Glossary of Formulas and References

SafeVent
This glossary gathers the main formulas used by the SafeVent application to support the monitoring, diagnosis, and management of lung-protective mechanical ventilation, along with their respective scientific references.

In addition, SafeVent includes a generative artificial intelligence assistant trained in protective mechanical ventilation, with access to scientific literature, clinical instructions, and content from online sources, allowing it to answer complex clinical questions and support decision-making with up-to-date evidence.

Mechanical Ventilation

1. **Ideal Body Weight (IBW)**

- Men: 50 + 0.91 × (Height in cm − 152.4)
- Women: 45.5 + 0.91 × (Height in cm − 152.4)
  Reference: ARDSNet. NEJM 2000. https://doi.org/10.1056/NEJM200005043421801

1. **Static Compliance (Cst)**

- Formula: Tidal Volume (Vt) / Driving Pressure (DP)

1. **Mechanical Power**

- VCV formula: 0.098 × Respiratory Rate × Vt × (Ppeak − 0.5 × DP)
- PCV formula: 0.098 × Respiratory Rate × Vt × Ppeak
- Expressed in J/min
  Reference: Gattinoni L, Tonetti T, et al. Intensive Care Med. 2016. https://doi.org/10.1007/s00134-016-4505-2

1. **Transairway Pressure**

- Formula: Peak Pressure (Ppeak) − Plateau Pressure (Pplat)

Oxygenation

1. **PaO2 / FiO2 Ratio**

- Formula: PaO2 (mmHg) / FiO2 (decimal)
  Used to classify ARDS by Berlin criteria

Reference: ARDS Task Force. JAMA 2012. https://doi.org/10.1001/jama.2012.5669

1. **Alveolar-Arterial O2 Gradient (D[A-a]O2)**

- Formula: (PAtm − PH2O) × FiO2 − (PaCO2 / R) − PaO2
- Typical values: PAtm = 760 mmHg, PH2O = 47 mmHg, R = 0.8
  Reference: West JB. Respiratory Physiology. 10th ed. Elsevier; 2015

1. **Arterial-Alveolar O2 Ratio (C[a/A]O2)**

- Formula: PaO2 / [(713 × FiO2) − (PaCO2 / 0.8)]
- Indicates oxygenation efficiency
  Reference: Nunn JF. Applied Respiratory Physiology. 5th ed. Butterworth-Heinemann; 1993

Acid-Base Status

1. **Ideal Respiratory Rate (for correcting hypercapnia)**

- Formula: (Current RR × Current PaCO2) / Target PaCO2

1. **Acid-Base Disorders and Compensation**

Disorder	pH	HCO3−	pCO2	Compensation
Metabolic Acidosis	< 7.35	Low	Low	Hyperventilation
Metabolic Alkalosis	> 7.45	High	High	Hypoventilation
Respiratory Acidosis	< 7.35	High	High	Renal retention of HCO3−
Respiratory Alkalosis	> 7.45	Low	Low	Renal excretion of HCO3−

Reference: https://www.labtestsonline.es/conditions/acidosis-y-alcalosis

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Drug Calculations

1. **Infusion Rate (ml/h)**

- Formula: ([Weight (kg)] × [Dose (mg/kg/h)] × [Dilution Volume (ml)]) / [Total Amount (mg)]
  Reference: Miller’s Anesthesia, 9th Ed. Michael A. Gropper

For questions or suggestions about this glossary, contact us at info@synapsai.net