

## Summary

Pre-COVID-19, SBM's Respiratory Protection Program (RPP) fit tested clinical staff that may perform direct care to patients with confirmed/suspect airborne pathogenic illness (i.e., TB, SARS, smallpox, and measles), support staff, Fire Marshals responding to emergencies and facilities staff. Annual fit test compliance was not enforced. Early 2020, SBM was faced with deficiencies in the RPP. The number of staff requiring immediate fit testing dramatically increased. We reacted to each day's new challenges and were able provide appropriate respiratory protection to the staff.

## Challenges

- Most MDs did not comply with the requirement for annual fit testing.
- Off-site medical staff, not working in the hospital, were being redeployed to COVID -19 floors when the clinics were closed. They had not been fit tested in years.
- EMTs had not been fit tested.
- Supply chain shortages and counterfeits made providing adequate respiratory protection challenging.
- Bitrex and saccharine sold out.

## Fit Testing Solutions

- Daily qualitative fit testing for staff in Lecture Halls, space that allowed for social distancing and rigorous sanitizing.
- Mass fit testing for staff and first responders made available.
- Air-line teams were provided Powered Air Purifying Respirators (PAPRs) to reduce the # of contaminated respirators discarded.
- 100 3M Versaflo 300+ PAPRs were obtained for staff difficult to fit on N95 or needing exemption from shaving for religious or medical reasons.
- EH&S's 20 years of detailed fit testing data was available when OSHA suspended the requirement for annual fit testing.
- EH&S worked closely with staff to address concerns about adequate fit.
- Stony Brook University Chemistry Department made Denatonium Benzoate (Bitrex) and sensitivity solution for our fit testing.



[https://www.3m.com/3M/en\\_US/p/d/v100559007/](https://www.3m.com/3M/en_US/p/d/v100559007/)

## Powered Air Purifying Respirator (PAPR)

- PAPRs were initially supplied by Emergency Management from their stockpile of 40 3M Breathe Easy PAPRs.
- These were used by the Airline Team to reduce the discarding of N95 used during sputum inducing procedures.
- With state funds, we acquired 150 more 3M Versaflo 300+ PAPRs.
- PAPRs were distributed to difficult to fit and bearded staff.

## Avoiding Crisis - Shortages

- At a use rate of 800 N95 per day, it was difficult to buy and stock reliable protection that staff had fit tested on.
- We received 10,000 + discontinued 3M 1870 they were a godsend until they ran out too.
- Unusual NIOSH approved Alpha Protech was good for use with surgical loops.
- We screened N95 for off sites locations to help verify integrity.
- Half face elastomeric respirators were purchased and outfitted with exhalation valves for healthcare use.
- Warehouse space was acquired to house the required 90-day supply of PPE. This alleviated life safety issues in elevator lobbies.
- Honeywell 365 N95's were defective. Straps broke easily on 30% of delivered stock. Threats of litigation from NY State got them replaced.
- Retested staff for alternative available masks as their current model became scarce.
- Windows installed in patient room doors to reduce entries to check patient's condition.

## Skin Breakdown

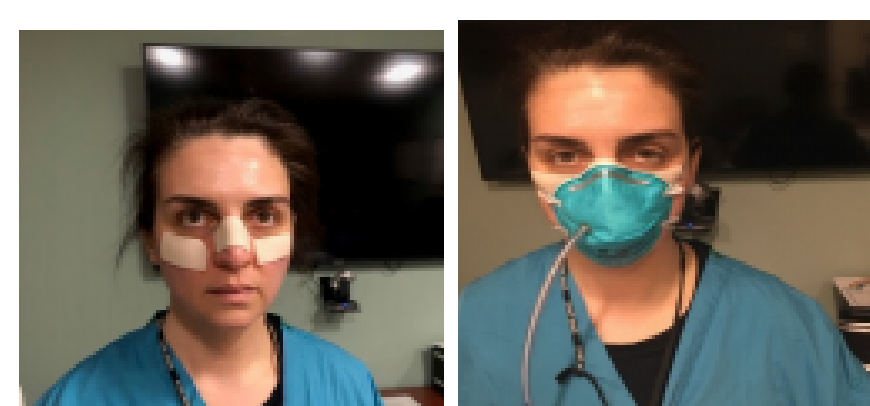
- Staff developed pressure wounds from wearing N95 for long shifts.
- Wound care staff researched barriers that would alleviate irritation and maintain the integrity of the fit.<sup>3</sup>

## Face Protection Under N95 Masks

Product	Usage T= Treatment P= Prevention	Lawson#	Comfort	Ease of removal	Total Fit Factor*
Mepilex Light	T P	62444	Very	Easy no redness	148
Duoderm Extra Thin	T P	16684	Very	Easy Tenderness redness	167
Tegaderm	P	06527	Very Makes skin feel tight	Challenging Tenderness	186
Control: Cavilon *	P	01069	Very	Wears off over time	200

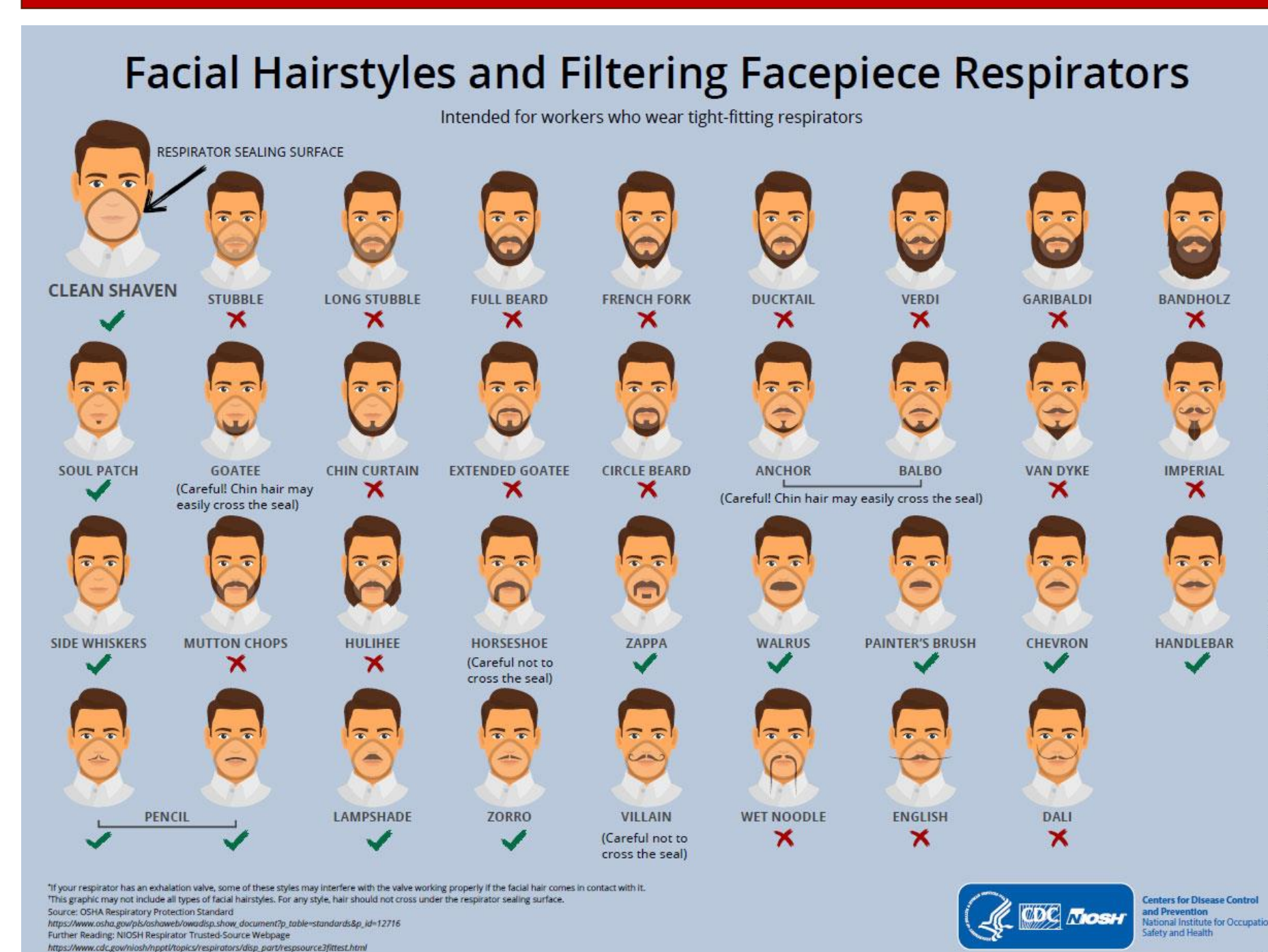
\*Total Fit Factor: 100 or Greater = N95 is effective

\* Cavilon Skin Protectant Barrier recommended for use under each dressing type (allow to completely dry before placing dressings)



Dressings should be placed using 3 pieces  
Cheekbones: 1 inch x 2 inches  
Bridge of Nose: 1 inch x 1 ½ inches  
Dressings should sit under edges of the N95 Mask <sup>3</sup>

## Distribution of PAPRs



- Stony Brook University Office of Equity and Access assesses the need for Religious exemption for wearing an N95.
- Employee Health and Wellness handles medical exemptions and fitness requirements.

## Decontaminating N95s

- Research into the integrity of sanitized respirators demonstrated a method that did not compromise fit.
- Heat killed pathogens without compromising fit and permeability of the N95s tested.<sup>1</sup>

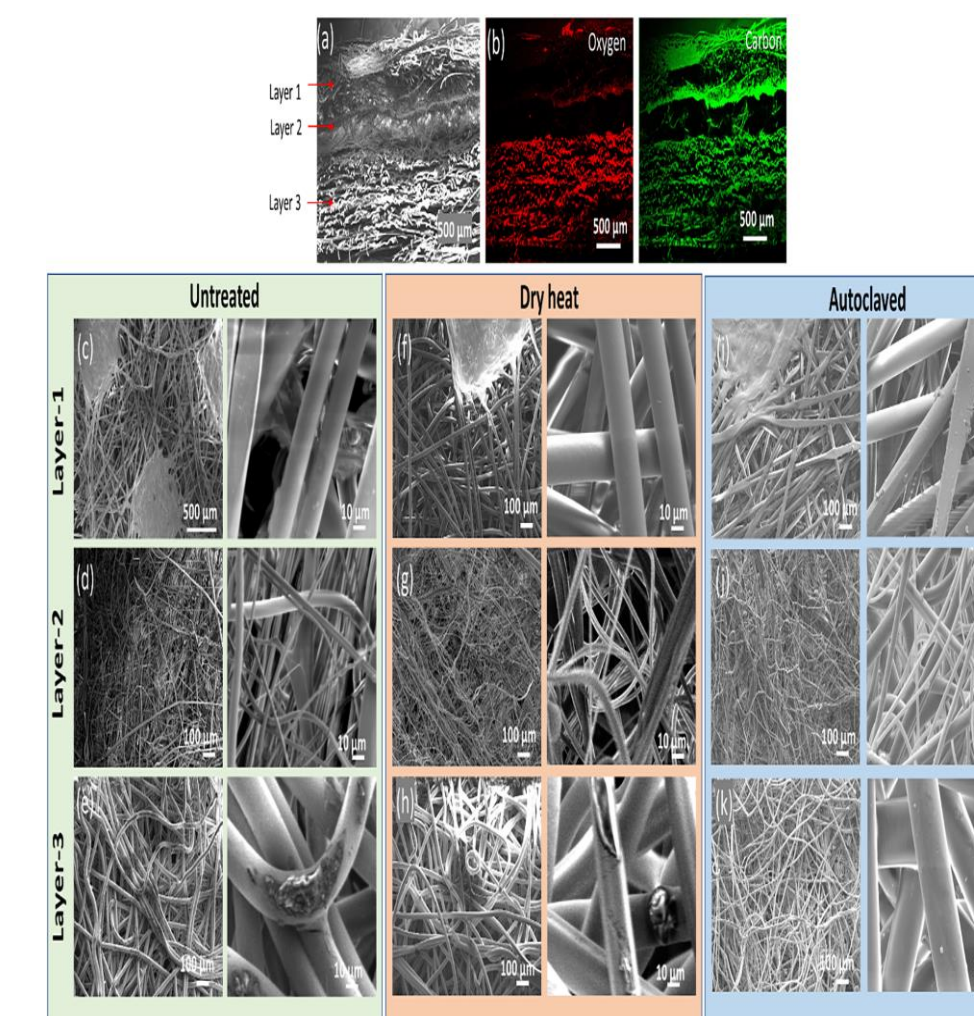
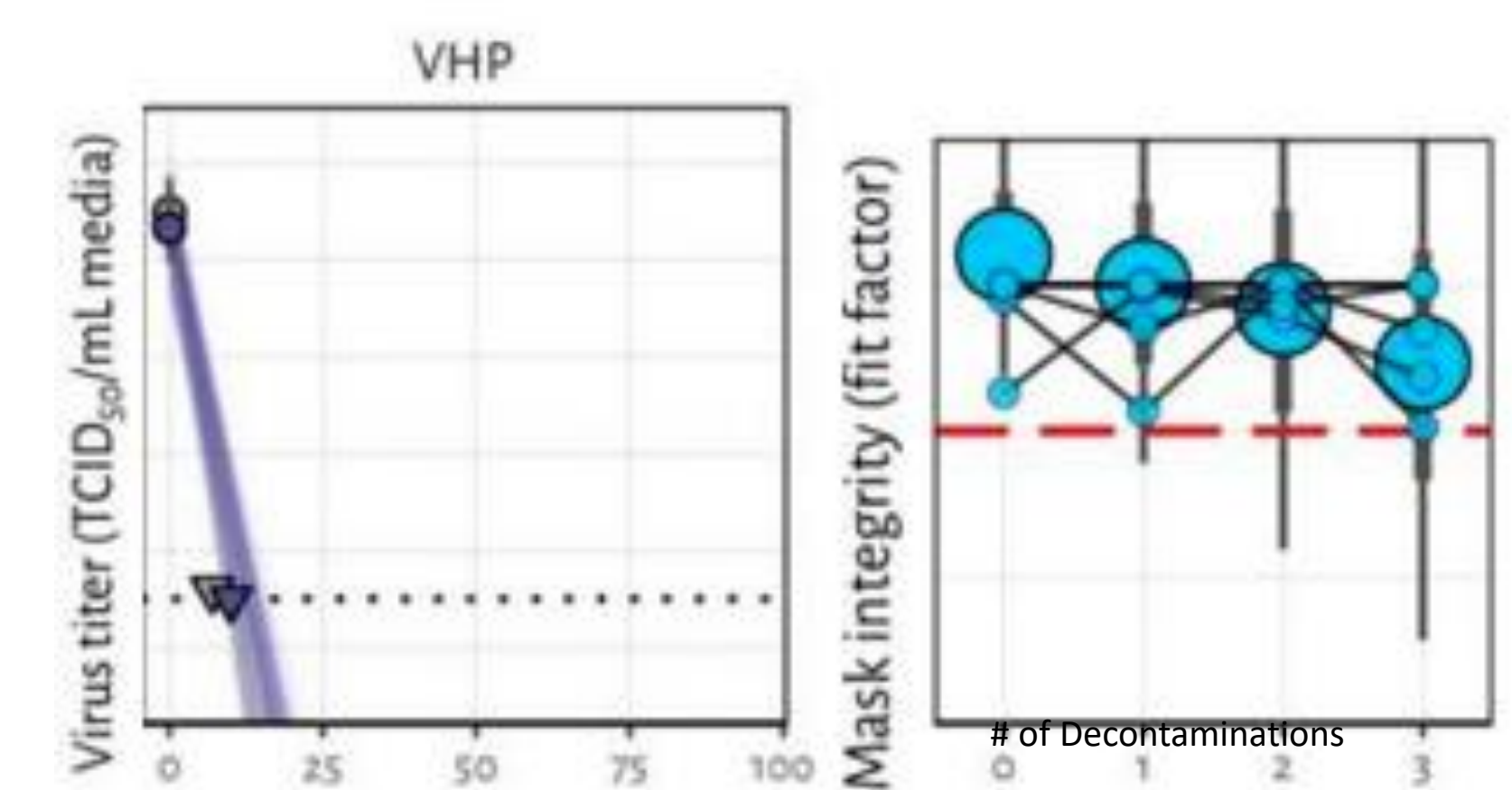


Fig 3. SEM characterizations of three layers in 3M 1860 N95 FFR. (a-b) SEM/EDS images of cross section. (c-e) SEM images of top-down view of untreated 3M 1860 N95. (f-h) SEM images of top-down view of the 3M 1860 N95 after dry heat treatment at 100°C for 4 cycles. (i-k) SEM images of top-down view of the 3M 1860 N95 after autoclaving treatment. <https://doi.org/10.1371/journal.pone.0257963.g003>

- Hydrogen peroxide mist - used in a trailer to sanitize N95s and return them to the original user. Over 10,000 masks were reused after decontamination.<sup>2</sup>



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## Portacount Quantitative Fit Testing

- Portacount - used to find N95s for staff previously unable to pass a fit test, evaluate vendors and unfamiliar respirator models.
- Used to rule out counterfeit masks, aid in research for reprocessing N95s and evaluate the interference of skin dressing on fit factor.
- Helped assure staff that the mask is protecting them from the pathogen even if they smell vapors.



<https://tsi.com/discontinued-products/portacount%C2%AE-respirator-fit-tester-8038/>

## Preparing for Future Challenges

- Fit testing was moved to Employee Health and Wellness. Quantitative Fit testing is required along with annual health screening for patient facing staff.
- 100 additional PAPRs were acquired and maintained for readiness.(350 Total in house)
- Working with 3M and other suppliers for advice on supply chain going forward – They recommended 1870+ replace the 1860 line.
- Off sites are fit testing 3 masks on all staff to give them flexibly if there are supply chain issues. We are likely to recommend they adopt the 3M1870+ as one of those masks

## References

- <sup>1</sup>Dry heat sterilization as a method to recycle N95 respirator masks: The importance of fit John G. Yuen, et al., PLoS ONE10.1371
- <sup>2</sup>Effectiveness of N95 Respirator Decontamination and Reuse against SARS-CoV-2 Virus Robert J. Fischer, et al., Emerging Infectious Diseases, 10.3201
- <sup>3</sup>Use of Thin dressings Under N95 respirators: Exploring the Impact on Mask Seal and Skin Preservation during the Covid-19 Pandemic; Guschel, Susan MS, ANP-C, CWON et al., Wound Management Prevention



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