

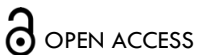


CASE REPORT

Comparing In-Person and Remote Testing of Adult Neurogenic Tests: A Case Report

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ABSTRACT

Aim: More than five years after the start of the COVID-19 pandemic, the need for virtual speech therapy services continues. The main aim of this preliminary case report was to determine if participants' performance on adult neurogenic communication disorder tests was similar when evaluations were conducted in-person and remotely. Another aim was to develop adaptations to be used when speech-language pathologists remotely give the tests employed in this report. Some tests used in this study have little or no published adaptations regarding remote administration.

Methods: Two adults participated in this study. Participant 1, a 47-year-old female, and Participant 2, a 49-year-old female, both had acquired neurogenic communicative disorders, and were given the: Apraxia Battery for Adults-2nd Edition, Communication Activities of Daily Living-3rd Edition, Colorado Motor Speech Framework, La Trobe Communication Questionnaire, and Quick Aphasia Battery-Extended and Remote Versions. Testing was done across two sessions per participant. Participant 1 used a tablet during remote testing; Participant 2 used a laptop.

Results: Some tests generated challenges when given remotely; minor technical issues were encountered. Wording to some questions was changed slightly while still retaining the general integrity of the original item. Overall, no significant changes in scores occurred between the two testing conditions.

Conclusions: Clinicians should be able to administer these assessments remotely or in-person with similar outcomes. Remote testing recommendations described can aid clinicians who use these assessments with their telepractice clients. It is recommended adult neurogenic clients use computers/laptops for remote testing and not tablets.

Introduction

The COVID-19 pandemic brought the need for virtual services that were convenient and safe for clients. At the end of the pandemic, the extent to which virtual rehabilitation services would continue was unknown. Yet this delivery method continues, allowing those who are unable to attend face-to-face sessions to access services.¹ Multiple factors may influence the ability to access services including: living in inaccessible areas (e.g., rural areas), inability to drive and/or lack of transportation, or shortages of available speech-language pathologists.² An ever-growing concern in America is the disparity in health care for rural communities where individuals may be unable to access needed care.³ Many obstacles exist in rural healthcare that either do not exist in larger urban areas or may not be on the same scale.⁴ A few examples include lack of access to resources, travel needed for both clients and providers, access to training, and even differences in the language used between healthcare provider and patient.⁴ In a survey of more than 100 persons with aphasia and their caregivers, reported concerns included struggling to access information as well as a shortage of local resources and services.⁵ These are reasons why remote delivery of speech-language pathology services may be a desirable option.

There are several considerations with respect to using remote delivery of speech-language pathology services. Barriers include potential health inequalities with women and younger adults being more likely to use remote services than men and older adults.⁶ Other challenges include insufficient technology access, possible threats to patients' privacy and confidentiality, and the presence of environmental distractions.^{1,6-9} It has also been suggested that remote sessions may lead to a lower quality of care, be less engaging, and more difficult to build rapport between the speech-language pathologists and patients.^{7,8} Advantages include greater patient convenience and comfort, greater family involvement, reduced scheduling conflicts, lower costs, enhanced session efficiency, and increased data collection.⁶⁻⁸ To capitalize on these advantages, speech-language pathologists may benefit from improved availability of adapted materials, and improved comfort with remote administration to provide high-quality remote services.

TESTING ADULTS WITH ACQUIRED NEUROGENIC DISORDERS

Various assessment tools are available to speech-language pathologists who evaluate adults with acquired neurogenic communication disorders. Two assessment tools to evaluate persons with suspected motor speech impairments are the Apraxia Battery for Adults-2nd Edition¹⁰ and the Colorado Motor Speech Framework.¹¹ The Apraxia Battery for Adults-2nd Edition aids in determining if an adult has apraxia of speech, nonverbal oral apraxia, and/or limb apraxia. Severity levels based on raw scores can be assigned to the six subtests ranging from production of words of increasing length and complexity, nonverbal tasks (e.g., lick lips) and limb movements (e.g., wave good-bye), reading aloud (i.e., Grandfather Passage), and counting forwards and backward. Many items have a multidimensional scoring system.

The Colorado Motor Speech Framework¹¹ is a more recently developed motor speech assessment tool that is freely available online (<https://cmsf.info/>). It covers a wide range of motor speech areas, including the five speech components (i.e., articulation, respiration, resonance, phonation, prosody), and encompasses various tasks (e.g., reading a sentence aloud while stressing a different word, diadochokinetic rate). Clinicians rate clients' intelligibility level and naturalness, and clients rate their own speech. Though the Colorado Motor Speech Framework does not provide scores per se, it is a flexible tool that provides valuable descriptive information for speech perceptual features. Some tasks yield quantitative data (e.g., maximum phonation time). Speech-language pathologists can also use results from the Colorado Motor Speech Framework to differentially diagnose apraxia of speech and types of dysarthria.

If speech-language pathologists evaluate adults with potential aphasia, the Quick Aphasia Battery¹² is another test that is freely available online (<https://aphasiablog.org/qab/>). The Quick Aphasia Battery comes in differing versions (e.g., extended, remote), in different languages (e.g., Spanish, Turkish), and evaluates various abilities (e.g., picture naming, repetition, reading aloud). The extended version has more test items than the original Quick Aphasia Battery, while the remote version of the Quick Aphasia Battery has adaptations for virtual administration developed by the test's authors. For example, in the picture naming section, persons are shown pictures that can be shared remotely. Depending on the subtest, items are numbered in the remote version so that patients do not have to attempt to explain where in a display pictures are located; instead, patients can state the number of the pictured item.

Beyond direct motor speech and language testing, speech-language pathologists may wish to determine if individuals' communication difficulties interfere with daily tasks. In such instances, the Communication Activities of Daily Living-3rd Edition¹³ can evaluate functional abilities. Some of the areas assessed in the Communication Activities of Daily Living-3rd Edition include reading, using numbers, and social interactions. Sample tasks include having patients state when the best time is to eat lunch, generate a problem they could tell a doctor about, and say what one should wear on a rainy day. Similar to the Apraxia Battery for Adults-2nd Edition,¹⁰ many items on both the Quick Aphasia Battery¹² and the Communication Activities of Daily Living-3rd Edition¹³ use a multidimensional scoring system.

The La Trobe Communication Questionnaire¹⁴ allows individuals to rate their perceived communication ability and rate how potential communication challenges affect them. It includes 30 questions with a total score ranging from 30-120 points. The following rating scale is used: 1- Never or Rarely, 2-Sometimes, 3-Often, and 4-Usually or Always. Examples of questions include: "When talking to others, do you leave out important details?" and "When talking to others, do you know when to talk and when to listen?" Although not utilized in the present study, a proxy version exists to determine a close other's perception of the patient's communicative abilities.

REMOTE ASSESSMENT OF NEUROGENIC COMMUNICATION DISORDERS

Some researchers have investigated the performance of individuals on adult neurogenic assessments administered remotely versus in-person. Rao et al¹⁵ found that adults with Primary Progressive Aphasia had consistent results on the Western Aphasia Battery -Revised¹⁶ when it was given remotely and in-person. A limitation of this study included the length of time between testing conditions, which ranged from 6-90 days apart. Given the time lapse, participants may have had a change in performance due to disease progression. Another recent study using the Western Aphasia Battery -Revised found that the test could reliably be given in-person or remotely to persons with aphasia and such testing could be done interchangeably.¹⁷

Modifications (i.e., adaptations) for remote administration of adult neurogenic tests have been described so that other clinicians may use them.^{2,17} Several modifications for the Western Aphasia Battery -Revised have been reported,^{16,17} including uploading and sharing images, sharing screen control with participants, and slightly altering the wording of certain questions or commands. Remote administration as well as modifications similar to the ones described (e.g., sharing images, slightly adjusted wording), have been reported for other tests^{2,18} including the Apraxia Battery for Adults-2nd Edition,¹⁰ the Apraxia of Speech Rating Scale-Version 3.0,¹⁹ and the Frenchay Dysarthria Assessment.²⁰ Overall, remote assessments of persons with acquired neurogenic disorders can produce favorable outcomes with performance similar to in-person testing.²¹

AIM AND RESEARCH QUESTION

Several researchers have recently reported remote modifications can successfully be made to various speech-language pathology tests that evaluate adults with acquired neurogenic disorders.^{2,17,21} A main limitation of Burda et al's² recent study was that all testing was done remotely, leading to potential concerns regarding the reliability of remote testing. Though remote speech-language pathology services continue to be used with positive results,²¹ additional research on other available tests is needed to determine if in-person and remote testing warrant similar results while maintaining original test integrity. Hence, the aim of this study was to determine if other adult neurogenic tests given in-person and remotely yielded similar results. More specifically, the researchers sought to answer the following question: Do adults with acquired neurogenic communication disorders have similar results when given the Apraxia Battery for Adults-2nd Edition,¹⁰ Communication Activities of Daily Living-3rd Edition,¹³ Colorado Motor Speech Framework,¹¹ La Trobe Communication Questionnaire,¹⁴ and Quick Aphasia Battery Extended and Remote Versions¹² in-person and remotely?

Methods

PARTICIPANTS

Two adults participated in this preliminary case report (IRB Protocol #FY24-38). Participant 1 was a 47-year-old female who experienced a bilateral cerebellar cerebrovascular accident (CVA) in August of 2008. She

has received outpatient individual and group speech therapy at a university speech and hearing clinic since Fall 2022. Participant 1 was previously employed as a nurse manager, though has been unable to work or drive following her CVA. She lives with her husband and has two young adult children who no longer live at home.

Participant 2 was a 49-year-old female who experienced two left hemisphere CVAs in November 2014 that occurred nine days apart. She has received speech therapy since 2014. She participated in individual therapy in the past but currently attends group therapy at a university speech and hearing clinic where she will occasionally be responsible for directing various activities (e.g., teaching recipes to the group). Participant 2 was previously employed as a marketing director. She has been unable to work since her CVAs but is able to drive. She lives with her husband and one son. Two other young adult children no longer live at home.

PROCEDURES

Assessments were conducted in-person as well as remotely via Zoom. Similar to Dekhtyar et al,¹⁷ participants were encouraged to use technology available in their homes during remote testing sessions. Thus, during these sessions, Participant 1 utilized a tablet, and Participant 2 utilized a laptop. The majority of remote adaptations involved putting pictures from each test into Google Slides. Testing conditions were counterbalanced across the participants (in-person first followed by remote testing, and remote testing followed by in-person). Participants completed the following tests across 2 sessions per condition (e.g., in-person vs. remote): Apraxia Battery for Adults-2nd Edition, Colorado Motor Speech Framework, Communication Activities of Daily Living-3rd Edition, La Trobe Communication Questionnaire, and Quick Aphasia Battery. All testing took place over the course of 4 weeks.

Apraxia Battery for Adults-2nd Edition Adaptations

Remote adaptations for the Apraxia Battery for Adults-2nd Edition¹⁰ involved transferring test questions and pictures into Google Slides as done in Burda et al.² One additional alteration was made during Subtest 1: Diadochokinetic Rate. The researchers provided a gesture of holding their hand up to the camera while saying "Stop" rather than the verbal cue alone. This change was implemented as Participant 2 was unable to hear via Zoom when she was supposed to discontinue her productions of the target syllables.

Colorado Motor Speech Framework Adaptations

For the Colorado Motor Speech Framework,¹¹ multiple changes were made related to stimuli presentation. A Google Slides presentation was used to present initial questions to determine the participants' environments (e.g., any distractions present?) and informed them of the need for a spoon. Pictures were added to slides to provide a model of the oral mechanism tasks; in the event such models would be needed. The Caterpillar reading passage was used to eliminate repetition with the Apraxia Battery for Adults-2nd Edition's¹⁰ use of the Grandfather passage. Some tasks were unable to be assessed remotely in the same way they were in-person. Specifically, the Resonance in-person section requires that

individuals repeat “Buy Bobby a puppy” when nostrils are occluded and unoccluded while clinicians hold a small mirror under participants’ noses. Attempts were made to have participants hold the back of a spoon under their nose while producing the target sentence. This proved not to be feasible. Participants had motor difficulties and could not simultaneously pinch their nares and hold the spoon underneath their nose. They also struggled to quickly shift the spoon from their nose to the camera for the research team to inspect if nasal emissions had fogged up the spoon. The team settled on participants producing the sentence with and without occluding their nares without utilizing the spoon. The following tasks requiring the researchers to physically move participants’ structures were not included during remote testing: moving participants’ lips from a smile to a pucker while participants resisted, opening participants’ lips while their lips were squeezed tightly together, closing and opening each person’s mouth, and lingual resistance tasks.

Communication Activities of Daily Living-3rd Edition Adaptations

Remote administration of the Communication Activities of Daily Living-3rd Edition¹³ required several adaptations. First, test items were entered into Google Slides to be shared with participants. During the beginning of the in-person assessment, participants are asked to hand the clinician a pencil. To yield similar results remotely, participants were asked to use their device to identify the pencil (e.g., circle with the mouse) given a visual field of three pictures that included a pen, pencil, and crayon. Also for in-person delivery, participants are presented with four one-dollar bills and two quarters. They are then asked which items the person could afford out of a four-item list based on each item’s price. This task was adapted for remote testing by providing the client images of the money and images of the four-item list with prices. Participants were then instructed to indicate which items they could buy with that amount of money.

Challenges occurred with how the participants were able to select the correct images. This occurred due to difficulty with the shared screen and mouse control access. In response, the researchers added numbers to the images in Google Slides to allow for easier image selection based on the prompt given to them. Directions were correspondingly altered (e.g., “Tell me the number of the picture that shows what the best time is for eating lunch.”).

Writing tasks, specifically filling out a patient information form, filling in a calendar, and writing a grocery list, led to various trial-and-error adaptations during remote testing. The first attempt was giving Participant 1 shared mouse control via Zoom. She used a tablet and utilized her finger on the screen instead of using a mouse. This yielded difficulty for Participant 1 navigating Zoom and the necessary documents. When this problem arose, a

shared Google Docs was sent to Participant 1 to complete the task via typing. Typing also proved to be challenging. Participant 1 had difficulty locating and accessing the shared document despite multiple attempts. Participant 1 was then asked to type answers within a calendar (e.g., denoting a birthday party’s date). A challenge with this format included lag time as researchers were unable to see the results in real time due to the responses not being submitted until the conclusion of the questions. Finally, a Google survey was made and sent via email to the participant at the time the assessment was administered. Participant 1 was required to type in her responses. This proved to be successful; however, use of the survey still did not provide immediate results and real-time responses from the participant. As the most successful of the adaptations, the survey was employed when remotely administering the Communication Activities of Daily Living-3rd Edition’s written tasks to Participant 2 who used her laptop.

La Trobe Communication Questionnaire Adaptations

For remote delivery of the La Trobe Communication Questionnaire,¹⁴ Google Slides was used to present stimuli. This slideshow included instructions, the questions, and the four-point rating scale: Never or Rarely- 1, Sometimes- 2, Often- 3, and Usually or Always- 4.

Quick Aphasia Battery Adaptations

Existing adaptations of Quick Aphasia Battery Remote version are freely available.¹² The in-person Quick Aphasia Battery extended versions include writing tasks, as do certain remote versions. For remote testing, the research team used Quick Aphasia Battery -Form 1A Remote. In the Writing section (i.e., subtest 5W), participants were instructed to write what they saw and what was happening when shown pictures. The research team put these pictures into Google Docs, put a response line below each pictured item, and then shared the screen with Participant 1. She was instructed to type her answers on the document. However, when she was asked to open this document, she did not have access, and thus, had to request access. Once Participant 1 accessed the document, the examiner had to delete the response lines under the images so she could type her answer. These adaptations were made for Participant 2 before testing started and proved to be successful.

Results

Generally, performance for both participants was similar, if not the same, for all tests whether administered remotely or in-person. For the Quick Aphasia Battery,¹² Participant 1 had an in-person score of 9.69 on the extended version and a score of 9.55 on the remote version (See Table 1). Both scores indicated no aphasia present.

Table 1: Results for the Quick Aphasia Battery - Form 1A Extended & Remote Versions for Participant 1

Subtests	Total Score Possible	Participant 1 Extended In-Person Score	Participant 1 In-Person Severity Level	Participant 1 Remote Score	Participant 1 Remote Severity Level
Word Comprehension	10	10	No Aphasia	10	No Aphasia
Sentence Comprehension	10	10	No Aphasia	8.96	No Aphasia
Word Finding	10	10	No Aphasia	10	No Aphasia
Grammatical Construction	10	10	No Aphasia	10	No Aphasia
Speech Motor Programming	10	10	No Aphasia	10	No Aphasia
Repetition	10	10	No Aphasia	10	No Aphasia
Reading	10	10	No Aphasia	10	No Aphasia
Quick Aphasia Battery Overall	10	9.69	No Aphasia	9.55	No Aphasia

As can be seen in Table 2, Participant 2 had an in-person score of 8.34 and a remote score of 8.43 on the Quick Aphasia Battery.¹² Both scores indicated mild aphasia.

Table 2: Results for the Quick Aphasia Battery - Form 1A Extended & Remote Versions for Participant 2

Subtests	Total Score Possible	Participant 2 Extended In-Person Score	Participant 2 In-Person Severity Level	Participant 2 Remote Score	Participant 2 Remote Severity Level
Word Comprehension	10	10	No Aphasia	10	No Aphasia
Sentence Comprehension	10	7.5	Mild	8.54	Mild
Word Finding	10	8	Mild	6	Moderate
Grammatical Construction	10	9.5	No Aphasia	9.63	No Aphasia
Speech Motor Programming	10	5	Moderate	10	No Aphasia
Repetition	10	9.17	No Aphasia	8.75	Mild
Reading	10	8.33	Mild	8.33	Mild
Quick Aphasia Battery Overall	10	8.34	Mild	8.43	Mild

For the Communication Activities of Daily Living-3rd Edition,¹³ the maximum possible index score is 136. Participant 1 had an index score of 118 for in-person testing and an index score of 119 on remote testing. Participant 2 obtained the same index scores for both in-person and remote testing: 119 (See Table 3). For the La

Trobe Communication Questionnaire,¹⁴ a maximum score of 120 is possible. Participant 1 garnered a slightly higher in-person score of 70, versus obtaining a score of 64 during remote testing. Participant 2 obtained the same total score of 71 across both testing conditions.

Table 3: Results for the Communication Activities of Daily Living-3rd Edition for Both Participants

Participant 1 Raw Score - In-Person	Participant 1 Percentile Rank	Participant 1 Index score - In-Person	Participant 1 Raw Score - Remote	Participant 1 Percentile Rank - Remote	Participant 1 Index Score - Remote
96	93	118	97	96	119
Participant 2 Raw Score - In-Person	Participant 2 Percentile Rank	Participant 2 Index score - In-Person	Participant 2 Raw Score - Remote	Participant 2 Percentile Rank - Remote	Participant 2 Index Score - Remote
97	96	119	97	96	119

On the Apraxia Battery for Adults-2nd Edition,¹⁰ Participant 1 had a greater number of subtests with differing scores across the two testing conditions. These variations led to her being rated as having mild apraxia for the in-person testing on two subtests, but no apraxia on the same two subtests for remote administration (See Table 4).

Table 4: Results for the Apraxia Battery for Adults-2nd Edition for Participant 1

Subtests	Participant 1 Raw Score In-Person	Participant 1 Level of Impairment	Participant 1 Raw Score - Remote	Participant 1 Level of Impairment - Remote
1: Diadochokinetic Rate	22	Mild	23	Mild
2a: Increasing Word Length	2	Mild	0	None
2b: Increasing Word Length	2	Mild	0	None
3a: Limb Apraxia	50	None	50	None
3b: Oral Apraxia	46	None	49	None
4: Utterance Time for Polysyllabic Words	10	None	10	None
5: Repeated Trials	28	None	30	None
6: Inventory of Articulation Characteristics of Apraxia	4	N/A	5	N/A

As can be seen in Table 5, Participant 2 had consistent severity ratings across the in-person and remote testing conditions on the Apraxia Battery for Adults-2nd Edition.¹⁰

Table 5: Results for the Apraxia Battery for Adults-2nd Edition for Participant 2

Subtests	Participant 2 Raw Score - In- Person	Participant 2 Level of Impairment	Participant 2 Raw Score - Remote	Participant 2 Level of Impairment - Remote
1: Diadochokinetic Rate	19	Mild	19	Mild
2a: Increasing Word Length	1	None	0	None
2b: Increasing Word Length	3	Moderate	3	Moderate
3a: Limb Apraxia	46	None	50	None
3b: Oral Apraxia	43	Mild	46	None
4: Utterance Time for Polysyllabic Words	10	None	10	None
5: Repeated Trials	27	Mild	24	Mild
6: Inventory of Articulation Characteristics of Apraxia	5	N/A	6	N/A

As previously noted, the Colorado Motor Speech Framework¹¹ is descriptive in nature and does not yield a total score. Yet, similar articulatory errors could be determined for each participant in both testing conditions. The research team could observe palatal movements during in-person testing, but not during remote testing. In addition, the team was unable to detect audible inspirations remotely but did identify this feature in-person for Participant 1. Researchers rated intelligibility to be 90-95% for both participants, whether via in-person or remote testing. Both participants rated their speech as a "4" during remote testing and as a "2" during in-person testing on a 7-point scale (anchor points: 1 being the worst, 7 being the best).

Discussion

Despite slight variations between testing conditions, remote testing results garnered similar, and sometimes identical, performance as in-person testing for both participants. Thus, many of the paper-and-pencil testing tasks adapted for remote administration in the current study led to no performance differences in the

participants, similar to other studies.²² Results from this case report support remote administration of testing for adults with neurogenic communication disorders and corroborate findings from prior studies.^{2,6,15,17,21} The present study is the only known case report including the Apraxia Battery for Adults-2nd Edition,¹⁰ Communication Activities of Daily Living-3rd Edition,¹³ Colorado Motor Speech Framework,¹¹ La Trobe Communication Questionnaire,¹⁴ and Quick Aphasia Battery.¹² Some remote adaptations in the current case report were straightforward and similar to modifications described by Dekhtyar et al,¹⁷ such as putting testing images into Google Slides or Google Docs, sharing screen control, and slightly adapting wording.

Speech-language pathologists often rely on using perceptual measures (e.g., what they see, what they hear) when evaluating persons who have potential motor speech disorders such as apraxia of speech or dysarthria.²³ Remotely evaluating an individual's speech perceptually or acoustically can prove challenging when incoming acoustic data is inaccurately altered in some

manner or even potentially lost.²³ This was the case with the Colorado Motor Speech Framework.¹¹ Certain subtests could not be given remotely, and slight performance differences occurred for Participant 1 across testing conditions. For example, audible inspirations were heard in-person, but not during remote testing. This is possibly due to the audio capabilities of devices (her tablets, the team's computers, lack of professional microphone) not detecting audible inspirations. Kallhoff et al¹⁸ also reported sound quality difficulties in their study. Lower quality speech samples recorded online can also likely lead to difficulty identifying words in sentences when contextual cues are unavailable.²³ It is uncertain why both participants rated their speech lower during the in-person sessions.

During remote testing of the Apraxia Battery for Adults-2nd Edition,¹⁰ Participant 1 was rated as having no impairments on the increasing word length subtests but rated as having a mild impairment in-person. She completed in-person testing first; remote testing occurred a week later. It is possible she recalled the prior week's testing, and there was a practice effect. Rao et al¹⁵ reported some of their participants were tested approximately a week apart between in-person and remote testing sessions. A longer duration of time between testing conditions led to greater differentiation between scores.¹⁵ Yet, Participant 1 had a higher in-person La Trobe Communication Questionnaire score, which was administered a week prior to her slightly lower score when the La Trobe Communication Questionnaire was given remotely. Participant 2 had fewer instances of variable performance compared to Participant 1. Overall, the research team found all tests used in this current case report generally yielded similar results and would provide helpful information when making treatment decisions.

Both participants reported that all the tests largely worked well when given remotely. Participant 1 preferred the convenience of remote testing but stated in-person testing was equally helpful. Though Participant 2 drives, she preferred remote testing for its convenience. Such preferences have been reported in other studies.^{6,7,18} However, Participant 1 noted that clearly hearing what was articulated by the researchers was challenging during the Quick Aphasia Battery-Remote. Participant 2 denoted remote testing of the Communication Activities of Daily Living-3rd Edition was cumbersome due to the varying adaptations. Both participants indicated that individuals with acquired neurogenic disorders who were not as technologically proficient would likely struggle with aspects of remote testing. Neither participant needed the help of caregivers. Caregiver assistance can at times prove challenging when using remote delivery of speech-language pathology services with adults who have acquired neurogenic communication disorders (e.g., caregivers may not accurately set up equipment).¹⁸

Various challenges with remote testing have been reported.^{1,6-9,18} The research team encountered two main challenges during remote testing. The first challenge was the inability to hear speech perceptual features in Participant 1 who used tablets for all remote testing. As

noted above, while the research team could hear audible inspirations during in-person testing, the team could not hear these features during remote testing. Participant 1 also purchased and used a new tablet between remote testing sessions. When using her new tablet, she was asked to produce a prolonged "ah" to measure her maximum phonation time during the Colorado Motor Speech Framework.¹¹ Her volume faded quickly even though she did not do this during any other previous testing, remote or in-person. When questioned after the maximum phonation time task, Participant 1 reported she maintained her volume the entire time she prolonged the vowel. Thus, the concern was with the new tablet. The second main challenge was determining the best adaptations for items on the Communication Activities of Daily Living-3rd Edition.¹³ The team eventually created remote adaptations that were successful (e.g., numbering pictures, coming up with an alternate but similar task), but it was a trial-and-error effort. Remote testing was more efficient and had fewer difficulties with Participant 2 in part, because she used a laptop rather than a tablet for all testing purposes. Participant 2 has participated in other remote testing research projects and reported that other researchers have required that participants use a laptop during study tasks. Using a laptop is a primary recommendation for speech-language pathologists to keep in mind, because remote testing attempts with Participant 1 using both of her tablets proved challenging at times.

Limitations and Future Research

Speech-language pathologists have been researching the reliability of in-person versus remote assessment practices.²⁴ The current preliminary case report supports remote administration of adult neurogenic tests as a reliable means to evaluate patients. Nonetheless, limitations and future research opportunities exist. Similar to Burda et al² there were only two participants. Both were high-functioning, completed remote testing independently, and gave recommendations on how well adaptations did or did not work. For adults with more severe neurogenic deficits, remote assessment could be more difficult and less effective.²¹ However, such individuals would also likely have difficulties during in-person testing. Hence, future research should include more participants with various severity levels and possible additional adaptations to ensure modifications are feasible for all.

Other limitations are that participants were both native English-speaking Caucasians and all testing was done in English. Including bilingual speakers and persons from underrepresented groups could help determine if the above-described adaptations would be available to a wider group of participants and highlight potential barriers when conducting remote testing.^{15,24-25} Bilingual speakers and persons from underrepresented communities can have difficulty accessing speech-language therapy services.²⁶ Therefore, using tests designed for bilingual speakers or speakers of languages other than English could be employed. For example, the freely available Quick Aphasia Battery's website (<https://aphasiablab.org/qab/>) offers the test in several languages.

Conclusions

Overall clinicians should be able to administer these assessments remotely or in-person with similar outcomes. Remote testing recommendations described can aid clinicians who use these assessments with their telepractice clients. It is recommended adult neurogenic clients use computers/laptops for remote testing and not tablets.

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