diseases than the United States. This experience and history are expected to be very useful and effective in controlling COVID-19.

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References

1. Li Q, Guan X, Wu P, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus–infected pneumonia. N Engl J Med 2020;382:1199–1207.
2. COVID-19 coronavirus pandemic. Worldometer website. https://www.worldometers.info/coronavirus/. Updated April 22, 2020. Accessed April 22, 2020.
3. Coronavirus disease 2019 (COVID-19) situation report-74. World Health Organization website. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200315-sitrep-55-covid-19.pdf?sfvrsn=33daa5cb_8. Published March 15, 2020. Accessed April 22, 2020.
4. Iranian Ministry of Health and Medical Education website [in Farsi]. http://behdasht.gov.ir/. Published 2020. Accessed April 22, 2020.
5. Italian Ministry of Health and Medical Education [in Italian]. http://www.salute.gov.it. Published 2020. Accessed April 22, 2020.
6. Lohrasbi V, Mohammadzadeh N, Shirmohammadiou N. Brief outcome of five decades of battle with infectious diseases in Iran. Virus Dis 2020;31:10–12. doi: 10.1007/s13337-019-00565-y.

Might hydrogen peroxide reduce the hospitalization rate and complications of SARS-CoV-2 infection?

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To the Editor—The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the virus responsible for COVID-19, which emerged in Wuhan, China, in December 2019. The current pandemic appears to be characterized by human-to-human transmission; it occurs through cough, sneeze, droplet inhalation, and direct contact of hands with mouth, nose, and eyes. The virus resides in the mucous membranes and it is transmitted through the saliva and the respiratory droplets. Although prevention of person-to-person transmission is the key to limiting the pandemic, so far, little

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Therefore, we advise an off-label use of \( \text{H}_2\text{O}_2 \) 3\% and 1.5 \% (10 volumes) by oral and nasal washing respectively, performed immediately after the onset of the first symptoms and the presumptive diagnosis of COVID-19 and during the illness in home quarantine or by hospitalized patients not requiring intensive care.

We propose a regimen of gargling 3 times per day for disinfection of the oral cavity and nasal washes with a nebulizer twice daily (due to a greater sensitivity of the nasal mucosa). Hydrogen peroxide (\( \text{H}_2\text{O}_2 \)) is safe for use on the mucous membranes as gargling or as a nasal spray; in fact, it is already commonly used in otorhinolaryngology. Figure 1 shows the epithelial of oral mucosa treated with \( \text{H}_2\text{O}_2 \) 3\% for a period of 6 months. No damage was observed on oral mucous membranes or their microvilli after ongoing gargling treatment with \( \text{H}_2\text{O}_2 \) 3\%. Another route for SARS-CoV-2 is through nasal-lacrimal ducts; thus, we advise the use of iodopovidone 0.5\%–0.6\% as eye drops (1 drop 3 times daily on conjunctiva of both eyes) due to its antiseptic action against SARS-CoV-2 within 1 minute.

In our opinion, the effectiveness of this regimen will be verified through a significant reduction of the rate of hospitalization and respiratory complications in patients positive for SARS-CoV-2 with and without mild-to-moderate symptoms. We strongly encourage the rapid development of randomized controlled trials including both SARS-CoV-2–positive and –negative participants to study the benefits of \( \text{H}_2\text{O}_2 \) 3\% in the reduction of pulmonary complications and hospitalization rates.

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**References**

1. No. 5443 del 22/02/2020 [in Italian]. Italian Ministry of Health website. [http://www.data-storage.it/download/2020/coronavirus-circolare_2.pdf](http://www.data-storage.it/download/2020/coronavirus-circolare_2.pdf). Published February 22, 2020. Accessed April 21, 2020.

2. Cortelyou PR. Use of peroxide of hydrogen in diseases of the throat and nose. *J Med Assoc Ga* 1968;57:449–550.

3. Urban MV, Rath T, Radtke C. Hydrogen peroxide (H2O2): a review of its use in surgery. *Wien Med Wochenschr* 2019;169:222–225.

4. Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe acute respiratory syndrome coronavirus and respiratory mucosal cells drives viral dissemination in rhesus macaques. *Int J Antimicrob Agents* 2020;55(3):105924.

5. Liu L, Wei Q, Nishiura K, et al. Spatiotemporal interplay of severe acute respiratory syndrome coronavirus and respiratory mucosal cells drives viral dissemination in rhesus macaques. *Mucosal Immunol* 2016;9:1089–1101.

6. Kampf G, Todt D, Pflaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. *J Hosp Infect* 2020;104:246–251.

7. Koarai A, Sugiuira H, Yanagisawa S, et al. Oxidative stress enhances toll-like receptor 3 response to double-stranded RNA in airway epithelial cells. *Am J Respir Cell Mol Biol* 2010;42:651–660.

**Fig. 1.** Mouth mucous membranes after administration of \( \text{H}_2\text{O}_2 \) 3\% (10 vol) over a period of six months (Scraping cytology and scanning electron microscopy; SEM 7500 Cambridge MARK 250 SEM).