RESEARCH REPORT

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A retrospective study of patients presenting with speech and language therapy needs within multidisciplinary Long COVID services: A service evaluation describing and comparing two cohorts across two NHS Trusts

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Abstract

Background: Post-COVID Syndrome (also known as Long COVID) refers to the multi-system condition affecting individuals following COVID-19 infection. This can include speech and language therapy (SLT) needs, including voice, swallowing, communication and upper airway difficulties. There is limited published literature in this clinical area of practice, particularly for those receiving input from community SLT services.

Aims: To describe and compare demand, typical SLT presentation and service delivery across two National Health Service (NHS) Long COVID multidisciplinary services. Independent retrospective service evaluation was completed for each service. Descriptive statistics were produced and compared across services. This service evaluation followed The Strengthening the Reporting of Observation Studies in Epidemiology guidelines for cohort studies.

Outcomes & Results: The findings indicated similarities across the two services in SLT service need and demand, clinical presentations and intervention approaches provided within Long COVID services. There were specific differences in the service provision and delivery of intervention in cognitive communication and upper airways subspecialties.

Conclusions & Implications: This study highlights the clinical complexities of SLT needs in individuals with Long COVID and the importance for an appropriately skilled and supported workforce within effective multidisciplinary teams. We call for consensus on SLT practices and a consistent and standardized approach to evaluation for SLT needs in Long COVID.

WHAT THIS PAPER ADDS

What is already known on this subject

SLT needs, including voice, swallowing, communication and upper airway difficulties, are present in individuals presenting with Long COVID, both in those who were or were not hospitalized. SLTs are seeing such individuals in a variety of settings, including community services and Long COVID multidisciplinary teams. There is minimal evidence of the clinical presentations and interventions provided to individuals with SLT needs compared across Long COVID services.

What this study adds to existing knowledge

This study compares two NHS Long COVID services providing a SLT service pathway. It highlights the similarities and differences in service demand and capacity, patient presentation, and SLT intervention to make suggestions for future practice consideration and priority evaluation. Expert consensus among SLT clinicians is a priority to ensure clinicians are delivering consistent and equitable care for patients, while new evidence and data emerge. A consistent and standardized approach to data collection and outcome measures is essential to ensure future research captures the impact and value of SLT input with individuals with Long COVID.

What are the clinical implications of this work?

The complexities and multifactorial SLT needs of individual with Long COVID call for appropriate SLT staffing provision, skill and training to fulfil the needs of this population. Speech and language therapists should be integrated with multidisciplinary Long COVID services to provide holistic care for patients and to support the professionals working with individuals with post-COVID voice, swallowing, communication and upper airway symptoms.

INTRODUCTION

Background

Post COVID-19 Syndrome, also referred to as 'Long COVID',[1] refers to individuals who have a collection of symptoms they continue to experience at least 4 weeks following COVID-19 infection (World Health Organisation (WHO), 2021). An estimated 3.0% of the population in the UK is experiencing self-reported Long COVID symptoms according to the Office for National Statistics (ONS), 2022), with fatigue reported as the most common symptom (56%), followed by shortness of breath (31%), loss of smell (22%), muscle ache (21%) and adverse effects on day-to-day activities (72%) reported in its analysis. Other surveys have reported difficulties 'finding words' (32.2–49.0%) (Davis et al., 2021; Seeßle et al., 2021), 'difficulty communicating verbally' (28%) and 'a lump in the throat/difficulty swallowing' (35%) as common symptoms (Davis et al., 2021). A recent study identified 62 significantly associated

symptoms with COVID-19 infection, with one of the largest adjusted hazard ratios including 'hoarse voice' (Subramanian et al., 2022). The understanding of Long COVID continues to evolve with an emerging picture of symptoms related to voice, swallowing, communication and the upper airways (Davis et al., 2021; Seeßle et al., 2021; Subramanian et al., 2022).

The National Institute for Health and Care Excellence (NICE) and National Health Service (NHS) England have provided evidence-based guidance for the management of the long-term effects of COVID-19 (NICE, 2022) and the design and implementation of care services (NHS England, 2022a, 2022b). The current guidance recommends integrated multidisciplinary rehabilitation services which take a holistic and individualized approach. This includes a range of specialist skills with explicit reference to expertise in managing fatigue and breathlessness (NICE, 2022). The NICE guidance states that 'additional expertise may be needed depending on symptoms' and 'a multidisciplinary team (MDT) with input from other services should exist' (NICE, 2022: 84). MDTs provide much needed opportunities to discuss complex cases and for team members to share learning about clinical practices in a relatively new syndrome (NHS England, 2022a). Referral pathways should include access to speech and language therapy (SLT) services to support the rehabilitation and self-management of common Long COVID symptoms, including cognitive communication ('brain fog'), swallowing, voice (including muscle tension dysphonia) and respiratory difficulties (NHS England, 2022b). Despite this, The Royal College of Speech and Language Therapists (RCSLT) has previously highlighted that 'even where dedicated or specially funded services exist, the professionals comprising the teams are not centrally defined, so disparities to care are still inevitable' (RCSLT, 2021a: 9). Furthermore, findings from the RCSLT have suggested a fragmented picture of SLT for individuals with Long COVID (RCSLT, 2021a).

Speech and language therapy (SLT)

Speech and language therapists are one of the registered allied health professionals (AHPs) as defined by Health Education England (HEE) (2022). Speech and language therapists specializing in the care of adults may support speech, language, communication, swallowing, voice and upper airway difficulties resulting from a wide range of medical conditions. The role and expertise of SLTs is expanding with highly specialist SLTs pioneering in the fields of complex neurology, respiratory, head and neck cancer, and laryngology.

The published literature examining SLT needs following COVID-19 illness has predominantly focused on those admitted to hospital (Archer et al., 2021; Marchese et al., 2022; Regan et al., 2021) requiring critical care support, mechanical ventilation, intubation and/or tracheostomy weaning (Ceruti et al., 2021; Dawson et al., 2020; Rouhani et al., 2021). At hospital discharge, there are varied reports of community SLT follow up for dysphonia (17.1−37.0%) and dysphagia (7.8−27.0%) following acute COVID-19 (Archer et al., 2021; Regan et al., 2021). In some critical care populations, near normal swallow function before discharge has been reported (Ceruti et al., 2021; Dawson et al., 2020), although there is literature demonstrating persistent post-COVID voice, swallowing and airway difficulties following discharge (Neevel et al., 2021; Rouhani et al., 2021; Vasanthan et al., 2021). An international commentary on dysphagia and dysphonia during the COVID-19 pandemic highlighted the contributory factors that may give rise to post-COVID dysphagia, dysphonia and upper airway problems in patients who were hospitalized (Miles et al., 2022). In comparison, however, there is a lack of published papers focusing on SLT needs in the non-hospitalized population. This is importance because in practice SLT services are receiving community referrals for individuals with Long COVID, with symptoms including dysphonia, dysphagia, breathing pattern disorder and chronic cough (Lechien et al., 2020), many of which who remained in their domiciliary setting during acute COVID-19 (RCSLT, 2022).

The findings from a UK survey conducted by the RCSLT and published in 2022 (Chadd et al., 2022) showed that most individuals with SLT needs because of Long COVID were not hospitalized with their acute illness. Only a small number of SLTs indicated that their patients had been in critical care with COVID-19 (Chadd et al., 2022; RCSLT, 2022). Furthermore, the most common SLT needs identified post-assessment by SLT were dysphagia (34.7%) and dysphonia (33.3%), followed by laryngeal hypersensitivity (12.0%), upper airway difficulties (8.0%) and cognitive–communication disorder (8.0%) (Chadd et al., 2022). Despite evidence that SLT needs are reported in individuals with Long COVID, the survey showed that only 14 out of 111 respondents (13.8%) were working in dedicated commissioned or funded multidisciplinary Long COVID services (Chadd et al., 2022).

To our knowledge there remains very limited published evidence that has evaluated the voice, swallowing, communication and upper airway difficulties that individuals living with Long COVID experience. In addition, there are rarely publications reporting in-depth information as to how services are provided within the context of multidisciplinary Long COVID services. This evidence is

required if we are to: support the care received by individuals; raise awareness of significant SLT symptoms of Long COVID to patients, the public and other healthcare professionals; highlight the role and impact of the SLT; and influence national guidance in context of a new multifaceted condition requiring a multidisciplinary approach and appropriate resource.

In this article we describe and compare the SLT demand, needs, and presentation and service delivery across two NHS Long COVID services. This article follows the timely publication of the RCSLT report *Understanding the Need For and Provision of SLT Services for Individuals with Post-COVID Syndrome in the UK* (RCSLT, 2022; see also Chadd et al., 2022).

Aims

This study examines two SLT clinical caseloads within community Long COVID services, describing and comparing data from two NHS Trusts over a 1-year period between January 2021 and January 2022, to answer the following questions:

- What is the current service demand for SLT services within MDT Long COVID services?
- What is the typical presentation of patients referred into MDT Long COVID services with SLT needs?
- How are SLT services being delivered within the context of MDT Long COVID services?

METHODS

Study design

This is a retrospective study, describing and comparing two cohort case series. This service evaluation follows the Enhancing the Quality and Transparency of Health Research (EQUATOR) guidelines for The Strengthening the Reporting of Observation Studies in Epidemiology (STROBE) (von Elm et al., 2008).

Participants and settings

All patients referred to SLT for two NHS services: Bolton NHS Foundation Trust and East Suffolk and North Essex NHS Foundation Trust between 1 January 2021 and 1 January 2022 were included within the study. Completed and open episodes of care were included, as long as the referral was received within the 1-year period under study. This time frame was chosen to allow direct comparison across

these services, as both had established their Long COVID services by 1 January 2021.

Patients referred to the services received SLT assessment and interventions in accordance with the bespoke needs of the individual and in line with professional code of conduct, local service delivery agreements, clinical experience and expertise. The data were recorded contemporaneously using each Trust's clinical records system. For context, we describe the service arrangement in each of these NHS settings below.

Bolton NHS Foundation Trust: 'Bolton'

The Long COVID service in Bolton, Greater Manchester, UK, was initially established as a pilot in January 2021, after which in August 2021 this led to a substantive therapy-led multidisciplinary Long COVID service for individuals living in Bolton and for NHS staff working for Bolton NHS Foundation Trust. The Long COVID service in Bolton is within the Integrated Community Services Division, Long Term Conditions Department. At the time of this service evaluation, the MDT consisted of a permanent respiratory physiotherapist (Agenda for Change (AfC) Band 7, 0.4 Whole Time Equivalent (WTE)), an occupational therapist (AfC Band 7, 1.0 WTE), and a speech and language therapist (AfC Band 7, 0.6 WTE) commissioned to assess and manage the following symptoms: breathlessness, breathing pattern disorder, fatigue, brain fog, communication, voice and swallowing difficulties. The SLT had access to community videofluoroscopy for patients who required instrumental assessment. Access to community fibreoptic endoscopic evaluation of swallowing (FEES) or SLT-led videoendoscopy was not available. Referrals could be made from individuals experiencing Long COVID symptoms, general practitioners (GPs), or other health and social care professionals. Following MDT triage, the individual would receive an initial assessment and ongoing management with the clinical disciplines they required. Medical management and initial confirmation of suspected Long COVID resided in primary care with the person's GP. Onward referrals and consultations were made with specialist secondary or tertiary care services where further medical investigations were necessary.

East Suffolk and North Essex NHS Foundation Trust: 'East Suffolk'

The Long COVID Assessment Service was established in December 2020 as a virtual clinic for residents of the Suffolk and North Essex Integrated Care System (subsequently known as the Integrated Care Board). The Long

COVID service refers patients to specialist clinics or services in accordance with their presenting symptoms and needs, therefore adopting a hub and spoke model with existing services within the care system. The East Suffolk SLT service is one of those specialist services to receive referrals. Referral to the Long COVID service is by GP with a requirement to rule out other potential causes before providing the clinical diagnosis of Long COVID in accordance with the criteria provided by NICE (2022). Whilst the specialist services operate independently, a virtual MDT meeting was implemented to discuss complex cases, with additional liaison and discussion occurring between services as required. The SLT provision is from dedicated resource (AFC band 7, 0.4 WTE) within the community service for the area. The SLT had access to outpatient videofluoroscopy for instrumental assessment of dysphagia. Whilst the SLT service usually provides outpatient FEES and SLT-led videonasoendoscopy, during the period under study access was more limited and less frequent. This was as a result of COVID recovery and concerns regarding aerosol generation. The SLT team is an integrated inpatient, outpatient and community service within a wider integrated pathways directorate.

Variables and data sources

Number of referrals to each SLT Long COVID service, and number of referrals to each SLT community service across the stipulated timeframe, were collected to examine caseload demand within the wider context of the respective community services. Demographic data were collected for patient age and sex (as recorded on clinical record systems). The variables were determined using themes and categories defined within the RCSLT Long COVID survey (Chadd et al., 2022; RCSLT, 2022). This survey was devised and tested by an expert group of researchers and clinicians. The variables were as follows:

- Referral source and reason; collected from the referral made to the services.
- SLT diagnosis and need; collected from the clinical record for the patient.
- Interventions provided, encompassing overarching purpose of intervention in accordance with the Care Aims Intended Outcomes Framework (Malcomess, 2020) alongside more specific intervention information (e.g., direct voice treatment, communication strategies, dysphagia rehabilitation); collected from clinical records.
- Wider MDT service involvement including specialist referrals made and specialist assessments undertaken (e.g., videofluoroscopy), collected from clinical records.

The Care Aims Intended Outcomes Framework (Malcomess, 2020)

This framework encompasses Care Aims, which take a person-centred approach and help to define and clarify the purpose of an intervention by a clinician using eight defined categories. For example, 'Rehabilitative' described '[as] the condition improves, problem will have diminished, and/or skills will increase but it is not anticipated to reach normal limits in the future …' (Malcomess, 2020: 4). 'Using a Care Aims approach in specialist care, it is intended that a care aim is allocated to the care to clarify the intended outcome' (1). In this study, the Care Aims framework was used retrospectively as an agreed tool to clarify the intended outcomes based on analysis of individual cases, in the absence of shared outcome measures or predetermined interventions.

Data management

The research team consisted of three clinical-academics, one clinical SLT and one student SLT. Two members of the research team were directly involved as SLT clinicians in one of the SLT Long COVID Services. A data collection tool was designed and adapted based on the data items collected in the RCSLT study (RCSLT, 2022). The research team (S.C., K.H., S.Y.W., W.K.) agreed the data items and definitions for the fields and categories for each variable. Researchers (S.C., K.H., S.Y.W., W.K.) evaluated the data from their respective services, producing anonymised data for analysis and discussion. Members of the research team (S.C., K.H., S.Y.W., W.K.) met frequently during data collection to enhance reporting consistency and reduce bias; for example, using consensus discussion to determine how interventions were categorized if queries arose, and checking accuracy of diagnoses made where there were anomalies or potential discrepancies that deviated from the predetermined definitions. The summary statistics were presented and discussed after each service had completed their respective service evaluation. Five anonymised cases from each service were presented to the research team to further enhance robustness and interrater agreement.

Data analysis

Descriptive statistics for each service dataset were produced and analysed using Microsoft Excel. Proportions were calculated for categorical data. The distribution of continuous variable for (age and appointment number)

TABLE 1 Patient demographics

	Bolton	**East Suffolk**
Number of patients referred	82	86
Age (mean, SD) (years)	54.5 (13.5)	48.2 (9.7)
Sex (*n*, %):		
Female	55 (67.1%)	71 (82.6%)
Male	27 (32.9%)	15 (17.4%)
Hospitalization (*n*, %):		
Non-hospitalized	63 (76.8%)	77 (89.5%)
Hospitalized	19 (23.2%)	9 (10.5%)
Intubated	2 (2.4%)	2 (2.3%)
Laryngeal injury	1 (1.2%)	1 (1.2%)

was tested using normality tests of skewness and kurtosis. If data were normally distributed, the mean and standard deviation was reported; if data were not normally distributed, the median and interquartile range was reported.

Ethical approval

This service evaluation project was given ethical approval by the University of Central Lancashire Health Ethics Review Panel (HEALTH0298). The project was granted approval from Bolton NHS Foundation Trust and East Suffolk and North Essex NHS Foundation Trust through respective clinical governance procedures. As per the health research authority decision tool, this project did not require NHS ethical approval.

RESULTS

Participants

During the study period 1 January 2021 to 1 January 2022, 82 patients were referred to the Bolton Long COVID SLT pathway and 86 patients were referred to the East Suffolk SLT Long COVID service (Table 1). All patients were included within the case series comparison; however, data were not available on all patients for all variables (Figure 1). For both services, patients were mostly female (67.1% *n* = 55 Bolton; 82.6% *n* = 71 East Suffolk) and predominantly of working age, with a mean age of 55 years in Bolton and 48 years in East Suffolk (Table 1).

Demand for SLT services

During the period under study, the East Suffolk community service received 1650 referrals in total, with the Long

COVID caseload constituting 5.2% of that caseload (*n* = 86). For the Bolton service, the total referrals received by their community team was 929 referrals, and the Long COVID caseload constituted 8.1% (*n* = 82). As a novel condition, this accounts for a new demand for SLT services.

Clinical presentation

In Bolton, 62.2% of referrals (51/82) were received through self-referrals from the individuals experiencing Long COVID symptoms, 22.0% (18/82) from GPs, 9.7% (8/82) from AHPs and 6.1% (5/82) from medical consultants. In East Suffolk, 94.2% of referrals (81/86) were received from the regional Long COVID assessment service, with a smaller proportion of referrals from ENT (3.5%, 3/86) and GP (2.3%, 2/86).

The primary reason that referrals were received by both services was consistent, with 73.2% (60/82) of patients referred for dysphonia in Bolton (Figure 2), and 64.0% (55/86) of patients in East Suffolk (Figure 3). Dysphagia was a reason for referral in 34.2% (28/82) of cases in Bolton, and 58.1% (50/86) of patients in East Suffolk. The East Suffolk service also received a high proportion of referrals (61.6%, 53/86) for cognitive communication difficulties (including difficulties with word finding and language processing) in contrast to a smaller number in the Bolton service (15.9%, 13/82) of patients.

SLT need and diagnosis

By initial appointment, four patients in Bolton and 10 patients in East Suffolk did not attend and were excluded from the reporting of need and diagnosis results (Figure 1). In the Bolton service (Figure 2), dysphonia was the predominant diagnosis given by the SLT representing 57.7% of patients (45/78) compared with 48.7% of patients (37/76) in East Suffolk (Figure 3), demonstrating this an area of high need for both services. A total of 22 patients in Bolton received ENT intervention (48.9%, 22/45) with patients presenting with muscle tension dysphonia, intra-arytenoid oedema and suspected laryngo-pharyngeal reflux. One individual presented with vocal cord palsy post-extubation and received vocal cord augmentation. A total of 14 patients (37.8%, 14/37) attended a joint SLT/ENT voice clinic in East Suffolk. Similarly; the majority of patients (57.1%, 8/14) were diagnosed with muscle tension dysphonia, with one patient diagnosed with a vocal cord lesion secondary to intubation injury.

The predominant clinician identified need in East Suffolk was cognitive communication difficulties for 52.6% (40/76) of patients. This contrasts with the Bolton

TABLE 2 Number of referrals and appointments

	Bolton	East Suffolk
Referrals	82	86
Percentage of SLT community caseload	8.1% ($n = 82/929$)	5.2% ($n = 86/1650$)
Appointment = 1	46.77% ($n = 29/62$)	36.67% ($n = 22/60$)
Appointments ≥ 2 Median (IQR) Range	53.2% ($n = 33/62$) 4 appointments (IQR = 4) 2–12	63.3% ($n = 38/60$) 4 appointments (IQR = 4) 2–10

N: IQR, interquartile range.

For patients who completed treatment, 36.7% (22/60) in East Suffolk received one appointment only and 63.3% (38/60) received two or more appointments (Table 2). For those who received two or more appointments, the median number of appointments provided was four (interquartile range (IQR) = 3). In Bolton 46.8% (29/62) received one appointment only in comparison with 53.2% (33/62) who received two or more appointments. The median number of appointments provided was four, consistent with the East Suffolk service (IQR = 2).

service where only 14.1% of patients (11/78) were noted as having cognitive communication difficulties. In both services, it was noted in clinical records that informal assessments using sections of assessments such as the Mount Wilga High Level Language Test (Simpson, 2006), Cognitive Communication Checklist for Acquired Brain Injury (MacDonald, 2015) and La Trobe Communication Assessment (Douglas et al., 2000) were used to identify impairment. There were no instances of a primary language impairment in these individuals and therefore the need and resultant intervention was based on the reported difficulties described by the patient.

Dysphagia was diagnosed in 30.8% of patients (24/78) in Bolton and 29.0% (22/76) in East Suffolk. Laryngeal hypersensitivity was diagnosed in 21.8% (17/78) of patients in Bolton and 29.0% (22/76) in East Suffolk.

SLT service delivery

Interventions

For both services, the predominant Care Aim for intervention was 'Enabling'; 32.3% (20/62) in Bolton and 33.3%
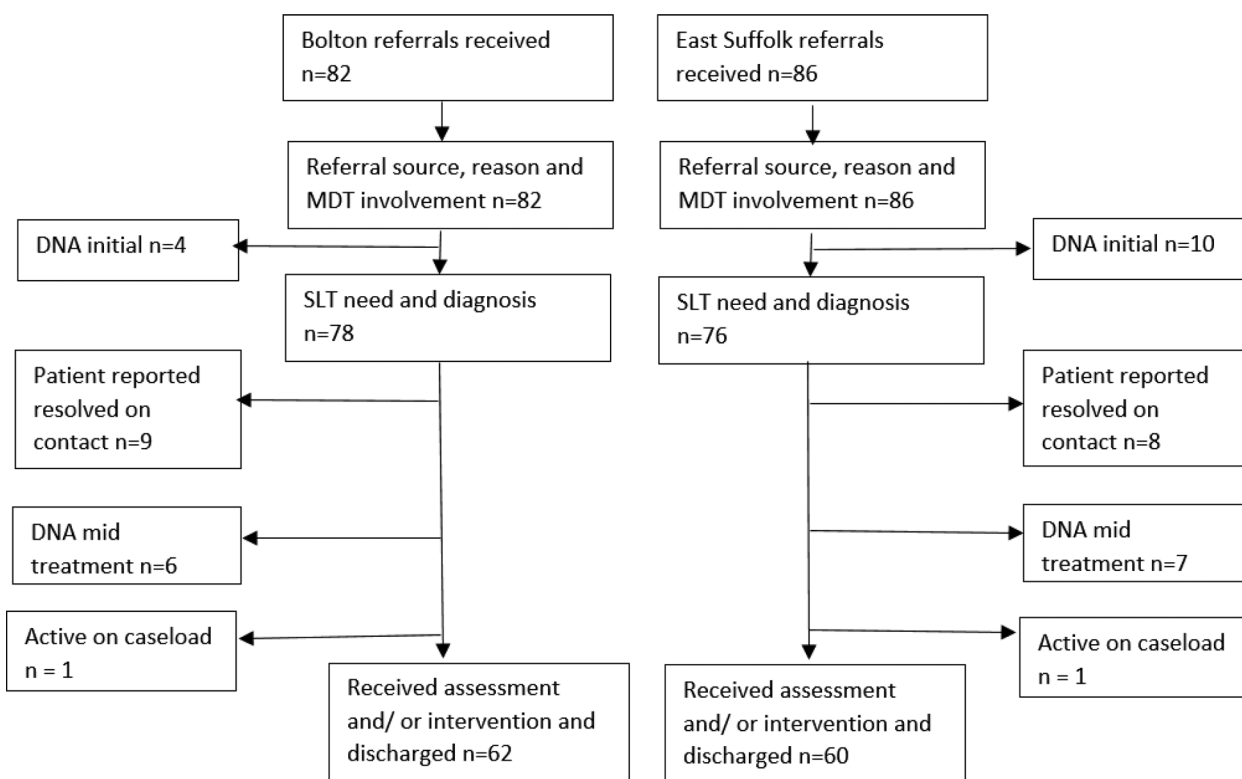
FIGURE 1 Available and missing data for each dataset.
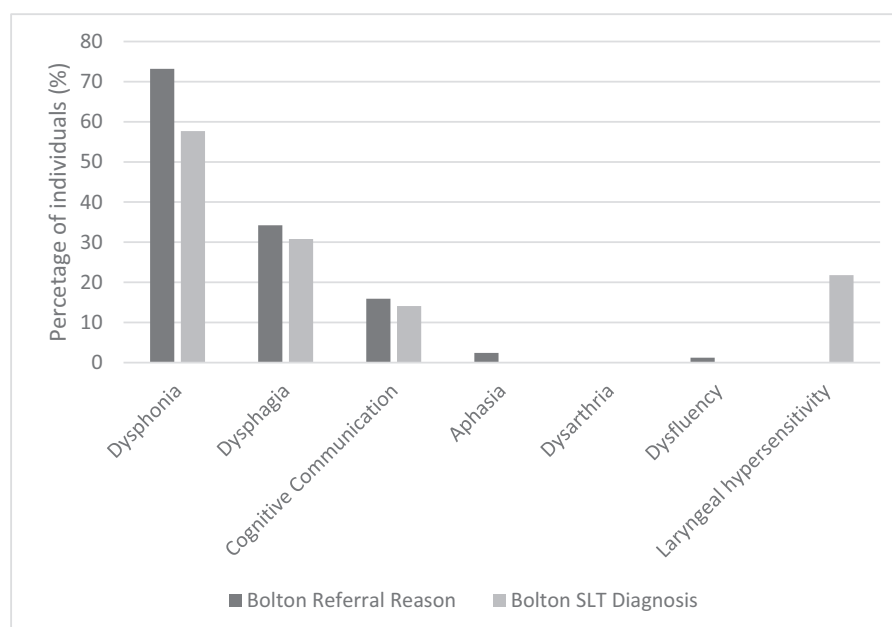
FIGURE 2   Bolton comparison of referral reason, and SLT need and diagnosis.
Note: SLT, speech and language therapy.
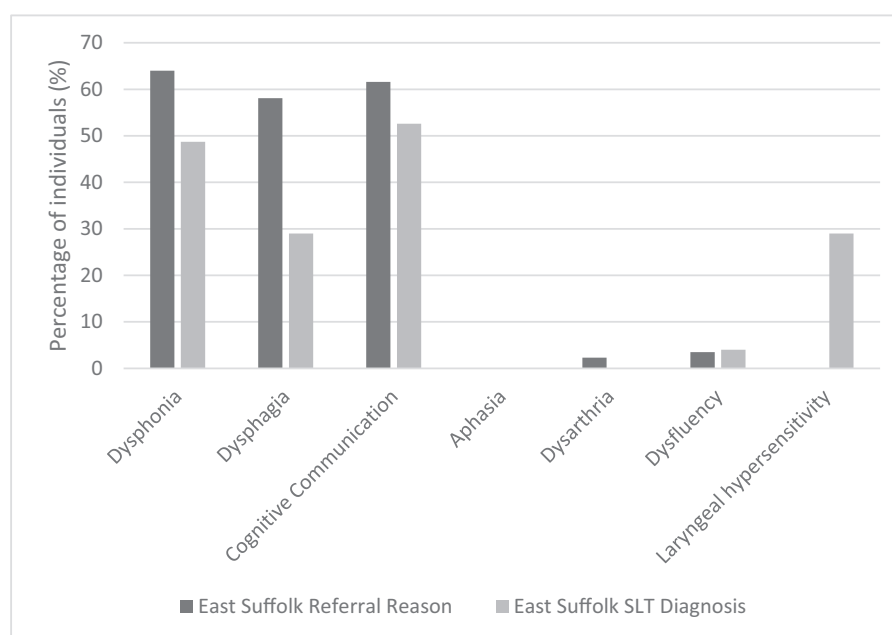
FIGURE 3   East Suffolk comparison of referral reason, and SLT need and diagnosis.
Note: SLT, speech and language therapy.

(20/60) in East Suffolk. The focus for intervention was 'curative' for 27.4% (17/62) in Bolton and 21.7% (13/60) in East Suffolk. 'Rehabilitative' was the Care Aim for 21.0% (13/62) in Bolton and 20.0% (12/60) In East Suffolk. 'Assess-ment' Care Aim was provided for 19.4% (12/62) in Bolton and 25.0% (15/60) in East Suffolk. The Care Aims data shown in Figure 4 demonstrate many similarities between the core intervention aims that each service was providing

FIGURE 4 Care aims.

TABLE 3 Speech and language therapy (SLT) type of intervention

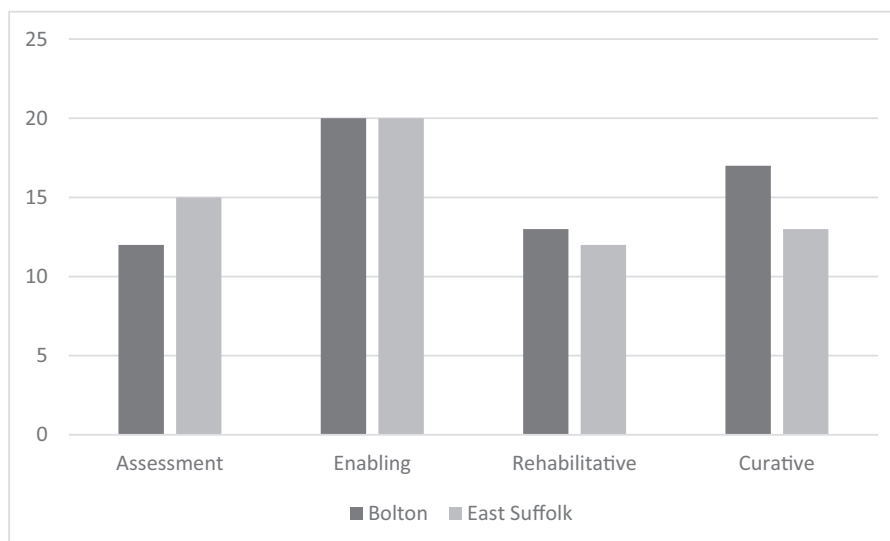|	Bolton	East Suffolk
Type of SLT intervention	Indirect voice 51.61% ($n = 32/62$) Direct voice 40.32% ($n = 25/62$) Dysphagia compensation 32.26% ($n = 20/62$) Dysphagia rehabilitation 12.90% ($n = 8/62$) Communication strategies 19.35% ($n = 12/62$)	Indirect voice 60% ($n = 36/60$) Direct voice 43.33% ($n = 26/60$) Dysphagia compensation 25% ($n = 15/60$) . Communication strategies 55% ($n = 33/60$)

to patients. No patients were categorized as receiving prevention, maintenance, supportive or palliative Care Aims in either service.

When examining the specific support that was provided (Table 3), the most common type of treatment patients received was indirect voice treatment (which includes voice education and advice for how to support a healthy voice), provided to 51.6% (32/62) of patients in Bolton and 60.0% (36/60) in East Suffolk. Direct voice techniques, such as resonant humming and trills, was provided to 40.3% (25/62) of patients in Bolton and 43.3% (26/60) in East Suffolk. Whilst there is similarity in these figures, where the services diverge is with support for dysphagia and cognitive communication. Dysphagia compensation, which included swallowing strategies, monitoring charts to detect and support patterns were provided for 32.3% (20/62) patients in Bolton, in comparison with 25.0% (15/60) patients in East Suffolk. In addition, 12.9% (8/62) of patients in Bolton were provided with dysphagia rehabilitation, whereas no patients in East Suffolk were provided with rehabilitation. In East Suffolk, 10 patients underwent videofluoroscopy, 45.5% of those reporting dysphagia (10/22) and only one patient was diagnosed with an instrumentally determined mild oro-pharyngeal dysphagia. In comparison, only three patients underwent

videofluoroscopy in Bolton, representing 12.5% of patients who were reporting dysphagia (3/24); two of these patients were diagnosed with an instrumentally determined oropharyngeal dysphagia. Due to the lack of access or availability of community FEES or SLT-led videoendoscopy, patients were not referred for this type of instrumental assessment of swallowing, and data regarding the unmet need for this procedure were not recorded in either service. Communication strategies, such as word-finding advice, was provided to 19.4% (12/62) of patients in Bolton in comparison with 55.0% (33/60) patients in East Suffolk.

MDT involvement

Examining other services that patients required, in the Bolton service 67.1% (55/82) of patients were also placed on the fatigue pathway led by an occupational therapist, and 69.5% (57/82) of patients required the respiratory pathway led by a physiotherapist, while 51.2% (42/82) of patients required all three disciplines: occupational therapy, physiotherapy and SLT. In East Suffolk, 66.3% of patients (57/86) were referred to the chronic fatigue service, 37.2% (32/86) to respiratory physiotherapy and 30.2% (20/86) to musculoskeletal physiotherapy, while 43.0% (37/86) of patients in

East Suffolk required all three disciplines. See Table 4 for MDT involvement across the two services.

In East Suffolk, 38.4% (32/86) patients were referred to the regional well-being counselling service, 12.2% (10/82) in Bolton were referred to psychology services. Ear, nose and throat (ENT) was a service required by 47.6% (39/86) in East Suffolk and 24.4% (20/82) in Bolton. In addition, five patients in Bolton (6.1%, 5/82) were referred to a tertiary upper airways service in which all these individuals were diagnosed with inducible laryngeal obstruction.

DISCUSSION

This paper offers an observation, description and comparison of Long COVID clinical services with dedicated SLT provision. In keeping with the objectives of the study, we have reported demand for SLT provision for these services, SLT clinical need and interventions provided to support these needs. This study offers a unique insight into some of the similarities and differences in service establishment for SLT needs post-COVID across two NHS services. The findings indicate the clinical complexities of post-COVID voice, swallowing, cognitive–communication and upper airway symptoms. We highlight and propose the implications and recommendations for future service delivery, the workforce, and research and evaluation approaches in practice.

The findings show multiple similarities regarding SLT demand, SLT clinical presentations and SLT intervention/care aim across the two SLT caseloads within Long COVID services. The demand, indicated by the number of referrals for SLT, was similar across the two services over the year period. There was a similar prevalence of dysphonia, dysphagia and laryngeal hypersensitivity, and similar instrumental assessment findings for voice and dysphagia. There were also similarities regarding the proportion of intervention types across the caseload, with most receiving an 'enabling' approach. Most patients across the two caseloads had two SLT needs and between two and 12 sessions. These similar findings across the two services indicate some consistency in the service demand, presentation and approach that the two SLT services took over the year period.

The findings also indicate a high degree of complexity of SLT needs across the two caseloads, given the range in number of SLT needs that patients presented with. There was also a high level of involvement from other specialist services and professionals across a broad range of areas of practice. This included core members of Long COVID services such as AHPs specialized in fatigue management and respiratory physiotherapy, in addition to medical specialities, for example, ENT, neurology and respiratory. This

TABLE 4 Multidisciplinary team (MDT) involvement

	Bolton	East Suffolk
MDT team/services	Fatigue management/OT 67.1% (n = 55/82)	Chronic fatigue service 66.3% (n = 57/86)
	Respiratory physiotherapy 69.5% (n = 57/82)	Respiratory physiotherapy 37.2% (n = 32/86)
	Psychology 12.0% (n = 10/82)	Musculoskeletal physiotherapy 30.2% (n = 26/86)
	ENT 24.4% (n = 20/82)	Well-being 38.4% (n = 33/86)
	Gastroenterology 6.1% (n = 5/82)	ENT 47.6% (n = 39/86)
	Neurology 15.9% (n = 13/82)	Gastroenterology 4.7% (n = 4/86)
	Rheumatology 3.7% (n = 3/82)	Neurology 3.5% (n = 3/86)
	Tertiary upper airways service 6.1% (n = 5/82)	Rheumatology 1.2% (n = 1/86)
	Chronic fatigue service 3.7% (n = 3/82)	Cardiology 2.3% (n = 2/86)
	Post Critical Care clinic 3.7% (n = 3/82)	Respiratory medicine 2.3% (n = 2/86)
	Dietetics 3.7% (n = 3/82)	English National Opera Breathe Programme 5.8% (n = 5/86)
	Tertiary dystonia 1.2% (n = 1/82)	
	Maxillofacial 1.2% (n = 1/82)	
	Regional tier 4 Long COVID service 1.22% (n = 1/82)	

Note: ENT, ear, nose and throat; MDT, multidisciplinary team.

is somewhat unsurprising given the multifaceted symptomology of individuals with Long COVID. However, this multi-symptom profile contributes to the complexity for the speech and language clinician during differential diagnosis, hypotheses of pathophysiology, and subsequently selecting the most appropriate assessment and intervention approach across different SLT subspecialties.

Cognitive communication

Cognitive–communication disorder refers to difficulties with communication (verbal, non-verbal, speaking, listening, reading and writing) that is affected by disruption of cognition (attention, perception, memory, executive function) (Sneed, 2018). Cognition and thus cognitive–communication competence is critical for functional communicative success. The East Suffolk SLT service received approximately four times the number of referrals and patient diagnoses for cognitive–communication difficulties in comparison with the service in Bolton. An explanation for this difference may be due to the difference in service pathways, for example, the service in Bolton had direct access to the MDT with specialist skills in cognition, such as occupational therapists, and therefore such needs were less likely to be directed to the SLT pathway.

The presence of self-reported brain fog has been significantly associated with subjective memory impairment, word-finding difficulties, high fatigue levels and myalgia (Jennings et al., 2021). However, the direct causes of brain fog and cognitive impairment, and associated communication difficulties, has yet to be fully understood in individuals with Long COVID, albeit the high prevalence of such symptoms (Davis et al., 2021; Graham et al., 2021). Other common medical conditions associated with Long COVID, such as chronic fatigue syndrome and depression, have also been linked with cognitive impairment (Ismail et al., 2017; Musella et al., 2018) and associated unemployment and job loss (Taylor & Kielhofner, 2005), but with little established research on the biological mechanisms that explain such somatic–cognitive associations (Jennings et al., 2021). Identifying the components or drivers specifically of communication difficulties related to cognition is therefore complex and requires a high degree of clinician expertise.

Pre-pandemic, SLTs specialized in the field of cognitive communication work with a range of individuals with progressive and non-progressive neurological conditions including dementia and brain injury both within and without MDTs. In comparison there is seldom SLT service provision within chronic fatigue services and those presenting with communication difficulties requiring a holistic and vocational rehabilitative approach (Taylor & Kielhofner, 2005). A multi- or interdisciplinary model of working for individuals with cognitive–communication difficulties post-COVID is therefore essential, as opposed to working in professional silos. This will most likely include close working relationships with occupational therapists, clinical psychologists, neuropsychologists and SLTs coexisting in Long COVID services. A call for consensus among the SLT community and recommendations for best practice is necessary.

Dysphagia

The assessment and management of eating, drinking and swallowing is a core competency for many SLTs. A small number of individuals across both services were referred for a videofluoroscopic evaluation of swallowing, and of those referred a minority presented with an instrumentally identified oropharyngeal dysphagia. Although there was equal access to videofluoroscopy for both services, there were more procedures conducted in East Suffolk (45.5%, 10/22) in comparison with Bolton (12.5%, 3/24). This may be explained by different clinical thresholds for requesting videofluoroscopy. This is valuable information alluding to the incongruence between patients' reports of dysphagia symptoms, for example, pharyngeal sticking, coughing, increased time to finish a meal and dissatisfaction at mealtimes, and evidence of impaired swallow function (Miles et al., 2022). This is of importance to SLT clinicians due to the level of expertise required to recognize the need to support patient experience even if swallow biomechanics are deemed 'typical'. The appropriate selection and use of patient reported outcome measures for swallowing difficulties will be important to identify these nuances, such as the Dysphagia Handicap Index (Silbergleit et al., 2012) and SWAL-QoL (McHorney et al., 2002), with additional adjuncts such as the Reflux Symptom Index (RSI) (Belafsky et al., 2002) or the Newcastle Laryngeal Hypersensitivity Questionnaire (Vertigan et al., 2014) for suspected laryngeal paraesthesias.

Given our knowledge of other symptoms of Long COVID, dysphagia symptoms may be driven by other factors such as laryngeal hypersensitivity, reflux, post-extubation dysphagia, muscle tension dysphagia, fatigue and breathlessness (Buckley et al., 2021; Frajkova et al., 2020; Hamdan et al., 2019; Kruser & Prescott, 2017). During the period under study in East Suffolk, access to SLT-led videonasendoscopy and FEES was limited by the emergence of COVID recovery planning, and implementation of changing professional guidance (RCSLT, 2021b) to facilitate the resumption of clinics. As in Bolton, many SLTs in

the UK have limited access to the aforementioned instrumental assessment procedures which may in future assist in dysphagia diagnostic specificity and hypothesis generation of pathophysiology. For example, there is limited yet emerging evidence and provision for pharyngeal manometry (Davidson et al., 2020), and ultrasound (Allen et al., 2021). As such there is even less evidence for targeted treatment approaches. This may explain the high presence of dysphagia compensatory strategies across the two services. Given the likelihood that post-COVID dysphagia symptoms may overlap with other Long COVID symptoms experienced by individuals such as fatigue, reflux, breathlessness and breathing pattern disorders, it is essential for SLTs to work within MDTs and to be able to access a range of instrumental tools that best suits the needs of this heterogeneous and complex patient group. Other professionals may target the potential drivers for dysphagia symptoms which may yield patient benefits. These interventions and approaches require a standardized approach, with quality evaluation and outcome measures to contribute to the evidence base.

Upper airway dysfunction

Upper airways dysfunction is an umbrella term for abnormal laryngeal functions such as dysphagia, pseudodysphagia, dysphonia, globus pharyngeus, laryngeal sensitivity, inducible laryngeal obstruction and chronic cough (Hull et al., 2016). The relationship has been made between precipitant factors such as upper respiratory tract infections, and aggravating comorbidity such as respiratory disease, sinus conditions, and reflux, with laryngeal hyperresponsiveness and upper airway dysfunction (Hull et al., 2016). The SLT workforce has been acknowledged to have the necessary skills to contribute to patients presenting with upper airways symptoms (RCSLT, 2021c). Across both services compared here, there were similar demands pertaining to 'laryngeal hypersensitivity'. Although of interest, referrals made by patients or healthcare professionals into both SLT Long COVID pathways did not specifically refer for reasons of 'laryngeal hypersensitivity'. This highlights the need for SLT clinicians to be aware of these issues post-COVID, and the role of SLT in highlighting such symptoms to our professional colleagues (RCSLT, 2021c).

Noticeably, the service provision for symptoms of laryngeal hypersensitivity was different across the two services. In Bolton, patients were referred to a tertiary upper airways service for assessment, diagnosis and management of upper airway disorders such as inducible laryngeal obstruction. In East Suffolk, however, whilst a tertiary service can be accessed, this is not in region and more patients

were referred to local ENT services. Therefore, for the most part in both services there may have been a reliance on subtle clinical features revealed by specific and focused clinical questioning, with ad hoc use of patient reported outcome measures (e.g., the Newcastle Hypersensitivity Questionnaire; Vertigan et al., 2014). This may be explained due to limited options for objectively assessing laryngeal sensation, unless access to specialist services with the provision for provocation laryngoscopy is available (Hull et al., 2016). This comparative study further demonstrates the importance of close and connected MDT working with specialist and expert services to ensure accurate diagnoses are made for SLTs working in upper airway disorders (RCSLT, 2021c).

Dysphonia

Post-COVID dysphonia referrals across both services were similar, highlighting consistency in demand. Most individuals with dysphonia who were seen by ENT were diagnosed with muscle tension dysphonia and laryngopharyngeal reflux. In contrast, only two individuals were diagnosed with structural dysphonia across the two services, both of whom had been admitted to critical care and intubated due to COVID-19. This small number contrasts to the literature detailing high incidences of post-extubation dysphonia, dysphagia, and airway complications (Dawson et al., 2020; Neevel et al., 2021; Rouhani et al., 2021; Vasanthan et al., 2021). This may be explained because most individuals in this comparative case series were not hospitalized, and even fewer had been intubated and ventilated/tracheostomized. Furthermore, individuals with post-extubation or severe laryngeal complications may be referred to specialist ENT laryngological services as opposed to community Long COVID services. The difference in the evidence base for individuals with post-COVID SLT needs who were and were not hospitalized remains, and therefore it is importance that future research reports on the outcomes and presentations of individuals who were not hospitalized.

The similarities in presentations and intervention approaches indicate the consistency in service delivery in this area, which align with current SLT voice services. However, the multifaceted nature of dysphonia post-COVID, including fatigue, breathlessness, breathing pattern, reflux and psychological health, also poses many complexities for the clinician in terms of timing of treatment, a linear or multifaceted treatment approach and the influence of multidisciplinary knowledge of co-occurring symptoms. The high prevalence of muscle tension dysphonia and functional laryngeal symptoms reported in this study likely requires a broader approach where

emotional and social support, financial resources, and family function factors may play a role (Misono et al., 2020). Furthermore, the timing of voice therapy in relation to occupational demand and the real-life impact on work must be highlighted. Individuals may require timely vocational rehabilitation regarding their voice difficulties, concurrently with symptoms of breathlessness, fatigue, and brain fog to enable return to work (NHS England, 2022a). This SLT subspecialism may appear more closely aligned with the existing set-up of SLT voice services; however, the importance and value of embedded MDT practice is paramount and must not be overlooked for the benefit of the patient and clinician (Misono et al., 2020), given the emerging patient profiles and complexities in overlapping symptoms. Of equal importance is the emergence of the extended, advanced practitioner roles for SLT-led videonasoendoscopy to assess laryngeal dysfunction, including voice, pharyngeal dysphagia and upper airway disorders in individuals with long COVID. The benefits of SLT-led assessment clinics have been shown to reduce waiting times, which led to prompter treatment (Payten et al., 2020; Seabrook et al., 2019), and predicted reduction in pathway costs (Occomore-Kent et al., 2021). Occomore-Kent et al. (2021) recognize that further exploration of the feasibility of SLT-led low-risk 2-week wait service, which may also be beneficial to patients presenting with laryngeal dysfunction post-COVID.

Limitations

This is a retrospective review of two clinical services, and data were recorded for the purpose of clinical assessment and intervention. As a result, there were differences in the way information was recorded and how assessments and interventions were delivered, leading to variability and challenges when describing and comparing the services. The research team mitigated this as much as possible by defining the datasets available and holding anonymised case discussions to ensure consistency in reporting. A prospective study where the aims are clearly defined in advance and variables controlled would have been preferential and resulted in more robust data. Despite this, this study does offer insights into the clinical situation for newly established services around this novel disease.

One area of challenge was the use of Care Aims to define treatment offered. As discussed in the methods section, the purpose of Care Aims is allocated in advance of providing care, to define the intended outcome (Chadd et al., 2022). It was agreed to use the Care Aims framework retrospectively to define and capture the overarching goal of intervention to facilitate comparison between both

services, due to the absence of a predetermined standardized approach to assessment, treatment and outcome measures for both services. Determining the Care Aim in retrospect proved challenging and required additional discussions between researchers, but this limitation should be acknowledged when interpreting the findings of this study.

The survey conducted by the RCSLT highlighted that a wide range of service models exist for Long COVID populations across regions of the UK (Chadd et al., 2022; RCSLT, 2022). This study is an illustration of some of those differences; namely, one service being provided through an integrated dedicated therapy team and the other provided through a hub-and-spoke model. Whilst this posed challenges for the researchers when consolidating and comparing findings to report the clinical needs of our patients, we hope this has been sufficient to be able to raise some important questions for services and clinicians around our role, how patients will present and the skills we will need to meet these needs. Beyond the scope of the paper is to comment on a preferential Long COVID service model and we would recommend this as a future direction for research alongside our multidisciplinary colleagues and service managers.

CONCLUSIONS

This paper provides a marker of evidence describing the SLT demands, capacity, presentations and interventions within two Long COVID services in the UK. It is the first of its kind to describe and compare the SLT presentations of individuals presenting with Long COVID. This development of the evidence is crucial for making recommendations to future research, practice considerations and the efforts of professional bodies to collectively support SLTs working in this new area of practice and benefit patient care.

The complexities of SLT needs described in this paper highlight the essential requirement of embedded multidisciplinary working not only to provide the best care for patients but also to critically support the professionals working with individuals with post-COVID voice, swallowing, communication and upper airway symptoms. The clinical complexities also call for appropriate staffing provision, skill and training to fulfil the needs of this population. It is acknowledged that nationally there are inconsistencies and inequalities regarding the access and service provision of Long COVID services. It is therefore essential that SLT is recognized within Long COVID commissioning guidelines that guide service managers and clinicians of the multifaceted nature of voice, swallowing, communication and upper airway symptoms.

The inconsistencies and differences in service need and provision detailed in this paper calls for consensus within the SLT community regarding the identification, assessment, diagnosis and management of SLT symptoms post-COVID. Expert consensus among SLT clinicians is a priority to ensure clinicians are delivering consistent and equitable care for patients with Long COVID SLT symptoms, while new evidence and data emerge. SLT research priorities must be established with stakeholders and individuals living with Long COVID to ensure research efforts are meaningful and collaborative. It will be critical to ensure a consistent and standardized approach to data collection and outcome measures so that future research captures the impact and value of SLT input with individuals with Long COVID, while working collaboratively within multidisciplinary services.

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Note

[1] For consistency, throughout we use the term 'Long COVID', which is described by the National Institute of Health and Care Excellence (NICE) as signs and symptoms that continue or develop after acute COVID-19, including both ongoing symptomatic COVID-19 (from 4 to 12 weeks) and post-COVID-19 syndrome (12 weeks or more).

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CONFLICT OF INTEREST STATEMENT

There are no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the main authors upon request. The data are not publicly available due to restrictions, that is, the data contains information that could compromise the privacy of the individuals.

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