EDITORIAL

Conserving Supply of Personal Protective Equipment—A Call for Ideas

Howard Bauchner, MD; Phil B. Fontanarosa, MD, MBA; Edward H. Livingston, MD

The editors of *JAMA* recognize the challenges, concerns, and frustration about the shortage of personal protective equipment (PPE) that is affecting the care of patients and safety of health care workers in the US and around the world. We seek creative immediate solutions for how to maximize the use of PPE, to conserve the supply of PPE, and to identify new sources of PPE. We are interested in suggestions, recommendations, and potential actions from individuals who have relevant experience, especially from physicians, other health care professionals, and administrators in hospitals and other clinical settings. *JAMA* is inviting immediate suggestions, which can be added as online comments to this article.

ARTICLE INFORMATION

Author Affiliations: Dr Bauchner is Editor in Chief, Dr Fontanarosa is Executive Editor, and Dr Livingston is Deputy Editor, *JAMA*.

Corresponding Author: Howard Bauchner, MD (howard.bauchner@jamanetwork.org).

Published Online: March 20, 2020. doi:10.1001/jama.2020.4770

Conflict of Interest Disclosures: None reported.

March 24, 2020

Omnidirectional Ultraviolet (UVC) Chamber Irradiation for Crisis Decontamination and Reuse of Select Personal Protective Equipment

Terry Donat, MD FACS FICS | Otolaryngology-Head and Neck Surgery, FHN Memorial Hospital, Freeport, Illinois

Single-use, high performance PPE for the care of infectious disease patients is typically discarded after gross material soiling, biological or chemical contamination, loss of performance, loss of integrity, progression between patients and both ending shifts or frequent brief specific periods of work. In the current international COVID19 healthcare crises, the available supplies of PPE are under extended strain and very prone to exhaustion if discarded for conventional causes without creative, effective conservation efforts.

Reuse of contaminated PPE, substandard PPE or no PPE is incompatible with maintaining healthy and effective responder workforces --- whether dealing with COVID19, other human pathogens, normal body flora or environmental biological agents. As PPE resources become scarce for protection of both patients and providers, urgent deployable methods for adaptable sterilization and extended reuse of PPE become, not only relevant, but critical and existential. It remains preferential to both extend use and reuse sterilized PPE, such as N95 masks designed for COVID19 viral protection, even if degraded, over accepting any amount of new inferior filtration masks never designed to protect against the exceptional viral load shedding observed in this disease.

Ultraviolet Germicidal Irradiation (UVGI) using commercial UVC light (254nm; 55 watts source) robotics has been keenly proposed and safely used for the effective decontamination and reuse of single-use N95 masks within conventional healthcare settings and subject to conventional healthcare facility room designs. Alternatively, immediate deployment of enhanced UVGI capabilities for mobile, fixed or field facilities may be easily accomplished by adaptively constructing chosen spaces into UVC reflecting chambers ---- using widely-available off the shelf components ---- for continuous UVC disinfection of select PPE and devices.

An Adaptive Solution

Reflective aluminum foil and aluminum-metallized surfaces are the most highly reflective metallic surfaces known for Germicidal UVC light (254nm). If walls, floor and ceiling surfaces of a fixed room or any other space were completely lined with highly-reflective aluminum-based materials to form a UVC-reflecting chamber, the ongoing capability of UVC disinfection using commercially available UVC light sources within such chambers is widely and rapidly deployable. This configuration maximizes both the incident UVC light and reflected UVC light without room surface attenuation from all possible angles (omnidirectional irradiation eliminating significant shadowing) onto the target articles

with a total estimated chamber UVC light intensity at least double the intensities of each of the sources.

Example *(for comparative cost estimates)*
A 10' x 10' x 10' tent, room or section of hospital corridor may be transformed by stapling reflective lining and placing UVC sources using the following commercially available materials. Estimated construction time with materials on site is 2-3 hours.

(1) 4 (four) Germicidal Lamps to be positioned one at each corner. Bulb Options: UVC light bulb (254nm; 60 Watt LED; $80.00 USD) with E26 standard bulb base OR 38 Watts UVGI disinfection lights with control timer (254nm; 38 Watts; $100 USD): COST TOTAL: 400.00 USD

(2) 600 sq. feet of Reflectix aluminized insulation (80% UVC reflective; $0.70 USD per sq. ft) from Lowes, Menards and some Home Depot home supply stores.
COST TOTAL: 420.00 USD

Strongly Encouraged Applications:
(1) To extend use and reuse select PPE.
(2) To decontaminate worn PPE on high-exposure healthcare providers prior to doffing (nominal eye shielding with cardstock paper is sufficient)
(3) To decontaminate worn PPE on high-exposure healthcare providers at 60-90 minute intervals to decrease cumulative PPE surface viral loads during shifts or particularly after high-exposure procedures.

Collaborating Authors:
David Smith, CEO – ALLCOOL USA, McClean, Virginia
Bruce Bina, CEO – Blue Ocean Research and Development Corporation, Naperville, Illinois
Leah Roberts, Consultant – Blue Ocean Research and Development Corporation
Brad Pioveson, Consultant – Blue Ocean Research and Development Corporation
Shawn Shianna MD – Otolaryngology, FHN Memorial Hospital, Freeport, IL

SOURCE: JAMA https://jamanetwork.com/journals/jama/fullarticle/2763590

CONFLICT OF INTEREST: None Reported

Correspondence:
Terry L. Donat MD FACS FICS
Director, Department of Surgery
FHN Memorial Hospital
Freeport, IL 61032
tdonat@fhn.org
terry.donat@outlook.com
Office: 815.599.7770
Mobile: 6309880271