professional practice documents including Speech Pathology Australia's Code of Ethics (Speech Pathology Australia, 2010), Parameters of Practice (Speech Pathology Australia, 2007), Credentialing Position Statement (Speech Pathology Australia, 2009) and existing national and facility based guidelines. Speech pathologists engaging in telepractice should possess the necessary knowledge and skills to provide the level of clinical service required, as they would in standard care.

3.3 The appropriateness to deliver services using telepractice must be made on a case-by-case basis considering individual client, technical and environmental factors, with clients providing informed consent.

Clinicians should evaluate an individual client's needs and determine if the clinical procedures can be appropriately modified for implementation within a telepractice model. Client eligibility and selection should consider physical and sensory (vision/hearing) status, cognitive functioning including attention and concentration, presence and severity of communication deficits, cultural and linguistic diversity, technical availability and capacity, the physical environment in which to conduct the service, and the availability of trained staff/carer to support the telepractice sessions. Informed consent should be obtained from both service providers and clients prior to engaging in a telepractice service, including disclosure regarding the benefits and limitations of the telepractice service and any alternatives to telepractice care.

3.4 Opportunities for feedback must be available to all consumers engaged in a telepractice service with avenues for reporting to the governing service provider.

Consumer engagement is imperative to support service acceptance and to overcome barriers for telepractice service implementation and sustainability. Processes should be developed to enable both clients and service providers to give feedback regarding the telepractice service during its development, implementation, and review. Consumer feedback should also be utilised for sustaining, improving and expanding telepractice services.

3.5 Clinicians must have competency in the clinical service being delivered and the operation of the telepractice equipment being used to deliver the service.

Clinicians undertaking telepractice should be appropriately trained to operate the telepractice equipment and deliver the modified clinical service. This knowledge and skill base should be reviewed, maintained, and updated to meet advancements in technology and telepractice services. Any training required is the responsibility of the service provider and must be maintained in accordance with clinical and operational standards.

3.6 Organisations engaging in telepractice must have access to technical support such that equipment is selected, configured, maintained, and upgraded to meet the necessary clinical and service requirements.

A thorough understanding is required of the telepractice environment (site based versus home based services) and the telepractice systems (i.e. hardware vs software/mobile devices) to be used. This includes audio-visual capability, peripheral devices, interoperability between the prospective systems and network quality. Telepractice services should be supported as per standard care. The physical environment in which the service is delivered should be safe, confidential, and modified (e.g., lighting) to optimise the telepractice session. Adherence to relevant policies and regulations regarding technology and technical safety are essential. Compliance with Australian privacy legislation must be met to ensure client-clinician confidentiality is maintained when utilising the chosen technological platform/network (e.g. videoconferencing via secure versus insecure networks). Appropriate workplace documentation (i.e. health information) and procedures (e.g. infection control) should also be followed.

3.7 Speech Pathology Australia supports educational opportunities to stimulate and facilitate the development of telepractice knowledge and skills to progress the application of telepractice in clinical and professional services.

The uptake and sustainability of telepractice as a model of care requires that educational programs include evidence-based theoretical and practical training of telepractice in their curriculum. Ideally these educational programs should enable students to suitably determine and facilitate the translation of current clinical services into a telepractice model, where appropriate.

3.8 Speech pathology services using telepractice should evaluate clinical, economic and consumer outcomes to guide the implementation, expansion, and sustainability of telepractice services.

Financial costs (e.g. human, capital and technological resources) should be considered when establishing and maintaining a telepractice service. Identifying the benefits and cost effectiveness of telepractice services is essential for development, uptake and sustainability.

3.9 Speech Pathology Australia supports the development and implementation of reimbursement and funding models to support the uptake and sustainability of telepractice services.

Within Australia, there are currently limited reimbursement models for telepractice delivered by speech pathologists and this contributes to the barriers for uptake of telepractice in public and private speech pathology services. Although some speech pathology studies have reported the potential for cost savings using telepractice, further research is required to advocate for mainstream reimbursement for telepractice services in speech pathology.

3.10 Speech Pathology Australia acknowledges the need for continued high quality research into the application of telepractice to speech pathology services in order to expand the evidence-base for this service delivery model.

The current evidence for telepractice delivery of speech pathology services is steadily growing. However, further funding is required to support high quality research projects that promote the

implementation of telepractice into speech pathology services. Appendix A summarises the current evidence.

4. Conclusion

The purpose of this position paper is to highlight to speech pathologists and service organisations the key issues to be considered when designing and implementing telepractice services. This position statement has also been produced to inform policy makers, government, and funding bodies of the evidence-base for using telepractice in speech pathology services.

Speech Pathology Australia recognises that telepractice may address some of the issues of inequity of access to speech pathology services in Australia and that demand for this service delivery model is increasing. It is critical that the outcomes from speech pathology services using telepractice are at least comparable to current clinical care. In addition telepractice services may offer the opportunity to enhance existing models of care. Speech Pathology Australia acknowledges that the evidence-base for telepractice is rapidly evolving and that as technology and communication infrastructure becomes more sophisticated and accessible this evidence-base will continue to grow.

References

American Speech-Language Hearing Association (ASHA). (n.d.). Professional issues: Telepractice. Retrieved from: http://www.asha.org/PRPSpecificTopic.aspx?folderid=8589934956&section=Key_Issues

American Telemedicine Association. (2014). Core operational guidelines for telehealth services involving provider-patient interactions. Retrieved from: http://www.americantelemed.org/docs/default-source/standards/core-operational-guidelines-for-telehealth-services.pdf?sfvrsn=4

Australian College of Rural and Remote Medicine (ACCRM). (2012). ACRRM telehealth advisory committee standards framework. Retrieved from: http://www.ehealth.acrrm.org.au/system/files/private/ATHAC%20Telehealth%20Standards%20Framework_0.pdf

Baharav, E., & Reiser, C. (2010). Using telepractice in parent training in early autism. *Telemedicine Journal and e-Health, 16*(6), 727-731.

Bergquist, T., Gehl, C., Mandrekar, J., Lepore, S., Hanna, S., Osten, A., & Beaulieu, W.(2009). The effect of internet-based cognitive rehabilitation in persons with memory impairments after severe traumatic brain injury. *Brain Injury, 23*(10), 790-799.

Bergquist, T., Thompson, K., Gehl, C., & Pineda, J. M. (2010). Satisfaction ratings after receiving Internet-based cognitive rehabilitation in persons with memory impairments after severe acquired brain injury. *Telemedicine Journal and e-Health, 16*(4), 417-423.

Blaiser, K.M., Behl, D., Callow-Heusser, C., & White, K.R. (2013). Measuring costs and outcomes of tele-intervention when serving families of children who are deaf/hard-of-hearing. *International Journal of Telerehabilitation, 5* (2), 3-10.

Bourgeois, M. S., Lenius, K., Turkstra, L., & Camp, C. (2007). The effects of cognitive teletherapy on reported everyday memory behaviours of persons with chronic traumatic brain injury. *Brain Injury, 21*(12), 1245-1257.

Brennan, D. M., Georgeadis, A. C., Baron, C. R., & Barker, L. M (2004). The effect of videoconference-based telerehabilitation on story retelling performance by brain-injured subjects and its implications for remote speech-language therapy. *Telemedicine Journal and e-Health*, *10*(2), 147-154.

Brennan, D.M., Tindall, L., Brown, J., Campbell, M., Cason, J., Christiana, D., …. Theodoros, D. (2010). A blueprint for telerehabilitation guidelines – October 2010. Retrieved from: http://www.americantelemed.org/docs/default-source/standards/a-blueprint-for-telerehabilitation-guidelines.pdf?sfvrsn=4

Bridgman, K., Block, S., Onslow, M., O'Brian, S., & Jones, M. (2014). Webcam preschool stuttering treatment: outcomes and experiences from a clinical trial. Paper presented at the 10th Oxford Dysfluency Conference, Oxford, United Kingdom.

Burns C.L., Ward E.C., Hill, A.J., Malcolm, K., Bassett, L., Kenny, L.M., Greenup, P. (2012). A pilot trial of a speech pathology telehealth service for head and neck cancer patients. *Journal of Telehealth and Telecare,* 1-4.

Canadian Association of Speech-Language Pathologists and Audiologists (CALSPA). (2006). Position paper on the use of telepractice for CALSPA Speech-Language Pathologists and Audiologists.

Carey, B., O'Brian, S., Onslow, M., Block, S., Jones, M., & Packman, A. (2010). Randomized controlled non-inferiority trial of a telehealth treatment for chronic stuttering: the Camperdown Program. *International Journal of Language & Communication Disorders, 45*, 108-120.

Carey, B., O'Brian, S., Onslow, M., Packman, A., & Menzies, R. (2012). Webcam delivery of the Camperdown Program for adolescents who stutter: A Phase I trial. *Language, Speech, and Hearing Services in Schools, 43*, 370-380.

Carlin, C.H., Milam, J.L., Carlin, E.L., & Owen, A. (2012). Promising practices in e-supervision: Exploring graduate speech-language pathology intern's perceptions. *International Journal of Telerehabilitation, 4* (2), 25-38.

Carlin, C.H., Boarman, K., Carlin, E., & Inselmann, K. (2013). The use of e-supervision to support speech–language pathology graduate students during teaching practica. *International Journal of Telerehabilitation, 5* (2), 21-31.

Ciccia, A.H., Whitford, B., Krumm, M., & McNeal, K. (2011). Improving the access of young urban children to speech, language and hearing screening via telehealth. *Journal of Telemedicine and Telecare, 17,* 240-244.

Constantinescu, G., Theodoros, D., Russell, T., Ward, E., Wilson, S., & Wootton, R. (2010). Assessing disordered speech and voice in Parkinson's disease: A telerehabilitation application. *International Journal of Language and Communication Disorders, 45*(6), 630-644.

Constantinescu, G. A., Theodoros, D., Russell, T., Ward, E., Wilson, S., & Wootton, R. (2011). Treating disordered speech and voice in Parkinson's disease online: A randomized controlled non-inferiority trial. *International Journal of Language and Communication Disorders,* 46 (*1*), 1-16.

Constantinescu, G. (2012). Satisfaction with telemedicine for teaching listening and spoken language to children with hearing loss. *Journal of Telemedicine and Telecare, 18,* 267-272.

Constantinescu, G., Waite, M., Dornan, D., Rushbrooke, E., Brown, J., McGovern, J., … Hill, A. (2014). A pilot study of telepractice delivery for teaching listening and spoken language to children with hearing loss. *Journal of Telemedicine and Telecare, 20,* 135-140.

Crutchley, S., Dudley, W., & Campbell, M. (2010). Articulation assessment through videoconferencing: A pilot study. *Communications of Global Information Technology*, *2*, 12-23.

Davis, A., Hopkins, T., & Abrahams, Y. (2012). Maximizing the impact of telepractice through a multifaceted service delivery model at the Shepherd Centre, Australia. *The Volta Review, 112,* 383-391.

Dechêne, L., Tousignant, M., Boissy, P., Macoir, J., Heroux, S., Hamel, M., . . . Page, C. (2011). Simulated in-home teletreatment for anomia. *International Journal of Telerehabilitation, 3*(2), 3-10.

Department of Health and Ageing. (2011). Guidance on security, privacy and technical specifications for clinicians. Australian Government.

Department of Health and Ageing. (2012). Telehealth technical standards position paper. Australian Government.

Eriks-Brophy, A., Quittenbaum, J., Anderson, D., & Nelson, T. (2008). Part of the problem or part of the solution? Communication assessments of Aboriginal children residing in remote communities using videoconferencing. *Clinical Linguistics and Phonetics, 22*, 589-609.

Fairweather, C., Parkin, M., & Rozsa, M. (2004). *Speech and language assessment in school-aged children via videoconferencing.* In B.E. Murdoch, J. Goozee, B. Whelan & K. Docking (Eds.), Proceedings of the 26th World Congress of the International Association of Logopaedics and Phoniatrics (IALP) [CD-ROM]. Melbourne, Australia: Speech Pathology Australia.

Forducey, P. G., Glueckauf, R. L., Bergquist, T. F., Maheu, M. M., & Yutsis, M. (2012). Telehealth for persons with severe functional disabilities and their caregivers: Facilitating self-care management in the home setting. *Psychological Services, 9*(2), 144 -162.

Gabel, R., Grogan-Johnson, S., Alvares, R., Bechstein, L., & Taylor J. (2013). A field study for telepractice intervention using the ASHJA NOMS K-12 database. *Communication Disorders Quarterly, 35,* 44-53.

Georgeadis, A. C., Brennan, D. M., Barker, L. M., & Baron, C. R. (2004). Telerehabilitation and its effect on story retelling by adults with neurogenic communication disorders. *Aphasiology, 18*(5-7), 639-652.

Glazer, C.A., Bailey, P.J., Icaza, I.L., Valladares, S.J., Steere, K.A., Rosenblatt, E.S., & Byrne, P.J. (2011). Multidisciplinary care of international patients with cleft palate using telemedicine. *Archives of Facial Plastic Surgery, 13,* 436-438.

Goldberg, S., Haley, K. L., & Jacks, A. (2012). Script training and generalization for people with aphasia. *American Journal of Speech-Language Pathology, 21*(3), 222-238.

Gray, L.C., Smith, A.C., Armfield, N.R., Travers, C., Croll, P., & Caffrey, L.J. (2011). Telehealth assessment – Final report. UniQuest: St Lucia.

Grogan-Johnson, S., Alvares, R., Rowan,L., & Creaghead, N., (2010). A pilot study comparing the effectiveness of speech language therapy provided by telemedicine with conventional on-site therapy. *Journal of Telemedicine and Telecare, 16,* 134-139.

Grogan-Johnson, S., Gabel, R., Taylor, J., Rowan, L., Alvares, R., & Schenker, J., (2011). A pilot exploration of speech sound intervention delivered by telehealth to school-aged children. *International Journal of Telerehabilitation, 3*, 39-42

Grogan-Johnson, S., Schmidt, A.M., Shenker, J., Alvares, R., Rowan, L.E., & Taylor, J. (2013). A comparison of speech sound intervention delivered by telepractice and side-by-side service delivery models. *Communication Disorders Quarterly, 34,* 210-220.

Hill, A. J., Theodoros, D. G., Russell, T. G., Cahill, L. M., Ward, E. C., & Clark, K. M. (2006). An Internet-based telerehabilitation system for the assessment of motor speech disorders: A pilot study. *American Journal of Speech Language Pathology, 15*(1), 45-56.

Hill, A., Theodoros, D., Russell, T., Ward, E., & Wootton, R. (2008). The effects of aphasia severity upon the ability to assess language disorders via telerehabilitation. *Aphasiology, 23*(5), 627–642.

Hill, A.J., Theodoros, D.G., Russell, T.G., & Ward, E.C. (2009a). The redesign and re-evaluation of an Internet-based telerehabilitation system for the assessment of dysarthria in adults. *Telemedicine Journal and e-Health*, *15* (9), 840-850.

Hill, A., Theodoros, D., Russell, T., & Ward, E. (2009b). Using telerehabilitation to assess apraxia of speech in adults. *International Journal of Language and Communication Disorders, iFirst Article*, 1–17.

Howell, S., Tripoliti, E., & Pring, T. (2009). Delivering the Lee Silverman Voice Treatment (LSVT) by web camera: a feasibility study. *International Journal of Language and Communication Disorders, 44* (*3*), 287-300.

Keck, C.S. & Doarn, C.R. (2014). Telehealth technology applications in speech-language pathology. *Journal of Telemedicine and e-Health, 20* (7), 1-7.

Kurland, J., Wilkins, A. R., & Stokes, P. (2014). iPractice: Piloting the effectiveness of a tablet-based home practice program in aphasia treatment. *Seminars in Speech and Language, 35*(1), 51-63.

Kurowski, B. G., Wade, S. L., Kirkwood, M. W., Brown, T. M., Stancin, T., & Taylor, H. G. (2013). Online problem-solving therapy for executive dysfunction after child traumatic brain injury. *Pediatrics, 132*(1), e158-166.

Kurowski, B. G., Wade, S. L., Kirkwood, M. W., Brown, T. M., Stancin, T., & Taylor, H. G. (2014). Long-term benefits of an early online problem-solving intervention for executive dysfunction after traumatic brain injury in children: A randomised clinical trial. *JAMA Pediatrics, 168* (6), 523-531.

Lalios, A.P. (2012). Connect*Hear* teleintervention program. *The Volta Review, 112*, 357-364.

Lewis, C., Packman, A., Onslow, M., Simpson, J. M., & Jones, M. (2008). A phase II trial of telehealth delivery of the Lidcombe Program of early stuttering intervention. *American Journal of Speech-Language Pathology, 17*, 139-149.

Medical Board of Australia. (2012). Guidelines for Technology-based Patient Consultations. Retrieved from: http://www.medicalboard.gov.au/Codes-Guidelines-Policies.aspx

Malandraki, G. A., McCullough, G., He, X., McWeeny, E., & Perlman, A. L. (2011). Teledynamic evaluation of oropharyngeal swallowing. *Journal of Speech Language and Hearing Research, 54* (6), 1497-1505.

Malandraki, G.A., Markaki, V., Georgopoulous,V.C., Bauer, J.L., Kalogeropoulos, I., & Nanas, S. (2013). An international pilot study of asynchronous teleconsultation for oropharyngeal dysphagia. *Journal of Telemedicine and Telecare,* 19, 75-79.

Man, D. W. K., Soong, W. Y. L., Tam, S. F., & Hui-Chan, C. W. Y. (2006a). A randomized clinical trial study on the effectiveness of a tele-analogy-based problem-solving programme for people with acquired brain injury (ABI). *NeuroRehabilitation, 21*, 205-217.

Man, D. W. K., Soong, W. Y. L., Tam, S. F., & Hui-Chan, C. W. Y. (2006b). Self-efficacy outcomes of people with brain injury in cognitive skill training using different types of trainer-trainee interaction. *Brain Injury, 20*(9), 959-970.

Mortley, J., Wade, J., & Enderby, P. (2004). Effectiveness of computerised rehabilitation for long-term aphasia: A case series study. *British Journal of General Practice, 54,* 856-857.

NHMRC. (2008). NHMRC additional levels of evidence and grades for recommendations for developers of guidelines – Stage 2 consultation. Canberra: National Health and Medical Research Council.

National Initiative for Telehealth Guidelines. (2003). National Initiative for Telehealth (NIFTE) framework of guidelines. Ottawa: NIFTE.

Nelson, E-L., & Palsbo, S. (2006). Challenges in telemedicine equivalence studies. *Evaluation and Program Planning*, 29, 419-425.

Ng, E. M., Polatajko, H. J., Marziali, E., Hunt, A., & Dawson, D. R. (2013). Telerehabilitation for addressing executive dysfunction after traumatic brain injury. *Brain Injury, 27*(5),

548-564.

O'Brian, S., Packman, A., & Onslow, M. (2008). Telehealth delivery of the Camperdown Program for adults who stutter: A phase I trial. *Journal of Speech, Language and Hearing Research*, *51*, 184-195.

O'Brian, S., Smith, K., Onslow, M. (2014). Webcam delivery of the Lidcombe Program for early stuttering: A phase I clinical trial. *Journal of Speech, Language, and Hearing Research*, *57*, 825-830.

Palsbo, S. E. (2007). Equivalence of functional communication assessment in speech pathology using videoconferencing. *Journal of Telemedicine and Telecare*, *13*(1), 40-4.

Parmanto, B., Pulantara, I. W., Schutte, J. L., Saptono, A., & McCue, M. P. (2013). An integrated telehealth system for remote administration of an adult autism assessment. *Telemedicine journal and e-health, 19*(2), 88-94.

Pearl, P. L., Sable C., Evans S., Knight J., Cunningham P., Latrecchiano G.R., Gropman, A., Stuart S., Glass P., Conway A., Ramadan I., Paiva T., Batshaw M.L. & Packer R.J. (2014) International telemedicine consultations for neurodevelopmental disabilities. *Telemedicine Journal and e-Health,* Vol.20, No. 6.

Riegler, L. J., Neils-Strunjas, J., Boyce, S., Wade, S. L., & Scheifele, P. M. (2013). Cognitive intervention results in web-based videophone treatment adherence and improved cognitive scores. *Medical Science Monitor, 19*, 269-275.

Rietdijk, R., Togher, L., & Power, E., (2012). Supporting family members of people with traumatic injury using telehealth: A systematic review. *Journal of Rehabilitation Medicine, 44*, 913-921

Sander, A. M., Clark, A. N., Atchison, T. B., & Rueda, M. (2009). A web-based videoconferencing approach to training caregivers in rural areas to compensate for problems related to traumatic brain injury. *Journal of Head Trauma Rehabilitation, 24*(4).

Schoenberg, M. R., Ruwe, W. D., Dawson, K., McDonald, N. B., Houston, B., & Forducey, P.G. (2008). Comparison of functional outcomes and treatment cost between a computer based cognitive rehabilitation teletherapy program and a face-to-face rehabilitation program. *Professional Psychology: Research and Practice, 39*(2), 169-175.

Sharma, S., Ward, EC., Burns, C., Theodoros, D. G., & Russell, T. (2011) Assessing swallowing disorders online: a pilot telerehabilitation study. *Telemedicine Journal and e-Health*, *17* (9), 688-695.

Soong, W., Tam, S. F., Man, W. K., & Hui-Chan, C. (2005). A pilot study on the effectiveness of tele-analogy-based problem-solving training for people with brain injuries. *International Journal of Rehabilitation Research, 28*, 341-347.

Speech Pathology Australia. (2007). Parameters of Practice:Guidelines for delegation, collaboration and teamwork in speech pathology practice. Melbourne, Victoria.

Speech Pathology Australia. (2010). Code of ethics. Melbourne, Victoria.

Speech Pathology Australia. (2009). Position statement: Credentialling. Melbourne, Victoria.

Suess, A., Romani, P., Wacker, D., Dyson, S., Kuhle, J., Lee, J., . . . Waldron, D. (2014). Evaluating the treatment fidelity of parents who conduct In-home functional communication training with coaching via telehealth. *Journal of Behavioral Education, 23*(1), 34-59.

The Royal Australian College of General Practitioners. (2011). *Standards for general practices offering video consultations.* South Melbourne: Author. Retrieved from: http://www.racgp.org.au/download/Documents/Standards/2011standardsforvideoconsultations.pdf

The Royal Australian College of General Practitioners. (2011). *Implementation guidelines for video consultations in general practice – A telehealth initiative. (Ver 2.0)* South Melbourne: Author. Retrieved from: http://www.medicalboard.gov.au/Codes-Guidelines-Policies.aspx

The Royal Australian College of General Practitioners. *Video consultation etiquette*. (Factsheet) Retrieved from: http://www.racgp.org.au/your-practice/e-health/telehealth/resources/factsheets/

Theodoros, D.G. (2008). Telerehabilitation for service delivery in speech-language pathology. *Journal of Telemedicine and Telecare*, *14* (5), 221-224.

Theodoros, D., Hill, A. J., Russell, T., Ward, E., Wootton, R. (2008). Assessing acquired language disorders in adults via the Internet. *Telemedicine Journal and e-Health, 14(*6), 552-559.

Theodoros, D.G. (2012). A new era in speech-language pathology practice: Innovation and diversification. *International Journal of Speech-Language Pathology*, *14* (3), 189-199.

Towey, M P. (2012). Speech therapy telepractice for Vocal Cord Dysfunction (VCD): MaineCare (Medicaid) Cost Savings. *International Journal of Telerehabilitation, 4* (1), 33-36.

Turkstra, L. S., Quinn-Padron, M., Johnson, J. E., Workinger, M. S., & Antoniotti, N. (2011). In-person versus telehealth assessment of discourse ability in adults with traumatic brain injury. *The Journal of Head Trauma Rehabilitation*, *27* (6), 424-432.

Vismara, L. A., McCormick, C., Young, G. S., Nadhan, A., & Monlux, K. (2013). Preliminary findings of a telehealth approach to parent training in autism. *Journal of Autism & Developmental Disorders, 43*(12), 2953-2969.

Wacker, D., Lee, J., Padilla Dalmau, Y., Kopelman, T., Lindgren, S., Kuhle, J., . . . Waldron, D. (2013). Conducting functional communication training via telehealth to reduce the problem behavior of young children with autism. *Journal of Developmental and Physical Disabilities, 25*(1), 35-48.

Wade, S., Carey, J., & Wolfe, C. (2006). The efficacy of an online cognitive-behavioral family intervention in improving child behavior and social competence following pediatric brain injury. *Rehabilitation Psychology, 51*(3), 11.

Wade, S., Walz, N. C., Carey, J., Williams, K. M., Cass, J., Herren, L., . . . Yeates, K. O. (2010). A randomized trial of teen online problem solving for improving executive function deficits following pediatric traumatic brain injury. *The Journal of Head Trauma Rehabilitation, 25*(6), 409-415.

Waite, M.C., Cahill, L. M., Theodoros, D.G., Busuttin, S., & Russell, T.G. (2006). A pilot study of online assessment of childhood speech disorders. *Journal of Telemedicine and Telecare, 12*(Suppl. 3), 92-94.

Waite, M.C., Theodoros, D.G., Rusell, T.G., & Cahill, L.M. (2010a). Assessment of children's literacy via an Internet-based telehealth system. *Telemedicine Journal and e-Health, 16,* 564-575.

Waite, M.C., Theodoros, D.G., Russell, T.G., & Cahill, L.M. (2010b). Internet-based telehealth assessment of language using the CELF-4. *Language, Speech, and Hearing Services in Schools, 41*, 445-458.

Waite, M.C., Theodoros, D.G., Russell, T.G., & Cahill, L.M. (2012). Assessing children's speech intelligibility and oral structures, and functions via an Internet-based telehealth system. *Journal of Telemedicine and Telecare, 18*, 198-203.

Ward, E., White, J., Russell, T., Theodoros, D., Kuhl, M., Nelson, K., Peters, I. (2007). Assessment of communication and swallowing function post laryngectomy: A telerehabilitation trial, *Journal of Telemedicine and Telecare*, *3* (3), 88-91.

Ward, E., Crombie, J., Trickey, M., Hill, A., Theodoros, D., Russell, T. (2009). Assessment of communication and swallowing post-laryngectomy: A telerehabilitation trial. *Journal of Telemedicine and Telecare*, *15* (5), 232-237.

Ward, E.C., Sharma, S., Burns, C., Theodoros, D.G., & Russell, T.(2012). Validity of conducting clinical dysphagia assessments with patients with normal to mild cognitive impairments via telerehabilitation. *Dysphagia, 27*(4), 460-472.

Ward, E.C., Burns, C., Theodoros, D.G., & Russell, T. G. (2014). Impact of dysphagia severity on clinical decision making via telerehabilitation. *Telemedicine Journal and e-Health, 20* (4), 296-303.

Ward, E.C. & Burns, C.L. (2014). Dysphagia management via telerehabilitation: A review of the current evidence. *Journal of Gastroenterology and Hepatology Research*, 3 (5), 1088-1094.

Whitehead, E., Dorfman, V., Tremper, G., Kramer, A., Sigler, A., & Gosman, A. (2012). Telemedicine as a means of effective speech evaluation for patients with cleft palate. *Annals of Plastic Surgery, 68,* 415- 417.

Wilson, L., Onslow, M., & Lincoln, M. (2004). Telehealth adaptation of the Lidcombe Program of early stuttering intervention: five case studies. *American Journal of Speech-Language Pathology, 13*, 81-93.

Appendix A: Evidence for Speech Pathology telepractice services

The following are summaries of current evidence for the use of telepractice for the delivery of speech pathology services. It is important to understand that this evidence relates to specific technology and describes assessment and treatment protocols modified for use by telepractice. The reader should refer to Appendix B for further details and relevant considerations outlined in the literature for telepractice delivery.

Childhood speech and language disorders

Validity and reliability has been established for the use of telepractice in a number of screening and formal language, oromotor, articulation and literacy assessments (Level III)(Ciccia, Whitford, Krumm, & McNeal, 2011; Crutchley, Dudley, & Campbell, 2010; Eriks-Brophy, Quittenbaum, Anderson, & Nelson, 2008; Fairweather, Parkin, & Rozsa, 2004; Waite, Cahill, Theodoros, Busuttin, & Russell, 2006; Waite, Theodoros, Russell, & Cahill, 2010a, 2010b, 2012). Telepractice has also been used by multidisciplinary teams to assess young children with multiple disabilities (Level IV) (Pearl et al., 2014) and following paediatric brain injury (Level I to III) (Kurowski et al., 2013, 2014; Rietdijk, Togher & Power, 2012; Wade S., Carey, J., & Wolfe, C, 2006; Wade et al., 2010). The use of telepractice in speech and language therapy with school aged children has also been reported, with a randomised controlled trial providing evidence for the provision of speech sound treatment (Level II) (Grogan-Johnson, Schmidt, Schenker, Alvares, Rowan, & Taylor, 2013). Further evidence supports the use of telepractice in speech and language therapy for school aged children (Level III) (Gabel, Grogan-Johnson, Alvares, Bechstein, & Taylor, 2013; Grogan-Johnson, Alvares, Rowan, & Creaghead, 2010; Grogan-Johnson, et al., 2011), along with the communication training of caregivers to support children with Autism Spectrum Disorder (Level IV) (Baharav & Reiser, 2010; Suess et al., 2014; Wacker et al., 2013; Vismara, McCormick, Young, Nadhan, & Monlux, 2013). Synchronous and hybrid models using hardware and PC-based videoconferencing systems have been used. The technical capabilities of the system are important to consider (e.g., audio and visual quality including the capability to view oral structures), particularly in relation to ensuring reliable assessment.

Adult speech and language disorders

There is evidence supporting telepractice assessment of speech and language disorders for acquired and developmental neurological conditions using standardised assessments, informal assessments, and discourse analysis (Level II to IV)(Brennan, Georgeadis, Baron & Barker, 2004; Constantinescu et al., 2010; Georgeadis, Brennan, Barker & Baron, 2004; Hill et al., 2006; Hill, Theodoros, Russell, Ward & Wootton, 2008; Hill, Theodoros, Russell &Ward, 2009a, 2009b; Palsbo, 2007; Parmanto, Pulantara, Schutte, Saptono, & McCue, 2013; Theodoros, Hill, Russell, Ward & Wootton, 2008; Turkstra, Quinn-Padron, Johnson, Workinger, & Antoniotti, 2011). Studies have also shown equivalency with standard care in the delivery of treatment for language and cognitive communication disorders and the training of caregivers (Level II to IV) (Bergquist et al., 2009; Bergquist, Thompson, Gehl, & Pineda, 2010; Bourgeois, Lenius, Turkstra & Camp, 2007; Dechene et al., 2011; Forduecy, Glueckauf, Bergquist, Maheu, & Yutsis, 2012; Goldberg, Haley & Jacks, 2012; Kurland, Wilkins & Stokes, 2014; Man, Soong, Tam, & Hui-Chan, 2006a, 2006b; Mortley, Wade & Enderby, 2004; Ng, Polatajko, Marziali, Hunt & Dawson, 2013; Riegler, Neils-Strunjas, Boyce, Wade & Scheifele, 2013; Sander, Clark, Atchison & Rueda, 2009; Schoenberg et al., 2008; Soong, Tam, Man, & Hui-Chan, 2005). These studies have utilised synchronous, asynchronous and hybrid models using hardware and PC-based videoconferencing and mobile platforms, as well as telephone based interaction, along with instant and short messaging systems (SMS).

Fluency

Evidence (Level II to IV) suggests that telepractice delivery of Lidcombe Program with young children and Camperdown Program with adolescents and adults is efficacious (Bridgman, Block, Onslow, O'Brian, & Jones, 2014; Carey, O'Brian, Onslow, Block, Jones, & Packman, 2010; Carey, O'Brian, Onslow, Packman, & Menzies, 2012; Lewis, Packman, Onslow, Simpson, & Jones, 2008; O'Brian, Packman, & Onslow, 2008; O'Brian, Smith, & Onslow, 2014; Wilson, Onslow, & Lincoln, 2004). Studies have described synchronous models of telepractice treatment delivery using the telephone and home-based videoconferencing utilising personal computers and webcams. Randomised control trial evidence has shown that for the Lidcombe Program the number of consultations to reach Stage II using telepractice is equivalent to in-clinic delivery (Bridgman, et al. 2014). For the Camperdown Program with adults, randomised control trial evidence has shown telepractice delivery required fewer SLP contact hours than in-clinic delivery (Carey et al., 2010).

Voice disorders

The evidence for the management of voice disorders via telepractice has primarily come from studies exploring the delivery of the LSVT®LOUD program to people with Parkinson's disease (Level II & III) (Constantinescu, Theodoros, Russell, Wilson & Wootton, 2011; Constantinescu,Theodoros, Russell, Wilson & Wootton, 2010; Howell, Tripoliti, & Pring, 2009). Equivalency has been established for both assessment and management, however, the technology used and/or the telepractice model must be capable of capturing or transmitting voice signals over a distance "without compromising their acoustic integrity" (Keck & Doarn, 2014, p.4). Hybrid models (e.g., synchronous with store and forward capacity) have dominated research into the use of telepractice in the management of voice disorders. A small cost comparison study revealed that substantial cost reductions are possible using a telepractice model (Level IV) (Towey, 2012).

Dysphagia

Studies have confirmed the feasibility, reliability and validity of conducting adult clinical bedside swallowing assessments via telepractice (Level III) (Sharma, Ward, Burns, Theodoros & Russell, 2011; Ward, Sharma, Burns, Theodoros, & Russell, 2012; Ward, Burns, Theodoros, & Russell, 2014). Assessment outcomes were not influenced by patient severity status when using a customised PC based videoconferencing system. Specific modifications including split screen display, zoom camera, clear utensils, and a trained assistant at the client end to support the assessment are recommended. Asynchronous Videofluoroscopic Swallow Study telepractice models have been used effectively to facilitate accurate dysphagia diagnosis and avoid suboptimal clinical decision making (Level III) (Malandraki, McCullough, He, McWeeny, & Perlman, 2011; Malandraki, Markaki, Georgopoulous, Bauer, Kalogeropoulos, & Nanas, 2013).

Craniofacial and Head & Neck disorders

Telepractice has been used effectively for oromotor, speech, and swallowing assessments and speech and swallowing rehabilitation following both surgical and non-surgical intervention for head and neck cancer. In the laryngectomy population, telepractice has been used effectively to support oromotor and dysphagia assessments, alaryngeal communication training, surgical voice restoration, stoma management and respiratory rehabilitation (Level III & IV) (Burns, Ward, Hill, Malcolm, Bassett et al., 2012; Ward et al., 2007; Ward et al., 2009). These studies utilised hybrid telepractice models using hardware and customised PC based videoconferencing platforms. Two studies have reported the effectiveness of using synchronous videoconferencing for the management of cleft palate disorders (Level III & IV) (Glazer et al., 2011; Whitehead et al., 2012). Technical and operational requirements reported for using telepractice in head and neck disorders include high speed image transfer, use of medical camera systems, additional lighting sources, and trained support staff to facilitate clinical procedures at the client end.

Hearing impairment

There is evidence for the use of telepractice to deliver communication intervention to children with hearing impairment, with equivalency established for language outcomes using PC-based videoconferencing (Level II & III) (Blaiser, Behlm, Callow-Heusser, & White, 2013; Constantinescu et al., 2014). A cost effectiveness analysis indicated that cost savings increased as intensity of service delivery increased (Blaiser et al., 2013).

Clinical supervision and professional mentoring

Tele-supervision or e-supervision programs have provided clinical support to graduate speech pathology students via synchronous videoconferencing, instant messaging, and email. While not all work contexts can be supervised using telepractice, studies have reported benefits for both the supervisor and supervisee (Level IV) (Carlin, Milam, Carlin, & Owen, 2012; Carlin, Boarman, Carlin, & Inselmann, 2013). Synchronous and hybrid methods have also used hardware platforms effectively to support professional mentoring and education with the benefit of improving knowledge/skill base. (IV) (Burns et al., 2012).

Appendix B: Studies Providing Evidence for the use of Telepractice in Speech Pathology

Updated March 2020

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Childhood speech and language disorders					
Baharav & Reiser. (2010). Using telepractice in parent training in early autism. *Telemedicine and e-Health, 16*, 727-31.	Single subject, time series, repeated measures	IV	N=2 Parents of children with ASD, aged 4:6 and 5:2	1. Observation and coaching. Of live parent-child interactions. 2. Live PC-based two-way video conferencing between clinician and parent using Skype. 3. Network not reported	Child gains observed following twice weekly clinic based intervention sessions were maintained or even exceeded when 1 session per week was replaced with telepractice based parent coaching.
Ciccia et al., (2011). Improving the access of young urban children to speech, language and hearing screening via telehealth. *Journal of Telemedicine and Telecare, 17,* 240-244.	Comparison between telepractice and FTF delivery	III	Screening: n=10 (out of total N=411) children aged < 6 years; Satisfaction: n= 160 families	1. REEL-3, SKOLD, PLS-4, PLS-4 Articulation Screener, and hearing screening. Satisfaction Ratings 2. PC-based videoconferencing (Skype) 3. IP, bandwidth not stated	Language and speech assessment reliable in terms of pass/fail rates online vs. FTF. High family satisfaction.
Crutchley et al., (2010). Articulation assessment through videoconferencing: A pilot study. *Communications of Global Information Technology, 2,* 12-23.	Simultaneous assessment to compare telepractice to FTF.	III	N= 5 School-aged children with speech-sound disorder	1. GFTA-2 2. Hardware videoconferencing 3. H.323 network technology, bandwidth up to 2 Mbit/s	Overall high agreement with high degree of variation between individual phonemes.
Eriks-Brophy et al., (2008). Part of the problem or part of the solution? Communication assessments of Aboriginal children residing in remote communities using videoconferencing. *Clinical Linguistics and Phonetics, 22*, 589-609.	Simultaneous assessment to compare telepractice to FTF.	III	N=7 Canadian Aboriginal children aged 4-13 years with delayed speech or language development	1. PLS-4, PPVT-III, CELF-4, EOWPVT, GFTA-2. 2. Videoconferencing, details not provided; 3. Terrestrial transmission, bandwidth not stated	High agreement on language assessment; variable agreement on articulation assessment. Differences on certain classes of sounds; perhaps due to system issues. Telepractice can be effective complement to provision of services to Aboriginal children when procedures put in place to minimise cultural bias.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Childhood speech and language disorders					
Fairweather, Lincoln & Ramsden (2016). Speech-language pathology teletherapy in rural and remote educational settings; Decreasing service inequities. *International Journal of Speech- Language Pathology, 18*, 592-602	Case series with pre-post outcomes Mixed methods	IV	N = 19 Children aged 3-12 years with speech and language disorders	1. Goal Attainment Scaling and parental interviews. 6 x fortnightly therapy sessions over 12 weeks 2. Adobe Connect, Facetime or Skype software, desktop computers, laptops or tablet devices at either child or clinician sites 3. Education department network	45 goals established across speech production, expressive and receptive language skills, pragmatics, phonological awareness and fluency. 79% of children achieved at least one of their goals at expected level or beyond. 42% achieved all their goals Parent interview themes: practicality & convenience, child learning, difficulties with technology, and communication issues
Fairweather et al., (2004). *Speech and language assessment in school-aged children via videoconferencing.* In B.E. Murdoch, J. Goozee, B. Whelan & K. Docking (Eds.), Proceedings of the 26th World Congress of the International Association of Logopaedics and Phoniatrics (IALP) Melbourne, Australia: Speech Pathology Australia.	Simultaneous assessment to compare telepractice to FTF.	III	N = 13 Children aged 6-14 years.	1. GFTA-2, CELF-3, informal conversation sample and oromotor assessment 2. Videoconferencing. 3. Network not reported	High overall agreement on CELF-3 ratings. Generally high agreement on oromotor and articulation assessment. Lower levels of agreement for severe speech disorder and on some phoneme classes.
Gabel et al., (2013). A field study for telepractice intervention using the ASHJA NOMS K-12 database. *Communication Disorders Quarterly, 35,* 44-53.	Telepractice compared with the K-12 Schools National Outcomes Measurement System (NOMS) of ASHA	III	N = 71 Children with speech, language, pragmatic, stuttering and/or voice disorders	1. ASHA NOMS database 2. PC-based videoconferencing systems with headsets and built in microphone 3. Optical Connection-3 to the Ohio Academic Resources Network to reach the T1 connection at each K-12 school. Used 128kbit/s IP	The findings suggest many similarities between the characteristics of the telepractice and direct, in-person service delivery models. The telepractice service delivery model was effective for most students included in the study
Grogan-Johnson et al., (2010). A pilot study comparing the effectiveness of speech language therapy provided by telemedicine with conventional on-site therapy. *Journal of Telemedicine and Telecare, 16,* 134-139.	Counterbalance design. Students randomly assigned.	III	N= 34 Children with stuttering, speech sound production and language impairment	1. GFTA-2 2. PC-based videoconferencing with document camera was used for telepractice at the remote sites. 3. Videoconferencing occurred on the educational network at a minimum bandwidth of 10Mbit/sec.	Videoconferencing seems to be a suitable alternative service delivery to providing speech pathology intervention in schools.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Childhood speech and language disorders					
Grogan-Johnson et al., (2011). A pilot exploration of speech sound intervention delivered by telehealth to school-aged children. *International Journal of Telerehabilitation, 3*, 39-42	Compared telehealth and FTF therapy. No random assignment of students and/or clinicians.	III	N=13 Children with speech sound production disorders	1. GFTA-2 & TinyEYE Speech Therapy Software 2. PC-based videoconferencing systems with built in microphones. An audio splitter to allow student assistant to listen to treatment session. 3. Network not reported	Students in both groups made progress with respects to their speech goals. Videoconferencing appears to be a feasible alternative service delivery model for delivery speech sound intervention into rural schools.
Grogan-Johnson et al., (2013). A comparison of speech sound intervention delivered by telepractice and side-by-side service delivery models. *Communication Disorders Quarterly, 34,* 210-220.	Randomised control trial.	II	N=14 Children aged 6-10 years with speech sound impairment.	1. Speech sound intervention consisting of 2 x 30 min sessions for 5 weeks 2. PC-based videoconferencing (Polycom PVX) 3. 10Mbit/s switched connection.	Children in both groups improved in speech sound production. No significant differences between telepractice and FTF groups post treatment.
Hodge….. Silove (2018). Literacy assessmen tvia telepractice is comparable to face-to-face assessment in children with reading difficulties living in rural Australia. *Telemedicine and e-Health*. DOI: 10.1089/tmj.2018.0049.	Simultaneous assessment to compare telpractice and FTF	III	N = 37 Children aged 8 to 12 years diagnosed with Specific Learning Disorder with impairment in reading	1. Woodcock Reading Mastery Test – 3rd edition, Test of Word Reading Efficiency – 2nd edition, MultiLit Sight Words Test,MultiLit Word Attack Test, Dallwood Spelling Test, parent survey, teacher feedback on child behaviour and performance 2. Coivu software, high quality webcams, speakers, commercial touch screens, standard-issue computers 3. Health and education department networks – dedicated broadband	Strong to excellent agreement on test scores between FTF & telepractice assessments Parents reported high degree comfort with telepractice mode of delivery Clinicians reported audio & video quality was sound in most assessments Minimal negative effects on concentration, level of engagement & participation by children even those with ADHD

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Kurowski et al., (2013). Online problem-solving therapy for executive dysfunction after child traumatic brain injury. *Pediatrics*, *132*(1), e158-166. Kurowski et al., (2014). Long-term Benefits of an Early Online Problem-Solving Intervention for Executive Dysfunction After Traumatic Brain Injury in Children: A Randomised Clinical Trial. *JAMA Pediatrics, 168* (6), 523-531.	Randomised controlled trial	II	N = 132 Adolescents with TBI	1. Counsellor-assisted problem solving intervention delivered via videoconferencing with clinician (intervention) compared to provision of internet resources with no clinician involvement (control) 2. PC-based videoconferencing (Skype) 3. High speed Internet	Significant improvement in executive function behaviours at follow-up in the intervention group compared to the control group. Effects from RCT sustained at 12 months post intervention.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Childhood speech and language disorders					
Pearl et al., (2014) International Telemedicine Consultations for Neurodevelopmental Disabilities. *Telemedicine and e-Health, 20* (6), 559-562.	Multiple time series study. Weekly telehealth sessions between team in the USA, to clinicians, families, and clients in based in eastern remote UAE.	IV	N=48 Children with Developmental Disability	1. Purpose built rooms that allowed for direct patient consultation and education via videoconferencing were established in UAE. 2. Hardware videoconferencing using video processor, and projector were installed along with software via a multitouch monitor 3. 768kpbs.	Weekly telehealth videoconferencing sessions in conjunction with triannual training conferences was an effective service delivery model to patients with neurodevelopmental disabilities across international borders.
Rietdijk et al., (2012). Supporting family members of people with traumatic injury using telehealth: A systematic review. Journal of Rehabilitation Medicine, 44, 913-921	Systematic review of level II studies	I	N = 24 peer reviewed articles reporting on 16 studies (7 articles on cognitive communication therapy).	1. Intervention involving family member of adult or child with TBI via telehealth. 2. Searched Medline, CINAHL, PsycINFO, Web of Science, Scopus, the Cochrane library, Embase, PsycBITE and ProQUEST 3. evaluated using PEDroP scale	Seven randomised controlled trials, four non-randomised controlled trials, and five case series studies. 15 out of 16 studies reported positive outcomes of the telehealth intervention. Few studies used blinded assessors.
Suess et al., 2014 Evaluating the Treatment Fidelity of Parents Who Conduct In-Home Functional Communication Training (FCT) with Coaching via Telehealth. *Journal of Behavioral Education, 23*, 34–59	Case Series, multi element	IV	N=3 Parents of children with ASD, aged 2:7 to 3:3	1. Initial FCT training and then viewing and recording treatment sessions. 2. PC Based videoconferencing between office based clinician and client at home using Skype and Debut software 3. Network not reported	Parents who received FCT via telehealth performed equally well when applying the intervention independently or during telehealth based coaching. Children's problem behaviour reduced. Results suggest that FCT via telehealth can result in successful implementation of the approach for children with ASD.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Thomas, McCabe, Ballard & Lincoln (2016). Telehealth delivery of Rapid Syllable Transition (ReST) treatment for childhood apraxia of speech. *International Journal of Speech-Language Pathology, 6*, 654-671.	Multiple baseline single case design with staggered introduction of independent variable across different timepoints	III	N = 5 Children with childhood apraxia of speech (CAS)	1. ReST 4 times per week for 3 weeks in home, CELF-2, CELF-4, Peabody Picture Vocabulary Test, Goldman-Fristoe Test of Articulation, test of auditory perception, Inconsistency assessment, Test of polysyllables, clinician & parent satisfaction 2. Adobe Connect 8, Desktop computer with inbuilt webcam, headset microphones 3. Home & university broadband	All 5 children significantly improved production of imitated treated pseudoword items & significantly generalized to similar untreated pseudo-words & real words. Two of the children showed significant generalization to imitated phrases with treatment items Four of children maintained their treatment gains up to 4 months post-treatment Parents & clinicians were satisfied with online treatment - Children motivated, service convenient, Technical issues with some sessions (latency, webcam freezing, establishing audio connection)

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Childhood speech and language disorders					
Wacker et al., (2013). Conducting Functional Communication Training via Telehealth to Reduce the Problem Behavior of Young Children with Autism. *Journal of Developmental and Physical* *Disabilities. 25*, 35–48	Non concurrent multiple baseline	IV	N=17 Parents of children with ASD, aged 18 to 83 months	1. Office based clinician and local clinic based clients 2. Windows-based PC, webcam and headset for audio and video transmission with teleconferencing and playback software to view and record sessions. 3. "reliable high speed Internet"	Wacker et al reported similar results between telehealth based coaching of parents delivering FCT intervention vs FTF on-site coaching. Children showed reduction in targeted problem behaviour. Reduction in cost of delivering telehealth based service vs FTF was estimated
Wade et al., (2010). A randomized trial of teen online problem solving for improving executive function deficits following pediatric traumatic brain injury. *The Journal of Head Trauma Rehabilitation*, *25*(6), 409-415.	Randomised controlled trial	III	N = 41 Adolescents with TBI	1. Teen online problem solving program delivered via videoconferencing compared to provision of internet resources with no clinician involvement. 2. PC-based videoconferencing 3. High speed internet	Adolescents with severe TBI in the intervention group had significantly greater improvements in self-reported executive function compared to the control group. This treatment effect was not observed for adolescents with moderate TBI. No treatment effects were observed on parent-reported executive function skills.
Wade et al., (2006). The efficacy of an online cognitive behavioral family intervention in improving child behavior and social competence following pediatric brain injury. *Rehabilitation Psychology,51*(3), 11.	Randomised controlled trial	III	N = 39 families of children with TBI	1. Family problem solving program delivered via videoconferencing with clinician (intervention) compared to provision of Internet resources with no clinician involvement (control) 2. PC-based videoconferencing 3. High speed internet	Child self-management and compliance was significantly better for the intervention group than the control group at follow-up.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Childhood speech and language disorders					
Waite et al., (2006). A pilot study of online assessment of childhood speech disorders. *Journal of Telemedicine and Telecare, 12*(S3), 92-94.	Randomised simultaneous assessment (SLP & participant). Reliability for telepractice ratings.	III	N=6 Children with speech sound disorder aged 4- 7 years	1. Informal articulation, intelligibility and oromotor assessment 2. Customised PC-based videoconferencing with store and forward capabilities. 3. 128 kbit/s IP	High overall agreement between telepractice and FTF assessments. High intra- and inter-rater agreement on most online measures.
Waite et al., (2010a). Assessment of children's literacy via an Internet-based telehealth system. *Telemedicine and E-health, 16,* 564-575.	Randomised simultaneous assessment (SLP & participant). Reliability for telepractice and FTF ratings.	III	N=20 Children with diagnosed or suspected delays in literacy, aged 8-13 years	1. QUIL, Neale-3, SAST 2. Customised PC-based videoconferencing with store and forward capabilities. Touchscreen at client end. 3. 128 kbit/s IP	Very good agreement for most measures. Very good inter- and intra-rater reliability. Modifications to technology would improve system efficiency and usability. Results support validity and reliability of telepractice.
Waite et al., (2010b). Internet-based telehealth assessment of language using the CELF-4. *Language, Speech, and Hearing Services in Schools, 41*, 445-458.	Randomised simultaneous assessment (SLP & participant). Reliability for telepractice and FTF ratings.	III	N=25 Children with diagnosed or suspected language impairment aged 5-9	1. Core subtests of CELF-4 2. Customised PC-based videoconferencing with store and forward capabilities. Touchscreen at client end. 3. 128 kbit/s IP	Very good agreement on all measures. Very good inter- and intra-rater reliability. Higher bandwidth recommended for system efficiency.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Childhood speech and language disorders					
Waite et al., (2012). Assessing children's speech intelligibility and oral structures, and functions via an Internet-based telehealth system. *Journal of Telemedicine and Telecare, 18*, 198-203.	Randomised simultaneous assessment (SLP & participant). Reliability for telepractice and FTF ratings.	III	N=20 Children with identified or suspected speech sound disorder aged 4-9 years.	1. Informal intelligibility and oromotor screening assessment 2. Customised PC-based videoconferencing with store and forward capabilities. 3. 128 kbit/s IP	High agreement and reliability for intelligibility scale. Mixed levels of agreement for oromotor assessment with comparable levels of inter- and intra-rater reliability of online and FTF ratings; mainly attributed to subjective nature of assessments. Overall results support validity and reliability.
Vismara et al., (2013) Preliminary Findings of a Telehealth Approach to Parent Training in Autism. *Journal of Autism &* *Developmental Disorders, 43*, 2953–2969	Single subject, multiple baseline across parent-child dyads	IV	N=8 Parents of children with ASD, aged 18 to 45 months	1. Self-directed Internet-based learning program 2. Live PC-based 2 way video conferencing and self-guided website 3. 128-bit encrypted software platform.	Findings suggest that telehealth may support parent learning and improve child behaviour for some families who have children with ASD
Adult speech and language disorders					
Bergquist et al., (2009). The effect of internet-based cognitive rehabilitation in persons with memory impairments after severe traumatic brain injury. *Brain Injury*, *23*(10), 790-799. Bergquist et al., (2010). Satisfaction ratings after receiving internet-based cognitive rehabilitation in persons with memory impairments after severe acquired brain injury. *Telemedicine and e-Health*, *16*(4), 417-423.	Randomised, crossover controlled trial	II	N = 14 Adults with TBI	1. Cognitive rehabilitation focussed on calendar use (intervention), compared to discussion of past diary entries (control). 2. Customised PC-based instant messaging system 3. Network not reported	No significant differences in memory functioning between intervention and control conditions. Significant improvements in use of compensatory memory strategies in both conditions. No significant differences in satisfaction between conditions

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Adult speech and language disorders					
Bourgeois et al., (2007). The effects of cognitive teletherapy on reported everyday memory behaviours of persons with chronic traumatic brain injury. *Brain Injury*, *21*(12), 1245-1257.	Pseudo-randomised controlled trial	III	N = 38 Adults with TBI	1. Spaced retrieval training (intervention) compared to didactic strategy instruction (control). 2. Telephone call for both conditions 3. Network not reported	Spaced retrieval training by phone produced more treatment goal mastery than didactic strategy instruction by phone. No significant differences between groups on generalised strategy use or quality of life.
Brennan et al., (2004). The effect of videoconference-based telerehabilitation on story retelling performance by brain-injured subjects and its implications for remote speech-language therapy. *Telemedicine and e-Health*, *10*(2), 147-154	Randomised, crossover repeated measures study	III	N = 40 Adults with stroke & TBI	1. Two story sets from Story Retell Procedure (SRP). Scored using %IU. Satisfaction ratings 2. PC-based videoconferencing 3. 10 Mbps LAN	No significant differences between FTF and telepractice. Variable such as age, education, technology experience, and gender did not significantly impact differences between telepractice and FTF.
Constantinescu et al., (2010). Assessing disordered speech and voice in Parkinson's disease: a telerehabilitation application. *International Journal of Language and Communication Disorders, 45(*6), 630-644	Randomised simultaneous assessment (SLP & participant).	III	N = 61 Adults with PD	1. Acoustic and perceptual assessment of dysarthria and voice in PD, satisfaction ratings 2. Customised PC-based videoconferencing with store and forward capabilities 3. 128kbit/s IP	For majority of parameters comparable levels of agreement between telepractice and FTF. Telepractice assessment of dysarthria and voice in PD generally valid and reliable
Constantinescu et al., (2011). Treating disordered speech and voice in Parkinson's disease online: a randomized controlled non-inferiority trial. *International Journal of Language and Communication Disorders, 46* (*1*), 1-16	Randomised controlled non-inferiority trial	II	N = 34 Adults with Parkinson's disease	1. Lee Silverman Voice Treatment (LSVT®LOUD) 2. Customised PC-based videoconferencing with store and forward capabilities 3. 128 kbit/s	Non-inferiority of online LSVT®LOUD confirmed. High client satisfaction
Dechene et al., (2011). Simulated in-home teletreatment for anomia. International Journal of Telerehabilitation, 3(2), 3-10.	Pre/post -intervention case series study	IV	N = 3 Adults with stroke	1. Lexical treatment tasks using black and white line drawings. 2. Customised PC-based videoconferencing. Touch screen at client end. 3. 600kbit/s	Improvements to confrontation naming for trained items. High client satisfaction.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Adult speech and language disorders					
Forducey et al., (2012). Telehealth for persons with severe functional disabilities and their caregivers: facilitating self-care management in the home setting. *Psychological Services*, *9*(2), 144-162.	Randomised crossover trial	II	N = 15 Adults with ABI	1. Cognitive rehabilitation focussed on calendar use compared to waitlist control 2. Customised PC-based instant messaging system 3. Network not reported	Significant differences between intervention and control groups in independent functioning
Georgeadis et al., (2004). Telerehabilitation and its effect on story retelling by adults with neurogenic communication disorders. *Aphasiology, 18*(5-7), 639-652	Randomised, crossover repeated measures study	III	N = 40 Adults with stroke & TBI	1. Two story sets from Story Retell Procedure (SRP). Scored using %IU. Satisfaction ratings 2. PC-based videoconferencing 3. 10 Mbps LAN	No significant differences between FTF and telepractice. High levels of client acceptance of telepractice
Goldberg et al., (2012). Script training and generalization for people with aphasia. *American Journal of Speech Language Pathology, 21* (*3*), 222-238.	Pre/post-intervention case series study	IV	N = 2 Adults with stroke	1. Two personally relevant scripts for each client. 2. PC-based videoconferencing (Skype) 3. Network not reported	Script training is feasible via videoconferencing when supported with FTF sessions.
Hill et al., (2006). An Internet-based telerehabilitation system for the assessment of motor speech disorders: a pilot study. *American Journal of Speech Language Pathology, 15*(1), 45-56.	Counterbalanced repeated measures design. SLP randomised	III	N = 19 Adults with stroke, TBI, PD, surgery, ABI	1. Frenchay Dysarthria Assessment, ASSIDS 2. Customised PC-based videoconferencing with store and forward capabilities 3. 128kbit/s IP	Assessment is feasible, but several ratings on FDA not comparable between environments.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Adult speech and language disorders					
Hill et al., (2008). The effects of aphasia severity on the ability to assess language disorders via telerehabilitation. *Aphasiology, 23*(5), 627-642	Randomised simultaneous assessment (SLP & participant randomised).	III	N = 32 Adults with stroke & TBI	1.BDAE-3 short form, BNT, satisfaction. 2. Customised PC-based videoconferencing with store and forward capabilities. Touchscreen at client end. 3. 128kbit/s IP	Severity of aphasia does not impact accuracy of assessment on BDAE-3. Severity of aphasia did affect ability to assess naming and paraphasia clusters (BNT) via telepractice
Hill et al., (2009a). The redesign and re-evaluation of an internet-based telerehabilitation system for the assessment of dysarthria in adults. *Telemedicine and* *e-Health, 15*(9), 840-850	Randomised simultaneous assessment. (SLP & participant randomised).	III	N = 24 Adults with stroke & TBI	1. Informal oromotor and perceptual assessment, ASSIDS, satisfaction ratings 2. Customised PC-based videoconferencing with store and forward capabilities 3. 128kbit/s IP	Valid and reliable assessment of dysarthria. High client satisfaction
Hill et al., (2009b). Using telerehabilitation to assess apraxia of speech in adults. *International Journal of Language and Communication Disorders, 44*(5), 731-747	Randomised simultaneous assessment. (SLP & participant randomised).	III	N = 11 Adults with stroke & TBI	1. ABA-2, satisfaction ratings 2. Customised PC-based videoconferencing with store and forward capabilities 3. 128kbit/s IP	Valid assessment of apraxia of speech via telepractice is feasible
Howell et al., (2009). Delivering the Lee Silverman Voice Treatment (LSVT) by web camera: a feasibility study. *International Journal of Language and Communication Disorders, 44* (*3*), 287-300	Case-control study	III	N = 17 Adults with Parkinson's Disease	1. Lee Silverman Voice Treatment (LSVT®LOUD). 2. Internet-based videoconferencing with voice recording and sound level meter capabilities. 3. Broadband internet connection (no other details reported)	LSVT is feasible via videoconferencing. Comparable gains for telepractice and FTF environments.
Kurland et al., (2014). iPractice: Piloting the effectiveness of a tablet-based home practice program in aphasia treatment. *Seminars in Speech and Language, 35* (*1*), 51-63.	Pre/post-intervention case series study.	IV	N = 8 Adults with stroke	1. Black and white line drawings used to create interactive object and action naming books using iBooks Author software. 2. Tablet-based videoconferencing using GoToMeeting app. 3. Network not reported	Home practice enabled maintenance and improvement of naming gains made during a 2-week FTF language treatment program. High client satisfaction, however only 5 of 8 participants completed the home practice program.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Adult speech and language disorders					
Man et al., (2006). A randomised controlled trial study on the effectiveness of a tele-analogy-based problem-solving programme for people with acquired brain injury. *Neurorehabilitation, 21* (*3*), 205-217. Man et al., (2006b). Self-efficacy outcomes of people with brain injury in cognitive skill training using different types of trainer-trainee interaction. *Brain Injury*, *20*(9), 959-970	Double blinded randomised controlled trial across four groups	II	N = 103 Adults with ABI	1. Computer-assisted skill training program for solving problems using analogies. 2. PC-based videoconferencing using Microsoft NetMeeting. 3. Broadband connection	Improvements to problem-solving skills in online environment comparable to outcomes of FTF environment and computer-assisted environment. High level of participant acceptance of telepractice delivery. The FTF clinician-directed training group had a statistically significant improvement in generic problem-solving self-efficacy whereas the other two groups did not.
Mortley et al., (2004). Effectiveness of computerised rehabilitation for long-term aphasia: a case series study. *British Journal of General Practice, 54,* 856-857	Pre/post-intervention case series study	IV	N = 7 Adults with stroke	1. A range of electronic word retrieval therapy tasks. 2. StepByStep© software loaded onto client and clinician PCs enabled transfer of client results and updates of therapy tasks to occur remotely 3. 56K modem (no other details reported)	Improvements to word retrieval skills. Participants reported intensive use of the system and a high degree of independence and satisfaction.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Adult speech and language disorders					
Ng et al., (2013). Telerehabilitation for addressing executive dysfunction after traumatic brain injury. *Brain Injury*, *27*(5), 548-564.	Case series	IV	N=3 Adults with TBI	1. Metacognitive intervention applied to participant-selected goals 2. Videoconferencing using Skype 3. High speed internet	Videoconferencing was feasible for implementing this approach. There were trends towards fewer symptoms of executive dysfunction and greater community integration.
Palsbo, S. E. (2007). Equivalence of functional communication assessment in speech pathology using videoconferencing. *Journal of Telemedicine and Telecare*, *13*(1), 40-4	Randomised, double-crossover agreement study. SLP not randomised	III	N = 24 Adults with stroke	1. Functional communication measures of motor speech, spoken language expression and spoken language comprehension 2. Hardware videoconferencing. 3. 384 kbit/s IP	Equivalency between telepractice and FTF assessment of functional communication.
Parmanto, et al., (2013). An integrated telehealth system for remote administration of an adult autism assessment. *Telemedicine and e-Health*, *19*(2), 88-94.	Case series	IV	N = 10 Adults with ASD	1. Autism Diagnostic Observation Scale 2. Customised PC-based videoconferencing with multiple remote-controlled cameras. Tablet for stimulus presentation to patient 3. 5MB/s Internet	Administration of the assessment was feasible and rated highly by clinicians and patients.
Pitt, Theodoros, Hill & Russell (2018). The impact of the Telerehabilitation Group Aphasia Intervention and Networking program on communication, participation and quality of life in people with aphasia *.International Journal of Speech-Language Pathology, 21, 513-523.*	Case series with pre-post-outcomes	IV	N = 18 Adults with aphasia N = 7 Communication partners	1. 12 x 1.5 hour online group therapy session – one per week for 12 weeks – 3 or 4 participants per group; Assessment for Living with Aphasia, Comprehensive Aphasia Test, Quality Communication Life Scale, Communicative Activities Checklist, Aphasia friendly satisfaction questionnaire, participant and partner interviews 2. Adobe Connect, Headset microphones 3. University broadband connection and 4G Wi-Fi	Online aphasia group therapy resulted in positive changes in communication related quality of life Most notable changes in Participation domain Group therapy online allowed for practice of a variety of different speech & discourse types High satisfaction with TeleGAIN All participants would recommend to others Frequency & experience of technology breakdowns impacted on satisfaction – loss of audio or video in some groups

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Riegler et al., (2013). Cognitive intervention results in web-based videophone treatment adherence and improved cognitive scores. *Medical Science Monitor, 19*, 269-275	Matched-subject case-control study	III	N = 12 Adults with TBI	1. MOPS-VI (Military On-Line Problem Solving Videophone Intervention) cognitive treatment. 2. Videoconference phone and PC 3. wireless Internet (no other details reported)	67% adherence to intervention. Improvements to memory and learning. No significant difference between FTF and web-based videophone treatment groups.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Adult speech and language disorders					
Sander et al., (2009). A Web-Based Videoconferencing Approach to Training Caregivers in Rural Areas to Compensate for Problems Related to Traumatic Brain Injury. *The Journal of Head Trauma Rehabilitation, 24*(4), 248–261.	Case series	IV	N = 15 Adults with TBI	1. Education and problem solving program for caregivers 2. PC-based videoconferencing 3. Commercial high-speed internet connection	Participants reported overall satisfaction, comfort, perceived they had gained knowledge and at follow-up reported having used knowledge to help deal with problems.
Schoenberg et al., (2008). Comparison of functional outcomes and treatment cost between computer-based cognitive rehabilitation teletherapy program and face-to-face rehabilitation program. *Prof Psych: Research Practice, 39(*2), 169-175	Case-control study	III	N=39 Adults with TBI	1. A range of electronic therapy tasks targeting attention, reaction time, visuospatial, learning, memory and problem solving skills. 2. PC loaded with CRI/PPS Teletherapy System containing therapy exercises and allowed transfer of results and updates of tasks to occur remotely 3. Network not reported	No significant difference between FTF and teletherapy groups for functional outcomes. Similar total cost for FTF and teletherapy programs.
Soong et al., (2005). A pilot study on the effectiveness of tele-analogy-based problem-solving training for people with brain injuries. *International* *Journal of Rehabilitation Research, 28* (*4*), 341-347.	Pilot randomised controlled trial	II	N = 15 Adults with ABI	1. Problem-solving intervention program administered via online vs. computer-assisted programme vs. therapist-administered program. 2. Computer software or online program with videoconferencing 3. Network not reported	Similar improvements to problem-solving skills and self-efficacy for all three conditions.
Theodoros, Hill & Russell (2016). Clincal and quality of life outcomes of speech treatment for Parkinson's Disease dellivered to the home via telerehabilitation: a noninferiority randomized controlled trial. *American Journal of Speech-Language Pathology, 25*, 214-232.	Randomised controlled trial	II	N = 52 N = 21 Non-Metro Online N = 16 Metro FTF N = 15 Metro Online Adults with Parkinson's Disease and hypokinetic dysarthria – aged 50 – 87years	1. Perceptual speech ratings, acoustic measurements, quality of life (PDQ-39, Dysarthria Impact Profile), communication partner ratings 2. eHAB V2, multimedia telerehabilitation system with calibrated acoustic measurement software tool 3. Either 3G mobile phone network or ADSL broadband connection	Significant improvements in perceptual, acoustic & QoL measures pre-post Tx in both online groups No significant difference in mean change in monologue SPL post Tx between online (6.2dBdb) & FTF (7.5db) Comparable clinical & QoL outcomes for online & FTF groups No significant impact of location on online Tx Non-inferiority & validity of online intensive speech treatment for people with Parkinson's Disease supported

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Theodoros et al., (2008). Assessing acquired language disorders in adults via the Internet. *Telemedicine and e-Health, 14*(6), 552-559	Randomised simultaneous assessment. Participants and SLP randomised	III	N = 32 Adults with stroke & TBI	1. BDAE-3, BNT, satisfaction ratings 2. Customised PC-based videoconferencing with store and forward capabilities. Touchscreen at client end. 3. 128kbit/s	Valid and reliable assessment of aphasia to determine type and severity of aphasia. High client satisfaction

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Adult speech and language disorders					
Turkstra et al., (2011). In-person versus telehealth assessment of discourse ability in adults with traumatic brain injury. *The Journal of Head Trauma Rehabilitation, 27* (6), 424-432.	Randomised, crossover repeated measures study	III	N = 20 Adults with TBI	1. Conversation, picture description, story-generation and procedural description tasks 2. PC-based videoconferencing with store and forward capabilities 3. 512kbit/s	No significant differences between FTF and telepractice.
Woolfe,….. Marshall (2016). A comparison of remote therapy, face-to-face therapy and an attention control intervention for people with aphasia: a quasi-randomised controlled feasibility study. *Clinical Rehabilitation, 30,* 359-373.	Quasi-randomised controlled study	III	N = 20 Adults with aphasia and word-finding difficulties 4 groups with 5 participants per group: Remote therapy form university Remote therapy from clinical site FTF therapy Attention control	1. Word-finding therapy twice per week for 4 weeks; Outcome measures – Test of spoken picture naming, word retrieval in conversation, patient satisfaction 2. Facetime, loaned iPads 3. University broadband	Compliance & satisfaction with treatment was good Treatment fidelity was high for remote & FTF treatment – not affected by online delivery Participants improved in picture naming significantly more than control group – 20-40 more words compared 5 words Remote groups demonstrated the greatest improvement on both treated & untreated words No significant difference between groups in assessment of conversation – naming not improved in conversation
Stuttering – Adults and adolescents					
Carey et al., (2010). Randomized controlled non-inferiority trial of a telehealth treatment for chronic stuttering: the Camperdown Program. *International Journal of Language and Communication Disorders, 45*, 108-120.	Randomised controlled trial	II	N = 40 Adults who stutter	1. Camperdown Program 2. Telephone: mobile or fixed line Fixed line telephone voicemail service for participant recordings 3. Mobile and fixed line telephone networks	Telephone delivery of Camperdown Program as efficacious as in-clinic delivery. Telehealth significantly more efficient than in-clinic and participants were satisfied with service delivery method.
Carey et al., (2012). Webcam delivery of the Camperdown Program for adolescents who stutter: a phase I trial. *Language, Speech and Hearing Services in Schools, 43*, 370-380.	Case series	IV	N = 3 Adolescents who stutter	1. Camperdown Program 2. Personal computer, webcam, Skype, Audacity (audio recording program). SLP used Pamela for Skype (audio and video recording program) 3. SLP – Internet using broadband	Home-based videoconferencing using personal computers and webcams efficacious, efficient and appealing. Similar time required as telephone delivered treatment.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
O'Brian et al., (2008). Telehealth delivery of the Camperdown Program for adults who stutter: a phase I trial. *Journal of Speech Language and Hearing Research, 51*, 184-195.	Case series	IV	N =10 Adults who stutter	1. Camperdown Program 2. Telephone: mobile or fixed line Fixed line telephone voicemail service for participant recordings 3. Mobile and fixed line telephone networks	Telepractice delivery of Camperdown Program effective in reducing stuttering in some adults who stutter. Reduced clinical hours compared with in-clinic delivery.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Stuttering – Children					
Bridgman et al., (2016). Lidcombe program webcam treatment for early stuttering; a randomised controlled trial. *Journal of Speech Language Hearing Research, 59*, 932-939.	Randomised controlled trial	II	N = 49 Children who stutter (aged: 3 to 5;11)	1. Lidcombe Program 2. Personal computer, webcam, webcam software not specified 3. Internet. No further details reported	Lidcombe Program delivered using home-based videoconferencing comparable to standard in-clinic delivery. No difference between groups for %SS at 9mths and 18mths post randomisation. No difference between groups for number of SLP consultations to complete Stage I.
Lewis et al., (2008). A phase II trial of telehealth delivery of the Lidcombe Program of early stuttering intervention. *American Journal of Speech-Language Pathology, 17*, 139-149.	Randomised controlled trial.	II	N = 22 Children who stutter (aged: 3 to 6 years)	1. Lidcombe Program, parent training audio and video recordings, information sheets 2. Telephone and email 3. Telephone using a toll free number. No further details reported	Telephone delivery of Lidcombe Program viable and effective. More SLP consultations required than standard in-clinic.
O'Brian et al., (2014). Webcam delivery of the Lidcombe Program for early stuttering: a phase I clinical trial. *Journal of Speech, Language and Hearing Research, 57,* 825-830.	Case series Pre-test/post-test	IV	N = 3 Children who stutter (aged: 3;6 , 4;3 , 4;9)	1. Lidcombe Program 2. Personal computer, webcam, webcam software (not specified) 3. Broadband Internet.	Webcam delivery of the Lidcombe Program viable and efficacious. Based on three participants. More SLP consultations were required than standard in-clinic but fewer consultations than reported for telephone delivery.
Wilson et al., (2004). Telehealth adaptation of the Lidcombe Program of early stuttering intervention: five case studies. *American Journal of Speech-Language Pathology, 13*, 81-93.	Series of case studies	IV	N = 5 Children who stutter (aged: 3; 5 to 5;7)	1. Lidcombe Program, parent training audio and video recordings, information sheets 2. Telephone 3. Network not reported	Telephone delivery of Lidcombe Program viable and effective. Parents expressed satisfaction with telepractice delivery of Lidcombe Program. More SLP consultations required than standard in-clinic.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Dysphagia					
Malandraki et al., (2012). Teledynamic evaluation of oropharyngeal dysphagia. *Journal of Speech, Language, and Hearing Research*, *54*, 1497-1505.	Prospective cohort study, no control group. Compared recorded ratings of two VFSS studies per patient directed consecutively in online and FTF method	III	N=32 Adults with dysphagia	1. Assessed a) severity of dysphagia, b) Penetration-Aspiration Scale, c) clinician treatment recommendations 2. Used Teledynamic Software System connected to hospital fluoroscopy machine. 3. Broadband Internet. No network speed specified.	Analysis of the recorded VFSS images showed overall good agreement in subjective severity ratings, Penetration-Aspiration scale ratings. Moderate to high agreement for treatment recommendations. Technical and operational issues impacting on the feasibility and accuracy of online VFSS administration and interpretation were reported.
Malandraki et al., (2013). An international pilot study of asynchronous teleconsultation for oropharyngeal dysphagia. *Journal of Telemedicine and Telecare*, *19*, 75-79.	Prospective study, no control group. Compared ratings of recorded VFSS studies and treatment plans of novice dysphagia clinician (Greece) and expert SLP (USA).	III	N = 17 Adults with dysphagia at hospital in Greece	1. VFSS recorded at 14 frames per second (fps) at hospital in Greece 2. Website utilized to store patient information, case histories VFSS recordings. VFSS images were stored using a compression codec WMV9 and rated on a PC using standard video software. 3. No network details provided	Teleconsultation model was effective in preventing substandard decisions in >50% of patients assessed when comparing decisions of the novice dysphagia clinician in comparison to the decisions of the specialist dysphagia clinician

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Dysphagia					
Sharma et al., (2011) Assessing swallowing disorders online: A pilot telerehabilitation study. *Journal of Telemedicine and eHealth*, 17(9), 688-695.	Prospective cohort study with control group. Simultaneous assessment with SLP randomised.	III	N = 10 Standardised adult patients portraying 2 each of normal, and simulated mild, moderate and severe dysphagia	1. Performed CSE and determined levels of agreement between diagnostic decisions for FTF & online clinicians. 2. Customised videoconferencing system with additional capabilities (store and forward; free standing zoom capable webcamera, lapel microphone). Modifications incorporated into the CSE protocol to assist online assessment. 3. Wireless network, 128kbit/s	Found high levels of agreement between online and FTF decisions across all aspects of the clinical swallow assessment, clinical decisions and recommendations.
Ward et al., (2012). Validity of conducting clinical dysphagia assessments for patients with normal to mild cognitive impairment via telerehabilitation, *Dysphagia*, *27*, 460-472.	Prospective cohort study with control group. Simultaneous assessment with SLP randomised.	III	N=40 Adults with dysphagia with normal to mild cognitive impairment.	1. Assessed levels of agreement between diagnostic decisions from simultaneous FTF and online assessments performed CSE 2. Customised videoconferencing system with store and forward capabilities. 3. Wireless network, 128kbit/s	Clinically acceptable levels of agreement found between online and FTF decisions across: oral, oromotor, and laryngeal function; food and fluid trials; aspiration risk and clinical management decisions using Dysphagia Outcome Severity Scale ratings.
Ward et al., (2014). Impact of dysphagia severity on clinical decision making via telerehabilitation. *Telemedicine and e-Health,* 20 (4), 296-303.	Prospective cohort study with control group. Simultaneous assessment with SLP randomised.	III	N=100 Adults with dysphagia comprising of four matched groups of 25 patients	1. Assessed levels of agreement between diagnostic decisions from simultaneous FTF and online assessments performed CSE across four severity levels 2. Customised videoconferencing system with store and forward capabilities. 3. Wireless network, 128kbit/s	Comparable levels of agreement across all severity groups were observed between raters for decisions regarding oral versus non-oral intake, and safe food/fluid consistencies. Over 90% agreement achieved on CSE items. Greater support from assistant at patient end was required for those patients with increased complexity.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Head and Neck Cancer					
Burns, Ward et al., (2017).Randomised controlled trial of a multisite speech pathology telepractice service providing swallowing and communication intervention to patients with head and neck cancer: Evaluation of service outcomes. *Head and Neck*. DOI 10.1002/hed.24706.	Randomised controlled trial	II	N = 82 N = 43 Telepractice model of care (TMOC) N = 39 Standard MOC Adults undergone treatment for head and neck cancer	1. Patients referred from regional sites managed by specialist clinician either by standard care or telepractice. Comparisons made re service efficiency for number and duration of contacts, patient and clinician satisfaction 2. Hardware-based VC system with Pan-tilt-zoom camera & LED screen, multidirectional microphone, hand-held medical camera 3. Health Department Telehealth network – bandwidth at least 1 Mbit/s	Significantly less number of contacts and duration needed for TMOC to manage patient compared to standard MOC Higher patient and clinician satisfaction for TMOC compared to standard MOC
Burns, Kularatna et al (2017). Cost analysis of a speech pathology synchronous telepractice service for patients with head and neck cancer. *Head and Neck, 39*, 2470-2480.	Randomised controlled trial	II	N = 82 N = 43 Telepractice model of care (TMOC) N = 39 Standard MOC Adults undergone treatment for head and neck cancer	1. Compared health service costs, patient and carer costs, and patient reported quality of life between TMOC and standard MOC 2. Hardware-based VC system with Pan-tilt-zoom camera & LED screen, multidirectional microphone, hand-held medical camera 3. Health Department Telehealth network – bandwidth at least 1 Mbit/s	TMOC reported average cost savings of 12% for health service and $40.05 saving per patient per referral. An equivalent positive increase in quality of life reported for both groups
Collins, Burns et al., (2017). Home-based telehealth service for swallowing and nutritional management following head and neck cancer treatment. *Journal of Telemedicine and Telecare, 23,* 866-872	Prospective cohort study with matched control group	III	N = 30 N = 15 Telepractice model of care (TMOC) N = 15 Standard MOc	1. Compared service outcomes, costs, and consumer satisfaction between TMOC and Standard MOC 2. Patients own computers, smartphones/tablet devices with camera and microphone. Clinicians used videoconferencing unit 3. Health Department Telehealth network and portal	TMOC more efficient with reduced number and duration of appointments required until discharge. Significant patient cost savings for TMOC. Lower but nonsignificant overall cost difference for health service when using TMOC. High patient satisfaction for TMOC

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Burns et al., (2012). A pilot trial of a speech pathology telehealth service for head and neck cancer patients. *Journal of Telemedicine and Telecare. 18,* 443-446	Case series Description of clinical service	IV	N = 38 Adults with head and neck cancer: laryngectomy & non-laryngectomy	1. Clinical support provided via telepractice by specialist cancer service to patients/clinicians at regional cancer site 2. Videoconferencing unit with medical camera system 3. Health Department's Telehealth service using IP at 1 Mbit/s	50 sessions conducted. All clinical problems managed successfully via telehealth. High levels of patient and clinician satisfaction.
Wall, Kularatna, Ward, Cartmill,Hill & Porceddu (2017). Adherence to prophylactic swallowing therapy program during (chemo) radiotherapy: Impact of service delivery model and patient factors. *Dysphagia, 32*, 279-292.	Randomised controlled trial	II	N = 79 N = 26 Clinician directed N = 26 SwallowIT N = 27 patient self-directed Adults with ororpharyngeal cancer undergoing (chemo) radiotherapy	1. 6 week program – 10 practice sessions per week (independent or clinician + independent practice); Outcome measure – adherence - % prescribed sessions completed, patient factors 2. SwallowIT software program on tablet computer 3. Wi-Fi USB, connects to external server	% adherence across all groups low at 6 weeks (27%) – declined at week 4 of CRT Clinician-directed significantly better adherence than patient self-directed weeks 1-3 Trend for higher adherence in *Swallow*IT group compared to patient self-directed 10% higher rate of adherence for clinician-directed & *Swallow*IT therapy Smoking at baseline, concomitant chemotherapy, low score on functional oral intake scale & reduced motivation – significant negative predictors of adherence
Wall, Kularatna, Ward, Cartmill, Hill, Isenring, Byrnes & Porceddu (2018). Economic analysis of a three-arm RCT exploring the delivery of intensive prophylactic swallowing therapy to patients with head and neck cancer during (chemo) radiotherapy. *Dysphagia*, DOI 10.1002/hed.24706.	Randomised controlled trial	II	N = 79 N = 26 Clinician directed N = 26 SwallowIT N = 27 patient self-directed Adults with ororpharyngeal cancer undergoing (chemo) radiotherapy	1. 6 week program – 10 practice sessions per week (independent or clinician + independent practice); Outcome measures – health service costs, patient costs, patient reported quality of life 2. SwallowIT software program on tablet computer 3. Wi-Fi USB, connects to external server	Compared to clinician-directed model, *Swallow*IT provided significant cost savings to both health service & patients - $1901 per patient Compared to patient self-directed therapy, *Swallow*IT was more cost-effective due to clinically significantly superior quality of life outcomes post CRT for comparable costs

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Ward et al., (2007). Assessment of communication and swallow function post laryngectomy: A telerehabilitation trial, *Journal of Telemedicine and Telecare*, *13*(3), 88-91.	Prospective cohort study with control group. Simultaneous assessment with SLP randomised.	III	N = 20 Adults with Laryngectomy	1. Compared diagnostic decisions from simultaneous FTF and online assessments of oromotor, swallowing and communication using structured script 2. Custom built videoconferencing unit with and additional capabilities (store and forward). 3. 128 kbit/s	Found acceptable levels of agreement between online and FTF ratings for oromotor, speech and swallowing clinical decisions, but issues with limited vision from fixed web cameras. Clinicians reported reduced satisfaction. Patient satisfaction was high.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Head and Neck Cancer					
Ward et al., (2009). Assessment of communication and swallowing post-laryngectomy: A telerehabilitation trial, *Journal of Telemedicine and Telecare*, *15* (5), 232-237.	Prospective cohort study with no control group. Simultaneous assessment.	III	N=10 Adults with Laryngectomy	1. Compared diagnostic decisions from simultaneous FTF and online assessments of communication, swallowing and stoma status assessed alaryngeal speech and swallowing 2. Custom built videoconferencing units with store and forward and additional capabilities. 3. 3G phone network – maximum throughput 3 Mbit/s	Acceptable levels of agreement between online and FTF ratings for oromotor, speech, swallowing and stoma status. Clinicians and patients reported high satisfaction.
Hearing Impairment					
Blaiser et al., (2013). Measuring costs and outcomes of tele-intervention when serving families of children who are deaf/hard-of-hearing. *International Journal of Telerehabilitation, 5* (2), 3-10.	Randomised control trial Random allocation with children in each group being matched on several criteria.	II	N=27 Families of infants and toddlers with hearing impairment	1. Parent-Infant Program services according to Individualized Family Service Plan; mean of 2 visits/ month for 6 months; 1 visit was via telepractice, the other was in-person. 2. Two-way PC videoconferencing; 3. IP of various bandwidths; midway through study families with insufficient bandwidth upgraded to minimum of 1.5 Mbps	Telepractice group scored significantly higher on expressive language and significantly better on Parent Engagement subscale. Cost savings of telepractice increased as intensity of service delivery increased. Provider and family satisfaction was positive overall, but there was variability in opinions.

Study	Study design	NHRMC level	Sample	1. Materials 2. Technology 3. Network	Findings
Hearing Impairment					
Constantinescu, G. (2012). Satisfaction with telemedicine for teaching listening and spoken language to children with hearing loss. *Journal of Telemedicine and Telecare, 18,* 267-272.	Cohort study measuring treatment satisfaction	IV	N=18; 13 families + 5 therapists	1. Auditory-Verbal Therapy 2. PC-based videoconferencing (Skype) 3. High-speed broadband	Parents and therapists generally expressed high satisfaction across all domains. All parents felt that interaction via telepractice was at least as comfortable as FTF interaction and they were at least as satisfied as they would be with FTF treatment.
Constantinescu et al., (2014). A pilot study of telepractice delivery for teaching listening and spoken language to children with hearing loss. *Journal of Telemedicine and Telecare. 20,* 135-140.	Retrospective cohort study with matched controls	III	N=14 Children with bilateral hearing impairment.	1. Auditory-Verbal Therapy 2. PC-based videoconferencing (Skype) 3. Broadband IP	No significant differences between e-AVT and FTF groups on language scores 2 years post-optimal amplification. Overall, the E-AVT group scored within the normal range for children with normal hearing on the language test.
Davis et al., (2012). Maximizing the impact of telepractice through a multifaceted service delivery model at the Shepherd Centre, Australia. *The Volta Review, 112,* 383-391.	Non-experimental descriptive study	IV	N=45 Children and families with hearing impairment.	1. Auditory-Verbal Therapy 2. PC-based videoconferencing (Skype) 3. IP, bandwidth not stated	47% of children achieved Total Language Scores within the average range or above. These children had been diagnosed and fitted with hearing aids and/or cochlear implants before 12 months of age and had highly engaged patients.
Lalios, A.P. (2012). Connect*Hear* teleintervention program. *The Volta Review, 112*, 357-364.	Non- experimental descriptive study of treatment satisfaction	IV	N=11 Families consisting of 13 individuals with hearing loss	1. Auditory-Verbal Therapy 2. Various hardware including PCs, laptops, portable devices and software including Skype and iChat; 3. Various IP, including wired, wireless and satellite.	All parents observed that their child had made progress through telepractice intervention and all reported high satisfaction with the program.

Abbreviations:

NHMRC = National Health & Medical Research Council; RCT = Randomised Controlled Trial; ASD = Autism Spectrum Disorder; TBI = Traumatic Brain Injury; ABI = Acquired Brain Injury; PD = Parkinson's disease; SLP = Speech Language Pathologist; PC = Personal Computer; FTF = Face-to-Face; ASHA = American Speech and Hearing Association; REEL-3 = Receptive-Expressive Emergent Language Test, Third Edition; SKOLD = Screening Kit of Language Development; PLS-4 = Preschool Language Scale -4; GFTA-2 = Goldman-Fristoe Test of Articulation, Second Edition; PPVT-III = Peabody Picture Vocabulary Test, Third Edition; CELF®-4 = Clinical Evaluation of Language Fundamentals® - Fourth Edition; EOWPVT-4 = Expressive One-Word Picture Vocabulary Test – 4; CELF-3 = Clinical Evaluation of Language Fundamentals 3; QUIL = Queensland University Inventory of Literacy; NEALE = Neale Analysis of reading ability; SAST = South Australian Spelling Test; ADOS = Autism Diagnostic Observation Scale; BNT = Boston Naming Test; BDAE-3 = Boston Diagnostic Aphasia Examination, 3rd Edition; ABA-2 = Apraxia Battery for Adults, 2nd Edition; ASSIDS = Assessment of Intelligibility of Dysarthria Speech ; IP = Internet Protocol; T1 = Transmission System 1; 3G = Third Generation; CSE = Clinical Swallowing Examination; VPI = Velopharyngeal insufficiency; FCT = Functional Communication Training; USA = United States of America; UAE = United Arab Emirates.

Level 1 / 114 William Street T 61 3 9642 4899 office@speechpathologyaustralia.org.au
Melbourne Victoria 3000 F 61 3 9642 4922 www.speechpathologyaustralia.org.au

FAQs from SPA members
Telepractice in Speech Pathology

Speech Pathology Australia is aware that interest in the use of telepractice (telehealth) has increased in response to the outbreak of coronavirus COVID-19. The following FAQs are intended to provide guidance and resources to members for responsibly implementing and maintaining clinical standards through telepractice. If you have further questions in relation to this document, please do not hesitate to contact Speech Pathology Australia on 03 9642 4899 or 1300 368 835 or office@speechpathologyaustralia.org.au

What is Speech Pathology Australia's position on telepractice?

The Association supports the use of telepractice as a service delivery model where it is based on current evidence-based practice and is at least equivalent to standard clinical care. Members who engage in telepractice need to ensure they have appropriate skills and technology and are bound by the Association's Code of Ethics and other Core Documents. Speech pathologists are urged to become familiar with SPA's Position Statement: Telepractice in Speech Pathology.

How do I know what services are appropriate to offer through telepractice?

As with other methods of service delivery, speech pathologists should seek evidence related to telepractice. SPA's Position Statement: Telepractice in Speech Pathology contains a review of current evidence. Members may also perform a search such as "telepractice" or "telehealth" on SpeechBITE. The evidence for some areas of practice suggest that benefit is contingent on related factors, such as having a trained support person or other health practitioner onsite with the client. Where there is no evidence published, clinicians should utilise the same decision-making process for other treatments or methods that do not yet have published evidence. SPA's worksheet "Ethical decision making: Should I use this therapy approach?" can help guide members through this process. Members are encouraged to seek professional support from those with experience offering telepractice services.

What clients are appropriate to be served through telepractice?

Clinicians should assess individual client needs and determine the appropriateness of this method of service delivery on a case-by-case basis. Speech pathologists should consider any factors that may impact the provision of services, including:

- Sensory and physical characteristics: This may include vision, hearing, motor dexterity, physical endurance and positioning
- Cognitive, behavioural and motivational characteristics: Consider attention, ability to sit and focus on a computer, understanding and perception of a remote interaction
- Communication characteristics: Including auditory comprehension, sign language use, speech intelligibility, skill and need for written language, use of AAC, severity of communication deficits and their impact
- Support resources: Such as availability of technology, ability of carer to support technology and service provision

(Speech Pathology Australia, 2014 and American Speech-Language-Hearing Association, n.d.)

What technology is required to offer telepractice services?

Acquisition and use of technology should be driven by client needs. Speech pathologists are encouraged to familiarise themselves with technology options and how they can be implemented to accommodate specific situations. Areas to consider may include:

- Hardware: Identify what computer will be used at clinician site and client site. Determine if processing speed and memory support videoconferencing. Identify whether the device requires the client to sit at a desk or if it offers some flexibility and mobility.
- Webcam: Internal (embedded) webcams may facilitate face-to-face communication. External webcams or document cameras permit flexibility in observing or the ability to view work performed on a horizontal surface.
- Audio: Assess whether clinician and client microphone/speakers permit appropriate observation and communication. Some environments or communication needs may require a headset.
- Platform: Evaluate functions of your platform and how the client will interact during the session. Screen share, whiteboards, drawing tools and shared keyboard/mouse controls are features commonly used by telepractitioners. Assess the security features of the platform. Although some free versions of videoconference platforms exist, these often have a session time limit which may be disruptive to services.
- Connectivity: Determine if the internet at both the client and clinician site supports a clear connection. This can be assessed from websites such as https://www.speedtest.net/. The upload / download speeds required will depend on the platform and materials being used. However, a general minimum standard is 3 Mbps for static materials and 5 Mbps for video, gaming, etc.

(American Speech-Language-Hearing Association, n.d.)

Clinicians should be familiar with technology and platform functionality prior to engaging in services and should be able to familiarise and guide clients and carers. Practices are encouraged to develop procedures and protocols to manage training and navigate technical support issues as they arise. Policy and procedure templates and guides, available on the Association's Private Practice Essentials page, may be useful in developing these.

Does someone need to be onsite with the client?

In the majority of cases, it is beneficial or necessary to have a carer, or facilitator, present with the client. This individual may resolve technical issues, support service provision as appropriate, manage materials and camera angles, verify observations, and respond to urgent situations. Facilitators are key in ensuring that the client's environment is private, secure, and distraction-free. Although some clients may be safely and effectively served without an onsite facilitator, having someone else present helps to reduce risk and promote generalisation of skills to other contexts.

Depending on the situation, the facilitator role could be filled by AHAs, parents, partners, teachers, support workers, or other professionals. speech pathologists should evaluate individual procedures and determine whether a facilitator requires specific skills to support them and if the facilitator has skills to support a session Speech pathologists should help facilitators understand the role of each person in the interaction and any activities, materials, etc. that are required in a session.

Do different funding streams support the use of telepractice for speech pathology?

- NDIS: Yes. Clients being served under NDIS, regardless of how their plan is managed, may receive speech pathology services through telepractice.
- Medicare and DVA: No. Although temporary Medicare Benefits Schedule (MBS) and Department of Veterans' Affairs (DVA) item codes do allow doctors, nurses and mental health professionals to provide services through telehealth to specific clients , these do not currently include speech pathology. In the Association's submission in regards to the MBS item review,

it was recommended that the existing allied health items should be altered to include telehealth as a service provision alongside face to face consultations.

- Private Insurance: It depends. Private insurers may cover speech pathology telepractice services on a case-by-case basis. Members are advised to contact individual insurers, or have the client do due process to determine whether this would be covered by their policy.

Are there specific risks associated with offering telepractice services?

Telepractice is a relatively new method of service delivery. As with any developing area there may be gaps in evidence, policy or precedent to guide these services. The largely digital and remote nature of telepractice also makes it susceptible to certain online risks. The following considerations may assist members to reduce professional and clinical risk and engage in responsible service-provision:

- Informed Consent: Obtain informed consent from both the service provider and clients or decision-makers. Ensure that each understand processes and procedures that will be used, disclose benefits and limitations of telepractice, and share any other relevant information, such as whether a rebate will be available for the session.
- Indemnity Insurance: All members are encouraged to have their own professional indemnity insurance. Those engaging in telepractice should inform their insurance provider and seek appropriate advice.
- Privacy: Ensure that the client and clinician site is secure and permits the session to remain confidential. Records and documents should be transmitted and stored in a secure way. Only use a secure internet server for sessions or to transmit information.
- Emergency Plan: Identify a plan to respond to urgent situations and confirm this with the onsite facilitator and other stakeholders. Identify contact information for local emergency or medical services.
- Recordings: If the speech pathologist believes there is a clinical need or justification for the session to be recorded, then the speech pathologist could do so after informing the client and obtaining their consent for the recording to occur. If any part of a consultation is recorded, that recording forms part of the client's record and must be managed and stored in accordance with the principles applying to all other elements of the client's record.

Where can I learn more about how to offer effective telepractice services?

The Association reminds members that the provision of telepractice is a learnt skill and encourages members to seek professional development and support prior to commencing services. Speech Pathology Australia is currently developing a detailed online learning module. Other resources:

- Free Webinar: To help members who have an urgent need to upskill in this area, SPA has made one of its webinars, Telepractice in speech pathology – principles and practicalities by Dr. Clare Burns, available to member free of charge.
- The Royal Institute for Deaf and Blind Children has published an instructional e-book, RIDBC Teleschool: Guiding Principles for Telepractice, available on iOS devices.
- The American Speech-Language-Hearing Association (ASHA) maintains a Practice Portal offering information on key issues and resources in telepractice. Although some information is specific to practice in the United States, many principles may be applicable to Australian practitioners.

References

American Speech-Language-Hearing Association (n.d.). Telepractice (**Practice Portal**). Retrieved March, 12, 2020, from : https://www.asha.org/Practice-Portal/Professional-Issues/Telepractice/

Speech Pathology Australia (2014) Position Statement: Telepractice in Speech Pathology. Melbourne, Australia. The Speech Pathology Association of Australia Ltd.

xxxxx

Original: March 2020

Should I use telepractice? Consider these factors:

Technology

Do you and the client have a computer (not a phone) with a webcam and speakers?
Do you and the client have internet with sufficient bandwidth to video chat for the length of your session?

if not

Environment

Do you and the client have a quiet space, free from the interruptions of pets, people, and noises?
Is your background clear? Toys, books, and pictures might be distracting.

if not

Client goals

Can you see and hear sufficiently well to know if they are successfully acquiring their goals?
How will you know that your therapy is effective?
What evidence is there for these goals being delivered via telepractice?

if not

Client factors

Does the client have sufficient prerequisite skills to engage with you on a screen? If not, is there an other person who can act as your proxy? Are they free from other demands on their time?
Do they have a similar toy/game/activity at home that you can use in your session?

if not

Privacy and program factors

Is the program HIPAA compliant?
Does the platform you use require a subscription or cost to the client? Free isn't always better
How are you storing a recording you make in session?

if not

Clinician factors

Have you accessed training to deliver services via telepractice? Do you know how to troubleshoot if the technology fails?
Have you weighed the risks to the client of providing no services vs service with reduced efficacy?
Are you able to deliver effective services?
Have you read the FAQ on telepractice?

if not

It may not be appropriate to use telepractice

Speech Pathology Australia