care raises questions about the relevance of far distance airborne transmission in most clinical settings. A near-distance transmission mode is more likely the dominant mode of transmission. This could be the case even for AGPs, given the high number of close distance and direct contacts described during the specific AGPs performed by our cohort that resulted in transmission despite use of FFP-2 or FFP-3 masks. Our assumptions are limited by the fact that no data about fit testing, the use of face shields or goggles, and other personal protective equipment for contact precautions were collected. However numerous personal observations of the removal procedure of FFP-2 mask confirm the potential of hand contamination, with the mask becoming a fomite as shown by fluorescein and bacteriophage markers in the literature.[6] This is especially likely after stressful events like resuscitation and emergency airway management, as demonstrated in simulation studies of donning and doffing of personal protective equipment.[7] Lentz et al[8] showed a protective effect of respirator use during APGs and lower odds ratios of infections in intensive care units, dedicated COVID-19 units, and the presence of personal protective equipment observers in a global case–control study.

In summary, unprotected contacts off work and with undiagnosed patients or fellow HCWs during work seem to be a major driver of SARS-CoV-2 infections among HCWs, making general protective measures a necessity at least until full vaccination status is reached.

Acknowledgments.

Financial support. This work was funded by institutional funds only.

Conflicts of interest. All authors report no conflicts of interest relevant to this article.

References

1. Gohil SK, Huang SS. Community COVID-19 incidence and health care personnel COVID-19 seroprevalence. *JAMA Network Open* 2021;4(3):e211575.
2. Schneider S, Piening B, Nouri-Pasovsky PA, Krüger AC, Gastmeier P, Aghdassi SJS. SARS-coronavirus-2 cases in HCWs may not regularly originate from patient care: lessons from a university hospital on the underestimated risk of healthcare worker to healthcare worker transmission. *Antimicrob Resist Infect Control* 2020;9:192.
3. Brandt MP, Jäger W, Epple S, Haferkamp A, Schräder A. SARS-CoV-2 outbreak in medical employees in a large urologic department: spread, containment and outcome. *Am J Infect Control* 2021;49:674–677.
4. Pfenninger EG, Christ P, Neumüller M, *et al.* Beurteilung des Infektionsrisikos durch SARS-CoV-2 für medizinisches personal—erkenntnisse aus der Praxis. *Bundesgesundheitsbl* 2021;64:304–313.
5. Tang L, Hijano DR, Gaur AH, *et al.* Asymptomatic and symptomatic SARS CoV 2 infections after BNT162b2 vaccination in a routinely screened workforce. *JAMA* 2021;326:2500–2502.
6. Brady TM, Strauch AL, Almaguer CM, *et al.* Transfer of bacteriophage MS2 and fluorescein from N95 filtering facepiece respirators to hands: measuring fomite potential. *J Occup Environ Hyg* 2017;14:898–906.
7. Díaz-Guio DA, Ricardo-Zapata A, Ospina-Velez J, Gómez-Candamil G, Mora-Martinez S, Rodriguez-Morales AJ. Cognitive load and performance of healthcare professionals in donning and doffing PPE before and after a simulation-based educational intervention and its implications during the COVID-19 pandemic for biosafety. *Infez Med* 2020;28 suppl 1:111–117.
8. Lentz RJ, Colt H, Chen H, *et al.* Assessing coronavirus disease 2019 (COVID-19) transmission to healthcare personnel: the global AVT-HCP case control study. *Infect Control Hosp Epidemiol* 2021;42:381–387.

Postacute coronavirus disease 2019 (COVID-19) syndrome in maxillofacial surgeons after initial infection: A Brazilian experience

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To the Editor—The coronavirus disease 2019 (COVID-19) pandemic has been major sanitary crisis of recent times. Its pathogenesis is complex and systemic manifestations are the most varied.[1] In addition to serious cases of hospitalization, persistent symptoms have been observed in patients that impact on rehabilitation and quality of life.[2] This clinical condition is recognized as a postacute COVID-19 syndrome that affects different severe acute respiratory coronavirus virus 2 (SARS-CoV-2)–positive patients.[2,3]

By acting directly with the oral cavity and subsequent exposure to aerosol and saliva, dentists are at risk for infection by novel coronavirus and, consequently, can also develop sequelae.[4] Thus, we report a case series of post-acute COVID-19 syndrome in maxillofacial surgeons of a Brazilian public center and highlight the need for clinical follow-up of these professionals.

Between April and June 2020, 20 maxillofacial surgeons in Sergipe, Brazil, worked during the first wave of COVID-19 performing high complexity surgeries and, unfortunately, most of them were infected (15 of 20, 75%). In addition, 4 individuals tested positive for SARS-CoV-2 in subsequent months (2–5 months) (Table 1).

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Cite this article: Santana LAM, *et al.* (2022). Postacute coronavirus disease 2019 (COVID-19) syndrome in maxillofacial surgeons after initial infection: A Brazilian experience. *Infection Control & Hospital Epidemiology*, 43: 1744–1746, https://doi.org/10.1017/ice.2021.401

Table 1. Clinical Profile of Oral Surgery Group Infected During First COVID-19 Pandemic Wave in Brazilian Public Center Medical and Potential Sequels and Symptoms in Subsequent Months

Case No.	Age/Sex	COVID-19 Test Results[a]	COVID-19 Symptoms	RT-qPCR Test After First Record	Persistent Symptoms After Acute COVID-19 (6 months)	Persistent Symptoms After Acute COVID-19 (12 months)
1	47 y/ M	Positive	Fever, cough, dyspnea, headache, myalgia, anosmia, ageusia, intestinal complications	Positive (2 months)	Headache and myalgia	Headache, fatigue, and hyperglycemia
2	51 y/ F	Positive	Fever, cough, dyspnea, headache, myalgia, intestinal complications, coryza	Negative (1 month)	Fatigue and muscle weakness	Vertigo, hypertensive crisis, and hormonal disorders
3	52 y/ M	Positive	Cough, anosmia, hypogeusia, headache, myalgia	Negative (1 month)	Fatigue, anxiety, memory loss, inability to concentrate, headache, hypogeusia, and anosmia	Fatigue, anxiety, and inability to concentrate
4	45 y/ M	Positive	Fever, cough, anosmia, ageusia, and myalgia	Positive (5 months)	Fatigue, cough, insomnia, hypogeusia, anosmia, memory loss, inability to concentrate, and hypertension	Memory loss, inability to concentrate, and hypertension
5	46 y/ M	Positive	Cough, anosmia, ageusia	Negative (1 month)	Fatigue, cough, anosmia, ageusia, muscle weakness	Fatigue, muscle weakness, hypertension, glycemic alterations
6	47 y/ M	Positive	Fever, cough, headache, muscle weakness	Positive (4 months)	Fatigue, hypogeusia, and anosmia	Insomnia, hypogeusia, and anosmia
7	38 y/ M	Positive	Myalgia, sore throat, intestinal complications	Negative (1 month)	No	No
8	46 y/ M	Positive	Fever, cough, coryza, dyspnea, anosmia, myalgia, ageusia, headache, muscle weakness, myalgia, intestinal complications	Negative (1 month)	Fatigue and cough	Fatigue
9	53 y/ M	Positive	Fever, cough, headache, myalgia, anosmia, ageusia, intestinal complications	Negative (1 month)	Fatigue, cough, joint pain, headache, myalgia, anosmia, and ageusia	No
10	46 y/ M	Positive	Fever, cough, dyspnea, headache, myalgia, anosmia, ageusia	Negative (1 month)	Fatigue, anxiety, insomnia, memory loss and inability to concentrate, myalgia, headache, hypertension	Anxiety, insomnia, myalgia, headache, hypertension, and hair loss
11	42 y/ M	Positive	Fever, cough, myalgia, anosmia, ageusia	Positive (2 months)	Fatigue, cough, anxiety, hypogeusia, anosmia, memory loss, and fatigue	Cough
12	39 y/ M	Positive	Anosmia, ageusia	Negative (1 month)	No	No
13	60 y/ M	Positive	Anosmia, ageusia	Negative (1 month)	Fatigue, anxiety, and myalgia	No
14	45 y/ M	Positive	Asymptomatic	Negative (1 month)	No	No
15	41 y/ M	Positive	Asymptomatic	Negative (1 month)	No	No
16	45 y/ M	Negative	No	Negative (1 month)	No	No
17	56 y/ M	Negative	No	Negative (1 month)	No	No
18	40 y/ M	Negative	No	Negative (1 month)	No	No
19	38 y/ M	Negative	No	Negative (1 month)	No	No
20	44 y/ F	Negative	No	Negative (1 month)	No	No

Note. M, male; F, female.
[a]Results provided by RT-qPCR analysis for SARS-CoV-2.

The mean age of participants was of 46.1 years (SD ±5.2) and 15 cases (75%) were SARS-CoV-2 positive. Of these 15 cases, 11 (73.3%) showed persistent symptoms during 12 months of follow-up.

These postacute symptoms ranged from mild to moderate, including fever, muscle disorders, chemosensory alterations, respiratory and intestinal complications, and intestinal alterations. These persistent symptoms directly affected the performance of their usual activities as professionals and, consequently, caused a decline in quality of life. These clinical findings coincided with the characteristics of postacute COVID-19 syndrome. Moreover, the continuation of these symptoms beyond 6 months were reported by 9 of the 11 maxillofacial surgeons diagnosed with postacute COVID-19 syndrome. Some professionals experienced significant worsening of symptoms and development of comorbidities, such as hypertension and glycemic disorders.

Postacute COVID-19 syndrome, or long COVID, is defined as persistence of symptoms or appearance of sequelae beyond 3 or 4 weeks from the onset of disease.[2] In general, the most commonly reported symptoms are fatigue, sleep difficulties, and anxiety and/or depression.[2,5] The pathophysiologic mechanisms of syndrome are unclear, although damage provoked by host inflammatory response and immunological deficits may predispose a COVID-19 patient to a greater chance of sequelae.[6]

To our knowledge, this is the first study to report a case series of sequelae of COVID-19 in maxillofacial surgeons presenting postacute COVID-19 syndrome followed for 12 months. Commonly, studies have reported the prevalence of postacute COVID-19 syndrome in patients followed for 6 months; fatigue and dyspnea affected a larger number of these patients.[2,5] Also, the presence of comorbidities have been reported as determining factors of increased severity of disease,[3,6] which was not observed in our study.

Researchers have focused on the analysis of the sequelae of COVID-19 in hospitalized patients once they are expected to have longer convalescence.[5] The professionals evaluated in our study did not need hospitalization; thus, regardless of the severity of the disease, the sequelae may be significant and can impact quality of life. Interestingly, Augustin et al (2021)[5] demonstrated that long-term symptoms of postacute COVID-19 syndrome are not exclusive to more severely ill patients or those with a long period of hospitalization, despite the expectation of longer convalescence for hospitalized patients. In their study, 930 (97.1%) of 958 COVID-19 patients who were not hospitalized developed symptoms as shortness of breath, fatigue, joint pain, anosmia, and/or ageusia.

Other important alterations found in the literature are thromboembolic disorders, renal failure, pulmonary fibrosis, Hashimoto thyroiditis, gastrointestinal and hepatobiliary sequelae, psoriasis, and Guillain-Barré syndrome.[2,7] The association between COVID-19 and development of these pathologies is still poorly understood, but some hypotheses have been postulated. Regarding anosmia, it is thought that SARS-CoV-2 may damage the olfactory neuroepithelium by linkage to the ACE2 receptor and that fatigue could result from endothelial dysfunction in brain capillaries as consequence of the inflammatory process.[8,9]

In conclusion, our results reinforce the need for long follow-up of healthcare workers affected by novel coronavirus, mainly, those working on the front lines and in environments with a high flow of infected patients, including individuals not hospitalized. In addition, most of these symptoms may be underdiagnosed and directly affect quality of life; thus, a multidisciplinary approach is needed, as well as monitoring of symptoms after the initial period of illness.

Acknowledgments.

Financial support. No financial support was provided relevant to this article.

Conflicts of interest. All authors report no conflicts of interest relevant to this article.

References

1. Machhi J, Herskovitz J, Senan AM, *et al.* The natural history, pathobiology, and clinical manifestations of SARS-CoV-2 infections. *J Neuroimmune Pharmacol* 2020;15:359–386.
2. Nalbandian A, Sehgal K, Gupta A, *et al.* Postacute COVID-19 syndrome. *Nat Med* 2021;27:601–615.
3. Yong SJ. Long COVID or post-COVID-19 syndrome: putative pathophysiology, risk factors, and treatments. *Infect Dis (Lond)* 2021. doi: 10.1080/23744235.2021.1924397.
4. Santana LADM, Pinho JNA, de Albuquerque HIM, Souza LMA. COVID-19 contamination among maxillofacial surgeons and impact in Brazilian public center. *J Stomatol Oral Maxillofac Surg* 2021. doi: 10.1016/j.jormas.2021.05.001.
5. Augustin M, Schommers P, Stecher M, *et al.* Post-COVID syndrome in nonhospitalised patients with COVID-19: a longitudinal prospective cohort study. *Lancet Reg Health Eur* 2021. doi: 10.1016/j.lanepe.2021.100122.
6. Williamson EJ, Walker AJ, Bhaskaran K, *et al.* Factors associated with COVID-19–related death using Open SAFELY. *Nature* 2020;584:430–436.
7. Caress JB, Castoro RJ, Simmons Z, Scelsa SN, Lewis RA, Ahlawat A, Narayanaswami P. COVID-19-associated Guillain-Barré syndrome: the early pandemic experience. *Muscle Nerve* 2020;62:485–491.
8. Hoffmann M, Kleine-Weber H, Schroeder S, *et al.* SARS-CoV-2 cell entry depends on ACE2 and TMPRSS2 and is blocked by a clinically proven protease inhibitor. *Cell* 2020;181:271–280.
9. Nauen DW, Hooper JE, Stewart CM, Solomon IH. Assessing brain capillaries in coronavirus disease 2019. *JAMA Neurol* 2021. doi: 10.1001/jamaneurol.2021.0225.