Acute Respiratory Distress Syndrome "Ruler"

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Introduction

Following the publication of the ARDS Network (ARDSnet) trial over two decades ago lung protective ventilation with low tidal volumes has become a mainstay in the evidence based management of acute respiratory distress syndrome (ARDS). The ARDSnet trial protocol uses the Devine formula which is based on height and gender to calculate the predicted body weight (PBW) which is then used to calculate the tidal volume in ml/kg.

The first step to calculating a safe tidal volume is measuring the patient height. Visual estimates of patients height are often inaccurate and measurements in some patient groups can be challenging. Various methods have been suggested to aid accuracy and ease of measurement. Once the height is known the second step is to use the Devine formula to calculate the PBW. This is often done using online calculators or using tables with height and the PBW. The third and final step is to multiply the PBW by the desired tidal volume in ml/kg typically starting at 6ml/kg.

During the COVID-19 pandemic, the combination of various factors such as greatly increased doctor and nursing workload, use of personal protective equipment (PPE), concerns over the use of reusable equipment such as tape measures and difficult access to online calculators for PBW calculation when donned in PPE in some COVID-19 units made measuring height and calculating a safe tidal volume particularly challenging.

Objectives

To develop a quick and safe way of calculating lung protective tidal volumes for ARDS patients including in COVID-19 Intensive care units.

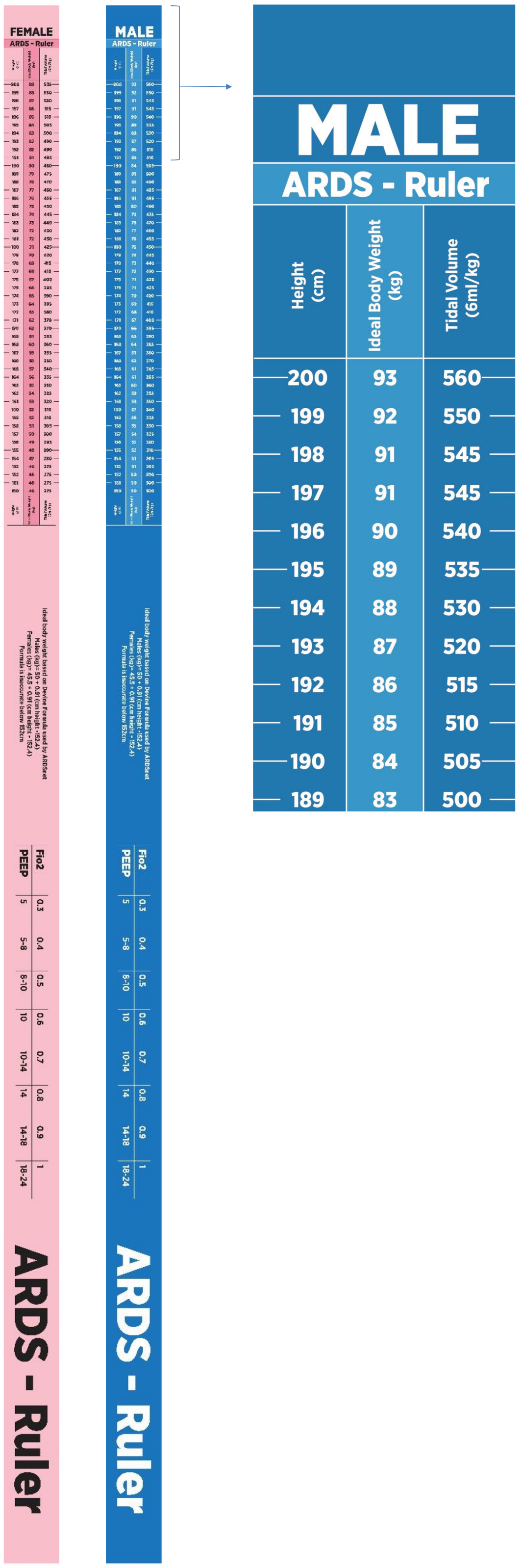
Methods and Materials

We used the Devine formula to calculate the PBW in males and females at every centimeter (cm) from 152cm to 200cm. Males PBW= 50 + (0.91 × [height in centimeters − 152.4]) Female PBW= 45.5 + (0.91 × [height in centimeters − 152.4]). We then multiplied the PBW by 6 to generate a 6ml/kg PBW tidal volume.

Using image editing software we then designed gender specific rulers with cm markings to measure height placed beside the corresponding calculated PBW and tidal volume 6ml/kg for that height. We also placed the ARDSnet PEEP/Fio2 titration table. The resulting ruler when printed to scale can then be used as a disposable measuring tape that allows height, PBW and 6ml/kg tidal volume to be calculated easily with one measurement and without the need to resort to calculators, tables or reusable equipment.

Conclusions

These JPEG images can be downloaded and printed to scale. Once printed the ARDS 'rulers' allow easy and quick measurement of height, PBW and 6ml/kg tidal volume with one measurement without resorting to calculators or tables. As they are simply printed on standard paper they are single use and therefore do not pose an infection control risk.



References

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