

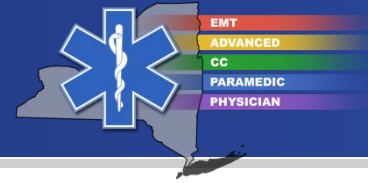
Automatic Transport Ventilator

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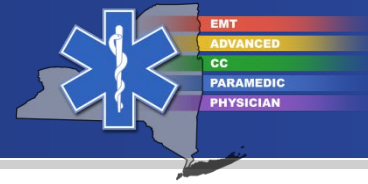
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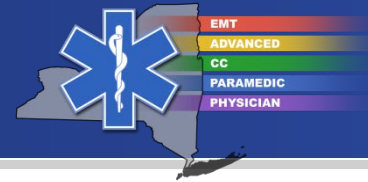
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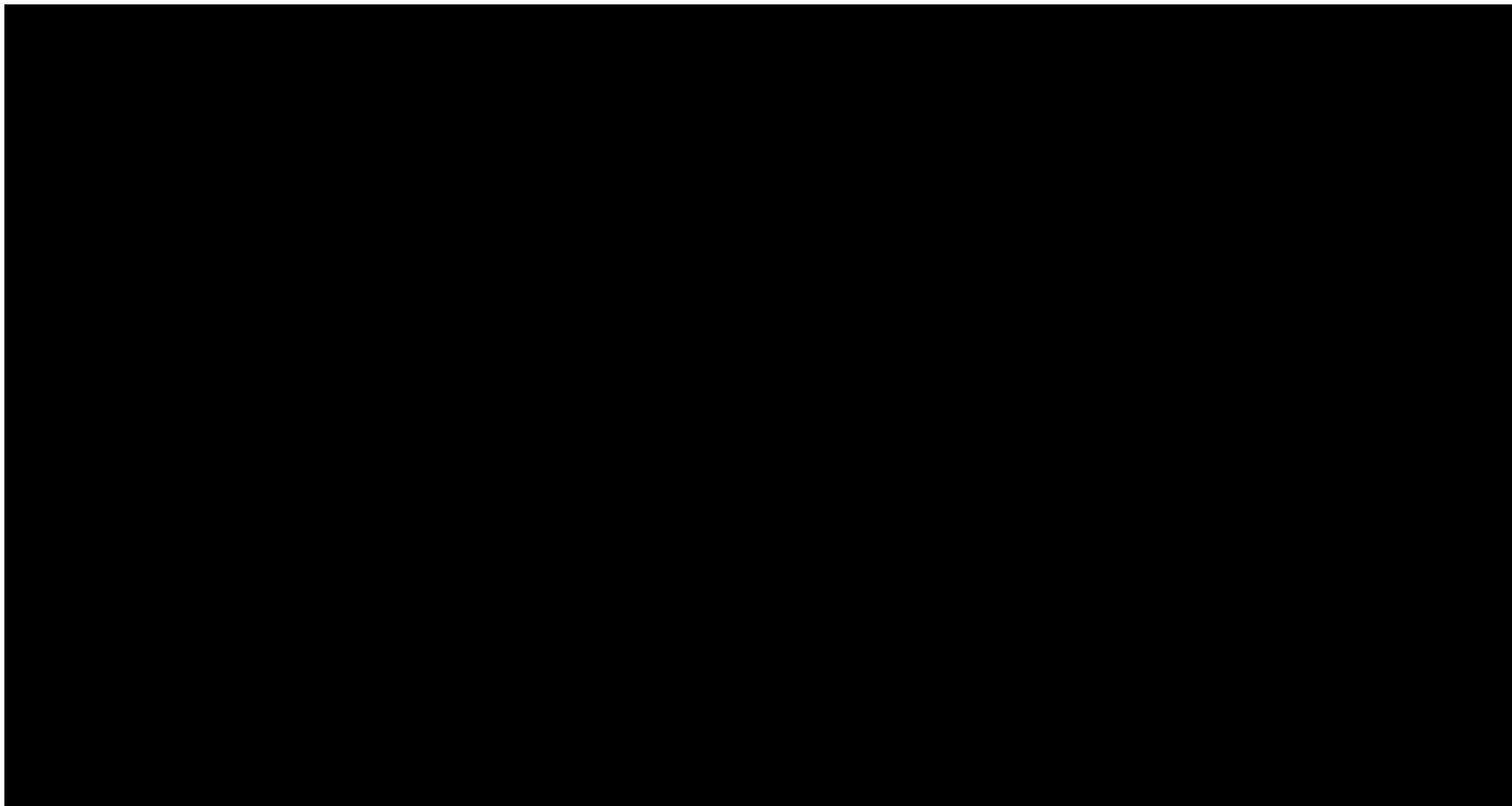
- No financial conflicts of interest

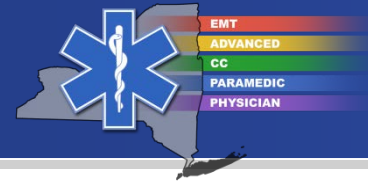


- Video: general concepts
- General parameters
- Recommended minimum requirements for ventilator
- Initiating ventilation
- Key points
- Video: ventilator settings

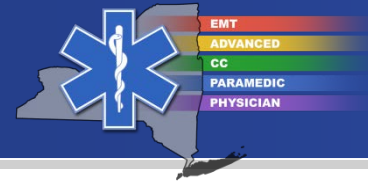


Please see Automatic Transport Ventilator Video 1 Below



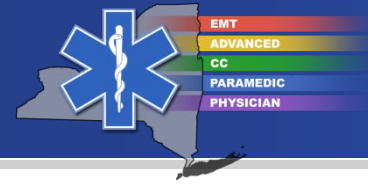


- These are general guidelines
- Please refer to the manufacturer's ventilator operation manual for specific directions on how to operate your ventilator
- The general parameters include FiO_2 , PEEP, mode, pressure support, volume control, rate, and I-time
 - Changes to FiO_2 and PEEP affect oxygenation (reflected in SaO_2)
 - Changes to volume and rate affect ventilation (reflected in $EtCO_2$)

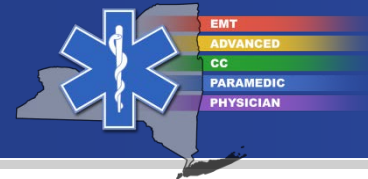


- FiO_2 is the fraction of inhaled oxygen expressed as a percent
- You may start with an FiO_2 of 1.0 or 100%
- Titrate the FiO_2 during transport to keep the SpO_2 between 92-96%

General Parameters – PEEP

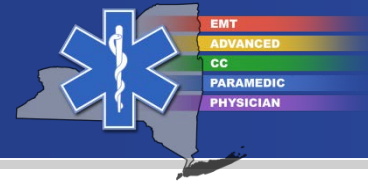


- PEEP is positive end expiratory pressure
- Generally PEEP is started at 5 cm H₂O
- May increase to 10 cm H₂O, as needed, to improve oxygenation

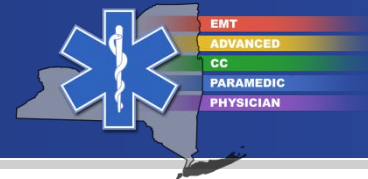


- Mode is generally A/C or SIMV in the transport environment
 - A/C is assist control
 - Ventilator will deliver breaths based at programmed rate if the patient does not trigger a breath on his or her own
 - Tidal volume is the same regardless of whether the breath is ventilator or patient-triggered
 - SIMV is synchronized intermittent mandatory ventilation
 - Ventilator will also deliver breaths at a programmed rate if the patient does not trigger a breath on his or her own
 - Patient-triggered breaths are not assisted (but may have pressure support, if programmed)
 - A/C and SIMV are essentially the same in patients who are not breathing on their own (e.g. paralyzed/sedated)

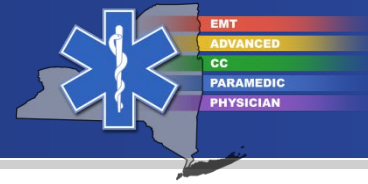
General Parameters – Pressure Support



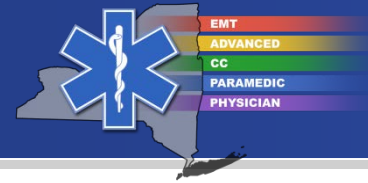
- Use pressure support if mode is SIMV (if available)
- Affects patient-triggered breaths only
- Delivers a continuous inspiratory pressure (rather than volume) and then drops to the set level of PEEP during exhalation
- Commonly used in combination with SIMV to decrease work of breathing during patient-triggered breaths
- Pressure support is not applicable in A/C because A/C mode delivers a constant volume (not pressure)
- Utilize 5-10 cm H₂O of pressure support



- Volume control is the tidal volume the ventilator will deliver
- Set between 6-8 mL/kg of *ideal* body weight (420-560 mL for a 70 kg patient)
- This parameter is used with both A/C and SIMV modes because both modes are essentially the same for ventilator-triggered breaths and deliver a fixed volume in these instances
- Adjust to maintain a plateau pressure [Pplat] < 30 cm H₂O or PIP (peak inspiratory pressure) < 35 cm H₂O

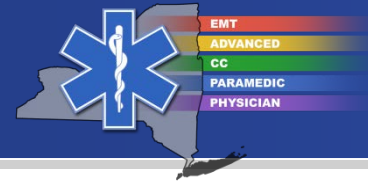


- Will determine minimum respiratory rate if the patient is not breathing on his or her own
- Child: 16-20 breaths per minute
- Adult: 12-14 breaths per minute
- Can adjust based on EtCO₂



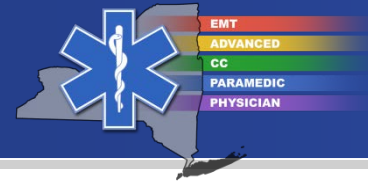
- I-time is the amount of time spent in inspiration during a given cycle
 - Child: 0.7-0.8 seconds
 - Adult: 0.8-1.2 seconds
- A similar concept is the I:E ratio (inspiratory to expiratory ratio)
 - If the rate is set at 12 breaths per minute (one breath every 5 seconds) and the adult I-time is 1 second then the I:E ratio is 20 %
 - Generally set at 33%
 - May be lower in patients with COPD to allow more time for exhalation

Recommended Ventilator Requirements

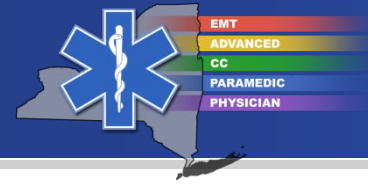


- Confirm pressure limit / safety relief at max of 40 cm H₂O
- Ability to adjust volume to 4-8 mL/kg of ideal body weight
- Ability to adjust rate in the minimum range of 10-30 breaths per minute
- Ability to add PEEP or a PEEP valve in the minimum range of 5-10 cm H₂O
- Ability to accommodate patient-triggered breaths

Initiating Mechanical Ventilation – Preparation

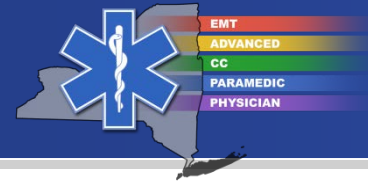


- Use EtCO₂ and pulse oximetry to evaluate effectiveness of ventilation and oxygenation as well as to confirm airway device placement
- Prepare BVM
 - Keep bag ready at all times in case of ventilator failure
 - Keep mask immediately available in the event of a dislodged tube
- Assure a secondary oxygen source with a minimum of 1000 psi in a D tank
 - Attach ventilator to this oxygen source
- Attach a disposable ventilator circuit to ventilator
- Attach gas outlet, pressure transducer, and exhalation valve tubes to corresponding connectors

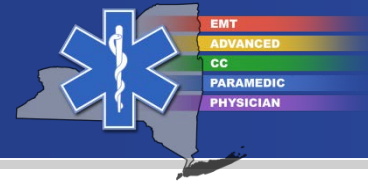


- Program parameters:
 - Select mode (A/C or SIMV), if applicable
 - Select rate and titrate to EtCO₂
 - If the EtCO₂ is too high, increase the rate
 - If the EtCO₂ is too low, decrease the rate
 - Select tidal volume based on ideal body weight
 - Select FiO₂
 - May start at FiO₂ of 1.0 (100% O₂) then titrate down to maintain SaO₂ 92-96%
 - Verify high pressure alarm is no higher than 40 cm H₂O
 - Set PEEP to 5 cm H₂O

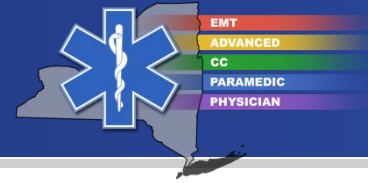
Initiating Mechanical Ventilation – Verification



- Observe several breaths
- Confirm adequate chest rise
- Monitor and adjust for EtCO₂ and SpO₂
 - Rate and tidal volume affect EtCO₂
 - FiO₂ and PEEP affect SpO₂
- Record all set parameters on the patient record
- Monitor and record PIP, if applicable



- If the ventilator should fail at any time or if an alarm is received that cannot be corrected, ventilate the patient immediately with a BVM connected to 100% oxygen
- Keep the appropriate sized mask with the BVM readily accessible in case of a problem with airway placement
- Do not use automated transport ventilators when performing CPR; ventilate with a BVM during CPR



Pleas See Automatic Transport Ventilator Video 2 Below

