

	Department: Respiratory Services	Date Originated: September 1986 Date Reviewed/Revised: June 2010
PROCEDURE	Topic: <u>Critical Care</u> – Calculations of Pulmonary Mechanics for Ventilated Patients, Respiratory Therapy Number: B-00-12-12028	Related Links:

APPLICABLE SITES:

St. Paul's Hospital
 Mount Saint Joseph Hospital

The following formulae apply for the manual calculation of airway resistance, and both static and dynamic lung compliance in ventilated patients.

For patients in pressure control ventilation, dynamic compliance will be calculated. For patients in volume control ventilation, static compliance will be calculated.

CALCULATION OF INDEX OF RESISTANCE (cmH₂O/L/sec) IN VENTILATED PATIENTS:

1. Ensure the airway is clear of secretions.
2. Obtain the following values:
 - Peak inspiratory pressure
 - Peak flowrate **using a square flow waveform** (Convert the flowrate from L/min to L/sec)
3. Add an inspiratory plateau of 0.5 – 1.0 seconds for 3 consecutive breaths. Measure the plateau pressure. Remove the inspiratory plateau.

Note: Peak pressure, plateau pressure, and ventilator peak flowrate must all be measured within the same time frame.

4. Calculate the airway resistance using the following equation:

$$R_{AW} = \frac{P_{PEAK} - P_{PLAT}}{\text{Flow}}$$

CALCULATION OF STATIC COMPLIANCE (mL/cmH₂O) IN VENTILATED PATIENTS:

1. Ensure the airway is clear of secretions.
2. Obtain the following values:
 - Effective tidal volume
 - Peak inspiratory pressure
 - Positive end expiratory pressure (Total)
 - Plateau pressure
3. Calculate the static compliance using the following equation:

$$C_{DYN} = \frac{V_{tEFF}}{P_{PEAK} - PEEP_{TOTAL}}$$

CALCULATION OF DYNAMIC COMPLIANCE (mL/cmH₂O) IN VENTILATED PATIENTS:

1. Ensure the airway is clear of secretions.
2. Obtain the following values:
 - Effective tidal volume
 - Peak inspiratory pressure
 - Positive end expiratory pressure (Total)
 - Plateau pressure
3. Calculate the dynamic compliance using the following equation:

$$C_{STAT} = \frac{V_{tEFF}}{P_{PLATEAU} - PEEP_{TOTAL}}$$