REPAIRING A DAMAGED POWERED AIR-PURIFYING RESPIRATOR (PAPR) BATTERY COMPONENT WITH 3-D PRINTING

Robert Ries, Dante Varotsis, Michelle Ho, Kathryn Linder, Jordan Kurzum, Bon Ku MD MPP, Matt Fields MD, Robert Pugliese PharmD, Morgan Hutchinson MD
Health Design Lab at Thomas Jefferson University

What’s the Problem?

- The COVID-19 pandemic has led to increased use and turnover of personal protective equipment (PPE)
- There were equipment failures with PAPR units (3M Air-Mate and 3M Versaflo) due to a faulty component which normally allows the battery to be detached from the PAPR unit
- This single broken component renders an entire PAPR unit unusable
- With a national shortage of replacement parts, other solutions are needed to repair existing units

Our Solution

- A team from the Thomas Jefferson University Health Design Lab worked with local engineers at FKB to create a 3-D replacement model for the faulty component
- A new component (shown below in orange) was designed to function with existing battery components

HMW rapidly repair damaged PPE within the limited time frame of the COVID-19 pandemic?

- The new component was created using a desktop fused deposition modeling (FDM) 3-D printer with polylactic acid (PLA) filament
- While the new 3-D printed component seems to fit appropriately, we have not conducted robust testing
- Further study is needed to test long term durability and safety of the 3-D printed component

Our solution is inexpensive and available to other hospitals experiencing the same equipment failures via open source Standard Template Library (STL) files found here: https://sites.google.com/view/projectpapr/project-papr

Special acknowledgement to John Spetrino, Franki Abraham, and Dylan Kenna