## LETTERS TO THE EDITOR

# Preoxygenation via a non-rebreather mask comparing a standard oxygen flowmeter rate of 15 Lpm to maximally open

Dear Editor,

Preoxygenation is critical to safe emergency airway management with an end-tidal oxygen ($ETO_2$) of >90% considered the target prior to induction. Outside of the operating theatre and in prehospital environments, turning open the valve of a standard wall/cylinder outlet past the 15 Lpm graduation ('overflow') has been proposed to greatly enhance preoxygenation via a non-rebreather mask (NRB),[1] achieving an $ETO_2$ of 86% in a recently published report.[2] However, this study used an American 15 L/min flowmeter that allows oxygen flow of 40–60 Lpm if opened fully, while previous work with NRB masks with standard oxygen flow rates of 15 Lpm produce an $ETO_2$ of only 50–65%[3,4] and standard Australian oxygen outlets may only increase this flow to 19 Lpm when completely open.[5] Therefore, preoxygenation may not be improved by such a margin for all types of 15 Lpm flowmeters.

### Methods

We performed a randomised crossover trial on healthy volunteers using two preoxygenation conditions; 3 min tidal volume breathing via a NRB at 15 Lpm and 3 min tidal volume breathing via a NRB with the 15 Lpm flowmeter with the dial turned all the way open (overflow). $ETO_2$ as a measure of preoxygenation/denitrogenating efficacy was measured by single exhaled vital capacity breath. The study received ethics approval from the Sydney Local Health District Ethics Review Committee (HREC/15/RPAH/587) and was registered with the Australian clinical trials registry (ACTRN12617000339358). The NRB used was a Mayo adult high-concentration full non-rebreathing mask (http://www.mayohealthcare.com.au/products/Resp_oxygen_variableconcent_mask.htm#oxygenmask).

### Results

Forty participants (29 males, 11 females) completed both preoxygenation conditions. The mean age of participants was 41 years (SD = 10), and mean BMI of 26 (SD = 3). The median $ETO_2$ was greatest for NRB with overflow (median = 55%, IQR = 10, 25–75 percentiles = 51–61%) compared to 15 Lpm (median = 48%, IQR = 7, 25–75 percentiles = 44–51%). The difference in median $ETO_2$ was 8% (95% CI: 6–10%, $P < 0.001$).

### Conclusions

The preoxygenation achieved using our Australian standard 15 Lpm flowmeter at overflow with our NRB mask was only marginally effective in improving preoxygenation in healthy volunteers. This contrasts with a USA study showing a greatly increased $ETO_2$ that utilised a different 15 Lpm flowmeter, but was marked as having overflow rates of 40–60 L/min.[2] The technique of preoxygenation with a NRB with overflow from a standard 15 Lpm flowmeter lacking markings for higher flow may not be as effective at preventing hypoxia at intubation in Australia as other available methods.

### Competing interests

None declared.

## References

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