

Presented By



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Definition of Cardiopulmonary Rehabilitation


- AARC Clinical Practice Guidelines States:
 - Rehab is a *"multidisciplinary program of care for patients with chronic respiratory impairment that is individually tailored and designed to optimize physical and social performance and autonomy."*
 - Cardiopulmonary rehabilitation (CP) is a non-invasive, multidisciplinary process that influences multiple organ systems functionality with a goal to improve QOL, and tolerate ADL's.

Principal Goals of CP Rehab



- Decrease symptoms
- Decrease disability
- Decrease mortality
- Increase participation in physical and social activities
- Improve QOL

"The cardiopulmonary system affects and is affected by virtually every organ system in the body."



Dean, EL Cardiovascular and Pulmonary PT 4th Edition

Factors That Disrupt Oxygen Transport

- Fever
- Cardiopulmonary diseases
- The healing process
- Thermo regulators
- Anxiety, stress and pain
- Loss of the gravitational stress of bed rest!
- #1 Lack of mobilization and exercise

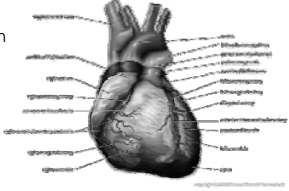
Cardiopulmonary Rehabilitation for the Tracheostomy and Ventilator Patient

Negative Sequelae of Bed Rest

- The negative impact of bed rest has been well known for over 60 years!
- No evidence exists in the literature that supports efficacy of bed rest.
- Bed rest adversely affects all major organ systems by decreasing efficiency of the oxygen transport system.
- Deconditioning associated with bed rest may be influenced by decreased oxygen delivery, and vice versa.
- Disuse atrophy at the cellular level begins within 4 hours of implementing bed rest.
- Inactivity causes muscle fibers to change their structure and nerve conductivity.
- Inactivity causes functional and cognitive deficits that can persist for years.

What Are The Positive Effects of Mobilization and Exercise?

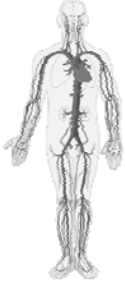
- Cardiac Effects
 - Increase venous return
 - Increase SV, HR, CO
 - Increase contractility
 - Increase coronary artery perfusion
 - Increase circulatory blood volume



By Tvanbr (Own work) [Public domain], via Wikimedia Commons

What Are The Positive Effects of Mobilization and Exercise?

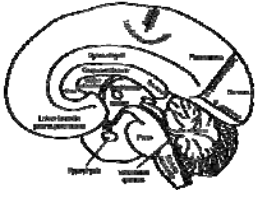
- Circulatory Effects
 - Decrease peripheral resistance
 - Increase peripheral blood flow and tissue oxygenation
 - Decrease venous stasis (emboli)
 - Increase pulmonary lymphatic blood flow and drainage (effusion)
 - Promote diuresis
 - Increase platelet aggregation
 - Increase WBC production



By LadyoffHats [Public domain], via Wikimedia Commons

What Are The Positive Effects of Mobilization and Exercise?


- Neurologic Effects
 - Increase arousal
 - Fewer sleep disturbances
 - Increase cerebral electric activity
 - Increase sympathetic stimulation
 - Increase postural reflexes



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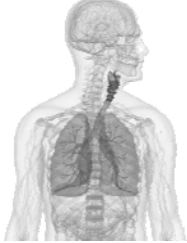
What Are The Positive Effects of Mobilization and Exercise?

- Metabolic Effects
 - Increase growth hormone synthesis
 - Increase glucose metabolism – decrease insulin resistance
 - Speed drug metabolism/clearance
 - Increase immunity/less infection



What Are The Positive Effects of Mobilization and Exercise?

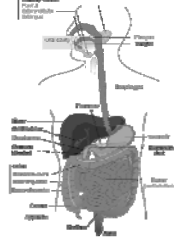
- Pulmonary Effects
 - Increase volumes and capacities
 - Increase efficiency of respiratory mechanics
 - Enhance cough
 - Decrease thoracic blood volume
 - Increase Cst and decreased Raw
 - Increase immune factors



Cardiopulmonary Rehabilitation for the Tracheostomy and Ventilator Patient

What Are The Positive Effects of Mobilization and Exercise?

- Nutrition/Digestive Effects
 - Increase gut function
 - Absorption
 - Motility



By Mariana RuizLadavofhats, edited by Joaquim Alves Gaspar [Public domain], via Wikimedia Commons

What Are The Positive Effects of Mobilization and Exercise?

- Musculoskeletal Effects
 - Engage the diaphragm, chest wall muscles, larynx, abdominal muscles (accessory)
 - Engage skeletal muscles
 - Move bones and joints
 - Increase strength and endurance



By User:Mikael Haggström (Image:Gray190.png) [Public domain], via Wikimedia Commons

What Are The Main Components of a Rehabilitation Program?

- Exercise training
- Breathing techniques
- Respiratory muscle training
- Education
- Psychosocial/behavioral interventions
- Nutritional assessment and intervention



Exercise Training

- The primary "drugs" of rehabilitation are:
 - Mobilization
 - Exercise

Exercise Training



Breathing Techniques

- Pursed lip breathing
 - Coordinate breathing and activity
- Diaphragmatic breathing
- Lateral costal breathing
- Accessory muscle breathing
- Butterfly technique
- Glossopharyngeal breathing
- Abdominal binders



Cardiopulmonary Rehabilitation for the Tracheostomy and Ventilator Patient

Alternative Airway Clearance Techniques

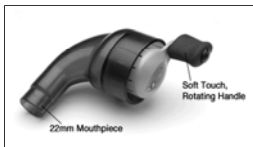
- Chest physical therapy
- Percussion and postural drainage
- Manual hyperventilation, NaCl instillation
- Active cycle breathing
- Autogenic drainage
- Huffing
- Assistive coughing
 - Abdominal thrust, costophrenic assist, anterior chest compression assist, side lying counter rotation assist
- Mobilization and exercise!!

Respiratory Muscle Training and Airway Clearance Devices



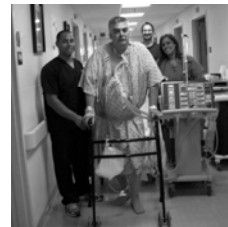
Left: PEP Valve
Right: Bronchial Hygiene acapella® Vibratory PEP Therapy System-Portex

Respiratory Muscle Training and Airway Clearance Devices



Left: The Quake® by Thayer Medical
Right: The Lung Flute

Respiratory Muscle Training and Airway Clearance Devices



Airway Clearance Devices



Left: The Vest-Airway Clearance System <http://www.thevest.com/>
Right: Source: English Wikipedia Originally uploaded by: en:User:ImmortalGoddess Category:Pulmonology)

Airway Clearance Devices

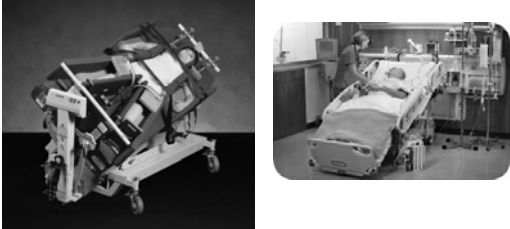


CoughAssist Mechanical Insufflator-Exsufflator -Respirics

The #1 Airway Clearance Device Is....



Alternatives To Recumbent Bed Rest



Left: RotoRest™ Delta Kinetic™ Therapy System-KCI
Right: TotalCare® Connect bed-Hill-Rom

Alternatives To Recumbent Bed Rest


- Rehab can begin in the bed....
 - Bed rest exercises
 - Moving in the bed for simple ADL's
 - Sitting on the side of the bed to dangle
 - Progress to standing transfers to the chair
 - Chair exercises
 - Begin short walks

Posture and Positioning Matter

- Benefits of an upright position are:
 - Maximize ventilation and perfusion
 - Improve cough and secretion clearance
 - Decrease Raw Increase Cst
 - Promote bladder and bowel function
 - Promote fluid shifts

Why Is Body Position Important?

- Daily tasks that require trunk control:
 - Breathing
 - Coughing
 - Eating
 - Talking
 - Moving
 - Bowel and bladder emptying

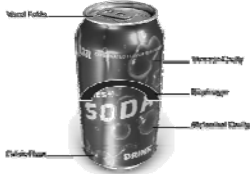


By Vitdy Ragulin [Serena Xivv_cyl.21.10.10.] [CC-BY-SA-3.0] [www.creativecommons.org/licenses/by-sa/3.0], via Wikimedia Commons

Posture and Positioning Matter

- Primary Pressure Regulating Muscles
 - Intercostal (thoracic pressure)
 - Diaphragm (abdominal pressure)
 - Back muscles (stabilize spine and ribcage)

Postural Control Model Using a Soda-Pop Can



Cardiopulmonary Rehabilitation for the Tracheostomy and Ventilator Patient

Posture and Positioning Matter

- COPD
 - Flattened diaphragm
 - Elongated cardiac shadow
 - Hyperlucent lung fields
 - Increased A-P diameter



Advantages of Using The Passy-Muir® Valve

- Closing the respiratory system and regulating intrathoracic and intrabdominal pressures will:
 - Allow graded exhalation
 - Improve internal pressure support for posture
 - Improve upper extremity force/strength
 - Improve bowel and bladder emptying
 - Improve swallowing mechanics
 - Improve coughing/secretion management
 - Restore voicing

CASE STUDY MR. G.

- Mr. G., age 57, was working on his house while on a ladder, fell, and was admitted to the hospital with multiple fractures, acute respiratory failure and acute change in mental status with confusion. When initially admitted to our hospital, he had a tracheostomy, required ventilator support, and required bilateral soft wrist restraints for safety.

CASE STUDY MR. G.

57 YEAR OLD MALE
S/P FALL
VDRF
FAILED ATTEMPTS TO WEAN AT PREVIOUS FACILITIES
EXHIBITS INABILITY TO PERFORM ANY FUNCTIONAL TASKS
NPO

CASE STUDY MR. G.

- RESPIRATORY EVALUATION
 - Vent settings
 - Breath sounds
 - CXR
 - ABGs
 - Sputum
 - Tracheostomy site



CASE STUDY MR. G.

- RESPIRATORY PLAN OF CARE
 - Protocol
 - Respiratory rehab communication
 - Out of bed program
 - Oral care
 - Trach care
 - Daily assessment
 - Spontaneous mechanics



Cardiopulmonary Rehabilitation for the Tracheostomy and Ventilator Patient

CASE STUDY MR. G.

• PHYSICAL THERAPY EVALUATION

- Bed Mobility
- Transfers
- Gait
- Fall recovery



CASE STUDY MR. G.

• PHYSICAL THERAPY PLAN OF CARE

- Balance
- Standing
- Weight shifting
- Transfer training
- Exercises
- Gait



CASE STUDY MR. G.

• PHYSICAL THERAPY PLAN OF CARE

- SAFETY
 - Evaluation
 - Safety Awareness
 - Cognition
 - Goals



CASE STUDY MR. G.

• OCCUPATIONAL THERAPY EVALUATION

- Dependent
- Delayed response times
- Decreased endurance
- Poor balance for functional tasks
- ADL'S dependent



CASE STUDY MR. G.

• OCCUPATIONAL THERAPY EVALUATION

- Therapeutic exercises
- Endurance tasks
- Graded exercises
- Functional tasks



CASE STUDY MR. G.

• SPEECH/SWALLOW EVALUATION

- NPO
- Peg tube
- Ventilator Support
- Moderate Cognitive Deficits Noted



CASE STUDY MR. G.

- PASSY-MUIR® VALVE
 - #10 Shiley
 - TC trials 30%
 - RT and SLP



CASE STUDY MR. G.

- SPEECH/SWALLOW PLAN OF CARE
 - Attention, memory, problem solving
 - Thermal stimulation
 - Oropharyngeal exercises
 - PO Trial with texture analysis
 - Speaking valve use with swallowing



CASE STUDY MR. G.



CASE STUDY MR. G.



THANK YOU!



Additional Educational Opportunities

- Self-study webinars available on demand
 - Getting Started
 - Ventilator Application
 - Swallowing
 - Pediatric
 - Special Populations
- Live group webinars
- www.passy-muir.com
- Passy-Muir Inc. is an approved provider of continuing education through ASHA , AARC, CMSA and California Board of Nursing Credit

Receiving CEU's for this Course

- You will have 72 hours from the time this courses ends to complete the evaluation, which is required to receive credit.
 - Look in your email for a reminder link, or type this into your Internet browser's address bar:
 - ep.passy-muir.com



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