

Category : **Respiratory: mechanical ventilation**

A228 - Differential effects of mechanical power on mortality among male and female critically ill patients

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Introduction:

Injurious effects of energy delivered to the lung during mechanical ventilation, estimated by mechanical power (MP), may depend on lung size, with potential differential effects between male and female patients. We hypothesized that 1) effects of non-normalized MP on 28-day mortality are modified by patient sex, affecting females more markedly due to smaller lung sizes [1], and 2) differences are mitigated by normalization of MP to respiratory system compliance (C_{rs}) as proxy for functional lung size [2].

Methods:

19,806 (37.9% female) mechanically ventilated patients from the ICUs of Beth Israel Deaconess Medical Center in Boston, USA were included. Median respiratory settings were calculated for the first 24h of mechanical ventilation and analyses adjusted for a comprehensive confounder model.

Results:

Median (IQR) non-normalized MP was higher in males than females (11.8 [9.4-15.9] versus 10.4J/min [8.1-13.7], $p < 0.001$). Patient sex modified the association between non-normalized MP and mortality (p -for-interaction=0.018), resulting in a 52.7% larger effect size in females compared to males (absolute +5.5 [95%CI 4.7-6.2] versus +3.6% [3.2-4.1] mortality risk increase per 5J/min). At a threshold of 17J/min [3], mortality risk was an absolute 8.4% higher for females (*Figure*). Normalization of MP to C_{rs} (MP/C_{rs}) mitigated differential effects (p -for-interaction=0.23; *Figure*). In females, normalized MP was 11.1% higher than males and partially (23.8%) mediated increased mortality risk.

Conclusion:

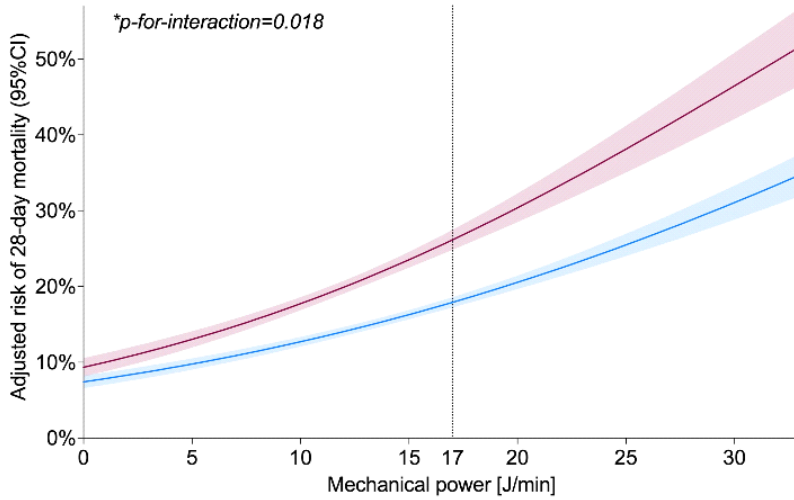
Changes in non-normalized MP result in a larger effect size in females than males and risks at non-normalized thresholds show relevant differences between both sexes. Normalization of MP to C_{rs} mitigates differences. Higher normalized MP delivered to females mediated increased mortality risk, supporting the use of ventilation strategies individualized to patients' C_{rs} as a proxy of functional lung size.

References:

[1] Brower et al., *NEJM*, 2000 [2] Gattinoni et al., *ICM*, 2016 [3] Serpa Neto et al., *ICM*, 2018

Image :

A) Effect modification of non-normalized mechanical power by sex



B) Effect modification of normalized mechanical power by sex

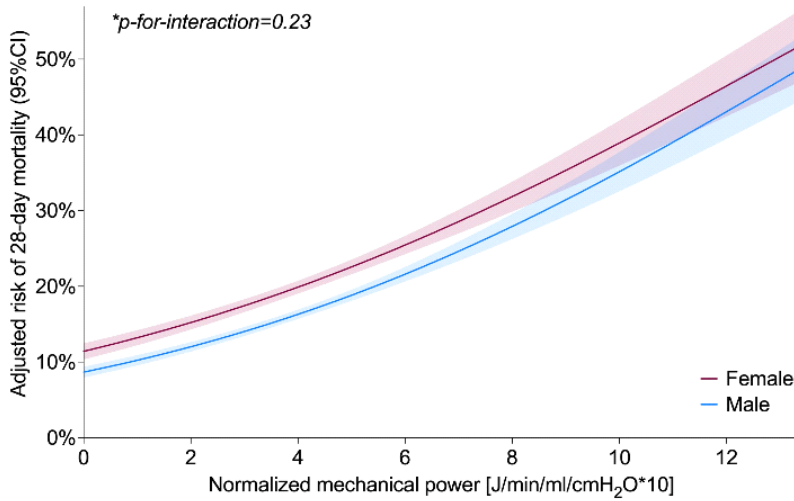


Figure. Association of mechanical power with 28-day mortality in male and female patients. The association of non-normalized mechanical power (MP) with mortality was modified by patient sex, resulting in a 54.7% larger effect size per unit change and an absolute 8.4% higher mortality risk at a threshold of 17J/min [3] among females compared to males (Panel A). Normalization of mechanical power to respiratory system compliance mitigated these differential effects (Panel B).