



# Masks in the Fight Against COVID-19: An 'Inconvenient' Truth

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“One might argue that fear and anxiety are better countered with data and education than with a marginally beneficial mask”

—— Klompas et al, NEJM, April 1, 2020 ——

## Eye on the Community

The fast changing opinions about who should be wearing masks, and which ones offer better protection has become the center of a global debate. OE survey data suggests, 6 in 10 in our community favor masks for everyone and 9 of 10 believe surgical masks are superior to homemade cloth masks. The logical assumption is the widespread use of surgical masks in our communities amidst a crisis of limited supply to frontline healthcare workers. But here is the challenge, 10% in our community believe cloth masks are dangerous, 5% believe they are definitely better, and the remainder are torn in the middle. There is evidence that helps us determine priorities for the use of N95 masks, surgical masks and cloth masks.

## Mandatory Masks for All Citizens

The SARS-CoV-2 virus, responsible for COVID-19, is known to be mainly transmitted by droplet particles from one person to another and displays similar characteristics to previous SARS-coronaviruses [9]. Masks, along with full personal protective equipment, represent the standard of care for health care professionals when managing COVID + patients.

Even outside of healthcare, masks could still offer protection. Masks may limit the exposure of the mask-wearer to droplets from others, as well as preventing the spread of droplets from the mask-wearer to others. Recently, international media outlets (Washington Post, New York Times) have reported that citizens should wear masks, even simple homemade masks made from cloth. Several national governments (Israel, India) have recently made it mandatory for citizens to wear masks in public.

What is the evidence supporting these claims? Should this intervention be adopted by citizens, or healthcare workers who do not have other personal protective equipment (PPE)?

## The World Health Organization Issues A Word of Caution

The WHO states that evidence is far from conclusive to make global recommendations for wearing of masks. Any recommendation calling for all citizens to use masks will risk depletion for front line healthcare workers.

“Should the supply of standard commercial face masks not meet demand, it would be useful to know whether improvised masks could provide any protection to others from those who are infected.”

—— Davies, 2013 ——

## Healthcare Workers and Masks

Two randomized trials compared continuous PPE use by healthcare workers exposed to influenza patients to no PPE use whatsoever. Pooled data indicated that surgical masks conferred a significant protective effect against development of respiratory illness (RR = 0.59; 95%CI: 0.46–0.77) and influenza-like illness (RR = 0.34; 95%CI: 0.14–0.82) compared to no masks [3].

The same authors analyzed the results of 16 observational studies (1674 participants) and reported large reduction in risk of 78% with any sort of mask worn by healthcare workers. (RR of 0.78, 95%CI: 0.60 - 0.88) [3]

## Not All Masks are Equal

There are currently 3 key options at play. These include the N95 mask (by definition able to filter over 95% of virus sized particles), a standard surgical mask (variable thickness and materials designed to block large droplets only), and homemade cloth masks. While there is also some evidence that two surgical masks from the same supplier may display quite different filtration efficacy, N95 masks are more consistent. [6, 11] Please see Table 1.

A recent meta-analysis of four trials suggests that N95 masks worn by healthcare workers with exposure to influenza patients are equally protective to surgical masks, with respect to four different definitions of influenza like illnesses [10]. This updated systematic review includes one additional study published in 2019, compared to previous systematic review in 2017 which found a protective effect of N95 masks for clinical respiratory illness (RR = 0.47; 95% CI: 0.36–0.62), but not for Influenza like illness (RR = 0.59; 95% CI: 0.27– 1.28). [3]

One randomized trial specifically evaluated the use of cloth masks among 1607 health care workers in the Vietnam. They were given either 5 cloth masks to be washed and re-used over a 4-week period, or given 2 surgical masks per shift. The cloth masks were considerably worse than surgical masks for preventing influenza-like illness (RR = 13.25, 95%CI: 1.74 to 100.97, P = 0.03), but not for lab-confirmed cases (RR = 1.66, 95%: 0.95 to 2.91, P > 0.05) [8]. The authors hypothesized that the fact that cloth masks did not appear to be superior to the control group is likely confounded by the fact that most people in the control group wore some type of mask (it is unethical to ask people not to wear a mask), but were analyzed according to intention-to-treat [8].

“Moisture retention, reuse of cloth masks and poor filtration may result in increased risk of infection.”

— MacIntyre, 2015 —

	N95	Surgical	Cloth
FDA approved manufacturing	Yes	Yes	No
Filtration efficacy for virus sized particles	>95% (SD <1%) [11]	89.5% (SD 2.7%) [1]	50.9% (SD 16.9%) [1]
RCT Evidence for Healthcare workers	Yes, helpful [10]	Yes, helpful [10]	Yes, more dangerous than surgical mask [8]
RCT Evidence in community	Not directly studied	Yes, helpful only if combined with hand washing [4,7]	Not directly studied

OEINSIGHTS

## Cloth Masks are Inferior to Surgical Masks in Numerous Experiments

Following H1N1 in 2009, Davies et al conducted a prescient study evaluating whether masks made from cloth could stop the transmission of virus-sized droplet particles [1].

In this study, the filtration efficacy of homemade cotton masks for Bacteriophage MS2, a single-stranded RNA coliphage similar in size to most viruses, was found to be 50.9% (SD 16.9%). Surgical masks filtered 89.5% of these particles (SD 2.7%). [1]

Regarding the transmission of droplets and particles during coughing, both homemade and surgical masks significantly decreased the numbers of colony forming units (CFUs) isolated from 21 volunteers. Median CFU for no mask is 2 (IQR: 0 - 12.3) while the median for cloth masks was 1, (IQR 0 - 3, P = 0.004) and the median CFU for surgical masks was 0 (IQR 0 - 1, P < 0.001). [1]

## Masks Offer little Advantage in the Community Over Handwashing

In 2008, a cluster randomized controlled trial run by the University of Michigan's School of Public Health evaluated the effectiveness of surgical masks and hand hygiene on combating the spread of seasonal influenza among 1178 young adults living in residence halls. [4]

The authors reported a 14% event rate, less than 7% loss to follow-up and found that the combination of both surgical masks and hand hygiene, but not masks alone, significantly reduced the incidence of influenza-like illness as of 3 weeks post-intervention (RR 0.52, 95% CI: 0.30 - 0.88, P = 0.02), and the difference between groups increased each week until the end of the study 6 weeks post-intervention (RR 0.25, 95%CI: 0.07 - 0.87, P = 0.03). [4]

Another cluster RCT performed in Hong Kong followed 794 household members in 259 houses where a household member had laboratory-confirmed influenza illness. The households which implemented surgical masks and hand hygiene within 36 hours of symptom onset in the index patient displayed decreased transmission of lab-confirmed infections (RR= 0.33, 95% CI, 0.13 - 0.87). [7]

“They are NOT effective in preventing general public from catching Coronavirus, but if health care providers can't get them to care for sick patients, it puts them and our communities at risk!”

—— Jerome M. Adams, Surgeon General, ——  
USA (NY TIMES, Feb 29, 2020)

## What We Know At Present

### **For Healthcare workers**

The evidence is clear that surgical and N95 masks can protect against virus mediated influenza like illness. Current evidence supports the use of surgical masks and N95 masks by healthcare workers. Cloth masks do not seem effective among healthcare workers.

### **For citizens in the community**

Strictly speaking, there is no randomized study demonstrating the effectiveness of cloth masks in preventing influenzas like illness in the community. Both trials described in this article found a protective effect when masks were combined with hand hygiene.

While the evidence is far from definitive, emphasis on homemade masks alone as a universal community measure for protection against viral illness and spread is currently unsupported by the literature. Moreover, while there is no evidence of harm from cloth masks, masks may also pose a false sense of safety decreasing citizen focus on proven tactics like handwashing and social distancing. Until definitive evidence is available, citizens may use cloth masks but should proceed with caution and absolutely remember to continue other tactics like handwashing and social distancing.

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