OSCMS - Face Masks

The Problem:

N95 masks are in short supply, and people who don't need them are using them. Surgical masks can serve lighter duty uses. Fabric face masks are best used to protect existing N95s and surgical masks.

Current US Resources:

- HHS Strategic National Stockpile:
    - 30,000,000 surgical face masks in Strategic National Stockpile (HHS officials, Time)
    - “"U.S. Department of Health and Human Services intends to purchase 500 million N95 respirators over the next 18 months for the Strategic National Stockpile " (HHS, 3/4/20)

Worst Case Expectation:

- **World Health Organization:** “89 million medical masks will be required for the COVID-19 response” (each month, globally) (CNBC, 3/4/20) (WHO 3/3/20)

Why We'll Need It:

- “Facemasks are an acceptable alternative when the supply chain of respirators cannot meet the demand,” the CDC said in a statement that is expected to unsettle health care workers who have been trained to use the more protective gear during contagions.” (WP, 3/10/20)
- “Among the general public, persons with respiratory symptoms or those caring for COVID-19 patients at home should receive medical masks.” (WHO 2/27/20)

Why We Won't Need It:

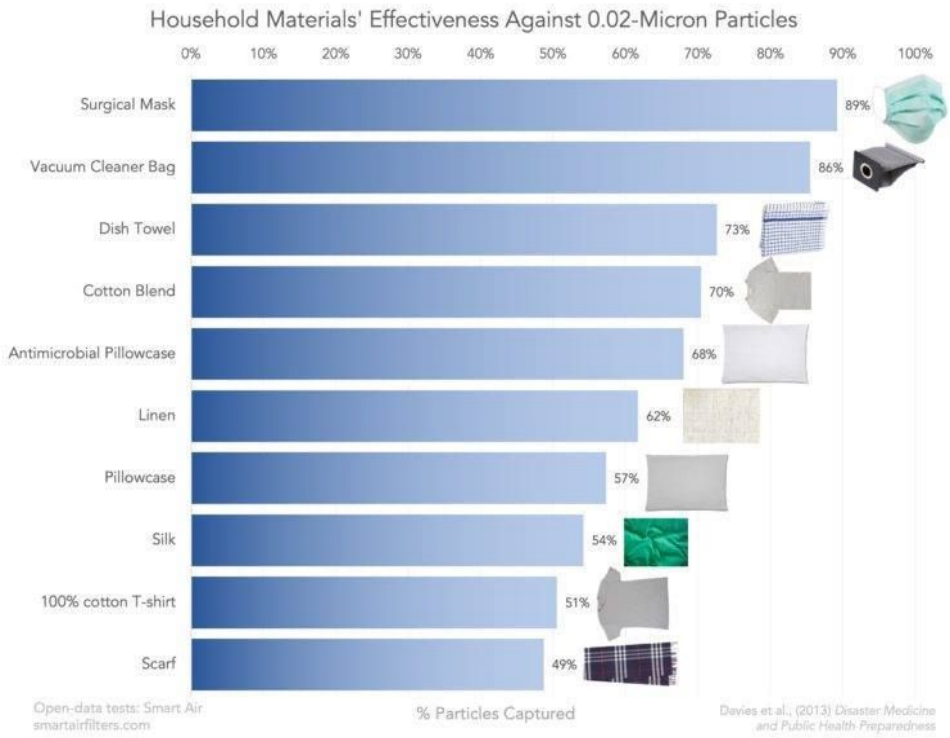
- China can produce 116 M masks a day (source).
- WHO advocates consideration of ad hoc measures to reduce PPE needs:

- Telemedicine to minimize the number of individuals who go to healthcare facilities for evaluation
- Using physical barriers to reduce virus exposure, such as glass or plastic windows, including areas where the patients will first present in a healthcare setting (e.g., triage area, registration desk, pharmacy windows)
- Bundling activities to reduce the number of times a room is entered and pre-planning which bundle of activities will be performed
- Restricting individuals from unnecessarily entering the rooms of COVID-19 patients

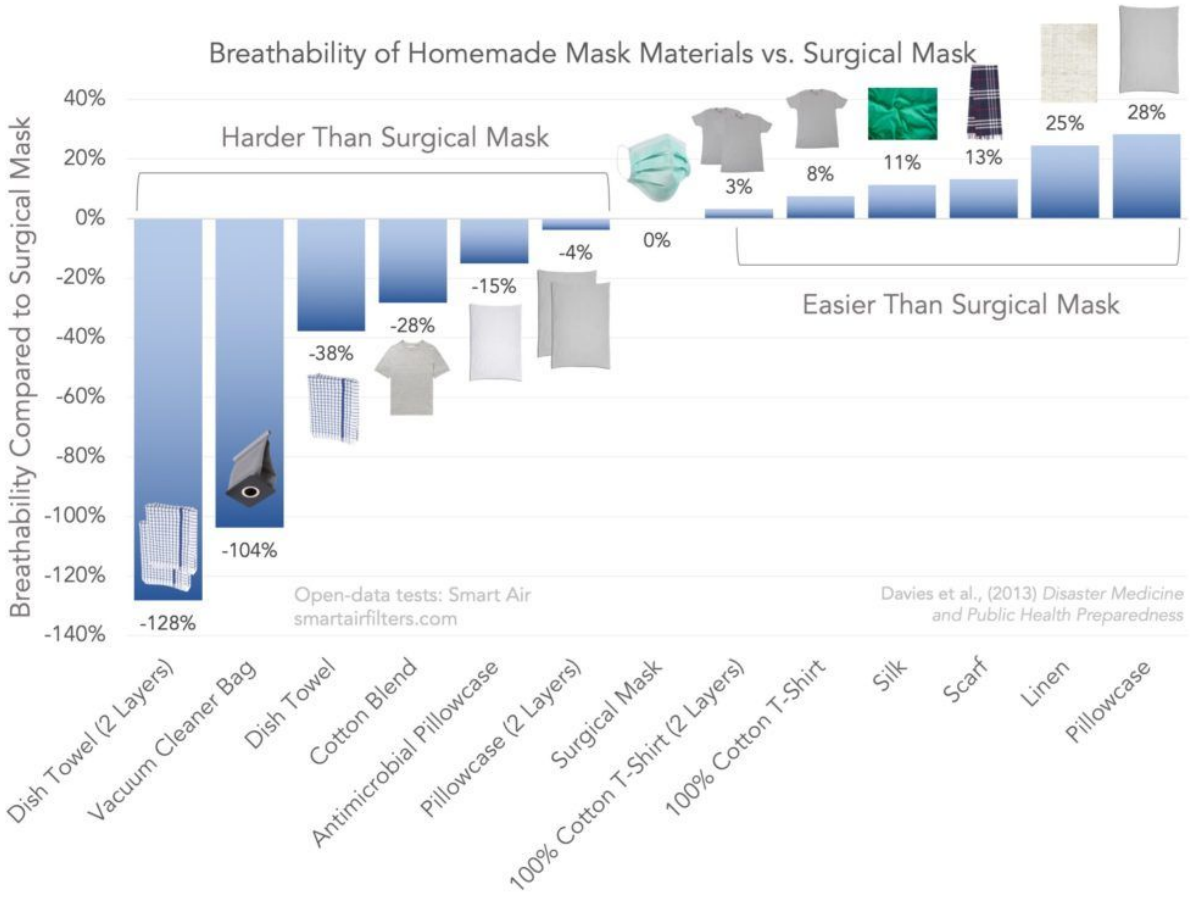
Engineering Requirements:

Material Selection:

Filtration Efficiency



Pressure Drop



Assembly/Fabrication Requirements:

- Must include documentation with masks with details about materials/fiber content. Documentation should also clarify whether the mask is intended to be worn over existing PPE to prolong the life, or if it is intended to provide filtration (higher number of layers, includes disposable filter and information about how to replace filters).
- Ties are preferred to elastics.
- If elastics are used, must be non-latex elastic.
- If mask is intended to go over existing PPE (as in the case of covering an N95 respirator) it should be no more than 2 layers of breathable fabric so that it does not restrict airflow.

Projects/Resources:

- https://www.appropedia.org/Simple_masks

- https://www.researchgate.net/publication/258525804_Testing_the_Efficacy_of_Homemade_Masks_Would_They_Protect_in_an_Influenza_Pandemic
- Household Materials' Effectiveness Against 0.02-Micron Particles (Infographic **Catastrophe Grade**)
- https://www.slideshare.net/muralikrishnan71697092/respiratory-protection-face-masks-and-respirators (Slideshow)

Reviewed Designs:

CDC Stance on Sewn Masks: The Center for Disease Control notes that fabric masks are a crisis response option when other supplies are not available.

This section is for product designs (links to instructions or downloadable packages) that have been reviewed and approved by medical professionals. When adding a design to this list, please include the (approximate) date of approval, the group or organization that reviewed it, and any modifications they recommend.*

***A few notes on fabric masks:**

- Fabric masks provide different levels of filtration depending on the materials used. Please see our documentation for levels of filtration, and note that all homemade designs are to be used at your own risk. **Based on the available research, clinicians should consider using multiple masks over an 8 hour period if using woven fabric alone (and not over existing PPE to protect against soiling). Store similar to N95s (allowing the mask to hang in a designated area or placed in a paper bag and labeled - with one mask per paper bag). Launder after each use.** Finer weaves are better when using woven material alone.
- **If you are producing for clinicians,** it is best to ensure your local hospitals and local clinicians will accept the mask design you are considering as every hospital/clinician will have their own guidelines. We recommend working through Relief Crafters of America as they are taking hospital requests, or with hospitals that have made public requests for sewn masks.
- Almost any breathable design that fits over a respirator and can be worn securely can be used to protect an N95 respirator from soiling, in turn potentially prolonging its availability for use as PPE. **When making masks to protect PPE: 1)** Lighter colors are better because they make it easier to see soiling **2)** Use no more than 2 layers for this as no filtration is needed - the goal is protection from soiling, only **3)** Ensure coverage if using over an N95 (these come in several sizes and from different manufacturers) **4)** Fit is important, and ties that go around the back of the head are preferred **5)** No latex should be used in designs for clinical settings - do not use elastic. **6)** Using different colors on the front (outside facing; lighter is better) and back (inside facing) part of the mask is ideal so that the sides can easily be recognized.

Fabric Face Masks

Project Name: “We Can Sew It” Mask
Design Link: https://bit.ly/2UaFAHK

- Reviewed: 3/21
- Reviewed by: OSCMS Medical Review Team

- *Note: Please see documentation regarding the filtering properties of various fabrics;* ***good for use over existing PPE (surgical masks and N95s) as designed****. Uses ties not earloops.*

Project Name: Phoebe Health Mask
Design Link: https://bit.ly/2J4jNeD
- Reviewed: 3/21
- Reviewed by: OSCMS Medical Review Team
- *Note: This design works especially well as a protective cover for the* ***duckbill shape of some N95 masks****; please ensure fit. Non-latex elastic or adopt ties for behind the head.*

Project Name: Providence St. Joseph Health Face Mask Kit
Design Link: https://vimeo.com/399324367/13cd93f150
- Reviewed: 3/21
- Reviewed by: Providence St. Joseph Health System
- *Note: Video available; uses ties. Very similar to "We Can Sew It"*

Project Name: HelpfulEngineering Cloth Mask
Design Link: http://project-cloth-masks.com (Locally sourced materials)
- Reviewed 3/21
- Reviewed by: OSCMS Medical Review Team
- *Note: "Non woven polypropylene (NWPP) is commonly used in surgical masks and can be easily sewn into masks that can block the spread of droplets from coughs and sneezes" - Community Pleated Masks. Non-latex elastic or adopt ties behind the head. Hair elastics may hurt some people/be too tight.*

Project Name: How to Make a Face Mask
Design Link: How-to-make-a-Face-Mask (Deaconess Hospital)
- Reviewed 3/20
- Reviewed by: OSCMS Medical Review Team
- *Note: Please see documentation regarding the filtering properties of various fabrics;* ***will only be useful to clinical settings if worn over existing PPE as designed****. Do not use latex elastics if designing for healthcare.*

Project Name: Maker's Habitat DIY Fabric Mask
Design Link: Maker's Habitat
- Reviewed: 3/23
- Reviewed by: OSCMS Medical Review Team
- *Note: Please use our filtering resources/documentation.* ***Without the filter, this design is good for use over existing PPE*** *- ties are preferred over loops. For the filter, consider non-woven polypropylene (see Helpful Engineering mask).*

Not Recommended:

This section is for product designs and ideas that are explicitly NOT recommended by medical professionals for reasons of safety or feasibility. If you see an idea that has been explicitly rejected, add it here so we can focus efforts on more feasible designs. Please include the group or organization that made this judgment and a brief description of the reason.

Design link or brief description:

- Reviewed by:
- Reason: