

I am honoured to have the opportunity to discuss this topic in a public forum, especially that it gets to be with my most learned colleague Ken Milne EBM specialist, and Emergency medicine communicator extraordinaire. And one of the most fascinating aspects of all this is here we are, two months after a pandemic touched down in our corner of the world, and we as a society, are barely even talking about this public health measure. 103 Countries, 13 US States, over 2 billion people either have mandated mask laws or have innate mask use of over >80%. Here in Canada? We have mandatory mask laws for (Let me check my notes) exactly zero people. In the old medical adage, Never be the first, nor the last, doctor to use a new medication. We are at risk of becoming the latter.

It seems to be accepted now that public masking works. Quite the evolution. Six weeks ago the recommendation was only wear a mask if you are symptomatic. Next “You can think about the option of possibly thinking about wearing a mask. Or not” Now: this is a good idea we strongly recommend it. it is time to take the next step and make mask mandatory.

The big shift came when we learned about the frequency of asymptomatic, presymptomatic and paucisymptomatic spread. That’s what made this sequel of SARS2 so much more dangerous than the original SARS11. In the first iteration in 2003, only sick people were infectious. Now we know peak spread of COVID 19 occurs from 36 hours before onset of symptoms to five days after. And that approximately 50% of transmission occurs in that first, presymptomatic period. Nevermind the paucisymptomatic and asymptomatic spreaders.

There is a paradigm in safety science called the Swiss Cheese Model. Think of every public health intervention as layer, trying to prevent spread. The more layers we add, the safer we become. Our key layers so far have been don’t go out if you’re sick, temperature checks at hospitals and other entries, lockdowns on communities, robust testing and contact tracing, physical distancing > 2m if you leave the home, and copious hand hygiene. Well, Because of presxatic spread two of those layers instantly become more full of holes: don’t leave the home if your sick, and temperature checks. B/c you can feel fully well and normal temperature and still be a typhoid mary. Which leave the remaining four. And guess what? We’re starting to remove yet another layer. Lockdowns.

Which brings us to masks. Just adding another layer of protection. And important to note, this i in addition to the other layers. So if we are in agreement with Dr. Tam and the other CMOHs that mask work well for source control, then we need to start getting a lot more people to wear masks. A lot more. Current data shows 34% of Canadians have worn a mask in public in the last two weeks. And two good modeling papers show that in order for us to effectively drop the Rnought of masks to below one, presuming that cloth masks are 60% effective at preventing source transmission, we need at least 60% of the population to be wearing masks. Which is where mandating masks come in.

We can see that with other public health interventions, asking nicely just doesn’t cut it. Seatbelt use in Alberta, prior to a mandate, was 20%. After, 70%. Similar numbers for bicycle helmet laws.

In summary, public masking is an effective, likely essential, public health measure in a pandemic. Only mandates will get us to the adherence rates necessary to substantially drop the Rnought, allowing us to decrease deaths, illness, and reopen the economy sooner and more robustly.

It is unfortunate that [the same level of evidence for the benefits of masks isn't being applied to the harms of masks](#). Infections from the outside of masks... definitely an issue in the ER, when working with COVID +ve patients. For the public? Unknown, and commonsense would be not an issue. Improper donning and doffing? Again, an issue in the ER. For the public? Unknown. Risk compensation theory? [I could go into a twenty minute diatribe on why this is theoretical malarkey](#), and will if I'm asked, but there is literally no evidence of this for any public health intervention, be it [ski helmets](#), or [seat belts](#), or [sex education for teens](#), or [condom distribution to prevent AIDS](#).

Let's dig in a little deeper on the evidence behind public masking. A foundation of EBM is the pyramid of evidence, with the pinnacle being systematic reviews and Randomized Control Trials. [There are five RCTs that look at the value of masks as PPE, meaning, for controlling a wearer from getting infected](#). Four of these support the utility of masks to this, and this has been enough to allow the [Cochrane database of Systemic Reviews to label masks as a reasonably option to stop the spread of respiratory viruses](#).

The corollary, using masks as source control, so using a mask to prevent an infected person from infecting others, has never really been studied in a systemic fashion. In particular, there has never been an RCT looking at this issue at a population, rather than individual scale. I can envision how you would have to go about this. Pick two similarly sized cities, say Edmonton and Calgary, or Oshawa and Kitchner. Make sure each city starts with the same percentage of infected people. Tell all the people of Calgary to wear masks, and forbid the Edmontonians to wear them. Make sure each city otherwise behaves identically. Then measure the prevalence at the end.

So. Kind of impossible to get this level of evidence for population level evidence. Yet policy makers still need to make a decision, despite this absence of "gold-standard" evidence. This is where the precautionary principle comes to play. If you are releasing a chemical into the environment, and the possible harms totally outweigh the possible benefits... don't do it. Here, we have a situation where the possible benefits are 1) thousands to tens of thousands lives saved. 2) reopened economy 3) health care dollars saved. And the possible harms are 1) facial dermatitis and 2) some destroyed t-shirts. Then you go with the intervention.

Fortunately, we're not just working in a complete information vacuum, just an RCT vacuum. There are other levels of evidence we can use. Observational data, case-control studies,

lab bench experiments, and even anecdotes are still on the hierarchy of evidence that can be used by policymakers.

Lab bench experiments: We know the virus is 125 nm. We know that the virus is spread by droplets, and that speech produces droplets of 1-10 micrometres, and that surgical masks filter 89% of particles larger than 0.02 micrometres, cloth masks 49-85% filtration, depending on the material used.

Case-Control: In the 2003 SARS epidemic 28% of the infected were habitual mask wearers, vs. 59% of the non-infected.

Observational: every country that has mandated masks prior to April 1<sup>st</sup> has substantial bent the curve, and many have reopened their economy without a reintroduction of COVID wave. This includes S. Korea, Taiwan, Austria and Czechia. This is for sure hypothesis generating and not a conclusion, as there are confounders, and correlation is not the same as causation, but pretty powerful nonetheless. I know which curve I'd rather be on.

Anecdotal: The choir superspreader event, where 52 out of 60 choir members got infected, likely from a single symptomatic member (there may have been some asymptomatic choir members infected from another rehearsal 7 days previous). The authors surmise that face coverings may (or may not) have prevented so much transmission.

And don't even get me started that we haven't applied the same rigorous evidence filter to the benefits of harms of 2 m distancing, school closures, lockdowns, and other public health interventions.

I would submit that using the terms "there is no evidence to indicate.." should be replaced by the term "there are no RCTs supporting this, but there is these alternate sources of evidence which we should base our policy decision on". If there is a high likelihood of immense benefit to society from mandating masks, and a low likelihood of harm, policymakers should err on the side of mandating masks.

There are still questions to be answered. What's the role of governments in supplying masks to those who can't make them, in particular the homeless, seniors, and disabled? When does the mandate apply? Whenever you leave the house? Whenever you can't physically distance more than 2 m? Only in stores, transit and workplaces? Does it apply to the entire country? Only those areas where there is community spread? In particular to those areas without community spread, to prevent the spark from igniting the fire? These details are best left to policy makers. But with 103 countries ahead of us, we can look to other jurisdictions to inform best practices.

This isn't a game. We're having fun here, with our discussion of levels of evidence. But this isn't just an esoteric exercise. This same debate is occurring in the offices of Canada's politicians and chief medical officers. And if they ignore the copious evidence supporting the need for mandatory masking, I am concerned people are going to die. Real people, not just statistics. Every death is a parent, a grandparent a loved one. Lockdowns are going to be re-

enacted. The economy will suffer. Action on the climate crisis will be delayed. And all of that devastates me. And it's why I'm putting myself out there, trying to fight for truth, and a better, safer, healthier pandemic response. I protect you. You protect me. We all protect society.

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45. T Suess, et al., The role of facemasks and hand hygiene in the prevention of influenza transmission in households: results from a cluster randomised trial; Berlin, Germany, 2009-2011. *BMC infectious diseases* **12**, 26 (2012).
46. BJ Cowling, et al., Facemasks and hand hygiene to prevent influenza transmission in households: a cluster randomized trial. *Annals Intern. Medicine* **151**, 437–446 (2009).
47. AE Aiello, et al., Mask use, hand hygiene, and seasonal influenza-like illness among young adults: a randomized intervention trial. *The J. Infect. Dis.* **201**, 491–498 (2010).
48. AE Aiello, et al., Facemasks, Hand Hygiene, and Influenza among Young Adults: A Randomized Intervention Trial. *PLoS ONE* **7** (2012).

2. This is excepting the Latin American Countries, like Chile, Ecuador, and Peru, which, despite mandatory masking laws, continue to have substantial spread.