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## Chest Physiotherapy

<b>Purpose</b>	To standardize the use of chest physiotherapy as a form of therapy using one or more techniques to optimize the effects of gravity and external manipulation of the thorax by postural drainage, percussion, vibration and cough. A mechanical percussor may also be used to transmit vibrations to lung tissues.
<b>Policy</b>	Respiratory Care Services provides skilled practitioners to administer chest physiotherapy to the patient according to physician's orders. <b>Accountability/Training</b> <ul style="list-style-type: none"> <li>• Chest Physiotherapy is administered by a Licensed Respiratory Care Practitioner trained in the procedure(s).</li> <li>• Training must be equivalent to the minimal entry level in the Respiratory Care Service with the understanding of age specific requirements of the patient population treated.</li> </ul>
<b>Physician's Order</b>	A written order by a physician is required specifying: <ul style="list-style-type: none"> <li>• Frequency of therapy.</li> <li>• Lung, lobes and segments to be drained.</li> <li>• Any physical or physiological difficulties in positioning patient.</li> <li>• Cough stimulation as necessary.</li> <li>• Type of supplemental oxygen, and/or adjunct therapy to be used.</li> </ul>
<b>Indications</b>	This therapy is indicated as an adjunct in any patient whose cough alone (voluntary or induced) cannot provide adequate lung clearance or the mucociliary escalator malfunctions. This is particularly true of patients with voluminous secretions, thick tenacious secretions, and patients with neuromuscular disorders.  Drainage positions should be specific for involved segments unless contraindicated or if modification is necessary. Drainage usually in conjunction with breathing exercises, techniques of percussion, vibration and/or suctioning must have physician's order.  NOTE: Therapy must be designed specific to the patient and his immediate problem - a therapy that is brief, effective and safe.  Diseases frequently requiring postural drainage:  Bronchiectasis, cystic fibrosis, COPD, Bronchitis, lung abscess.
<b>Contraindications</b>	<ul style="list-style-type: none"> <li>• Untreated tension pneumothorax (absolute contraindication)</li> </ul> Prone, supine and/or Trendelenburg positions may not be tolerated in a patient with the following conditions: Check with the physician.

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**Contraindications Continued**

- Unstable cardiovascular disorders: arrhythmias, hypotension, hypertension, organic heart disease, congestive heart failure, and pulmonary edema. Acute head or neck surgery/injury or disease: increased intracranial pressure, increased edema around airway.
- Dyspnea: orthopnea, severe lung disease, pulmonary emboli, large pleural effusion, anxiety, angina.
- Undiagnosed chest pain.
- Chronic obstructive pulmonary disease with cor pulmonale, orthopnea, dyspnea on exertion.
- Active cases of tuberculosis
- Pulmonary edema, congestive heart failure.
- Distended abdomen, pregnancy, obesity, ascites.
- Severe surgical emphysema.
- Neuromuscular disease
- Aneurysm or decrease in circulation of main blood vessels.
- Post eye surgery.
- Hiatal hernia, esophageal anastomosis.
- Hemoptysis.
- Neonate prone to intracranial bleeding.
- Pain or discomfort restricting patient's cooperation.
- Vomiting
- Surgically undrained empyema.

Careful positioning is indicated in patients with:

- Fractures.
- Recent spine surgery.
- Broncho-pleural fistula (keep involved side down).
- Immediate post-op pneumonectomy.
- Certain orthopedic injuries/surgeries.

Vigorous chest percussion is relatively contraindicated in patients with the following problems:

- Acute medical/surgical emergencies, poor or unstable cardiovascular disorders.
- Fragile, fractured ribs or osteoporosis, or extremely unstable chest wall.
- Fresh burns, skin grafts or infection on thorax.
- Acute bronchospasm, untreated.
- Incision or trauma to chest or upper abdomen.
- Recent spinal fusion or surgery.
- Pulmonary emboli.
- Temporary transvenous pacemaker Resectable pulmonary tumors (percussion usually not done over tumor)
- Pain preventing patient's cooperation.

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**Contraindications Continued**

- Extraparenchymal complications (pneumothorax, pleural effusion, empyema).
- Subcutaneous emphysema.
- Untreated pneumothorax.
- Acute lung abscess. Simulated cough is relatively contraindicated in the following cases:
- Suspected or real intra-abdominal injury, disorder, bleeding, recent surgery.
- Organomegaly.
- Pregnancy.
- Diaphragm injury or surgery.

**Goals**

To improve the mobilization of bronchial secretions and the matching of ventilation and perfusion to normalize functional residual capacity (FRC).

**Equipment**

- Tilt bed and/or pillows.
- Towels or thick pad (or cushioned infant mask).
- Sputum cup/tissue.
- Stethoscope.

**Procedure**

Step	Action
1	Verify physician's orders and check ID bracelet
2	Collect needed equipment.
3	Wash hands.
4	Explain procedure and rationale to the patient.
5	Check patient's pulse and respiratory rate. Auscultate chest.
6	Position patient according to segmental drainage chart. Allow 30-45 minutes after patient's completion of a meal.
7	If patient's status does not allow full positioning, position him as close as possible to proper angle. (i.e., use pillows under hips if patient will not tolerate Trendelenburg. If position still is not tolerated, try positioning patient flat). Inform physician if positions are not tolerated.
8	Place folded towel or thick pad across patient's chest

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	over area to be percussed (adults and older children).
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**Procedure  
Continued**

<b>Step</b>	<b>Action</b>
9	Cup hands with fingers and thumbs closed, use mechanical percussor, or use neonatal percussor on premature infants. Begin percussion over lung segment (see attached chart) by flexion and extension of wrists. The therapist's shoulders and elbows should be relaxed.
10	Percuss back and forth or in a circular motion, not continuously over one spot. Avoid spine, kidneys, base of the rib cage, and bony prominences such as sternum, clavicle, spine, and over scapula. Use caution in areas of breast.
11	Force of percussion and length of time must be tailored to individual patient according to the patient's age, condition of chest, tolerance, pain, secretion consistency and amount.
Note:	Percussion should not be painful or uncomfortable to the patient. If it is, other techniques must be considered. Amount of time for percussion varies: 30-45 seconds to 2-3 minutes per segment depending on amount of secretions and how easily moved. Aim for brief, effective, safe treatment. If using a mechanical percussor, the same precautions apply.
12	Check patient's vital signs frequently. If significant changes occur, notify the physician after repositioning the patient.
13	Percussion may stimulate patient to cough. Add vibration on exhalation to assist mobilization of secretions; return to percussion as necessary. Encourage patient to cough frequently using stimulation/suction if ordered by physician.
14	If no cough is induced, proceed to voluntary cough technique or reflexive cough techniques as indicated by physician order.
15	Maintain position for amount of time required to clear

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	lungs or as limited by patient's tolerance.
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**Procedure  
Continued**

Step	Action
16	Do not leave patient unattended.
17	Auscultate chest. Check patient's pulse and respiratory rate.
18	Chart therapy and results on the RCS flow sheet and treatment card including: <ul style="list-style-type: none"> <li>• Areas (lobes) percussed.</li> <li>• Postural drainage positions (specific).</li> <li>• The position of the patient is left in at the end of therapy.</li> </ul>

**Vibration:**

Step	Action
1	Check patient's medical record for orders and change in status. Check ID bracelet.
2	Collect equipment needed.
3	Wash hands.
4	Explain procedure and rationale to the patient.
5	Check patient's pulse and respiratory rate. Auscultate chest.
6	Position patient according to segmental drainage chart. Allow 30-45 minutes after patient's completion of a meal.
7	If patient's status does not allow full positioning, position him as close as possible to proper angle. (i.e., use pillows under hips if patient will not tolerate Trendelenburg. If position still is not tolerated, try positioning patient flat). Inform physician if positions are not tolerated.
8	The therapist molds his hands parallel to the patient's ribs anteriorly and posteriorly over area of lung to be treated. Keep wrists and elbows at right angles.
9	Feel the normal movement of the chest as the patient deep breathes or is given a deep breath. For compression

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	vibration, during prolonged exhalation compress the chest
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**Procedure  
Continued**

Step	Action
9	while vibrating the chest wall with the hands, moving in short frequent (isotonic) movements - lateral to medial
10	Maintain position until therapy is effective or as limited by patient's tolerance.
11	Check the patient's vital signs frequently. If significant changes occur, notify physician after repositioning patient.
12	If no cough is induced, proceed to voluntary cough techniques or reflexive cough techniques as indicated by physician order.
13	Do not leave patient unattended.
14	Auscultate chest.
15	Chart therapy and results on the RCS flow sheet and treatment card per RCS Policy 7.1.1 and 7.1.2.

**Diaphragm Assist:**

Step	Action
1	Check patient's medical record for orders and change in status. Check ID bracelet.
2	Collect above equipment.
3	Wash hands.
4	Explain procedure and rationale to the patient.
5	Check patient's pulse and respiratory rate. Auscultate chest.
6	Position patient according to segmental drainage chart. Allow 30-45 minutes after patient's completion of a meal.
7	Place you hand horizontally with palm over umbilicus - one hand on top of the other. Hand should be over gut area that is displaced by diaphragm so that force exerted will simulate abdominal contraction.

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**Procedure continued**

Step	Action
8	Ask for or give patient deep breath (AMBU, Intermittent Positive Pressure Breathing therapy). At beginning of exhale (keep mouth or vocal cords open for unobstructed flow of air). Apply a firm, thrust under diaphragm in a 45° combined down and forward motion.
9	Listen to sound of forced expiration and the absence or presence of secretions and then mobilization. Auscultate chest. Repeat therapy as necessary or as tolerated by patient.
10	Auscultate chest.
11	Chart therapy, outcome, and patient tolerance on the patient's Respiratory Care Service flow sheet. Record the treatment time on the department treatment card. Notify M.D./R.N. of anything unusual; chart this notification on the RCS Patient flow sheet per RCS policies # 7.1.1 and # 7.1.2,
Note:	If unable to clear lungs with above manipulation techniques, tracheal suctioning may be indicated. Physician's order required.

**Continuation of Therapy:**

Step	Action
1	Check physician's order sheet.
2	Monitor patient response to therapy.
3	Record appropriate information on Respiratory Care Service flow sheet per policies # 7.1.1 and # 7.1.2, and on department treatment card.

**Discontinuation of Therapy:**

Step	Action
1	Check physician's order sheet or check for 72-hour expiration. Patient's condition must not indicate need for

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	therapy.
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**Procedure continued**

Step	Action
2	Must check for change in status that might contraindicate this therapy
3	Explain change in therapy to patient.
4	Record on Respiratory Care Service flow sheet, and treatment card date and time of discontinuance and therapist's signature. Progress note with relevant clinical data as to reason why therapy is being discontinued must be recorded in progress note section of the patient chart to notify MD of discontinuance

**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>

**Undesirable Side Effects**

- Increased intracranial pressure.
- Secretions may accumulate excessively in airways:
- Increased mobilization of secretions in patients unable to cough can result in compromised respiration; therefore, precautions must be taken to have appropriate tools available and functioning before drainage for safe lung ventilation and lung clearing (i.e., oxygen source and tracheal suctioning equipment), if indicated by physician's order. Added stress may be placed on the cardiovascular system.
- Effect of gravity on the cardiovascular system in certain drainage positions is the reverse of normal. A patient whose cardiovascular system is already compromised for whatever reason may not tolerate these changes as indicated by fluctuations in vital signs or subjective discomfort in the patient. The physician must be notified and therapy must be discontinued under these situations, per physician order.
- Shifting of the abdominal contents against the diaphragm in certain position may cause a decreased excursion in this muscle. This in turn will prevent the patient from taking a deep breath resulting in a decreased tidal volume, especially in patients with distended abdomen or neuromuscular weakness. Intermittent Positive Pressure Breathing therapy or use of an ambu bag to ventilate an intubated patient is usual in this situation.
- Nausea/Vomiting:

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	<ul style="list-style-type: none"> <li>• Reflux of gastric contents may take place in patients susceptible to this phenomenon, in certain drainage positions and with diaphragm assist. Drainage after meals should be avoided especially in infants and patients</li> </ul>
<b>Undesirable Side Effects continued</b>	<p>with esophageal reflux. A "burning" in the back of the patient's throat is a symptom of this phenomenon and cause for discontinuation of therapy to Prevent aspiration.</p> <ul style="list-style-type: none"> <li>• Damage to ribs (fracture, spread, or costochondritis) when chest manipulation is used.</li> <li>• Pain should not occur with these procedures. If present, the procedure should be discontinued.</li> <li>• Bronchospasm can be induced in patients susceptible to this difficulty. If the patient experiences difficulty in breathing and/or wheezing, the procedure should be discontinued. Position the patient for best breathing mechanics and notify physician.</li> <li>• Pulmonary hemorrhage is possible using the percussion technique. Abdominal organ bruising or bleeding is possible with diaphragm assist technique. At first sign, discontinue therapy, take vital signs, and notify physician.</li> <li>• Headache.</li> <li>• Dizziness.</li> </ul>
<b>Assessment of Outcome</b>	<ul style="list-style-type: none"> <li>• Sound of voluntary or reflex cough mechanic.</li> <li>• Increase in the patient's own ability to clear secretions.</li> <li>• Increased tolerance for procedure (vs., clinical appearance, ABGs).</li> <li>• Sputum amount, consistency, color, and frequency.</li> <li>• Auscultation of chest.</li> <li>• Improved chest x-ray.</li> </ul>
<b>Patient Teaching</b>	<p>Instruct the patient as follows:</p> <ul style="list-style-type: none"> <li>• Explain to the patient why chest manipulation techniques are being received. Relate it to disease or injury condition.</li> <li>• Tell the patient that everything will be done to make the procedure as comfortable as possible.</li> <li>• Instruct the patient in proper breathing techniques such as "huffing" and effective cough.</li> <li>• Explain any adjuncts to therapy.</li> <li>• If the patient is coherent, at the end of the patient teaching aspects of this procedure, patient should be able to verbalize and demonstrate understanding of the procedure.</li> </ul>
<b>References</b>	<p>AARC Clinical Practice Guidelines, <u>Postural Drainage Therapy</u>, Respiratory Care, 1991; 36; 1418-1426</p> <p>Scanlan CL, Myslinski MJ; <u>Bronchial hygiene therapy</u>. In: <u>Egan's</u></p>

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