Guidelines for Standards of Care for Patients with Acute Respiratory Failure on Mechanical Ventilatory Support

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Guidelines for Standards of Care for Patients with Acute Respiratory Failure On Mechanical Ventilatory Support

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The following report has been developed by the Task Force on Guidelines of the Society of Critical Care Medicine to describe minimum standards for the care of critically ill patients with acute respiratory failure on mechanical ventilation in a critical care unit. Because they are minimum standards, all of these guidelines must be met and many critical care units will exceed most or all of these requirements. However, on rare occasions, clinical circumstances will dictate exceptions to one or many of these standards. The reason for exceptions must be documented in the medical record. These guidelines have not been designed to describe care delivery to patients receiving chronic ventilator therapy outside the critical care environment.

In addition to conforming to the specific standards listed below, all units must meet standards previously described for Services and Personnel[1] and Unit Design[2].

Personnel Who Shall Be Available

1. Physician

    a. Medical management must be directed or concurrently provided by a physician who possesses credentials granted by the hospital for the management of critically ill patients undergoing mechanical ventilation, who visits the patient at least daily, and is available within 30 min. 24 hr/day.

    Note: This physician may be either the primary physician or a consultant designated to assume responsibility for this aspect of care.

2. 24 hr/day inhouse personnel

    a. Personnel with the ability to provide advanced cardiac life support

    b. Personnel with qualifications and privileges to intubate the trachea

3. Nurse

    a. Minimum 1:2 RN/patient ratio around the clock

    b. Ability to increase to 1:1 ratio around the clock if acuity demands

    c. Special precautions must be maintained for any patient with respiratory paralysis

4. Respiratory therapy

    a. At least one respiratory therapist assigned to the unit at all times

    b. The number of therapists assigned to the unit is based on some measure of acuity

5. Nursing support personnel function as described in the SCCM/AACN position statement of April 1989

Monitoring that Shall Be Available

1. The capability to monitor on a continuous basis
    a. Cardiac rate and rhythm
    b. Oxygen saturation of hemoglobin
    c. End-tidal carbon dioxide
    d. Arterial, central venous, and pulmonary artery pressure
    e. Core temperature
2. The capability to monitor on an intermittent basis
    a. Weight of bedridden and ambulating patients
    b. Cardiac output
    c. Blood pressure (noninvasively)

Support Services that Shall Be Available

1. Radiographic services
    a. Portable chest radiographic equipment and films available 24 hr/day to unit personnel for immediate review; radiologist available within 30 min if consultation requested
    b. Official chest radiograph interpretation within 24 hr
    c. Pulmonary angiography and lung scans--if not available inhouse, transfer arrangements to a facility that has such capability
2. Laboratory services
    a. Available at least daily
        (1) Microbiology laboratory
        (2) Ability to measure phosphate, calcium, and magnesium levels
        (3) Ability to measure the following drug levels: theophylline, digoxin, and aminoglycosides
        (4) Cardiac enzymes, including fractionation
    b. Available 24 hr/day results to be available within 1 hr
        (1) Hemoglobin, hematocrit, and white blood count with differential

(2) Blood glucose, sodium, potassium, chloride, carbon dioxide, blood urea nitrogen, and creatinine

(3) Prothrombin time, partial thromboplastin time, and platelet count

(4) Urinalysis

c. Available 24 hr/day -- results must be available with 30 min unless some form of continuous and alarmed surveillance of patient oxygenation and ventilation is in use for the patient

(1) Arterial blood gas analysis

3. Respiratory services

a. Diagnostic and therapeutic bronchoscopy as clinically indicated

b. 24 hr/day availability of measures aimed at pulmonary secretion control, specifically chest physiotherapy and postural drainage, as clinically indicated

Equipment That Shall be Available

1. Ventilators with the following capabilities

a. Capability of delivering mechanical breaths via a variety of modalities

Note: Assist control, (synchronous) intermittent mandatory ventilation, pressure support ventilation, and controlled mechanical ventilation are modalities that should be available.

b. Positive end expiratory pressure

c. Humidification and warming of gases

d. Oxygen pressure, volume, and apnea alarms

e. Capability to manipulate flow rate or inspiration/expiration ratio

2. At each bedside, resuscitation equipment that includes a resuscitation bag and mask of proper size and fit for the patient being ventilated and an oxygen source. Resuscitation cart immediately available

3. Portable respirometer

4. Endotracheal tubes and tracheostomy tubes in a wide variety of sizes with high-volume/lowpressure cuffs and uncuffed pediatric tubes

5. Suction equipment at each bedside

General Management

1. The patient is managed in a unit that meets previously described guidelines for Services and Personnel and Unit Design[2].

2. The initial evaluation of the patient shall include the following if indicated by the clinical presentation

a. Chest radiograph

b. ECG (for patients > 21 yr of age)

c. Complete blood count

d. Blood chemistries to include glucose, sodium, potassium, chloride, carbon dioxide, blood urea nitrogen, creatine, phosphate, magnesium

e. Prothrombin time, partial thromboplastin time, platelet count

f. Arterial blood gas analysis

g. Cultures of blood, sputum, and urine

3. Vital signs shall be measured and recorded at least hourly until stable.

4. Patients with unstable cardiopulmonary status must have continuous monitoring of their circulation, oxygenation, and ventilation. The use of ECGs, pulse oximeters, and capnographs is encouraged for this purpose.

5. Variables that shall be measured and recorded serially at least every 4 hr will relate to the proper functioning of the ventilator and to oxygen delivery, or demand and will include

a. Flo2

b. Minute ventilation

c. Tidal volume

d. Peak and mean airway pressures

e. Temperature of inspired gas

f. Confirmation that all alarms are set

g. Oxygen saturation of hemoglobin

h. Cardiac rate, rhythm, and blood pressure

i. Temperature

Note: Measurement of the following variables may be helpful and should be available as needed: (1) end-exhalation, (2) I.E. ratio

6. Variables that shall be measured and recorded at least every 8 hr. include:

a. Intake and output measurements

7. The following shall be utilized at intervals to be determined by individual clinical circumstances

a. Arterial blood gas analysis

b. Measurement of vital capacity, negative inspiratory force, and dynamic compliance

c. Nutritional support--enteral and parenteral

d. Continuous intravenous access

e. Objective measurements of nutritional status

f. Endotracheal tube cuff pressure measurements

g. Measurement of patient weight

h. Chest radiographs

8. Consideration should be given to measures aimed at

a. Stress ulcer prophylaxis

b. Deep vein thrombosis prophylaxis

c. Avoidance of nosocomial infection

9. The following therapies or diagnostic modalities shall be available

a. Cardiac pacing

b. Special beds

c. Temperature control devices

d. Thoracentesis

e. Tube thoracotomy

f. Tracheostomy

g. Anticoagulation

h. Dialysis

Ventilator Management

Ventilator management must be directed or concurrently provided by a physician with appropriate qualifications (see above). This physician shall be responsible for directing airway management, ventilatory support, and removal from the ventilator. This physician should tailor management to specific circumstances, using the guidelines below when clinically applicable and appropriate.

1. Management of the Airway

a. The endotracheal tube or tracheostomy tube should be secured safely and comfortably.

b. Attention should be given to the prevention of unplanned extubation including either physical or medical restraints (sedation or muscle relaxants) when indicated for demented, confused, or agitated patients.

c. Secretions should be suctioned as necessary using sterile technique.

2. Ventilator support

a. To achieve an adequate level of oxygenation, the patient's oxygen saturation should be maintained at ≥90%. Exceptions can be expected in patients with congenital cyanotic heart disease or far advanced chronic obstructive lung disease.

b. Minute ventilation should be adjusted based on patient comfort, pH, and ventilatory mechanics.

c. To avoid oxygen toxicity and absorption atelectasis, the Flo2 should be decreased to <0.5 as soon as possible.

d. To achieve optimal oxygen delivery to tissues, objective measurements of oxygen delivery (pH, blood pressure, oxygen saturation, Po2) should be obtained as dictated by the clinical presentation. Assurance of adequacy of oxygen delivery requires special attention when levels of positive end expiratory pressure >15 cm H_2O are required.

e. The frequency of arterial blood gas analysis should be dictated by the acuity of illness, availability of noninvasive monitoring, and frequency of ventilator changes.

f. To achieve patient comfort, consideration should be given to the use of sedation if indicated, or an arterial line if frequent blood testing is required.

3. Removal of ventilator support

a. Ventilator weaning should be instituted in a timely manner supported by objective observations of pulmonary mechanics and/or function and demonstration of improvement or resolution of the problem necessitating ventilation.

b. After each substantial change in ventilator support, the patient should be observed for clinical changes. In addition, the need for objective measures of adequacy of oxygen delivery (measurement of Po2 or oxygen saturation) should be dictated by clinical circumstances.

References

1. Task Force on Guidelines, Society of Critical Care Medicine: Recommendations for services and personnel for delivery of care in a critical care setting. *Crit Care Med* 1988: 16:809

2. Task Force on Guidelines, Society of Critical Care Medicine: Recommendations for critical care unit design. *Crit Care Med* 1988: 16:796

These guidelines have been developed by the Task Force on Guidelines of the Society of Critical Care Medicine, and approved by its Council. These guidelines reflect the official opinion of SCCM and do not necessarily reflect, and should not be construed to reflect, the views of the specialty boards or any other medical review organization.

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