AARC Clinical Practice Guideline

In-Hospital Transport of the Mechanically Ventilated Patient — 2002 Revision & Update

TMV 1.0 PROCEDURE:
Transportation of a mechanically ventilated patient for diagnostic or therapeutic procedures.

TMV 2.0 DESCRIPTION/DEFINITION:
Transportation of mechanically ventilated patients for diagnostic or therapeutic procedures is always associated with a degree of risk.[1-9] Every attempt should be made to assure that monitoring, ventilation, oxygenation, and patient care remain constant during movement. Patient transport includes preparation, movement to and from, and time spent at destination.

TMV 3.0 SETTINGS:
This guideline is intended for the critical care and acute care inpatient setting.

TMV 4.0 INDICATIONS:
Transportation of mechanically ventilated patients should only be undertaken following a careful evaluation of the risk-benefit ratio.

TMV 5.0 CONTRAINDICATIONS:
Transportation of the mechanically ventilated patient should not be undertaken until a complete analysis of potential risks and benefits has been accomplished.

5.1 Contraindications include

5.1.1 inability to provide adequate oxygenation and ventilation during transport either by manual ventilation, portable ventilator, or standard intensive care unit ventilator,[1,10-12]

5.1.2 inability to maintain acceptable hemodynamic performance during transport,[13-15]

5.1.3 inability to adequately monitor patient cardiopulmonary status during transport,[14]

5.1.4 inability to maintain airway control during transport.

5.1.5 Transport should not be undertaken unless all the necessary members of the transport team are present.

TMV 6.0 HAZARDS & COMPLICATIONS:
Hazards and complications of transport include the following:

6.1 Hyperventilation during manual ventilation may cause respiratory alkalosis, cardiac dysrhythmias, and hypotension.[1,10,11]

6.2 Loss of PEEP/CPAP may result in hypoxemia or shock.[16,17]

6.3 Position changes may result in hypotension, hypercarbia, and hypoxemia.[14]

6.4 Tachycardia and other dysrhythmias have been associated with transport.[13-15]

6.5 Equipment failure can result in inaccurate data or loss of monitoring capabilities.[8,9]

6.6 Inadvertent disconnection of intravenous access for pharmacologic agents may result in hemodynamic instability.[8,9,13]

6.7 Movement may cause disconnection from ventilatory support and respiratory compromise.[16,18]

6.8 Movement may result in accidental extubation.[13,19]

6.9 Movement may result in accidental removal of vascular access.[3-5,8,9]

6.10 Loss of oxygen supply may lead to hypoxemia.

6.11 Ventilator-associated pneumonia has been associated with transport.[20]

TMV 7.0 LIMITATIONS OF METHOD:
The literature suggests that nearly two thirds of all transports for diagnostic studies fail to yield results that affect patient care.[8,9]

TMV 8.0 ASSESSMENT OF NEED:
The necessity and safety for transport should be as-

sessed by the multidisciplinary team of health care providers, eg, respiratory therapist, physician, nurse. The risks of transport should be weighed against the potential benefits from the diagnostic or therapeutic procedure to be performed.

TMV 9.0 ASSESSMENT OF OUTCOME:
The safe arrival of the mechanically ventilated patient at his/ her destination is the indicator of a favorable outcome.

TMV 10.0 RESOURCES:

10.1 Equipment

10.1.1 Emergency airway management supplies should be available and checked for operation before transport

10.1.2 Portable oxygen source of adequate volume

10.1.3 A self-inflating bag and mask of appropriate size

10.1.4 Transport ventilators have been shown to provide more constant ventilation than manual ventilation in some instances. If a transport ventilator is used, it should:[1,10-12,21,22]

10.1.4.1 have sufficient portable power supply for the duration of transport;[23]

10.1.4.2 have independent control of tidal volume and respiratory frequency;[16]

10.1.4.3 be able to provide full ventilatory support as in assist-control or intermittent mechanical ventilation (not necessarily both);

10.1.4.4 deliver a constant volume in the face of changing pulmonary impedance;

10.1.4.5 monitor airway pressure;

10.1.4.6 provide a disconnect alarm;

10.1.4.7 be capable of providing PEEP;

10.1.4.8 provide an F_{IO_2} of 1.0.

10.1.5 A pulse oximeter is desirable.

10.1.6 Appropriate pharmacologic agents should be readily available.

10.1.7 Portable monitor should display ECG and heart rate and provide at least one channel for vascular pressure measurement.

10.1.8 An appropriate hygroscopic condenser humidifier should be used to provide humidification during transport.

10.1.9 Stethoscope

10.1.10 Hand-held spirometer for tidal volume measurement

10.2 Personnel: All mechanically ventilated patients should be accompanied by a registered nurse and a respiratory therapist during the entire transport.

10.2.1 At least one team member must be proficient in managing the airway in the event of accidental extubation.

10.2.2 At least one team member should be proficient in operating and troubleshooting all of the equipment described in Section 10.1.

TMV 11.0 MONITORING:
Monitoring provided during transport should be similar to that during stationary care.

11.1 Electrocardiograph should be continuously monitored for heart rate and dysrhythmias.

11.2 Blood pressure should be monitored continuously if invasive lines are present. In the absence of invasive monitoring, blood pressure should be measured intermittently via sphygmomanometer.

11.3 Respiratory rate should be monitored intermittently.

11.4 Airway pressures should be monitored if a transport ventilator is used.[24]

11.5 Tidal volume should be monitored intermittently to assure appropriate ventilation.[25]

11.6 Continuous pulse oximetry is appropriate during transport of all mechanically ventilated patients.

11.7 Breath sounds should be monitored intermittently.

TMV 12.0 FREQUENCY:
Patients should be transported only when indications are present as described in Section 4.

TMV 13.0 INFECTION CONTROL:

13.1 Universal Precautions should be observed.[26]

13.2 All equipment should be disinfected between patients.

13.3 Centers for Disease Control and Prevention recommendations for control of exposure to tuberculosis and droplet nuclei are to be im-

plemented when patient is known or suspected to be immunosuppressed, is known to have tuberculosis, or has other risk factors for the disease.[27]

Revised by David W Chang EdD RRT, Athens Technical College, Athens GA, and approved by the 2002 CPG Steering Committee.

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