


Letter to the Editor

Examining the need for eye protection for coronavirus disease 2019 (COVID-19) prevention in the community

Alexandre R. Marra MD, MS^{1,2,3} , Michael B. Edmond MD, MPH, MPA², Saskia V. Popescu PhD, MPH, MA, CIC⁴ and Eli N. Perencevich MD, MS^{1,2}

¹Center for Access & Delivery Research and Evaluation (CADRE), Iowa City VA Health Care System, Iowa City, Iowa, United States, ²Department of Internal Medicine, University of Iowa Hospital & Clinics, Iowa City, Iowa, United States, ³Albert Einstein Jewish Institute for Education and Research, Hospital Israelita Albert Einstein, São Paulo, Brazil and ⁴George Mason University, Fairfax, Virginia, United States

To the Editor—As the world reopens after extreme social distancing designed to flatten the curve and protect hospitals, it appears that even countries that had controlled coronavirus disease 2019 (COVID-19) with widespread testing and contact tracing, such as South Korea and Singapore, are seeing increased case counts. One proposed method for reducing transmission as society reopens is requiring the public to wear face coverings, including cotton face masks or face shields.¹ An important factor that distinguishes face shields from masks is eye protection. Yet the importance of eye protection in the prevention of COVID-19 and other coronaviruses is underappreciated, which has led to public health authorities recommending cotton face masks over potentially more protective alternatives, such as face shields.

The mucous membranes of healthcare workers (HCWs), including the conjunctiva, may be exposed to respiratory droplets from the patient.² The importance of eye protection during care of patients with novel coronaviruses was recognized in 2003 during the severe acute respiratory syndrome coronavirus (SARS-CoV-1) outbreaks and subsequent Middle East respiratory syndrome coronavirus (MERS-CoV) outbreaks.³ For example, during SARS, the lack of eye protection when transferring a patient may have been the primary risk factor for one of the first doctors infected.⁴

It has been increasingly recognized that severe acute respiratory coronavirus virus 2 (SARS-CoV-2) can be transmitted from infected individuals when they are asymptomatic or presymptomatic.^{3,5} Thus, to prevent transmission in the community, personal protective equipment (PPE) must be worn at all times in addition to other containment measures such as 2 m (6 feet) distancing and avoiding large gatherings. Both droplet and contact transmission routes have been implicated in the spread of SARS-CoV-2.^{1,3} PPE has 2 potential benefits when worn in the community: (1) PPE can provide source control by containing the respiratory droplets generated through coughs, sneezes or during speech and (2) PPE can act as a barrier preventing respiratory droplets from landing on facial mucosal membranes or other parts of the face. Additionally, PPE can prevent contact transmission by

preventing contaminated hands from reaching the mucosal membranes of the mouth, nose and eyes.

Eye protection might provide additional benefits. A detailed investigation of risk factors for HCW acquisition of SARS, including multivariate generalized estimating equation logistic regression models, identified unprotected eye contact with body fluids as an independent risk factor for infection (odds ratio [OR], 7.34; $P = .001$).⁶ However, in a survey of 8 of the 9 US healthcare facilities in which SARS-CoV-1-infected patients were evaluated, 70% of HCWs reported some exposure to patients without wearing some level of eye protection and none acquired infection.⁷

Although conjunctivitis has been described in a few patients with COVID-19 and other coronavirus syndromes,⁵ emerging evidence supports that coronavirus can enter the host via the conjunctival route.⁸ Conjunctiva may be a potential portal for infection⁹ because it is directly exposed to extraocular pathogens, and the mucosa of the ocular surface and upper respiratory tract are connected by the nasolacrimal duct and have been shown to share the same entry receptors for some respiratory viruses,⁵ including angiotensin-converting enzyme 2 (ACE2) for SARS-CoV-1 and SARS-CoV-2.^{2,5} In addition, SARS-CoV-2 was detectable in several nasolacrimal system-associated tissues, including the conjunctiva, lacrimal gland, nasal cavity, and throat, thus validating the anatomical bridge between ocular mucosa and the respiratory tract.⁸ Finally, macaques were susceptible to SARS-CoV-2 infection via the conjunctival route and progressed to lung infections suggesting the biological importance of eye infection.¹⁰

Given that SARS-CoV-2 can be transmitted by fomites and droplets that contact the mucous membranes of the mouth and nose, as well as the eyes, it appears that until proven otherwise, HCWs and at-risk citizens in the community should use barriers to protect their entire face including their eyes. Current public health guidance recommends cotton face masks, but given the potential role of the conjunctival route, face shields that provide barrier protection for the entire face might be the superior option. Further research in this area is critically needed.

Acknowledgments.

Financial support. All authors report no source of funding or support.

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

Author for correspondence: Eli N. Perencevich, E-mail: eli-perencevich@uiowa.edu

Cite this article: Marra AR, et al. (2020). Examining the need for eye protection for coronavirus disease 2019 (COVID-19) prevention in the community. *Infection Control & Hospital Epidemiology*, <https://doi.org/10.1017/ice.2020.314>

References

1. Perencevich EN, Diekema DJ, Edmond MB. Moving personal protective equipment into the community: face shields and containment of COVID-19. *JAMA* 2020;323:2252–2253.
2. Khunti K, Greenhalgh T, Chan XH, *et al*. What is the efficacy of eye protection equipment compared to no eye protection equipment in preventing transmission of COVID-19-type respiratory illness in primary and community care? The Centre for Evidence-Based Medicine website. <https://www.cebm.net/covid-19/what-is-the-efficacy-of-eye-protection-equipment-compared-to-no-eye-protection-equipment-in-preventing-transmission-of-covid-19-type-respiratory-illnesses-in-primary-and-community-care/>. Accessed May 28, 2020.
3. Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Epidemiology of and risk factors for coronavirus infection in healthcare workers. *Ann Intern Med* 2020 May 5 [Epub ahead of print]. doi: [10.7326/M20-1632](https://doi.org/10.7326/M20-1632).
4. Fisher DA, Chew MN, Lim YT, Tambyah PA. Preventing local transmission of SARS: lessons from Singapore. *Med J Aust* 2003;178:555–558.
5. Sun CB, Wang YY, Liu GH, Liu Z. Role of the eye in transmitting human coronavirus: what we know and what we do not know. *Front Public Health* 2020;8:155.
6. Raboud J, Shigayeva A, McGeer A, *et al*. Risk factors for SARS transmission from patients requiring intubation: a multicentre investigation in Toronto, Canada. *PLoS One* 2010;5(5):e10717.
7. Park BJ, Peck AJ, Kuehnert MJ, *et al*. Lack of SARS transmission among healthcare workers, United States. *Emerg Infect Dis* 2004;10:244–248.
8. Siedlecki J, Brantl V, Schworm B, *et al*. COVID-19: ophthalmological aspects of the SARS-CoV 2 global pandemic. *Klin Monbl Augenheilkd* 2020;237:675–680.
9. Chen L, Liu M, Zhang Z, *et al*. Ocular manifestations of a hospitalised patient with confirmed 2019 novel coronavirus disease. *Br J Ophthalmol* 2020 Apr 7 [Epub ahead of print]. doi: [10.1136/bjophthalmol-2020-316304](https://doi.org/10.1136/bjophthalmol-2020-316304).
10. Deng W, Bao L, Gao H, *et al*. Ocular conjunctival inoculation of SARS-CoV-2 can cause mild COVID-19 in Rhesus macaques. *bioRxiv*; 2020. doi: [10.1101/2020.03.13.990036](https://doi.org/10.1101/2020.03.13.990036).