

Low cost, Creative Solutions during Covid-19 Pandemic

Compiled by Choon L Bong from KK Hospital, Singapore, using photos and links from www and social media. Sources are acknowledged where possible.

To minimize aerosolizing:

Plastic drapes:

- For intubation (a video laryngoscope available)
- For Bag and mask
- For extubation



Source: UK

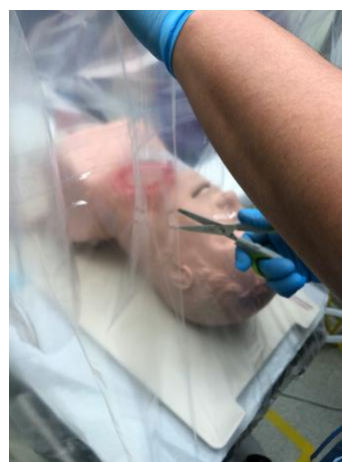


Courtesy of Belen De Jose Maria,
Barcelona

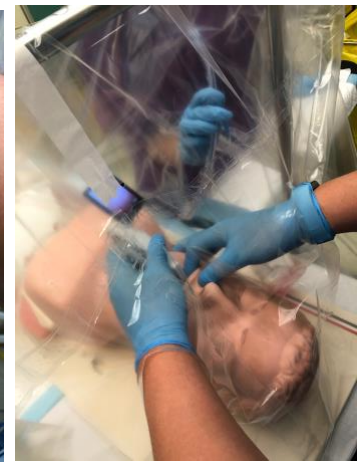


DIY "tent" made from clear plastic
Draped over existing bar

Courtesy of Teddy Fabila, KKH, Singapore



Cut slits for access



Airway maneuver

Box:



Courtesy of Alvin Tan, Ng Teng Fong Hospital, Singapore
Box created by Ngee Ann Polytechnic, Singapore

Creative, low cost ways to make PPEs

Links to consider if you have to make your own mask:

<https://www.scmp.com/news/hong-kong/health-environment/article/3050689/how-make-your-own-mask-hong-kong-scientists>

https://www.consumer.org.hk/ws_en/news/specials/2020/mask-diy-tips.html

<https://time.com/5805557/homemade-medical-face-mask-shortage/>

<https://maidsailors.com/blog/how-to-make-a-surgical-mask/>

How to make your own N95 mask equivalent

https://www.youtube.com/watch?v=Es_iY5WJdmI

Relative Effectiveness of Homemade masks

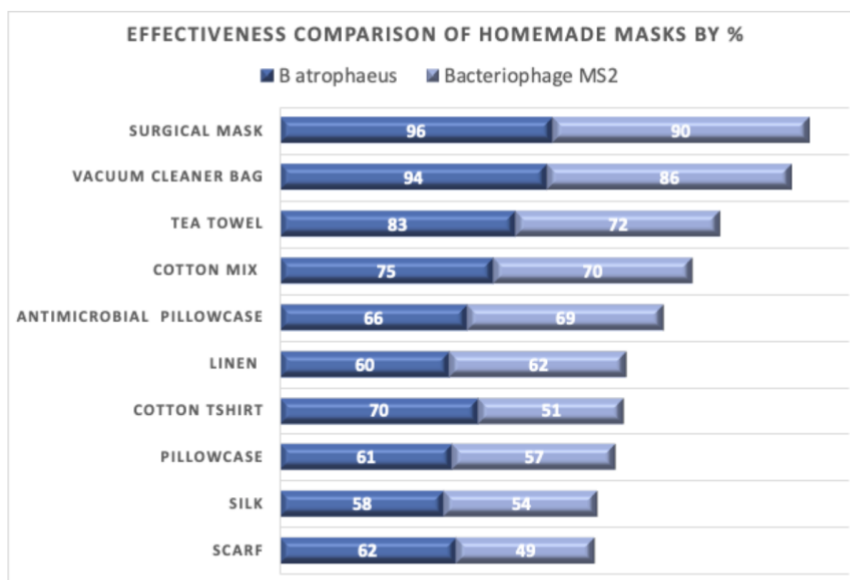


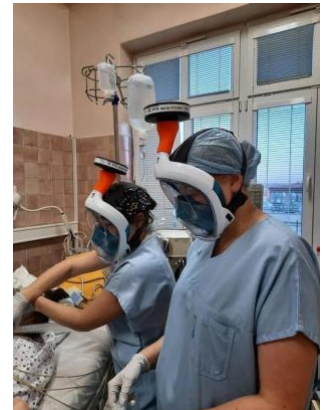
Table 1: *The mask effectiveness is offset by difficulty to breathe through the filter, vacuum bags were rated highly but the effort to breathe made it less secure.

**Using inner filters such as feminine hygiene products for N95 masks is not recommended as [N95 mask once contaminated retain 99.8% of pathogens](#)

***Other materials such as teabags which are antimicrobial might be used or layered with other materials

Source: <https://aim.stanford.edu/covid-19-evidence-service/>

Faceshields/ Eye shields



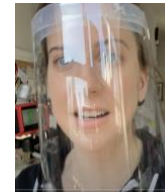
Source: KKH, Singapore

Source: Italy

[DIY Faceshields made from transparent plastic bottles](https://www.youtube.com/watch?v=1S83fjKY19w)
<https://www.youtube.com/watch?v=1S83fjKY19w>



[DIY Faceshield made from everyday materials](https://www.youtube.com/watch?v=vHnZyvYQ7UY)
<https://www.youtube.com/watch?v=vHnZyvYQ7UY>
<https://www.youtube.com/watch?v=fsU3wyLELII>
<https://www.youtube.com/watch?v=R46pt7sOzUg>



[DIY Detachable face shields for caps](https://www.youtube.com/watch?v=9RwymUuSzdQ)
<https://www.youtube.com/watch?v=9RwymUuSzdQ>

[DIY Respirator from Scuba-diving mask:](https://www.youtube.com/watch?v=w4Csqdxkrfw&feature=youtu.be)
<https://www.youtube.com/watch?v=w4Csqdxkrfw&feature=youtu.be>

Protective goggles:

Use Industrial safety goggles from hardware stores, scuba diving goggles, cycling goggles (e.g. from Decathlon)



[DIY protective goggles from a plastic bottle](https://www.youtube.com/watch?v=NfW_uNDZUb8)
https://www.youtube.com/watch?v=NfW_uNDZUb8

Protective Gowns:

- From Aprons



From Garbage Bags



Source: Malaysia

<https://www.facebook.com/754355969/videos/10158032668015970/>



Source: United Kingdom

<https://www.dailymail.co.uk/news/article-8137531/Nurses-forced-wear-BIN-BAGS-protect-major-UK-hospital.html>

Re-using PPE:

How to Store and Re-use N95 masks without contamination (# use a plastic box)

<https://www.facebook.com/30608862/posts/10103219262264717>

Re-using Facial Masks

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.

Splitting/ Sharing ventilators:

<https://emcrit.org/pulmcrit/split-ventilators/>

<https://www.youtube.com/watch?v=NER2h9STy7Q&feature=youtu.be>