Welcome to the NVFC’s Train Strong Webinar Series.

Today’s webinar is “Personal Protective Equipment Preservation and N95 Respirator Decontamination and Reuse.”
The National Volunteer Fire Council (NVFC) is the leading nonprofit membership association representing the interests of the volunteer fire, EMS, and rescue services. The NVFC serves as the voice of the volunteer in the national arena and provides invaluable resources, programs, education, and advocacy for first responders across the nation.
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Today’s Panelists

Chief Keith Bryant

John F. Koerner, MPH, CIH

CAPT Joselito Ignacio, MPH, CIH
COVID19 – PPE Best Practices and Decontamination

The information presented is current to 6/1/2020 and is based on the current research.
COVID19 – PPE Best Practices and Decontamination

PPE Distribution

- 92.1 M N-95 Respirators.
- 146.1 M surgical masks.
- 12.7 M face shields.
- 1 B+ gloves.

- 32.9 M gowns.
- 200+ shipments from overseas.

June 4, 2020
COVID19 – PPE Best Practices and Decontamination

PPE Needs

• FEMA, HHS and CDC identify current and projected needs for critical equipment and balance relief efforts continually.

• DLA contracted with Battelle for 60 critical care decontamination systems for sanitation of N-95 Respirators.

• FEMA and HHS have obligated over $6.2B.
COVID-19 – PPE Best Practices and Decontamination

U.S. Fire Administration

• Personnel assigned to multiple task forces and working groups.
• Representing the needs of fire and EMS.
• Sharing information, training, and products for use by fire and EMS.
• Gathering data through fire reporting software.
COVID-19: Best Practices for PPE Preservation

John F. Koerner, MPH, CIH


Strategic Plans, Office of the Assistant Secretary for Preparedness and Response

June 4, 2020

This document contains references and links to non-federal resources and organizations. This information is meant solely for informational purposes and is not intended to be an endorsement of any non-federal entity by FEMA, U.S. Department of Homeland Security or the U.S. government.
Purpose

- To discuss and provide a venue to reflect upon best practices for the preservation of personal protective equipment in healthcare for current, emerging, and future surge operations.
Methods

1. FDA Emergency Use Authorizations beginning March 28, 2020
2. CDC “Strategies to Optimize the Supply of PPE and Equipment”
3. Expedited literature review for best practices
4. Informal interviews to gather experiential evidence
5. Focus group to assess Fact Sheet
6. Interagency review and published
7. Ad hoc Technical Working Group for Decontamination
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June 4, 2020
As supply decreases, different strategies are used to optimize PPE

Severity of shortage

- **Conventional**
  - Usual Standard of Care
  - Cached and usual supplies available

- **Contingency**
  - Functionally equivalent care
  - Conservation, adaptation, & substitution of supplies
  - Use during *expected* shortages

- **Crisis**
  - Crisis standards of care
  - Critical supplies lacking
  - If no gowns, use gown alternatives
  - Consider with *known* shortages

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FEMA Fact Sheet

Coronavirus (COVID-19) Pandemic: Personal Protective Equipment Preservation Best Practices

Published – April 12, 2020

https://www.fema.gov/media-library-data/1587131519031-6501ee8a0ce72004832fa37141c53bc0/PPE_FACTSHEET.pdf

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June 4, 2020
FEMA Fact Sheet: *Published April 12, 2020*

**Personal Protective Equipment Preservation Best Practices**

1. Amplifies the CDC strategies for optimizing PPE.

2. Suggests appropriate actions based on the organizational/facility stage in the response and specific to user circumstances.

3. All U.S. healthcare facilities should begin using PPE contingency strategies NOW.

4. Pillars of Practice: **REDUCE – REUSE - REPURPOSE**
Non-healthcare industries should conserve medical PPE for medical care.
Maintain social distancing.
If feasible, conduct patient or civilian interactions outdoors or in large open spaces.

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REDUCE - Usage Rate of PPE

Contingency – Engineering, Barriers, and Technology

• Use barrier controls when possible to limit the need for PPE (e.g. masking patients, acrylic barriers, car windows, improved ventilation systems).
• Limit visitor access and offer technology-based alternatives (e.g., video chat).
• Use tele-consultation, internet-based interviews, or remote camera-based observation when available.
• When clinically appropriate, place IV towers and ventilators outside of patient rooms to allow monitoring and management without entering the room.
Contingency – Work Practices & Administrative Changes
• Minimize number of people with, and frequency of, direct patient or civilian contact.
• Work with cohorts of patients/civilians who test positive for COVID-19, rather than single subjects.
• Consolidate activities to a single visit.
• Modify supporting staff workflow to limit PPE use.

Contingency – Personal Protective Equipment
• Understand your PPE requirements and burn rates.
• Extend use-times of undamaged, non-visibly soiled PPE.
• Note: OSHA has relaxed enforcement of annual fit-testing requirements for N-95 FFR’s
REUSE

• Contingency – Implement strategies to optimize the supply of PPE and equipment.

• Crisis - Implement expanded facility-based PPE reuse policies and procedures.

• Crisis - Track “check in” and “check out” of PPE designated for reuse. Each worker is provided specific PPE at the beginning of the shift. At the end of the shift, all PPE is labeled, collected, and stored for reuse.

• Crisis – Implement guidance for decontamination and reuse of FFRs

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• Contingency - Use other NIOSH-approved respirators instead of N-95 FFR when respiratory protection is required.
• Contingency - Seek alternative supplies of PPE.
• Crisis - Use N-95 FFRs beyond their expiration dates if certain conditions are met.
• Crisis - Use FDA authorized imported, non-NIOSH-approved disposable FFRs.
Communicate, Communicate, Communicate

To ensure uniform application of modified practices, processes, and procedures, all workers must be trained, with recommended elements including:

- Reasons for changes from standard practice and for implementing contingency and crisis practices during COVID-19 related PPE shortages
- New PPE guidance (FDA, CDC, DOJ) related to COVID-19
- Proper methods to conduct new or changed work practices (e.g., staffing, social distancing)
- Methods to install or utilize any barrier controls (e.g., patient masking, Plexiglas shields)
- Proper donning and doffing of PPE to minimize self-infection
- Proper hand hygiene


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DECONTAMINATION AND REUSE OF N95 RESPIRATORS FOR HEALTHCARE FACILITIES

CAPT JOSELITO IGNACIO, MA, MPH, CIH, CSP, REHS
U.S. PUBLIC HEALTH SERVICE OFFICER ASSIGNED AS DHS/FEMA CBRN SCIENCE ADVISOR

4 JUNE 2020

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DECONTAMINATION AND REUSE OF DISPOSABLE N95 RESPIRATORS

Reduce
Think of ways to reduce your use of PPE.

Reuse
Implement ways to safely decontaminate and reuse PPE.

Repurpose
Use alternative types or sources for PPE.
WHEN N95 DECONTAMINATION AND REUSE RECOMMENDED

Crisis capacity to ensure continued availability

National or healthcare facility-level
The CDC recommended the healthcare system focus efforts on three FFR reprocessing techniques.

Preservation Thread / Healthcare Resiliency Taskforce

- New guidance recommends researchers, decontamination companies, healthcare systems, or individual hospitals should focus current efforts on ultraviolet germicidal irradiation (UVGI), vaporous hydrogen peroxide (VHP), and moist heat incubation.
  - VHP is a promising method with a potential for high capacity throughput, but certain VHP systems, such as the Clarus® R VHP generator, may be more compatible with FFR decontamination.
  - Moist heat caused minimal degradation in the filtration and fit performance of the tested FFRs. One limitation of the moist heat method is the uncertainty of the disinfection efficacy for various pathogens.
  - UVGI is a promising method but the disinfection efficacy is dependent on dose. Moreover, UVGI is unlikely to kill all the viruses and bacteria on an FFR due to shadow effects produced by the multiple layers of the FFR’s construction.

<table>
<thead>
<tr>
<th>Method</th>
<th>Treatment level</th>
<th>Antimicrobial efficacy</th>
<th>Filtration performance</th>
<th>Fit performance</th>
<th>Material degradation</th>
</tr>
</thead>
<tbody>
<tr>
<td>VHP</td>
<td>Various concentrations and dwell times tested</td>
<td>&gt;99.99%</td>
<td>Passed</td>
<td>Unaffected for up to 20 treatments</td>
<td>Degradation of straps notes after 30 cycles</td>
</tr>
<tr>
<td>Moist heat</td>
<td>99.99%</td>
<td>99.99%</td>
<td>6 of 6 models passed after 3 cycles</td>
<td>Passed</td>
<td>Some respirators experienced seal compromise</td>
</tr>
<tr>
<td>UVGI</td>
<td>0.5-950 J/cm²</td>
<td>99.9% for all tested viruses</td>
<td>Passed</td>
<td>90-100% passing rate after 3 cycles</td>
<td>Reduction of material durability at higher doses</td>
</tr>
</tbody>
</table>

Summary prepared by the Healthcare Resiliency Task Force Preservation Thread
Source: CDC, “Decontamination and Reuse of Filtering Facepiece Respirators using Contingency and Crisis Capacity Strategies,” Last Updated March 31, 2020
<table>
<thead>
<tr>
<th>Method</th>
<th>Treatment level</th>
<th>Microbe tested</th>
<th>Antimicrobial efficacy</th>
<th>References</th>
</tr>
</thead>
</table>
| Vaporous hydrogen peroxide (VHP)      | **Battelle report:** Bioquell Clarus C HPV generator: The HPV cycle included a 10 min conditioning phase, 20 min gassing phase at 2 g/min, 150 min dwell phase at 0.5 g/min, and 300 min of aeration.  
**Bergman et. al.:** Room Bio-Decontamination Service (RBDS™, BIOQUELL UK Ltd, Andover, UK), which utilizes four portable modules: the Clarus® R HPV generator (utilizing 30% H₂O₂), the Clarus R20 aeration unit, an instrumentation module and a control computer. Room concentration = 8 g/m³, 15 min dwell, 125-min total cycle time.  
**Kenney personal communication:** Bioquell BQ-50 generator: The HPV cycle included a 10 minute conditioning phase, 30–40 min gassing phase at 16 g/min, 25 min dwell phase, and a 150 min aeration phase. | *Geobacillus stearothermophilus spores*  
T1, T7, and phi-6 bacteriophages | >99.999%                                                                                                                                      | 3, 4, 6                  |
<table>
<thead>
<tr>
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<th>Treatment level</th>
<th>Microbe tested</th>
<th>Antimicrobial efficacy</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultraviolet germicidal irradiation (UVGI)</td>
<td>0.5–1.8 J/cm²</td>
<td>Influenza A (H1N1)</td>
<td>99.9% for all tested viruses</td>
<td>12, 13, 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Avian influenza A virus (H5N1), low pathogenic</td>
<td></td>
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<td></td>
<td>Influenza A (H7N9), A/Anhui/1/2013</td>
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<td></td>
<td></td>
<td>Influenza A (H7N9), A/Shanghai/1/2013</td>
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<td></td>
<td></td>
<td>MERS-CoV</td>
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<td>SARS-CoV</td>
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<td>H1N1</td>
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<td></td>
<td>Influenza A/PR/8/34</td>
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<td></td>
<td></td>
<td>MS2 bacteriophage</td>
<td></td>
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<tr>
<td>Microwave generated steam</td>
<td>1100–1250 W microwave models (range: 40 sec to 2 min)</td>
<td>H1N1 influenza</td>
<td>99.9%</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A/PR/8/34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microwave steam bags</td>
<td>1100 W, 90 sec (bags filled with 60 mL tap water)</td>
<td>MS2 bacteriophage</td>
<td>99.9%</td>
<td>15</td>
</tr>
<tr>
<td>Method</td>
<td>Treatment level</td>
<td>Microbe tested</td>
<td>Antimicrobial efficacy</td>
<td>References</td>
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</tr>
<tr>
<td>Moist heat incubation</td>
<td>15–30 min (60°C, 80% RH)</td>
<td>H1N1 influenza A/PR/8/34</td>
<td>99.99%</td>
<td>14</td>
</tr>
<tr>
<td>Liquid hydrogen peroxide</td>
<td>1 sec to 30 min (range: 3–6%)</td>
<td>Not evaluated</td>
<td>Not evaluated</td>
<td></td>
</tr>
<tr>
<td>Ethylene oxide</td>
<td>1 hour at 55°C; conc. range: 725–833 mg/L</td>
<td>Not evaluated</td>
<td>Not evaluated</td>
<td></td>
</tr>
</tbody>
</table>
FDA EMERGENCY USE AUTHORIZED N95 DECONTAMINATION SYSTEMS

Sterilucent HC 80TT

Steris VPro

ASP Sterrad 100NX

Sterizone VP4

Steris AMSCO 400 Series Medium Steam Sterilizer

Battelle Critical Care Decontamination System
DECONTAMINATION AND REUSE OF DISPOSABLE N95 RESPIRATORS

**Battelle CCDS™ Process**

**HEALTH CARE PROVIDER SIGN-UP PROCESS**

**Battelle CCDS Critical Care Decontamination System™**

1. **Sign up with Battelle**
   - Visit battelle.org/decon to fill out the enrollment form
   - Battelle emails enrollee links to the enrollment contract, instructions, and the Battelle POC

2. **Contact Us to Get Your Code**
   - Enrollee signs contract and contacts Battelle POC to receive their 3-digit codes for each facility

3. **Properly Label Respirators**
   - Once the 3-digit codes are received from Battelle, enrollee collects N95 respirators
   - N95 respirators must be unsullied (free of blood, mucus, make-up, lip balm, etc.) and labeled with a permanent marker

4. **Collect & Bag All N95 Respirators**
   - Enrollee collects all N95 respirators into a single plastic bag
   - Once the plastic bag is filled, tie off the bag and put it into another plastic bag

5. **Properly Package**
   - Clean the outside bag with disinfectant
   - Shipping box must be labeled with the 3-digit code and a biohazard sticker

6. **Ship to CCDS Site**
   - Enrollee contacts their chosen logistics provider to coordinate pick-up and delivery of their N95 respirators
   - Enrollee can either use a logistics provider of their choice or Battelle's preferred logistics provider

7. **Decontaminated & Returned**
   - Your shipments are barcoded to ensure chain of custody
   - Your N95 respirators are processed and then verified to ensure they are free of decontaminant
   - Your decontaminated N95 respirators are returned to your facility

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Conclusions

• Preservation of PPE (Reduce, Reuse, Repurpose) can manage demand at healthcare facility level as resupplies can resume;

• Reminder to use hierarchy of controls
  • Elimination
  • Substitution
  • Engineering Controls
  • Safe Work Practices
  • PPE

• COVID-19 crisis, there are authorized capabilities to decontaminate N-95 respirators for safe reuse;
Post-webinar thoughts or questions?

VOLUNTEEROICES.NVFC.ORG

Or contact Caroline Stachowiak at: caroline@nvfc.org
THANK YOU!

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