CROSS-SECTIONAL STUDY

Surveying the Attitudes and the Preparedness of Healthcare Workers Regarding Communication and Swallowing Difficulties Associated with Long-COVID

Amy Kilmurray Gorman, Órla Gilheaney*, Kathleen McTiernan

School of Linguistic, Speech & Communication Sciences, Trinity College Dublin, Dublin 2, Ireland
**Corresponding author: GilheanO@tcd.ie*

Abstract

Introduction: Long-COVID occurs in individuals experiencing symptoms which persist for more than 12 weeks after initial infection. Long-COVID is associated with a collection of symptoms including communication and swallowing difficulties. There is limited peer-reviewed literature available regarding the nature, impact, or management of communication and swallowing difficulties in Long-COVID. Therefore, care delivery may not be optimal, impacting patient outcomes and recovery. The aim of this study was to determine the attitudes and preparedness of healthcare workers regarding communication and swallowing difficulties associated with Long-COVID.

Methods: An anonymous online cross-sectional survey was conducted with healthcare workers working with patients living with Long-COVID, with quantitative and qualitative data gathered. Data was collated using Qualtrics and analysed using SPSS and Qualtrics.

Results: Overall, 27 professionals completed the survey in full, with sample representation from Speech and Language Therapists (n=15; 55%), Physiotherapists (n=5; 1%), Occupational Therapists (n=4; 15 %), Nurses (n=2; 7%) and Doctors (n=1; 4%); and international representation from the following countries: Ireland (n=15; 56 %), Canada (n= 5; 19%), the USA (n=4; 15%), Australia (n=2; 7%), and the UK (n=1; 4%). Most participants reported that they "sometimes" assess (73%, n=19) and "sometimes" (49%, n=13) or "never" (37%, n=10) provide treatment for communication difficulties associated with Long-COVID. Furthermore, participants reported that they either "sometimes" (44%, n=12) or "never" (30%, n=8) assess for swallowing difficulties associated with Long-COVID and that they either "sometimes" (41%, n=11) or "never" (41%, n=11) provide treatment for swallowing difficulties. Additionally, MDT collaboration was not a constant factor in patient management, with most of the participants reporting that this "sometimes" (63%, n=17) or "never" (7%, n=2) happens. The majority of participants (56%, n=14) had not received specific education or training regarding the provision of appropriate treatment and support for people living with Long-COVID associated communication and swallowing difficulties, with 78% (n=21) of participants indicating that they would like further education in this area.

Discussion: This study provided insight into the attitudes and preparedness of MDT members regarding the management of communication and swallowing difficulties experienced by people living with Long-COVID. Although healthcare professionals believe communication and swallowing difficulties are significant issues for people with Long-COVID, they also reported that they do not feel that they are adequately trained in the management of these symptoms to support patients. Participants would welcome further education, further training programmes that focus on communication and swallowing challenges associated with Long-COVID required to support patients in their wellness and recovery journeys.

Keywords: Long-COVID, post-COVID conditions, dysphagia, communication disorders, multi-disciplinary team, healthcare

Introduction

The first cases of COVID-19 were reported in Wuhan, China in December 2019[1,2], leading to the infection of more than 633 million people and causing the death of over 6.6 million people globally to date[3]. COVID-19 is an acute multisystem infection, which for some people causes only mild symptoms, but for others causes severe illness with lasting sequelae. Mild symptoms of COVID-19 tend to recover without the requirement of specialist treatment, and include symptoms such as: tiredness, cough, fever, and loss of taste or smell. Some people, however, experience more severe symptoms (e.g.

pneumonia, dyspnoea, fever, cough, fatigue, haemoptysis, diarrhoea, or hypoxia) and require medical attention and/or hospital admission[2,4–6]. The most severe cases can progress to acute respiratory distress syndrome (ARDS) which often requires patients to be ventilated[7]. In addition, COVID-19 can also impact the nervous system[4,8], which can result in delirium[9], stroke[10], impaired consciousness[11], post-traumatic stress disorder[12], or communication and swallowing disorders[13,14].

Some patients experience cognitive-linguistic deficits during the acute COVID-19 infection phase, which are thought to be linked to an immunological reaction in the central nervous system (CNS) to infection and impact the structure and/or functioning of the CNS[15–17]. These difficulties are commonly reported and often include neurological presentations such as new onset aphasia[18], delirium[17], sustained and divided attention deficits[19], executive dysfunction[17], or even disorders of consciousness in severe cases[15]. Furthermore, voice difficulties, or dysphonia have been reported in 27% of hospitalised patients[20] and 44% of non-hospitalised patients during the acute phases of COVID-19 infection[21] Individuals who require a tracheostomy or ventilation secondary to acute COVID-19 respiratory difficulties are at greater risk (79%) of developing dysphonia as a result of vocal fold movement impairments, glottic injuries and glottic stenosis[22,23].

Additionally, available research indicates that a significant number of hospitalised patients with COVID-19 develop secondary swallowing difficulties, or dysphagia, particularly those who require intensive care treatment, (e.g. intubation)[24,25]. Common symptoms include pooling of secretions, silent aspiration, and residue post-swallow in the vallecula and hypopharynx[26]. The risk of developing dysphagia in patients with COVID-19 is increased significantly in prolonged mechanical ventilation[22,27]. For patients experiencing respiratory difficulties secondary to COVID-19, dysphagia-related aspiration pneumonia can increase the risk of morbidity and mortality[24,27].

Long-COVID

Some individuals may experience "Long-COVID" or prolonged symptoms which persist for more than 12 weeks after their initial COVID-19 infection[16,28,29]. A recent systematic review found that up to 80% of those who contract COVID-19 may develop Long-COVID[30], with approximately 5 million people being at risk of contracting Long-COVID globally[31]. Although the symptoms of acute COVID-19 are often more severe in older age groups and those with underlying medical conditions[1,2], Long-COVID symptoms are more frequently reported in young female adults, and those who have no apparent risk factors or underlying medical conditions for severe COVID-19[29,32]. While a concrete definition of the Long-COVID symptom profile is not yet agreed upon, multisystem involvement is frequent[29,32], and commonly reported symptoms affect many bodily systems. Frequently reported symptoms included: respiratory dysfunction, fatigue, joint, chest, and muscle pain, cardiac issues, and anxiety/depression[28,33]. Notably, cognitive-linguistic deficits and swallowing concerns have also been flagged as potential symptoms of Long-COVID, due to their prevalence in the acute phase of COVID-19 infection, although research remains sparse.

Long-COVID associated communication and swallowing difficulties.

Research on Long-COVID-related communication and swallowing difficulties is currently lacking, with limited focus on the prevalence, nature, or management of these issues. There is emerging research regarding communication concerns in this cohort, with cognitive-linguistic memory and concentration challenges, word-finding difficulties, disfluency and syntax problems, and difficulties with reading and writing that patients with Long-COVID being reported[34,37]. Furthermore, individuals with Long-COVID have been shown to perform worse than people living with myalgic encephalomyelitis/chronic fatigue syndrome across multiple language tasks including immediate and delayed recall, letter fluency, informativeness of spoken discourse, and narrative[16]. As such, these symptoms may lead to previously skilled communicators having difficulties completing essential daily occupational and social activities that require basic communication skills[17].

Going beyond cognitive-linguistic communication difficulties, further communication concerns have been anecdotally reported by people living with Long-COVID, for example, dysphonia. However, despite both anecdotal patient reports and the research detailing the prevalence of voice and airway difficulties during the acute phase of COVID-19, research related to these complications is lacking. However, the limited research currently available suggests that patients may develop significant voice and airway difficulties in Long-COVID, due to the neurological, muscular, or respiratory sequelae of acute COVID-19[35]. Evidence also indicates that dysphagia can occur in individuals living with Long-COVID[35,36], with up to 27% of such individuals demonstrating silent aspiration on videofluoroscopy post-COVID infection, with higher levels of intubation during the acute infection phase associated with higher levels of penetration and/or aspiration post-COVID[38].

Multidisciplinary management of Long-COVID associated communication and swallowing difficulties

Long-COVID is a new and emerging condition which currently lacks an agreed definition or clear pathway of intervention[28]. Long-COVID is described as a multi-system syndrome and requires multidisciplinary team (MDT) management to optimise patient recovery[32]. The National Institute for Health and Care Excellence (NICE) guidelines[28] recognise the role of a range of professionals in the overall rehabilitation of Long-COVID patients, advocating for the adoption of a holistic and whole-patient perspective[39]. However, regarding Long-COVID related communication and swallowing difficulties, there are no clear evidence-based MDT management guidelines. Although it is recognised that all individuals with a communication or swallowing impairment have the right to receive "timely, individual, person-centred rehabilitation, which will support and maximise

their mental health and wellbeing, participation in society, and ability to return to work"[40], SLTs have not been consistently included in the multidisciplinary management of patients living with Long-COVID even though there is an urgent need for education of MDT members in communication and swallowing difficulties in Long-COVID to optimise patient outcomes and recovery[17,41]. There is also a lack of research specifically focused on the roles and levels of training and knowledge of MDT members in the management of communication or swallowing difficulties experienced by people with Long-COVID, services may not be facilitating patients' full recovery from complications. Therefore, the aim of this research was to determine the attitudes and preparedness of healthcare workers regarding the MDT management of communication and swallowing difficulties associated with Long-COVID.

Methods

A mixed methods cross-sectional anonymous online survey was conducted in accordance with the CROSS guidelines and convenience sampling was used to investigate the attitudes and preparedness of healthcare workers regarding the management of communication and swallowing difficulties associated with Long-COVID[42]. Ethical approval was obtained from the research ethics committee from the School of Linguistic, Speech and Communication Sciences, Trinity College Dublin (TT56).

Individuals were eligible to participate if they were qualified healthcare professionals who have worked with people living with Long-COVID. Individuals were excluded if they did not have a sufficient level of English to complete the study, if they did not work with people living with Long-COVID, if they were not a healthcare worker, and if they were healthcare professionals who were not yet fully qualified (e.g. students).

Administrators working within international professional organisations, registration bodies, or support/special interest groups for healthcare workers across allied health, medical, and nursing professions acted as Gatekeepers. The healthcare organisations that were invited to facilitate this research were located internationally, including Ireland, the UK, Europe, Australia, New Zealand, the US, Canada, South Africa and India. Gatekeepers shared information regarding the survey and its purpose. In addition, Gatekeepers were provided with a link and QR code to access the participant information leaflet and the survey and they were requested to share these study details and the survey with the members of their organisation via email.

The draft survey was piloted with 3 SLT students and was adapted according to the feedback given by the pilot study participants. The anonymous survey, which contained 29 questions, was designed and disseminated using the survey software programme Qualtrics and the data collected included demographics, participants' level of clinical experiences, knowledge regarding the communication and swallowing difficulties of people living with Long-COVID and participants' perceptions of their preparedness to work with this cohort. Descriptive statistics were used to analyse the data collected.

Results

In total, 76 healthcare workers indicated interest and completed some sections of the survey, with only 27 of these individuals completing the survey in full. Therefore, these 27 fully completed surveys were included in the sample for this study **(Figure 1)**.

There were 15 (56 %) Speech and Language Therapists, 5 (18%) Physiotherapists, 4 (15%) Occupational Therapists, 2 (7%) Nurses and 1 (4%) Doctor in the sample. The levels of education of the participants varied with 13 (48%) participants reporting that they had bachelor's degrees, 13 (48%) participants reporting that they had master's degrees and 1 (3.7%) participant reporting that they had a Clinical Doctorate. The participants were working in the following countries: Ireland (n=15, 56%), Canada (n=5, 19%), America (n=4, 15%), Australia (n=2, 7%), and the UK (n=1, 3%). The clinical practice settings in which the participants worked included public hospitals (n=19, 70%), rehabilitation facilities (n=3, 12%), primary care settings (n=2, 7%), private clinics (n=2, 7%), and private hospitals (n=1, 4%). Most of the sample 81.5% (n=22) reported having clinical experience in the management of patients with Long-COVID who presented with communication and/or swallowing difficulties. A majority of the participants (56%, n=14) reported that they had not received education on the assessment and treatment of communication, or swallowing difficulties associated with Long-COVID and most of the participants (78%, n=21) reported that they would like further education in this area.

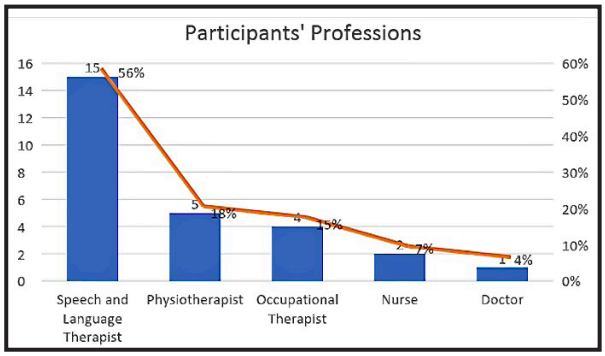


Figure 1. **Professions of participants**

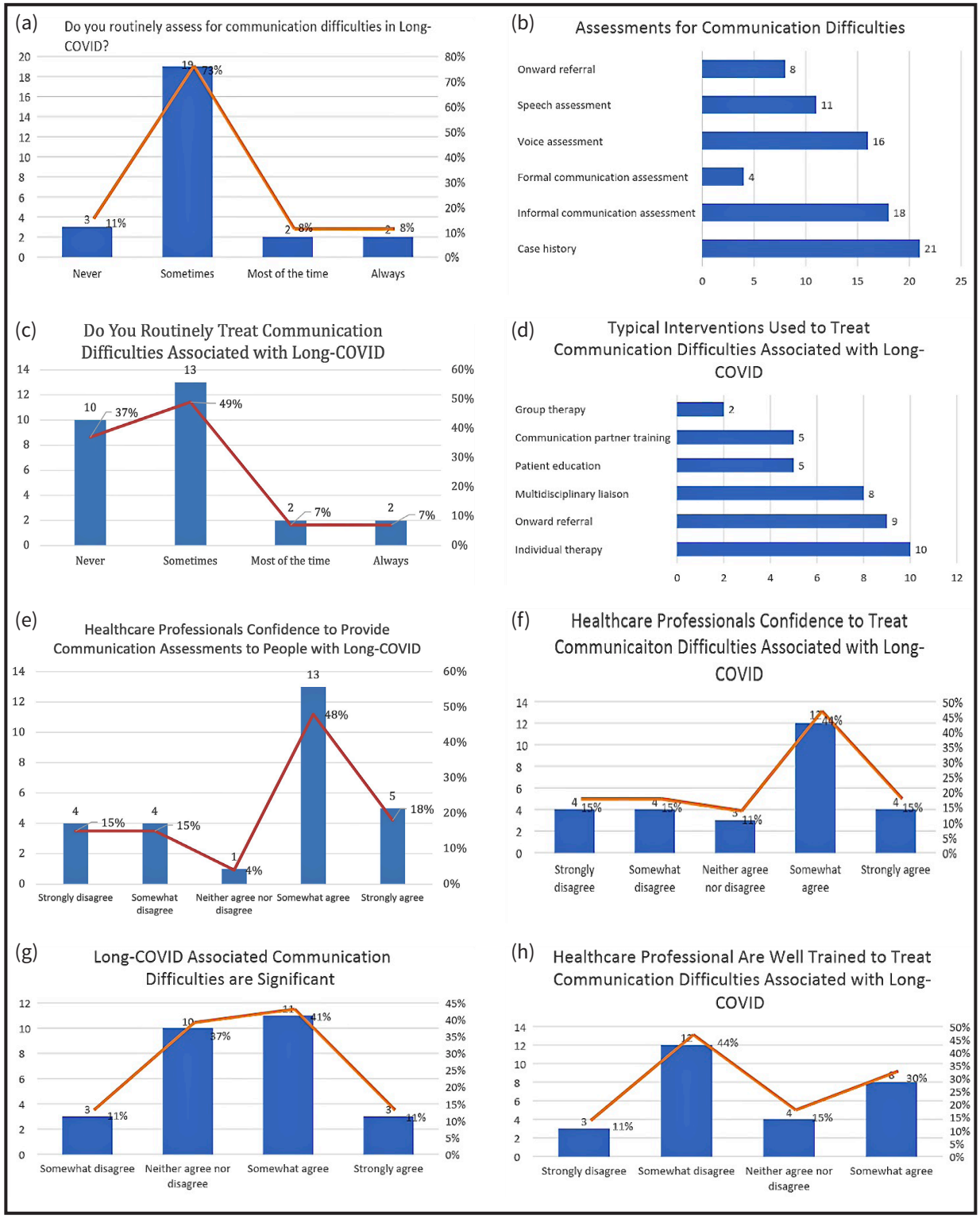
Communication Difficulties associated with Long-COVID

Assessment. Participants were asked if they assess patients for communication difficulties when they present with Long-COVID **(Figure 2)**.

Most of the participants (73%, n=19) reported that they "sometimes" assess for these issues, 11% (n=3) reported that they never routinely assess patients, 8% (n=2) reported that they assess patients most of the time and 8% (n=2) reported that they always assess this cohort of patients.

A variety of assessments were reported as routinely used to assess communication difficulties in Long-COVID **(Figure 3)**.

The most frequently used assessments to assess



(a) Figure 2. **Assessment for communication difficulties in people living with Long-COVID** (b) Figure 3. **Assessments routinely used to assess communication difficulties in Long-COVID** (c) Figure 4. **Participant responses to the question "Do you routinely treat communication difficulties associated with Long-Covid?"** (d) Figure 5. **Interventions typically used by healthcare professionals in the treatment of communication difficulties in patients with Long-COVID** (e) Figure 6. **Healthcare professionals' confidence to provide communication assessments to people with Long-COVID** (f) Figure 7. **Confidence in providing communication treatment for people with Long-COVID** (g) Figure 8. **Level of agreeance that communication difficulties are significant in Long-COVID** (h) Figure 9. **Level of agreeance that healthcare professionals are well trained to treat people with Long-COVID and communication difficulties**

Long-COVID patients for communication difficulties were case histories (n=21), informal communication assessments (n=18) and voice assessments (n=16). Some of the participants also reported that they carried speech assessments (n=11) and formal assessments.

Treatment. Participants were also asked if they routinely treat communication difficulties associated with Long-COVID **(Figure 4)**.

Most of the participants reported that they "sometimes" (49%, n=13) or "never" (37%, n=10) treat communication difficulties.

Healthcare professionals used a variety of different interventions to treat communication difficulties that present with Long-COVID **(Figure 5)**.

The most frequently reported methods used to treat communication difficulties associated with Long-COVID include individual therapy (n=10), onward referral (n=9) and referral to multidisciplinary liaison (n=8). Other interventions used by participants included patient education (n=5), communication partner training (n=5) and group therapy (n=2).

Confidence to assess and treat communication difficulties associated with Long-COVID. Most of the participants were somewhat confident or were confident in assessing communication for people with Long-COVID. Almost half of the participants (48%, n=13) reported that they somewhat agreed that they were confident and 18% (n=5) reported that they strongly agreed that they were confident to assess this cohort of patients **(Figure 6)**.

A significant proportion of participants, however, were not confident to assess communication in Long-COVID patients with 15% (n=4) reporting that they strongly disagreed and 15% (n=4) reporting that they somewhat disagreed that they were confident to assess communication for this cohort of patients.

Levels of confidence also varied among participants regarding the provision of treatment for communication challenges associated with Long-COVID **(Figure 7)**.

Most of the participants either somewhat disagreed (44%, n=12) or disagreed (11%, n=3) with the statement that healthcare professionals are well trained to treat communication difficulties associated with Long-Covid. Only 30% (n=8) of participants somewhat agreed with this statement, 15% (n=4) reported that they neither agree nor disagree and no participants strongly agreed.

Swallowing Difficulties associated with Long-COVID

Assessment. Participants were asked if they assess patients for swallowing difficulties in Long-COVID **(Figure 10)**.

Most of the participants either strongly agreed (15%, n=4) or somewhat agreed, (44%, n=12) that they felt confident in their abilities to provide intervention for communication problems associated with Long-COVID. Levels of agreement regarding the significance of communication difficulties associated with Long-COVID varied among participants **(Figure 8)**.

Just over half of the participants either somewhat agreed (41%, n=11) or strongly agreed (11%, n=3) that communication difficulties are significant in Long-COVID. However, more than half of the participants (55%, n=15) disagreed with the statement that healthcare professionals are well-trained to treat people with Long-COVID communication difficulties **(Figure 9)**.

Most of the healthcare professionals who participated in the study reported they either "sometimes" assessed (44%, n=12), most of the time assessed (11%, n=3) or always assessed (15%, n=4) for swallowing difficulties in patients who present with Long-COVID.

A variety of assessments are routinely used to assess patients who present with Long-COVID **(Figure 11)**. The most frequently used swallowing assessments were patient case histories (n=19), clinical swallow examinations (n=16) and oro-facial examinations (n=15). Other assessment methods reported included instrumental assessment (n=8), onward referral. (n=8) and using a swallow screening tool (n=5).

Participants were asked if they routinely treat swallowing difficulties associated with Long-Covid **(Figure 12)**.

Most of the healthcare professionals who participated in the study reported that they either sometimes (41%, n=11) or never (41%, n=11) treat swallowing difficulties associated with Long-COVID.

A variety of interventions were used by the healthcare professionals who participated in the study to treat swallowing difficulties associated with Long-COVID **(Figure 13)**.

The most frequently used interventions to treat swallowing difficulties associated with Long-COVID were swallow rehabilitation (n=15) compensatory strategies (n=15) patient education (n=14) and diet modification (n=13). Multidisciplinary liaison (n=10), onward referral (n=9) and medication adjustment (n=6) were also reported as interventions used to address swallowing difficulties.

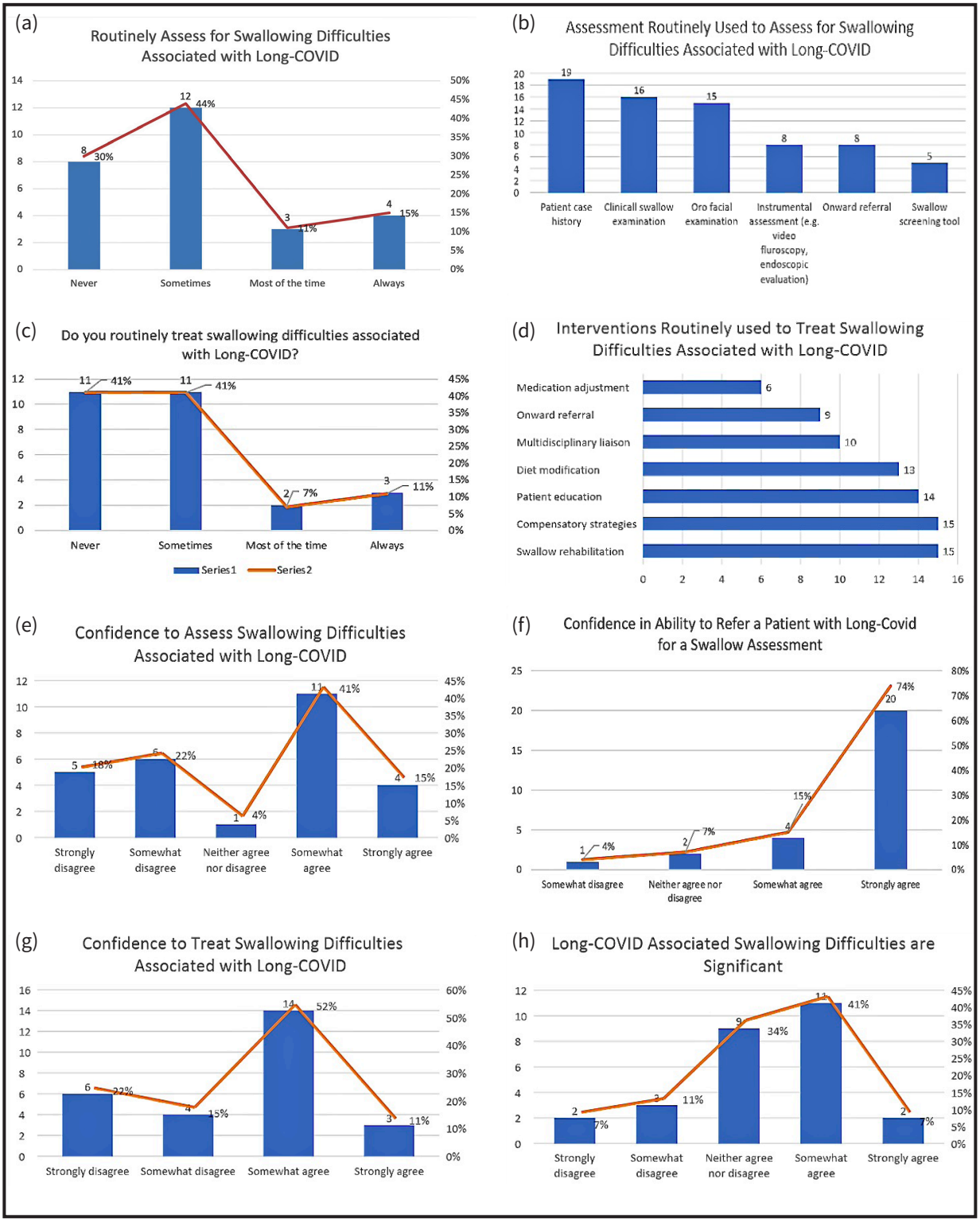
Confidence to assess and treat swallowing difficulties associated with Long-COVID. More than half of the participants (56%, n=15) reported that they felt confident in assessing swallowing difficulties associated with Long-COVID **(Figure 14)**.

Many of the participants (40%, n=10), that they either somewhat disagreed (22%, n=6) or strongly disagreed (18%, n=5) that healthcare professionals are confident to conduct swallowing assessments with patients with Long-COVID.

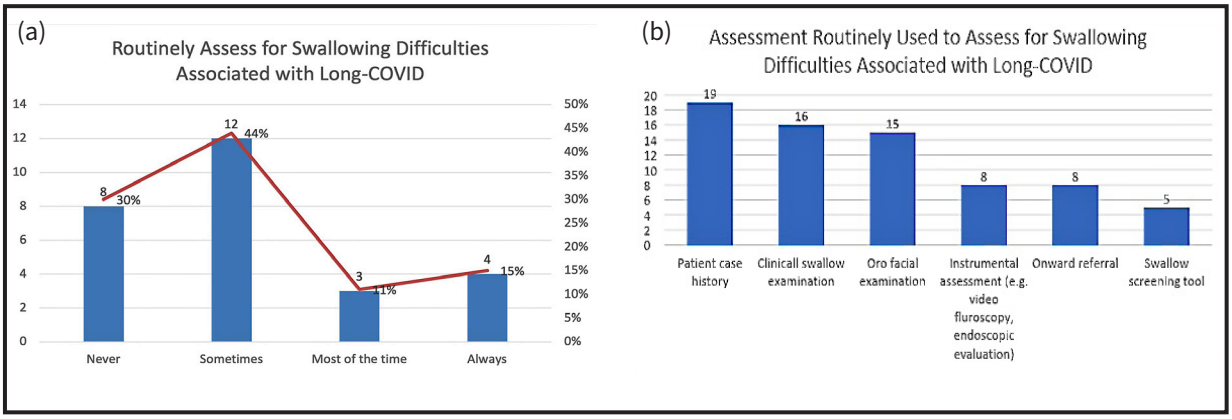
Most of the participants (89%, n=24) agreed to some degree that they felt confident in their abilities to refer a patient with Long-COVID for a swallow assessment **(Figure 15)**.

Only one (4%) participant somewhat disagreed that they felt confident to refer a patient with Long-Covid for a swallow assessment, with 2 (7%) participants neither agreeing or disagreeing, 4 (15%) participants somewhat agreeing and 20 (74%) participants strongly agreeing that they felt confident to refer a patient for a swallow assessment.

More than half of the participants 63% (n=17) agreed that they felt confident in providing intervention for



(a) Figure 10. **Routinely provide assessment for swallowing difficulties in people with Long-COVID** (b) Figure 11. **Assessments routinely used to assess swallowing difficulties in those living with Long-COVID** (c) Figure 12. **Participant responses to the question "Do you routinely treat swallowing difficulties associated with Long-Covid?"** (d) Figure 13. **Intervention typically used by healthcare professionals in the treatment of swallowing difficulties in Long-COVID** (e) Figure 14. **Healthcare professionals' confidence in conducting swallowing assessments with patients living with Long-COVID** (f) Figure 15. **Healthcare professionals' confidence in ability to refer a patient with Long-Covid for a swallow assessment** (g) Figure 16. **Healthcare professionals' confidence in providing intervention for swallowing problems** (h) Figure 17. **Participants' beliefs about the significance of swallowing difficulties**



(a) Figure 18. **Healthcare professionals' beliefs about the adequacy of training in Long-COVID and associated swallowing difficulties** (h) Figure 19. **Routine collaboration with MDT when managing communication and/or swallowing difficulties in patients with Long-COVID**

dysphagia in patients with Long-COVID (Figure 16).

More than a third of the participants (37%, n=10), however, responded that they either somewhat disagreed (15%, n=4) or strongly disagreed (22%, n=6) that they felt confident to provide intervention for swallowing problems associated with Long-COVID.

Participant beliefs varied regarding whether swallowing difficulties associated with Long-COVID are significant (Figure 17).

Almost half of the participants either somewhat agreed (41%, n=11) or strongly agreed (7%, n=2) that swallowing difficulties associated with Long-COVID are significant.

Participants were asked if they believed healthcare professionals are well trained to treat Long-COVID associated swallowing difficulties (Figure 18).

Most of the participants 62.96% (n=17) did not believe that healthcare professionals are well trained to treat people who had Long-COVID associated swallowing difficulties. Only 30% (n=8) of the participants either somewhat agreed (23%, n=6) or strongly agreed (7%, n=2) that healthcare professionals are well-trained to treat this cohort of patients.

Collaboration with Multidisciplinary Team. Participants were asked if they regularly collaborated with other healthcare professionals during the management of communication and/or swallowing difficulties for patients with Long-COVID (Figure 19).

Most of the participants (83%, n=25) reported that they either sometimes (63%, n=17), most of the time (19%, n=19) or always (11%, n=3) collaborate with a multidisciplinary team about the swallowing and/or communication difficulties experienced by people living with Long-COVID. Only 7%, (n=2) of the participants reported that they never collaborated with members of a multidisciplinary team when managing the communication and swallowing difficulties experienced by people with Long-COVID.

Education and Training in the Management of Communication and Swallowing Difficulties in People Living with Long-COVID. Participants were asked about the education they had received regarding the management of communication and/ or swallowing difficulties in Long-COVID. The majority of the participants 67% (n=18) had not received education on swallowing or communication difficulties associated with Long-COVID. Participants were asked to describe their education on swallowing or communication difficulties associated with Long-COVID and 55% (n=9) of the participants completed the qualitative section of the survey. Three themes were identified after a thematic analysis of the qualitative data **(Table 1)**.

Participants were asked about the education they would like to engage in education and training about the communication and/or swallowing difficulties in Long-COVID. Most of the participants (75%, n=21) indicated that they would like to engage in education and training. The following themes were identified after thematic analysis of the qualitative data from the participants (62%, n=17) who responded to open-ended question regarding the type of education and training that they would like to receive **(Table 2)**.

Discussion

This cross-sectional survey explored the attitudes and preparedness of healthcare workers regarding the management of communication and swallowing difficulties associated with Long-COVID. Previous literature has shown that up to 80% of those who contracted COVID-19 may develop Long-COVID, with an estimated 5 million people globally who are at risk of contracting Long-COVID[30,31]. However, this study demonstrated that 43% of participants reported no experience in working with individuals with Long-COVID in general. Yet given these high prevalence figures, it is likely that most healthcare professionals will encounter an individual living with Long-COVID within their overall caseload.

Table 1. **Qualitative themes regarding education received in relation to the management of communication and/or swallowing difficulties in Long-COVID**

Theme regarding education and training received	Explanation
Education received on the topic of acute COVID-19 infection	Participants (n=3) e reported that they have received education on acute COVID-19 and speech and/or communication difficulties.
Education received on the topic of Long-COVID via webinars	Participants (n=5) reported that they have attended webinars on Long-COVID in general.
Education received on the topic of Long-COVID was self-directed	Participants reported (n=2) that their education on swallowing and/or communication difficulties was obtained through self-directed education (e.g. via the review and analysis of evidence-based articles).

Table 2. **Qualitative themes regarding how healthcare professionals would like to upskill in the area of communication and/or swallowing difficulties in Long-COVID**

Theme regarding education and training participants would like to receive	Explanation
The wish to attend additional courses, workshops, or webinars on this topic	Participants (n=9) reported that they would like to attend webinars, courses, or workshops to upskill in this area.
The need to receive more education on screening for communication and swallowing difficulties in Long-COVID	Participants (n=4) reported that they would like to upskill in this area with a focus on education on screening for communication and swallowing difficulties in Long-COVID. Participant 15 would like education in providing "*general advice for patients awaiting SLT assessment for dysphagia.*"
The need for SLT upskilling and increased SLT staffing	Participants (n=2) reported that SLT's should be routinely involved in the management of Long-COVID, with one participant stating that their clinic should "*employ an SLT*" and that "*OTs could help upskilling SLT's on fatigue as a factor*."

Therefore, it is essential that awareness regarding Long-COVID is addressed to improve clinical interactions. More specifically, despite emerging evidence regarding the potential for communication and swallowing problems in those living with Long-COVID, most healthcare professionals reported that they either do not or that they only sometimes assess for swallowing problems in this group. Furthermore, the majority of healthcare professionals sampled here (55%, n=15) who work with people living with Long-COVID reported that they do not believe that healthcare professionals are adequately trained on the management of these concerns. As such, professionals may face clinical uncertainty when working with this group which may lead to dissatisfaction with care provided and suboptimal patient outcomes.

Attitudes regarding communication and swallowing difficulties among those living with Long-COVID

Previous research indicates that cognitive-linguistic difficulties, voice disorders, and dysphagia are common symptoms among those living with Long-COVID[16,17,20,21,34–36,43]. Bolstering these findings, the current study found that 51% and 40% of professionals here believe communication and swallowing difficulties respectively to be significant issues for those living with Long-COVID. This is an important finding as it indicates that many clinicians may be sensitive to the key concerns of patients, indicating the potential for joint goal sharing and treatment optimisation. With regards to communication specifically, recent qualitative studies have outlined the impact of Long-COVID on communication, indicating that previously skilled communicators are avoiding conversations and changing how they interact with others due to cognitive-linguistic difficulties associated with Long-COVID[17]. These findings have also been further supported by quantitative results that demonstrate that individuals living with Long-COVID perform worse than the control groups across multiple language assessments including immediate recall, delayed recall, letter fluency and narrative[16]. Although research on this topic is still limited, swallowing is also reported to be impacted, with loss of taste, difficulties with tongue function (limited elevation and lateralisation), saliva management (xerostomia, decrease of saliva in the mouth, thick saliva) and anterior spillage reported by those living with Long-COVID[44]. Therefore, it is evident that a myriad of communication and swallowing areas may be impacted, re-emphasising the need for collaborative work between patients and clinicians to advance care delivery and outcomes in this field.

Preparedness of clinicians to manage communication difficulties among those living with Long-COVID

This study discovered that the assessments used by healthcare professionals for communication difficulties in Long-COVID typically include patient case histories, informal communication, voice, or speech assessments, formal communication assessments and the C19-YRS[45]. Interestingly, formal communication assessments were

only used by 4% (n=4) of healthcare professionals, with 22.22% using informal/non-standardised methods. This echoes recent research suggesting that Long-COVID related communication concerns may not be adequately detected via traditional standardised assessments16. As many existing formal assessments are standardised on populations which don't include those living with Long-COVID, it is advised that professionals use existing formal assessments with caution, until future research recognises these individuals within their sampling processes.

Furthermore, this study demonstrates that healthcare professionals typically use a combined approach of multiple interventions in the treatment of communication difficulties in Long-COVID. These include individual or group therapy, communication partner training, patient education and multidisciplinary liaison, all of which are in line with the generalised NICE Long-COVID management guidelines[28]. However, despite the existence of these guidelines, there is a scarcity of management guidelines specifically for communication issues in this cohort. Available literature regarding COVID-related communication difficulties is primarily focused on the acute stage of COVID-19[23], with minimal focus on options available for those living with longer-term implications. Therefore, it is essential that research focuses on treatment and support options for clinicians to use with this group to provide effective and satisfactory patient support.

Preparedness of clinicians to manage swallowing difficulties among those living with Long-COVID

This study found that healthcare professionals use a combination of assessments for swallowing difficulties in Long-COVID, including case histories, clinical swallow examinations, oro-facial examinations, instrumental assessments, and swallow screening tools. Approximately a fifth (22%) of participants used clinical swallow examinations, despite recent findings that clinical swallow examinations were poor indicators of aspiration in individuals living with Long-COVID[38]. This may indicate a lack of access to, awareness of, or training in the use of more sensitive instrumental assessments. This theory is supported by results here, with only 11% of professionals reporting the use of objective swallow assessments. This finding is concerning as there is an established inherent risk of silent aspiration in the Long-COVID population[38]. As such, underlying clinical risk may be missed with reliance on clinical assessments alone, thus potentially negatively influencing clinical outcomes.

Current research suggests that the management of dysphagia should be pragmatic with a whole-patient perspective including holistic support, and treatment of the patient's symptoms[39]. Additionally, as dysphagia symptoms vary between individuals, management plans should be personalised in each case. In this vein, this study concluded that when healthcare professionals do provide intervention for swallowing difficulties in people with Long-COVID, they utilise multiple and variable treatment strategies. At a broad level, current generalised Long-COVID rehabilitation guidelines advocate for the provision of patient education, compensatory strategies, and physical rehabilitation, among other strategies[28]. As such, extrapolating these guidelines to the treatment of dysphagia demonstrates that the participants of this study are positively using intervention principles which align with current recommended practice. While this is promising, further research into the efficacy and effectiveness of specific dysphagia rehabilitation options for this cohort is required to ensure optimal patient recovery and well-being.

Education regarding communication and swallowing difficulties among those living with Long-COVID

This study found that most healthcare workers who participated (62%) have not received any specific education on swallowing or communication difficulties in Long-COVID, and the majority believe that they do not have sufficient training to treat people experiencing communication (55%) or swallowing (62%) difficulties associated with Long-COVID. Those who have completed education in this area did so via attending webinars, education on acute COVID-19, and self-led education, as opposed to organised, accredited, or modularised training. Three-quarters of these participants (75%) wished to improve their knowledge and training in this field, which lines up with previous research suggesting that upskilling for MDT members in communication and swallowing difficulties in COVID-19 and Long-COVID is imminently required[17]. However, published literature to date has not indicated how healthcare workers want to receive this additional education or which topics they prioritise it focusing on. Therefore, this research has provided new insights into how healthcare professionals would like to upskill in this area by emphasising the drive for additional courses, workshops, or webinars focusing primarily on screening methods for communication and swallowing difficulties among those living with Long-COVID, thus providing guidelines for future research and education in this field.

Limitations

The primary limitation of this study was the small sample size and limited range of MDT members who participated in the survey. Despite the use of broad sampling strategies, a limited number of professionals completed the survey in full, thus potentially limiting the generalisability of findings. In addition, the sample was primarily characterised by SLTs (55%). Furthermore, some key members of the Long-COVID MDT did not participate, namely pharmacists and dietitians. As such, the views of SLTs may have been over-represented, with the exclusion of other beneficial viewpoints. Therefore, it is advised that future research samples a broader and more representative cohort of MDT professionals working with adults experiencing Long-COVID associated communication and/or swallowing problems. Furthermore, as this research highlighted a limited amount of available education for healthcare workers regarding communication and swallowing difficulties associated with Long-COVID,

it is recommended that factors hindering provision of this supplementary training are explored (e.g. a lack of funding) to understand and tackle barriers to future care developments. Finally,, involvement of public and patient representatives in future research would be beneficial in order to determine the impact of the current lack of care for this cohort on their wellness journey and recovery.

Conclusions

This study has provided an initial insight into MDT members' attitudes towards working with people living with Long-COVID-related communication and swallowing difficulties and their preparedness to provide clinical support to this group. Overall, results indicate that a sizeable cohort of healthcare professionals recruited believe that communication and swallowing difficulties are significant clinical issues, yet they do not feel as though they have received sufficient training in the management of these concerns. Avenues for future upskilling and education in this field are suggested here, in addition to directions provided for future research in order to improve clinical care delivery to this vulnerable patient group. ◄

References

1. Ahn DG, Shin HJ, Kim MH, Lee S, Kim HS, Myoung J, Kim BT, Kim SJ. Current status of epidemiology, diagnosis, therapeutics, and vaccines for novel coronavirus disease 2019 (COVID-19). *Journal of Microbiology and Biotechnology*. 2020 Mar 3;30(3):313.
2. World Health Organization (WHO). Coronavirus: Who.int.; 2022 [Available from: https://www.who.int/health-topics/coronavirus#tab=tab_1.
3. Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *The Lancet Infectious Diseases*. 2020 May 1;20(5):533-4.
4. Alberti P, Beretta S, Piatti M, Karantzoulis A, Piatti ML, Santoro P, Viganò M, Giovannelli G, Pirro F, Montisano DA, Appollonio I. Guillain-Barré syndrome related to COVID-19 infection. Neurology: Neuroimmunology & Neuroinflammation. 2020 Apr 29;7(4):e741.
5. Raveendran AV, Jayadevan R, Sashidharan S. Long COVID: an overview. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*. 2021 May 1;15(3):869-75.
6. Gupta A, Madhavan MV, Sehgal K, Nair N, Mahajan S, Sehrawat TS, Bikdeli B, Ahluwalia N, Ausiello JC, Wan EY, Freedberg DE. Extrapulmonary manifestations of COVID-19. *Nature Medicine*. 2020 Jul;26(7):1017-32.
7. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, Fan G, Xu J, Gu X, Cheng Z. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*. 2020 Feb 15;395(10223):497-506.
8. Varatharaj A, Thomas N, Ellul MA, Davies NW, Pollak TA, Tenorio EL, Sultan M, Easton A, Breen G, Zandi M, Coles JP. Neurological and neuropsychiatric complications of COVID-19 in 153 patients: a UK-wide surveillance study. *The Lancet Psychiatry*. 2020 Oct 1;7(10):875-82.
9. Rogers JP, Chesney E, Oliver D, Pollak TA, McGuire P, Fusar-Poli P, Zandi MS, Lewis G, David AS. Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: a systematic review and meta-analysis with comparison to the COVID-19 pandemic. *The Lancet Psychiatry*. 2020 Jul 1;7(7):611-27.
10. Oxley TJ, Mocco J, Majidi S, Kellner CP, Shoirah H, Singh IP, De Leacy RA, Shigematsu T, Ladner TR, Yaeger KA, Skliut M. Large-vessel stroke as a presenting feature of Covid-19 in the young. *New England Journal of Medicine*. 2020 May 14;382(20):e60.
11. Mao L, Jin H, Wang M, Hu Y, Chen S, He Q, Chang J, Hong C, Zhou Y, Wang D, Miao X. Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. *JAMA Neurology*. 2020 Jun 1;77(6):683-90.
12. Janiri D, Carfì A, Kotzalidis GD, Bernabei R, Landi F, Sani G, COVID GA, Post-Acute Care Study Group. Posttraumatic stress disorder in patients after severe COVID-19 infection. *JAMA Psychiatry*. 2021 May 1;78(5):567-9.
13. Archer SK, Iezzi CM, Gilpin L. Swallowing and voice outcomes in patients hospitalized with COVID-19: an observational cohort study. *Archives of Physical Medicine and Rehabilitation*. 2021 Jun 1;102(6):1084-90.
14. Daroische R, Hemminghyth MS, Eilertsen TH, Breitve MH, Chwiszczuk LJ. Cognitive impairment after COVID-19—a review on objective test data. *Frontiers in Neurology*. 2021 Jul 29;12:699582.
15. Ramage AE. Potential for cognitive communication impairment in COVID-19 survivors: a call to action for speech-language pathologists. *American Journal of Speech-Language Pathology*. 2020 Nov 12;29(4):1821-32.
16. Cummings L. Cognitive-linguistic difficulties in COVID-19. InExploring Contextualism and Performativity: *The Environment Matters* 2022 Dec 16 (pp. 141-161). Cham: Springer International Publishing.
17. Cummings L, editor. COVID-19 and speech-language pathology. New York: Routledge; 2023.
18. Langton-Frost N, Brodsky MB. Speech-language pathology approaches to neurorehabilitation in acute care during COVID-19: Capitalizing on neuroplasticity. *PM&R.* 2022 Feb;14(2):217-26.
19. Zhou H, Lu S, Chen J, Wei N, Wang D, Lyu H, Shi C, Hu S. The landscape of cognitive function in recovered COVID-19 patients. *Journal of Psychiatric Research.* 2020 Oct 1;129:98-102.
20. Lechien JR, Chiesa-Estomba CM, Cabaraux P, Mat Q, Huet K, Harmegnies B, Horoi M, Le Bon SD, Rodriguez A, Dequanter D, Hans S. Features of mild-to-moderate COVID-19 patients with dysphonia. *Journal of Voice*. 2022 Mar 1;36(2):249-55.
21. Cantarella G, Aldè M, Consonni D, Zuccotti G, Di Berardino F, Barozzi S, Bertoli S, Battezzati A, Zanetti D, Pignataro L. Prevalence of Dysphonia in Non hospitalized Patients with COVID-19 in Lombardy, the Italian Epicenter of the Pandemic. *Journal of Voice*. 2023 Jul 1;37(4):605-9.
22. Neevel AJ, Smith JD, Morrison RJ, Hogikyan ND, Kupfer RA, Stein AP. Postacute COVID-19 laryngeal injury and dysfunction. *Oto Open*. 2021 Aug;5(3):2473974X211041040.
23. Miles A, McRae J, Clunie G, Gillivan-Murphy P, Inamoto Y, Kalf H, Pillay M, Pownall S, Ratcliffe P, Richard T, Robinson U. An international commentary on dysphagia and dysphonia during the COVID-19 pandemic. *Dysphagia*. 2022 Dec;37(6):1349-74.
24. Dawson C, Capewell R, Ellis S, Matthews S, Adamson S, Wood M, Fitch L, Reid K, Shaw M, Wheeler J, Pracy P. Dysphagia presentation and management following coronavirus disease 2019: an acute care tertiary centre experience. *The Journal of Laryngology & Otology*. 2020 Nov;134(11):981-6.
25. Lima MS, Sassi FC, Medeiros GC, Ritto AP, Andrade CR. Functional development of swallowing in ICU patients with COVID-19. *InCoDAS* 2020 Oct 7 (Vol. 32, p. e20200222). Sociedade Brasileira de Fonoaudiologia.
26. Osbeck Sandblom H, Dotevall H, Svennerholm K, Tuomi L, Finizia C. Characterization of dysphagia and laryngeal findings in COVID-19 patients treated in the ICU—an observational clinical study. *Plos One*. 2021 Jun 4;16(6):e0252347.
27. Laguna LB, Marcos-Neira P, de Lagrán Zurbano IM, Marco EM, Guisasola CP, Soria CD, Martí PR. Dysphagia and mechanical ventilation in SARS-COV-2 pneumonia: It's real. *Clinical Nutrition*. 2022 Dec 1;41(12):2927-33.
28. National Institute for Health and Care Excellence. COVID-19 rapid guideline: managing the long-term effects of COVID-19. *National Institute for Health and Care Excellence*; 2020. https://www.nice.org.uk/guidance/ng188/resources/covid19-rapid-guideline-managing-the-longterm-effects-of-covid19-pdf-51035515742
29. Yong SJ. Long COVID or post-COVID-19 syndrome: putative pathophysiology, risk factors, and treatments. *Infectious Diseases*. 2021 Oct 3;53(10):737-54.
30. Cabrera Martimbianco AL, Pacheco RL, Bagattini ÂM, Riera R. Frequency, signs and symptoms, and criteria adopted for long COVID-19: A systematic review. *International Journal of Clinical practice*. 2021 Oct;75(10):e14357.
31. Altmann DM, Boyton RJ. Decoding the unknowns in long covid. *BMJ*. 2021 Feb 4;372.
32. Dennis A, Wamil M, Alberts J, Oben J, Cuthbertson DJ, Wootton D, Crooks M, Gabbay M, Brady M, Hishmeh L, Attree E. Multiorgan impairment in low-risk individuals with post-COVID-19 syndrome: a prospective, community-based study. *BMJ Open*. 2021 Mar 1;11(3):e048391.
33. Carfì A, Bernabei R, Landi F. Gemelli against COVID-19 post-acute care study group. Persistent symptoms in patients after acute COVID-19. *JAMA*. 2020 Aug 11;324(6):603-5.
34. Callan C, Ladds E, Husain L, Pattinson K, Greenhalgh T. 'I can't cope with multiple inputs': a qualitative study of the lived experience of 'brain fog'after COVID-19. BMJ open. 2022 Feb 1;12(2):e056366.
35. Neevel AJ, Smith JD, Morrison RJ, Hogikyan ND, Kupfer RA, Stein AP. Postacute COVID-19 laryngeal injury and dysfunction. *Oto Open*. 2021 Aug;5(3):2473974X211041040.
36. Frank U, Frank K. COVID-19–neue Herausforderungen in der Dysphagie-und Atemtherapie. *Der Nervenarzt*. 2022 Feb;93(2):167-74.
37. Lopez-Leon S, Wegman-Ostrosky T, Perelman C, Sepulveda R, Rebolledo PA, Cuapio A, Villapol S. More than 50 long-term effects of COVID-19: a systematic review and meta-analysis. *Scientific Reports*. 2021 Aug 9;11(1):1-2.

38. Webler K, Carpenter J, Hamilton V, Rafferty M, Cherney LR. Dysphagia characteristics of patients post SARS-CoV-2 during inpatient rehabilitation. *Archives of Physical Medicine and Rehabilitation.* 2022 Feb 1;103(2):336-41.
39. Greenhalgh T, Knight M, Buxton M, Husain L. Management of post-acute covid-19 in primary care. *BMJ*. 2020 Aug 11;370.
40. Royal College of Speech and Language Therapists (RCSLT). Long COVID and speech and language therapy: Understanding the mid- to long-term speech and language therapy needs and the impact on services. 2021. www.rcslt.org/news/new-rcslt-report-on-longcovid-and-speech-and-language-therapy/. Accessed 10 November 2022.
41. Carfi A, Bernabei R, Landi F. Gemelli against COVID-19 post-acute care study group. Persistent symptoms in patients after acute COVID-19. *JAMA*. 2020 Aug 11;324(6):603-5.
42. Sharma A, Minh Duc NT, Luu Lam Thang T, Nam NH, Ng SJ, Abbas KS, Huy NT, Marušić A, Paul CL, Kwok J, Karbwang J. A consensus-based checklist for reporting of survey studies (CROSS). *Journal of General Internal Medicine*. 2021 Oct;36(10):3179-87.
43. Priftis K. Neurolinguistic deficits and other cognitive disorders in adults with severe COVID-19 infection. *InCOVID-19 and Speech-Language Pathology* 2022 Sep 15 (pp. 53-71). Routledge.
44. Verma H, Shah J, Akhilesh K, Shukla B. Patients' perspective about speech, swallowing and hearing status post-SARS-CoV-2 (COVID-19) recovery: E-survey. *European Archives of Oto-Rhino-Laryngology.* 2022 May;279(5):2523-32.
45. O'Connor RJ, Preston N, Parkin A, Makower S, Ross D, Gee J, Halpin SJ, Horton M, Sivan M. The COVID-19 Yorkshire Rehabilitation Scale (C19-YRS): application and psychometric analysis in a post-COVID-19 syndrome cohort. *Journal of Medical Virology*. 2022 Mar;94(3):1027-34