

Loss of Smell and Taste Among Healthcare Personnel Screened for Coronavirus 2019

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Among 283 symptomatic healthcare personnel (HCP) tested for SARS-CoV-2, 51 (18%) were positive. Among those 51 HCP, self-reported loss of smell and taste were present in 51% and 52.9%, respectively, with either present in 60.8%. These symptoms had high specificity (93% each, 96% for either) for a positive SARS-CoV-2 test.

Keywords. healthcare personnel; COVID-19; SARS-CoV-2; screening; smell.

Since first recognized in Wuhan, China, in December 2020, coronavirus disease 2019 (COVID-19), which is caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has quickly spread throughout the world and was officially recognized as a pandemic on 11 March 2020 [1, 2]. The United States has since become the country with the highest number of reported cases and deaths. Knowledge of COVID-19 is rapidly increasing, including a better understanding of persons at high risk of acquiring infection and the most common presenting clinical manifestations. One particular high-risk group is healthcare personnel (HCP) given their frequent exposure to persons with COVID-19. Early reports have found high rates of HCP infection in China and Italy, and a recent Centers for Disease Control and Prevention (CDC) report documented more than 9000 HCP with COVID-19 in the United States [3]. Given limited testing resources and the essential role of HCP in responding to COVID-19, an early and efficient screening of this group is critical for maintaining the ongoing response to the pandemic. Our aim in this study was to describe the most common and distinguishing clinical

symptoms among HCP who underwent screening for COVID-19, with the goal of enhancing future COVID-19 symptom screening efforts.

METHODS

Our health system's COVID-19 screening program used re-deployed hospital staff and was implemented through employee health services. The program was advertised through institutional emails to all hospital employees and medical staff and advised HCP with fever or symptoms (congestion, shortness of breath, cough) to use. Two nurses operated a COVID-19 advice line 24/7 and used a standardized symptom algorithm within the electronic health record (EPIC, Verona, WI) to screen callers for consideration of further testing. HCP with symptoms consistent with a viral-like illness were triaged to the employee health services staff for a virtual clinical assessment and then scheduled for SARS-CoV-2 testing. Testing was conducted Monday through Friday in an enclosed room near the emergency room and was retrofitted into a temporary medical unit. Nasopharyngeal swabs were taken by a rotating team of Grady Health System-employed nurses and medical assistants specifically trained for the procedure and who were redeployed from other departments that had decreased clinical activities due to COVID-19. Each HCP filled out a paper or on-line screening data form (see [Supplementary Materials](#)) prior to testing. The symptom screen was based on CDC recommendations at the time with the major exception being additional questions on loss of smell and taste that were prompted by reports of these symptoms from our first few positive cases. SARS-CoV-2 polymerase chain reaction (PCR) testing was carried out using the Abbott Laboratories *m2000* RealTime (Lake Bluff, IL) system in the Grady Memorial Hospital microbiology laboratory. Test results and back-to-work guidance were provided via a telephone call within 48–72 hours of testing by employee health services. Analysis was completed with RStudio (version 3.6.3, R Core Team, 2020). R Foundation for Statistical Computing (Vienna, Austria) was used to compare characteristics of those with and without a positive SARS-CoV-2 test result (see [Supplementary Materials](#)). Study approval was obtained from the Emory Institutional Review Board and Grady Research Oversight Committee.

RESULTS

During the first 4 weeks of COVID-19 screening, 549 calls were received and 283 HCP were referred for and had testing performed; 51 (18%) had a positive SARS-CoV-2 test result. The majority of HCP tested were female (81%), worked in the hospital (83%), had patient contact (89%), and were under

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self-isolation (86%) at the time of testing. Of note, 11 (21.6%) HCP with a positive test for SARS-CoV-2 were working at the time of testing. Various types of HCP were tested, with nurses (33%) being the most common. Slightly more than one-third (35%) reported contact with a patient with COVID-19. The mean number of days with symptoms prior to testing was 5.7 and was similar throughout the study period (see [Supplementary Materials](#)). In comparing those with and without a positive SARS-CoV-2 test, there was no significant difference in demographic characteristics, including in patient contact (96% vs 88%, $P = .14$) and exposure to patients with COVID-19 (33% vs 36%, $P = .85$).

HCP with a positive SARS-CoV-2 test compared with those with a negative test had a higher mean number of symptoms and were more likely to have reported fever, chills, myalgia, and loss of smell or taste ([Table 1](#)). In regard to the sensitivity of certain symptoms, the most sensitive symptoms for a positive SARS-CoV-2 test were fatigue (76.5%), cough (72.5%), chills (66.7%), and fever (62.7%). The sensitivity of self-reported loss of smell and taste was 51.0% and 52.9%, respectively, and the sensitivity of either loss of smell or taste was 60.7%. Of note, slightly less than half (48.4%) of HCP with a positive SARS-CoV-2 test and either loss of smell or taste had nasal congestion. The most specific symptoms were loss of smell (93%) and taste (93%), and the presence of either symptom had a specificity of 96%. No other symptom had a specificity >70%. Loss of smell and loss of taste were also the symptoms with the highest positive predictive values at 60% and 61%, respectively. The sensitivity, specificity, negative predictive value, and positive predictive value of each symptom are shown in [Table 1](#).

DISCUSSION

Using a redeployed team of healthcare staff and an onsite testing facility, we were able to screen a large number of HCP and detect 51 cases of confirmed COVID-19. Importantly, we found the symptoms with the highest specificity and positive predictive value for a positive SARS-CoV-2 test to be loss of taste and/or smell. We are the first to evaluate the sensitivity of loss of smell and taste in distinguishing symptomatic HCP with and without a positive SARS-CoV-2 test and support their recent inclusion to the list of symptoms associated with COVID-19 provided by the CDC [4]. Furthermore, our findings indicate loss of smell and/or taste may be useful to include in COVID-19 screening algorithms.

The CDC considers HCP to be a high-priority group for COVID-19 screening given their high risk of exposure and their essential nature in combatting the pandemic. However, to date, there have been few reports of systematic COVID-19 screening programs among HCP. Our work provides an important example of the feasibility and yield of a hospital-wide screening program. The large number of cases detected highlights the value of screening HCP and, given that some were still working at the time of testing, the importance of detection to ensure individuals are provided proper care and counselled to self-isolate to limit potential workplace spread. Our model of using redeployed staff allowed for the screening program to be rapidly implemented and to function efficiently. This method provided additional work opportunities for underused outpatient clinical staff, minimized the amount of training and onboarding needed, and engaged a team that was committed to the well-being of their colleagues.

The high specificity and positive predictive value of loss of smell and/or taste for a positive SARS-CoV-2 test in our cohort

Table 1. Presence and Performance of Symptoms for Detecting Coronavirus Disease 2019 Among Healthcare Personnel

Symptom	SARS-CoV-2 -, n = 232 (%)	SARS-CoV-2 +, n = 51 (%)	P Value	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Mean symptoms (standard deviation)	4.2 (2.2)	5.9 (2.1)	<.01
Fever	74 (33)	32 (63)	<.01	0.63	0.68	0.30	0.89
Fatigue	139 (61)	39 (77)	.06	0.76	0.39	0.22	0.88
Chills	83 (36)	34 (67)	.01	0.67	0.64	0.29	0.90
Myalgia	80 (35)	28 (55)	.01	0.55	0.65	0.26	0.87
Cough	157 (69)	37 (73)	.72	0.73	0.31	0.19	0.84
Shortness of breath	86 (38)	16 (31)	.49	0.31	0.62	0.16	0.80
Nasal congestion	118 (52)	25 (49)	.84	0.49	0.48	0.17	0.81
Sore throat	108 (47)	22 (43)	.70	0.43	0.53	0.17	0.81
Diarrhea	72 (32)	13 (26)	.55	0.26	0.68	0.15	0.81
Loss of smell	17 (8)	26 (51)	<.01	0.51	0.93	0.60	0.89
Loss of taste	17 (8)	27 (53)	<.01	0.53	0.93	0.61	0.90
Loss of smell or taste	24 (11)	31 (61)	<.01	0.61	0.89	0.56	0.91
Loss of smell and taste	10 (4)	22 (43)	<.01	0.43	0.96	0.69	0.88

Abbreviation: SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

highlights the utility of including these symptoms in COVID-19 screening algorithms. In settings with limited testing capacity, the presence of these symptoms may help guide decisions on who to test. The association of loss of smell and/or taste with COVID-19 was first reported in the media and more recently in research reports. CDC surveillance revealed a 16% prevalence of loss of smell or taste among more than 9000 HCP with COVID-19. However, this is likely an underestimate given these symptoms were not part of the data collection form, but included as free text [3]. A cross-sectional study of patients already diagnosed with COVID-19 found rates of loss of smell and taste of 68% and 71%, respectively, and a strong association with disease. However, limitations included a limited survey response, particularly among COVID-19-negative patients, and potential recall bias [5]. Two additional reports that used a specific smell questionnaire among patients with mild COVID-19 found some level of olfactory and gustatory function loss in 86% and 88% of patients [6], respectively, and any altered sense of smell or taste in 65% [7]. These results highlight the sensitivity of these symptoms, especially when obtained via a detailed inquiry.

A major strength of our study was the inclusion of consecutive, symptomatic persons. This allowed us to determine the utility of loss of smell and taste in distinguishing COVID-19 from other viral-like illnesses. The etiology of loss of smell and/or taste is thought to be secondary to invasion of the olfactory epithelium and less likely due to nasal mucosal edema; notably, less than half of COVID-19 patients with these symptoms had nasal congestion.

In summary, our findings demonstrate the utility and need for HCP COVID-19 screening and suggest that loss of smell and/or taste be added to symptom screening algorithms. Loss of smell and/or taste are easy to obtain via self-report and, as we demonstrated, are very specific symptoms for COVID-19. Additional approaches to optimal HCP screening should be evaluated, including the implementation of serology testing. Available data indicate that PCR testing is most accurate early in the course of the illness and decreases substantially after the first week, which may lead to missed cases [8, 9]. Serology testing among our cohort may have revealed additional cases of COVID-19 including among those with a negative SARS-CoV-2 test and loss of smell and/or taste. Given that some HCP were working at

the time of testing and the number of days from symptom onset to testing was high (median, 5.7 days) and did not change over time, initiatives to trigger earlier testing in HCP with symptoms are also needed. Optimizing HCP screening for COVID-19 will help protect essential front-line workers and sustain our health-care systems during this pandemic.

Supplementary Data

Supplementary materials are available at *Clinical Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

Notes

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