Gender Disparity in Ventilated ICU Patients

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Introduction

An audit of compliance with nationally accepted recommendations[1] for lung protective ventilation (LPV) on the Intensive Care Unit at Peterborough City Hospital, found that female patients were at a significantly higher risk of being ventilated above LPV volumes than male patients.

Background

This audit repeated a 2020 audit designed to establish compliance with Acute Respiratory Distress Syndrome Network (ARDSNet) guidelines for lung protective ventilation of 5-7mL/kg[1] ideal body weight (IBW) in the ICU.

The initial audit found overall poor compliance (53%) with tidal volumes of 5-7mL/kg. A laminated chart was introduced on all ICU ventilators to aid calculation of IBW and appropriate tidal volumes, and the audit findings were presented at a departmental meeting.

Method

The ICU charts for 50 patients between October and December 2021 were examined for height, weight, gender, tidal volume, and reason for ventilation. Tidal volumes were recorded at 12pm for a maximum of three days and averaged. Weaning patients and patients ventilated for less than 8 hours by 12pm were excluded.

Ideal body weight was calculated for each patient as per ARDSNet[1]:

- Males IBW = 50 + 0.91(height in cm - 152.4)
- Females IBW = 45 + 0.91(height in cm - 152.4)

Demographics:

- n = 50 - Female 14 (28%), Male 36 (72%)
- Age = 54.3 (SD 15.8)
- BMI 31.1 (SD 9.2)

Results

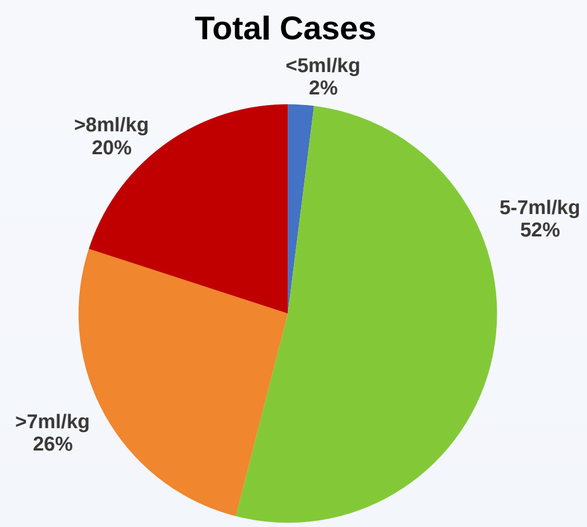

Fig. 1: Overall Ventilation Volumes

54% of all patients (n=27) were ventilated in compliance with LPV recommendations of 5-7mL/kg IBW. 46% (n=23) were ventilated with volumes >7mL/kg.

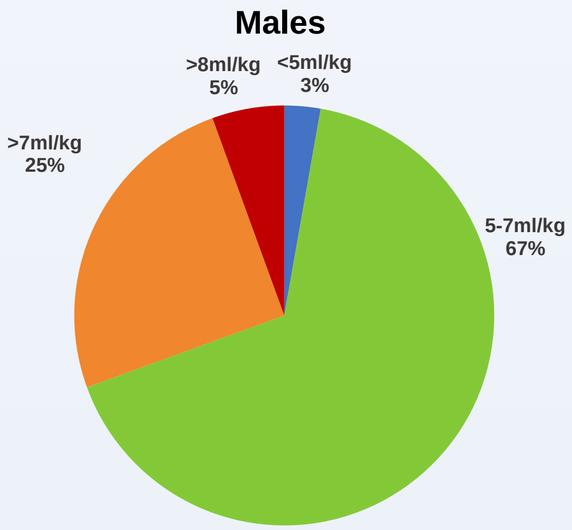

Fig. 2: Ventilation Volumes for Male Patients

67% (n=24) of male patients were ventilated according to LPV guidelines of 5-7mL/kg.

30.6% (n=11) of male patients were ventilated with volumes >7mL/kg IBW, with only 5.6% (n=2) ventilated with volumes >8mL/kg.

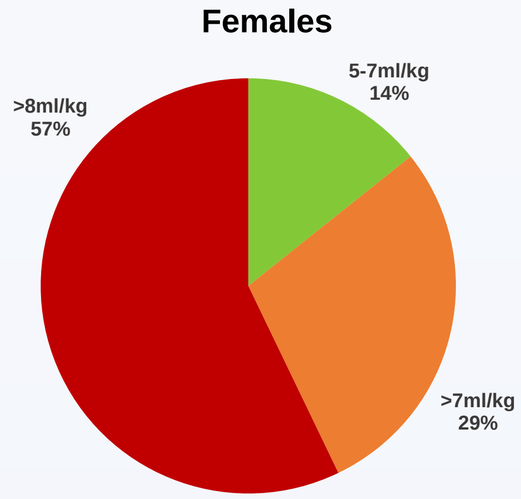

Fig. 3: Ventilation Volumes for Female Patients

85.7% (n=12) of female patients were ventilated with volumes >7mL/kg IBW.

57.1% (n=8) were ventilated with volumes >8mL/kg.

Discussion

The results of this audit found an ongoing deviation from the use of recommended LPV volumes, disproportionately affecting female patients.

Female patients were nearly three times as likely to be ventilated with volumes >7mL/kg compared to male patients, and almost six times as likely to be ventilated with volumes >7mL/kg than to be ventilated according to LPV recommendations.

The proposed cause of this difference is the calculation of ventilation volumes using actual body weight, rather than ideal body weight according to height, which is correspondingly lower in females than males[1].

Review of the initial 2020 audit of 30 patients (which was not originally analysed by gender) showed 68.8% of women (n=11) ventilated with volumes >7mL/kg vs 28.6% of men (n=4), demonstrating there has been no improvement in compliance with LPV, despite interventions.

Multiple published studies have shown poorer outcomes for female patients admitted to ICU compared to their male counterparts[2,3], including specifically patients with ARDS[3].

The findings of this audit demonstrate a measurable difference in the ventilation of male and female patients, which has the potential to be a contributing factor in these outcomes.

It highlights the need for continued work to improve the care of ventilated patients in ICU, particularly female patients who are disproportionately at risk[2,3].

Recommendations

1. Further departmental education on LPV with additional focus on gender differences
2. Ensure accurate patient heights are recorded
3. Routinely calculate appropriate tidal volumes for patients using IBW prior to starting ventilation
4. Use calculated IBW in ventilator settings
5. Review ventilation volumes on each ward round and patient review
6. Take particular care for female patients, who have been shown to be at a higher risk

Acknowledgements

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References

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