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EDITORIAL

Combating the tridemic: new guidelines, masking and altruism

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Over the past three years, COVID-19 control measures have led to an unintentional lowering of the prevalence of common respiratory infections.[1,2] Herd immunity has accumulated as a result of natural virus circulation and vaccination, so non-pharmaceutical COVID-19 control measures have been progressively withdrawn.[3] In the United States, there are alarming signs of a tridemic involving COVID-19, influenza, and respiratory syncytial virus (RSV).[4–6]

Advances in research on COVID-19 and aerosol dynamics reveal the key role of airborne transmission for SARS-CoV-2 and other common respiratory viruses.[7,8] However, current infection control guidelines have not been updated to highlight this newly acquired knowledge.[9] The well-known hierarchy of administrative control, environmental control and personal protection was established largely through earlier experiences with TB control.[10] These measures need to be urgently updated to overcome the challenges from faster virus shedding, shorter incubation periods and greater transmissibility of many respiratory virus infections. Administrative control is much more difficult with a virus that can spread rapidly before symptoms occur or in asymptomatically infected individuals,[11–13] particularly if a highly sensitive point-of-

care diagnostic test is not available. Ventilation remains useful for long-range aerosol transmission, but ventilation dilution is too slow to stop transmission at short range or when high infective loads are continuously emitted by breathing, talking, singing, coughing or sneezing, particularly within an elated gathering of many individuals in confined settings.[7,8]

Wearing a well-fitting mask can reduce transmission, both by controlling the source and by providing personal protection.[11,14] If both parties wear a mask that is 80% effective for source control and personal protection, their combined effect would reduce the risk to (1 - 0.8) x (1 - 0.8) = 4%, compared to when only one party wears a mask the risk is 1 x (1 - 0.8) = 20%. Existing advice to ask only symptomatic or vulnerable persons to wear mask is less effective than universal masking. Transmission often occurs in asymptomatic or pre-symptomatic persons for COVID-19, influenza or RSV.[11–13] In the Greater Boston area of Massachusetts, United States, the lifting of universal masking requirements in school districts led to a doubling of case rates among both students and staff in the following 15 weeks compared to school districts that sustained the mandatory requirement, even when their baseline rates were similar.[15] This could have underestimated the actual protective effect, as students and staff in all school districts were similarly exposed to other infectious sources outside schools following the general relaxation of the masking requirement in Massachusetts. As shown in the Figure, the theoretical protective effectiveness of masks increases rapidly with increasing mask coverage. Using an 80% effective mask (for source control and recipient protection), the overall transmission risk increases from 4% (of the unmasked level) when everyone in a group wears a mask, to 36% when only half do so.

The waning or low herd immunity for COVID-19, influenza and RSV could interact with behavioural changes and colder weather to trigger a tridemic of these airborne respiratory infections in the northern hemisphere this winter.[4,16] Vaccination access and/or uptake may still remain suboptimal for COVID-19[16,17] and influenza[18] in many countries, and vaccines for RSV are still in development. Although oral antivirals are now available for COVID-19 and influenza, they may not be easily accessible or affordable for relevant high-risk groups, especially in low- to middle-income countries. Masking is a readily available and highly effective tool to control airborne transmission of these common respiratory infections. Unfortunately, strong public desire to return to normality may have generated an overt or subtle social pressure to remove the mask,[16] although this simple tool can potentially save lives in aggregate settings.[19,20] Social

prejudice and political hurdles may also hinder the re-introduction of masking requirements, at least indoors. Cultural norms differ between countries and ideological differences also affect how one perceives the role of the mask. However much we desire to resume a "normal" life, during a tridemic, altruism and solidarity are needed to promote masking to protect large, vulnerable segments of our population.[21] A debate on this issue by the medical and scientific communities is most welcome.

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Figure. Relative reduction in transmission risk by the proportion of persons on a mask 60% or 80% effective for both source control and recipient protection in a uniformly mixing aggregate setting. The overall transmission risk relative to unmasked level is estimated by the weight-adjusted average of the relative transmission risks of four 2 X 2 source-recipient masking combinations: source no mask, recipient no mask: relative risk = 1 X 1; source no mask, recipient mask: relative risk = 1 X (1 - mask effectiveness); source mask, recipient no mask: relative risk = (1 - mask effectiveness) X 1; source mask, recipient mask: relative risk = (1 - mask effectiveness) X (1 - mask effectiveness). The weight for each combination is the product of source and recipient, both as proportions of the whole group.