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LETTERS TO THE EDITOR

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Prevention of Fogging of Protective Eyewear for Medical Staff During the COVID-19 Pandemic



Dear Editor:

The coronavirus disease (COVID-19) has caused huge harm worldwide.¹ COVID-19 is transmitted from person to person and spreads very quickly.^{2,3} Globally, 2,810,325 cases of COVID-19 have been confirmed by the World Health Organization, including 193,825 deaths, as of April 26, 2020. In China, there have been 84,338 cases and 4,642 deaths.⁴ As of February 29, 2020, an estimated 42,000 medical personnel have served as frontline staff and have been indispensable during this worldwide pandemic.⁵ More than 3,000 personnel in Hubei Province, China, were infected during the early stage of the pandemic because knowledge pertaining to the prevention and control of the virus was lacking.⁶

One medical staff member became infected despite wearing protective equipment and an N95 mask; the initial manifestation was unilateral conjunctivitis, which was followed by fever a few hours later.⁷ Many studies have noted the importance of wearing goggles to protect the eyes from severe acute respiratory syndrome coronavirus 2 infection when in contact with patients.⁸⁻¹¹ Through interviews with the medical staff at our hospital in Wuhan, China, we learned that the fogging of goggles was a problem when caring for COVID-19 patients. Fogging impairs vision, thus hindering work efficiency when nurses collect blood, for example. This may lead to failure to collect blood properly or even to injury to patients. Furthermore, fogging may delay tracheal intubation and deep vein catheterization. However, washing and reusing goggles increases the chance of infection.

To help ED health care staff overcome the problem of fogging, we retrieved papers from the China National Knowledge Infrastructure, Wanfang Data, and SinoMed databases, and interviewed medical staff in our hospital who were caring for COVID-19 patients. Four methods

to overcome fogging were commonly employed: using washing-up liquid or hand sanitizer, and application of anti-fogging agents or iodophors¹²⁻¹⁸ (Table).

Three articles reported how washing-up liquid can prevent fogging;^{12,13,15} in one of these studies, the Whitecat brand (Shanghai Hutchison Whitecat Co Ltd) was used.¹² Four articles reported that hand sanitizer was used to prevent fogging;^{12,15,17,18} in 3 of these studies, the brand of hand sanitizer used was reported: Maokang (Maokang Medical),¹² Blue Moon (Blue Moon [China] Co Ltd),¹⁷ and Jiemiejing (Wuhan East Lake Star Technology Co, Ltd).¹⁸ Five articles reported that antifogging sprays were used;^{12-15,17} in 4 of these studies, a spray designed for swimming goggles or car headlights was used, but the brand was not specified.¹²⁻¹⁵ Five articles reported that an iodophor could be used to prevent fogging.^{12,14-17} One article reported that the antifogging effect of iodophor was better than that of an antifogging spray designed for swimming goggles.¹² However, in some cases the iodophor turned the goggle lenses brown, thus impairing the vision of the medical staff.¹² In addition, an iodophor generally takes longer than antifogging sprays (approximately 10 minutes) to dry completely. Three articles reported the following disadvantages of antifogging sprays: higher cost and the potential for damage to the eyes if sprayed incorrectly.^{12,13,15}

Two articles reported that using a film could prevent fogging.^{13,15} However, this method has the disadvantages of high cost, curling of the film (causing discomfort to the wearer), tearing of the film (potentially damaging the skin of the wearer), and the possibility of allergic reaction.¹³ Other studies used gels in a small number of subjects.^{16,17}

In conclusion, using washing-up liquid^{12,13,15,18} or hand sanitizer^{12,15,17-18} is the most effective method for preventing goggles from fogging. We hope that these findings will help ED staff overcome the problem of fogging of protective eyewear and improve their work efficiency when treating patients with COVID-19.—Yuli Hu, MSc, Lan Wang, BSc, Sanlian Hu, MSc, and Fang Fang, BSc, Shanghai Jiao Tong University Affiliated Sixth People's Hospital, Shanghai, China; E-mail: liuliu9027@163.com [Sanlian Hu]

<https://doi.org/10.1016/j.jen.2020.05.003>

J Emerg Nurs 2020;46:564-572.
0099-1767

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TABLE

Common methods used to overcome fogging of goggles

Method	Details	Fog-free duration (hours)
Using washing-up liquid ^{12-13,15}	Wipe the goggles evenly using gauze, toilet paper, or cotton swabs, dry, and use.	4–6 ¹²
Using hand sanitizer ^{12,15,17,18}	Wipe the goggles evenly using gauze, toilet paper, or cotton swabs, dry, and use.	2–4, ¹² ≤4, ¹⁷ 5–8 ¹⁸
Application of antifogging agents ^{12-15,17}	Spray antifogging agent evenly, dry, and use.	≤ ¹² , 1–3 ¹⁷
Application of iodophor ^{12,14-17}	Pour iodophor on goggles directly or apply with cotton swabs, smear evenly, dry, and use.	≤ ¹² , 4–6, ¹⁶ ≤4 ¹⁷

Author Disclosures

Conflicts of interest: none.

Funding

The authors were funded by the Public Health Emergencies of Hospital Emergency Nursing Human Resource Database to Development and Construction fund (grant number 2020RK44). The authors were also funded by the Anti-epidemic First-line Nurses' Suggestions on the Sudden Coronavirus Diseases the Operational Training—Qualitative Research fund (grant number Jyh2021).

Acknowledgments

Yuli Hu, Lan Wang, and Fang Fang contributed equally to this work.

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COVID-19 Curve Guides India's Health Infrastructure Growth Needs



Dear Editor:

The coronavirus disease 2019 (COVID-19) crisis has brought the entire world to a standstill over the past 4 months. Major countries across the world, including the United States, Spain, the United Kingdom, Italy, France, Germany, Russia, India, Iran, and Brazil have been prominent victims, with each country crossing the 100,000 mark for COVID-19 cases and the US going beyond 1.8 million cases.¹ Lockdowns, along with behavioral changes such as physical distancing, using face masks, frequently washing hands with soap, following respiratory etiquette, and updating self-health awareness are proving to be effective measures in slowing the COVID-19 curve in many countries. With the world staring at a potential economic recession, many countries across the world have slowly and steadily started easing their respective lockdowns in the hope that the aforementioned measures will prevent an uncontrollable rise in COVID-19 cases. In this letter, we discuss why the cases may keep on increasing, especially in countries with high population density pockets, analyze the growth rate of COVID-19 cases, define metrics leading to flattening of the COVID-19 curve, and also discuss the rate at which countries should scale up their health infrastructure in the coming months. Although the analysis is generic and could be applied to other countries as well, we have taken the example of India, which has conditions such as high population and population density, a large economically vulnerable population owing to multiple lockdowns, and developing health infrastructure.

Multiple lockdowns since March 25, 2020 have helped slow the COVID-19 curve in India immensely and have

given much needed time to the central and state governments to scale up health infrastructure as well as to sensitize the population on various preventive measures, which will go a long way in keeping the curve within control in the coming months. Economic slowdown has caused large-scale migration from the urban pockets, which in turn has led to an increase in the COVID-19 curve in India. Thus, the government has started relaxing the lockdown to start various organized and unorganized economic sectors and to ease the movement of people in a bid to give relief to the ones in need. Such relaxations, coupled with the large population and population density, are likely to increase the number of COVID-19 cases in the coming months.

Highlighting the federal government structure in India, the COVID-19 containment strategy has been implemented state-wise. Various Indian states are adopting a strategy of 14 days of quarantine for any individual coming from outside the state. But the number of individuals coming from outside these states is huge. For example, Bihar is expecting a total of 2.7 million migrants to come back.² Institutional quarantine has its own infrastructural limitations. Home quarantine seems to be a possible option for asymptomatic and mildly symptomatic cases, but should be strictly implemented. The social fabric and the culture of joint (extended) families can help in the successful implementation of the home quarantine scheme. The states are aggressively ramping up the number of COVID-19 tests per day so as to comb through and detect, at least in the hotspots, all the positive cases that are already inside the state and are mostly asymptomatic owing to India's young population.

Combing through the entire population is an extremely difficult and nearly impossible task. India is currently carrying out more than 100,000 tests per day.³ Even if India scales up to 400,000 tests per day (nearly what the US is doing right now), it will take 3,425 days (9.3 years) to test its population of 1.37 billion.³ Even if we focus on combing only the hotspots, the high number of asymptomatic cases will keep on causing more hotspots at different locations, and further, a person tested today might get infected tomorrow because of easing of the lockdown norms.

The disease incidence usually decreases only when herd immunity is reached in a community. Herd immunity is a phenomenon where a considerable size of a community becomes immune to a particular communicable disease, thereby reducing the number of disease carriers.^{4,5} Usually vaccination assists in achieving herd immunity but a vaccine for COVID-19 is still far away. The other method is by natural infection where a sizable portion of the community is exposed to the virus in a controlled manner such that they develop antibodies in response and become immune to the disease.⁶ In