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PEOPLE WHO ARE NOT FIRST RESPONDERS OR MEDICAL PERSONNEL

MASKS FOR COVID-19 USE: WHAT SHOULD I WEAR ?

The science of masks is complicated. If you want more, you can find plenty on-line provided by 3M & the CDC / NIH. We will try to keep this simple, but provide what you need to know. You may be surprised at the misinformation you have heard.

Why do you need to know more than you think? The usual reasons – the media & politicians have confused all of us. Even some experts are not clear. Upfront we will tell you some need to know things:

- The average virus particle size when dry & aerosolized is much smaller than any filter fabric you will be wearing.
- The best filter technology (HEPA) cannot capture all virus particles. Realistically, you can't walk around in a "space suit" so there is always some exposure. (e.g., Powered Air Purifying Respirator (PAPR) with particulate filters, face shield, protective eyewear, head and body covering – hazmat type suits).
- Filter media effectiveness is complex. The movement of air through the filter media is complex. This brief is not meant to be comprehensive.
- There are 9 types of particulate respirator filters: N= not oil resistant, R= somewhat oil resistant, P=oil proof; Respirators that collect 95% of challenge particles are given a 95 rating, 99% get a 99 rating, and 99.97% get a 100 rating. Note: there are masks rated as "surgical respirators".
- "Surgical / procedural" masks do a better job of protecting the other person from you.

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- Masks leak at the perimeter. The filter material performance is important but other things can go wrong. In addition to blow by of air you can get infected via other means – eyes, bad hand techniques, donning and removing mistakes, etc.
- A micron (μm) is a metric unit of measure equal to 1 millionth of a meter in length (about 39 millionths of an inch). The average cross-section of a human hair is 50 microns. The human eye cannot see anything smaller than 40 microns in size.
- Typical hospital contaminants:
 - ✚ Dust 1 – 10,000 μm (can act as a carrier of microorganisms)
 - ✚ Pollen 10-1,000 μm
 - ✚ Fungal spores 10-30 μm
 - ✚ Bacteria 0.5 – 20 μm
 - ✚ Viruses .002 – 0.30 μm (below 0.1 μm is too small for existing air filter technology)
- Biological organisms can be carried on droplet nuclei generated from coughs, sneezes, etc. They have been found to be from submicron to over 20 microns. Influenza particles have been found to be < 1 micron to > 4 microns. Hepatitis B virus is 0.042 – 0.047 μm (microns). Ebola virus is 0.08 μm diameter x 0.79-0.97 μm length. **Coronavirus (SARS CoV-2 & MERS – CoV) 0.12 μm .**
- **Surgical masks are as good as respirators for virus protection according to recent live / on-site studies. This is contrary to some lab test data.**
- **Almost 30% of healthcare workers in a NYC ER department contracted the swine flu (H1N1) in 2009. This is without identifying PPE types.**



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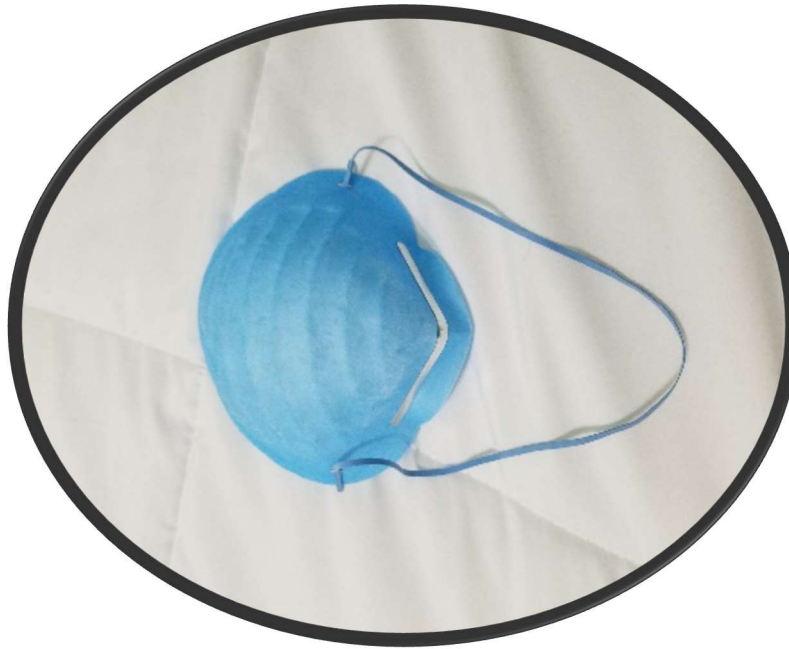
- A recently completed study (2019) of 7 cities across the US during the influenza seasons from 2011 to 2015 studied ~ 2,400 healthcare workers wearing N95 respirators vs “medical” masks (“surgical / procedural”). They found no significant difference in rates of acquired flu amongst the staff – 7% to 8% regardless of the mask type.
- Wear the best / highest rated mask you can find and tolerate. A homemade mask is better than no mask in most cases. They all should help even though there is no guarantee - even with a rated mask.
- A recent (April 2020) study on these made at home masks (Respiratory Cloth Masks) demonstrated in lab tests that they can offer significant protection against the transmission of aerosol particles.



**ABOVE IS AN INDUSTRIAL MASK WITH A ONE WAY VALVE,
ALLOWING AIR TO FREELY FLOW OUT. CLEARLY NOT GOOD
FOR THE OTHER PERSON.**



ABOVE IS AN INDUSTRIAL N95 MASK WITH NO AIR VALVE.



ABOVE IS ANOTHER TYPE OF MOLDED MASK WHICH MAY BE RATED FOR INDUSTRIAL USE (NO RATING SHOWN) & APPEARS TO BE THE SAME AS A 3M DENTAL MASK. THEY ALSO COME IN PINK.



**ABOVE IS AN INDUSTRIAL MASK WITH NO SHOWN RATING,
PROBABLY MEANT ORIGINALLY FOR DUST CONTROL.**



**ABOVE IS A TYPICAL SURGICAL / PROCEDURAL MASK WHICH
IS MEANT TO PROTECT THE PATIENT FIRST.**



ABOVE IS AN INDUSTRIAL MASK (TYPICALLY REFERRED TO AS AN ELASTOMERIC RESPIRATOR). THE FILTERS VARY DEPENDING ON THE TOXINS / PARTICULATE MATTER YOU WANT TO KEEP OUT OF YOUR LUNGS. CAN BE VERY EFFECTIVE BUT YOU ARE NOT GOING TO WANT TO WEAR FOR VERY LONG AS THEY ARE HEAVY, HOT, HUMID, AND UNCOMFORTABLE.



**ABOVE IS THE SAME AS PREVIOUS BUT SPECIFICALLY FOR
PAINTING. FILTERS BY 3M.**

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DITTO ABOVE FOR ELASTOMERIC RESPIRATOR.



ABOVE IS A HOMEADE DEVICE USING A CPAP MASK. THIS TYPE COVERS THE NOSE AND MOUTH (NOT ALL OF THEM DO SO). USING A FILTER FABRIC MADE BY 3M FOR HVAC DEVICES WITH A MERV (HVAC FILTER RATING SYSTEM) 12 RATING : 1.0 – 3.0 μ m @ >95% EFFICIENCY. YOU MAY FIND A HIGHER MERV FILTER FABRIC OR YOU COULD DOUBLE IT UP BUT IT WILL BE VERY HARD TO BREATH THROUGH SUCH A SMALL OPENING.



ABOVE IS A HOMEMADE DEVICE USING COTTON FABRIC (2 LAYERS) WITH A 3M FILTER FABRIC (HIGH MERV RATING) INSERTED BETWEEN. A RECENT STUDY (APRIL 2020) REVIEWS “RESPIRATORY CLOTH MASKS” FINDS THAT THEY CAN PROVIDE SIGNIFICANT PROTECTION.



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LOOKING FOR MORE: CHECK OUT OUR SOURCES. WE DID NOT MAKE THIS STUFF UP!

- 3M TECHNICAL DATA BULLETIN RELEASE 4, APRIL 2020, #174: RESPIRATORY PROTECTION FOR AIRBORNE EXPOSURES TO BIOHAZARDS
- 3M TECHNICAL BULLETIN MARCH 2020, REVISION 3 : RESPIRATORS AND SURGICAL MASKS : A COMPARISON
<https://multimedia.3m.com/mws/media/957730O/respirators-and-surgical-masks-contrast-technical-bulletin.pdf>
- CDC: PROPER N95 RESPIRATOR USE FOR RESPIRATORY PROTECTION PREPAREDNESS
<https://blogs.cdc.gov/niosh-science-blog/2020/03/16/n95-preparedness/>
- CDC: N95 RESPIRATORS AND SURGICAL MASKS
<https://www.fda.gov/medical-devices/personal-protective-equipment-infection-control/n95-respirators-and-surgical-masks-face-masks>
- CDC: UNDERSTANDING THE DIFFERENCE
<https://www.cdc.gov/niosh/npptl/pdfs/UnderstandDifferenceInFogaphic-508.pdf>
- AMERICAN CHEMICAL SOCIETY: ACS/NANO – AEROSOL FILTRATION EFFICIENCY OF COMMON FABRICS USED IN RESPIRATORY CLOTH MASKS
<https://pubs.acs.org/doi/10.1021/acsnano.0c03252?ref=pdf>



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Aerosol Filtration Efficiency of Common Fabrics Used in Respiratory Cloth Masks

Abhiteja Konda, Abhinav Prakash, Gregory A. Moss, Michael Schmoldt, Gregory D. Grant, and Supratik Guha

ACS Nano Article ASAP

DOI: 10.1021/acsnano.0c03252

- Science Daily summary of the ACS / NANO article cited above
The best material for homemade face masks may be a combination of two fabrics
<https://www.sciencedaily.com/releases/2020/04/200424081648.htm>
- Science Daily
Surgical masks as good as respirators for flu and respiratory virus protection
<https://www.sciencedaily.com/releases/2019/09/190903134732.htm>

Underlying source article:

Lewis J. Radonovich, Michael S. Simberkoff, Mary T. Bessesen, Alexandria C. Brown, Derek A. T. Cummings, Charlotte A. Gaydos, Jenna G. Los, Amanda E. Krosche, Cynthia L. Gibert, Geoffrey J. Gorse, Ann-Christine Nyquist, Nicholas G. Reich, Maria C. Rodriguez-Barradas, Connie Savor Price, Trish M.

Perl. **N95 Respirators vs Medical Masks for Preventing Influenza Among Health Care Personnel.** JAMA, 2019; 322 (9): 824

DOI: [10.1001/jama.2019.11645](https://doi.org/10.1001/jama.2019.11645)



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Not everyone agrees:

If your mask works so well, why do I have to wear one?

<http://www.capecharlesmirror.com/news/reader-submitted-if-your-mask-works-so-well-why-do-i-have-to-wear-one/>

Maybe not:

How useful is a mask?

<https://www.newsbreak.com/news/0P6m8q6S/new-study-reveals-exactly-how-useful-a-mask-is-at-protecting-you-from-covid-19?s=oldSite&ss=a4>

We bought these masks several months ago from a legitimate technology firm and just got them. In spite of their claims, they are NOT FDA approved. The CDC web site says they are NOT approved as N95 masks!



