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## Masks

February 25, 2021

### Bottomline

- For over 50 years the advice and studies showed that masks didn't offer any benefit to non medical personnel,
- There have been only two randomized studies of cloth mask effectiveness. Both showed that masks do not provide a level of protection beyond what no mask provides.
- In court cases about forcing people to wear masks for their safety and the safety of others the rulings have stated "masks did little or nothing to prevent transmission of the virus and that "masking was not an effective means of source control in general, and, in particular, in the case of asymptomatic transmission"
- The empirical data (masked and unmasked countries) shows that the unmasked areas actually have fewer cases.

This issue of cloth mask use has been one of the toughest COVID-related issues to deal with not because of the actual science behind wearing a mask but because much of the discussion and consideration hasn't been science-based but rather is heavily influenced by emotion, politics and misinformation.

For over 50 years the advice and all the studies were pretty straight forward. Masks did not offer any benefit to non medical personnel, they were ineffective in preventing the spread of viruses and your risk of infection could actually increase for consistent use of a mask.

- [Study of surgical face mask use in health care workers at a hospital](#) (2009, Japan). Conclusion: **Face mask use in health care workers has not been demonstrated to provide benefit** in terms of cold symptoms or getting colds.
- A 2017 [Study](#) comparing cloth masks with surgical masks states "Cloth masks can protect the wearer from potentially harmful substances (eg, blood spray); however, **they do not provide protection from airborne particles or pathogens**. The study went on to say that "**your risk of infection actually increases if you use a cloth mask**"
- [CDC Review since 1946 of masks and influenza](#) (May 2020) stated "**we found no significant reduction in influenza transmission with the use of face masks**"
- A 2009 study on the [Filtration Performance of FDA-Cleared Surgical Masks](#) **concluded** - The wide variation in penetration levels for room air particles, which included particles in the same size range of viruses **confirms that surgical masks should not be used for respiratory protection**. This was despite the fact that the authors sealed the masks to the mannikins with silicone – something that you cant do in real life.

The results were consistent with the advice given at the start of the Covid.

- On February 29th, U.S. Surgeon General Dr. Jerome Adams tweeted that **surgical masks do not offer any benefit to the average citizen in** preventing SARS-CoV-2 transmission. He tweeted, "**Seriously People Stop Buying Masks. They are NOT effective in preventing general public from catching #Coronavirus** – this tweet is now unavailable.
- [On March 8 Dr. Fauci told 60 minutes](#) "**There's no reason to be walking around with a mask**, while masks may block some droplets, Fauci said, they do not provide the level of protection people think they do. Wearing a mask may also have unintended consequences: **People who wear masks tend to touch their face more often to adjust them, which can spread germs from their hands**.
- On March 30 the [World Health Organization warned against wearing masks](#) "WHO stands by its recommendation to not wear mask is you are not sick or caring for someone who is sick" "**There is no specific evidence to**



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**suggest that the wearing of masks by the mass population has any potential benefit. In fact, there's some evidence to suggest the opposite"** Dr. Mike Ryan, executive director of the WHO health emergencies program.

- On April 1 the [New England Journal of Medicine](#) wrote "**we know that wearing a mask outside health care facilities offers little, if any protection.**"
- On May 1, the [Washington Post](#) wrote to warn readers "**that masks could cause painful rashes and acne for people** who wear them for long periods of time."

Then starting in May / June the advice changed to "you need to wear a mask to protect others."

- The CDC published a document that stated "in light of this new evidence, CDC recommends wearing cloth face coverings in public settings where other social distancing measures are difficult to maintain." **The recommendation was published without a single scientific paper or other information provided to support that cloth masks actually provide any respiratory protection.**

Unfortunately, media outlets failed to ask questions about the sudden 180 degree turn in advice. Instead, they took to shaming people who questioned the change. One study in August went so far as to that you were a [sociopath if you refused to wear a mask](#).

In November of 2020, after months of telling people "you have to wear a masks to protect others not yourself" the CDC changed their guidance to "you need to wear a mask to protect yourself." **Again, this changed was not based on any scientific study or data.** In fact, this advice stands in marked contrast to what has been said since May that [mask don't protect you, they help protect others](#).

What is interesting is that you can still find data as of February 2021 on the CDC and other websites contradicting that advice.

- [The CDC says of surgical masks](#) "Does **NOT provide the wearer with a reliable level of protection from inhaling smaller airborne particles and is not considered respiratory protection**"
- A [data sheet](#) from mask manufacture 3M states - Surgical masks are loose-fitting devices that were designed to be worn by medical personnel to protect accidental contamination of patient wounds, and to protect the wearer against splashes or sprays of bodily fluids. **They aren't effective at blocking particles smaller than 100 microns** - the virus is 0.1 microns or over 1,000x smaller than this limit.
- OSHA/CDC website states: A surgical mask is not a respirator. **It cannot be used to protect workers who perform or assist with aerosol-generating procedures,** which may create very fine aerosol spray.
- And everyone has seen the notice on the side of a box of masks that states "**will not provide any protection against COVID-19 (coronavirus)**"

So what is the truth? Do masks help and to what degree? To understand and evaluate the competing evidence / guidance on masks requires some background on viruses and how they spread.



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First, we need to define several things that we will be discussing.

- **Droplet** –are defined as large (>5 microns) aqueous bodies (far to small to be seen)
- **Aerosol** – are defined as less than 5 microns (even smaller than droplets which can't be seen)
- **Covid 19 Virus** is 0.1 microns on average.
- **Cloth masks** - have holes ranging from 5 to 20 microns.
- As a size reference
  - The average human hair is 80 microns
  - The smallest object an average person can see is 70 microns.
  - A raindrop is 1,000 microns in size or 200x larger than the “droplets” we are discussing here. This is important because most people think of a droplet as similar to rain or to be something that they can see.
  - Droplets fall to earth quickly, but aerosols can travel on air currents potentially for hours.

Second, we know that Covid spreads mainly through the air. Infected people exhale viral particles that are usually carried inside larger particles called either droplets or aerosols. People around the infected person then inhale those droplets or aerosols and are exposed to the virus.

So if the public is to be protected, it is critical that the method of protection not only provide meaningful protection without harming the public; it also must not exacerbate whatever issue you are trying to resolve.

So the question becomes does a mask protect you and others because it can catch droplets and aerosols and thereby reduce the amount of virus in the air? Or does it turn more droplets in to aerosols allowing them to stay airborne longer?

A good place to start to find this answer would be to look at studies that show about the size of particles humans exhale when they breath.

- A 2009 [study show](#) that 80-90% of particles exhaled in breath are <0.8 micron (0.1 to 0.8 micron range).
- The studies reviewed in this July 20, 2020 [paper consistently](#) show that humans produce infectious aerosols in a wide range of particle sizes, **but pathogens predominate in small particles** (<5 μm that are immediately respirable by exposed individuals).

These two studies show us that 1) the most dangerous particles are the aerosols not the droplets and 2) the vast majority of particles human exhale as aerosols that are too small (under .8 micron) to be caught / trapped by cloth masks with holes 6 to 25x larger in size then the aerosol they are trying to catch.

To give you a real-world example, we are going to change all the measurements to inches and pick 0.4 microns as the average diameter of the aerosols. In inches, viruses are 0.1 inch, the average aerosols are 0.4 inches and the best mask would have holes that are 5 inches in size – like a big chain link fence. Now imagine taking a handful of uncooked long grain rice (about 0.35 inches – not perfect but close to 0.4) and throwing them at a chain link fence with 5” holes in it. How many of those rice particles do you think the fence would stop?

In this example, you can see that the vast majority of the aerosols make it through the mask. These aerosols then remain aloft for extended periods after passing through the mask, responding to airflow patterns (like HVAC systems and breathing), effectively evading the 6-foot-over or 6-foot-under rhetoric, as the aerosol range is 18-20 feet.

The aerosols and droplets that do get stuck in the mask don't disappear. Depending on the size of the aerosols / droplets they will stick to the cloth fibers or fill in the gaps in the mask. Once they fill in the gaps they can then be pushed out of the mask by the next breath, cough or shout. When this happens, they are turned in to smaller particles that can remain airborne longer than the larger particles they started out as (like blowing soap bubbles with a waffle stick).



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Finally, we need to touch on fit. For a mask to be effective it must have a solid fitted that doesn't allow aerosols / droplets out the sides, top or bottom of the mask. If there is no solid fit then the aerosols / droplets are released and allowed to float for extended timeframes. As an example of the importance of fit, think about the importance of fit with a scuba diving mask. If you put on a poor fitting mask and dive the mask will fill with water. Not because the water comes through the glass lens but because it comes through the poor seal between the mask and your face. The same holds for aerosols / droplets and cloth masks.

Regardless of if you believe the above examples showing that masks don't provide the protection needed or if you are still in the "the use of cloth masks offer critical protection to users" camp there is the fact that only two randomized studies of cloth mask have been conducted. Both of these studies show that masks do not provide a level of protection beyond what no mask provides.

- The first study was a 2015 [randomised trial of cloth masks](#) which compared cloth masks to medical masks in healthcare workers. It showed that 1) there was significant penetration of particles through the cloth masks (97% penetration **or the mask only stopped 3% of particles**), 2) that the virus may survive on the surface of the face masks and that there was a high risk of self-contamination through repeated use and improper doffing and 3) **that wore the cloth masks had 13 times more infection outcomes than those that wore surgical masks.**
- The second was a [Danish Mask Study](#), published in November in the *Annals of Internal Medicine*. This was a 4,800-person randomized trial that took place in the spring and early summer in Denmark. The trial randomly assigned them to "wear a mask" or "don't wear mask", and followed them to see how many acquired Covid. **The answer was a nearly identical proportion -- 42 of 2,393 people (1.8%) in the mask group and 53 of 2,470 (2.1%) in the no-mask group. The difference was not statistically significant (mask use did not reduce the cases of Covid)**

Finally, there have been several court cases about forcing people to wear masks for their safety and others. In each example the courts found that masks were not effective and did little to prevent the transmission of viruses.

- A [December 2013 case in which a nurses union filed a grievance against mask wearing](#) - after considering detailed evidence from six experts, consulting 250 exhibits and 100+ scientific papers the Arbitrator's ruling stated "**masks were not an effective measure for patient safety**". ONA's experts testified that forcing healthy registered nurses to wear masks for up to six months during the influenza season **did little or nothing to prevent transmission of the virus in hospitals**. They testified that nurses who have no symptoms are unlikely to be a real source of transmission and that it was "illogical" to force healthy nurses to mask.
- In September of 2018 a [second case was decided](#) – after reviewing extensive expert evidence submitted by both ONA and St. Michael's Hospital, Arbitrator William Kaplan, found that St. Michael's mandatory mask policy is "illogical and makes no sense" The ruling stated that "**in answer to the question are masks an effective means of source control? This answer to this question was "no,"** later in the ruling it is noted that "**masking was not an effective means of source control in general, and, in particular, in the case of asymptomatic transmission**"

Since the vast majority of the evidence shows that masks are not an effective means of reducing the spread of the virus how is it that our leaders wound up with the opposite view. Two things seem to have led us here.

First, a belief from politicians and medical spoke people that they had to do something. Doing nothing just allowed your politic opponent to beat you over the head with the "they are doing nothing to help you" statement.



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Second, many have pointed to a CDC report showing that two infected hairdressers in Missouri, who wore masks, did not infect any of their 139 clients. The problems with this analysis are several fold: 1) only 67 of the clients were tested leaving us with no idea if the other 72 clients got the virus or not. 2) the 67 clients were only tested 1x and may have developed Covid after the initial test. 3) we have no idea as to the other measures (ventilation, etc) that may have mitigated the spread.

Finally, in 2020 more than 1,848 marine recruits participated in a two week quarantine that included mask wearing, social distancing, daily temperature and symptom checks. They lived in a closed campus which they could not leave. They had no access to electronics or other devices. They all tested negative before the quarantine began. **At the end of the two weeks, 35 of the participants (1.9%) tested positive.** Of the 1,554 recruits who declined to participate **26 (1.7%) results tested positive.** This study doesn't conclusively prove that masks don't work, maybe there would have been an even higher rate without masks but it certainly **shows that the masks did little to reduce the rate compared to the group that did not wear masks.**

All of this shows that masks are at best a marginal benefit. Even our leaders have said this. Masks are just a symbol that we are trying to do something. As Fauci stated "I wear a mask because I want to show people that I am doing something." That may be a great reason to encourage people to take a symbolic stance "I wear pink to show me support for Breast Cancer research" but it is not a reason to try to force people to do something of little if any medical benefit.

Furthermore, even if masks did keep people from exhaling large particles and reduced that virus forcing people to wear masks will have little effect unless asymptomatic transmission (AT) is a significant portion of the spread. People stay away from sick people, but not from those who do not look or feel sick.

For a complete discussion of asymptomatic transmission please see our report on it. The bottomline is that when real world contact tracers tried to find asymptomatic transmission they are unable to do so.

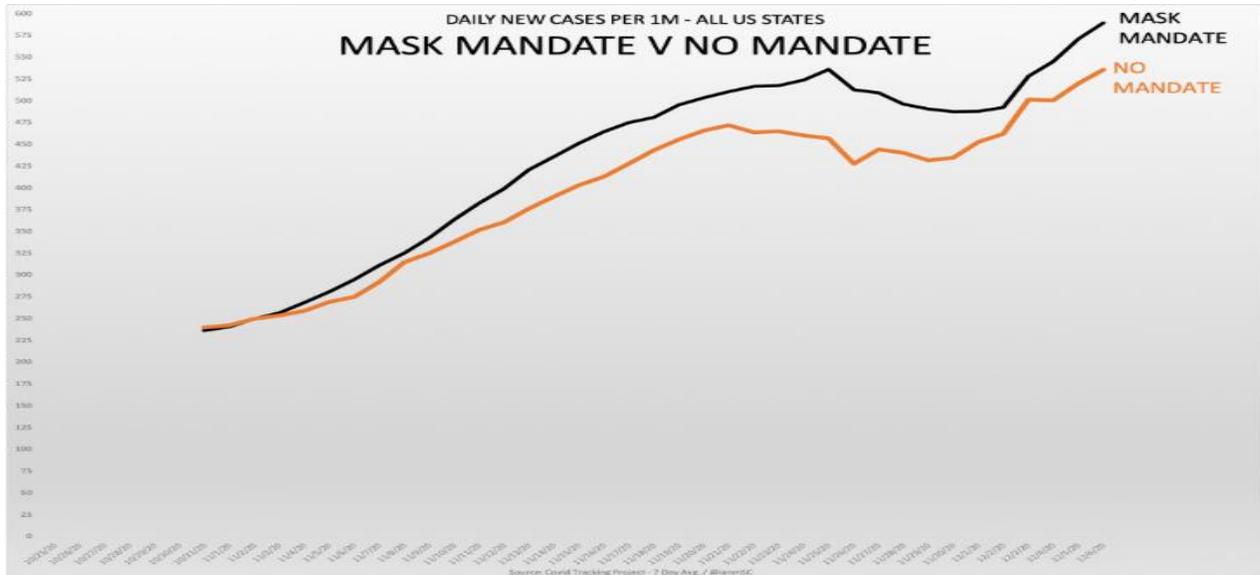
Finally, what does the empirical data show? In states where they have been masked and unmasked countries the data shows that the unmasked areas actually have fewer cases.



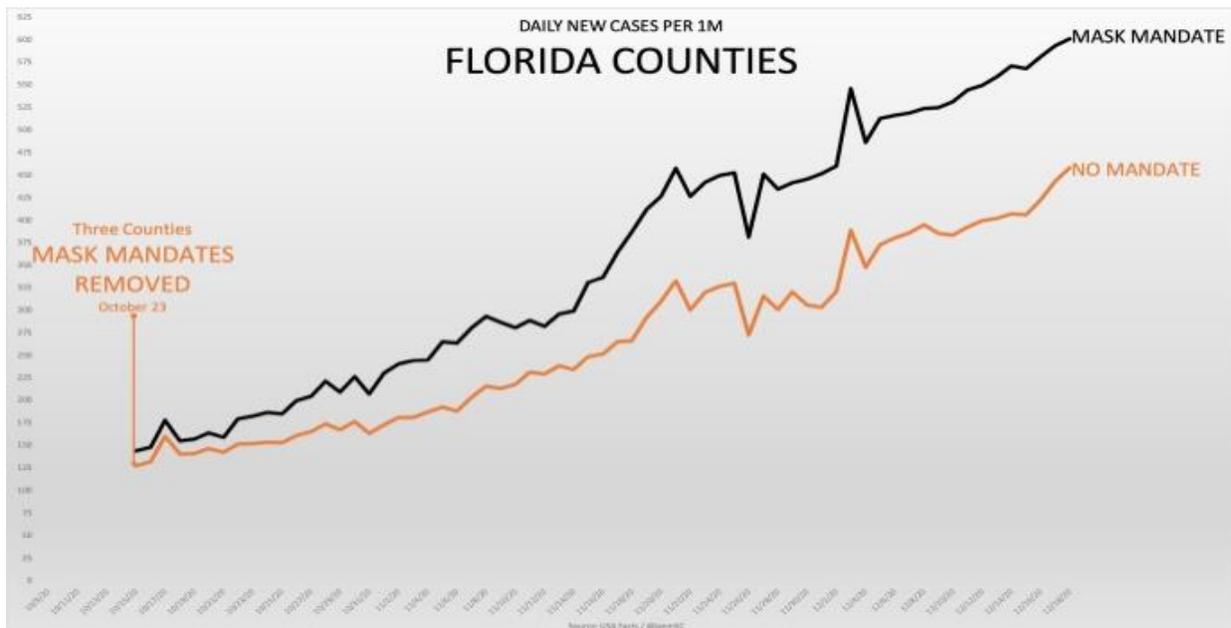
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October 28, 2020 through December 6, 2020



Daily cases for Florida counties without mask mandates have been lower than counties with mandates since October 15 (Florida moved to Phase 3 reopening on September 25). *“When counties DID have a mandate in effect, there were 667,239 cases over 3,137 days with an average of 23 cases per 100,000 per day. When counties DID NOT have a countywide order, there were 438,687 cases over 12,139 days with an average of 22 cases per 100,000 per day.”*

22 of Florida’s 67 counties have a mask mandate. Between May 1 and December 15, there is essentially no difference in population-adjusted cases between masked and unmasked counties: 23 vs 22 cases per 100,000 population. (NOTE: For areas with a mask mandate, the study started counting cases 14 days after the mandate went into effect.)



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Tennessee has been awash in COVID 'cases' for months, but mask mandates have made virtually zero difference. Here's a comparison of 8 'masked' vs 9 'unmasked' counties in the geographically similar region of East Tenn from Oct 1 - Dec 22. Mask mandated areas actually did worse

County	Cases Oct 1 - Dec 22	population	% of population infected	mask mandate?
Blount	6,180	133,088	4.6%	no
Campbell	2,003	39,797	5.0%	no
Cocke	1,749	36,004	4.9%	no
Hancock	183	6,620	2.8%	no
Hawkins	2,417	56,786	4.3%	no
Jefferson	2,289	53,679	4.3%	no
Johnson	960	17,788	5.4%	no
Morgan	1,030	21,403	4.8%	no
Union	740	19,488	3.8%	no
	<b><u>17,551</u></b>	<b><u>384,653</u></b>	<b><u>4.6%</u></b>	
Carter	2,854	56,391	5.1%	yes
Greene	3,837	68,834	5.6%	yes
Hamblen	3,293	64,934	5.1%	yes
Knox	19,443	470,313	4.1%	yes
Sevier	5,335	98,250	5.4%	yes
Sullivan	7,587	158,348	4.8%	yes
Unicoi	1,025	17,883	5.7%	yes
Washington	6,939	129,375	5.4%	yes
	<b><u>50,313</u></b>	<b><u>1,064,328</u></b>	<b><u>4.7%</u></b>	
	<b>Population</b>	<b>No. infected Oct 1 - Dec 12</b>	<b>% infected Oct 1 - Dec 22</b>	
<b>No mandate</b>	<b><u>384,653</u></b>	<b><u>17,551</u></b>	<b><u>4.6%</u></b>	
<b>Mandate</b>	<b><u>1,064,328</u></b>	<b><u>50,313</u></b>	<b><u>4.7%</u></b>	
<p>A comparison of 17 Eastern Tennessee counties - with and without mask mandates - for the period of October 1, 2020 to December 22, 2020.</p> <p>(Counties that instituted a mandate in the middle of the period were not included.)</p>				

Please see our “Masks In Charts” report showing the impact of masks mandates in a series of charts.



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### Additional Studies

- This [report shows](#) that based on empirical evidence, masks are not an effective means for reducing aerosol-based transmission. \*Note – this report also provides a complete dissection and explanation of aerosols and airborne particles, a must read if you want to understand the science behind particle size and airborne transmission.
- A May 2020 [Study of the correct use of masks](#) in 714 men and women showed that over 87% of people wear a mask incorrectly. To quote the study “mask use by the general public may not translate into effective protection but instead provide false reassurance.” About 75% performed strap placement incorrectly, 61% left a “visible gap between the mask and skin,” and about 60% didn’t tighten the nose-clip.
- A September 2020 [Study of mask research](#) concludes that **“wearing masks (other than N95) will not be effective at preventing SARS-CoV-2 transmission, whether worn as source control or as PPE.”**
- [A study of patients infected with Covid](#) (July 2020, South Korea) found that **“Both surgical and cotton masks seem to be ineffective in preventing the dissemination of SARS–CoV-2** from the coughs of patients with COVID-19 to the environment and external mask surface.”
- [Review of masks and N95s against respiratory infection](#) (2017, Singapore). An analyses of 6 randomized controlled trials (RCTs) and 23 observational studies conducted during the 2003 SARS pandemic **concluded that the evidence of a protective effect of masks or respirators against verified respiratory infection was not statistically significant (compared to no mask)**
- [Austrian observation](#) (August 2020) in German stated that the introduction, retraction and re-introduction of mandatory face masks in Austria **had no influence at all on the infection rate.**
- August 13, 2020 - [In Kansas, the 90 counties without mask mandates had lower coronavirus infection rates than the 15 counties with mask mandates.](#) To hide this fact, the Kansas health department tried to manipulate the official statistics and data presentation.
- [A study of different types of face coverings in non-clinical setting](#) (August 2020) found that neck gators had 110% droplet transmission (10% higher than not wearing a mask) and that speaking through some masks (particularly the neck fleece, bandanas) seemed to disperse the largest droplets into a multitude of smaller droplets ... which explains the apparent increase in droplet count relative to no mask in that case.

### Could mask wearing make things worse?

- [A December 2020 study](#) showed that mask Wearing May Result in Less Social Distancing which may result in increased infections
- A July 2020 [CDC study](#) of Covid positive patients reported that 71% of them reported that they wore a mask at all times, 14% said most times and 3.8% said they never did. This was at a time when approximately 60% of the population indicated that they consistently wore masks. Those who tested positive also indicated by a large margin (42% vs 14%) that they had been in contact with a known COVID-19 person. Thus it is possible that wearing a mask could be making things worse by giving people a false sense of security.
- June 2020 WHO [advice on the use of masks in the context of COVID-19](#) states “The likely disadvantages of the use of mask by healthy people in the general public include: 1) potential increased risk of self-contamination due to the manipulation of a face mask and subsequently touching eyes with contaminated hands; 2) potential self-contamination that can occur if non- medical masks are not changed when wet or soiled. This can create favourable conditions for microorganism to amplify; 3) potential headache and/or breathing difficulties, depending on type of mask used;4) potential development of facial skin lesions, irritant dermatitis or worsening acne, when used frequently for long hours; and 5) a false sense of security, leading to potentially lower adherence to other critical preventive measures such as physical distancing and hand hygiene.



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**Please let us know what else we can do for you.**

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