

## ***GNYACSM Original Research Abstract***

---

### **Comparing the Effect of N-95 vs Surgical Mask Use on Resting Metabolic Data Changes**

ROBERT STEINBERG, ALEXANDER ROTHSTEIN, AMERIGO ROSSI, ALYSSA HILLIAN, JOANNE DIFRANCISCO-DONOGHUE

Interdisciplinary Health Sciences; New York Institute of Technology College of Osteopathic Medicine, Old Westbury, NY

---

*Category: Doctoral*

*Advisor / Mentor: Rossi, Amerigo, FACSM (arossi01@nyit.edu)*

#### **ABSTRACT**

Face masks reduce the spread of viral respiratory particles, however, their impact on respiratory physiology requires further research. Previous studies reported reduced gas exchange when wearing a surgical mask, however, breath-by-breath data has not been analyzed. **PURPOSE:** To compare physiological changes when wearing an N95 mask and surgical mask at rest. Variables measured include oxygen consumption ( $VO_2$ ), carbon dioxide ventilation ( $VC_{O_2}$ ), respiratory exchange ratio (RER), heart rate (HR), respiratory rate (RR), minute ventilation (MV), and discomfort. **METHODS:** 42 subjects ages 18-55 (19 men; age  $22.98 \pm 3.83$ ) were recruited. Exclusion criteria was a history of metabolic disease/claustrophobia. Respiratory and metabolic data was collected using indirect calorimetry under a hood. RR was recorded via a smart skin apparatus for breath-by-breath data. Testing consisted of three 15-minute trials: no mask, N-95 mask, and a surgical mask. HR,  $VO_2$ ,  $VC_{O_2}$ , RER, RR and MV were recorded at 1-minute intervals. Discomfort was assessed using a Likert scale. Results were analyzed using repeated measures ANOVA. **RESULTS:**  $VC_{O_2}$  was significantly lower in surgical masks when compared to the control ( $p=.05$ ). Both surgical and N95 masks had significantly lower RERs ( $p<.001$ ,  $p<.005$ ). MV was higher in N95 and surgical conditions, but only significant in N95 ( $p<.001$ ). RR was not significantly different across conditions ( $p=.102$ ). Subjects reported the most discomfort wearing the N95 mask ( $p<.001$ ). **CONCLUSION:** Variance in gas exchange data suggests alterations in respiratory efficiency and metabolic rate while using face masks. This is supported by the significant decrease in RER with both masks, indicating a shift in substrate preference towards fat metabolism. While there were no significant differences in RR, MV was increased, suggesting compensation for altered gas exchange. This may account for the increased discomfort associated with mask use, particularly with N95s.