

ERS member survey on COVID-19 symptomatology and personal protection: a construct to predict early COVID-19 disease*

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Abstract

Background: This paper reports on a survey performed amongst members of the European Rhinologic Society (ERS) in relation to COVID-19. The survey audited several items, such as (onset of) symptoms that could be a sign of COVID-19, number of patients seen with face-to-face consultation in an outpatient setting, surgeries done, whether personal protective equipment was used, and some personal data including country of practice.

Results: Of the 507 respondents, 304 reported one or more complaints (60%); the most common were sore throat, headache, fatigue, stuffy nose and a dry cough. The pattern of complaints of cases tested for COVID-19 was used to create a symptom-based diagnostic construct for COVID-19. Two possibilities were used: (1) anosmia as the only complaint, or combined with either fever and/or shortness of breath (2) a combination of fever, headache, fatigue, dry cough, and coughing up sputum / thick phlegm from the lungs. With these two constructs most patients were adequately classified. A limited percentage of the respondents used/could use adequate personal protection equipment (PPE). In the respondents who were tested for COVID, none with a positive test reported adequate protection 75-100% of the time and 69% no adequate protection at all. Of those with a negative test only 26% reported no protection.

Conclusion: This study underlines the importance of adequate protection for ENT surgeons, and especially rhinologists. Furthermore, anosmia is again confirmed as an important marker of COVID-19.

Key words: COVID-19, anosmia, personal protection, early signs of disease

Introduction

On March 11, 2020, the World Health Organization officially declared COVID-19 a pandemic. Since the outbreak of this pandemic in December 2019, the prevalence has continued to increase and affects most regions worldwide.

Coronavirus disease 2019 (COVID-19) causes a range of illness severity from mild to very severe leading to death^(1,2). Health care workers having successive contact with many patients are at high risk of catching the disease but also of spreading the disease to their patients⁽³⁾. Risk to healthcare workers through transmission of COVID-19 is primarily through droplet spread. Rhinologists, in particular, are exposed to a high reservoir of

viral load as we are dealing with the nose and airway⁽⁴⁾. Moreover, procedures in this region can induce aerosolization of viral particles⁽⁵⁾.

There is now ample evidence that COVID-19 can be contagious before the classical symptoms like cough and high fever arise⁽⁶⁻⁸⁾. Therefore, identifying the early symptoms of COVID-19 is of particular importance and is a health system priority. Early studies from the COVID-19 outbreak have illustrated several non-specific signs and symptoms in infected patients, including fever, dry cough, dyspnoea, myalgia, fatigue, lymphopenia, and radiographic evidence of pneumonia. Recently, a probable association between COVID-19 and altered olfactory function has

been reported by several groups ^(1, 9-12). To evaluate COVID-19 symptoms in the European Rhinologic Society membership, we undertook a short questionnaire to assess COVID-19 symptoms, level of personal protection and amount of testing for COVID-19 performed in our membership.

Methodology

Survey

A survey to audit (onset of) symptoms that could be a sign of COVID-19, patients seen with face-to-face consultation in an outpatient setting, surgeries done, whether personal protective equipment was used, and some personal data including country of practice was sent to the members of the ERS (n=5000). A reminder to fill in the questionnaire was sent after 2 days and it was possible to complete the survey from March 25th until April 8th. More than 90% (474/507) of the responses were made in the first 4 days.

The figures reported are copied directly from Survey Monkey. The full report can be consulted here (<https://nl.surveymonkey.com/results/SM-3JFCHJ6M7/>).

Data were downloaded into SPSS for analysis.

The pattern of complaints of cases tested for COVID-19 was used to create a symptom-based diagnostic construct for COVID-19. Two possibilities were used:

1. Anosmia as the only complaint, or anosmia combined with either fever and/or shortness of breath
2. All these 5 complaints combined: fever, headache, fatigue, dry cough, and coughing up sputum / thick phlegm from the lungs.

With these two constructs the COVID status of tested respondents could be adequately predicted (10/13 positive tests and only 1/42 negative tests included; see results). However, 3 cases with a positive COVID-19 test who had diarrhoea as their sole complaint were not picked up. Since only one case of solitary diarrhoea tested negative, and only 4 cases of solitary diarrhoea were present in the untested group, no separate construct was possible for diarrhoea as the only symptom.

Distribution of complaints are depicted in Tables 2-4.

Results

The questionnaire was filled in by 507 respondents. 38% were female. Most were aged below 50 (66%). The majority came from Europe (61.5%) and the Middle East (9.5%; Table 1). Of the 507 respondents, 304 reported one or more of in total 351 complaints (60%); the most common were sore throat, headache, fatigue, stuffy nose and a dry cough (Figure 1, Table 2).

Table 1. Respondents per region and countries with 10 or more respondents.

Region	n (%)
Europe	312 (61.5)
Middle East	48 (9.5)
Asia	28 (5.5)
North America	15 (3.0)
South America	15 (3.0)
Other	15 (3.0)
Unknown	74 (14.6)
Country	n (%)
United Kingdom	57 (11.2)
Belgium	27 (5.3)
Italy	25 (4.9)
Sweden	22 (4.3)
Greece	20 (3.9)
Egypt	20 (3.9)
Denmark	17 (3.4)
Spain	16 (3.2)
Portugal	14 (2.8)
Brazil	12 (2.4)
Finland	10 (2.0)
Germany	10 (2.0)
The Netherlands	10 (2.0)

In the group of respondents indicating any complaint (n=304), 51 were tested for COVID-19; 13 tested positive and 38 negative. Of the 203 respondents without complaints, 4 (2.0%) were tested for COVID-19 (and found negative). The distribution of complaints of the respondents with a negative test was comparable to the overall group, whereas those with a positive test had a distinctive pattern with notably more anosmia, fever, fatigue, and shortness of breath, and also more nausea/vomiting/diarrhoea, whereas a sore throat was less frequent (Table 2). Interestingly, 61,5 % (8/13) of the respondents who tested positive had anosmia compared to 7,1% (3/42) of the respondents with complaints but tested negative.

Applying the construct (see methods) on the pattern of complaints (if any) of the 55 tested cases would result in the inclusion of:

- 1) 8/13 positive tests, 1/42 negative tests (from a person complaining of fever, anosmia, dry cough, fatigue, sore throat, headache and stuffy nose) for the construct anosmia as only complaint, or anosmia combined with either fever and/or shortness of breath.

Table 2. Distribution of complaints.

	All (n=304)	Positive test (n=13)	Negative test (n=42)	Likely COVID-19 (+) (n=23)^	COVID-19 (-) with complaints (n=281)^
Fever	51 (17.8%)	7 (53.8%)	10 (23.8%)	14 (60.9%)	37 (13.2%)
Anosmia	29 (9.5%)	8 (61.5%)	3 (7.1%)	17 (73.9%)	12 (4.3%)
Dry cough	106 (34.9%)	5 (38.5%)	15 (35.7%)	11 (47.8%)	95 (33.8%)
Fatigue	115 (37.8%)	8 (61.5%)	12 (28.6%)	14 (60.9%)	101 (35.9%)
Coughing up sputum / thick phlegm from the lungs	35 (11.5%)	3 (23.1%)	3 (7.1%)	7 (30.4%)	28 (10.0%)
Shortness of breath	30 (9.9%)	4 (30.8%)	5 (11.9%)	8 (34.8%)	22 (7.8%)
Bone or joint pain	47 (15.5%)	3 (23.1%)	6 (14.3%)	9 (39.1%)	38 (13.5%)
Sore throat	123 (40.5%)	3 (23.1%)	21 (50.0%)	7 (30.4%)	116 (41.3%)
Headache	120 (39.5%)	7 (53.8%)	17 (40.5%)	13 (56.5%)	107 (38.1%)
Chills	34 (11.2%)	5 (38.5%)	6 (14.3%)	9 (39.1%)	25 (8.9%)
Nausea or vomiting	18 (5.9%)	4 (30.8%)	1 (2.4%)	5 (21.7%)	13 (4.6%)
Stuffy nose	114 (37.5%)	4 (30.8%)	13 (31.0%)	10 (43.5%)	104 (37.0%)
Diarrhoea	51 (17.8%)	7 (53.8%)	5 (11.9%)	9 (39.1%)	42 (14.9%)

^ the distribution of some of these numbers is influenced by the diagnostic construct for COVID-19.

2) 2/13 positive tests, 0/42 negative tests for all these 5 complaints combined: fever, headache, fatigue, dry cough, and coughing up sputum / thick phlegm from the lungs.

Applying the 2 diagnostic criteria to the 253 untested respondents with complaints would yield another 10 suspected COVID-19 cases. Adding these 10 suspected cases to all cases with a positive test gave the total “likely COVID-19 (+)” cohort of 23 cases from 304 with any symptoms (7.6%). This would be in line with the respondents indicating that on average ~10% of their colleagues had complaints that could point to COVID-19 (with ~1% being hospitalized and ~0.3% in the ICU). Interestingly, the difference in distribution of complaints between the likely COVID-19 (+) cohort and the non-COVID-19 cohort follows that of the COVID-19 (+) and COVID-19 (-) tested subjects, even for those complaints that were not in the diagnostic construct (Table 2).

Respondents were also asked to indicate the timing of their symptoms in February and March. The symptoms were reported by 5.9% in the first week of February versus 32.9% in the third week of March (Figure 2). No effect of the geographical regions was found, mainly because of high numbers in Europe. Between European countries, the comparison was roughly the same, although somewhat limited by smaller numbers per country. In Italy, however, 7/18 (38.9%) respondents reported complaints already occurring in the first week of February. The distribution of complaints was rather uniform throughout the different weeks, although in the second half of February fever, anosmia, fatigue, productive cough and chills were reported more often. The number of likely COVID-19 cases rose in this period and extended into the first half of March, whereas respondents with a positive test were from March only, probably due to lack of

V2 Do or did you have symptoms of

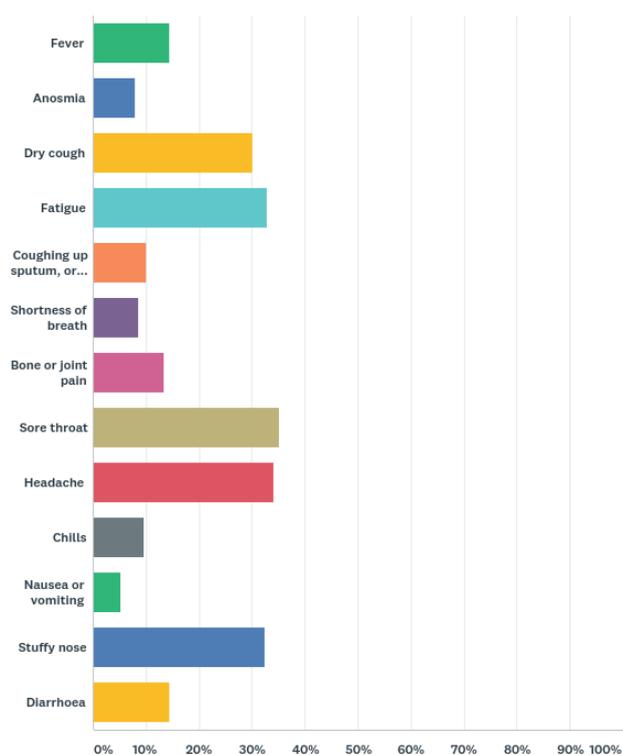


Figure 1 Symptoms reported by respondents.

Table 3. Change in distribution of complaints over time.

Start of complaints	All (n=304) [^]	1st half of Feb (n=28)	2nd half of Feb (n=33)	1st half of Mar (n=110)	2nd half of Mar (n=130)
Fever	51 (17.8%)	6 (21.4%)	10 (30.3%)	18 (16.4%)	16 (12.3%)
Anosmia	29 (9.5%)	1 (3.6%)	4 (12.1%)	13 (11.8%)	11 (8.5%)
Dry cough	106 (34.9%)	10 (35.7%)	13 (39.4%)	47 (42.7%)	34 (26.2%)
Fatigue	115 (37.8%)	16 (57.1%)	19 (57.6%)	37 (33.6%)	43 (33.1%)
Coughing up sputum / thick phlegm from the lungs	35 (11.5%)	2 (7.1%)	12 (36.4%)	11 (10.0%)	10 (7.7%)
Shortness of breath	30 (9.9%)	3 (10.7%)	3 (9.1%)	10 (9.1%)	13 (10.0%)
Bone or joint pain	47 (15.5%)	8 (28.6%)	5 (15.2%)	17 (15.5%)	17 (13.1%)
Sore throat	123 (40.5%)	12 (42.9%)	14 (42.4%)	47 (42.7%)	50 (38.5%)
Headache	120 (39.5%)	11 (39.3%)	14 (42.4%)	42 (38.2%)	53 (40.8%)
Chills	34 (11.2%)	4 (14.3%)	7 (21.2%)	11 (10.0%)	12 (9.2%)
Nausea or vomiting	18 (5.9%)	2 (7.1%)	4 (12.1%)	8 (7.3%)	4 (3.1%)
Stuffy nose	114 (37.5%)	8 (28.6%)	14 (42.4%)	49 (44.5%)	42 (32.3%)
Diarrhoea	51 (17.8%)	6 (21.4%)	6 (18.2%)	14 (12.7%)	25 (19.2%)
Likely COVID-19 (+)	23 (7.6%)	1 (3.6%)	3 (9.1%)	11 (10.0%)	8 (6.2%)
Tested COVID-19 (+)	13 (4.3%)	0 (0.0%)	0 (0.0%)	6 (5.5%)	7 (5.4%)

[^]Three respondents with complaints did not answer when their complaints started and are thus missing from the subanalysis.

Table 4. Distribution of complaints from start of complaints compared to first COVID-19 patient in respondent's country.

Start of complaints	All (n=304) [^]	Before 1st COVID-19 (n=19)	First 2 weeks after 1st COVID-19 (n=47)	3-4 weeks after 1st COVID-19 (n=76)	5-6 weeks after 1st COVID-19 (n=57)	>6 weeks after 1st COVID-19 (n=61)
Fever	51 (17.8%)	4 (21.1%)	11 (23.4%)	13 (17.1%)	10 (17.5%)	10 (16.4%)
Anosmia	29 (9.5%)	0 (0.0%)	5 (10.6%)	4 (5.3%)	8 (14.0%)	9 (14.8%)
Dry cough	106 (34.9%)	8 (42.1%)	18 (38.3%)	20 (26.3%)	23 (40.4%)	20 (32.8%)
Fatigue	115 (37.8%)	12 (63.2%)	22 (46.8%)	25 (32.9%)	21 (36.8%)	25 (41.0%)
Coughing up sputum / thick phlegm from the lungs	35 (11.5%)	2 (10.5%)	6 (12.8%)	10 (13.2%)	6 (10.5%)	7 (11.5%)
Shortness of breath	30 (9.9%)	2 (10.5%)	4 (8.5%)	7 (9.2%)	7 (12.3%)	8 (13.1%)
Bone or joint pain	47 (15.5%)	5 (26.3%)	12 (25.5%)	8 (10.5%)	7 (12.3%)	9 (14.8%)
Sore throat	123 (40.5%)	11 (57.9%)	17 (36.2%)	28 (36.8%)	25 (43.9%)	23 (37.7%)
Headache	120 (39.5%)	9 (47.4%)	18 (38.3%)	28 (36.8%)	27 (47.4%)	26 (42.6%)
Chills	34 (11.2%)	1 (5.3%)	8 (17.0%)	7 (9.2%)	7 (12.3%)	6 (9.8%)
Nausea or vomiting	18 (5.9%)	1 (5.3%)	4 (8.5%)	3 (3.9%)	5 (8.8%)	4 (6.6%)
Stuffy nose	114 (37.5%)	7 (36.8%)	17 (36.2%)	21 (27.6%)	31 (54.4%)	22 (36.1%)
Diarrhoea	51 (17.8%)	4 (21.2%)	6 (12.8%)	9 (11.8%)	9 (15.8%)	14 (23.0%)
Likely COVID-19 (+)	23 (7.6%)	1 (5.3%)*	3 (6.4%)	4 (5.3%)	7 (12.3%)	4 (6.6%)
Tested COVID-19 (+)	13 (4.3%)	0 (0.0%)	0 (0.0%)	2 (2.6%)	5 (8.8%)	3 (4.9%)

[^] A total of 44 respondents with complaints did not answer their country and are thus missing from the subanalysis. * It is unknown from the survey whether this person travelled in the weeks before February.

testing options in the beginning of the outbreak (Table 3).

When comparing the timing of the start of complaints with the

first known case of COVID-19 in the respondent's country, an interesting increase was observed of anosmia being reported from 0% before to 15% >6 weeks after COVID-19 reached the

V3 When do/did you have symptoms?

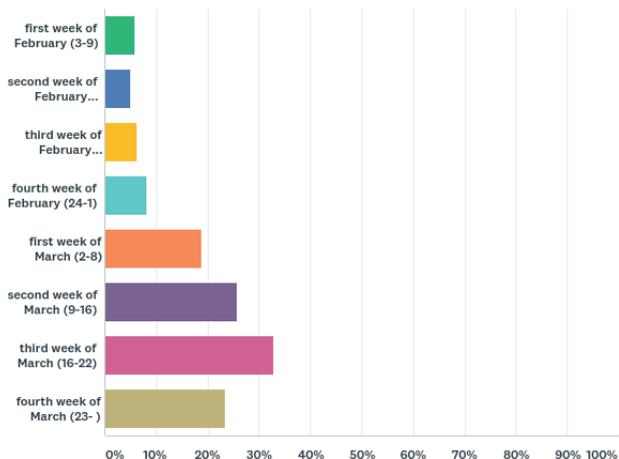


Figure 2. Time of symptoms of respondents.

V13 What personal protective equipment did you use

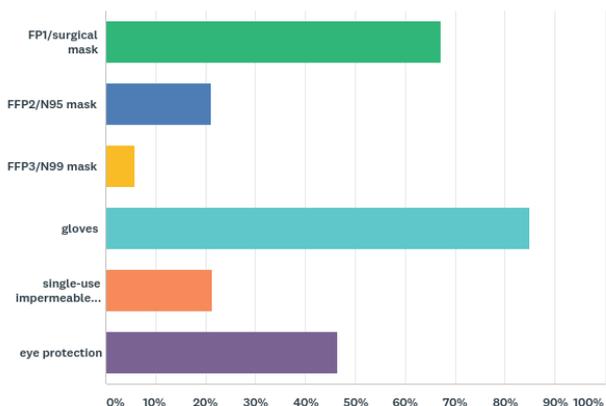


Figure 3. Personal protection used during consultation.

country. For sore throat, fatigue, fever, bone/joint pain and dry cough the opposite was true: these were reported mostly before, or in the first 2 weeks after COVID-19 reached the country (Table 4).

Most respondents indicated they were seeing outpatients throughout February (~80%) and this number declined from the second week of March (~70%) and thereafter (~50% in the third week of March). The number of patients was also reduced; in February an average of 60 patients was seen each week, while in March this was reduced to about 40 patients per week. The likely COVID-19 (+) cohort tended to see more patients on average in both months (February: 82.8 versus 60.2 per week; March: 53.7 versus 40.4 per week; both not statistically significant). When asked to indicate whether adequate personal protection equipment (PPE) was used during consultation, only 26% reported

V14 What personal protective equipment did you use in the OR

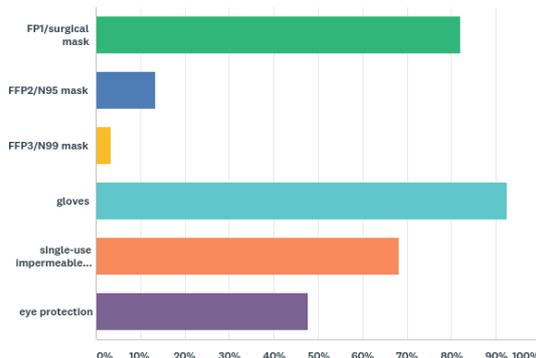


Figure 4. Personal protection used during surgery.

75-100% of the time. Even in this group less than half used an FFP2 or FFP3 mask, less than a third used a single-use impermeable gown and around 60% used eye protection (Figure 3 and 4). Gloves were worn by roughly 90% in the group reporting the use of adequate protection. In the group reporting use of adequate protection less than 75% of the time, the figures were even worse: only 17% used an FFP2 or FFP3 mask, 14% a gown, 34% eye protection and 69% gloves. Sinus and skull base surgery was also reduced in this period; 65-70% of the respondents performed surgery in February which fell to only 18.5% in the third week of March. Although less dramatic, again differences existed between those reporting adequate PPE more and less than 75% of the time. The use of FFP2 or FFP3 masks was 27 vs 10%, a gown 67 vs 60%, eye protection 59 vs 38% and gloves 91 vs 81%, respectively.

Comparing the use of adequate PPE to the risk of contracting COVID-19, it is interesting that from the likely COVID-19+ cohort only 9% reported adequate protection in 75% of the time or more, compared to 27% in the non-COVID-19 cohort. Moreover, the use of an FFP2 or 3 mask was only 5% in the likely COVID-19 group, in the outpatient setting as well as during surgery. In the 55 respondents who were tested, this is even more apparent: from those with a positive test (n=13), none reported adequate protection 75-100% of the time; 9/13 (69.2%) reported no adequate protection at all. Of those with a negative test (n=42), 11 (26%) reported adequate protection in 75-100% of the time and (only) the same amount (26%) reporting no protection. The use of FFP1, 2, or 3 masks, gowns and gloves was much lower in those with a positive test, compared to those with a negative one, both in the OR and in the outpatient setting.

Discussion

Identifying COVID-19 infections early is of utmost importance both for the patient and the clinician, in particular in otorhino-

laryngology where it is not possible to effect adequate social distancing during their practice ⁽⁴⁾. Transmission of SARS-CoV-2 is primarily through droplet spread, exposing rhinologists to a high reservoir of viral load ⁽⁷⁾. Awareness and vigilance to protect ourselves and team members with the necessary PPE during our daily activity is of utmost importance to avoid spreading and accidental infection. Health workers are at extra risk but also give unique opportunity to question about their symptomatology. This paper shows that two constructs can predict most early patients. As already reported by others, this paper emphasizes that anosmia as the only complaint, or anosmia combined with either fever and/or shortness of breath seems to be the best predictor of early COVID-19 infection ^(1,9). Fortunately, the literature thus far also indicates that the prognosis for the recovery of the anosmia is good in most patients ⁽¹³⁾. In the current climate patients should be informed that anosmia may be an early feature of COVID19 infection but that their sense of smell is likely to return as the illness resolves.

Although this survey is reliable, having been done by a group of physicians, the construct should be tested on a large cohort of patients who have been tested early in their presentation. One could argue to make the construct less strict. If 4 out of 5 complaints were used, 2/42 (5%) of negative tested subjects would be included, as well as an additional 7 likely COVID cases from the untested group. These 7 cases were comparable to the likely COVID (+) cohort in terms of number of patients seen, surgeries performed, and protection used. However, the timing of complaints versus start of COVID in the respondent's country would make 3/7 cases very unlikely COVID (+) (data not shown), supporting the use of the stricter construct (all 5 complaints present).

If it proves reliable, it can be used as predictor and early warning sign for COVID-19. Also based on the good prognosis of anosmia in COVID-19, it might be reasonable to reassure patients with acute onset of smell loss whilst warning them that they may have COVID-19.

In this survey we also asked ERS members about the personal protective measures they were able to take in the last months. It is clear that most members were not protecting themselves adequately, either due to non-availability of adequate PPE or initial lack of awareness of the seriousness of the risk of contamination. In many countries the seriousness of the risks for otorhinolaryngologists have been recognized rather late: it was only on April 9th that Public Health England updated their recommendations on PPE, recognizing ENT as requiring maximum protection due to high-risk nature of our procedures (and only after serious lobbying from our speciality association). Zou et al. showed higher viral loads soon after symptom-onset and higher

viral loads in the nose compared to the throat ⁽⁶⁾. The viral load that was detected in asymptomatic/mildly diseased patients was similar to that in symptomatic patients, which suggests high transmission-potential from asymptomatic (or minimally symptomatic) patients.

In addition, if viral particles become aerosolized, they stay in the air for at least 3 hours and can stay alive on surfaces in the room ⁽¹⁴⁾. Now that we are better aware of the risks in outpatients and especially in the operating room, members are advised not to see potentially infectious patients without adequate PPE ⁽⁴⁾. Moreover, many societies now advise testing with PCR and CT-scan of the thorax before doing (sinus- and skull base) surgery ^(15,16).

Strengths and limitations

This study is unique because all respondents are medical doctors, most of whom were audited during or directly after the Corona pandemic reached their respective countries. It allows insight in the risks of exposure when protocols, sound data, and routine are lacking. With a response rate of ~10% and 60% of respondents having had complaints, the major limitation would be the risk of inclusion bias (mainly those having had complaints might be prone to fill in the questionnaire).

Conclusions

Based on the data from this paper and other recent papers, patients with acute anosmia as the only complaint, should be regarded as likely COVID-19 (+) and should not be seen without adequate personal protection.

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None.

Authorship contribution

WF created the online survey, wrote the manuscript and reviewed the data. SR performed the data analysis and reviewed the final paper. SC and VL reviewed the data and the final paper.

Conflict of interest

WF and SR are editors of the journal but were not involved in the reviewing process.

Ethics approval and consent to participate

Not applicable.

Availability of data and materials

<https://nl.surveymonkey.com/results/SM-3JFCHJ6M7/>

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