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	Document Title:	<b>RAPID SHALLOW BREATHING INDEX</b>

### **PURPOSE:**

To discuss the steps involved in determining the Rapid Shallow Breathing Index of patients using mechanical ventilator.

### **SCOPE:**

Applies to all Respiratory Therapy Services staff of Dr. Pablo O. Torre Memorial Hospital

### **PERSON RESPONSIBLE:**


Respiratory Therapist, Physician

### **GENERAL GUIDELINES:**

1. The rapid shallow breathing index (RSBI or Tobin index) is used as a predictor for weaning success. Generally, a RSBI < 100 is predictive of weaning success. Conversely, a RSBI > 100 does not necessarily predict failure. An instrument called Wright Respirometer is used, which has inferential meter that measures tidal and minute volume from the number of revolutions of a vane rotated by the gas stream as the latter passes through ten tangential slots in a cylindric stator ring to turn a flat two-bladed rotor.

**PRINCIPLE OF OPERATION.** Wright/Haloscale Respirometers use an extremely sensitive air turbine to measure the gas flow. Revolutions of the turbine vane are transferred to the hands via a watch-type gear mechanism. The energy to drive the turbine is derived from the airflow itself, no other power source is required. Wright/ Haloscale Respirometers respond to flow in one direction only, reverse flow is ignored.



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## **CLINICAL USE OF THE RESPIROMETER**

- A) **IN GENERAL ANAESTHESIA.** In the operating theatre the measurement of tidal and minute volume indicates whether adequate ventilation has been achieved, whether in open or closed circuit, whether in spontaneously breathing or mechanically ventilated patients. For mechanically ventilated patients, the Respirometer should be placed in the expiratory limb of the circuit.
  - B) **DURING RECOVERY.** The single most important judgment that must be made before returning a patient to the ward is the adequacy of lung ventilation. The Wright/Haloscale Respirometer is a convenient instrument for this purpose.
  - C) **INTENSIVE CARE.** In the ICU it has long been appreciated that blood gas results must be interpreted not only by reference to FiO<sub>2</sub>, but also to minute volume. Ventilatory adequacy in this circumstance is very quickly established using a Respirometer.
  - D) **WHEN WEANING.** Weaning from a ventilator requires alertness to subtle changes in the patient's condition. Blood gas analysis will indicate when the patient has progressed to the point where weaning may be attempted. This point can be established using a Respirometer to determine that the patient's tidal volume and minute volume are adequate for that patient. Tidal and minute volume measurements during weaning are the best indicators of the degree of success of weaning or the need to return the patient to the ventilator, thereby reducing the frequent measuring of arterial blood gases.
2. Infection Prevention and Control Unit protocol should be followed for disinfection of the Respirometer after every patient's use.
  3. Hand washing and personal protection like mask and gloves should be observed at all times.
  4. Always charge the services rendered after the procedure is done.

## **PROCEDURE:**


1. CHECKING THE WRIGHT/HALOSCALE RESPIROMETER
  - 1.1. Examine the exterior of the instrument for any obvious damage.



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- 1.2. Ensure that the ON/OFF and RESET finger controls are firmly attached and moved smoothly.
  - 1.3. Look through the inlet and outlet and check that the interior of the Respirometer is clean, free from deposits and dry.
  - 1.4. To check the mechanism: reset the pointers to zero and ensure that the unit is on. Cup the Respirometer in the 8 open palm of one hand, leaving the inlet unobstructed and facing the base of the thumb. Blow gently into the palm of the hand. The pointers should rotate smoothly and slowly and the mechanism should operate silently at this low flow. Never blow a large volume of air rapidly into the inlet since this will damage the sensitive mechanism inside the Respirometer.
2. Check the ON/OFF control while the pointers are rotating. Press the RESET button to return the pointers to zero.
  3. Assure that the patient is in a comfortable position with the head of the bed elevated to 45 Degrees (provided that there are no contraindications to this position, such as spinal cord injury or postural hypotension).
  4. Choose the point of insertion in the breathing circuit as close to the patient connection as is possible and convenient. Two different adaptors are supplied with the Respirometer enabling it to be connected to a ventilator, absorber or anaesthetic facemask. Sharp bends or sudden reductions of bore close to the axial outlet of the Respirometer are not desirable. A straight run of tubing to the inlet is advantageous. Ensure that all connections in the circuit, particularly those to the Respirometer, are leak-proof.
  5. When the pointer on the liter scale is near to a whole liter sub-division, it refers to the position of the pointer on the fractional scale to confirm whether the whole liter value is just about to be reached or has been passed.
  6. Attach the Respirometer to the point of insertion and at the end of one minute, record the Vt and respiratory rate.
  7. The instrument registers the volume of flow passing inwards through the inlet and out through the outlet (see arrow engraved on case). It will not respond to flow in the opposite direction.



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8. Calculate for the RSBI using the following formula:


$$V_t = V_e / RR$$

$$RSBI = Rate / V_t \text{ (in liters)}$$

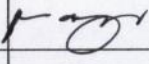

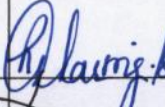
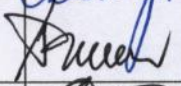
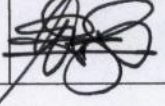
9. Place the patient back on ventilator and record data in the RTS Treatment form and attach to patient's chart.
10. The whole procedure takes five minutes to finish.

#### REFERENCE:


1. Manthous CA. Summarizing the logistics of liberation from mechanical ventilation. *Respir Care Clin N. Am.* 2000;6:463-8. [PubMed]google Scholar
2. Tobin M, Alex C. Discontinuation of mechanical ventilation. *Principles and Practice of Mechanical Ventilation.* New York: McGraw-Hill; 1994. [Google Scholar]
3. MacIntyre NR. Evidence-based ventilator weaning and discontinuation. *Respir Care.* 2004;49:830-6[PubMed]

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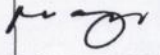

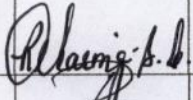
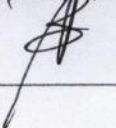
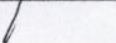


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KEY TASKS	PERSON RESPONSIBLE
1. Checks the physician's order and functionality of the equipment prior to the procedure.	RTS Staff
2. Positions the patient properly.	
3. Does the procedure.	
4. Place the patient back on ventilator after and records data in the RTS Treatment form and attaches it to patient's chart.	

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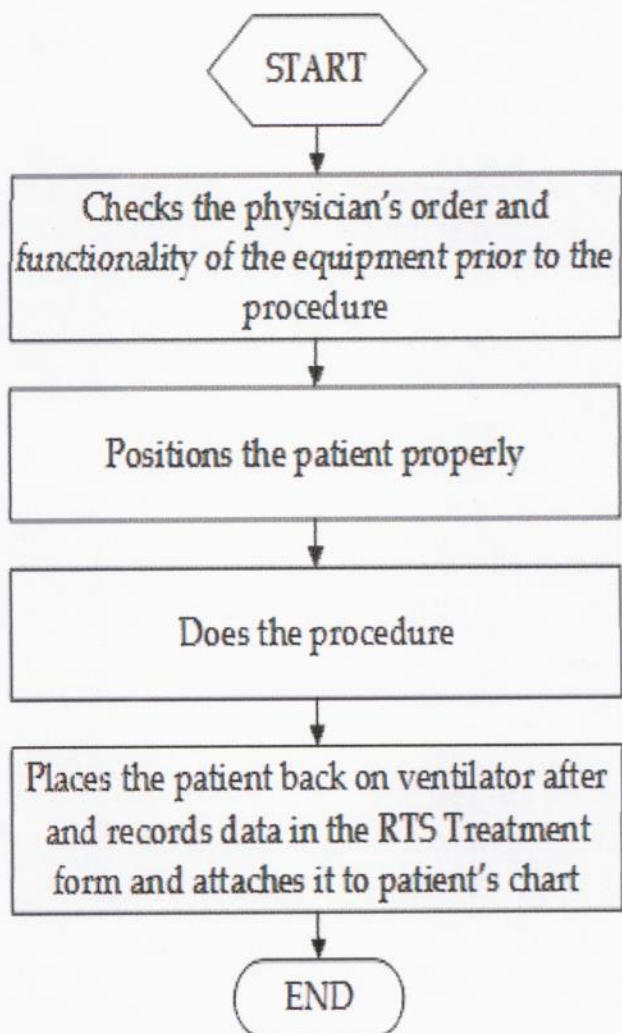


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## FLOWCHART

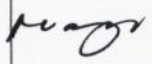

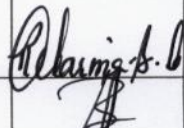





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