Pandemic Extended Use and Reuse of N95 Filtering Facepiece Respirators

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Overview of

Centers for Disease Control and Prevention

PANDEMIC PLANNING: Recommended Guidance for Extended Use and Limited Reuse of N95 Filtering Facepiece Respirators in Healthcare Settings

https://www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html

Acknowledgement: The information in this presentation was adapted from the above CDC website for the University of Nebraska Medical Center (UNMC) Healthcare and Emergency Responder Organization Education through Simulation (HEROES) under the direction of Elizabeth L. Beam, PhD, RN (UNMC); Angela Kim Hayes, MPH, BSN, RN (UNMC), Stephen Smith (UNMC), Aurora Le, MPH, CPH, CSP (Indiana University) and Shawn G. Gibbs, PhD, MBA, CIH (Indiana University)

N95 Supply Conservation

CDC guidelines recommend that health care institutions:

- Minimize the number of individuals who need to use respiratory protection through the preferential use of engineering and administrative controls
- Use alternatives to N95 respirators (e.g., other classes of filtering facepiece respirators, elastomeric half-mask and full facepiece air purifying respirators, powered air purifying respirators) where feasible
- Implement practices allowing extended use and/or limited reuse of N95 respirators, when acceptable
- Prioritize the use of N95 respirators for those personnel at the highest risk of contracting or experiencing complications of infection

Definitions

Extended use of an N95 respirator is defined as

- Wearing the *same* N95 respirator for repeated patient care encounters with multiple patients infected with the *same* pathogen

Patients will likely be cohorted in a designated location within a waiting room or hospital unit to facilitate extended use.

Limited reuse of an N95 respirator is defined as

- Using the *same* N95 respirator for multiple encounters with a patient but *removing or doffing* the respirator after each encounter
- N95 respirator is stored in between patient encounters and *donned or put on* prior to room re-entry and patient care

Implementation

Decisions to implement the CDC recommendations for extended use or limited reuse of N95 respirators **are made on a case by case considering the characteristics of the** respiratory pathogen

- routes of transmission
- prevalence of disease in the region
- Infection attack rate
- severity of illness
- local conditions
- number of disposable N95 respirators available
- current respirator usage rate

Follow your facility policy and procedure

Review-General Instructions for N95 Use

- Discard any respirator that is obviously damaged or becomes hard to breathe through.
- Discard N95 respirators following use during aerosol generating procedures
- Discard N95 respirators contaminated with blood, respiratory or nasal secretions, or other bodily fluids
- Discard N95 respirators following close contact with, or exit from, the care area of any patient co-infected/colonized with an organism requiring contact precautions

Reducing Respirator Contamination

Limiting potential N95 respirator surface contamination is necessary to preserve supply

- Revised Personal Protective Equipment (PPE) donning and doffing sequences
- Strict adherence to hand hygiene practices
- Minimize unnecessary contact with the respirator surface
- Prevent droplet spray contamination
  - Cleanable/disposable face shield over N95 respirator
  - Procedure mask over N95 respirator
- Masking patients—source control

Extended Use Recommendations

A key consideration for safe extended use is that the respirator must maintain its fit and function while in use.

The maximum length of continuous use for each N95 is dictated by wearer and respirator specific factors

- Need to use the restroom
- Meal breaks
- Performance of duties not requiring respiratory protection
- Respirator became
  - contaminated
  - difficult to breathe through
  - damaged

Recommendations for Limited-Reuse of Respirators

- Currently there is not a viable method for determining maximum possible number of safe reuses for an N95 respirator for all instances as many variables affect respirator function and contamination over time.

- In the absence of manufacturer recommendations, research suggests limiting the number of reuses to no more than 5. Follow your facility policy and procedure and recommended inspection procedures before donning a previously used respirator.

One Respirator- One Person

Secondary exposures can occur from respirator reuse if respirators are shared among users and at least one of the users is infectious. To prevent inadvertent sharing of respirators

- Label containers used for storing respirators prior to initial use

  or

- Label the respirator itself on the strap prior to initial use
- Unlabeled used respirators should be discarded

Storage

- To minimize potential for further or cross-contamination store respirators:
- in a designated area
- so that they do not touch each other
- in a manner to prevent damage or deformity
  - Hang used respirators in a designated storage area
- or
  - Place in a breathable container such as a paper bag
- Regularly clean/disinfect or dispose of storage containers
- ***Tip—Do not store N95 respirators for reuse in a non-breathable container or bag such as a plastic zip-lock type bag to prevent microbial propagation***

Steps to Prevent Exposure During Re-Use

- Donning/doffing must be performed in a manner to ensure the inside of the N95 is not contaminated
- Staff donning a used respirator should remember to do so carefully and deliberately to avoid contamination of the inside of the respirator and self inoculation.

HEROES - Emergency Preparedness Education and Training

Emergency preparedness education and training for healthcare professionals and students across the state of Nebraska and beyond.

https://app1.unmc.edu/nursing/heroes/mpv.cfm?updateindex=132&src=yt

Suggested Steps to Prevent Exposure During Re-Use

- Perform hand hygiene
- Don procedure gloves (non-sterile)
- Inspect N95 for physical damage
  - Strap tension
  - Nosepiece intact
  - Tears
  - Visible soil
- Avoid touching the inside of the respirator.
  - If inadvertent contact is made with the inside of the respirator discard
- Don respirator
- Adjust respirator to ensure comfort
- Perform user seal check
- Discard gloves after the N95 respirator is donned and any

Suggested Steps for Doffing PPE –all about sequence

- Remove disposable isolation gown
- Remove procedure gloves using glove in glove technique
- Perform hand hygiene
- Carefully doff disposable face shield and exit room
  - If using a reusable face shield exit room doff face shield into designated receptacle for later cleaning and disinfection
- Perform hand hygiene
- Don clean non-sterile procedure gloves
- Lean forward to remove N95 beginning with the bottom strap
- Remove the top strap ensuring it does not contact the interior of the respirator
- Place the respirator in the labeled bag or container and place in designated location for use
- Remove gloves using glove in glove technique
- Perform hand hygiene

N95 Filtering Facepiece Respirators Ultraviolet Germicidal Irradiation (UVGI) Process for Decontamination and Reuse

Shawn G. Gibbs; Indiana University

Presenting on behalf of:

John J Lowe, Katie D Paladino, Jerald D Farke, Kathleen Boulter, Kelly Cawcutt, Mark Emodi, Shawn Gibbs, Richard Hankins, Lauren Hinkle, Terry Micheels, Shelly Schwedhelm, Angela Vasa, Michael Wadman, Suzanne Watson, and Mark E Rupp

University of Nebraska Medical Center

Nebraska Medicine

Centers for Disease Control and Prevention

Coronavirus Disease 2019 (COVID-19)

Decontamination and Reuse of Filtering Facepiece Respirators using Contingency and Crisis Capacity Strategies

Disposable filtering facepiece respirators (FFRs) are not approved for routine decontamination and reuse as standard of care. However, FFR decontamination and reuse may need to be considered as a crisis capacity strategy to ensure continued availability. Based on the limited research available, ultraviolet germicidal irradiation, vaporous hydrogen peroxide, and moist heat showed the most promise as potential methods to decontaminate FFRs. This document summarizes research about decontamination of FFRs before reuse.

Introduction

Reusing disposable filtering facepiece respirators (FFRs) has been suggested as a contingency capacity strategy to conserve available supplies for healthcare environments during a pandemic. Strategies for FFR extended use and reuse (without decontamination of the respirator) are currently available from CDC/NIOSH.

The surfaces of an FFR may become contaminated while filtering the inhalation air of the wearer during exposures to pathogen-laden aerosols. The pathogens on the filter materials of the FFR may be transferred to the wearer upon contact with the FFR during activities such as adjusting the FFR, improper doffing of the FFR, or when performing a user-seal check when redoffing a previously worn FFR. A study evaluating the persistence of SARS-CoV-2 (the virus that causes COVID-19) on

https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html

Warnings

- Last Resort—first apply Strategies for Optimizing the Supply of N95 Respirators: Crisis/Alternate Strategies
- Voids the NIOSH approval
- Decontamination technologies should be used cautiously
    - UVGI, vaporized hydrogen peroxide, warm moist heat, etc.
- Should only be done by the organization and trained professionals
- This was the result of multiple tests, a review of the scientific literature, and incorporation of current institutional practice

No one likes that we need to do this.

Personal Protective Equipment and Respiratory Protection

HCP use of non-NIOSH approved masks or homemade masks

In settings where N95 respirators are so limited that routinely practiced standards of care for wearing N95 respirators and equivalent or higher level of protection respirators are no longer possible, and surgical masks are not available, as a last resort, it may be necessary for HCP to use masks that have never been evaluated or approved by NIOSH or homemade masks. It may be considered to use these masks for care of patients with COVID-19, tuberculosis, measles, and varicella. However, caution should be exercised when considering this option.[1,2]

Not everyone should do this.

https://www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy/crisis-alternate-strategies.html

Number of methods previously evaluated

FDA

Optimizing Respirator Decontamination to Ensure Supplies for Emergency Preparedness

Assessed UGVI on 15 FFR models

http://www.fda.gov/emergency-preparedness-and-response/mcm-regulatory-science/optimizing-respirator-decontamination-ensure-supplies-emergency-preparedness

Assessing VHP on FFRs for up to 50 disinfection cycles

https://www.fda.gov/emergency-preparedness-and-response/mcm-regulatory-science/investigating-decontamination-and-reuse-respirators-public-health-emergencies

NIOSH CDC

Reusability of Filtering Facepiece Respirators

https://www.cdc.gov/niosh/topics/flu/respiratory.html

Trust

- Discussion with HCW
  - Initial
  - Process Design
  - Process Evaluation
  - Operationalization
  - Feed Back
- Communication
  - Strategy
- Safety
  - Those Processing
  - Those Using

N95 Respirator Decontamination and Re-Use Process

Key Points:

- All N95 Respirators MUST be labeled with your first initial, last name, date of first use and department location **(this is important to ensure return of <u>your</u> mask)**
- Please limit the daily donning of new respirators as much as possible (extended use, per policy, is strongly encouraged)
- All Used N95 Respirators are to be discarded in your *brown* "dirty" paper bag
- Respirators sent for decontamination will be returned to you in a new *white* "clean" paper bag stapled at the top
  - It will include a new *brown* bag to be used as your "dirty" discard bag. **Tally marks will be added to the respirator <u>by decontamination staff</u> each time the mask undergoes the decontamination process.** Ensure your name and return location are on supplied brown bag
- All decontaminated N95 Respirators will be kept in the *white* "clean" paper bag
- Note the location of your department/unit/site "dirty drop off" and "clean pick up" stations
- Each health care professional is responsible for ensuring the proper fit and integrity of each respirator upon re-use

Note to Float Staff-
You can choose to note your return location as your last worked unit/department/site
OR
You can designate your return location as "Float" in which case you can retrieve your clean white bag from the Decon. Unit's holding area on 7th floor UT (old Adult Crisis Unit)

More detailed information, including a detailed training document, can be found on the link below or by scanning this QR code with your phone:
https://www.nebraskamed.com/covid

3/21/2020

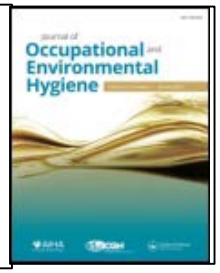
Nebraska Medicine

Why we chose UVGI--Possible

Effects of Ultraviolet Germicidal Irradiation (UVGI) on N95 Respirator Filtration Performance and Structural Integrity

William G. Lindsley,[1] Stephen B. Martin Jr.,[2] Robert E. Thewlis,[1] Khachatur Sarkisian,[3] Julian O. Nwoko,[4] Kenneth R. Mead,[5] and John D. Noti[1]

[1]Allergy and Clinical Immunology Branch, Health Effects Laboratory Division, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Morgantown, West Virginia
[2]Field Studies Branch, Division of Respiratory Disease Studies, National Institute for Occupational Safety



American Journal of Infection Control 46 (2018) e49-e55

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Major Article

Ultraviolet germicidal irradiation of influenza-contaminated N95 filtering facepiece respirators

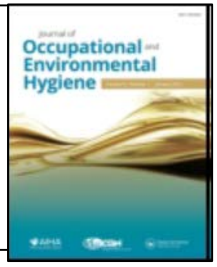
Devin Mills BS, Delbert A. Harnish MS *, Caryn Lawrence BS, Megan Sandoval-Powers BS, Brian K. Heimbuch MS

Engineering Science Division, Applied Research Associates, Panama City, FL

Inactivation of Viruses on Surfaces by Ultraviolet Germicidal Irradiation

Chun-Chieh Tseng and Chih-Shan Li

Graduate Institute of Environmental Health, National Taiwan University, Taipei, Taiwan



Why we chose UVGI--Familiarity

Ultraviolet (UV)-reflective paint with ultraviolet germicidal irradiation (UVGI) improves decontamination of nosocomial bacteria on hospital room surfaces

Katelyn C. Jelden[a], Shawn G. Gibbs[b], Philip W. Smith[c], Angela L. Hewlett[c], Peter C. Iwen[d,e], Kendra K. Schmid[f], and John J. Lowe[a]

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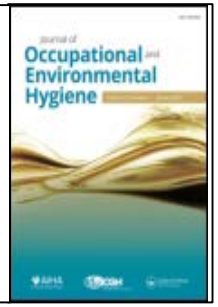

Commentary

Nebraska Biocontainment Unit patient discharge and environmental decontamination after Ebola care

Katelyn C. Jelden BS[a], Shawn G. Gibbs PhD[a,b], Philip W. Smith MD[b,c], Michelle M. Schwedhelm MSN[b,d], Peter C. Iwen PhD[e], Elizabeth L. Beam MSN[b,f], A. Kim Hayes RN[g], Nedra Marion MPA[g], Christopher J. Kratochvil MD[h], Kathleen C. Boulter BA[b], Angela L. Hewlett MD[b,c], John J. Lowe PhD[a,b,*]

AJIC
American Journal of Infection Control

Comparison of hospital room surface disinfection using a novel ultraviolet germicidal irradiation (UVGI) generator

Katelyn C. Jelden[a], Shawn G. Gibbs[b], Philip W. Smith[c], Angela L. Hewlett[c], Peter C. Iwen[d,e], Kendra K. Schmid[f], and John J. Lowe[a]

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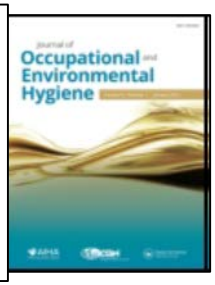
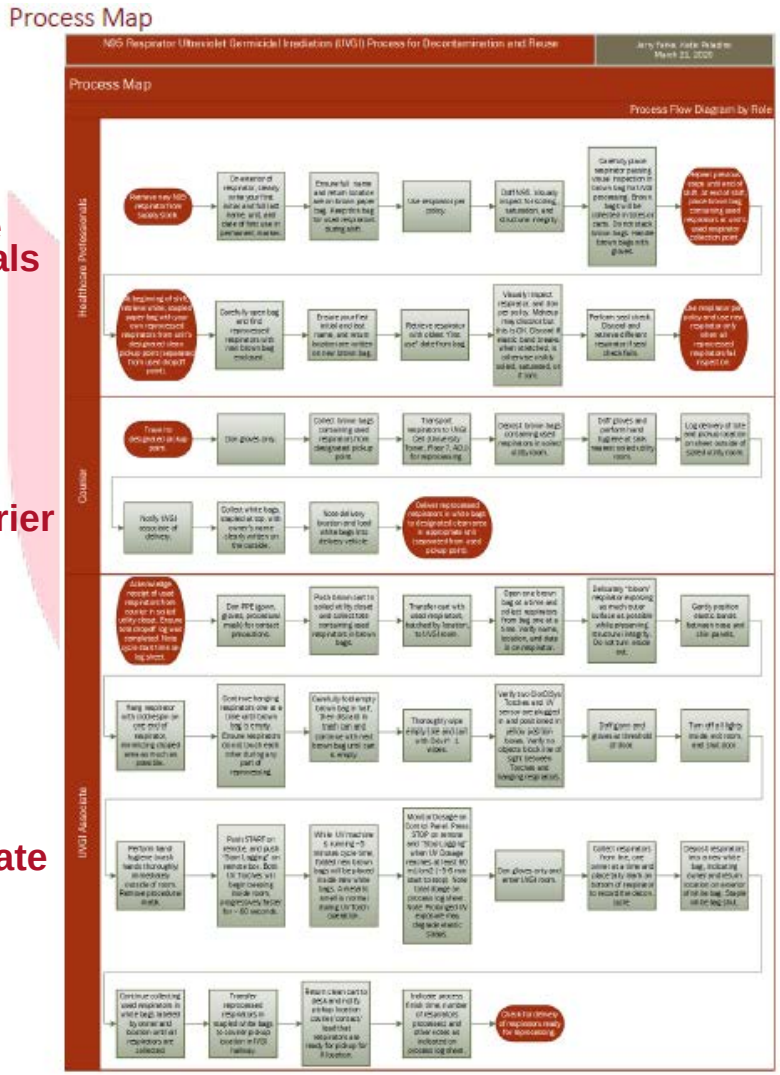


Process Map

Principles

- Clear
- Step by Step
- Flow from each use through reprocessing through re use
- Everyone knows their role
- Refresher training on Donning and Doffing



Health Care Professionals

Courier

UVGI Associate

Optimizing Process

- Trial and error
  - Placement
  - Exposure times
- Surface decontamination process not entire FFR
- UVGI is measure by room UV meter

Questions?

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