



RESEARCH REPORT

Shielding, hospital admission and mortality among 1216 people with total laryngectomy in the UK during the COVID-19 pandemic: A cross-sectional survey from the first national lockdown

Roganie Govender^{1,2} | Katherine Behenna³ | Grainne Brady^{4,5} |
Margaret Coffey^{6,5} | Malcolm Babb⁷ | Joanne M. Patterson⁸

¹ University College London Hospital, Head & Neck Academic Centre, London, UK

² Department of Applied Health Research, Institute of Epidemiology & Healthcare University College London, London, UK

³ ENT/HNC SLT Department, Nottingham University Hospitals Healthcare Trust, Nottingham, UK

⁴ Department of Speech, Voice and Swallowing, The Royal Marsden NHS Foundation Trust, London, UK

⁵ Department of Surgery and Cancer, Imperial College London, London, UK

⁶ Imperial College Healthcare Trust, SLT Department, Charing Cross Hospital, London, UK

⁷ National Association of Laryngectomee Clubs, London, UK

⁸ School of Health Sciences, Institute of Population Health/Liverpool Head and Neck Centre, University of Liverpool, Liverpool, UK

Correspondence

Roganie Govender, Head & Neck Academic Centre, University College London Hospital, Ground Floor Central, 250 Euston Road, London NW1 2PQ, UK. Emails: Roganie.Govender@nhs.net, Roganie.Govender@ucl.ac.uk

Abstract

Background: People with a total laryngectomy (PTL) rely on a permanent opening in their neck (stoma) to breathe. This altered anatomy may increase susceptibility to contracting and transmitting SARS-CoV-2.

Aims: To report on (1) the frequency and characteristics of PTL who tested positive for COVID-19, (2) the receipt of advice regarding shielding and patient self-reports of shielding, (3) hospital admissions and length of stay, and (4) mortality rates in this group during the first UK national lockdown.

Methods & Procedures: This is a cross-sectional survey and case note review. National Health Service (NHS) centres providing care to PTL were invited to participate via the Royal College of Speech and Language Therapists' (RCSLT) Head & Neck Clinical Excellence Networks and through social media. PTL were reviewed by their speech and language therapist either in person or via telehealth between 30 March and 30 September 2020. Data were collected within the time frame covered by the Control of Patient Information (COPI) notice issued for COVID-19 and included information on COVID-19 testing, shielding, hospital admissions, length of stay and deaths. Information was submitted to the lead NHS site using a custom designed data-capture worksheet. Analysis was performed using descriptive statistics, including proportions and frequency counts. Pearson's Chi squared tests were used to compare categorical data using a 5% significance level.

Outcomes & Results: Data were obtained from 1216 PTL from 26 centres across the UK. A total of 81% were male; mean age was 70 years (28–97 years). Of the total group, 12% received a COVID-19 test. A total of 24 (2% of total sample) tested positive for COVID-19. Almost one-third of PTL (32%) received a government letter or were advised to shield by a healthcare professional. During the data collection time frame, 12% had a hospital admission ($n = 151$) with a median length of stay of 1 day (1–133 days), interquartile range (IQR) = 17 days. A total of 20 of these

admissions (13%) had tested positive for COVID-19 with a median length of stay of 26 days, IQR = 49 days. The overall mortality was 4% (41 patients), with eight deaths occurring within 28 days of testing positive for COVID-19.

Conclusions & Implications: This study highlighted the lack of routine national data for neck-breathers with which to compare the current findings. Greater testing in the community is necessary to understand the prevalence of COVID-19 in PTL and if this group is indeed more susceptible. The potential for nasopharyngeal and tracheal aspirates to show differing results when testing for COVID-19 in neck-breathers requires further investigation.

KEYWORDS

COVID-19 pandemic, neck-breathers, shielding, total laryngectomy

What this paper adds

What is already known on the subject?

- People with total laryngectomy (PTL) have an altered anatomy for breathing and speaking. The presence of a neck stoma poses an additional virus entry point aside from the nose, mouth and conjunctiva. This could increase the susceptibility to COVID-19 for PTL.

What this paper adds?

- This is the first national audit to provide data on shielding, hospital admissions and mortality for patients with total laryngectomy in the UK over the pandemic. The overall mortality in PTL over the first lockdown did not appear to be higher than the “best case” estimates from previous years. However, one in three PTL who acquired COVID-19 and were admitted to hospital, died within 28 days of testing positive. These findings are relevant to the current care and management of PTL over the pandemic but also highlights important knowledge gaps.

What are the potential or actual clinical implications of this work?

- This study highlights gaps in the collection of baseline information on hospital admissions, length of stay and mortality for people with laryngectomy in the UK, restricting comparisons between the current data and historical data. The need for further research on whether neck-breathers should be tested via both nasopharyngeal and tracheal aspirates is important not just currently, but also in case of any future respiratory epidemics.

INTRODUCTION

People with a total laryngectomy (PTL) may be described as neck-breathers because they rely on a permanent opening in their neck (stoma) to breathe. These individuals have had their entire larynx, and in some cases additional structures such as the pharynx and part of the oesophagus, surgically removed usually due to cancer. Therefore, they have a permanent separation of the nose from the rest of

the throat and breathing apparatus. It is hypothesized that this group of individuals may be particularly susceptible to both contracting and transmitting SARS-CoV-2 due to their altered anatomy and potential susceptibility to respiratory infection (Hess et al., 1999) (Figure 1 shows the altered anatomy for a total laryngectomy).

Concerns around increased clinical vulnerability in relation to SARS-CoV-2 for PTL are based on three key elements. First, the way in which SARS-CoV-2 is known

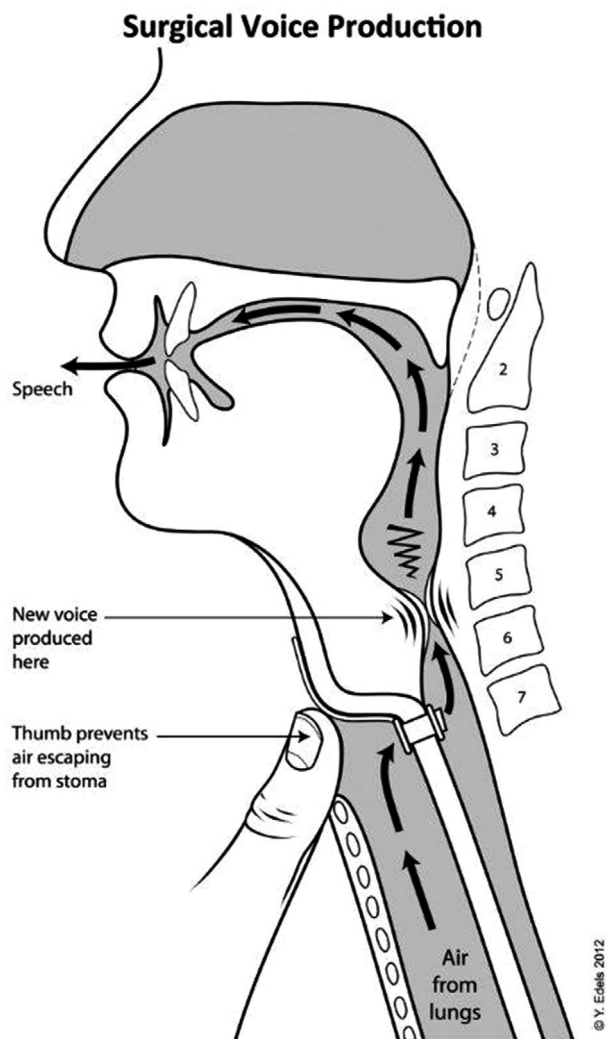


FIGURE 1 Altered anatomy of a person with a total laryngectomy, indicating a neck stoma and finger occlusion for the production of voice through a one-way voice prosthesis. Source: Courtesy Y. Edels, reproduced with permission

to spread via droplet transmission, fomites and aerosols is particularly important for the unique alterations in anatomy experienced by PTL. The presence of a neck stoma poses an additional virus entry point aside from the nose, mouth and conjunctiva. The stoma presents direct access to the trachea, and therefore increased potential risk from inhalation of virus through either droplets or aerosols (Kligerman et al., 2020; Paderno et al., 2020; Patel et al., 2020). Furthermore, the need for PTL to frequently touch the stoma not only to produce voice but also for cleaning purposes increases the risk of self-contamination via the formite route (Yeung et al., 2020). Second, the majority of PTL tend to be older males and often with pre-existing co-morbidities including chronic pulmonary disease, peripheral vascular disease, cardiac disease, cerebrovascular disease, diabetes (Hennessy et al., 2020) and

atelectasis due to changes in pulmonary function (Hess et al., 1999). This demographic is reported to be at higher risk for adverse morbidity and mortality from COVID-19 (Joy et al., 2020). Third, potential virus transmission risk also exists due to the presence of a voice prosthesis. Whilst some voice prostheses may last 6–12 months for some patients, many will require regular replacement at intervals of typically every 2–3 months (Lewin et al., 2016) to optimize communication and avoid the risk of aspiration (Goldstein et al., 2020; Parinello et al., 2020). In the UK, this procedure usually takes place within an outpatient setting requiring patients to travel to hospital. Where possible, clinicians were advised to delay voice prosthesis replacement which is recognized as an aerosol-generating procedure requiring healthcare professionals to wear full personal protective equipment (PPE) to minimize virus transmission risks (RCSLT Guidelines, 2020).

For the reasons outlined above, clinicians, patients and professional bodies questioned whether shielding¹ should be considered to help protect PTL from virus infection, hospital admissions and a consequent increase in mortality. In contrast with other cancer populations, historical routine data related to health and social care for PTL are limited and we found no published datasets that provided figures for expected hospital admissions, length of stay or mortality for this group. In order to contextualize our findings, we estimated pre-pandemic death rates extracted from unpublished clinical data obtained from seven centres across the UK that also participated in this audit. The average annual death rate was calculated across a 4-year period (2016–19) to be 8.5% (range = 3–14%). For comparison purposes with the audit time frame, the expected death rate across a 6-month period was estimated as 4.2%. This paper reports on a unique UK-wide audit of PTL during the first national lockdown.

The objectives of this paper are to report on the following:

- The frequency and characteristics of PTL who tested positive for COVID-19 via PCR testing and/or clinical diagnosis.
- The provision of advice regarding shielding and patient self-report of shielding. (The term shielding is used as defined by the UK government guidance to refer to individuals identified by the NHS to be extremely clinically vulnerable and those identified through the COVID-19 population risk assessment and added to the Shielded Patient List.)
- Rate of hospital admissions and length of stay.
- Mortality rates for PTL during the first national lockdown compared with previous average (half-yearly) estimates.

METHODS

Patient and public involvement

The key questions and data collected for this project were precipitated by queries from PTL to their own hospital care teams, the National Association of Laryngectomy Clubs (NALC) and on social media. Patients and their families were keen to know whether they were more susceptible to the virus because of their neck-breathing status and what if anything they could do to mitigate the risk. In response to this, the Royal College of Speech & Language Therapists (RCSLT) Head & Neck Cancer Clinical Excellence Networks used their online discussion forum to share queries and concerns raised by patients. The RCSLT also hosted a webinar on laryngectomy to which patient representatives were invited to share their experiences and concerns during the pandemic. The key concerns raised were distilled into priority areas that are reflected by the data collected for this audit. A patient representative from the NALC is a co-author on this paper and has already assisted in the dissemination of preliminary results to PTL. Further patient discussion forums around the findings from this project have also been arranged.

Approvals and governance

This was an investigator-led multicentre project. Data were obtained via case note reviews and survey questions. The project was logged with the RCSLT, the professional body for speech and language therapists (SLTs) in the UK. The project proposal was approved as a service evaluation by the Applied Health in Cancer Governance Group at the lead NHS site, and confirmed using the UK policy framework for Health & Social Care Research online tool (<http://www.hra-decisiontools.org.uk/research/>). Data collection took place within the time frame covered by the Control of Patient Information (COPI) notice issued for COVID-19 (Health Service (Control of Patient Information) Regulations 2002). Individual sites also sought local approval to share data in line with their own hospital Trust requirements. For a data flowchart, see the additional supporting information.

Invitation to participate and site enrolment

NHS sites within the UK delivering care to PTL were invited to participate. Information about the survey was cascaded via the RCSLT, the Head & Neck Cancer Clinical Excellence Networks and via social media.

Procedure

An SLT at each site was identified as the service evaluation coordinator and was emailed the project proposal and all relevant documentation. We used a data-capture worksheet (devised in Excel, password protected and encrypted) to collect data for our objectives, which are outlined below. We chose this method instead of an online tool such as REDCap or ROOT (web-based research electronic data-capture systems) as clinicians advised us that they wanted a simple system with which they were familiar and would not require additional time for training, or be too onerous to complete. Given the time pressures, need for expediency and expressed preference by clinicians to contribute data into a simple system we opted for the Excel spreadsheet. Personal identifying information was kept to a minimum on the advice of the information governance team. Verbal patient consent was obtained whenever possible. For a flowchart of the procedure and data collection, see Supplementary File 1 in the additional supporting information.

Data collection

Data were collected on the proportion of PTL who received a COVID-19 test and their outcome to allow for some comparison with national incident rates. Living circumstances and employment status were collected to ascertain any increased risks to virus exposure. Information on time since the total laryngectomy surgery was collected as pulmonary function is known to be compromised in people post-operation (Hess et al., 1999). We also collected information on shielding, hospital admissions and length of stay and survival outcome. Other information on voice prostheses use and stoma humidification was also obtained, but will be reported independently of this paper.

Analysis

Data were analysed using SPSS version 24. Continuous data were summarized as medians and interquartile ranges (IQR), and categorical data were described as frequencies of counts and percentages. Pearson's Chi squared tests were used to compare categorical data: a 5% significance level was used to determine statistical significance.

RESULTS

A total of 43 centres in the UK agreed to participate in the audit. A total of 26 centres across 10 geographical

TABLE 1 Geographical regions, percentage data completion, people with a total laryngectomy (PTL) with COVID-19 and associated deaths

Region	Number of centres submitting data	Number of submissions and % of total caseload for submitting centres	Number of COVID positives recorded	Number of deaths within 28 days of a COVID positive
North West	3	183 (98%)	2	0
North East	3	250 (79%)	5	1
Yorkshire and Humber	3	116 (67%)	1	1
East Midlands	3	143 (73%)	0	0
West Midlands	0	0	–	–
London	6	294 (75%)	14	6
East of England	3	34 (67%)	1	0
South East	3	144 (91%)	0	0
South West	1	33 (100%)	1	0
Wales	1	19 (unknown)	0	0

regions for England and Wales submitted data for analysis (Table 1). No data were submitted for just one region in England. Reasons for centres dropping out of the audit were insufficient staff capacity ($n = 15$) and information governance barriers ($n = 2$). The number of centres within each region that submitted cases, the proportion relative to the total caseload, the number of PTL who were known to be COVID-19 positive, and the number of deaths during the audit period are also indicated in Table 1. The proportion of cases submitted across centres within a region was at least two-thirds of the total combined caseload of PTL reported for those centres. The predominant reason for missing data was lack of contact by PTL with the reporting centre for the duration of the audit period.

The total number of cases available for analysis was 1216. Table 2 illustrates the patient demographics and data obtained for COVID-19 status, shielding, hospital admissions, length of stay and mortality for the total group and the group testing positive for COVID-19.

COVID-19 status

The COVID-19 status for the majority of the sample was unavailable (88%) with a high proportion untested or not known. In total, COVID-19 test outcomes were recorded for 151 PTL. A total of 2% ($n = 24$) of cases submitted had tested COVID-19 positive. Just over half of these patients were from the London region (Table 1). Patient characteristics of all 24 cases are summarized in Table 2. Of significance, in the COVID-19-positive group, more PTL lived in a care facility (17% versus 2%, $p < 0.000$); more self-isolated (54% versus 31% $p = 0.015$); had longer length of hospital stay (24 versus 3 days $p = 0.003$) and died (50% versus 4%, $p < 0.00001$) compared with the total group. How-

ever, there were no significant differences in age, gender, employment, time post-laryngectomy or shielding advice between the two groups.

Shielding

Approximately one-third of PTL ($n = 395$) were advised to shield, one-third of whom (34%) chose not to shield during lockdown. Conversely, of the 326 PTL who did not receive this advice, 38% chose to self-isolate. Details for the remainder of the sample were either unknown or missing.

Hospital admissions and length of stay

A total of 151 PTL were admitted to hospital during the audit period with one-fifth ($n = 31$) being admitted to an intensive care unit. There was a large range of length of stay, with two-thirds of in-patient admissions being for more than 1 week. A total of 20 patients who tested COVID-19 positive also had a hospital admission within the audit time frame, although one-third were admitted for non-COVID-19-related reasons. There was a median length of stay of 26 days (IQR = 49) for this group. Seven PTL were admitted to an intensive care unit, three of these admissions were related to their COVID-19 diagnosis.

Mortality

The mortality rate for the total sample was 4% ($n = 41$). However, half of patients within the COVID-19-positive group died ($n = 12$) (Table 2). Of these deaths, two-thirds ($n = 8$) died within 28 days of testing positive. Three-quarters

TABLE 2 Patient demographics, COVID status, shielding, hospital admissions/length of stay (LOS), mortality

	Total group (n = 1216)	COVID positive group (n = 24)
Age (mean, range)	70 years (28–97 years)	72 years (55–93 years)
Sex	Male: 987 (81%) Female: 229 (19%)	Male: 20 (83%) Female: 4 (17%)
Time post-laryngectomy	Median: 71 months IQR: 112 months	Median: 93 months IQR: 249 months
Living circumstances	Living with someone: 774 (64%) Lives alone: 391 (32%) In care facility: 29 (2%) Missing: 15 (1%) Other: 7	Living with someone: 12 (50%) Lives alone: 7 (29%) In care facility: 4 (17%) Other: 1 (4%)
Employment status	Full-time: 78 (6%) Part-time: 49 (4%) Retired: 836 (69%) Unemployed: 83 (7%) Sick leave: 21 (2%) Other: 67 (5%) Missing: 82 (7%)	Full-time: 3 (13%) Retired: 18 (75%) Unemployed: 1 (4%) Other: 1 (4%) Missing: 1 (4%)
COVID-19 status	Not tested: 523 (43%) Negative test: 127 (10%) Positive: 24 (2%) Unknown/missing: 542 (45%)	Yes: 24 (100%)
Advised to shield	Yes: 395 (32%) No: 326 (27%) Unknown: 425 (35%) Missing: 70 (6%)	Yes: 7 (29%) No: 5 (21%) Unknown: 12 (50%)
Hospital admissions	Yes: 151 (12%) No: 834 (69%) Missing: 231 (19%)	Yes: 20 (83%) No: 4 (17%) COVID related: 13 (65%) Non-COVID related: 7 (35%)
Length of hospital stay (median, range)	Median: 1 day (range: 1–133 days) IQR: 17	Median: 26 days IQR: 49
Mortality	Alive: 698 (57%) Died: 41 (4%) Missing: 477 (39%)	Alive: 12 (50%) Died: 12 (50%) Within 28 days of COVID-19: 8 (33%)

($n = 6$) of COVID-19 related deaths were from the London region (Table 1).

DISCUSSION

We report findings from the largest UK national audit of PTL performed over a 6-month time frame during the first wave of the COVID-19 pandemic. Our findings show that during the early phase of the pandemic, testing offered to PTL was limited and mainly available to those who were actually admitted to hospital. It is therefore difficult to estimate what proportion of PTL in the community may have been COVID-19 positive, but remained relatively well. Some of the key symptoms of COVID-19, namely loss of taste, loss of smell (Caldas et al., 2013; Mumovic & Hocevar-Boltezar, 2014; Riva et al., 2020) and continu-

ous coughing (Fontana et al., 1999, 2002) represent issues that PTL deal with as a consequence of their laryngectomy surgery. It is possible that PTL may not have been able to identify these as separate symptoms if they contracted the virus. Further to this, there has been some debate about how best to test PTL for SARS-CoV-2. In the early stages of the pandemic, there were anecdotal reports of some PTL testing negative for COVID-19 via conventional testing of nasopharyngeal aspirates, whilst chest imaging suggested findings consistent with the presence of the virus. It is possible that the anatomical alterations post-laryngectomy and the consequent need to test both tracheal and nasopharyngeal aspirates may not have been fully considered during the early stage of the pandemic leading to some PTL erroneously being diagnosed as COVID-19 negative. Disparate findings from tracheal and nasopharyngeal swabs of PTL have been previously reported (Patel et al.,

2020) and good mechanistic reasoning for testing multiple sites for this group have been described by several authors (Gallo, 2020; Hennessy et al., 2020; Parinello et al., 2020; Patel et al., 2020). Our data show that we have COVID-19 test results for just 12% of the total sample, with 2% testing positive. This likely reflects the low levels of testing taking place during the early phase of the pandemic. We also found that most PTL who did receive a test did so when they had a hospital admission. Given the poor rate of community testing and the variation in how PTL were tested during the first wave, we cannot estimate with any certainty what the prevalence of COVID-19 was for PTL during the first wave. We did, however, observe that our data seemed to map the overall prevalence of COVID-19 reported by the Office for National Statistics (ONS), and that the majority of positive cases came from London, which was most affected during the first wave. We are also mindful that more centres in London submitted data compared with other regions which may contribute to this picture.

Our data show that about one-third of patients were given advice to shield through either a government letter or via their general practitioner or consultant, whilst a proportion made an independent decision to self-isolate at some stage during the audit time frame. We recognize that this is only indicative due to the large amount of missing data, but they do provide a minimum figure of the proportion of PTL advised to shield. Shielding as a concept was confusing, not least because the UK public had to navigate many new terms, rules and guidelines that constantly changed with the unfolding and evolving pandemic. At the outset, the public was informed via the national media that a subset of extremely clinically vulnerable individuals would be sent letters from the government advising them to shield. PTL did not automatically fall into this category, but some PTL with other co-morbidities would have received a letter. However, there was also general guidance that people over 70 years of age, and likely at greater risk for severe morbidity and mortality, should 'shield' or isolate to keep safe (Smith & Spiegelhalter, 2020). People on the official government 'shielding list' were given certain benefits such as priority shopping deliveries and medication drop-offs, whilst those who made a self-choice were not offered these benefits. Whilst the majority of PTL in our sample were retired, about 10% reported being in full- or part-time work. SLTs reported anecdotal cases of some PTL not being allowed to work from home by employers and increased anxiety by those who felt their laryngectomy put them at higher risk. Advocacy by a few professional bodies including the RCSLT, ENT-UK and the British Association of Head and Neck Oncologists (BAHNO) did not change the status of PTL as a recognized extremely clinically vulnerable group, but patients were encouraged to

discuss their individual situation with their own general practitioner so that shielding could be prescribed on a case-by-case basis.

This audit provides one of the first datasets to our knowledge to report on hospital admissions for PTL in the UK. Over the audit time frame, hospital admissions seemed high at 12%, but without comparative historical data, it is difficult to interpret this figure. Whilst the majority of all PTL admissions during the audit time frame were mainly for a day, we did observe that 83% of our group who tested COVID-19 positive (20/24) had a hospital admission with a median length of stay of almost 4 weeks (26 days). This figure is considerably higher than the median length of stay of 8 days (IQR = 12) reported for the general population admitted to UK hospitals with COVID-19 over this time (Docherty et al., 2020). Furthermore, our data show that one-third of our COVID-positive PTL admissions required intensive care compared with 12.5% reported for the general population in the data published by Docherty et al. Due to the concerns around a high risk of aerosolization in laryngectomy care, surgery was discouraged in the early phase of the pandemic (Kligerman et al., 2020). However, there were reports of at least two cases of PTL operated on immediately prior to the lockdown who were known to have died in hospital during their post-operative recovery during the lockdown period. Notwithstanding the pandemic, PTL often require specialized nursing and knowledge of neck-breathers, meaning that admission to non-specialist wards is often challenging for staff unaccustomed to working with this group. For this reason, it is possible that PTL testing COVID-19 positive may require intensive care more than the general population.

The overall mortality from our audit was 4%, which closely resembles the 4.2% estimated death rates for a 6-month time frame for PTL described above in the introduction of this paper. However, in the PTL group who tested positive ($n = 24$), half of patients died, with one-third (8/24) dying within 28 days of a COVID-19-positive test. These results seem to suggest that while there was no major increase in overall mortality compared with expected estimates, if PTL contracted the virus and were admitted to hospital the mortality risk was high at 50% (33% within 28 days), although the role of co-morbidities is recognized as a likely contributing factor. Interestingly, data from a surgical audit for head and neck patients in general who received surgery within the similar time frame showed that 29/1137 (3%) tested positive for COVID. The mortality rate within 30 days of surgery was reported to be 1.2%, which was similar to pre-COVID-19. However, for the COVID-positive cohort, mortality was reported to be 11% (3/29) (Covidurg Collaborative, 2020). Whilst we cannot make a direct comparison as our audit was not based solely on new operative cases, it is noteworthy that two PTLs who

died in our cohort were within 30 days of surgery. It is also acknowledged that mortality was highest in the early months of the first wave with a gradual reduction seen as treatments improved (Docherty et al., 2020). Data for the UK population as a whole during the first wave show that 29% of patients admitted to a general ward died within 28 days of a positive COVID-19 test, compared with 36% who were treated in an intensive care unit (Docherty et al., 2020). The majority of PTL who died were from the London region, which reflects the area which reported the most positive cases in our audit, but also mirrors the overall geographical picture of the virus spread and mortality during the first wave (Kontopantelis et al., 2020).

One significant limitation of this audit is that insufficient data were collected on multi-morbidity, ethnicity and socio-economic status, all of which have been shown to be important factors when studying the spread of COVID-19 and its impact. The main reason for omitting this information was to keep the amount of personal information collected and shared to a minimum for governance reasons. It is highly recommended that any future study captures this information as part of more formal research.

The audit has also called to attention the need for improved information and advice for this patient group as the pandemic continues. During the first lockdown PTL received confusing information regarding their risk and vulnerability. Our audit suggests that those who contract COVID-19 are at increased risk in comparison with the general population, and it is notable that half of patients who did test positive died, with one-third of deaths occurring within the 28-day time frame. Our data mainly reflect testing in people who had a hospital admission, and it is likely that those individuals who may have received other forms of testing including antibody tests within the community have not been captured here, partly because of the rapidly evolving changes that occurred within the audit time frame. Raising awareness that a permanent breathing stoma presents an extra route of direct transmission which, considered alongside other known factors (older age, underlying immune conditions, co-morbidities, ethnicity), may increase overall susceptibility. We therefore call for individualized decision-making by PTL and their general practitioners when it comes to advice regarding shielding during this and any future respiratory pandemics. In addition, there needs to be clear national guidelines about how PTL should be tested for respiratory viruses such as COVID-19 (i.e., with tracheal as well as nasopharyngeal aspirates). Such guidance is urgently required as community testing escalates. We also recommend greater awareness campaigns which highlight the anatomical changes involving the separation and diversion of the trachea away from the neo-pharynx for PTL.

In conclusion, our audit captures information about the largest cohort of PTL in the UK during the first wave of the pandemic. However, the audit also highlights the absence of robust standardized data regarding PTL across the UK making comparisons difficult. The lack of central data restricts investigation and future research and may even risk marginalization of this patient population. It is notable that larger national statistics and data sets such as those regarding hospital admissions and death rates do not include data regarding permanent neck-breathers. The pandemic has shown that this granular level of information is important to collect to be better prepared for future outbreaks. SLTs play an important role in the long-term care of PTL and other neck-breathers, and this is an opportune time to influence government bodies and advocate for better national-level data collection (Patterson et al., 2020). It is perhaps incumbent upon the relevant professional and patient representative bodies in conjunction with their clinical and academic advisors to take the lead in advocating for, if not directly addressing, this issue.

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CONFLICT OF INTEREST

The authors report no conflict of interest.

FUNDING

No specific funding was obtained for this project.

ETHICS APPROVAL

The study was approved as a service evaluation by the Applied Health in Cancer Governance Group at the lead NHS site, and confirmed using the UK policy framework for Health & Social Care Research online tool (<http://www.hra-decisiontools.org.uk/research/>). Data collection took place within the time frame covered by the COPI notice issued for COVID-19 (Health Service (Control of Patient Information) Regulations 2002).

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

NOTE

¹ The term *shielding* has been widely adopted by the UK government during the COVID-19 pandemic to refer to how individuals with the highest risk of severe illness if they catch coronavirus should be protected. This included not leaving home and minimizing any face-to-face contact. Such individuals were identified by the NHS, added to the Shielded Patient List and sent letters by the UK government providing guidance on shielding. The term is distinguished from the practice of self-isolation which any individual, regardless of clinical vulnerability, may be required to do for a specific number of days if they tested positive for COVID-19 or if they were in close contact with someone else who had tested positive within a specified time frame.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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