

COVID-19 as a turning point in the need for specialized units for the sense of smell

**Izquierdo-Domínguez A^{1,2*}, Calvo-Henríquez C^{3,4*}, Ceballos JC⁵,
Rodríguez-Iglesias M^{3,4}, Mullol J^{5,6,7¶}, Alobid I^{2,5,6,7¶}**

¹Department of Allergy. Consorci Sanitari de Terrassa. Barcelona. Spain.

²Unidad Alergo-Rino. Centro Médico Teknon. Barcelona. Spain.

³Rhinology Study Group of the Young-Otolaryngologists of the International Federations of Oto-rhino-laryngological Societies (YO-IFOS). Paris. France.

⁴Service of Otolaryngology. Hospital Complex of Santiago de Compostela. Santiago de Compostela. Spain.

⁵Rhinology Unit & Smell Clinic. Department of Otorhinolaryngology. Hospital Clinic Barcelona. Universitat de Barcelona. Barcelona. Spain.

⁶Clinical and Experimental Respiratory Immunoallergy. IDIBAPS. Barcelona. Spain.

⁷CIBER of Respiratory Diseases (CIBERES). Spain.

*Both authors have equally contributed as main authors

¶ These authors equally contribute as senior and corresponding authors

Corresponding:

Isam Alobid

E-mail: isamalobid@gmail.com

Joaquim Mullol

E-mail: jmullol@clinic.cat

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.18176/jiaci.0891

Key words: Olfactory Units. Smell loss. COVID-19. Allergologist. Otolaryngologist.

Palabras clave: Unidades de olfato. Pérdida de olfato. COVID-19. Alergólogo. Otorrinolaringólogo.

The high prevalence of olfactory dysfunction (OD) by SARS-CoV-2 has revealed the lack of specialized units [1,2].

The main objective is to know the new olfactory units (OU) since the COVID-19 pandemic, and to evaluate the tests used for diagnosis, management and treatment of OD and providing up-to-date data on the current practice in Spain. Due to the increase in COVID-19 and other diseases related to OD, the creation of new OUs is necessary, considering that OD is a predictive symptom of these diseases that affects all ages [3]. To our knowledge this is the first study on OU and no studies were found in other countries.

A prospective cross-sectional study, carried out by means of a survey that contains 17 items (supplementary file 1). The survey was developed by 6 experts and was distributed to all members of Spanish ENT and Allergy societies through the Google platform. We considered the "OU" to be a team (ENT or Allergist) with the infrastructure and staff to perform the assigned functions (validated test, well ventilated cabin with controlled humidity and temperature).

Statistical analysis was performed with STATA using Shapiro Wilk test, chi-2 test and Spearman correlation analysis.

Finally, 136 facilities were included (112/82.4% otolaryngologist and 24/17.6% allergists).

Olfactory unit

40.5±7.6% of OUs were created after pandemics. 42 (33.9%) of the respondent have OU now, while 25 (22.3%) already had it ($p<0.001$). It means that 17% of hospitals who did not have an OU before COVID-19, now they have it, while 82.8% are still lacking it (Figure 1).

None of the comparisons reached statistical significance, except for new OU of private practice with 17.7%, to compare 12% create OU in public practice ($p<0.001$) (Table S1).

Stratified analysis by having OU or not

Facilities with OU are more prone to prescribe olfactory training (OT) ($p<0.001$) and for longest periods ($p=0.003$) (Table S2). Centers with OU are more prone to assess olfaction ($p<0.001$) and taste ($p<0.001$) (Figure S1A). Finally, it was more common to have OU for those respondents in private than public ($p=0.023$)

The common causes of OD assessed by allergists are chronic rhinosinusitis with nasal polyps (CRSwNP) (50.0%), followed by COVID-19 (20.8%), allergic rhinitis (AR) (12.5%) and non-AR (4.2%) compared to otolaryngologists (36.6%, 29.5%, 4.5% and 5.4% respectively) ($P>0.05$). It's more common for those with OU (90.2%) than those without OU (62.2%) ($p=0.001$).

Treatment of OD

OT is prescribed by 88.1% of the respondents. The most common method is the combined (mix of validated kits with essential oils) rehabilitation (40.5%) while the less common is homemade (10.8%). There are no differences in the preferred method between facilities with and without OU, the existence of the OU before or after COVID-19, specialty, or private practice. However, it is noteworthy that those who prescribe OT are more prone to use both VAS and smell test to assess olfaction ($p=0.020$).

The time of OT is prescribed for 1-3 months by 18.9%; 3-6 months by 67.6% and >6 months by 18.8%. Those with an OU prescribe training during more time ($p<0.001$) being the most frequent answer 3-6 months (59.5%) when they have OU while 1-3 months (23.7%) for those who do not have it.

Follow-up visits are not planned by 8.1% of the respondents. Yet is planned each 3 months by 42.7% and 6 months by 8.8%. Overall, there are no differences between those with and without OU (Table S2). It is less frequent prescribing follow-up visits in those who do not have OU ($p=0.023$).

Oral steroids are prescribed by 32.4%, while topical steroids by 51.5% with no differences between those with and without OU, private/public settings, nor among specialties.

Stratified analysis by specialty

OT is more common for otolaryngologists (67.9%) than allergists (29.2%) (Table S3). There were also differences in the way olfaction is studied, assessment being distinct instrumentally are varied by otolaryngologists than allergists ($p=0.016$) (Figure S1B and Supplementary Figure 2).

Stratified analysis by public/private center

Private practices are more prone to have OU ($p=0.023$), and to use instrumental evaluation ($p=0.006$) (Table S4). Opposed, it is not more probable to perform OT, neither perform shorter follow-up visits.

It is evident that pandemics has accelerated the creation of OU as 40% of all the existing OU were created after pandemics. However, there is still 82.8% of the surveyed hospitals that lack OU. Despite the differences were not significant, new OU tend to prescribe fewer oral steroids but more intranasal steroids, in the same way it happens between specialties. According to the current evidence, there was a “controversy concerning the effect of intranasal steroids” on OD of COVID-19. A recent investigation demonstrated that it could be useful to improve OD. However, others reported data that did not affect the recovery time. Hence, some studies recommended further clinical trials will require to be undertaken [4].

Respondents with OU perform diagnosis and treatment more adjusted to up-to-date evidence [5,6,7]. They are more prone to perform instrumental assessment, they prescribe OT for more time and had an increased follow-up.

Allergists uses less instrumental assessment and prescribe less OT. It could be attributed to the fact that allergist soften deal with AR and CRSwNP usually managed with medical treatment. However, the fact of not using instrumental assessment (90%) impairs their ability of assessing disease severity [8].

This survey revealed that 25% of respondents do not perform OT. In relation with the length of the OT, it has been seen that longer treatments have better outcomes [9,10]. Most of the respondents fail to follow their patients more than 6

months. However, this difference is even more troublesome in these centers without OU.

This study has some limitations. 1) We didn't provide a detailed definition on OU, therefore, interpretation bias might affect the stratified analysis. 2) We obtained 136 responses, while in Spain there are 467 hospitals in the national health system. This is a fairly representative sample.

In conclusion, this study revealed that COVID-19 pandemics has stimulated the creation of OU. This study has demonstrated the utility of OU to deal with OD.

Acknowledgement

The authors would like to thank SEORL and SEIAC especially Alfonso del Cuvillo, Rafael Fernández and José Miguel Villacampa for their support and survey review.

Conflicts of Interest

- Isam Alobid: Consultant for Roche, Novartis, Mylan, Menarini, MSD
- Joaquim Mullol: member of national or international advisory boards, received speaker fees, or funding for clinical trials and research projects from ALK, AstraZeneca, Genentech, GlaxoSmithKline, Glenmark, Menarini, Mitsubishi-Tanabe, MSD, Mylan-MEDA Pharma, Novartis, Regeneron Pharmaceuticals, SANOFI-Genzyme, UCB Pharma, and Uriach Group.

The other authors declare that they have no conflicts of interest.

This study was supported by the Commission of Rhinology and Allergy, Spanish ENT Society (SEORL-CCC).

The data reported here were presented as an oral communication at the SEORL 2022 Annual Congress.

Bibliography

1. Saniasiaya J, Islam MA, Abdullah B. Prevalence of Olfactory Dysfunction in Coronavirus Disease 2019 (COVID-19): A Meta-analysis of 27,492 Patients. *Laryngoscope*. 2021;131(4):865–78.
2. Coelho DH, Reiter ER, Budd SG, Shin Y, Kons ZA, Costanzo RM. Quality of life and safety impact of COVID-19 associated smell and taste disturbances. *Am J Otolaryngol*. 2021;42(4):103001.
3. Izquierdo-Dominguez A, Rojas-Lechuga MJ, Mullol J, Alobid I. Olfactory Dysfunction in the COVID-19 Outbreak. *J Investig Allergol Clin Immunol*. 2020;30(5):317-26.
4. Hosseinpoor M, Kabiri M, Rajati Haghi M, Ghadam Soltani T, Rezaei A, Faghfoury A, et al. Intranasal Corticosteroid Treatment on Recovery of Long-Term Olfactory Dysfunction Due to COVID-19. *Laryngoscope*. 2022;132(11):2209-16.
5. Temmel AFP, Quint C, Schickinger-Fischer B, Klimek L, Stoller E, Hummel T. Characteristics of olfactory disorders in relation to major causes of olfactory loss. *Arch Otolaryngol Head Neck Surg*. 2002;128(6):635–41.
6. Hummel T, Podlesek D. Clinical assessment of olfactory function. *Chem Senses*. 2021;46:bjab053.
7. Hopkins C, Alanin M, Philpott C, Harries P, Whitcroft K, Qureishi A, et al. Management of new onset loss of sense of smell during the COVID-19 pandemic - BRS Consensus Guidelines. *Clin Otolaryngol*. 2021;46(1):16–22.
8. Katotomichelakis M, Simopoulos E, Zhang N, Tripsianis G, Danielides G, Livaditis M, et al. Olfactory dysfunction and asthma as risk factors for poor

- quality of life in upper airway diseases. *Am J Rhinol Allergy*. 2013;27(4):293–8.
9. Sorokowska A, Drechsler E, Karwowski M, Hummel T. Effects of olfactory training: a meta-analysis. *Rhinology*. 2017;55(1):17–26.
10. Yuan F, Huang T, Wei Y, Wu D. Steroids and Olfactory Training for Postviral Olfactory Dysfunction: A Systematic Review. *Front Neurosci*. 2021;12:15:708510.

Accepted Article

FIGURE LEGEND**Figure 1. Number of Olfactory Units (OU) in Spain.**