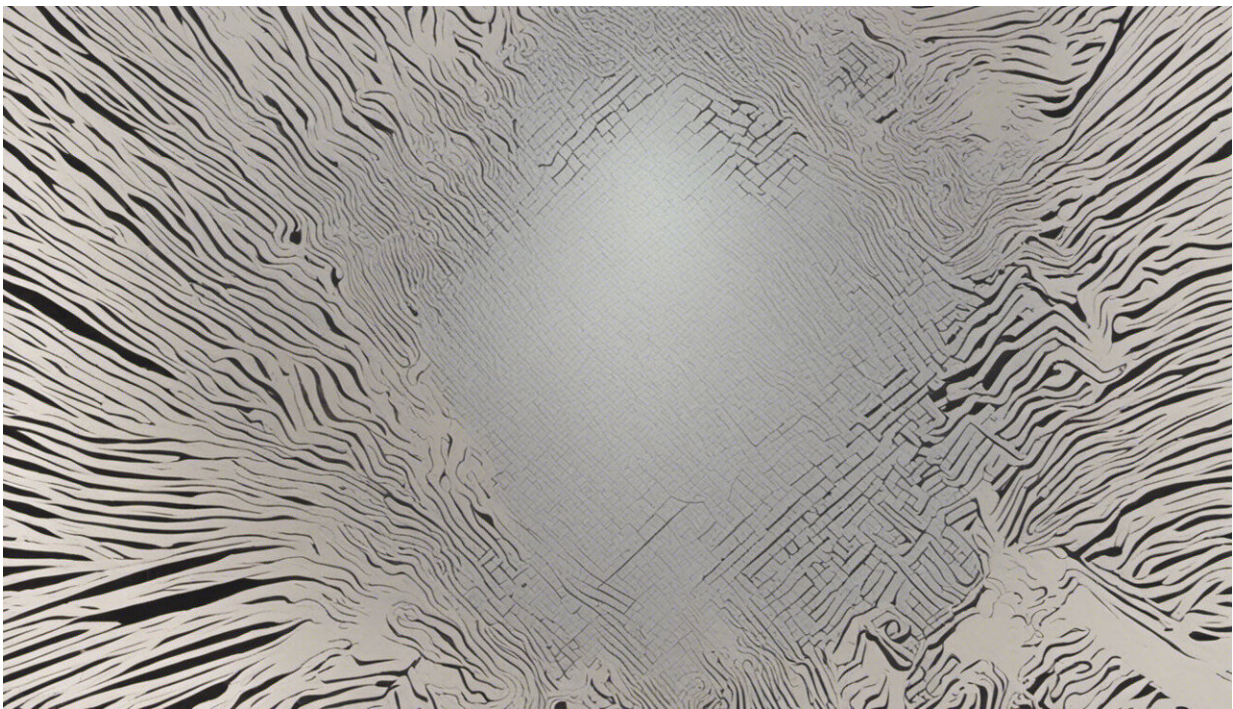


Time to upgrade from cloth and surgical masks to respirators? Your questions answered

January 18 2022, by Leyla Asadi, C Raina MacIntyre, Lisa M Brosseau, Trish Greenhalgh



Credit: AI-generated image ([disclaimer](#))

With the rapid spread of Omicron, many countries are rethinking their COVID mask advice for the community.

Respirators have been mandatory in public places in [Austria](#) for a year. Now, the [United States Centers for Disease Control and Prevention](#) suggests respirators be considered for greater protection, for instance, on public transport or in enclosed crowded spaces. It's time to rethink and upgrade masks for you and your family.

What is a respirator?

Respirators, often wrongly called "masks" because of their appearance, are [personal protective equipment](#) made to a particular standard and designed to prevent inhalation of hazardous airborne contaminants.

In the US, respirator standards are managed by the [National Institute for Occupational Safety and Health](#) (NIOSH), and cover three things: filter efficiency, breathing resistance and fit. A filter that meets the N95 standard (equivalent to Europe's FFP2) must capture at least 95% of particles in the most penetrating size range at a high flow rate. In Australia, a respirator must meet [TGA standards](#).

A respirator that consists entirely of filtering material—rather than having layers, say for waterproofing—is called a filtering facepiece respirator (FFR). An FFR can be worn multiple times but must eventually be thrown away. Research suggests FFRs lose their ability to fit well after [20 wears](#)—due to stretching of straps or failure of the nose clip or edge components.

The filter material is usually a non-woven polypropylene electret, which means the fibers carry an electrical charge to enhance particle collection while ensuring low breathing resistance.

Why were we told to wear cloth masks at first?

It was initially assumed SARS-CoV-2 spread via droplets (in coughs and sneezes) which caused infection when they landed on the mouth, nose or eyes. For such particles, a cloth or [surgical mask](#) is an efficient form of *source control* to protect others from virus emitted by the wearer.

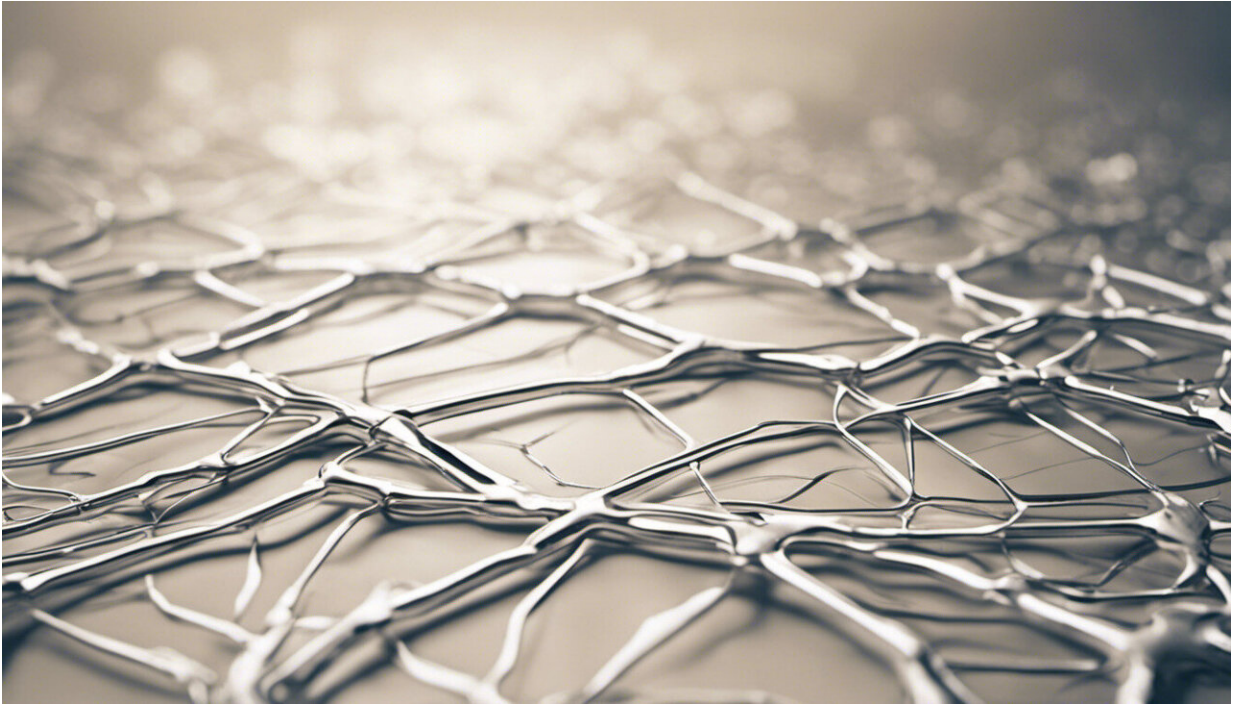
Now it's understood the virus is airborne. Virus-laden particles build up in the air over time indoors because of breathing and speaking.

Will a respirator protect me even if others are unmasked?

It depends on the type of exposure and how long you are exposed. It is important to consider your risk depending on where you are, what you're doing, with whom and how long you're there.

The [safest situation](#), especially for prolonged contact in crowded settings, is when everyone is wearing well-fitting N95 respirators.

It's hard to show evidence to support respirator use in the community—but lack of randomized controlled trials (RCT) does not mean they are not effective. Studying masks or respirators at a population level is complex and involves many variables. There is [strong evidence](#) from RCTs in [health workers](#) and laboratory studies showing respirators are effective for source control and personal protection.



Credit: AI-generated image ([disclaimer](#))

I really like my cloth mask. Is it OK to keep wearing it?

Probably not. Cloth masks are not made to any particular standard, so their properties and quality vary considerably.

In general, they are poor filters of small airborne particles.

Surgical masks are cheaper—can I just switch to those?

Not really. While some surgical masks may have better filtration capacity than cloth masks, they were designed primarily to prevent the emission of large droplets. Some medical-grade surgical masks may also

offer protection from body fluid splashes or sprays. No surgical mask will prevent the emission or inhalation of small infectious particles, however.

A key deficiency of surgical and cloth masks is their loose fit compared to respirators.

While some older, hard-cup style respirators may be uncomfortable, newer styles are [better tolerated](#). This may be due to their greater surface area, which could contribute to lower breathing resistance.

Should I have my respirator professionally fitted?

No. When respirators are used to protect workers from airborne hazards such as dust or pollution, employers are legally required to undertake fit-testing (see for example the US [Occupational Safety and Health Administration](#) fit-testing standard). But even non-fit tested respirators will provide [superior protection](#) over cloth or surgical masks.

A respirator should rest against your face with no gaps, especially around the nose and chin. To create a tight seal, form the nose clip and place both straps around your head, adjusting them if necessary.

If the facepiece collapses a small amount when you inhale, the respirator probably fits well. Get in the habit of doing a ["self seal-check"](#) before each wear.

Thoughts on how we might get better numbers to inform our understanding of where we are with Omicron. When will this COVID wave be over? 4 numbers to keep an eye on and why <https://t.co/ORaj9tqacX> via [@ConversationEDU](#)

— Prof. Peter Doherty (@ProfPCDoherty) [January 13, 2022](#)

Shouldn't respirators be reserved for healthcare professionals?

No. Early in the pandemic, the public were discouraged from buying respirators because of a global shortage of personal protective equipment and the assumption healthcare workers were at higher risk of catching COVID from so-called "aerosol-generating procedures" such as intubation.

25-hour protection when both people are wearing fit-tested N95 respirators

Time to infectious dose for an uninfected person (receiver)*

		Receiver is wearing (%inward leakage)				
		Nothing	Typical cloth mask	Typical surgical mask	Non-fit-tested N95 FFR	Fit-tested N95 FFR
Source is wearing (%outward leakage)		100%	75%	50%	20%	10%
Nothing	100%	15 min	20 min	30 min	1.25 hr	2.5 hr
Typical cloth mask	75%	20 min	26 min	40 min	1.7 hr	3.3 hr
Typical surgical mask	50%	30 min	40 min	1 hr	2.5 hr	5 hr
Non-fit-tested N95 FFR**	20%	1.5 hr	1.7 hr	2.5 hr	6.25 hr	12.5 hr
Fit-tested N95 FFR	10%	2.5 hr	3.3 hr	5 hr	12.5 hr	25 hr

*The data for % inward and outward leakage of cloth and surgical masks were derived from a study by Lindsley et al (2021). Data for non-fit-tested N95 FFRs come from a study by Brosseau (2020). Data for fit-tested N95 FFRs are derived from OSHA-assigned protection factor of 10 for half-facepiece respirators. Also, times were established before wide circulation of more transmissible Delta variant.

**FFR= filtering facepiece respirator; N95 = not oil-proof, 95% efficient at NIOSH filter test conditions



Mask effectiveness table. Credit: Lisa M Brosseau, Author provided

We now know [everyday activities like talking and singing](#) are *more* likely to generate infectious aerosols than medical procedures.

As with vaccines, there are global equity issues and we need to [expand manufacturing capacity](#) to ensure sufficient supply for everyone.

What about the cost and environmental impact?

Compared to cloth masks, respirators (which are not washable) cost more and have a greater environmental impact. But disposable respirators can be used for [extended periods](#) if they are not wet or damaged, and there are re-usable options such as [elastometric respirators](#). A respirator should be thrown away when it gets dirty or the straps, nose clip or other components lose their integrity.

Costs and environmental concerns need to be weighed against the costs and waste produced by a single COVID hospital admission. In Australia, the average daily cost of an Intensive Care Unit stay has been [estimated at \\$4375](#).

What if I can't afford or get my hands on a N95 respirator?

The Korean KF94 and Chinese KN95s are cheaper alternatives that provide better protection than a surgical or cloth mask. [Beware counterfeits](#), such as those without a GN stamp to show they meet manufacturing standards.

If you can't get hold of a respirator, you can [improve protection of a surgical or cloth mask](#).

Options include "[double masking](#)" by wearing a tight-fitting cloth mask over a surgical mask. You can also "knot and tuck" a surgical mask by tying the sides and tucking the remainder inside. Finally, a well-designed cloth mask (with three layers) can perform as well as a good quality surgical mask.

It's still true that something is better than nothing. But don't count on these types of [masks](#) to provide the same level of protection for the same amount of time as an N95 respirator.

Respirators should be provided and required

The World Health Organization has stressed the importance of a "vaccines-plus" approach.

There is a strong case, when prevalence of COVID is high, for governments to both mandate and fund the provision of respirators for the public, [as some parts of the US](#) are now doing.

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Citation: Time to upgrade from cloth and surgical masks to respirators? Your questions answered (2022, January 18) retrieved 3 May 2024 from <https://medicalxpress.com/news/2022-01-surgical-masks-respirators.html>

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