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Lance Daley

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Masks Play a Key Role – Regardless of COVID-19 Vaccines

By Lance Daley

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Staff Article

Since the first reported case of COVID-19 in December 2019, there have been over 100 million cases and over 3 million deaths due to complications from the coronavirus. The framework of health systems and economies across the globe have been significantly taxed as a result of the abundance of cases, with hospitals going over maximum capacity and many businesses having to close their doors permanently. As a result, people have become isolated and divided over solutions for combating the spread of the virus. Increasing evidence supports that COVID-19 is mainly spread through airborne droplets, such as from talking, coughing, and sneezing. Face masks could be an inexpensive and effective option for slowing the spread of the virus. A study of Beijing households in March 2020 revealed that face mask use in households with at least one positive case reduced transmission of the virus by 79%.¹ Face masks, whether they be cloth or medical, are an effective solution for preventing the spread of COVID-19.

In a recent study published by Li et. al in *PLOS One*, researchers simulated the spread of the virus based on varying levels of mask wearing.² The model used for the simulation (known as a SEIR model) is popularly used to simulate disease outbreaks, like the COVID-19 outbreak. The model works by adjusting the following populations over time: people susceptible to the virus (S), people exposed but not showing symptoms (E), people infected (I), and recovered individuals (R). Using this data, the approximate rate of infection of the virus can be calculated, without accounting for any preventative measures such as mask wearing and social distancing. The goal is to compare how accounting for mask wearing in different capacities (as well as the varying effectiveness of different mask styles) could affect the rate at which people become infected with the virus.

When conducting the simulation, the researchers took into consideration access to medical resources, population densities, and cultures that might affect mask wearing and transmission rates. The approximate percentage of droplets stopped from escaping the mouth by a mask (40-75%), the amount of people potentially wearing a mask at any given moment (8-100%), and the availability of masks to the population (5-100%) were tested by the researchers at these specific ranges to represent different situations throughout the world. For example, some industrialized countries can produce masks for almost all of their population and have a reserve readily available. Countries that are less developed or depend on other countries for goods may experience a shortage of masks.

Switzerland, which only produces enough masks to accommodate around 30% of its population, relies on other countries to provide an adequate number of masks.³ If countries producing many masks decide to keep them mainly for themselves, Switzerland and countries in similar situations could be left to face the dire consequences of a severe COVID-19 outbreak without any means to stop it. The governments of big mask-producing countries have an enormous impact on global supply chains depending on their responses. On March 8, 240,000 face masks from Germany that were bound for Switzerland were returned as the country announced a national ban on the export of medical equipment.³ State-centered politics like this could lead to the downfall of an effective global response by preventing needful countries from receiving medical equipment.

The final results of the simulation showed that the rate of infection dropped by more than 20% in scenarios where over half of the population wore masks. This rate increased to more than 70% in populations where everyone wore masks. The only scenarios that did not exhibit a significant drop in infection rate were those where only 8% of the population were estimated to be wearing masks. This data further supports the benefit of a global call to action for enforcing mask-wearing guidelines for all public areas, not just at the jurisdiction of businesses. Although it is implausible to reach a 100% rate of mask-wearing, improving mask-wearing rates would significantly decelerate transmission rates.

In practical situations, a low rate of mask-wearing could be attributed to a shortage of medical supplies, unwillingness to wear a mask, lax government attitudes, underlying medical conditions, or a combination of these factors. In a country such as the United States where medical supplies and cloth face masks are readily available, the use of a face mask could significantly slow down the rate of transmission, especially considering the potential for increased travel and social gatherings as summer approaches.

Although the Pfizer and Moderna COVID-19 vaccines are being distributed around the world, the vaccine could take a while to reach the entire population of and be effective in a large country like the U.S. In Pennsylvania, Governor Tom Wolf proposed that on April 19, all Pennsylvania residents will be able to get a COVID-19 vaccine if they wish. Despite this, appointments may be scarce and still take place for many months after this date. Along with this, the process of being vaccinated takes about a month to complete.⁴ In third-world countries, the wait for the vaccine could be even longer. The potential for a long wait for distribution of the vaccine further reinforces the need to wear masks in order to slow down the rapidly increasing curve of the virus.

With this in mind, the vaccine itself may not completely return society back to normal right away. The effectiveness of the vaccine and the percentage of people who actually get the vaccine will greatly impact the spread of the virus in the future. Even if the vaccine is highly effective, if less than half of a population gets it, the efforts to reduce the spread will be largely futile. This is because there would still be potential for those who have not received the vaccine to spread and experience severe symptoms of COVID-19.

Like other viruses, the concept of herd immunity applies to the virus that causes COVID-19. Herd immunity is the idea that almost all of a population has become immune to a specific virus; this reduces the spread of the virus because the number of people who can become infected and spread it have been significantly reduced.⁵ In this case, if someone has a contagious virus and is not immune to it, it is unlikely they will spread it to anyone else considering most people are vaccinated or immune. Herd immunity can be obtained through either a large proportion of people gaining immunity from exposure to a virus or through

vaccination. Immunity from exposure to the virus risks developing symptoms and complications that not only could have negative health consequences but could lead to death. Along with this, the antibodies produced from being infected with the virus likely only last in the immune system for around 8 months, according to the National Institute of Health.⁶ For these reasons, vaccination is a much less dangerous way of effectively obtaining immunity. Historically, herd immunity against Measles requires about a 95% vaccination rate and herd immunity against Polio requires around an 80% vaccination rate.⁵ The proportion of people exactly needed to induce herd immunity with COVID-19 is unknown, but estimates by researchers show that herd immunity may occur around a 50-70% vaccination rate.⁷ Although this estimate is not as intense as those for Measles and Polio, this does not mean COVID-19 should not be taken seriously. COVID-19 is highly contagious and has already caused many deaths worldwide. A high vaccination rate and reaching herd immunity is also vital for younger children unable to receive the vaccine as well as anyone else who may not be able to due to health or personal reasons. It will take a combination of vaccinations, mask wearing, and social distancing to reach herd immunity as fast as possible.

Analysis by the *British Medical Journal* shows that the Pfizer vaccine has a 95% efficacy rate after two doses.⁸ Assuming this is accurate, the curve of infection should begin to slow down if most of a population gets the vaccine. Additionally, preliminary research indicates that those who are vaccinated are less likely to transmit SARS-Cov-2, but more research is necessary to verify this.⁹ Encouraging social distancing and enforcing mask-wearing throughout 2021 would lessen the likelihood that those who have not received the vaccine would become infected. Further research on COVID-19 vaccines needs to be conducted in order to identify the full effects of the vaccines. At this time it is known that those who are vaccinated will be immune from the illnesses caused by the virus, but there may be a chance that they can still spread the virus. Continuing mask-wearing also prevents the spread of the virus by reducing exposures from those who are already vaccinated but may still carry and spread the virus. Those who are vaccinated could potentially be asymptomatic carriers, although vaccinated individuals are thought to be less likely to spread the virus. Combining aggressive mask-wearing restrictions with a highly effective vaccine would curb the increasing transmission rate faster than the help of a vaccine alone.

The impact of the vaccine, although potentially monumental, will likely hinge on social distancing and mask-wearing efforts. With the Biden administration in office, there are encouraging signs that a more assertive attitude towards mask-wearing and social distancing will be implemented in the U.S. In a speech in Delaware, Biden stated that he “will mandate mask-wearing in all federal buildings and all interstate transportation because masks save lives - period”.¹⁰ As of March 8, five states have lifted their mask mandate requirements for public places, namely Texas, Mississippi, Montana, Iowa, and North Dakota.¹¹ These states join the 11 states that never required masks in the first place. States should be enforcing mask-wearing to expedite the process of lowering the number of COVID-19 cases. Vaccination efforts will be most effective when assisted by mask-wearing and social distancing. The focus should be to aggressively combine mask-wearing, vaccination, and social distancing to reach a point that society can return to normal. Attempting to open up consumer sectors without requiring mask-wearing while infection rates are still high will only repress the potential effects of the vaccine. Although COVID-19 has dampened the lives of many thus far, a more assertive approach towards vaccination and mask-wearing could mean better days are ahead for all.

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