Boston - Durable PPE project 2020

Proposal

Slack project

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1. Introduction (March 17, 2020)

This is a proposal created by a group of anesthesiologists at Brigham and Women's Hospital to 3D-print an adapter to connect a common scuba mask with common filters to create **durable personal protective equipment**. The doc was started by Dr. Jacqueline Boehme (jboehme@partners.org) and Dr. Alex Stone (abstone@partners.org), joined by Dr. Kamen Vlassakov (kvlassakov@bwh.harvard.edu).

Interested in helping?

- Join the Slack project
- Check out the open doc for info-sharing, brainstorming, and volunteering

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2. Problem & proposed solution

Problem: Front-line providers are running out of personal protective equipment (PPE). At our hospital, we have a limited supply of PPE remaining. PPE consists of face masks (N95) and face shields. *Both are in short supply with people stockpiling these at home and stealing them from hospitals*. Overall demand grossly exceeds supply globally and production, distribution and supply routes are compromised by the pandemic. In addition, the typical forms of PPE are disposable. We need something more permanent to both combat the limited supply and also to decrease waste and carbon footprint.

As Anesthesia and Critical Care providers at the Brigham and Women's Hospital, we are extremely concerned for our fellow physicians and healthcare staff who are on the front lines performing life saving invasive procedures such as endotracheal intubation, in patients with COVID-19. They are increasingly at risk with each passing moment as this pandemic escalates and asymptomatic carriers

are likely ubiquitous (under the present inadequate testing). Without PPE, we will fall ill, be unable to care for our ever escalating number of patients, and put our families at-risk every night we return home.

Hypothesis: Since face masks and face shields will likely become unavailable in our hospital in a number of weeks (or even days, if the epidemiological situation escalates), we need to quickly adapt alternatives. If we can create durable, reusable, cleanable, subject to multiple sterilizations PPE from existing materials, then we can mitigate provider exposure during this emergency and provide protection to front-line staff.

Proposed solution: Adapting a full face snorkel mask to fit a filter already in use for breathing circuits and in hospitals.

We will adapt a full-face snorkel mask to fit a filter already in-use for breathing circuits and in hospital. Because this filter is re-usable, and unavailable/unknown to the general public, it will be less at risk to be taken from providers treating ill patients. The mask: HEAD Sea Vu Dry Full Face Snorkeling Mask.

The goal would be to create an adaptor for the snorkel to attach to a standard 15mm and 22mm anesthesia breathing circuit (mandated by iso 5356-1:2004) to attach it to inline filters which the hospital has. Below are pictures of the pieces. I'll be happy to provide more pictures upon request. Additionally, I would be willing to bring the piece to a place in the greater boston area if it would facilitate the process.

	**Figure 1: The Sea Vu Mask by Head.Ada**
	**Figure 2: The pieces as I would like them to come together**

Figure 3: Image of the interior diameters of the pieces

Note (arthurblume@gmail.com): I think Dr. Stone may have intended another image here -- checking

Figure 4: Image of the female and male adapters of the anesthesia breathing circuit

Figure 5: Male and female connections of the snorkel mask

Initial Prototype:

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3. Contacts

Note (arthurblume@gmail.com 2020-03-18): This list has largely been superseded by the Slack project, which you can join here. For an overview of subprojects (Slack channels), check out this daily update.

Project contacts
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Meeting? *Put meeting notes here*
Designing? *Drop your 3D files here*