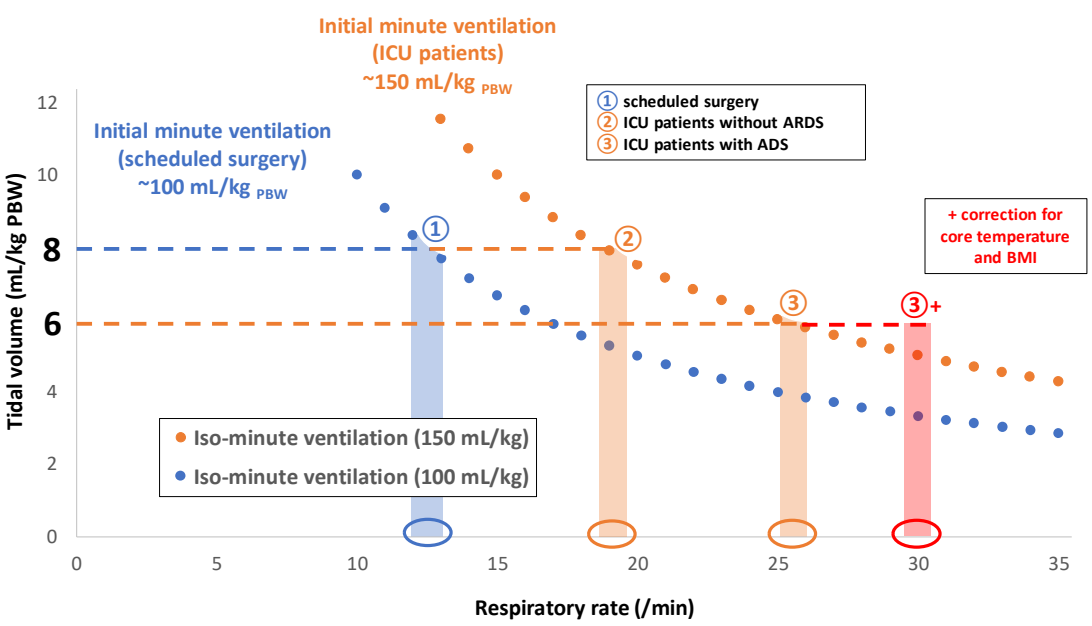
Bulle #4 : Choice of initial tidal volume (V_T) and respiratory rate (RR) settings

The choice of the initial tidal volume (V_T) and respiratory rate (RR) is important because these parameters will often be maintained or slightly modified during hospitalization[1-5]. These parameters mainly determine minute ventilation, and in combination with the determinants of dead space, alveolar ventilation (effective ventilation for gas exchange and in particular the CO_2 elimination).

Rational for the choice of V_T and RR:

In this application, we determine the initial minute ventilation target based on patient type (approximately 100 mL/kg $_{PBW}$ for patients ventilated for scheduled surgery, approximately 150 mL/kg $_{PBW}$ for intensive care unit (ICU) patients), with an adjustment depending on body temperature (adjustment for fever or hypothermia) and body mass index (BMI) (adjustment for BMI >30 kg/m^2).

The initial tidal volume is determined by the clinician (from 6 mL/kg $_{PBW}$ in the case of acute respiratory distress syndrome (ARDS) in the absence of threatening acidosis or hyperkalemia, to approximately 8 mL/kg $_{PBW}$ in other cases), and the proposed RR depends on of the targeted minute ventilation.



This figure represents the initial choice propositions of the V_T and RR settings for several frequently encountered situations:

① **Scheduled surgery:** a V_T of 8 mL/kg $_{PBW}$ with a RR of 12–14/min to achieve a minute ventilation of 100 mL/kg $_{PBW}$/min.

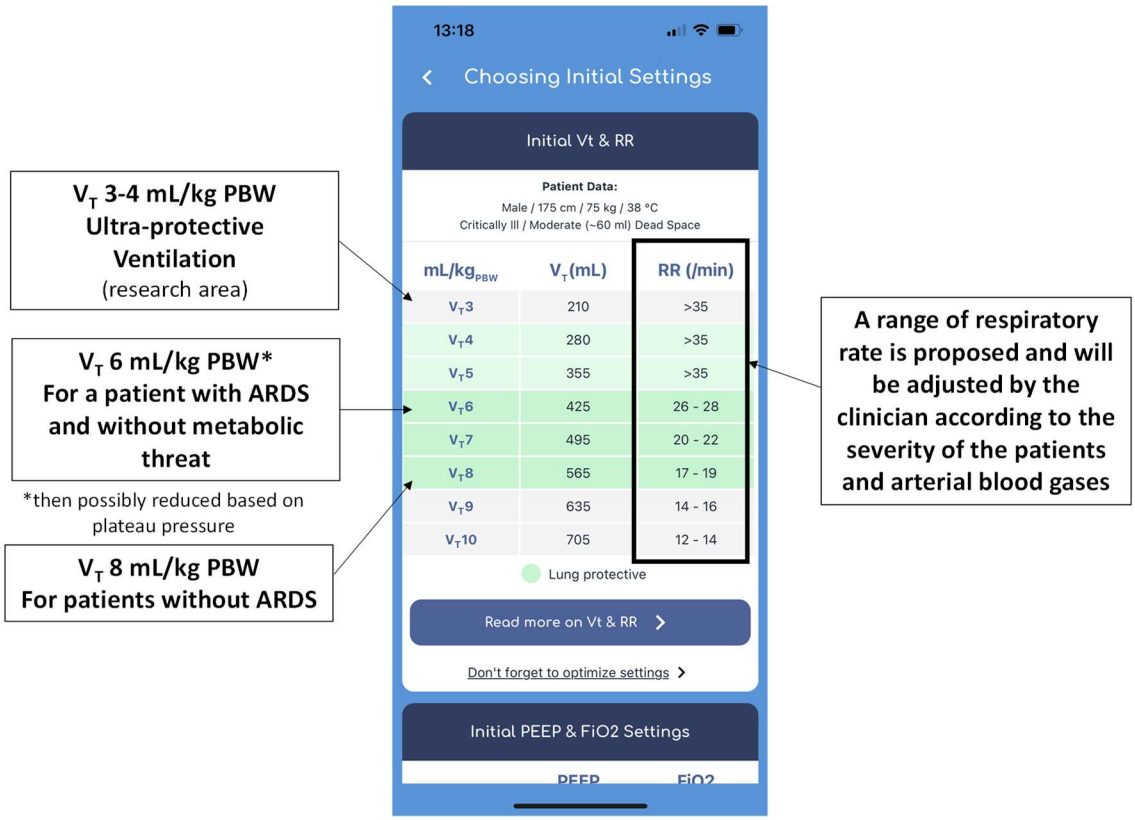
② **Intensive care without ARDS:** a V_T of 8 mL/kg $_{PBW}$ with a RR of 18–20/min to obtain a minute ventilation of 150 mL/kg $_{PBW}$/min.

③ **Intensive care with ARDS:** a V_T of 6 mL/kg $_{PBW}$ with a RR of 24–26/min for a minute ventilation of 150 mL/kg $_{PBW}$/min.

These setting proposals do not take into account adjustments which may be made depending on body temperature, BMI, and clinical judgment.
③**+ Intensive care with ARDS and increased metabolism** (For example, increased temperature >38 °C, BMI >40 kg/m^2): with a V_T at 6 mL/kg $_{PBW}$, the required RR can be set to 30/min or more (minute ventilation at 180 mL/kg $_{PBW}$/min or more as in some studies[6-11]).

Choice of combinations V_T/RR proposed in VentilO

In this application, the choice of combinations depends on the PBW, the type of patient, the actual weight, and the body temperature that has been entered. The target minute ventilation is calculated based on these parameters, and the combinations of V_T (from 3 to 10 mL/kg $_{PBW}$) and RR to obtain this minute ventilation are proposed:



The V_T recommended in the literature is most often between 6 mL/kg $_{PBW}$ for ARDS and 8 mL/kg $_{PBW}$ in other cases. Adjustments are then promptly required based on arterial blood gas control and physiological measurements (pressure plateau, driving pressure, and auto-PEEP). The use of V_T at 3 or 4 mL/kg $_{PBW}$ is more the field of research currently and the data are preliminary[12-14].

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