

New Mexico Medical Advisory Team (MAT) Assessment

MAT Workgroup Name: Clinical Care- ICU/Ventilators

Date: April 6, 2020

Question or request:

Minimum Standards for Ventilators What are the minimum standards for ventilators?

Recommendation/s in bullet form:

- **We recommend** that all ventilators purchased by the State of New Mexico meet the following criteria:
 1. Only ventilators intended for facility use or intra-facility transport should be used. Those intended for EMS/ambulance use are not appropriate.
 2. All ventilators should be approved for adult patients; those approved for adult and pediatric patients are also acceptable.
 3. Ventilators should allow for control of volume and pressure, respiratory rate, PEEP, tidal volume, flow and/or I:E ratio.
 - a. Ventilators should also include controls for oxygen titration on room air to F(10)(2) of 1.0 on oxygen source of 50-55 psi.
 4. Ventilators should measure and display inspiratory tidal volume and peak inspiratory pressure.
 5. All ventilators should have AC power with a battery backup (ideally for more than 4 hours).
 6. Ventilators should operate with an O₂ concentrator or a low-flow source, that is not an external compressed gas source.
 7. Oxygen consumption by ventilators should allow for the following based on time to empty a 680L E tank with assist control volume:
 - a. 16-L minute ventilation; 35 breaths/min; 15 mL/cm H₂O compliance; 20cm H₂O/L/s resistance; 10 cm H₂O PEEP; F(10)(2) of 1.0 and 0.5; 1:2 I:E ratio >38 min F(10)(2) = 1.0; > 104 min F(10)(2) = 0.5
 - b. 6-L minute ventilation; 12 breaths/min; 30 mL/cm H₂O compliance; 20cm H₂O/L/s resistance; 5 cm H₂O PEEP; F(10)(2) of 1.0 and 0.5; 1:2 I:E ratio
 - c. >100 min F(10)(2) = 1.0; > 280 min F(10)(2) = 0.5
 8. Ventilators should allow for a range of flows:
 - a. Low limit - equal to or less than 10 L/min
 - b. High limit - equal to or higher than 80 L/min
 9. Ventilators should include internal Positive End Expiratory Pressure (PEEP) therapy and PEEP compensation.
 10. Ventilators should have audible and visible alarms.
 11. All ventilators should have a sustained performance of at least 2,000 hours.
 12. Any purchased ventilators should be bought as a kit to include all ancillary equipment needed to ventilate one patient.
 13. Only ventilators that are FDA approved or those that have received approval for use under the Emergency Use Authorization for COVID-19 with no active recalls should be purchased.
- **We recommend** that any vendor offering to sell ventilators to the State of New Mexico submit via e-mail or in writing a written proposal confirming that their product meets the specification outlined above. An operating manual or verbal conversation should not substitute for the written confirmation that specifications have been met.
- **We recommend** that machines that fit the specifications as indicated in writing or via email be ordered. Offers of machines that do not fit the specification should be evaluated by the Medical Advisory Team for possible use under contingency or crisis operations.

Assessment: n/a

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Red flags and concerns:

The risk of using the BiPAP machines is that the oral mask used with these devices may leak and aerosolize the infection, which occurred during SARS. If these machines must be used, health care providers should take appropriate precautions with environmental control (for example, negative pressure) or additional filtration where feasible. Ventilating patients with communicable diseases using devices that are single limb or noninvasive without a filtered seal from atmosphere may contaminate the room air and increase risk of transmission.

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Resources/Reference:

Society of Critical Care Medicine COVID-19 Critical Care Guidelines, available from:

<https://www.sccm.org/getattachment/Disaster/SSC-COVID19-Critical-Care-Guidelines.pdf?lang=en-US>; [Accessed March 28, 2020]