Implementing a COVID-19 specialist smell clinic: experience at the Wrightington, Wigan and Leigh Teaching Hospitals (WWL), NHS Foundation Trust, United Kingdom

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ABSTRACT

Introduction: It is clear that a proportion of patients continue to suffer long-lasting symptoms following acute infection with coronavirus disease 2019 (COVID-19). Persistent olfactory dysfunction is one of the commonest complaints reported in the condition colloquially known as long COVID (now known as post-acute sequelae of SARS-CoV-2 infection (PASC)). The prevalence, risk factors and clinical course of long COVID olfactory dysfunction are not yet well understood. At present, the main stay of treatment is olfactory training. Quantitative olfactory testing and impacts on patient quality of life have not been widely studied. This study describes our experiences at Wrightington, Wigan and Leigh Teaching Hospitals, UK (WWL) of establishing a COVID-19 smell clinic, along with preliminary data on patient demographics, baseline smell test scores and quality of life questionnaire scores before olfactory training.

Methods: We piloted a COVID-19 smell clinic. We recorded patient demographics and clinical characteristics then performed clinical assessment of each patient. Quantitative measurements of olfactory dysfunction were recorded using the University of Pennsylvania Smell Identification Test (UPSIT). We measured the impact of olfactory dysfunction on patient quality of life using the validated English Olfactory Disorders Questionnaire (eODQ).

Results: 20 patients participated in the clinic. 4 patients were excluded from analysis due to missing data. Median age was 35 years. 81% (n=13) of the participants were female. 50% (n=8) of patients suffered with a combination of anosmia/ageusia and parosmia, whilst 43% (n=7) of patients suffered with anosmia/ageusia without parosmia. Almost all the patients registered UPSIT scores in keeping with impaired olfaction. Patient scores ranged from 22 to 35, with the median score at 30. All patients reported that their olfactory dysfunction had an impact on their quality of life. The median eODQ score reported was 90, with scores ranging from 42 to 169 out of a maximum of 180.

Conclusion: We have demonstrated that it is simple and feasible to set up a COVID-19 smell clinic. The materials are inexpensive, but supervised completion of the UPSIT and eODQ is time-consuming. Patients demonstrate reduced olfaction on quantitative testing and experience significant impacts on their quality of life as a result. More research is needed to demonstrate if olfactory training results in measurable improvements in smell test scores and quality of life.

KEYWORDS:
Anosmia; parosmia; olfactory dysfunction; COVID-19; long COVID; post-acute COVID-19 syndrome; post-acute sequelae of SARS-CoV-2 infection; olfactory training; smell training; UPSIT

INTRODUCTION

As of March 12th 2021, there have been over 118 million cases of coronavirus disease 2019 (COVID-19), with over 2.6 million confirmed deaths worldwide.[1] At the start of the pandemic ENT United Kingdom (UK) highlighted to the world that loss of smell was a symptom of COVID-19 infection.[2] Loss of smell and taste is now recognised as one of the main symptoms of acute COVID-19 infection, affecting approximately 65-70% of patients.[3-5] The majority recover their sense of taste or smell spontaneously. However, in a survey of UK healthcare workers with COVID-19, almost half of the participants had persistent loss of sense of smell/taste 4 weeks after symptom onset.[6] This dysfunction can manifest quantitatively or qualitatively. Quantitative dysfunction implies a reduction in smell (hyposmia or microsmia), absence of smell (anosmia) or absence in taste (ageusia). Qualitative dysfunction implies abnormal perception of odours (parosmia), a perception of odour that is not present (phanotsmia) or abnormal taste perception (dysgeusia).[4] In addition, patients may also experience chemesthesis, a perception of abnormal sensations in the nose or mouth such as burning or tingling.[6]

It is now clear that many patients continue to exhibit symptoms of COVID-19 long after the acute infection. Multiple terms have been used to describe this syndrome whereby symptoms persist. The terms 'long COVID' and, more recently, 'post-acute COVID-19 syndrome', have been used interchangeably to describe the persistence of symptoms beyond 4 weeks of onset of COVID-19 infection.[7] This has been further subdivided: patients experiencing symptoms 4-12 weeks after acute infection are categorised as 'ongoing symptomatic COVID-19'. Those with symptoms beyond 12 weeks from acute infection are categorised as 'post-COVID-19' syndrome or 'chronic COVID'.[7] The National Institutes of Health in the US have recently advocated for the use of the term 'post-acute sequelae of SARS-CoV-2 infection (PASC) to encompass all the aforementioned terms.[8] The UK Office for

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National Statistics reports that 1 in 10 patients continue to exhibit symptoms after 12 weeks following a positive test result.[9] The true scale of disease burden of COVID associated olfactory dysfunction is beginning to emerge. Hopkins et al have recently completed a 6-month follow-up survey on patients with self-reported smell loss during the pandemic. They estimate that potentially more than 1 million patients worldwide may be suffering with ongoing olfactory dysfunction six months after acute infection.[3] Another large study demonstrated that loss of smell is the third most commonly reported symptom in PASC.[10] Olfactory disorders cause noticeable reductions in quality of life and increased rates of depression.[11] In addition, patients may no longer be able to detect harmful odours such as spoiled food, gas or smoke. Patients who rely on smell for their occupation may face unemployment. At present, there is a dearth of research regarding the clinical course and potential for recovery from persistent olfactory dysfunction after COVID-19 infection.

Currently, the mainstay of treatment for COVID associated olfactory dysfunction is smell training. The rationale for this has been extrapolated from pre-COVID-19 studies. A systematic review and meta-analysis in 2016 demonstrated how olfactory training was efficacious in treating olfactory dysfunction of multiple aetiologies.[12]

In this paper, we describe our experiences of setting up a COVID anosmia clinic in the UK. We have piloted our service whereby patients undergo clinical assessment and quantitative testing of olfactory dysfunction through psychophysical smell testing. In addition, a validated questionnaire was used to assess the impact of olfactory dysfunction on patient quality of life. Patients were then counselled and initiated on olfactory training. We explain here the logistics of running the clinic and demonstrate its feasibility.

MATERIALS AND METHODS

We piloted an outpatient COVID smell clinic at Wrightington, Wigan and Leigh (WWL) NHS Foundation Trust. Our Trust consists of three district general hospital sites in addition to satellite outpatient clinic facilities. The clinic started in September 2020 after the first wave of the pandemic. It ran once a week, with capacity for four face-to-face appointments. The clinic was led by one ENT consultant and supported by an ENT registrar and an ENT specialist nurse.

Members of staff at our NHS Trust were invited by email to attend a multidisciplinary long COVID clinic if they were suffering with persistent symptoms following COVID-19 infection. The multidisciplinary long COVID clinic was led by one consultant respiratory physician and one rehabilitation medicine consultant. From here, patients with loss of sense of smell or taste were referred to our COVID smell clinic. In addition, we invited referrals directly to the COVID smell clinic from primary care. We accepted 20 patients who had satisfied the criteria detailed in the ENT UK / British Rhinological Society (BRS) COVID anosmia management guideline.[13] Patients with history of COVID-19 infection confirmed through polymerase chain reaction (PCR) testing or SARS-CoV-2 spike protein antibody testing were eligible. Given lack of availability of COVID-19 testing early in the first wave, patients with a convincing history of COVID-19 symptoms but without a confirmatory positive test were also eligible. We accepted patients with persistent loss of smell and taste and/or altered smell and taste for greater than three months. Patient occupation, demographics, PCR test history and antibody status were recorded. A clinical history of olfactory dysfunction was taken and the presence of qualitative olfactory dysfunction such as parosmia and phantosmia was recorded. Patients with a history of head trauma, associated neurological symptoms or anosmia secondary to nasal obstruction were excluded.

Baseline olfactory dysfunction was quantified using the validated University of Pennsylvania Smell Identification Test (UPSIT) at the first clinic appointment.[14] The UPSIT is a psychophysical olfactory test, which consists of four 10-page booklets which has been previously validated in the UK population.[15] Each page carries a different odour which is released when the page is scratched. For each page, patients must choose the correct answer from four options. No formal gustatory testing was performed. The impact of loss of smell and/or taste on the patient's quality of life was measured using the validated English Olfactory Disorders Questionnaire (eODQ).[16] The ENT specialist nurse supervised the completion of the UPSIT and the eODQ with the patient. The patients were subsequently reviewed by an ENT clinician. A clinical history was taken to rule out other causes of olfactory dysfunction. An ENT examination including anterior rhinoscopy was performed, and flexible nasendoscopy was performed to rule out other pathology if indicated.

Patients were then counselled on how to perform smell training. They were supplied with perfume testing sticks and a pack of 4 essential oils – rose, lemon, clove and eucalyptus. Patients were advised to gently smell each oil twice a day for 4 months. Strict adherence to smell training was advised. Patients were given information leaflets and directed to online resources by the charities abScent[16] and Fifth Sense[18] for further information. The patients are due to be followed up four months after initial consultation. Repeat UPSIT and eODQ will be recorded to assess for change following smell training and advice.

RESULTS

Sixteen patients were analysed (four patients were excluded due to missing data). Patient age ranged from 20 to 55 years, with the median age being 35 years. 81% (n=13) of the participants were female. All participants were British Caucasian. 56% (n=9) of the patients were healthcare workers, which comprised of two doctors, six nurses and one occupational therapist.

Five patients (31%) received a COVID PCR test at the time of symptom onset. Three patients (19%) received a positive PCR test. 63% (n=10) of patients had SARS-CoV-2 spike protein antibody testing after symptom onset. Of those who received antibody testing, 91% (10 of 11) of patients were seropositive for SARS-CoV-2 spike protein antibodies.

Four patients (25%) reported olfactory dysfunction as their only symptom of acute COVID-19 infection. Eight of the patients (50%) suffered with a combination of anosmia/ageusia and parosmia, whilst 43% (n=7) of patients suffered with anosmia/ageusia without parosmia. One patient reported isolated parosmia with no subjective loss of smell/taste. Coffee was the most common odour which patients had lost the ability to smell (n=3).

Eight (50%) patients reported associated rhinological symptoms: three patients suffered nasal obstruction, two complained of rhinorrhoea, two experienced itchiness and sneezing and one reported unilateral orbital pain.

Almost all the patients registered UPSIT scores in keeping with impaired olfaction. The normative UPSIT data suggests normal olfaction if scores were greater than 34 in males and 35 in females. Our patient scores ranged from 22 to 35, with the median score of 30.

All patients reported that olfactory dysfunction had an impact on their quality of life. The median eODQ score reported was 90, with scores ranging from 42 to 169 out of a maximum of 180 (the higher the score, the greater the negative impact). Patients suffering with parosmia had comparable eODQ scores (median score = 89) compared to those with smell/taste loss alone (median score = 92).

DISCUSSION

Here we describe our experiences setting up a COVID smell clinic. We found that there is significant demand for the service, with many patients still awaiting review. The materials for UPSIT testing and essential oils for smell training can be easily purchased and the eODQ is freely available online.[18]

Not surprisingly, we have seen a significant number of healthcare workers in our clinic. At first, referrals to the multidisciplinary long COVID clinic were prioritised for members of staff at our institution as a pilot for the service. It remains to be seen whether healthcare workers represent the majority of patients attending the clinic once we begin to review more patients referred from primary care.

The majority of patients in our cohort were female. This is comparable to other studies which have suggested a female preponderance for olfactory dysfunction associated with COVID-19.[6,20] Women were 2.5 times more likely to have ongoing loss of smell after 4-6 weeks following acute infection.[21] It has also been shown that women are more likely to suffer from PASC more generally.[10] Loss of smell was the third most common PASC symptom after fatigue, headache and dyspnoea.[10]

Only 19% of our cohort had a confirmed positive COVID PCR test. This may reflect a lack of test availability early during the first wave of the pandemic in the UK. The UK Department of Health only recognised anosmia as an official COVID-19 symptom from May 2020.[22] Patients presenting with anosmia alone would not have been eligible for PCR testing prior to this. 63% of our patients were seropositive for SARS-CoV-2 spike protein antibodies. A recent UK cohort study showed that seropositive patients with acute loss of smell were much less likely to recover their smell after 4-6 weeks compared to seronegative patients.[21]

Parosmia is a symptom that appears to have been overlooked early in the pandemic. A large international survey was conducted early in the first wave in April 2020. They reported only 7% of patients with COVID-19 experienced parosmia.[20] A more recent survey of patients with self-reported smell loss after COVID-19 infection demonstrated that 43% of patients experienced parosmia, typically within 2.5 months of onset of anosmia.[3] It has been suggested that parosmia is a poor prognostic marker for smell recovery, which could explain why more than half of the patients in our COVID smell clinic reported parosmia or phantosmia.[21] In contrast, a recent retrospective study suggests parosmia is associated with olfactory recovery following smell training in non-COVID post-infectious olfactory dysfunction.[23] Liu et al postulate that parosmia may represent processing of incomplete afferent sensory information. Smell training helps to improve the cognitive processing of this sensory information, thus leading to improved olfactory outcomes.[23] More research is required to clarify the significance of parosmia in the prognosis of smell recovery following COVID associated olfactory dysfunction.

In this pilot study we used the UPSIT score as a baseline score of olfactory dysfunction, with the aim to monitor for improvements in olfaction following smell training. A study of 50 UK participants with smell loss after COVID-19 recorded a mean UPSIT scores of 29.1, comparable to the median UPSIT score of 30 in our cohort.[21] There is evidence to suggest that more severe smell loss detected on baseline psychophysical testing was strongly predictive of persistent smell loss.[24] This suggests that patients with severe olfactory dysfunction as demonstrated by low UPSIT scores should be carefully counselled about the potential for long term smell loss. Adherence to smell training may be even more important for these patients if they hope to regain their sense of smell, but more research is required to investigate this.

Psychophysical smell testing alone does not measure the entire impact of olfactory disorders on the individual. Our results show a broad range of eODQ scores, reflecting varying impacts on the quality of life in our patients. Olfactory dysfunction can be devastating for those who depend on smell for their livelihoods. It may threaten employment for chefs, sommeliers, fire fighters and many other occupations. It has been reported that up to one third of patients with smell disorders suffer from symptoms of depression, with patients experiencing parosmia particularly at risk.[11]

This study was limited by its small sample size, and thus interpretation of these preliminary data should be done cautiously. Given this was an initial pilot and feasibility study, we have not yet assessed the impact of our smell training intervention. Separate assessment of gustatory function may have added more depth to the assessment of dysfunction and how that might affect quality of life.

There is good evidence for smell training in treating non-COVID smell loss.[12] However, there is a paucity of research on the outcomes of COVID associated anosmia following smell training. We plan to follow up our patients after four months of smell training and obtain observational data, assessing for changes in their repeat UPSIT and eODQ scores.

CONCLUSION

In conclusion, we have demonstrated that it is simple and feasible to set up a COVID smell clinic. The materials are inexpensive, but supervised completion of the UPSIT and eODQ can be time-consuming. More research is required into the outcomes of smell training in COVID olfactory dysfunction and we hope to add observational data to the literature soon. We are predicting a huge burden of COVID associated olfactory dysfunction on otolaryngology services in the months and years to come. These patients will require sensitive and holistic treatment, which may indirectly help to reduce the impending mental health crisis caused by the COVID-19 pandemic.[25]

ETHICAL CONSIDERATIONS

No formal ethical approval was required as this was an implementation and evaluation of a new clinical service based on the national guideline as described by the ENT UK / BRS consensus paper on the management of new onset loss of smell during the COVID-19 pandemic.[13]

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

ACKNOWLEDGEMENTS

Nil.

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