

# Face Shields offer improved effectiveness compared to face masks in the general public.

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## Summary

While recommended for the general public during the 2020 coronavirus pandemic, there is little evidence to support the use of face masks in preventing the spread of SARS-CoV-2. However, face shields may provide superior protection when worn with or without a face mask.

Several experts across the U.S. support the recommendation of face shields for use by the general public.

### **Key Advantages over Face Masks:**

- + Increased durability
- + Easier to clean and reuse
- + Covers eyes as well as nose and mouth
- + Deters subconscious face touching
- + Does not obstruct breathing
- + More comfortable
- + Does not cause glasses to fog

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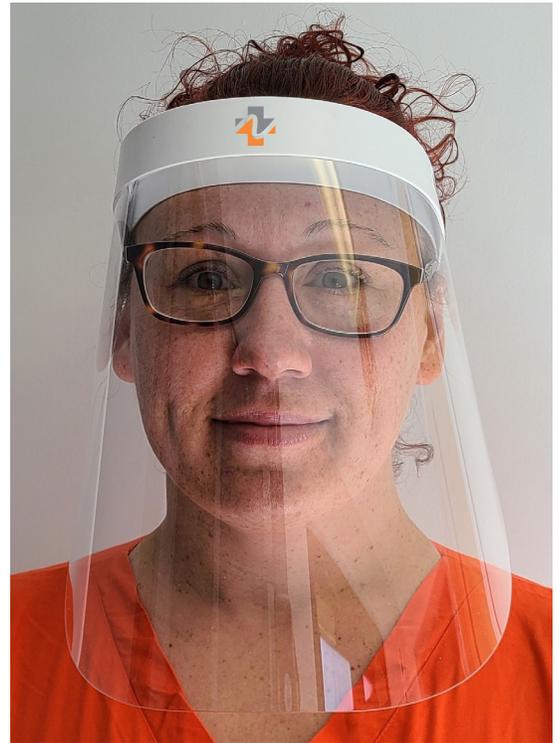
Currently, there is no vaccine to prevent coronavirus disease 2019 (COVID-19) brought on by the SARS-CoV-2 virus. According to the Center for Disease Control (CDC), the best way to prevent illness is to avoid viral exposure.<sup>1</sup> The mode of SARS-CoV-2 respiratory transmission is not completely understood, but thought to spread between people who are in close contact with one another (within about six (6) feet) by virus-containing droplets released when an infected person breathes, speaks, laughs, coughs, or sneezes. These droplets may then land in the mouths, noses or eyes of people nearby. The droplets can also land on nearby surfaces that others then touch – spreading the infection by touching their eyes, nose, or mouth.<sup>1,2</sup> It seems less likely the virus spreads through the air, as the attack rates are considerably lower than other airborne viral pathogens such as chicken pox or measles, transmitted by smaller aerosols.<sup>3</sup> Given these considerations, health authorities recommend social distancing, frequent hand washing, and using face coverings when out in public. As cities and states ease stay-at-home orders and strict forms of social distancing, the Infectious Diseases Society of America (IDSA) included societal use of personal protective equipment (PPE), such as masks and face shields, in its recommendations.<sup>4</sup>

Face masks (surgical and/or the do-it-yourself variety) have become commonplace, if not required, to enter many establishments throughout the country. The effectiveness of face masks in preventing the spread of the SARS-CoV-2 virus is largely unknown. Existing studies have provided a mix of results.<sup>5,6</sup> Handmade cloth masks have become widely adopted by the greater community. These types of masks have been shown to be less effective than surgical masks for prevention of communicable respiratory illnesses,<sup>6</sup> but are more readily available. Materials commonly used to produce cloth masks may only provide marginal protection against virus-containing particles in exhaled breath.<sup>7</sup> Due to potential moisture retention, reuse of cloth masks and poor filtration may increase risk of

infection.<sup>8</sup> Furthermore, the effectiveness of any face mask at filtering incoming or outgoing air is likely compromised by leakage that typically occurs around the mask, which can be substantial, especially for non-N95 masks.<sup>9</sup> The quality of mask fit undoubtedly varies by individual. In the end, it is uncertain how effective the face mask policies have been in controlling the spread of COVID-19.

Face shields could be an increasingly useful tool in limiting the transmission of respiratory viruses, such as SARS-CoV-2, helping to minimize droplet and contact transmission. A recently published JAMA Viewpoint discussed how limitations to the supply chain have made obtaining medical masks for the general public difficult, and face shields for the community may be a viable alternative.<sup>3</sup> Face shields reduced immediate viral exposure by 96% when worn by a simulated health care worker within 18 inches of a cough.<sup>10</sup> When the study was repeated at a distance of six (6) feet, face shields reduced inhaled virus by 92%.<sup>10</sup> While no existing studies have evaluated face shields for containing a sneeze or cough by the wearer,<sup>3</sup> but based on a face shield's ability to provide a physical barrier this appears to be a possible benefit. As such, the University of Iowa now requires all University Health Care staff to wear faces shields while on campus.<sup>11</sup> Other experts in the field suggest that individuals may be best protected by wearing face shields. A UCLA infectious diseases expert, Dr. James Cherry, believes face shields are more effective than masks in protecting the wearer from viral infection.<sup>12</sup> He stated that supermarket cashiers and bus drivers who aren't otherwise protected by plexiglass barriers should be wearing face shields.<sup>12</sup> Similarly, Dr. Robert Kim-Farley, an epidemiologist and infectious diseases expert at UCLA's Fielding School of Public Health, said face shields would be helpful for those who encounter lots of people every day.<sup>13</sup>

Face shields offer several advantages over the use of face masks alone. Face shields offer durability, reusability, and a greater deterrent to unconsciously touch one's face.<sup>3,12-14</sup> The possibility of contracting SARS-CoV-2 through the eyes is under investigation.<sup>15</sup> Guangfa Wang, a member of the national expert panel on pneumonia in China, reports to have come down with pneumonia after exposure to SARS-CoV-2, which was preceded by eye redness.<sup>16,17</sup> Wang wore an N95 mask but was not wearing any eye protection. Additionally researchers successfully inoculated Rhesus monkeys with the SARS-CoV-2 virus via eye swabs, confirming this is a viable infection route.<sup>18</sup> A study in Hong Kong published in *Lancet Respiratory Medicine* on May 7, 2020 also showed that the SARS-CoV-2 virus was highly infective of cultured human conjunctiva (the outer protective membrane of the eye) explant tissue, with 100x higher viral replication rates than SARS-CoV.<sup>19</sup> The American Academy of Ophthalmology updated recommendations that PPE be worn by medical personnel to protect mouth, nose (e.g., an N95 mask), and eyes (e.g., goggle or face shield) when caring for patients, especially those suspected of having COVID-19.<sup>15</sup> Additionally, a recent news article and several



**Figure 1: Actuated Medical Reinforced Face Shield.**

published reports suggest that the virus can cause conjunctivitis (i.e., pink eye), so face shields could offer source control in this regard.

Other advantages of face shields for the general public appeal to usability and functionality. Face masks often cause discomfort, leading to constant fidgeting and re-adjustment. This extra touching could spread contamination from the outside of the mask. Additionally, face mask wearers may loosen the fit and/or uncover their nose to improve breathing, greatly reducing filtering effectiveness. Face masks also make it difficult to communicate as the listener can no longer see lip movement (especially important for hard of hearing individuals), and the mask tends to muffle speech. To overcome this, the speaker tends to strain or

Product Comparison	Surgical Face Mask	Cloth Face Mask	Face Shield
			
Prevents wearer from spreading large molecule respiratory droplets	✓	✓	✓
Protects wearer's eyes	✗	✗	✓
Reusable/Able to Disinfect	✗	✓	✓
Allows visible communication	✗	✗	✓
Deters subconscious face touching	✗	✗	✓
Easy to breathe in	✗	✗	✓
Availability	Limited	Readily	Readily
Price	\$0.05-1 / ea.	\$2-20 / ea.	\$6-12 / ea.
Assumption that all PPE is properly worn as directed			

Figure 2: Feature Comparison for Face Masks and Face Shields.

raise their voice, increasing the emission of respiratory droplets according to experimental studies.<sup>20</sup>

In conclusion, whether used by themselves or with face masks for broader protection, face shields should be considered an essential form of PPE for the general community during the COVID-19 pandemic. This will be increasingly important as stay-at-home orders and restrictions ease. Social interactions will inevitably increase in the coming months. We all must continue to avoid touching our mouths, noses, and eyes with unwashed hands and follow social distancing guidelines. However, when choosing what PPE you will be wearing out in public, it is critical that it is used properly to provide the expected level of protection. Use of a face shield as in addition to masks or as a standalone can provide the wearer extra protection and may help slow the spread of COVID-19.

#### **About Actuated Medical, Inc.**

Actuated Medical develops medical devices that integrate electronically controlled motion technologies that improve patient outcomes and reduce healthcare costs. Actuated Medical a certified women-owned business located in Bellefonte, PA and is ISO 13485 certified. In response to the COVID-19 pandemic, Actuated Medical shifted to manufacturing Face Shields in its FDA-compliant facility. Actuated Medical, Inc. does not make any claims of safety or effectiveness of its face shields for any intended use.

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