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UMaine Today



UMaine, Maine MEP collaborating on production of aerosol shields to protect health care workers

April 20, 2020

A University of Maine and Maine Manufacturing Extension Partnership (Maine MEP) innovation team [developing solutions](#) to COVID-19-related health care challenges has worked with in-state hospitals and manufacturing partners to build, test and start production of two variations of an “aerosol box” meant to protect frontline medical staff as they intubate or transport patients who may be sick with the disease.

The two designs of the aerosol boxes are constructed from clear polycarbonate. The first design is a three-sided shield with handholes that covers the patient’s head and shoulders, and allows medical personnel to intubate safely to contain aerosol spray from a patient’s respiratory tract. The second fully encloses a patient’s head and, with the help of a portable tube and filter, creates a negative-pressure environment so that viral particles leaving a patient’s respiratory tract can be captured before they contaminate the surrounding air.

The boxes were developed collaboratively following a request from MaineHealth that referenced a concept first conceived by Dr. Hsien Yung-Lai, a physician in Taiwan whose aerosol box design to treat COVID-19 patients has been shared widely during the ongoing pandemic.

UMaine’s first prototype was based on a sketch by John Karp, business growth coach for the Maine MEP and a member of the UMaine innovation team. John Belding, director of UMaine’s Advanced Manufacturing Center (AMC), and his team worked with Karp to refine the sketch using computer-aided design and drafting software, and produced a prototype box for MaineHealth to test. Maine MEP then worked with its in-state manufacturing contacts to start production on a version of the design, incorporating MaineHealth’s feedback.

Gorham-based Plas-Tech was the first manufacturer to come online in early April, followed by Thermoformed Plastics of New England, based in Biddeford, and VELUX America in Wells.

The negative pressure version of the box developed out of conversations between Dr. Robert Bowie, UMaine professor of biomedical engineering, and hospital contacts at Northern Light Eastern Maine Medical Center and St. Joseph Hospital, both located in Bangor. The team at AMC built prototypes for those hospitals to test, and refined designs to their specifications. A third negative-pressure prototype was recently delivered to Maine Medical Center in Portland.

“The transport aerosol box is an example of how the community can contribute to keep frontline staff safe and reduce the risk of exposure to COVID-19,” says Lindsey Lucas, nursing director, Maine Medical Center Acute Ventilator Unit. “By providing an extra layer of personal protective equipment while transporting a patient who requires oxygen therapy, we can reduce the risk of exposure to our health care workers. The immediate feedback from staff has been positive, as it provides a sense of safety and security, which goes a long way when we are navigating such an unpredictable course.”

Hospitals can clean and sterilize the boxes for reuse. In-state manufacturing means they can be delivered quickly to area hospitals to meet demand.

“This is an example of what we can do collaboratively as a community,” says Dr. James Jarvis, FAAFP, medical specialist, COVID-19 incident commander, Northern Light Health. “We remain extremely grateful for the innovative efforts by UMaine to help protect our front line health care workers and will enthusiastically support any assistance that meets all safety standards.”

The University of Maine COVID-19 innovation team includes UMaine faculty, staff and students, representatives from the Maine Department of Economic and Community Development, Maine MEP, MaineHealth, St. Joseph Hospital and Northern Light Health. Other collaborating partners include the Manufacturers Association of Maine and Maine Procurement Technical Assistance Center.

The team based at the state’s public research university is operating as part of a March 22 umbrella agreement with the Maine Emergency Management Agency (MEMA) allowing the University of Maine System to provide goods and services to Maine health care facilities and agencies as coordinated by MEMA.

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