

# Unmasking the mask: the role of personal protective equipment for ophthalmologists caring for asymptomatic patients during the COVID-19 pandemic

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## Abstract

• The use of personal protective equipment (PPE) for ophthalmologists caring for asymptomatic patients remains controversial. This commentary reviews the latest emerging evidence. This is paramountly important in shaping health policies in countries which is not currently recommended.

• **KEYWORDS:** COVID-19; personal protective equipment; mask

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Whilst the use of personal protective equipment (PPE) including mask, gown, gloves, eye protection (goggles or face shield) is recommended world-wide in the management of patients suspected or confirmed to have COVID-19<sup>[1-2]</sup>, its role for ophthalmologists caring for asymptomatic patients remains highly contentious<sup>[3-5]</sup>. Those in favour believe that there is sufficient emerging evidence to suggest that ophthalmologists are at a higher risk of contracting SARS-CoV-2 than the general population, and that PPE reduces this risk<sup>[6]</sup>. Other potential benefits include a reminder to social distance, reduced frequency of face touching and relief of anxiety<sup>[4]</sup>. Opponents believe that there is insufficient evidence to support its routine use, and that it deprives other healthcare workers at higher risk of infection access to these limited supplies. Additional arguments suggest that improper

use may be detrimental, and that they can lead to a false sense of security which promotes complacency in applying complementary modes of infection mitigation.

Ophthalmologists come into close contact with multiple patients every day, at the slit-lamp biomicroscope and for prolonged durations whilst at the operating microscope. This distance is less than what is currently recommended by the World Health Organisation (1 m) when avoiding symptomatic patients<sup>[2]</sup>. Potential sources of SARS-CoV-2 infection for ophthalmologists include direct contact, tears, droplets and aerosols. In a large Chinese cohort of 1099 patients with laboratory confirmed COVID-19, conjunctival congestion was reported in 0.8% of patients<sup>[7]</sup>. In a smaller cohort from Hubei, China, 12 out of 38 (31.6%) of COVID-19 patients had ocular manifestations consistent with conjunctivitis<sup>[8]</sup>. Some<sup>[9]</sup>, but not all<sup>[10]</sup> studies have isolated SARS-CoV-2 from tear and conjunctival secretions. In a prospective interventional case series performed on 30 novel coronavirus pneumonia patients, swabs were taken to collect tear and conjunctival samples at time points separated by 2-3d<sup>[9]</sup>. SARS-CoV-2 was found to be present in the swabs of one patient by reverse-transcription polymerase chain reaction assays. This finding should prompt ophthalmologists to avoid direct contact with the conjunctival mucosa or tears by wearing gloves or lifting the eyelid with a disposable cotton swab.

Of great concern is ongoing debate regarding the predominant mode of transmission of the virus: droplet versus aerosols. In one study under experimental conditions, SARS-CoV-2 remained viable in aerosols throughout the duration of the study (3h), albeit with a reduction in infectious titre from  $10^{3.5}$  to  $10^{2.7}$  tissue culture infectious dose (TCID<sub>50</sub>)<sup>[11]</sup>. The authors concluded that aerosol and fomite transmission of SARS-CoV-2 is plausible. SARS-CoV-2 has even been isolated from air exhaust outlets of airborne infection isolation rooms holding patients with COVID-19 in Singapore<sup>[12]</sup>. Although aerosol transmission seems possible, it appears to be the exception rather than the rule. The low reproductive rate (estimated at 2.5) and secondary attack rate (estimated at 5% of close contacts) of SARS-CoV-2 suggest that the predominant mode of transmission is *via* droplets. This is important, because

normal medical masks can help protect against droplets but may not be protective against aerosols, when N95 masks are generally advised. Slit-lamp shields are effective against larger droplets, but only offer limited protection against aerosols<sup>[13]</sup>. Specific evidence supporting the use of masks by healthcare workers when caring for asymptomatic patients is emerging. A retrospective review of 493 medical staff at Zhongnan Hospital of Wuhan University, China found none of 278 staff became infected by SARS-CoV-2 when wearing N95 respirators versus 10 of 213 staff who were infected when they did not wear a mask. This is despite the fact that the non-mask wearers worked in departments (hepatobiliary and pancreatic surgery, trauma and microsurgery, urology) that were considered to be of lower risk than the group who wore N95 respirators (respiratory medicine, intensive care and infectious disease)<sup>[14]</sup>. A review of health care workers from Mass General Brigham, the largest healthcare system within Massachusetts with more than 75 000 employees demonstrated a linear reduction in SARS-CoV-2 positivity rates from 14.65% to 11.46% after the implementation of universal masking for health care workers and patients, despite a statewide increase during the same period<sup>[15]</sup>. Recently, a recent systematic review of 172 observational studies and Meta-analysis of 44 comparative studies of beta coronaviruses including SARS-CoV-2 suggested lower rates of transmission with the following interventions: physical distancing of 1 m or more, use of face masks (with stronger protection conveyed by N95 versus disposable surgical masks) and eye protection<sup>[16]</sup>. With a mean incubation period of 5.1d<sup>[17]</sup>, patients infected by SARS-CoV-2 can be asymptomatic<sup>[18]</sup> and spread the disease<sup>[19]</sup>. In February 2020, the Diamond Princess cruise ship was quarantined for two weeks off the coast of Yokohama, Japan following an outbreak of COVID-19. Out of the 3711 passengers, 634 tested positives for COVID-19. It was estimated that 17.6% of these were asymptomatic<sup>[20]</sup>. The prevalence of asymptomatic COVID-19 in foreign nationals leaving Wuhan, China at the height of the epidemic has been reported between 1.3%-1.8%<sup>[21-22]</sup>. Undocumented rates of infection have been estimated up to 86%<sup>[23]</sup>. There has already been a documented case of asymptomatic SARS-CoV-2 carrier transmission in Germany<sup>[24]</sup>. One of the three ophthalmologists (Li Wenliang) from the Central Hospital of Wuhan who died from COVID-19 in February 2020 is thought to have contracted the disease from an asymptomatic glaucoma patient<sup>[25-28]</sup>. Given the fact that ophthalmologists may themselves be asymptomatic carriers and see multiple patients each day, mask-wearing may prevent infection of patients. The importance of this will depend on the rate of community transmission in a population but is particularly relevant for ophthalmologists whose patients tend to be older

and co-morbid (the most vulnerable to severe morbidity and mortality by COVID-19)<sup>[29]</sup>.

Surgical masks are currently recommended for ophthalmologists seeing asymptomatic patients in some or all areas of the USA, UK, Italy, China including Hong Kong area, Singapore and South Korea<sup>[3,30]</sup>. Countries and areas with high levels of mask usage including Singapore and Hong Kong, China have tended to have lower doubling times of COVID-19 infection<sup>[31]</sup>. For masks to be effective, they must be properly fitted, worn properly without readjustment and doffed correctly without touching the front of the mask. Importantly, a mask alone does not confer strong protection against SARS-CoV-2 infection<sup>[2,4]</sup>. Standard precautions, including hand hygiene, other forms of PPE (gown, gloves and eye protection), respiratory hygiene and cough etiquette all remain critical elements in mitigating infectious risk. In addition, simple measures such as avoiding close contact with patients, minimising speaking during consultations and installing breath-shields on slit-lamp biomicroscopes (regularly disinfecting them to prevent fomite transmission) are recommended.

Public policy should be driven by science first and resource allocation second. There is mounting evidence to recommend the use of masks by both ophthalmologists and patients, even when both parties are asymptomatic. Limitations in PPE supply can be addressed in multiple ways, including reclamation, reuse and repurposing<sup>[32]</sup>. It is critically important that ophthalmologists are aware of the risks of COVID-19 infection to themselves and their patients and stay abreast of evolving evidence to guide their own decisions on PPE when caring for patients.

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