Masks, false safety and real dangers, Part 2:
Microbial challenges from masks

Boris Borovoy, Colleen Huber, Maria Crisler

Abstract

Face masks have come into common use in many countries since mid-2020, for all age groups. Some aspect of this may be voluntary, but certainly much of this use is either accompanied by force, threats, subtle coercion, or a continuum of subtle to fierce societal pressures on the individual to conform to mask-wearing. From widespread fear of COVID-19, associated with the virus named SARS-CoV2, mask-wearing is recently assumed by many to be a prudent measure against contagion. In this paper, the second in our series, we continue our examination of the potential hazards of masks, in which we now turn attention to microbial contamination from masks and mask use, changes in oral and nasal microbiota, and potential risks to the lungs and other organ systems from microbial factors. Because widespread masking is a very new society-wide experiment, the impact of this experiment, the obstruction of airways from free breathing and a typical air exchange interplay with oral microbiota is not yet known. Furthermore, the effects of such changes in the lungs and beyond are not yet known. This paper will explore some considerations of these changes, by examining mask effectiveness against transmission, historical evidence of epidemiology from the 1918-1919 pandemic, microbial contamination, respiratory disease and the role of oral bacteria in systemic disease; and infections involving fungi, yeast, and molds. Compiling statistical and scientific evidence from these subjects alone should help equip any individual with adequate information on risks and benefits when choosing whether to wear a mask.

Are masks effective in preventing transmission of infection and are there unintended consequences when wearing them?

Face masks have been adopted by the public of several countries in 2020, with astonishing speed. Conflicting instructions from public health authorities left individual citizens unsure of whether to wear a mask, such that relying on gathered commentary from media and acquaintances in order to make such a decision has become standard. When an individual's preferences are not well formed, merely observing another person makes the option chosen by the other person a social default, that is more likely to be chosen by the observer also.[1]

Concerns regarding use of masks among the public have been voiced by many medical professionals. Over 2,000 Belgian medical professionals, including hundreds of medical doctors, have urged prevention of COVID-19 by means of strengthening natural immunity. Their recommendations, among other measures, include specifically to exercise in fresh air *without a mask.* [2] A number of reasons for this concern have been raised. In this paper, we will examine specifically microbial concerns with regard to mask-wearing.

Masks have been shown through overwhelming clinical evidence to have no effect against transmission of viral pathogens.[3] Penetration of cloth masks by viral particles was almost 97% and of surgical masks was 44%.[4] Even bacteria, approximately ten times the volume of coronaviruses, have been poorly impeded by both cloth masks and disposable surgical masks. Face masks became almost ineffective after two hours of use, and after 150 minutes of use, more bacteria was emitted through the disposable mask than from the same subject unmasked.[5] One must wonder, if new masks worn by healthcare workers, that are soiled by wear during a work shift, transmit more bacteria to patients than from an unmasked healthcare worker, then what is happening to the lungs of the mask-wearer?

Use of personal protective equipment (PPE) has long been debated for healthcare workers regarding their interactions with patients who are carrying highly pathogenic organisms, and this study found about half of even trained healthcare workers in clinical settings make at least one protocol deviation in donning and doffing PPE.[6] Certainly the general public without such training is likely to have a higher rate of similar or more egregious errors in PPE protocol. Masks have been determined to be unnecessary even in surgical settings, and of no benefit in preventing infections.[7] In fact, "The rate of wound infections [while unmasked] was less than half what it was when everyone wore masks." Oral microbial flora dispersed by unmasked healthcare workers standing one meter from the workspace failed to contaminate exposed plates on that surface.[8]

Let us also examine the entire surface area of the masked person when considering that person's potential for transmitting pathogens. Facemasks generally only cover the lower half of the face, which we know from studying burn victims is less than 2% of the entire body surface area.[9] We know that numbers of airborne bacteria expelled from the upper airway are insignificantly small compared with the volume of bacteria shed from the skin.[10] The bacteria shed from the skin of mask wearers was found to create more contamination than from non-mask wearers, presumably due to shifting, wiggling and increased rubbing and exfoliation.[11] [12]

The challenge to the masked person is that the lungs normally expel bacteria with freely exhaled breath, a necessary exhaust system not previously challenged throughout human or even vertebrate history with deliberate obstruction. In this paper we also explore both the effect of masks on microbial transmission as well as the risks and demonstrated problems of re-directed and re-inhaled bacteria and other microbes into the airways.

Are masks effective in preventing transmission of COVID-19 in particular?

COVID-19 is a remarkably low transmissibility disease. This paper shows patterns of transmission to close contacts from those who tested positive for SARS CoV2 in New South Wales high schools and primary schools. From 18 initial positive tests, only 2 out of 863 close contacts tested positive as a secondary case.[13]

In July 2020, the Council of Foreign Relations conducted a survey of 25 countries, with the following question to their citizens:

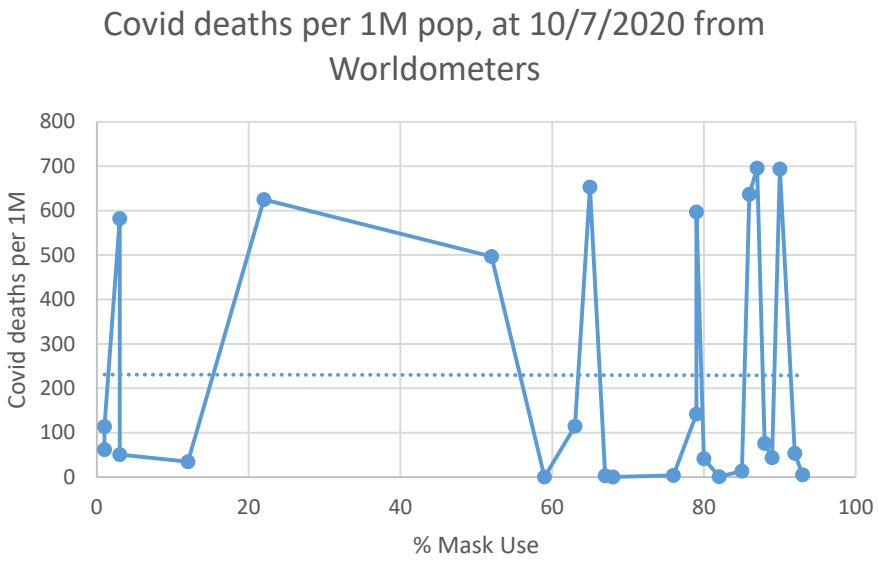
"Have you always worn a face mask outside the home in the last seven days?" The "Yes" responses ranged from 1% in Finland and Denmark, to 93% in Singapore.[14]

We then examined each of the same 25 countries for prevalence of mask use versus Covid-19 deaths per 1 million population. This data was gathered from Worldometers statistics.[15] That data is shown in Table 1, also represented in Graph 1.

Table 1

	% mask use over Jul 6-12, 2020 from CFR survey	Covid deaths per 1M pop, at 10/7/2020 from Worldometers
Singapore	93	5
Philippines	92	54
Brazil	90	694
UAE	89	44
India	88	76
Spain	87	696
Mexico	86	637
Hong Kong	85	14
Thailand	82	0.8
Indonesia	80	42
Italy	79	597
Saudi Arabia	79	142
Malaysia	76	4
Vietnam	68	0.4
China	67	3
United States	65	653
Germany	63	115
Taiwan	59	0.3
France	52	497
United Kingdom	22	625
Australia	12	35
Norway	3	51
Sweden	3	582
Denmark	1	114
Finland	1	62

Graph 1



As we see from the above data, there was no significant correlation with mask use and either increase or reduction of deaths from COVID-19; thus masking could not have caused a significant reduction in deaths. In fact, two of the countries with the highest COVID-19 deaths also had high rates of mask use: Spain at 87% mask use and Brazil at 90% mask use. Again, masking could not have caused a significant reduction in deaths.

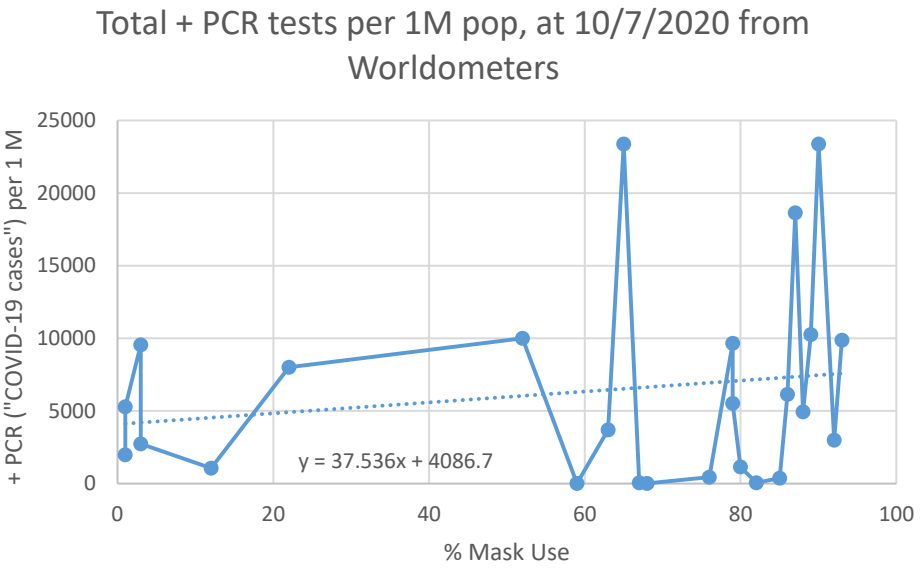
Another table presented from Worldometers data also demonstrates the rate of positive COVID-19 PCR tests per one million population in the same 25 countries surveyed. This data is reported in Table 2 and Graph 2.

Table 2

	% mask use over Jul 6-12, 2020 from CFR survey	Total + PCR tests per 1M pop, at 10/7/2020 from Worldometers
Singapore	93	9866
Philippines	92	2998
Brazil	90	23378
UAE	89	10264
India	88	4938
Spain	87	18654
Mexico	86	6146
Hong Kong	85	385
Thailand	82	52
Indonesia	80	1151

Italy	79	5525
Saudi Arabia	79	9661
Malaysia	76	431
Vietnam	68	11
China	67	59
United States	65	23385
Germany	63	3708
Taiwan	59	22
France	52	10006
United Kingdom	22	8006
Australia	12	1063
Norway	3	2742
Sweden	3	9557
Denmark	1	5297
Finland	1	1993

Graph 2



Contrary to data in table 1, we do see a significant trend in table 2. Curve-fitting a trend line, we see a positive slope for this line of 37.536. That is, for every increased percentage point of mask use in a country, there were an average of 37.536 additional positive PCR tests per one million population. This shows that masking has not accomplished the advertised function of

reducing the number of positive PCR tests, but rather seems to be correlated with an increased number of positive PCR tests for COVID-19.

The historical role of bacteria in a viral pandemic

It is not at all an anomaly for fatal pneumonia to follow coronavirus infections.[16] Indeed, historical data support a correlation between pandemic and bacterial pneumonia. It is thought that the majority of deaths in the 1918-1919 pandemic "likely resulted directly from secondary bacterial pneumonia caused by common upper respiratory-tract bacteria." [17] Histopathology of lung tissue sections from that time reveal, "in virtually all cases, compelling histologic evidence of severe acute bacterial pneumonia, either as the predominant pathology or in conjunction [with influenza]." Histological evidence revealed presence of bacterial pneumonia, including bronchopneumonia. Lobar consolidation characteristic of pneumococcal pneumonia, as well as pathognomonic characteristics of streptococcal and staphylococcal pneumoniae were found. In fact, there were no negative lung culture results in any of the specimens. "Bacteria were commonly observed in the sections, often in massive numbers." In fact the bacterial damage was extensive. Vasculitis, capillary thrombosis and necrosis surrounding areas of bronchiolar damage were found. And "without this secondary bacterial pneumonia, experts generally believed that most patients would have recovered."[18]

Interestingly the above-cited paper that found a majority of 1918-1919 pandemic deaths to be from bacterial pneumonia was co-authored by Anthony Fauci, MD who has been tasked with advising the US on proper response to the 2020 COVID-19 pandemic, yet he has not publicly discussed this precedented risk of bacterial pneumonia in 2020, even having performed extensive research himself. It is also known that the 1918-1919 pandemic was the last time that human societies experimented with widespread long-term masking. As now, healthy people were made to wear masks, and it is thought by some that there would have been no pandemic in 1918 without masking. Are we repeating known mistakes from our history and what are the consequences?

The cities of Stockton CA and Boston MA were compared as follows during that pandemic.[19]

"**Masks**: The wearing of proper masks in a proper manner should be made compulsory in hospitals and for all who are directly exposed to infection. It should be made compulsory for barbers, dentists, etc. The evidence before the committee as to beneficial results consequent upon the enforced wearing of masks by the entire population at all times was contradictory, and it has not encouraged the committee to suggest the general adoption of the practice. Persons who desire to wear masks, however, in their own interests, should be instructed as to how to make and wear proper masks, and encouraged to do so.

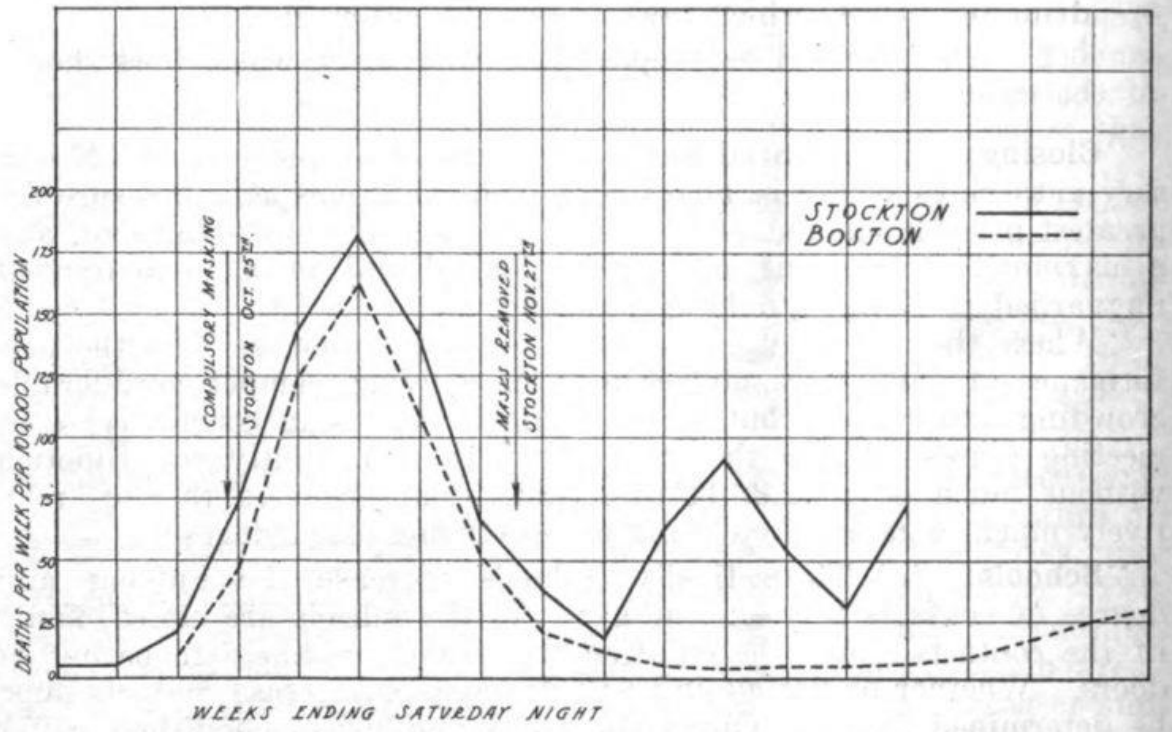


FIG. 17. Stockton, California, and Boston, Massachusetts. Comparative death rates per 100,000 population, by weeks. The use of masks was made compulsory in Stockton, but not in Boston.

One historian writes, "The quarantine, isolation and mask-wearing failed to diminish the spread of the influenza. Instead the practices likely increased fatality and had disastrous economic consequences. The medical policy of 1918 was contrary to the medical science of 1918, and the destructive practices of quarantine, isolation and mask-wearing were largely abandoned."[20]

The harm extended to the next generation. Subsequent health outcomes included increased prevalence of heart disease in infants born in 1919. [21]

Microbial contamination of and from masks

Bacteria are on average ten times the size of viruses, particularly coronaviruses, and have less penetration through masks.[22] Therefore, at least part of the re-circulated flow of bacteria in aerosolized and droplet exhalation does not escape the vicinity of the oral and nasal environment. Bacteria and other microbes are not only retained in this space, but masks themselves are warm, moist repositories of these microbes.

Laboratory testing of used masks from 20 train commuters revealed that 11 of the 20 masks tested contained over 100,000 bacterial colonies. Molds and yeasts were also found. Three of the masks contained more than one million bacterial colonies.[23] Because such particles have been cultured from masks, they are expected to remain fully available to the airways while a mask is worn.

The outside surfaces of surgical masks were found to have high levels of the following microbes, even in hospitals, more concentrated on the outside of masks than in the environment.[24] Staphylococcus species (57%) and Pseudomonas spp (38%) were predominant among bacteria, and Penicillium spp (39%) and Aspergillus spp. (31%) were the predominant fungi. These correlated with the same bacteria and fungi found in samples of the ambient air where the masks were worn.[25]

Evidence is still not abundant of injury from mask-carried microbes due to the experimental and newly adopted practice of widespread masking. Even in Asia, where public use of masks had been more common than in the west, masks were generally only worn by those who had to travel in public while suffering a respiratory illness or those suffering from seasonal pollen allergies. Without regard to the 1918-1919 epidemic, widespread masking is new again in 2020.

We further demonstrate absence of evidence is not evidence of absence. Decades of clinical evidence have attributed a variety of moderate and severe pathologies to microbes that originate in the mouth and nose, as we discuss in this paper.

The mechanism of pathology originating from masks is likely as follows: Microbe-carrying droplets, trapped in masks, stay damp while the mask is worn, whereas without a mask, exhaled droplets and aerosol are known to dry quickly. In the continually damp environment of the mask, bacteria start to proliferate, are re-inhaled and then transferred throughout the body, as discussed below.

Bacteria are exhaled through masks at an increasing rate over the time of use.[26] Outward penetration of masks by bacteria is made worse by the plosive force of coughing, sneezing and talking loudly. Scatter mechanics from the mesh of the mask and resulting chaotic collisions of aerosolized droplets in turn produce a wider contaminated airspace outside the masked mouth than outside the unmasked mouth, in the same way that a screen placed under a faucet disperses the water falling through it.

Cloth mask wearers had significantly higher influenza-like illness when compared to unmasked.[27] This meta-analysis found no benefit of masks against transmission of laboratory-confirmed influenza, in analysis of 14 randomized controlled trials.[28]

James Meehan MD reports seeing patients clinically that have facial rashes, fungal infections, bacterial infections. "Reports coming from my colleagues from all over the world, are suggesting that the bacterial pneumonias are on the rise." Dr. Meehan reports that this is "because untrained members of the public are wearing medical masks repeatedly . . . in a non-sterile fashion."[29]

Recently, a group A strep throat outbreak of unusual size in Michigan public schools where masks are mandatory was reported during the week before this writing.[30] A number of factors may be involved in this outbreak. Not only are students being forced to wear masks, but also schools were closed during lockdown long enough to possibly allow buildup of microbes in their ventilation systems. The problem may be compounded by masks damaging immunity, not being properly washed, poor training of PPE use, or even trapping Streptococcus while forcibly trying to inhale and exhale. After all, deeper inhalation, as we know happens with mask wearing, could have produced a concerning health hazard.

What may be an even more intractable health hazard is the vast range of possibilities where normally colonized strains of oral and nasal bacteria interact with newer virulent strains in the favorable incubating environment of face masks. The possibility of superstrains and their consequences in the population will likely eclipse the effects and the incidence of the relatively mild COVID-19 virus (estimated IFR 0.015[31]),, as we have seen from the autopsies discussed above of the 1918-1919 pandemic victims.

Respiratory diseases from oral bacteria

CPAP has been used for decades, but universal masking is very new. We know that wearing the CPAP mask has led to life-threatening Legionella pneumonia as well as Streptococcus infections.[32] This disproves the hypothesis that microbial growth on masks is always benign.

Aspiration pneumonia is a consequence of oral bacteria aspirated into the lungs. The teeth and gums are reservoirs for respiratory pathogens.[33] [34] Oral dysbiosis is a disordered ecosystem of commensal as well as pathogenic bacteria in the mouth. Dental caries and periodontal disease are common results of such dysbiosis. One dental practice estimates that 50% of their patients are suffering from mask-induced dental problems, including decaying teeth, receding gum lines and "seriously sour breath."[35] The dentists theorize that these new oral infections are mostly caused by the tendency for people to mouth-breathe while wearing a mask, which is not consistent with the evolution of the form and functionality of the airways of humans or any other species.