

Improved Performance of N95 Isolation Masks: Enhancing Communication, Fit, and Comfort

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Numerous studies show that healthcare workers are poorly compliant with respiratory protection guidelines, especially when a N95 respirator is recommended. Many features of the current N95 masks may contribute to the lack of compliance: temperature and humidity accumulation in the mask as well as pressure from the nose clip and elastic straps may cause discomfort when the N95 is worn for prolonged periods of time. To improve compliance and to reduce the risk of disease transmission, we have developed a prototype with features that improve the fit and comfort of the mask. One-way exhalation valves and novel filter media were used to reduce the temperature and humidity accumulation. Viscoelastic polyurethane foam was used to not only generate a better seal between the mask and the user's face, but also to reduce contact pressure. To facilitate communication, we have we have incorporated a clear polyethylene terephthalate (PET) centerpiece, which permits lip reading and facial expressions to be seen. Preliminary data suggests the prototype increases humidity within the mask while decreasing temperature. Future work includes improving the fit of the mask to greater variety head forms. In addition, we plan to continue development and testing of the filter media, while also testing effectiveness of a desiccant. Ultimately, we hope to accomplish the intended social impact of improving compliance and reduce the risk of disease transmission.