Submission Title:
Masks and End-Tidal Carbon Dioxide Levels in Healthy Adults After Exertion

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Abstract

Introduction and Purpose

Though the subject of considerable debate, investigators recently reported in the pediatric literature that mask wearing by children has potential risk for hypercarbia. There is a limited amount of data evaluating the relationship between surgical mask wearing and CO2 retention in adults. We conducted a prospective trial to assess end-tidal CO2 (ETCO2) levels in healthy adults before and after exertion.

Methods

This was a prospective cross-over trial conducted at a community-based, academic ED. Consenting healthy volunteers ages 18-45 years were randomized for the order in which they were evaluated to start with or without a three-layer surgical mask. Each had ETCO2 and SpO2 measured before and after briskly walking 100 yards with and without a mask, respectively. Categorical data presented as frequency of occurrence. Continuous data presented as means+/-SD and analyzed by t-tests. The primary outcome parameter was to compare the mean difference in CO2 level changes for subjects after walking with and without masks.

Results

31 subjects enrolled; 64% age>30 years, 80% non-Hispanic White, 55% female, mean Sp02 at rest without a mask was 97+/-1 mmHg, and mean ETCO2 at rest without mask was 35.2+/-2.9 mmHg. The mean difference in ETCO2 levels for subjects when masked vs. unmasked at rest was not statistically significant (-0.1; p=0.1). With respect to the primary outcome parameter, the mean difference in ETCO2 level for subjects after walking with and without masks were similar (+0.65; p=0.13). There were no significant differences in change in ETCO2 levels for masked vs. unmasked subjects after walking with respect to age (p=0.9), gender (p=0.4), and race (p=0.8). The mean difference in

Sp02 level changes for subjects after walking with and without masks were similar (+0.4; p=0.07). There were no significant differences in change in Sp02 levels after walking for masked vs. unmasked subjects with respect to age (p=0.6), gender (p=0.2), and race (p=0.9).

Conclusion

Within our study group of healthy, young adult volunteers, we did not observe a difference between CO2 levels after walking 100 yards with and without a mask.