



Telehealth Management of Dysphagia in Adults: A Survey of Speech Language Pathologists' Experiences and Perceptions

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Abstract

The goal of this study was to explore telehealth use for dysphagia management in response to COVID-19 to understand variables associated with clinician confidence and perceived effectiveness of this service delivery model and determine clinician-perceived benefits and challenges of managing dysphagia via telehealth. Speech-language pathologists (SLPs, $n = 235$) completed a web-based survey, providing information on demographics, telehealth use during the pandemic, and perspectives on current and future tele-management of dysphagia. Analyses included descriptive statistics to examine usage patterns; logistic regression to determine which variables were associated with telehealth use, clinician confidence, and perceived-effectiveness; and conventional content analysis to analyze responses to open-ended questions. Results revealed a sharp increase in the tele-management of dysphagia during the pandemic. Years of experience with dysphagia management ($p = .031$) and pre-pandemic use of telehealth ($p < .001$) were significantly associated with current use patterns. Working in the outpatient setting was associated with greater clinician confidence ($p = .003$) and perceived effectiveness ($p = .007$), and use of guidelines ($p = .042$) was also associated with greater clinician confidence. Key challenges identified included inadequate technological infrastructure, inadequate patient digital literacy, and reimbursement restrictions. Key benefits were treatment continuity, improving access to care, and time savings. The majority (67%) of respondents reported that they would use telehealth in the future. These findings demonstrate SLPs' abilities and desire to expand their practice patterns to include telehealth for dysphagia management. Therefore, clinician training and more research on best practices for assessment and treatment of dysphagia via telehealth is warranted to refine models of care for dysphagia tele-management.

Keywords Telehealth · Dysphagia · Management · Survey · COVID-19

Introduction

At the onset of the SARS-CoV-2 (COVID-19) pandemic in March 2020, the healthcare landscape changed abruptly, and it became a global healthcare priority to mitigate viral transmission [1]. Given the close-contact and aerosol-generating nature of most dysphagia procedures, there was an urgent need to minimize in-person service delivery, and one way to do so was to adopt telehealth [2, 3]. This was further facilitated by the lifting of many federal, state, and international reimbursement and licensure restrictions at the onset of the pandemic [4, 5] that allowed for continued provision of dysphagia services without putting patients or providers at risk of contracting COVID-19.

While telehealth quickly became widely used as a platform for dysphagia service delivery during this period, prior to the pandemic, this modality was not commonly

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used in dysphagia practice [6]. However, an amassing body of literature had already begun to support its use to manage dysphagia across adult populations. Indeed, completing a dysphagia-specific case-history via telehealth can be effective and efficient [7] and telehealth clinical swallowing evaluations with on-site facilitators have repeatedly been shown to be feasible and reliable in patients with a variety of diagnoses including head and neck cancer [8], stroke [9], and neurodegenerative disease [10], including patients with varying cognitive abilities [10]. Research has also supported that tele-clinical swallowing evaluations reduce wait times and costs [8], and are associated with excellent patient satisfaction ratings [8, 11]. Instrumental swallowing evaluations have also been explored using telehealth. Televideofluoroscopic swallow studies (tele-VFSS) directed in real-time by a remote clinician have demonstrated feasibility and reliability [12, 13] and in cases where a local dysphagia expert is not available, asynchronous teleconsultation based on VFSS assessments may play an important role in improving patient care [14].

There is also emerging evidence to support dysphagia treatment via telehealth [15]. In the head and neck cancer population, home-based exercise programs with telehealth treatment sessions have been associated with high levels of satisfaction and reduced costs of attendance for patients [16]. Applications and websites to facilitate home treatment and enhance patient adherence have also started to emerge with overall positive outcomes in regard to patient satisfaction, adherence, and functional outcomes [17–24]. For adults with neurogenic dysphagia, there is preliminary evidence to support the implementation of compensatory strategies [25] and exercise-based treatments [26] via telehealth, with reported improvements in physiologic function [27], swallowing performance [26], and treatment adherence [24, 26].

Many of the studies discussed above have utilized specialized equipment (e.g., cameras and microphones) and specific technology platforms which were not widely available to clinicians and patients during the COVID-19 pandemic. Providing additional equipment to patients was generally not feasible due to uncertainties regarding the way in which the novel coronavirus could spread and due to financial limitations. This was a possible barrier in translating the existing research to clinical practice during the pandemic. Despite the significant body of literature supporting the tele-management of dysphagia, its integration in clinical practice prior to the pandemic had been limited and many clinicians reported feeling unprepared to adopt this model when the pandemic started [6]. Clinician experience with and acceptance of telehealth is a crucial determinant of the implementation, expansion, success, and sustainability of telehealth services [28–30]. To date, clinician satisfaction with dysphagia tele-services has been assessed in few controlled studies [16, 31, 32]. However, to our knowledge, no extensive work has

been done to help us broadly examine clinician experiences and perceptions with tele-management of dysphagia across settings, procedures, and patient-populations, and to explore variables associated with current or future telehealth usage for dysphagia care. This work is both critical and timely as telehealth starts to become part of standard healthcare [2, 3] – and has the potential to significantly improve access to care for patients with dysphagia [16, 33, 34]. Therefore, we aimed to complete an international survey of dysphagia clinicians to better understand telehealth usage patterns and clinicians' experiences and perceptions using telehealth for dysphagia management during this time. Specifically, we aimed to answer 5 primary questions:

- (1) To what extent were in-person dysphagia services disrupted during the COVID-19 pandemic?
- (2) What were the primary usage patterns of telehealth (i.e., types of procedures, facilitator use, trainings) during this time?
- (3) What clinician variables were significantly associated with telehealth use during the pandemic, and for those that used telehealth—what were the variables that were associated with clinician confidence and perceived effectiveness?
- (4) What were the clinician-perceived benefits and challenges of using telehealth to manage dysphagia during and after the pandemic?
- (5) What variables were significantly associated with clinicians reporting that they would or would not use telehealth in the future (i.e., after the pandemic)?

Methods

Participants

Study participants completed a web-based anonymous survey via the Qualtrics online software [35] between January 15th and April 1st 2021. Participants were Speech Language Pathologists (SLPs) recruited through social media including Facebook, Twitter, and Instagram; emails to colleagues around the U.S. and internationally; and the American Speech-Language Hearing Association listserv for Special Interest Group 13, Swallowing and Swallowing Disorders. Survey enrollment was voluntary and participants were offered to enroll in a raffle to win one of two \$50 vouchers by entering their email at the end of the survey. Inclusion criteria were (1) being a licensed SLP (in their country/area) or clinical fellow in Speech Language Pathology and (2) currently treating adult patients (> 18 years of age) for dysphagia.

Development and Pilot Testing of Survey

A pilot survey was first distributed to 12 SLPs who provided feedback regarding the survey quality and format to examine face validity. All field testers agreed that all questions were relevant and useful; however, minor wording suggestions were made to improve clarity.

Survey Structure

The survey (Online Appendix 1) consisted of 47 questions in three main categories with several subsections in each category. The first section titled “Demographics and Clinical Data” included 13 questions related to participant demographics and experience ($n=8$), clinical data such as work setting and patient populations ($n=3$), and prior experience with telehealth ($n=2$). The second section titled “Dysphagia and Telehealth during COVID-19” included 27 questions pertaining to dysphagia management during the most and least restrictive periods of COVID-19. Most and least restrictive periods were not pre-specified time periods, but rather were defined according to local restrictions and interpreted individually for each survey respondent. The “most restrictive (MR) period” was described in the survey as “during the period that local or state government restrictions on in-person contact and movement were the strictest (e.g., May 2020 in NYC).” The “least restrictive (LR) period” was defined as “when most local and government restrictions were lifted, and clinicians were able to start seeing patients in-person regularly.” Questions in this section related to cancellation patterns of in-person procedures during the COVID-19 pandemic ($n=4$), patterns of telehealth use during the pandemic ($n=9$), use of guidelines and trainings ($n=4$), clinician confidence and perceived-effectiveness of telehealth services ($n=8$), and challenges of telehealth dysphagia management ($n=2$). The final (third) section titled “Dysphagia and Telehealth after COVID-19” included seven questions regarding the likelihood of using telehealth in the future and clinician-perceived challenges and benefits of telehealth for dysphagia management.

Statistical Analysis

Descriptive statistics were used to answer research questions related to cancellations and telehealth usage patterns. All variables were categorical or ordinal and were summarized using frequencies and percentages. Across models, predictors included: years of experience managing dysphagia, prior experience with telehealth across any area of SLP, work setting, use of a facilitator, use of guidelines, completion of trainings, and use of telehealth during the pandemic. We did not consider the predictor “years of experience as an SLP” because it was highly correlated with “years of

experience managing dysphagia” (Spearman $\rho=0.93$), nor did we consider “prior experience with telehealth specifically for dysphagia” because few participants ($n=29$) had dysphagia-specific telehealth experience prior to COVID-19. Binary logistic regression was used to determine which variables were significantly associated with the use of telehealth during the pandemic and projected future telehealth use. Ordinal logistic regression was used to determine which variables were significantly associated with clinician confidence and perceived effectiveness of telehealth to manage dysphagia during the pandemic. Statistical analyses were performed in R Version 4.0.1 [36].

A ranking system was used to analyze clinician-perceived challenges of telehealth. Nine possible challenges were presented in the survey, and clinicians ranked them in terms of their relative importance. A mean rank was calculated for each obstacle and the top three challenges are reported.

Conventional content analysis [37] was used to answer research questions related to clinician-perceived benefits of telehealth and other free-response data, in which an inductive approach was used to develop themes from open-ended survey responses. Because this was an inductive process, a reliability analysis may dilute theme complexity [38] and therefore, this analysis was completed in pairs of raters. This allowed raters to develop consensus between the pairs and increase validity of theme identification. The raters familiarized themselves with the data and coded the data for key themes. This was done by tagging each response with a meaningful label or code (1–2 words) that represented it. The first author subsequently reviewed all codes to remove duplicates (if any), combine similar codes, and ensure the codes best represented the underlying constructs. The frequency (i.e., number of occurrences) of each code was calculated. The first author then categorized the codes into descriptive themes, with a focus on the quantification of trends and patterns reported by clinicians [39].

Results

A total of 278 participants submitted the survey; however, 24 did not meet at least one of the inclusion criteria and 19 survey responses were removed due to responses deemed to be incomplete/suspicious. Specifically, 14 of 19 survey responses had identical IP addresses and responded “I don’t know” to most questions, and the remaining five had identical IP addresses with limited responses and total response time of less than three minutes. Thus, 235 surveys were included in the final analyses (Fig. 1). Questions were not mandatory; therefore, the number of survey respondents who answered each question varied and is reported in the results section.

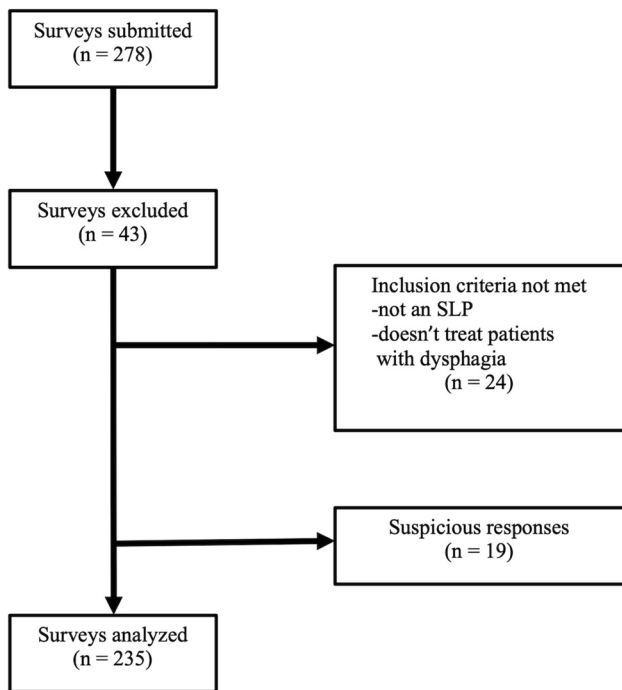


Fig. 1 Flowchart of data cleaning procedure

Demographics of Survey Participants

Survey respondents were Speech Language Pathologists (SLPs) ($n = 224$) or SLP clinical fellows ($n = 10$), 94.4% were females, with 61% of participants from the U.S. and the remaining 39% from 16 other countries. See Table 1 for detailed demographic and clinical background information.

Research Question 1: Disruption to In-Person Services—Cancellation of in-Person Procedures During the COVID-19 Pandemic

Cancellation patterns during the most and least restrictive periods of the COVID-19 pandemic are shown in Supplemental Table 1. Specifically, during the most restrictive (MR) period of the pandemic, 48.2% of respondents to this question ($n = 112/232$) reported cancelling clinical evaluations, 71.5% ($n = 163/228$) canceled instrumental evaluations, and 56% ($n = 129/230$) reported cancelling treatment sessions, at least half of the time (i.e., those that responded “about half the time,” “often,” or “always”). During the least restrictive (LR) period of the pandemic, 12.99% ($n = 30/231$) of participants canceled clinical evaluations, 18.7% ($n = 43/230$) canceled instrumental evaluations, and 13.36% ($n = 31/232$) canceled treatment sessions, at least half of the time (i.e., those that responded “about half the time,” “often,” or “always”).

Table 1 Survey respondent demographics

	Case (percent)
Age	
21–30 years old	52 (22.1%)
31–40 years old	80 (34.0%)
41–50 years old	54 (23.0%)
51–60 years old	31 (13.2%)
> 60 years old	18 (7.6%)
Gender	
Female	222 (94.4%)
Male	10 (4.3%)
Other	0 (0%)
Prefer not to answer	3 (1.3%)
Race	
American Indian or Native Alaskan	1 (0.43%)
Asian or pacific Islander	12 (5.1%)
Black, not Hispanic	7 (3.0%)
White, not Hispanic	188 (80.3%)
Hispanic	11 (4.7%)
Prefer not to answer	15 (6.4%)
Education	
Bachelors	28 (11.9%)
Masters	166 (70.3%)
Doctorate	23 (9.7%)
Post-doctorate	9 (3.8%)
SLPD	5 (2.1%)
Other	2 (0.9%)
Region	
North America	162 (68.9%)
South America	24 (10.2%)
Europe	36 (15.3%)
Asia	1 (0.4%)
Australasia	5 (2.1%)
Middle east	3 (1.3%)
Africa	3 (1.3%)
Years of experience as an SLP	
< 1 year (CF)	10 (4.2%)
1–5 years	41 (17.4%)
6–10 years	51 (21.6%)
11–15 years	43 (18.2%)
> 15 years	88 (37.3%)
Years of experience with dysphagia care	
< 1 year	16 (6.8%)
1–5 years	44 (18.7%)
6–10 years	60 (25.5%)
11–15 years	48 (20.4%)
> 15 years	67 (28.5%)
Work setting^a	
Acute care	124
Sub-acute rehab hospital	40
Skilled nursing facility	41
Outpatient	83

Table 1 (continued)

	Case (percent)
Private practice	42
University clinic	29
Home health	26
Other	4
Patient age range^a	
Younger adults (18–39)	119
Middle-age adults (40–60)	188
Older adults (> 60)	222
Patient populations^a	
Stroke	187
TBI	107
Neurodegenerative disease	192
Head and neck Cancer	133
Other	55

^aSurvey respondents may belong to more than one grouping in this category (therefore percentages are not provided for this category)

Conventional content analysis revealed seven key reasons for these cancellations including: (1) COVID restrictions (e.g., government regulations, facility closures, COVID testing requirements; MR $n = 69$; LR $n = 20$); (2) COVID risk (e.g., testing positive for COVID-19, high COVID-19 case counts, surge in infections; MR $n = 39$, LR $n = 22$); (3) COVID uncertainty (e.g., lack of clarity regarding how to safely carry out procedures, awaiting policy development and clearance; MR $n = 9$, LR $n = 0$); (4) insufficient resources

(e.g., lack of personal protective equipment (PPE), lack of access to instrumental assessments; MR $n = 25$, LR $n = 13$); (5) patient concern (i.e., patient perceived risk of contracting COVID-19; MR $n = 22$, LR $n = 21$); (6) dysphagia services not being prioritized (e.g., dysphagia services were only completed in cases of emergency; MR $n = 10$, LR $n = 4$); and (7) barriers to telehealth (e.g., lack of equipment, clinician inexperience with this modality; MR $n = 6$, LR $n = 1$).

Research Question 2: Telehealth Usage Patterns

Before COVID-19

All survey respondents ($n = 235$) answered questions regarding telehealth use prior to COVID-19 (Fig. 2). When considering experience with telehealth across any area of SLP practice prior to the pandemic, 20.4% ($n = 48$) reported having some experience, 33.2% ($n = 78$) reported familiarity with research but no personal experience, and 46.4% ($n = 109$) reported no familiarity or experience at all. When considering using telehealth to manage dysphagia specifically prior to COVID-19, 12.3% ($n = 29$) of participants reported having some experience, 26.0% ($n = 61$) reported familiarity with research but no personal experience, and 61.7% ($n = 145$) reported no familiarity with research or experience.

During COVID-19

A total of 50.2% ($n = 118$) of survey respondents reported using telehealth to manage dysphagia *during* the COVID-19

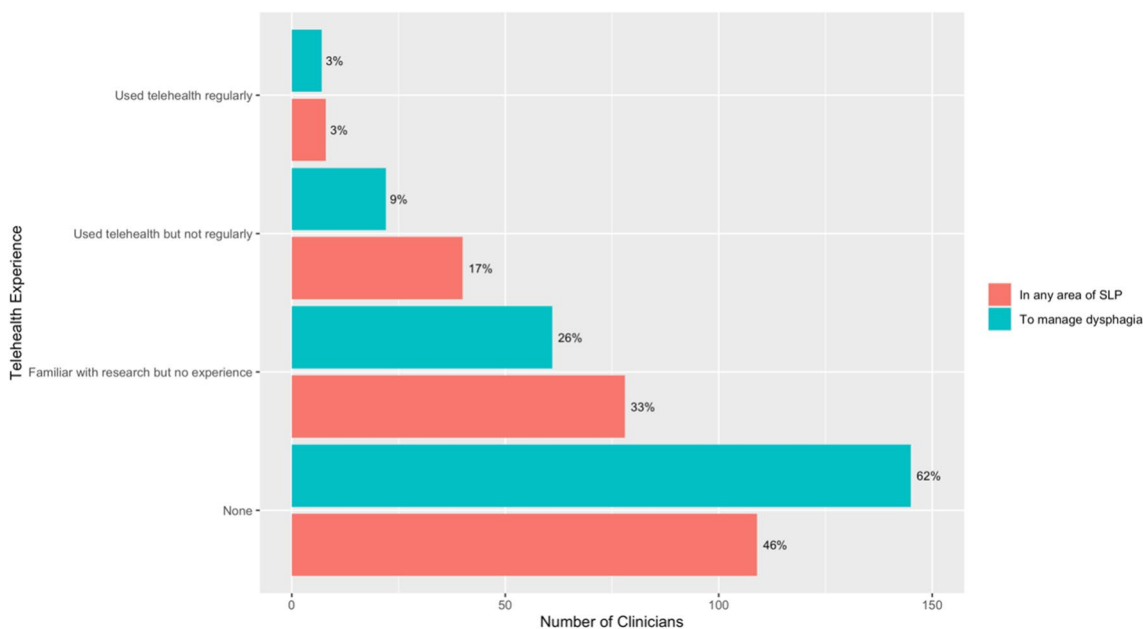


Fig. 2 Telehealth use prior to COVID-19

pandemic. Of those, 34.7% ($n=41$) used telehealth in the inpatient setting, 89.0% ($n=105$) in the outpatient setting, and 23.7% ($n=28$) used telehealth in both the in- and outpatient settings. Details regarding the frequency with which clinicians used telehealth for different procedures during the most and least restrictive periods of the pandemic are reported in Fig. 3. Across settings, during the most restrictive period of the pandemic, telehealth was most frequently used for therapy sessions ($n=97$), followed by consultations ($n=79$), and then clinical (bedside) assessments ($n=62$). Clinicians also reported using telehealth for other procedures ($n=27$) such as family training, education, or counseling, consultations with other professionals, multidisciplinary clinics, case meetings, supervision meetings, telephone consultations, research visits, pre/post-operative counseling and troubleshooting, and interpreter services. Telehealth was least commonly used for instrumental assessments ($n=7$). During the least restrictive period of the pandemic, a similar pattern was observed. Telehealth was most frequently used for therapy sessions ($n=88$), followed by consultations ($n=69$), clinical (bedside) assessments ($n=53$), and other procedures as described above ($n=19$). It was least commonly used for instrumental assessments ($n=9$) during this time as well.

Facilitator Use

We defined a “facilitator” as a caregiver/nurse/aid who facilitated patients in the use of technology, environmental requirements (e.g., position of the patient and the cameras, lighting), feeding the patient (if needed), and was present during the session for safety reasons. Of the 131 participants who responded to this question, 16.8% ($n=22$) reported always using a facilitator, 19.8% ($n=26$) used a facilitator most of the time, 6.9% ($n=9$) used a facilitator about half of the time, 34.4% ($n=45$) used a facilitator sometimes, and

22.1% ($n=29$) never used a facilitator. Facilitators most commonly were a caregiver relative ($n=81$) and less commonly a caregiver aid ($n=25$), a nurse ($n=22$), or a physician ($n=1$). Conventional content analysis of the related open text question revealed that the main components of the remote sessions with which facilitators helped were technology set-up and use ($n=52$), food preparation ($n=20$) and administering bolus trials ($n=29$), clarification of instructions and cueing ($n=25$), providing case history information ($n=19$), facilitating equipment (e.g., holding cameras, providing patient with necessary devices/equipment, holding treatment devices, $n=13$), assisting with implementation of strategies, home practice, and carry-over ($n=9$), participating in patient/family education ($n=4$), providing translator services ($n=3$), and providing verification to the clinician regarding patient performance ($n=2$).

Guidelines and Trainings

Of those who utilized telehealth to manage dysphagia (118/235), published guidelines were utilized by 53.4% ($n=63$), and 55.1% ($n=65$) reported completing specific trainings. The most commonly used guidelines were those provided on the American Speech Language Hearing Association (ASHA) Telepractice Portal and ASHA recommendations ($n=25$), the Purdue I-EAT laboratory guidelines ($n=14$), and facility-specific guidelines and recommendations ($n=17$). Many other resources were also utilized, including the University of Queensland guidelines ($n=6$) and country-specific resources, such as guidance by Speech Pathology Australia (SPA), the Brazilian Federal Council of Speech Therapy, the Irish Association of Speech and Language Therapists (IASLT), the Canadian Personal Health Information Act (PHIA), the College of Speech Language Pathologists and Audiologists of Ontario (CASLPO), the Alberta College of Speech Language Pathologists and

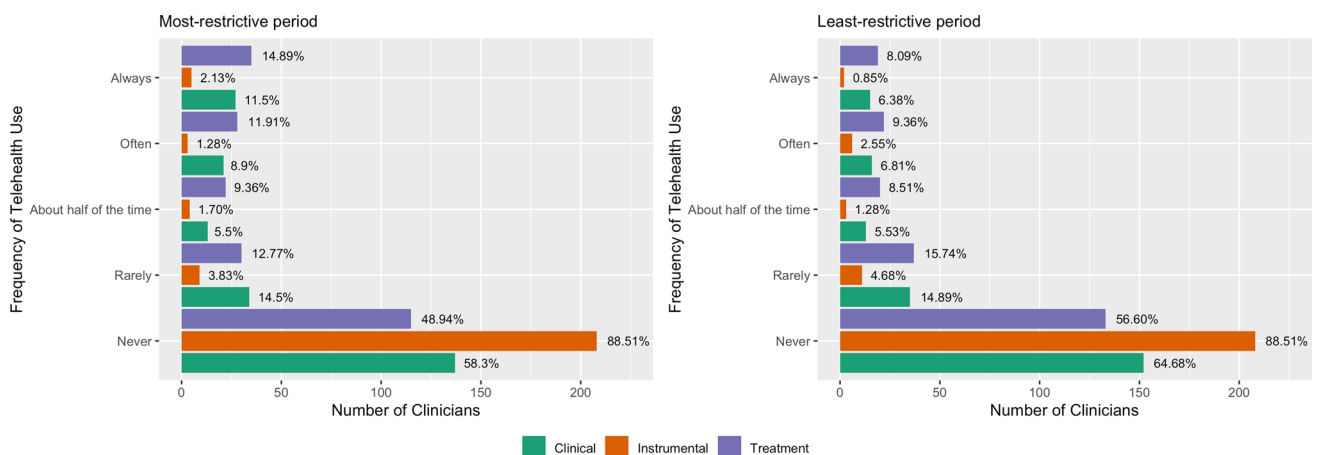


Fig. 3 Frequency of telehealth dysphagia services provided during the pandemic

Audiologists (ACSLPA), and Speech Pathology and Audiology Canada (SAC). Other respondents included resources or guidelines by other professional associations such as the Dysphagia Research Society (DRS), the Texas Speech and Hearing Association (TSHA), the Royal College of Speech and Language Therapists (RCSLT), the American Telemedicine Association (ATA), and peer-reviewed publications.

Trainings most commonly included country-specific webinars or courses, such as those from ASHA ($n=19$), the IASLT ($n=4$), or other country or facility-specific trainings. Webinars from experts in the field (e.g., Dr. Malandraki) ($n=7$), online resources/trainings from Purdue University ($n=4$), the University of Queensland ($n=3$), Australian-based webinars ($n=2$), and other unspecified webinars were also reported.

Clinician Confidence

Participants who utilized telehealth to manage dysphagia were asked to rate their level of confidence in providing dysphagia services via telehealth at the start of the pandemic ($n=104$ participants responded) and at the time of completing the survey ($n=109$ participants responded). Confidence was rated on a scale from 1 to 5, with 1 being “not confident at all” and 5 being “very confident.” At the start of the pandemic, 43 respondents (41.3%) rated themselves on the low end of the confidence scale (i.e., as a “1” or a “2”), and 18 respondents (17.3%) rated themselves on the high end of the confidence scale (i.e., as a “4” or a “5”). At the time of completing the survey, these numbers were almost reversed, with 12 respondents (11.0%) rating themselves on the low end of the confidence scale (i.e., as a “1” or a “2”) and 72 respondents (66.1%) rating themselves on the high end of the confidence scale (i.e., as a “4” or a “5”) (Fig. 4a).

Clinician Perceived Effectiveness

Clinicians also rated their level of perceived effectiveness of dysphagia services via telehealth at the start of the pandemic ($n=101$ participants responded) and at the time of completing the survey ($n=104$ participants responded). Effectiveness was also rated on a scale from 1 to 5, with 1 being “not effective at all” and 5 being “very effective.” At the start of the pandemic, 34 respondents (33.7%) rated themselves as effective or very effective (i.e., a “4” or a “5”) in providing tele-services for dysphagia. At the time of this survey, this number had doubled, and 70 respondents (67.3%) rated their services as effective or very effective (i.e., a “4” or a “5”) (Fig. 4b).

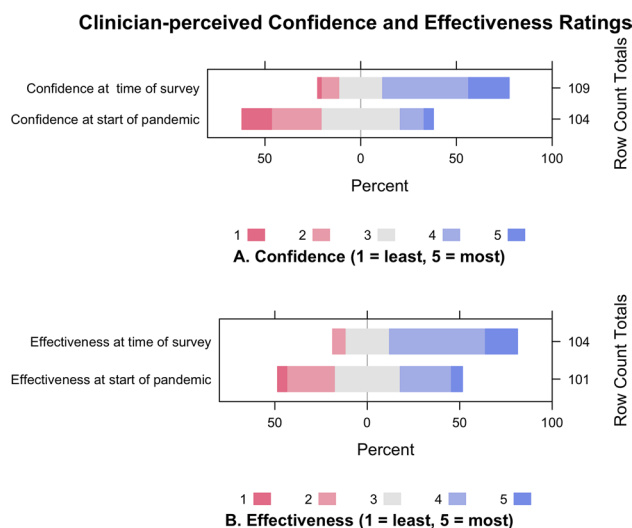


Fig. 4 Clinician confidence and perceived effectiveness of telehealth services

Self-reported Reasons for Ratings of Clinician Confidence and Effectiveness (Qualitative Analysis)

Survey respondents were then asked to justify their chosen levels of confidence and effectiveness, respectively. Conventional content analysis revealed similar reasons provided to justify levels of both parameters. Five key domains that influenced clinician confidence and perceived effectiveness were identified. These were: (1) prior experience, (2) treatment factors, (3) patient factors, (4) technology-related factors, and (5) perceived efficacy or success. See Table 2 for examples offered by the participants on the ways in which these domains enhanced and lowered clinician confidence and perceived effectiveness.

Research Question 3: Variables Significantly Associated with the Usage of Telehealth and Self-reported Confidence and Effectiveness Levels

Variables Significantly Associated with the Use of Telehealth

Binary logistic regression revealed that experience managing dysphagia ($p=.003$) and experience with telehealth prior to the pandemic ($p<.001$) were significantly associated with the use of telehealth to manage dysphagia during COVID-19 (Table 3). Specifically, 6–10 years of experience managing dysphagia (OR 2.06; CI 0.49–2.13) and more than 15 years of experience managing dysphagia (OR 4.83; CI 0.92–27.6) were associated with higher odds of using telehealth to manage dysphagia during the pandemic. Compared to those who had no experience or familiarity with telehealth, those who

Table 2 Factors clinicians reported to have influenced clinician confidence and perceived effectiveness of telehealth dysphagia management

Domains	Enhanced confidence/perceived effectiveness	Lowered confidence/perceived effectiveness
Prior experience	<ul style="list-style-type: none"> • Dysphagia management experience • Telehealth experience • Use of trainings and guidelines • General experience with technology platforms 	<ul style="list-style-type: none"> • Inexperience with telehealth • Lack of training
Treatment factors	<ul style="list-style-type: none"> • Facilitator use • Access to instrumental assessment • Omitting bolus trials • Engaging in treatment only 	<ul style="list-style-type: none"> • Lack of physical contact with patient • Lack of instrumental assessment or alternative objective measures • Inability to control the environment (e.g., distractions in patients' homes) • Difficulty working with facilitators • Safety concerns
Patient factors	<ul style="list-style-type: none"> • Higher cognition • Higher motivation 	<ul style="list-style-type: none"> • Lower cognition • Lower motivation
Technology-related factors	<ul style="list-style-type: none"> • Higher confidence, experience, and skill 	<ul style="list-style-type: none"> • Lower confidence, experience, and skill
Clinician-perceived efficacy	<ul style="list-style-type: none"> • Feeling a treatment was 'successful' 	<ul style="list-style-type: none"> • Feeling uncertainty about treatment 'success'

Table 3 Variables associated with the use of telehealth to manage dysphagia during COVID-19

Predictors	OR ^a	95% CI ^a	<i>p</i> -value
Age			.221
21–30 years old	–	–	
31–40 years old	1.09	0.37, 3.10	
41–50 years old	0.45	0.11, 1.69	
51–60 years old	0.29	0.06, 1.29	
> 60 years old	0.60	0.12, 2.85	
Geographic region			.460
USA	–	–	
Canada	2.35	0.81, 7.34	
Europe	1.15	0.50, 2.63	
Africa, Asia, & the Middle East	1.23	0.22, 7.44	
South America	1.36	0.53, 3.51	
Australia/New Zealand	4,617,769	0.00, NA	
Experience managing dysphagia			.031
< 1 year	–	–	
1–5 years	0.78	0.21, 2.90	
6–10 years	2.06	0.49, 9.13	
11–15 years	1.23	0.26, 6.16	
> 15 years	4.83	0.92, 27.6	
Prior experience with telehealth			< .001
None	–	–	
Familiar with research	2.63	1.40, 5.00	
Used telehealth but not regularly	4.22	1.84, 10.2	
Used telehealth regularly	6.83	0.85, 144	

odds ratio, *CI* confidence interval

were familiar with research on telehealth had 2.63 times the odds of using telehealth to manage dysphagia during the pandemic (OR 2.63, CI 1.40–5.00); those who used telehealth before, although not regularly, had 4.22 times the

odds (OR 4.22, CI 1.84–10.2), and those who used telehealth regularly has 6.83 times the odds (OR 6.83, CI 0.85–144).

Variables Significantly Associated with Clinician Confidence Using Telehealth for Dysphagia

Ordinal logistic regression revealed that work setting (*p* = .003) and the use of guidelines (*p* = .042) were significantly associated with higher clinician confidence in telehealth services at the time of the survey (Table 4). Specifically, working in the outpatient setting was associated with 94% increased odds of reporting higher confidence (OR 0.06; CI 0.01–0.29), when compared to clinicians working in the inpatient setting. Clinicians who used guidelines had over two times the odds of reporting higher confidence in their telehealth dysphagia care (*p* = .044; OR 2.39; CI 1.03–5.67).

Variables Significantly Associated with Clinician-Perceived Effectiveness Using Telehealth for Dysphagia

Similarly, work setting was significantly associated with higher clinician perceived effectiveness in telehealth services at the time of the survey (*p* = .007) (Table 5). Again, working in the outpatient setting only was associated with higher odds of clinician-perceived effectiveness (OR 0.07; CI 0.01–0.37) when compared to those who worked in the inpatient setting.

Research Question 4: Understanding the Benefits and Challenges of Telehealth to Manage Dysphagia

Benefits of Telehealth (Qualitative Analysis)

The most frequently reported benefits of telehealth during COVID-19 were safety (*n* = 69), access to care (*n* = 58), and

Table 4 Variables associated with SLP confidence of telehealth dysphagia management

Predictors	OR ^a	95% CI ^a	p-value
Experience managing dysphagia			.401
< 1 year	–	–	
1–5 years	4.41	0.44, 43.9	
6–10 years	5.00	0.55, 44.6	
11–15 years	9.80	0.91, 107	
> 15 years	6.25	0.73, 53.2	
Prior experience with telehealth			.220
None	–	–	
Familiar with research	1.97	0.72, 5.48	
Used telehealth but not regularly	3.44	1.07, 11.5	
Used telehealth regularly	1.49	0.27, 8.74	
Work setting			.003
Outpatient only	–	–	
Inpatient only	0.06	0.01, 0.29	
Both	0.75	0.29, 1.95	
Trainings completed			.314
No	–	–	
Yes	1.56	0.66, 3.72	
Use of guidelines			.042
No	–	–	
Yes	2.39	1.03, 5.67	
Presence of a facilitator			.052
Never	–	–	
Sometimes	1.86	0.45, 7.88	
Half of the time	2.80	0.42, 19.7	
Most of the time	7.39	1.66, 35.3	
Always	2.93	0.64, 13.9	

^aOR odds ratio, CI confidence interval

allowing for treatment continuity ($n=50$). There were many factors that clinicians reported to have facilitated telehealth use during COVID-19. These most prominently included factors pertaining to the pandemic and the need to mitigate viral transmission ($n=27$; e.g., government and facility restrictions on in-person procedures, the need to avoid public transportation, the safety of staying at home). External support factors such as administrative support ($n=10$), technical support ($n=12$) and technology trainings ($n=6$), and the use of a facilitator ($n=13$) were also reported to facilitate telehealth use. Telehealth-specific support and resources that abounded at this time, such as evidence to support telehealth dysphagia management ($n=8$), telehealth protocols from organizations or facilities ($n=16$), telehealth trainings ($n=3$), and telehealth education ($n=4$), also facilitated telehealth use. Finally, reimbursement of telehealth services ($n=16$), improving patient accessibility to dysphagia services ($n=15$), facilities providing equipment to patients who needed it (e.g., iPads, laptops) ($n=9$), and

Table 5 Variables associated with clinician-perceived effectiveness of telehealth dysphagia management

Predictors	OR ^a	95% CI ^a	p-value
Experience managing dysphagia			.155
< 1 year	–	–	
1–5 years	0.63	0.06, 6.34	
6–10 years	0.72	0.08, 6.03	
11–15 years	3.39	0.33, 35.9	
> 15 years	1.03	0.13, 8.28	
Prior experience with telehealth			.674
None	–	–	
Familiar with research	1.29	0.47, 3.53	
Used telehealth but not regularly	2.07	0.64, 6.81	
Used telehealth regularly	1.55	0.25, 9.93	
Work setting			.007
Outpatient only	–	–	
Inpatient only	0.07	0.01, 0.37	
Both	0.92	0.34, 2.50	
Trainings completed			.486
No	–	–	
Yes	1.37	0.57, 3.31	
Use of guidelines			.177
No	–	–	
Yes	1.80	0.77, 4.31	
Presence of a facilitator			.256
Never	–	–	
Sometimes	2.14	0.46, 10.3	
Half of the time	0.72	0.10, 5.28	
Most of the time	3.81	0.76, 20.0	
Always	1.94	0.38, 10.0	

^aOR odds ratio, CI confidence interval

a positive experience with telehealth ($n=7$) were all also reported as factors facilitating telehealth usage during the pandemic. Clinician-reported benefits of telehealth *beyond the pandemic* generally fell into two categories: (1) enhancing patient accessibility to care ($n=110$) and (2) benefits inherent to the telehealth modality ($n=86$; e.g., incorporating family in treatment; naturalistic environment; enabling treatment continuity after an initial intense burst of treatment; and time, cost, and travel savings).

Challenges of Telehealth (Rank-Order Analysis)

Key challenges of telehealth dysphagia management from clinicians' perspectives were lack of telehealth infrastructure (e.g., cameras, equipment) ($n=110$), reimbursement limitations ($n=81$), and lack of telehealth training ($n=106$). Key challenges that clinicians identified on the part of patients generally surrounded technology—such as patients not being “tech-savvy” ($n=134$), not having a computer/device

(*n* = 106), or not having adequate internet connectivity (*n* = 90) (Table 6).

Research Question 5: Variables Significantly Associated with Projected Use of Telehealth to Manage Dysphagia in the Future

Of all survey respondents, 36% said they would continue to use telehealth after COVID-19 and an additional 31% said they would continue to use telehealth after COVID-19, if reimbursement of services is possible. When comparing clinicians who said they would use telehealth in the future (i.e., those who said “yes” and those who said “yes, if reimbursement allows”) to those who said they would not use telehealth in the future, the only variable significantly associated with future telehealth use was the use of telehealth during COVID-19 (*p* < .001) (Table 7). Specifically, those who used telehealth in the outpatient setting (only) had 5.71 times the odds (*p* < .001, OR 5.71, CI 2.49–14.5) and those who used telehealth in the in-patient and out-patient settings had 6.02 times the odds (*p* = .006, OR 6.02, CI 1.88–27.0) of reporting that they would use telehealth in the future as compared to those who did not use telehealth during the pandemic. A sub-analysis consisting of just those who used telehealth during COVID-19 revealed no additional significant predictors of future telehealth adoption (Supplemental Table 2).

Self-reported Reasons for Clinician Likelihood of Using Telehealth in the Future (Qualitative Analysis)

Reasons why clinicians would be likely to use telehealth in the future related to increasing accessibility (*n* = 48) and improving efficiency (*n* = 12) of dysphagia care. Reasons why clinicians stated they would be less likely to use telehealth in the future were related to a lack of ability to perform instrumental evaluations and/or physically manipulate patients, and a resulting concern regarding diagnostic decision making via telehealth (*n* = 42). For example, one

Table 7 Variables associated with the likelihood of using telehealth in the future: “yes” vs “no”

Predictors	OR ^a	95% CI ^a	<i>p</i> -value
Experience managing dysphagia			.077
< 1 year	–	–	
1–5 years	2.05	0.56, 8.14	
6–10 years	5.06	1.38, 20.2	
11–15 years	3.23	0.88, 12.9	
> 15 years	4.34	1.16, 17.6	
Prior experience with telehealth			.200
None	–	–	
Familiar with research	1.27	0.61, 2.66	
Used telehealth but not regularly	2.16	0.82, 6.24	
Used telehealth regularly	3,394,358	0.00, NA	
Use of telehealth during COVID-19			< .001
No	–	–	
Yes—Outpatient only	5.71	2.49, 14.5	
Yes—Inpatient only	0.89	0.25, 3.14	
Yes—Inpatient and outpatient	6.02	1.88, 27.0	

^aOR odds ratio, CI confidence interval

respondent stated, “I would not use telehealth if I suspected a patient may be silently aspirating” and others said they would prefer to use telehealth for follow-up only. Few clinicians also reported barriers in access to technology and connectivity as limiting factors (*n* = 7).

Discussion

This study surveyed speech language pathologists (61% within US, and 39% in other countries) and identified patterns of telehealth use prior to and during the COVID-19 pandemic, as well as clinician-perceived benefits and challenges of using this service delivery model to manage dysphagia now and in the future. The data demonstrate limited

Table 6 Clinician reported challenges of telehealth dysphagia management

Rank	Clinician perspective		Patient perspective	
	During the pandemic (mean rank)	For the future (mean rank)	During the pandemic (mean rank)	For the future (mean rank)
1	Lack of infrastructure (2.17)	Reimbursement/insurance coverage/payment issues (1.89)	Reduced knowledge about technology (‘not tech savvy’) (2.26)	Reduced knowledge about technology (‘not tech savvy’) (2.40)
2	Reimbursement/insurance coverage/ payment issues (2.41)	Lack of infrastructure (2.36)	Lack of computer/device (2.68)	Reimbursement/insurance coverage/payment issues (2.63)
3	Lack of knowledge/training in telehealth (2.55)	Licensure restrictions (2.77)	Internet connectivity issues (3.11)	Lack of computer/device (2.94)

*Mean ranking is the mean rank out of 9 (1 = highest, 9 = lowest)

use of telehealth for dysphagia management prior to the pandemic, a large increase during the pandemic, and a further projected increase in the future. Years of experience with dysphagia management and pre-pandemic use of telehealth were significantly associated with current use patterns, and use of telehealth during the pandemic was significantly associated with projected future use. Working in the outpatient setting was associated with greater clinician confidence with and perceived effectiveness of telehealth, and use of guidelines was also associated with greater clinician confidence of tele-dysphagia management. Several key challenges and benefits were also identified and are discussed.

Telehealth Usage Patterns

Specifically, when evaluating telehealth usage patterns, we identified that prior to the pandemic only 20.4% of survey respondents had used telehealth in their SLP practice, and a mere 12.3% had utilized telehealth to manage dysphagia specifically, with only 2.98% of respondents reporting regular use of tele-management of dysphagia prior to the pandemic. The number of clinicians who used telehealth to manage dysphagia grew to an impressive 50% during the pandemic. This sharp increase is not surprising and reflects what was seen across other healthcare fields servicing populations that may experience dysphagia (e.g., head and neck cancer [40]; Parkinson's disease [41]) and across other SLP services [42–45]. This is likely due, at least in part, to the cancellation of in-person services during this time. We found that during the most restrictive (MR) period of the pandemic dysphagia services were frequently cancelled. Over 50% of clinicians reported cancelling treatment sessions at least half the time and 72% cancelling instrumental evaluations at least half the time. This is in accordance with the cancellation rates of elective surgeries, non-urgent office visits, and SLP voice and swallowing services in many facilities at the onset of the pandemic [46, 47]. During the least restrictive (LR) period of the pandemic, fewer procedures were cancelled; however, cancellations were still observed, explaining the rapid uptake in telehealth, to safely provide dysphagia management to patients in need.

We further identified that more years of experience with dysphagia management and prior experience using telehealth (in any area of SLP) were significantly associated with the probability of using telehealth to manage dysphagia during the pandemic. Experience has been associated with greater perceived usefulness of information technology systems [48]. It stands to reason that clinicians who were already using remote services would continue using this modality, as they would have the necessary tools, knowledge, and self-efficacy to do so [48]. Those familiar with research on the topic, but with no experience, were more likely to use telehealth, suggesting that being equipped with the necessary

knowledge, even in the absence of experience, facilitated the adoption of telehealth. This suggests that educating students and clinicians on the current research on best telehealth dysphagia practices should be considered as an important component of clinical education. In fact, a recent study highlighted the importance of extensive and specific training for successful implementation of telehealth clinical swallowing evaluations [49]. Further, it is likely that more experienced clinicians possess greater skill and clinical decision-making abilities, which may have enabled clinicians with more years of dysphagia experience to adopt telehealth more easily.

Looking more specifically at the types of dysphagia services provided via telehealth during both the MR and LR periods of the pandemic, treatment sessions were conducted most frequently, followed by clinical evaluations, with instrumental evaluations conducted infrequently. There are few validated tele-VFSS systems and those that do exist are not widely available in mainstream practice [12–14]. Therefore, most clinicians did not have the resources to conduct tele-VFSS, and further, given the restrictions on in-person activity, availability of instrumental evaluations was limited early in the pandemic. The greater frequency of telehealth treatment visits, as compared to assessments, corroborates qualitative findings from the present study which revealed greater clinician uncertainty regarding tele-assessments and some degree of hesitation in making diagnostic decisions via telehealth. This finding has been reported across SLP services [45, 50–52] and has been previously linked to dysphagia services as well [2, 53]. Uncertainty regarding telehealth assessments was also reported by clinicians as a factor that lowered their confidence and perceived effectiveness, with lack of instrumental assessment specifically reported by some as a diagnostic barrier. However, lack of instrumental assessment is not unique to telehealth and while it limits the conclusions that can be drawn from any clinical swallowing evaluation, clinical and instrumental assessments serve unique purposes in the continuum of dysphagia care [54, 55]. Findings from telehealth clinical swallowing evaluations have shown to reliably match findings from in-person clinical evaluations [9, 10] address patient needs, overcome barriers such as geographic distance, and enable more timely intervention [49]. Additionally, clinical swallowing tele-evaluations may be bolstered by objective measures, such as the Timed Water Swallow Test [56] and the Test of Masticating and Swallowing Solids [57], which have shown adequate reliability via telehealth [58]. Continued efforts to develop smart teledynamic systems that can collect more objective data via telehealth are ongoing across healthcare fields and should be examined in future research.

Clinician Confidence and Perceived Effectiveness

Clinician reported confidence and perceived effectiveness improved substantially from the start of the pandemic to the time of the survey. This was likely influenced by a number of factors, including increased experience gained with telehealth [48] and factors that clinicians reported to have enhanced their confidence, such as increased availability of guidelines and trainings and increased availability of instrumental assessments. This highlights the importance of addressing multiple domains including experience, training, guidelines, and access to instrumental assessments to increase the confidence of clinicians in tele-management. The improvement in clinician confidence and perceived effectiveness further demonstrates the potential for telehealth to be incorporated into clinical care post-pandemic for parts of the evaluation or treatment process when needed but not as a complete replacement for in-person services. An integrated model of care that incorporates in-person and telehealth services has recently been proposed as the way forward to enhance dysphagia care [53]. Fritz et al. (2020) propose a framework for using telehealth as an initial starting point for dysphagia management, during which one can obtain medical and case history information, obtain patient-reported outcomes, and complete certain components of the clinical swallowing evaluation [3, 59]. This information can then be used to determine next steps for a patient, which may include an instrumental evaluation and/or in-person follow-up. Depending on the circumstance, this model could easily be reversed—beginning with an in-person evaluation, which may include an instrumental assessment, and following up with treatment via telehealth [6].

Further, facilitators and use of trainings and guidelines all appeared to play an important role in telehealth dysphagia management. Across settings and procedures, among those who used telehealth during the pandemic, over 75% reported using a facilitator at least sometimes. The high proportion of survey respondents who utilized facilitators reflects prior research [8, 10, 60], guidelines highly recommending the use of a facilitator [2, 6], and more recent data suggesting that the presence of a family member may optimize remote dysphagia evaluations [3]. Among clinicians who used telehealth, 50% used guidelines and 55% completed trainings. While guidelines and trainings from various parts of the world were reportedly utilized in this sample, given that the majority of the sample was based in the U.S., our data may not capture the extent of training opportunities available internationally. Clinical guidelines provide specific recommendations about best practices, support care-providers with readily available information, and serve to improve patient care [61]. They may be specifically helpful in situations with uncertainty around best practices [61], such as during the COVID-19 pandemic. Indeed, clinicians reported the use

of guidelines and completion of trainings to enhance both their confidence and perceived effectiveness of telehealth dysphagia services. Further, we identified that the use of guidelines was statistically significantly associated with confidence in telehealth dysphagia management. These findings are supported by a recent implementation trial which highlighted the essential role of training and expert guidance for successful implementation of telehealth dysphagia services [49]. Thus, the expansion and wider dissemination of evidence-based trainings and guidelines is an important area for future work.

Statistical analysis also revealed that working in the outpatient (as compared to inpatient) setting was significantly associated with greater clinician-perceived confidence and effectiveness. Given illness severity and acuity, and variable patient alertness in inpatient settings, it is understandable that clinicians reported lower confidence and perceived-effectiveness of their telehealth services in these settings. Defining the ways in which telehealth can best be utilized for inpatient dysphagia management may be an important direction for future study. For example, exploring ways to facilitate valid and reliable remote clinical swallowing evaluations in under-resourced hospitals may be an area of study with potential to improve access to critical dysphagia services. However, safety safeguards and unique patient-factors would need to be carefully considered.

Benefits and Challenges of Telehealth

Understanding benefits and challenges of telehealth from clinicians' perspectives has important implications for how telehealth models of care may be optimized in both the in- and outpatient settings. Clinician-described benefits of telehealth during the pandemic generally surrounded the topics of safety, access to care, and treatment continuity. Telehealth enabled patients to continue (or begin) receiving dysphagia services without putting themselves or providers at risk for virus transmission [62–64]. Clinicians also reported numerous benefits of telehealth that extend well beyond the COVID-19 pandemic. These included improving patient access to care and numerous other benefits, such as time, cost, and travel savings, incorporating family into the sessions, utilizing the patient's naturalistic environment, and allowing for treatment continuity after an initial intense burst of treatment, among others. Indeed, it has been established that telehealth may improve access to care [16, 33, 34, 49, 65], reduce patient time, cost, and travel burden associated with receiving therapeutic services [8, 18], enable greater intensity and frequency of rehabilitation while allowing patients to remain in a comfortable and familiar environment [66], incorporate family and carers [53], and result in excellent patient and provider satisfaction [11, 17, 49, 67–69]. Of the respondents who used telehealth, most reported that

they will continue to do so in the future and using telehealth during the pandemic was significantly associated with projected future use. Moreover, while 50% of participants in this study utilized telehealth to manage dysphagia during the pandemic, 67% reported that they plan to use telehealth in the future. This underscores clinician willingness and desire to adopt telehealth as an integrated delivery model for dysphagia care.

However, to optimize the tele-management of dysphagia, a number of reported challenges need to be addressed. Clinicians reported that from their perspective, the primary obstacle to providing telehealth dysphagia services during the pandemic was a lack of infrastructure (e.g., technology available, Internet connectivity). In fact, one in four Americans does not have access to a smartphone device and/or sufficient broadband Internet to engage in synchronous videoconferencing [70, 71], and in many developing countries, lack of technological and infrastructure availability is even more significant and has been identified as a barrier to the adoption of this service delivery model [52]. Addressing these barriers is critical because quality of technology and stability of internet connection are important determinants of successful telehealth implementation [48]. Even for those with adequate internet and technology, facility constraints on resources and staff training may still be limiting factors that need to be addressed [49].

Clinicians also reported that they believed the primary obstacle to telehealth from the patients' perspective was inadequate "tech savviness," or digital literacy. It has been reported that, among patients with neurologic disease, computer self-efficacy and computer anxiety are significant predictors of participation in tele-rehabilitation [65]. Additionally, a patient's lack of experience with technology has been identified as a factor that may negatively impact patient-perceived usefulness of tele-treatment [65] and influence adherence [48]. Clinicians may be able to play a role in orienting patients to basic technology platforms, and facilitators may play an assisting role in this regard. However, clinicians likely need more training as well [53]. In a survey of SLPs in Hong Kong, 50% of respondents who did not use telehealth reported that "technology" was a key barrier, and that technology should be the focus of further training [51]. Moreover, a lot of the pre-pandemic research on tele-dysphagia management has utilized custom-built platforms, additional web-cameras, and trained facilitators—all of which were not available during the pandemic and may not be financially or logistically feasible for routine clinical use in the future. Simple, easy-to-use tele-dynamic systems may help to circumvent some of the barriers surrounding experience and training [72] as well as access to equipment. Thus, another critical need of the field is to develop smarter, easier, and more accessible telehealth platforms.

Finally, licensure and reimbursement restrictions were reported by clinicians as a key challenge of utilizing telehealth for dysphagia management. While telehealth has been reimbursed due to the pandemic "public health emergency" in the United States, policies have yet to be formally amended for the future. Advocacy at both the state and federal levels will be essential for working toward reimbursement schemes that include telehealth. Federal, state, and international reimbursement schemes will need to recognize and reimburse for telehealth services such that it can become a standard and enduring model of service delivery.

Limitations

This survey study had a relatively small sample size ($n = 235$), the majority (61%) of clinicians were from the United States, all were SLPs, and only ~50% of survey respondents ($n = 118$) utilized telehealth to manage dysphagia during the pandemic. However, the survey remained open for three months and extensive recruitment efforts via social media and personal contacts were conducted. Additionally, because it was not mandatory to answer each question, the number of respondents per question varied. Due to the heterogeneity in geographic region, work-setting, and patient populations that survey respondents worked with, there may be different standards of care, resources available, and reimbursement structures relating to telehealth practice that influenced telehealth use. Further, because many survey respondents worked in multiple settings and worked with patients of varying diagnoses, the data collected in this survey cannot differentiate the impact of specific work environments and patient populations on telehealth use. Future work should include other professionals who treat dysphagia, especially given the variety of disciplines involved in dysphagia care across the world.

Given the nature of this study, we acknowledge the possibility of a sampling bias, and it remains possible that the respondents who chose to participate in the survey may somehow differ from clinicians who did not complete the survey. Of note, the survey was limited to respondents who were able to read and understand English. Additionally, survey questions are subject to individual interpretation, which may differ among respondents and all responses are subjective. Clinicians' experiences and perceptions reflected in this survey represent a moment in time for each respondent. Especially given the ongoing and constantly evolving nature of the COVID-19 pandemic and the shifting work landscape during this time, clinicians' experiences with telehealth are likely also changing and evolving. Longitudinal and/or follow-up studies will be needed to better understand the evolution of telehealth in the field of dysphagia. Lastly, in the present survey, the challenges of telehealth that patients may experience were reported by clinicians. Future research

should seek to explore patient-perceived benefits and challenges of receiving dysphagia care via telehealth.

Conclusions and Future Directions

This survey of speech-language pathologists highlighted the limited use of telehealth to manage dysphagia prior to COVID-19, and the sharp rise in such use driven by the pandemic. However, this study also highlighted that, currently and even during the height of the pandemic, telehealth was and is under-utilized for dysphagia management. It is well-established that telehealth can improve access to care and expand provision of critical dysphagia services. Findings from this study revealed numerous clinician-reported benefits of dysphagia tele-management and clinician willingness to utilize this service delivery model. Several challenges were also identified; however, the majority of clinicians reported that they will use telehealth in the future. Technological developments, such as wearable devices, portable treatment and evaluative tools, smartphone applications, and adherence tracking mechanisms using standard consumer-grade equipment (e.g., iPhones and iPads) have already started playing a role in the tele-management of dysphagia and need to be further developed and evaluated in future research. Importantly, future research should also examine the experiences of multiple stakeholders—including patients, caregivers, and clinicians—to understand the barriers and facilitators of this mode of service delivery to refine and optimize dysphagia tele-management and improve access to care for our patients.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s00455-022-10544-z>.

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