

Introduction to Mechanical Ventilation

Modes:

CMV (Controlled Mandatory Ventilation) aka many other names aka ACV (Assist Controlled Ventilation) – Sets a number of breaths to be delivered by the ventilator regardless of patient effort. Additionally, will give a patient a full tidal volume when they breathe over the vent. Common settings are CMV 8, TV 700. Brain Dead Initial Vent settings: CMV 8, TV 700, FiO₂ 100%

- 1) a person with no respiratory drive on CMV 8 TV 700 will receive 8 breaths a minute, each of which is 700 cc (for a minute ventilation of 5600 cc/minute)
- 2) a patient breathing 20 times on the vent on CMV 8 TV 700 will get 20 breaths a minute, each of which is 700 cc (minute ventilation of 14,000 cc/minute!)

SIMV aka IMV (Synchronized intermittent mandatory ventilation) – Vent delivers a set number of breaths to a patient at a set tidal volume. After that, the patient is on their own for breathing. Common settings are IMV 2-4, TV 700, PS 10 (see below)

- 1) a person with no resp drive on IMV 4 TV 700 will get 4 breaths/minute, each at 700cc
- 2) A patient with some resp drive will get 4 breaths of 700 cc as well as whatever the patient can breath on their own (eg 5 additional breaths at 500 cc each)

CPAP (continuous positive airway pressure) – the vent delivers no breaths, just continuous pressure applied over both inspiration and expiration. This is usually a final weaning step (also used for sleep apnea). Common setting CPAP 5

Extra Settings:

PS (Pressure Support) – provides extra pressure during inspiration only to “help” deliver a breath to the patient. Useless in CMV mode, used with IMV or sometimes CPAP. Common setting, PS 5-12.

PEEP (Positive End-expiratory Pressure) – “back pressure” at the end of the expiratory cycle. Used to keep alveoli open. Used during CHF, ARDS. Do not use in COPD. Can cause decreased cardiac output. Can use with any vent mode. Common setting PEEP 5-10.

BiPAP – A combination of PS and PEEP, kind of like CPAP but allows you to give a different inspiratory pressure and expiratory pressure. Used as noninvasive ventilation primarily for CO₂ retention in COPD. Common setting BiPAP 10/5 (inspiration/expiration)

Weaning: (in general)

- 1) address underlying problem (ie pneumonia, COPD, CHF, Cardiogenic Shock)
- 2) wean off pressors (dopamine, levophed)
- 3) wean down FiO₂ to 30% or so
- 4) taper off PEEP
- 5) Decrease sedation
- 6) Change mode to IMV 2-4 with PS 5-10 for a 2-4 hour trial, and check ABG after wean
- 7) Gradually increase wean times or frequency of weans, decrease PS, decrease IMV
- 8) Do a CPAP trial
- 9) Consider extubation when pt on CPAP, good O₂ sats, good ABG