Respirometer: Clinical Guidelines

Purpose

To standardize the method used to measure a patient's induced or spontaneous inspiratory or expiratory tidal volume as well as vital capacity. To assess a patient for ability to breathe adequately without assistance.

Audience

The Respirometer may be used by a Licensed Respiratory Care Practitioner Therapist employed by Respiratory Care Services with understanding of age specific requirements of patient population.

Physician's Order

Written physician's order must state:

- Pulmonary mechanics.
- Frequency/tidal volume ratios

Indications

Patients with reduced tidal volumes/vital capacities due to debilitating disease process or drug induced obtundation. To evaluate a patient for readiness to wean from the ventilator.

Contra-indications

- The use of the Respirometer in patients whose flows exceed 30 lpm or less than 2.4 lpm is not indicated, due to lack of accuracy at these flows.
- The Respirometer is not recommended as a substitute for Pulmonary Function Testing.

Goals

To provide an accurate measurement of a patient's respiratory volumes and frequency/tidal volume ratios, thereby providing beneficial clinical information on the patient's status to the physicians.

Equipment and Supplies

For intubated patients or those with tracheostomy:

- Respirometer
- NIF tee one-way valve

For non-intubated patients:

- Respirometer
- Bacteria filter.

Procedure

Step	Action
1	Verify physician orders and patient I.D.
2	Wash hands.
3	Explain procedure to the patient.
4	Attach tee piece (Briggs adapter) with one-way valve and Respirometer to patient's endotracheal or tracheostomy tube.

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Procedure Continued

Step	Action
5	Instruct patient to relax and breathe easily, note volumes.
6	Instruct patient to inspire fully and exhale fully, note volumes.
7	Measure spontaneous breaths for one minute to determine total minute volume. Divide rate into minute volume for average tidal volume. Divide tidal volume into rate for f/vt ratio.
8	Reattach therapy appliance and confirm proper functioning.
9	Document on RCS patient ventilator flow sheet and treatment card as outlined in RCS Policies # 7.1.1 and 7.1.2.

Undesirable Side Effects

- Hyperventilation. Asking the patient to repeat a vital capacity maneuver several times may cause hyperventilation. The patient should be allowed to rest between efforts.
- Fatigue. Asking the patient to report a vital capacity maneuver several times may cause fatigue. The patient should be allowed to rest between efforts.
- Respiratory distress. If a patient requires ventilatory support or assistance and this must be removed for volume measurement, care should be taken to assure that the patient endures as little respiratory distress as possible.

Assessment of Outcomes

The effectiveness of this procedure will be judged on how well it meets the stated goals.

Patient Teaching

Instruct the patient:

- In the rationale of the procedure.
- In the breathing techniques necessary for proper volume measurement.

As a result of the educational aspects of this procedure, the patient should be able to demonstrate his understanding by correct execution of necessary breathing maneuvers.

Infection Control

Follow procedures outlined in Healthcare Epidemiology Policies and Procedures #2.24; Respiratory Care Services.
http://www.utmb.edu/policy/hcepidem/search/02-24.pdf

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References

Epstein SK. Etiology of Extubation Failure and the Predictive Value of the Rapid Shallow Index. American Journal of Respiratory Critical Care Medicine 1995; 152: 545-549

Gregg Ruppel, M.Ed., R.R.T. Spirometry & Pulmonary Mechanics, Manual of Pulmonary Functional Testing, 6th Edition, Mosby, 1994

Henry Prange Understanding gas exchange Respiratory Physiology Kluwer Academic Publishers, Boston December 1995

Terry Des Jardins, Clinical Manifestations & Assessment of Respiratory Disease, Mosby; 3rd edition (January 15, 1995)