Implementation Tips for Pooled Battelle H$_2$O$_2$ Vapor N95 Decontamination at a Major Urban Hospital

These implementation tips were developed and implemented by a major urban hospital that preferred not to be named. The tips may contain useful information for hospitals interested in decontamination using the Battelle Critical Care Decontamination System. This document does not comprise an endorsement of the Battelle system or any particular implementation by N95DECON.

Regulatory guidelines and internal hospital protocols for PPE use, conservation, and reuse should be followed. Battelle provides comprehensive protocols for hospitals to follow. This document is not affiliated with Battelle, and has not been reviewed or endorsed by Battelle.

Decontamination procedures are under development at many organizations. The guidance may change. See n95decon.org for updates. Please send comments and feedback at https://www.n95decon.org/contact.

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1. Notes on Battelle process
   - The Battelle process, which uses vaporized hydrogen peroxide, has been validated only for N95 FFRs not decontaminated by other methods.
   - This document is meant to help hospitals develop the internal processes necessary to work smoothly with Battelle. Battelle documentation is linked where relevant.

2. Initial steps to take immediately
   - Communicate with all staff to stop wearing makeup and facial oils (such as Vaseline on bridge of nose). Explain that N95 FFRs cannot be processed for decontamination if they are visibly soiled.
   - Widely distribute clearly-labelled N95 collection bins. We suggest one bin in a central location in each patient care unit. Repurpose recycling and trash bins from closed areas (labs, clinics). Label side and top of bin. Makeshift the top of the bin into a smaller collection hole (like a recycling bin).

3. N95 marking for Battelle
   N95 FFRs sent to Battelle need to be properly marked. If they are unmarked they will be discarded. These documents describe proper marking: Battelle Instructions for Healthcare Facilities and Battelle Instructions for Healthcare Personnel.
   - All new N95 FFRs issued need to be marked on the front with a 3-digit “Site Code” and a 2-digit “Site Location ID”. The format is _ _ _-_ _.
     - Marking must be in black permanent marker (e.g. Sharpie).
   - You will need to determine your Site Code with Battelle. This will be a 3-digit code, referred to in this document as “XXX.”
   - Five digits are required, so you can add “00” for the Site Location ID if you plan on collecting and distributing centrally.
     - You can choose the 2-digit Site Location IDs you wish to use. Typically these point to specific units in the hospital. If collecting and distributing centrally, you can simply use “00.”
   - In this document, we refer to this five-digit total (e.g. XXX-00) as the “facility code.”
Your hospital does not need to write the number of decontamination cycles on the N95. Number of decontamination cycles (“1,” “2,” etc.) will be marked on the N95 by Battelle.

- This process has been validated to maintain strap elasticity for 20 cycles, and validated to preserve filtration efficiency up to 50 cycles in Final Report for the Bioquell Hydrogen Peroxide Vapor (HPV) Decontamination for Reuse of N95 Respirators. Battelle therefore allows a maximum of 20 cycles and will discard N95 FFRs after 20.
- Your facility will decide how many cycles you are comfortable with.

4. Process for N95 marking, collection and distribution

- Materials Management should mark all new N95 FFRs with the facility code (e.g. XXX-00) prior to sending to your hospital’s PPE distribution centers.
  - Provide an infographic of a marked N95 with the proper code, and the words “mark all N95 FFRs with XXX-00, black permanent marker only.”
- Distribute N95 collection bins to all clinical areas. There should be one bin in every patient care unit, in a central location. These will be lined with normal (non-biohazard) trash bags.
- After contamination, end-users drop N95 into a designated collection bin.
  - Speak to your infection control and supply chain leads to formulate a system consistent with your approved infection control practices and reasonable for your supply chain N95 availability.
  - An example is to place N95 FFRs into a collection bin after aerosol-generating procedures (e.g. intubation) or after a shift (for those not performing aerosol-generating procedures).
- Environmental Services will collect the N95 FFRs with whatever frequency is clinically necessary for your facility.
  - Environmental Services will seal these bags by tying them shut.
- Sealed bags will be transported by Environmental Services to Dirty Processing.
- Dirty Processing will prepare the sealed bags for shipping to Battelle (double bagged) by following these instructions (see “Preparation for Shipment”):
  Battelle Instructions for Healthcare Facilities.
  - Contaminated N95 FFRs stay sealed within collection bags and are not handled individually except during the initial roll-out.
  - During the initial roll-out, Dirty Processing may need to mark these contaminated N95 FFRs with the facility code before shipment to Battelle.
– see in this document “Addressing unmarked N95 FFRs currently in circulation.”

- Transport to and from Battelle needs to be set up by your facility. A biohazard carrier is not required but may be recommended by Battelle if available.
- Decontaminated N95 FFRs returned to the hospital are received by Materials Management, and go into the N95 distribution pool as already set up for new N95 FFRs.
  - End-users will need to perform a fit check (also known as “user seal check”) when they don their decontaminated N95, as when donning any N95. [Fit Test vs Fit Check - Understanding the difference](#)
  - This part of the process does not differ from that for new, unused N95 FFRs.
- End-process storage:
  - The Battelle process has been approved for up to 20 cycles, but hospitals may choose to do fewer than 20. If you will be using fewer than 20 cycles, it is possible to decontaminate all N95 FFRs one additional time after your “last use” and store those clean N95 FFRs as a safeguard for potential future shortages.

5. Addressing unmarked N95 FFRs currently in circulation

- You probably have a lot of N95 FFRs in use (already left Materials Management and distributed to distribution centers and end-users) that have not been marked with the facility code. They must be marked before they are sent to Battelle. Unmarked N95 FFRs received by Battelle will be discarded.
- Contaminated/used N95 FFRs already collected in bins prior to getting your facility code:
  - As recommended above, the first step is to start collecting N95 FFRs. Eventually when you are ready to start decontamination, you will have collected a stockpile of used, unmarked N95 FFRs.
  - If you have not yet collected these N95 FFRs, Environmental Services can collect all N95 FFRs already in the bins a few hours after the all-user email goes out.
  - Collected bags of N95 FFRs go to Dirty Processing as described above. Staff here, wearing appropriate PPE, mark every N95 with the 5-digit Facility Code (e.g. XXX-00).
    - Consult your infection control lead to determine appropriate PPE.
○ Dirty Processing should plan to mark collected N95 FFRs for the first three days after roll-out and keep a rough estimate of how many unmarked N95 FFRs are getting into the bins.
○ Dirty Processing to continue the “dirty N95 check and mark” process for additional days as needed. Hopefully this only needs to happen for a few days.
○ Some unmarked N95 FFRs will inevitably make it through the system after the Dirty Processing backup ends. Battelle will discard unmarked N95 FFRs. This acceptable burn rate of N95 FFRs keeps the Dirty Processing staff from having to handle all dirty N95 FFRs as the process continues.

● N95 FFRs already held by end-users:
  ○ We recommend a single all-user broadcast email notifying all staff of key logistical points. Within this communication, notify all staff to mark N95 FFRs currently in their possession with the facility code.
    ■ Must be in black permanent marker (e.g. Sharpie)
    ■ Center front of N95
    ■ Include an infographic (picture of properly marked N95, with “mark all N95 FFRs with XXX-00, black permanent marker only”)
    ■ If you choose to use different Site Location IDs, specify these with a list in the same email. This document does not address the use of different Site Location IDs and is only meant to describe the return of N95 FFRs to a general supply.

● N95 FFRs at decentralized distribution centers within the hospital (e.g. PPE distribution center within OR or ED, fit-testing center, ICU)
  ○ All-user email above will help, but staff at these locations need targeted communication.
  ○ Provide printed copies of the infographic (picture of properly marked N95, with “mark all N95 FFRs with XXX-00, black permanent marker only”). Tape these to the wall or the distribution table so they stay between shifts.
  ○ In-person communication with staff: logistics personnel to physically check these locations during first few days of roll-out
6. Communication

- Initial all-user email to all staff, to notify them that you are planning on using the Battelle decontamination process. In this communication, include the following points:
  - It is necessary for all N95 users to stop wearing makeup and facial oils (such as Vaseline on bridge of nose).
  - This is for a future decontamination process, because N95 FFRs cannot be processed with visible soiling.
  - N95 FFRs need to be placed in collection bins, and that these bins are being actively rolled out.
- Communication with Materials Management as above
- Communication with PPE distribution centers as above
  - Physical check-in with distribution centers recommended for first 1-2 days as these are often staffed with personnel re-deployed from other areas, as these centers are a relatively new entity.
- All-user email just prior to starting the collection process, after you have your first Battelle run date set up and are ready to start the Dirty Processing marking.
  - Re-emphasize the key points from the initial email
  - Notify staff how to mark their own N95, include infographic
  - Consider setting up an email address for questions on the process
Appendices

Standardizing language for this document:

- “Materials Management” will describe the clean-products inlet into the hospital. This assumes that all new, clean N95 FFRs come into your facility at a central location.
- “Environmental Services” will describe the service normally tasked with collecting trash, recycling, etc at your facility.
- “Dirty Processing” will describe the typical location of cleaning and sterilizing operating room equipment. This assumes your facility has a central location for this and staff trained to process dirty equipment (e.g. surgical instruments).

Appropriate N95 FFRs for Battelle process

N95 processed by Battelle must not contain cellulose

- List provided by Battelle of cellulose-free N95 FFRs
  - 3M 1860(S)
  - 3M Aura 1870+
  - 3M 8205
  - 3M 8000
  - 3M 8210
  - 3M 9010
  - 3M Aura 9210+
  - Gerson 1730
  - Gerson 2140C
  - Gerson 2130
  - Moldex 1500 Series
  - Moldex 2200
  - Kimberly Clark 46727

- List provided by 3M of cellulose-free N95 FFRs
- 3MTM Health Care Particulate Respirator and Surgical Mask 1860, N95
- 3MTM Health Care Particulate Respirator and Surgical Mask 1860S, N95
- 3MTM AuraTM Health Care Particulate Respirator and Surgical Mask 1870+, N95
- 3MTM Particulate Respirator 8110S, N95
- 3MTM Particulate Respirator 8210, N95
- 3MTM Particulate Respirator 8210Plus, N95
- 3MTM Particulate Respirator 8210V, N95
- 3MTM Particulate Respirator 8211, N95
- 3MTM Particulate Respirator 8240, R95
- 3MTM Particulate Respirator 8246, R95, with Nuisance Level Acid Gas Relief
- 3MTM Particulate Respirator 8247, R95, with Nuisance Level Organic Vapor Relief
- 3MTM Particulate Respirator 8271, P95
- 3MTM Particulate Respirator 8511, N95
- 3MTM Particulate Welding Respirator 8515/07189(AAD), N95
- 3MTM Particulate Respirator 8516, N95, with Nuisance Level Acid Gas Relief
- 3MTM Particulate Respirator 8576, P95, with Nuisance Level Acid Gas Relief
- 3MTM Particulate Respirator 8577, P95, with Nuisance Level Organic Vapor Relief
- 3MTM AuraTM Particulate Respirator 9210+/37192, N95
- 3MTM AuraTM Particulate Respirator 9211+/37193(AAD), N95