

Mask wearing to complement social distancing and save lives during COVID-19

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Running head: Masks complement social distancing

Article submitted 9 April 2020. Final version accepted 16 April 2020.

COVID-19 is having a dramatic impact on health care systems in even the most developed countries. When there is no effective vaccine, breaking the transmission link is the main method for containing an infectious disease. Lockdowns of cities or countries have spread almost as fast as the exponential growth in the number of infections and deaths, but the disease trend has yet to be definitively reversed in the most severely affected countries.¹ In those few countries where the number of new cases or deaths has peaked, this often occurred too late to avert a major blow to the economy.

Social distancing is critical in slowing this rapidly spreading pandemic. However, a high degree of compliance is needed for it to exert the greatest impact and it may not be easily achievable, especially in Western cultures. Even during a lockdown, there are necessary person-to-person contacts, such as going to supermarkets or seeking medical care, and other

activities necessary to sustain the livelihood of citizens and communities. As people are constantly moving, the virus can be picked up from and/or passed onto objects if they are not wearing masks even when social distancing is rigorously practiced. These loopholes may bring the SARS-CoV-2 virus back to homes, institutions, and staff required to provide essential services, thus nullifying much of the effects of the lockdown.

The SARS-CoV-2 virus replicates rapidly and independently in the upper and lower respiratory tract at an early stage of the disease,² and it can persist in aerosols and droplet-contaminated fomites for hours and days.³ Controlling a respiratory infection at source is often more cost-effective than targeting multiple intervention points downstream for environmental control or personal protection. Asymptomatic infected persons with high viral load are being increasingly recognised, and transmission from these silent sources has also been reported.⁴ It therefore follows that source control needs to be applied not only for those with obvious symptoms, but also for everyone in situations where people congregate. While there have not been randomised controlled trials to show the efficacy of mask wearing, surgical masks on tuberculosis patients are reported to have reduced aerosol transmission to guinea pigs by 56%.⁵ Ignoring for one moment the much higher efficacy of surgical masks in intercepting infectious droplets at source, a 56% decrease in infectivity would transform a basic reproductive number (R_0) of 2.2,⁶ to give an effective reproductive number of 0.97. Theoretically at least, if everyone wears a mask during all person-to-person contact, the progressive decrease in the number of new infections in successive generations would eventually bring the pandemic down.

To most people who live in countries such as China and South Korea, the refusal to wear masks to complement social distancing is irrational when countries are prepared to accept a far more extreme measure such as lockdown. The immediate introduction of mass wearing of masks would help to maximise the effect of social distancing in slowing down the exponential growth of the epidemic, and allow sufficient time to reinforce our health care facilities and salvage countless lives. Waiting indefinitely to adopt mask wearing only when we are ready to re-open for business is not an option, as protracted lockdown is devastating to the global economy. Emergency legislation to enforce the wearing of masks should be considered if community compliance falls short of 100%. Mask wearing by possibly infected persons will reduce environmental contamination and transmission, at home or in health care facilities. Mask wearing by staff at work will minimise the risk of outbreaks in institutions and essential services. In Hong Kong, where there has been close to 100% mask wearing in

public places for more than 2 months, there is no evidence that wearing a mask leads to a relaxation of social distancing or hand hygiene practices.

There are severe shortages of disposable surgical masks. Some authorities, including the US Centers for Disease Control and Prevention, therefore advocate the use of cloth masks as a sustainable substitute for general community use. Masks can be made from a wide variety of materials available in our homes,⁷ and can be reused multiple times after washing with detergent or hot water. With political will and community mobilisation, huge quantities could be rapidly produced and distributed through enlisting the support of government, commercial, industrial and voluntary agencies. The Czech Republic has managed to produce cloth masks for 10 million people within a matter of days to allow compulsory mask wearing in public places.⁸ There have been some misconceptions about the cloth mask. Cloth masks are not alien to either Eastern or Western cultures. They were regularly used by surgeons performing operations before disposable masks became available. Gauze masks were advocated by the American Red Cross to protect sick and healthy persons during the 1918 Spanish Flu Pandemic (Figure). It is frequently claimed that surgical masks are a few times more effective than cloth masks, as they showed around 10% and 30% leakage, respectively, when tested with fine microbial particles.⁷ Nevertheless, the ability of cloth masks to intercept about 70% of infectious particles is a very meaningful benefit for any public health intervention, even though this is inferior to the figure of 90% for surgical masks.

A clustered randomised trial comparing cloth masks and surgical masks in health care workers is often cited as evidence against the use of cloth masks.⁹ However, that study was conducted in a high-risk setting in Viet Nam to assess the effectiveness of cloth masks in protecting healthcare workers from flu-like illnesses. It therefore addressed a very different question from the role of mass wearing of masks for source control in the community during the COVID-19 pandemic. Also, studies on the protective efficacy of masks are hampered by the fact that healthcare workers may be infected by the flu virus in ways other than from just patient contact. Studies on protective efficacy in cluster trials are further hindered by cross-transmission among healthcare workers through social contact and shared use of facilities outside patient care. As healthcare workers in each cluster are often infected in a synchronized manner, this reduces the effective sample size largely to the number of clusters. The published study only had 75 clusters randomly assigned into three groups: cloth mask, surgical mask and usual practice.⁹ Chance was likely a key factor in the observation of an exceptionally high infection rate in the cloth mask group, and attributing this to the type of

mask may be nothing more than speculation. We believe it is scientifically unsound to reject cloth masks for community use on the basis of this one study.

This pandemic will affect many aspects of our lives in our global village. Major recessions in the large economic powers will have massive repercussions for the smaller economies. The full impact of the pandemic is yet to be seen in Africa, Asia and South America. China's success in combating the virus shows the power of everyone working together.¹⁰ A mask that we all wear in public places shows a shared goal to protect each other, rather than mutual incrimination and discrimination.¹⁰ Let us all strike out in solidarity to conquer this most dangerous enemy in mankind's recent history.

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Figure: Historical picture of ladies wearing a surgical mask during the 1918 influenza epidemic (left panel) and picture of the potential problems faced by the population in wearing masks in the absence of adequate health education (right panel).

