"Everyone Gets a Mask!" Team Project

Basics: Orientation & Frequently Asked Questions

Respiratory Protection and Face Masks to Prevent COVID-19

Last updated: April 15, 2020

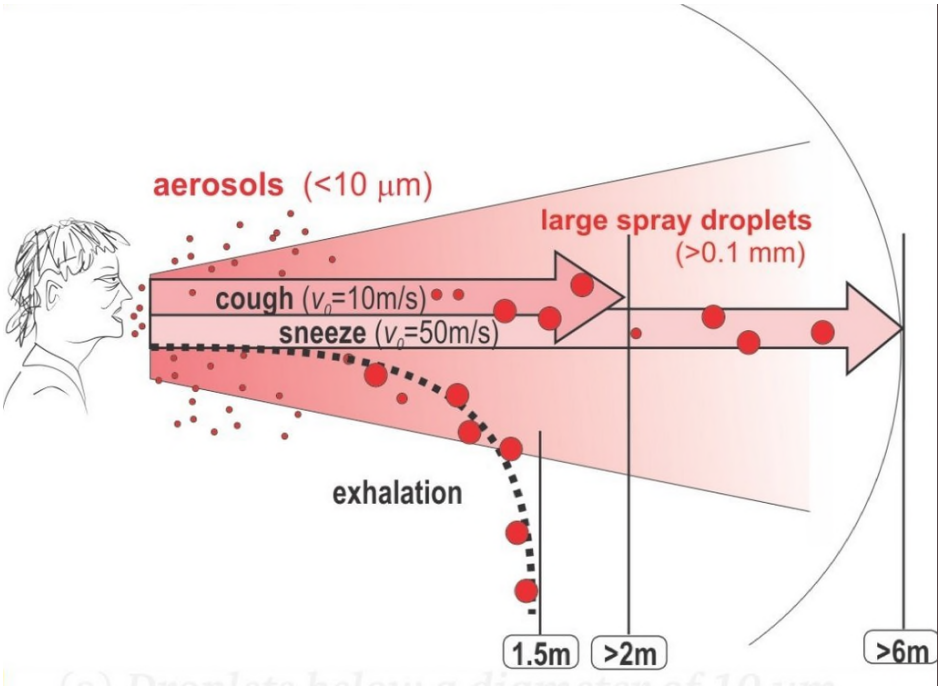
Note: The on-line version of this document at www.webility.md/masks has active hyperlinks for web access. Other project resource files are also there. Send comments to masks@webility.md.

This writeup gives basic background about cloth masks in the form of FAQs. It makes clear that home-sewn masks are not perfect, but in the absence of better commercially-produced devices can still provide important protections, especially to the general public.

How do face masks work?

The fibers in face masks catch airborne particles, which may be either wet or dry. The main way that COVID-19 viruses pass from person to person is through particles in the air that have been expelled when an infected person sneezes, coughs, sings, laughs, and speaks. If the particles are inhaled or come in contact with another person's moist mucous membranes, the virus can enter the body. (Another key pathway of course is touching your mouth, nose, or eyes with unclean hands.)

Most of the particles are virus-laden liquid droplets (measured in microns or millimeters) which are only airborne for a short distance; they rapidly fall to the ground or land on surfaces within 6 feet of the source. The very smallest particles are aerosols (measured in nanometers) which can float in the air for a half hour or more. Based on careful analysis of observed cases to date, aerosols have not been the main route by which people are getting infected with coronavirus.



What kinds of face masks are available, and which are the best?

The **most protective masks** are ones that filter out 95% of all particles. Contoured masks called "N95 respirators" (see image below) are supposed to be used by healthcare workers according to Federal occupational safety & health laws and regulations. There is a critical shortage of them now, prompting this maker effort.

Useful masks effectively filter AND are breathable (not increase the work of breathing very much). One could make a mask that filters out 95% of particles but is so difficult to breathe through that it would suffocate the user – or feel like it. An example of this is a mask made from a vacuum cleaner bag. In fact, people must be able to tolerate wearing masks for a prolonged period. Also, masks must either be disposable, or if not, able to be sterilized and washed.

Arranged from highest to lowest in terms of protection level, breathability, and cost, mask options are:

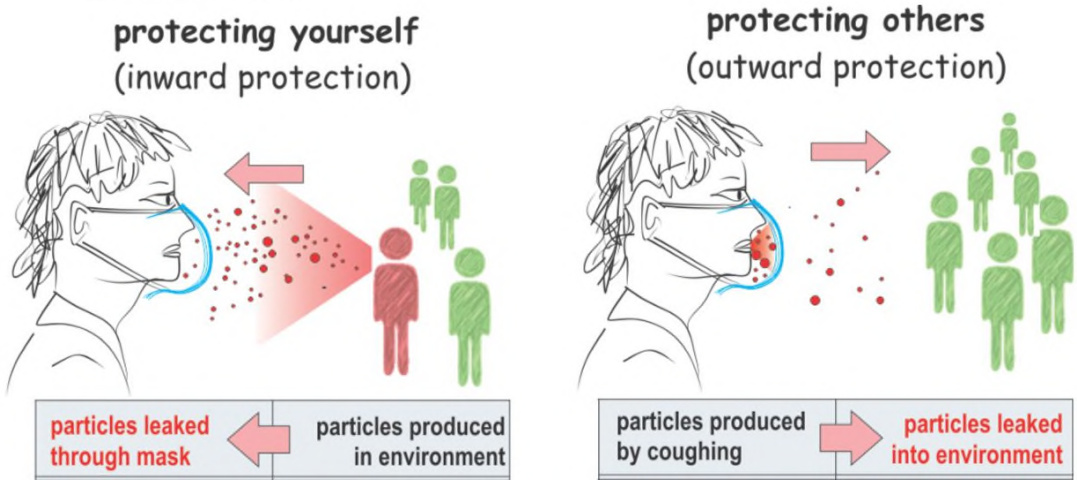
1. Machine-powered air purifying respirators that include a bonnet; these machines filter and blow clean air over the user's head and face (commercially manufactured, approved by OSHA)
2. N95 respirator masks (commercially manufactured, approved by FDA and by by OSHA)
2. Surgical or procedure masks (factory produced, approved by FDA, accepted by OSHA)
3. **Well-constructed cloth masks made at home using designs and materials that meet specifications which research has shown to improve performance**
4. Makeshift cloth masks made using the sewer's own design and fanciful or scrap materials.
5. Nothing at all.

Well-constructed homemade cloth masks, when made using specified designs and recommended fabrics, filter out about half of aerosol-sized particles and between 50 and 90% of respiratory droplets (almost but not quite as effectively as surgical masks). But they only do this when donned, worn, and taken off correctly. They deliver protection to the wearer, and also to others in case the wearer is contagious, even without knowing it.

During the COVID-19 pandemic, the decision to rely on homemade cloth masks is only appropriate when no better option is available. That is the situation at present. Under the current circumstances it seems irresponsible to let the perfect drive out the good, to use

nothing instead of these well-constructed cloth masks. As soon as better masks become widely available, that is what you should use.

CLOTH MASKS PROTECT YOU FROM OTHERS -- AND PROTECT OTHERS FROM YOU



When should masks be worn?

Everyone who lives in an area with significant community transmission of the COVID-19 virus should wear cloth face coverings when outside their own home. As of April 3, this is the official recommendation of the US Centers For Disease Control (CDC) - see www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover.html - and is even mandatory in some local areas. The recommendation was made after recent studies showed that people who feel entirely well but do not realize they are infected have been spreading the COVID-19 infection by merely breathing and talking with others. See www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover.html#studies. There are other specific situations in which covering the nose and mouth is essential, as laid out in other sections below. The best and most practical methods to do in various circumstances are also described below.

Although it has been unusual in America to see people wearing facemasks in public, we may now see them all around us every day. In other countries, however, particularly Asia, it is common to wear a facemask when sick or concerned about becoming sick.

There is more than one way to interpret a scene with people in masks. One way is that masks are a signal of fear – of people protecting themselves from danger -- afraid of catching COVID-19. Another way is to see masks as a sign of vulnerability, that the wearer is at high risk because of age or a chronic illness or a weak immune system due to cancer chemotherapy. But you can also look at a person in a mask and see a caring person who want to protect you – look at a crowd and see many caring people who want to protect each other – "just in case." So perhaps the best way to look at a scene where everyone is wearing masks is as evidence of "love made visible."

Healthcare workers

American healthcare workers, on the other hand, are accustomed to wearing manufactured disposable protective equipment every day. They are constantly working with vulnerable people who either need to be protected from infection, or who pose a risk to healthcare workers because their medical condition is potentially contagious. This manufactured protective equipment includes masks, gowns, hair covers, gloves, face shields, goggles, and so on.

Under normal conditions, the CDC says that healthcare professionals (HCP) should wear either FDA-approved N95 respirator masks or manufactured surgical masks whenever the possibility of respiratory exposure exists, depending on the specific circumstances.

However, we are now in a crisis with a critical (desperate) shortage of masks and other protective equipment. The CDC offers guidance about contingency plans and many alternatives, including the use of homemade masks:

> ***"Crisis/Alternate Strategies***
>
> These crisis capacity or alternate strategies accompany and build on the conventional and contingency capacity strategies. The following measures are not commensurate with current U.S. standards of care…..
>
> ***"HCP use of non-NIOSH approved masks or homemade masks…….***
>
> "In settings where facemasks are not available, HCP might use homemade masks (e.g., bandana, scarf) for care of patients with COVID-19 as a last resort. However, homemade masks are not considered PPE, since their capability to protect HCP is unknown. Caution should be exercised when considering this option. Homemade masks should ideally be used in combination with a face shield that covers the entire front (that extends to the chin or below) and sides of the face."……
> (www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/face-masks.html)
>
> "In settings where N95 respirators are so limited that routinely practiced standards of care for wearing N95 respirators and equivalent or higher level of protection respirators are no longer possible, and surgical masks are not available, as a last resort, it may be necessary for HCP to use masks that have never been evaluated or approved by NIOSH or homemade masks. It may be considered to use these masks for care of patients with COVID-19, tuberculosis, measles, and varicella. However, caution should be exercised when considering this option.[1,2] …….
> (www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy/crisis-alternate-strategies.html)
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> References
>
> 1. Dato, VM, Hostler, D, and Hahn, ME. Simple Respiratory Mask, *Emerg Infect Dis*. 2006; 12(6):1033–1034. www.ncbi.nlm.nih.gov/pmc/articles/PMC3373043/
> 2. Rengasamy S, Eimer B, and Shaffer R. Simple respiratory protection-evaluation of the filtration performance of cloth masks and common fabric materials against 20-1000 nm size particles, *Ann Occup Hyg*. 2010;54(7):789-98." www.ncbi.nlm.nih.gov/pubmed/20584862/

The rest of us – the general public

In addition to wearing cloth face coverings whenever we are out in public, the CDC says the general public should wear masks (unless they cannot tolerate the extra work of breathing) under certain circumstances listed specifically below. If surgical masks are not available, a high-quality homemade cloth mask may be the next best option. www.cdc.gov/coronavirus/2019-ncov/faq.html#How-to-Protect-Yourself

- When sick with a diagnosed or probable case of COVID-19.
- While having symptoms that might be COVID-19 which has not yet been diagnosed, and especially when on the way to get medical attention.
- When visiting a healthcare facility because:

  (a) they can unknowingly be contagious (infected but without any symptoms);

  (b) many of the people there may be contagious: infected or sick with COVID19;

  (c) some people there may be extra vulnerable due to age or other medical problems.
- While providing care or being in intimate contact with a person with COVID-19. In fact, if someone in your household is sick, some experts recommend that everyone wear face masks, especially when they in the same room as the sick person.
- After being diagnosed with COVID-19 or testing positive for it, until all symptoms have resolved for at least 7 days and a repeat test is negative (if available).

When should healthy people wear homemade cloth masks?

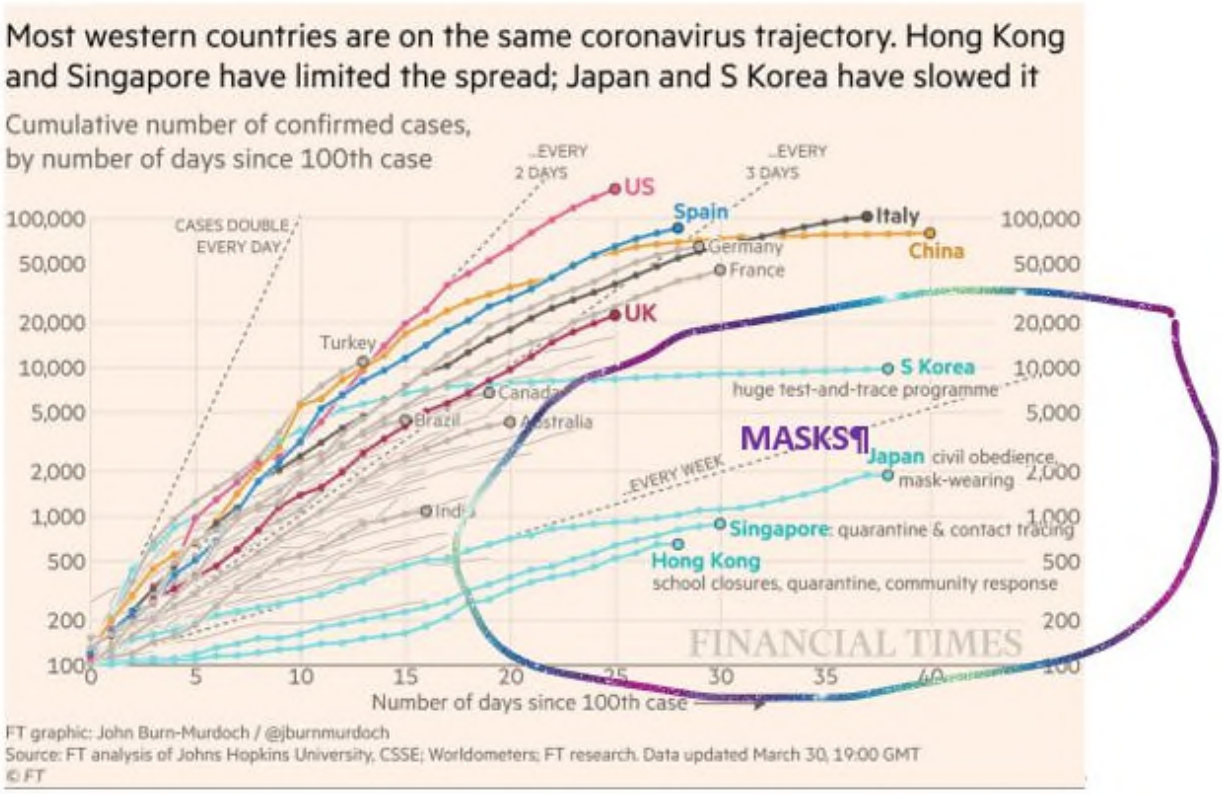
If you don't want to be an unwitting virus spreader, wearing a face mask is a good way to protect others from your respiratory droplets. People in countries such as Taiwan, Singapore, Japan, and the Czech Republic have already been wearing masks of various types when there is a good possibility that people with COVID-19 might be present. An excellent short video from the Czech Republic explains why they think the mandatory use of masks by everyone is the reason their epidemic is much less intense than ours. www.youtube.com/watch?v=jZtEX2-n2Hc

The chart that follows is from the Financial Times based on data from the Johns Hopkins Coronavirus tracking website. It shows the rate at which cases of COVID-19 have been increasing in countries in which the population as a whole is or is not wearing masks. There are other differences between the way the countries have responded to the pandemic as well, so masks are not the only explanation.
http://twitter.com/jburnmurdoch/status/1244722153041387520/photo/1
https://coronavirus.jhu.edu/map.html

(see chart below)

CHART SHOWING GROWTH IN TOTAL NUMBER OF CASES BY COUNTRY

Notice that countries differ in how steeply the lines climb. The countries with trend lines that are less steep are also the ones in which the methods employed to control COVID-19 include the population wearing masks, either voluntarily or as a requirement.



What about people at "high risk" for severe cases of COVID-19 ?

Mask wearing may provide some protection for people who are at high risk for developing the severe form of COVID-19 if they were to get infected.

Who is at high risk if they get infected with the coronavirus?

Based on currently available information and clinical expertise, older adults and people of any age who have serious underlying medical conditions might be at higher risk for severe illness from COVID-19. Those at high-risk for severe illness from COVID-19 include:

- People aged 65 years and older
- People who live in a nursing home or long-term care facility
- Other high-risk conditions could include:
    - People with chronic lung disease or moderate to severe asthma
    - People who have heart disease with complications

- People who are immunocompromised due to cancer treatment, bone marrow or organ transplantation, immune deficiencies, poorly controlled HIV or AIDS, and prolonged use of corticosteroids and other immune weakening medications
- People of any age with severe obesity (body mass index [(BM]I)≥40) or certain underlying medical conditions, particularly if not well controlled, such as those with diabetes, renal failure, or liver disease might also be at risk
- People who are pregnant should be careful, even though to date data on COVID-19 has not shown increased risk but they are known to be at risk with other severe viral illness.