

# RESPIRATORY CARE

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### RANGE OF OXYMASK FIO2 AT 40 L/M IN YOUNG, HEALTHY SUBJECTS

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**Background:** The OxyMask (Southmedic Inc, Canada) is an open-designed oxygen mask that, according to the manufacturer's website, is capable producing an FIO<sub>2</sub> of 60%-90% at 15 L/min or greater of O<sub>2</sub> flow. A previous study performed at our institution showed that the OxyMask delivered a mean FiO<sub>2</sub> of 44% with a standard deviation (SD) of 6% (range 34%-55%) on 15 L/min of O<sub>2</sub> flow. In this study, we sought to determine if setting the flowrate for 40 L/m would be more likely to meet the manufacturer's reported FIO<sub>2</sub> range of 60%-90%.

**Methodology:** After obtaining IRB approval from our institution, we recruited 15 healthy adults with a mean age of 23.9 years into our study. All participants were required to be less than 35 years of age, have a DLCO value of 90% of predicted or greater, be a non-smoker, and have no history of lung disease. Individuals meeting these criteria were then seated, placed on a tight-fitting OxyMask at 40 L/m, and were instructed to relax, breathe normally, and not talk for a period of 15 minutes. 40 L/m flow was verified using a TSI Certifier FA Plus pneumotachometer. During the testing period, all subjects were observed to perform quiet, restful breathing. At the end of the fifteen minute period, we performed a radial artery blood gas and measured pH, PaCO<sub>2</sub>, and PaO<sub>2</sub> using a GEM 3000 blood gas analyzer. No air bubbles were observed in any of the syringes and all samples were analyzed within five minutes. Assuming that our young, healthy subjects had normal cardiopulmonary anatomy and physiology, we estimated PAO<sub>2</sub> by dividing PaO<sub>2</sub> by a normal a/A ratio of 0.9 to reflect a ten percent higher partial pressure of oxygen in the alveoli than in arterial blood. Knowing approximate PAO<sub>2</sub>, we then calculated FIO<sub>2</sub> by the following formula:  $FIO_2 = [(PaO_2 \div 0.9) + (PaCO_2 \times 1.20)] \div (PB - 47)$ . **Results:** The mean PaO<sub>2</sub> produced by an OxyMask at 40 l/m was 321.2 mmHg with a SD of 42 mmHg. This resulted in a mean calculated FIO<sub>2</sub> of 58.8%, a SD of 6.87%, and produced a two SD FIO<sub>2</sub> range of 45.0%-72.5%. During the testing period, our subjects had a mean pH of 7.43 and a mean PaCO<sub>2</sub> of 37 mmHg. The average DLCO of the fifteen participants was 114% of predicted. **Conclusion:** In our group of young, healthy subjects, the range of FIO<sub>2</sub> produced by an OxyMask at 40 L/m was less than stated by the manufacturer. In order for the OxyMask to achieve an FiO<sub>2</sub> of 60%, the flowrate needs

to be increased to approximately 40 L/min in normally breathing individuals. Sponsored  
Research - None

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