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
Cut slits for access
Airway maneuver

Courtesy of Teddy Fabila, KKH, Singapore

v4 22 April 2020
Creative, low cost ways to make PPEs

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


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_iY5WJdml

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

DIY Faceshields made from transparent plastic bottles
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=fsU3wyLELI
https://www.youtube.com/watch?v=R46pt7sOzUg

DIY Detachable face shields for caps
https://www.youtube.com/watch?v=9RwymUuSzdQ

DIY Respirator from Scuba-diving mask:
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 Decathalon)

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

Source: Italy

https://www.youtube.com/watch?v=1S83fjKY19w
https://www.youtube.com/watch?v=vHnZyvYQ7UY
https://www.youtube.com/watch?v=fsU3wyLELI
https://www.youtube.com/watch?v=R46pt7sOzUg
https://www.youtube.com/watch?v=9RwymUuSzdQ
https://www.youtube.com/watch?v=w4Csqdxkrfw&feature=youtu.be
https://www.youtube.com/watch?v=NfW_uNDZUb8
Protective Gowns:

- From Aprons

Source: Malaysia
https://www.facebook.com/754355969/videos/10158032668015970/

From Garbage Bags

Source: United Kingdom

v4 22 April 2020
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

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

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