COVID-19 Response: Using/Reusing Masks and Making Hand Sanitizer

This WorkCare Fact Sheet provides guidance on the use and reuse of protective masks and a formula for making hand sanitizer to help prevent the spread of COVID-19.

Good hygiene practices are a first line of defense against the spread of contagious illnesses like COVID-19. With supply shortages, it's important to understand how to safely use/reuse masks and formulate hand sanitizer from available materials.

Masks

A face mask covering the nose and mouth (e.g., N95 respirator or surgical mask) is worn to protect against exposure to airborne contaminants and infectious particles. Numbers indicate the percentage of protection. For example, an N95 respirator filters out at least 95 percent of airborne particles during worst-case testing.

Surgical masks are filters with a mesh of polypropylene that catches potentially infected droplets. They are not rated for completely filtering out aerosolized viruses. However, surgical masks have been shown to be nearly as effective as N95 respirators in lab tests against aerosols and clinical trials against influenza transmission.

For CDC guidance, refer to Strategies for Optimizing the Supply of N95 Respirators, including emergency FDA approval of KN95 masks that meet Chinese government standards.

How to Wear to Mask

The following are some tips for wearing a mask:

- Clean your hands well before putting on and after taking off a mask. Bend the hard edge to fit your nose, put on your nose and pull the straps over your ears, then stretch the mask down to cover your chin.
- When alone, use clean hands to lower the mask to your chin to take a break or when you need to drink water. This gives a chance for the mask to dry out, which makes it more effective. When eating, remove the mask and set it in a clean place outside-up. Be sure to clean your hands before eating.

Can Masks Be Reused?

Disposable masks are meant to be worn by health care personnel once per patient and then thrown away to prevent the spread of germs among patients. For anyone else who may wear a mask as a precaution while doing daily tasks, a best practice is to wear one mask a day.

According to Stanford Medicine's Anesthesia Informatics and Media Lab, face masks can be disinfected for reuse (Table 1 on page 2).

Michael Lin, M.D., PhD., of Lin Lab, Department of Neurobiology at Stanford University, provides the following instructions:

1. For alternate use among several masks: After using one, put it in its own bag to let the virus decay for several days. It's best not to share your mask with anyone else.
2. For rapid decontamination: Place in an oven at 70°C = 160°F for 30-60 minutes; or put the mask in a steam basket placed above but not in boiling water for 10 minutes; or expose both sides in a UV sterilizer (40W, two feet away). Mask efficacy is unaffected by these treatments. Alcohol and bleach are not recommended because they affect the electrostatic membrane that assists with virus filtration.

Making Hand Sanitizer

Dr. Lin offers this advice for making hand sanitizer when consumer products are not available:

> *Mix two parts 95 percent non-denatured ethanol or 99-100 percent isopropanol with 1 part aloe vera gel or 90-100 percent glycerol.*

According to Dr. Lin, commercially produced hand sanitizer is 60-70 percent ethanol with moisturizers. When making your own hand sanitizer, 95 percent non-denatured ethanol is recommended. By comparison, 95 percent denatured ethanol has toxic additives. In addition, 100 percent, dehydrated, absolute anhydrous ethanol contains benzene, which is toxic. Isopropanol can be substituted for ethanol, but it takes longer to evaporate. In use, 60-70 percent of isopropanol is as effective as 60-70 percent of ethanol as a disinfectant. For detailed information on handrubs, refer to the World Health Organization's Guide to Local Production: WHO-recommeded Handrub Formulations.

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Can Facial Masks be Disinfected for Re-use?

(Measurement results by 4C Air Inc.)

Samples	Meltblown fiber filtration media		Static-charged cotton		E. Coli. Disinfection Efficiency
	Filtration efficiency (%)	Pressure drop (Pa)	Filtration efficiency (%)	Pressure drop (Pa)	
70°C hot air in oven, 30min	96.60	8.00	70.16	4.67	>99%
UV light, 30min	95.50	7.00	77.72	6.00	>99%
75% alcohol, soaking and drying	56.33	7.67	29.24	5.33	>99%
Chlorine-based disinfection, 5min	73.11	9.00	57.33	7.00	>99%
Hot water vapor from boiling water, 10min	94.74	8.00	77.65	7.00	>99%
Initial samples before treatment	96.76	8.33	78.01	5.33	

Conclusions: DO NOT use alcohol and chlorine-based disinfection methods. These will remove the static charge in the microfibers in N95 facial masks, reducing filtration efficiency. In addition, chlorine also retains gas after de-contamination and these fumes may be harmful.

Table 2: Data supplied courtesy of Professor Yi Cui | Materials Science and Engineering, Stanford University and Professor Steven Chu | Physics and Molecular & Cellular Physiology, Stanford University on behalf of 4C Air Incorporated.

