Can DIY facemasks and 3-D printed parts help fight COVID-19?

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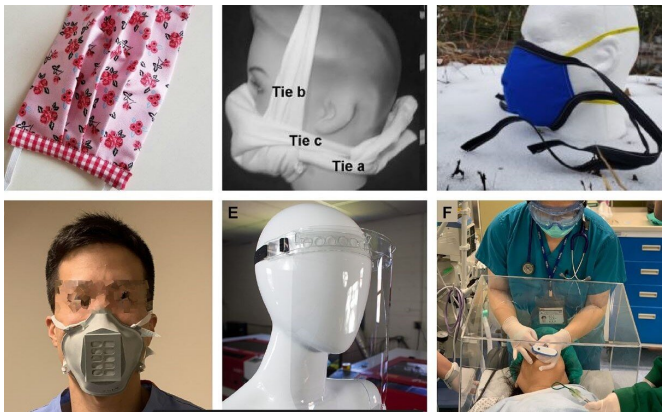

Credit: PLOS Biology

Free, open source hardware and 3-D printing could alleviate the burden of COVID-19 on global health systems, according to scientists at the University of Sussex. In a study publishing April 24, 2020 in the open access journal *PLOS Biology*, Professor Tom Baden and André Chagas at the University of Sussex, and co-authors from the University of Cambridge and the Francis Crick Institute, have suggested that this could be a viable option to provide our health services with the tools and equipment they so desperately need.

Free and open source hardware (FOSH) follows an ethos where blueprints for a tool are made freely available so that anyone can study, learn, modify, customize and commercialize them. The new study provides an overview of the blueprints which are currently available free online and which could be used to help in the fight against coronavirus, focusing on personal protective equipment, ventilators and diagnostic test kits.

Although some of the designs still need to be tested, many others have already received suitable verification, having been published in peer-reviewed papers. The authors therefore believe that FOSH should be seriously considered as a method of quickly providing equipment where it's needed.

Tom Baden, Professor of Neuroscience at the University of Sussex, said: "Now is the time that open hardware could really shine and it's so important that we get on board quickly.

"Previous studies and experiences have shown that free and open source hardware is a brilliant option in disaster situations. Designs can be shared globally, it has typically lower implementation costs than mass manufacturing and it can be easily adapted to meet local resources.

"But the real power—and the way this could really help to tackle COVID-19—is that once a tool has been designed and tested, anyone can build it. This bypasses the traditional manufacturing and distribution routes and means that it can become a community driven endeavour where anyone with the capacity to do so can help to produce much-needed equipment and supplies for the healthcare services."

The paper describes existing FOSH designs from simple tools like DIY facemasks to 3-D printed valves which can regulate airflow in ventilator tubes. Others are far more complex, including state-of-the-art scientific instruments for diagnostics, such as an automated pipetting robot, plate readers and a range of other medical tools and supplies.

But for those unverified designs, testing and approval can be a lengthy process. Author André Chagas said: "One thing governments could do right now, is to figure out a process in which we can legitimately fast-track the testing and certification of tools which are in short supply."

"For instance, in Spain a group is already testing their ventilator designs with support from the government. While each country will have different

rules and certifications to meet, this is a crucial moment for us to get together and figure out a single set of certification so that implementation can move faster."

Prof. Tom Baden added: "If governments can support this through financial support to ramp up production of the best tools, that would be incredibly useful right now.

"But asides from financial support, we also need support from those who actually know about the use of these tools, rather than just their design. To make this equipment properly and safely, we don't just need tech-savvy people building it. We need people in the healthcare sector who know how these tools should work and can actually test them. These people should contact ongoing products to see if they can help."

More information: Andre Maia Chagas et al. Leveraging open hardware to alleviate the burden of COVID-19 on global health systems, *PLOS Biology* (2020). DOI: 10.1371/journal.pbio.3000730

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