

UHS Process for Disinfection of N-95 Masks using

UV Light Disinfection

This process should only be used during crisis capacity management of Personal Protective Equipment (PPE)

March 27, 2020

This policy is subject to change based upon updated information from the CDC, federal, state and local government and any other sources that are providing guidance as to best practices during this unprecedented health care crisis.

Disclaimer: The content of these materials was adapted from the University of Nebraska Guidance document and modified to fit the needs of various acute care facilities. The depiction of equipment in the photographs does not represent an endorsement of the equipment by the facilities or their affiliates. The facilities and their affiliates are not responsible for any errors or omissions, or for the results obtained from the use of this information. All information in this site is provided "as is," with no guarantee of completeness, accuracy, timeliness or the results obtained from the use of this information.

Steriliz must add the COVID-19 Dose to your machines. Please e-mail your request to <u>support@steriliz.us</u> and include "N95" in the subject line if your unit has not been updated.

This process was directly modeled after the University of Nebraska document:

N95 Filtering Facemask Respirator Ultraviolet Germicidal Irradiation (UVGI) Process for Decontamination and Reuse

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Introduction

Rationale:

The ongoing pandemic of SARS-CoV-2 resulting in COVID-19 has severely stressed the worldwide healthcare system and has created dangerous shortages of personal protective equipment (PPE) including N95 filtering respirators. In an effort to extend the stockpile of N95 masks at Nebraska University, a decontamination procedure involving the delivery of ultraviolet germicidal irradiation (UVGI) to used N95 masks was developed.

Nebraska University's evidence base includes: 1) UVGI has been shown to effectively inactivate a wide range of human pathogens including coronaviruses and other human respiratory viruses; 2) UVGI has been demonstrated to inactivate human respiratory viruses, including coronaviruses, on various models of N95 masks 3) levels of UVGI needed to inactive human respiratory viruses are well below the level of irradiation that adversely affects the fit and filtration characteristics of N95 masks and 4) UVGI can be safely administered when appropriate safeguards are in place.

UHS Method:

Subject used N95 masks to UVGI at an exposure of **60,000 Microwatt Seconds per cm2**. Single-stranded RNA viruses, such as SARS-CoV-2, are generally inactivated by UVGI exposure of 2-5 mJ/cm2 (1). Thus, the UVGI exposure chosen exceeds, by at least several fold, the amount of exposure needed to inactivate SARS-CoV-2 and provides a wide margin of safety. Respirators are secured on wires that are strung across a room with one Rapid Disinfector that is moved into two different positions to complete two jobs. We monitor the delivered UVGI exposure dose with two UVGI sensors that can be initiated and monitored from outside the room to verify that the desired exposure has been achieved. As UV can cause damage to eyes and skin, this protects the operator's safety. We plan to decontaminate and reuse the N95 masks up **to 3 times**. The method described below is a result of multiple tests by Nebraska University, a review of the scientific literature, and incorporation of current institutional practice. It is recommended Sterile Processing staff be utilized for this procedure given their knowledge of clean/dirty separation and testing/documentation.



Room Set-up:



Roles:

Healthcare Professional:

Healthcare Professional retrieves new N95 FFR from secure storage location

- Using a permanent marker, HCP writes needed information on front of respirator including first initial and last name, department/unit location, and date of first use. This ensures correct respirator is returned to correct HCP and to the correct location. Date of first use is requested to monitor duration of use as well as number of decontamination cycles.
- HCP dons N95 FFR per policy ensuring integrity of respirator and proper fit
- The recommended number of cycles for N-95 disinfection should not exceed 3 cycles of UV disinfection.



Healthcare Provider upon doffing:

• Remove N95 mask following appropriate doffing guidelines. Inspect the mask for visible soiling (blood, etc.) - if so, the mask should be disposed of and not submitted for disinfection.

• Place used N95 mask in brown paper bag ensuring brown bag is correctly labeled with Healthcare provider's full name, and department/unit return location.

When ready to send brown bag, with used respirators, for decontamination, the HCP brings bag to department/unit designated "dirty" drop off location. This is separate from the department/unit "clean" location.

Sterile Processing Technician (recommended):

- Donning gloves only, SPD tech retrieves all used respirators (in brown bags) in a cart or tote from the unit.
- SPD tech takes cart/tote to Decontamination Unit. Only gloves need to be worn for this process.
- SPD tech places department/unit supply of brown bags (containing used respirators) in the Decontamination Unit's Dirty Storage area. SPD tech places tote or individual bags on the shelf designated for specific unit.
- SPD tech removes gloves and performs hand hygiene
- SPD tech logs requested information onto the drop off log sheet (name of individual dropping off, contact number, department/unit location, name of person to contact for pick up, pick up contact number)

SPD Technician performing UVGI

- Acknowledge receipt of used respirators from SPD tech in soiled utility closet. Ensure tote drop-off log was completed. Note cycle start time on log sheet.
- Don PPE (gown, gloves, procedural mask) for contact precautions.
- Push brown cart to soiled utility closet and collect tote containing used respirators in brown bags.
- Transfer cart with used respirators, batched by location, to UVGI room.
- Open one brown bag at a time and collect respirators from bag one at a time. Verify name, location, and date is on respirator.



- Delicately "bloom" respirator exposing as much outer surface as possible while preserving structural integrity. Do not turn inside out.
- Gently position elastic bands between nose and chin panels, if applicable.
- Hang respirator with clothespin on one end of respirator, minimizing the clipping area as much as possible.
- Carefully fold empty brown bag in half, then discard in trashcan and continue with next brown bag until cart is empty.
- Continue hanging respirators one at a time until brown bags are empty. Ensure respirators do not touch each other during any part of reprocessing.
- Thoroughly wipe empty tote and cart with Super Sani-cloth PDI wipes.
- Verify the Rapid Disinfector is plugged in and is centered, located 4 feet from clothesline, and two sensors turned on are positioned at opposite ends of the clothesline, Sensors must be elevated 40 inches from the floor. Place each sensor on its side facing the emitter.
- Doff gown and gloves at threshold of door.
- Turn off all lights inside, exit room, and shut door.
- Perform hand hygiene (wash hands thoroughly) immediately outside of room. Remove procedural mask.
- Close the door to the room, exit the room, and place the door safety sensor in place as you would for treating a room.
- Treatment of the PPE with a single Rapid disinfector unit will require two jobs with the unit in opposite positions.
- Power on the Samsung Galaxy
- Enter your User Name and Password then select Log In
- Select Arm System
- Make sure that checkboxes indicate that the sensors are detected.
- Select the location you are working in as if you were decontaminating a room
- Select COVID-19 on the Dose
- Select Start
- When the first job is complete enter the room and move the Rapid disinfector to the other side of the room located 4 feet of the clothesline. Reposition the sensors so they now face the emitter that has been relocated.
- Power on the Samsung Galaxy
- Enter your User Name and Password then select Log In



• Select Arm System

- Make sure that checkboxes indicate that the sensors are detected.
- Select the location you are working in as if you were decontaminating a room
- Select COVID-19 on the Dose
- Select Start

During the cycle, SPD tech prepares white bags. Decontaminated N95 masks are placed in new, clean white bags displaying HCP's name and return location. A new brown bag is included in the clean white bag to serve as new "dirty" discard brown bag.

Following the second cycle:

- Don gloves only and enter UVGI room.
- Collect respirators from line, one owner at a time and place tally mark on bottom of respirator to record the decontamination cycle.
- Deposit respirators into a new white bag, indicating owner and return location on exterior of white bag. Staple white bag shut.
- Continue collecting used respirators in white bags labeled by owner and location until all respirators are collected.
- Transfer reprocessed respirators in stapled white bags to clean pickup location.
- Notify receiving unit N 95 masks are ready for return. Deliver masks to designated clean area on unit.
- Indicate process finish time, number of respirators processed, and other notes as indicated on process log sheet.

Reprocessed mask recipient:

- HCP will notice a tally mark has been added, by the SPD tech, after decontamination process, to track the number of times a particular mask has gone through the decontamination.
- Recipients are responsible to inspect the mask for loosening of straps, discoloration or flaking of mask materials that may indicate degradation. If the recipient determines possible degradation, the mask should be discarded and not used.





Figure 2: Required Respirator Markings



Figure 3: Deposit brown bags containing used respirators on rack in soiled utility room





Figure 4: Perform hand hygiene



Figure 5: Log respirator drop-off





Figure 6: Place bags with respirators on cart and transport to UV room



Figure 7: Indicate name of N-95, and unit on new white bag



Figure 8: Wipe cart thoroughly with PDI wipes. Doff at threshold and exit room. Perform hand hygiene.





Figure 9: Sample UV room set-up. Place sensors facing the emitter, 40 inches from the floor.

		R-D	135
Location			
	Unit		
Test			Choose
Dose			
Spore	O COVID-19		
Sensors			
UV Sensor	135-1, not active		
UV Sensor	135-2. not active		

Figure 10: Select the COVID-19 Dose



Simulation	n Controls		
Door Swi Door is c	tch 1395 losed, armed		
Open D	oor		
Ensure	all personnel are clear.		
	Start	Cancel	

Figure 11: Start cycle on Samsung

Charl	7 0.4		7915 12:11 PM
Steri	1Z		
		Job Status	
		R-D 90	
Job 1: Location: Target Do Job Start Elapsed T	Compl Test: 2 see: Acute : Jul 25, ime: 5 minu	eted 12 (46000 µWs/cm ⁹) 2014 12:05 PM tes, 37 seconds	
		Completed	
Sensor	Intensity C (µW/cm ²)	(µWs/cm ²)	Time Remaining
1291	108	60245	
1392	98	59163	
1293	250	46100	
1394	250	48360	
	Place sens	ors back in charg	ing tray.
		-	
		UK.	
		A lo monte a lo mais la	

Figure 12: Run cycle until job is completed





Figure 13: Once job is complete, reposition Rapid Disinfector to the opposite side of the clothesline, 4 feet from the center of the line. Rotate sensors to face emitter.



Figure 14: While cycle runs, write name on new brown bag and place in corresponding labeled white bag.





Figure 15: Enter room with gloves and procedure mask



Figure 16: Add tally to respirator to indicate number of UV cycles





Figure 17: Carefully place N95 mask one at a time in corresponding bag for each owner



Figure 18: Staple shut clean white bag with disinfected N-95 masks





Figure 19: Place stapled bags with decontaminated N-95 masks in totes



Figure 20: Contact unit respirators are ready for pick-up



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Figures 2-8 and 14-19 directly excerpted from Nebraska University Document