AESI PRACTIC

PATHOPHYSIOLOGY

Calculate A-a gradient and determine pathophysiology of hypoxemia (V/Q mismatch, shunting, diffusion abnormality, or hypoventilation).

Estimate the metabolic rate of the body (normal, increased [i.e. sepsis or shock], decreased [i.e. hypothermia or hypothyroidism])

Measure compliance, resistance, and expiratory time constant (RC_{exp}) on the ventilator.

CONTROL VARIABLE

Determine the ventilator control as the independent variable: volume vs pressure and apply the equation of motion:

 $\Delta P = R X F + V/C$

R: resistance

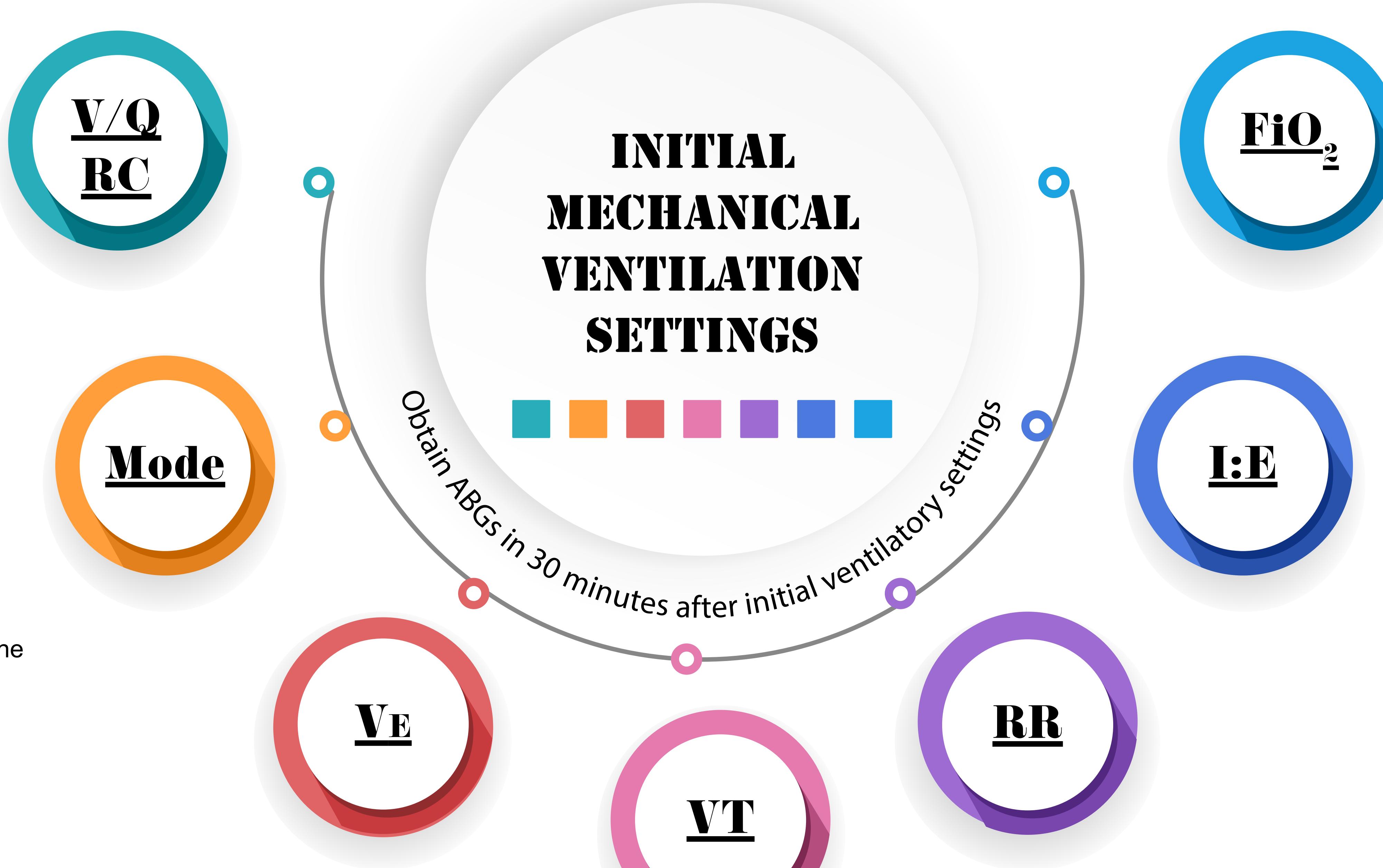
F: flow

V: volume

C: compliance

As you set the independent variable (V or P), the other variable (P or V) will be dependent on R and C of the respiratory system, and on the inspiratory efforts of the patient (Pmus)

Dual mode (PRVC) is preferred with a targeted tidal volume and pressure regulation.



MINUTE VENTIATION

Determine the dose of minute ventilation (VE): normal VE (100 mL/kg of IBW) adjusted for the metabolic rate (i.e. septic patients may need 1.25-2 X normal VE, hypothyroidism COPD, and hypothermia may need 0.8-0.9 X normal VE).

TIDAL VOLUME

Determine the dose of VT based on IBW (Ideal Body Weight):

4-6 mL/kg in shunting (ARDS)
6-8 mL/kg in V/Q mismatch (COPD and asthma)
8 mL/kg (normal lung).

Set the VT at the prescribed dose in volume control mode or determine the appropriate pressure to deliver the desired tidal volume in pressure control mode.

I:E RATIO

Determine I:E ratio based on the expiratory time constant.

OXYGENATION

decrease as appropriate.

FIO₂: 0.4-0.6 in V/Q mismatch

conditions. May start at 1 then

Mean Airway Pressure (MAP):

time, RR, pressure or volume.

Always follow protective lung

strategy limitations.

adjust PEEP, inspiratory time, rise

conditions, and 0.6-1 in shunting

Expiratory time should be at least 2-3X time constant to ensure full expiration and avoid auto-PEEP.

Patients with high R or high C (COPD and asthma) need longer expiratory time (lower I:E ratio) compared to low C (ARDS patients) who need longer inspiratory time (higher I:E ratio).

RESPIRATORY RATE

Determine the respiratory rate by dividing the minute ventilation over the tidal volume:

RR= VE/VT

