Cardiovascular Physical Therapy: Treatment Part 1

Presented by Bini Litwin, PT, DPT, PhD, MBA
Moderated by Kami Lerma, PT, Assistant Managing Editor, PhysicalTherapy.com

Earning CEUs
- Must be logged in for full time requirement
- Must pass 10-question multiple-choice exam
- Log in to your account and go to Pending Courses under the CEU courses tab.
- Must pass exam within 7 days of today
- Two opportunities to pass the exam

Download Handouts
Click to highlight handout
Click Save to My Computer
Goals

- Use the clinical decision making model to identify patients with limited activity tolerance who may benefit from PT
- Identify and apply relevant assessment measures giving consideration to the cardiopulmonary demands of exertion
- Discriminate between normal & abnormal responses to activity

WHEN TO STAY AND WHEN TO GO!!!
Guide to Practice: Practice Patterns

- Pattern A: Primary Prevention/Risk Reduction for Cardiovascular/Pulmonary Disorders
- Pattern B: Impaired Aerobic Capacity/Endurance Associated with Deconditioning
- Pattern D: Impaired Aerobic Capacity/Endurance Associated with Cardiovascular Pump Dysfunction or Failure

Clinical Decision Making: What should we do?

- What do we know?
- What do we need to know?
- Is PT indicated?
  - Should we stay or should we go?
- If yes, what should we do?
- If no, what should we do?

Activity Tolerance Decision

- Is the patient ready for activity?
- How well is the patient tolerating activity?
- What can cause injury?
- When is activity unsafe?
- Need to assess risk factors
PT Assessment: Cardiac Risk Factors

- Smoking*
- Hypertension*
- Elevated cholesterol levels*
- Family History

*Top risk factors
Modifiable vs. non-modifiable

Activity Tolerance Decision

- Activity Choice
  - Initiate  . Continue  . Terminate
- Monitor signs and symptoms
- What are indications/contraindications for treatment
- What is patient’s response
  - Modify plan
  - Progress based on physiological response
  - Must know norms to know abnormal

Activity Tolerance: Oxygen Transport System

Does O2 supply meet O2 demand?

\[
\text{Oxygen Supply (delivery)} = \frac{\text{Oxygen Demand (MV\text{O}_2)}}{\text{RPP (HR x SBP)}}
\]
Assessment Tests & Measures: O2 Transport System

- How will we know if O2 supply meets O2 demand?
- Is O2 supply sufficient at rest? Sufficient for activity?
- What amount of invasive support is assisting oxygen delivery to allow the patient to survive?
- Can the patient deliver enough oxygen to decrease invasive support?
- Can the patient accelerate oxygen delivery to support ↑'d activity?

Activity Tolerance

- Effect of Inactivity  e.g. bed rest
  - Decrease in MVO2
  - Decrease in CO
  - Decrease in ability to use O2 (A-VO2 )
- Determinants of physical performance/function
- Amt of time to reach prior function related to ↑ level of fitness
- Every day of bed rest, takes 1-2 days to return to prior level of function
  - Older, debilitated pts. may not respond same as young, normals (most studies done on young, normal)
  - May need slower rate, incremental increases
  - May need to work on peripheral musculature initially

Why are you there?

<table>
<thead>
<tr>
<th>PATIENT CARE PRIORITY</th>
<th>REASON FOR PT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival</td>
<td>Preventative</td>
</tr>
<tr>
<td>Recovery of O2 Supply</td>
<td>Enhance O2 Supply</td>
</tr>
<tr>
<td>Mobilize for Independence</td>
<td>↑ O2 Demand/Meds</td>
</tr>
<tr>
<td></td>
<td>Functional Training</td>
</tr>
</tbody>
</table>
Assessment

- What do we need to know?
- Patients needs, concerns, expectations
  - Patient/family interview
  - Quality of Life measures
  - Health Risk Factor profile
    - http://www.yourdiseaserisk.wustl.edu/
- 3 Categories
  - History
  - Review of systems
  - Specific tests and measures

Medical Chart

Review/Interview

- PMH
- Medical/surgical interventions
  - Dates
- Medications
- Clinical lab data
- Diagnostic tests/measures
- Signs & symptoms
- Vital signs over time

Assessment: Lab Studies

- Diagnostics: Lab Normative Values
  - Cardiac enzymes
  - Electrolytes: Na, Ca, K+
  - WBC, proteinurea, renal function, hematocrit
  - Cholesterol, triglycerides
  - A1C, blood glucose
  - Pulmonary function/gas exchange
Medical Chart Review

- Imaging studies
  - CXR
  - CT, MRI
  - Catheterization, angiogram, thallium stress test
- Pulmonary studies
  - PFT
  - ABG's
    - CO2, HCO3, pH, O2 availability/saturation
  - Oxygen therapy
- Conduction studies
  - ECG, telemetry
  - EPS
  - Holter monitors

Differential Diagnosis

- What do we suspect? What could be the problem?
  - Cardiac problem
  - Pulmonary problem
  - Musculoskeletal problem
  - System problem e.g. GI
- What practice pattern would this be?
  - What is the PT Diagnosis?
- What else do we need to know and how will we find this information?
  - Is oxygen transport system working?
  - Do we stay or go?
- If we stay, what should we do?
  - What assessments should we do?

Systems Review

- Cardiovascular/pulmonary systems
  - Examine in detail
  - HR, BP, RR
  - Edema
- Integumentary
  - Pliability (texture)
  - Scar
  - Skin color & integrity
- Musculoskeletal
  - Gross examination: symmetry, ROM, strength, Ht & Wt
- Assessment of obesity
  - BMI = (wt in lbs X 703)/(ht in inches)^2
  - Waist to hip circumference better discriminator of subclinical disease than BMI
- Associated with prevalence of atherosclerosis*
- Neuromuscular
  - Gross examination: balance, gait, locomotion, transfers, transfers
  - Motor function
- Communication, affect, cognition, language & learning style

* See E. et al. J Am Coll Cardiology 2007, 50, 752-758
PT Assessment: Interview

- Present complaints
- Symptoms
- Perception of problem
- Family situation
- Goals for rehab
  - Prior level of function
- Affect and cognition
- Cultural considerations

Assessment: Observation

- General appearance
  - Level of consciousness
  - Agitation; level of distress
- Monitoring/adaptive equipment in use
- Facial characteristics and phonation
- Cough/cough production
- Color
  - Skin tone
- Extremities
  - Body type: Obese, cachectic

Observation

- Medical interventions
  - Lines/tubes
  - O2 therapy
  - Monitoring equipment
- Posture and chest deformities
- Jugular Vein Distention (JVD)
- Breathing Pattern
  - Accessory muscle use
  - Symmetry
  - Inspiration to expiration ratio
Assessment: Inspection/Palpation

- Vital signs
  - HR(pulse), RR, BP, Temp, SpO2
  - Respiratory rate and pattern
  - HR before, during & after activity; lying, sitting, standing
  - HR a factor of fitness, age, environment, activity performed, existing pathology, meds
  - Febrile/afebrile

- Pain
  - How, where manifested, severity

---

Normative Values at Rest (Adult)

<table>
<thead>
<tr>
<th>Value</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Rate</td>
<td>60-100 beats/minute</td>
</tr>
<tr>
<td>Systolic Blood Pressure</td>
<td>85-140 mm Hg</td>
</tr>
<tr>
<td>Diastolic Blood Pressure</td>
<td>40-90 mm Hg</td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>12-20 breaths/minute</td>
</tr>
<tr>
<td>Oxygen Saturation</td>
<td>&gt;95%</td>
</tr>
</tbody>
</table>

---

Blood Pressure Guidelines*

<table>
<thead>
<tr>
<th>Systolic (mm Hg)</th>
<th>Normal</th>
<th>Prehypertension</th>
<th>Hypertension Stage 1</th>
<th>Hypertension Stage 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;120</td>
<td></td>
<td>120-139</td>
<td>140-159</td>
<td>&gt;159</td>
</tr>
</tbody>
</table>

| Diastolic (mm Hg)| <80    | 80-89          | 90-99                | >99                  |

*NHLBI, National Heart Lung and Blood Institute
Assessment: Inspection/Palpation

- Extremities
  - Clubbing
  - Skin texture, tone, bruising, temperature
  - Edema
  - Peripheral pulses
  - Claudication
  - Cap refill
  - Body fat composition
  - Rubor of dependency

Peripheral Pulses

- Upper Extremity
  - Temporal
  - Carotid
  - Apical
  - Brachial
  - Radial

- Lower Extremity
  - Femoral
  - Popliteal
  - Posterior tibial
  - Pedal Pulse
    - Dorsalis pedis

Peripheral Pulses
Assessment: Heart Sounds

- Normal sounds
- Abnormal sounds
- Rate and rhythm

Heart Auscultation: Areas of Auscultation

- Aortic area – 2nd intercostal space, right sternal border
- Pulmonic area – 2nd intercostal space, left sternal border
- Erb’s point – 3rd intercostal space, left sternal border, for murmurs of aortic and pulmonic origin
- Tricuspid area – 4-5th intercostal space, left sternal border
- Mitral area (apex of heart) – left 5th intercostal space, medial to mid-clavicular line
Heart Auscultation

Heart Sounds: Normal

- S1 – closure of mitral and tricuspid valves and onset of ventricular systole (mitral and tricuspid areas); lub of lub-dub
- S2 – closure of aortic and pulmonic valves and start of ventricular diastole (aortic and pulmonic areas); dub of lub-dub

http://www.med.ucla.edu/wilkes/Homebanner.htm
http://depts.washington.edu/physdx/heart/demo.html
Heart Sounds: Abnormal

- Systolic murmurs – swishing sound heard between S1 and S2; lush-dub
  - Aortic stenosis most common; aortic area
- Diastolic murmurs – swishing sounds heard right after S2 and diminish in intensity quickly
  - Aortic regurgitation; aortic area
- Pericardial rub – leathery sound with each heart beat; best heard over tricuspid area lying supine
  - Pericardial inflammation

Heart Sounds: Abnormal

- S3 – occurs early in diastole while the ventricle is rapidly filling; lub-dub-dub; ventricular gallop; use bell; best heard when lying on left side at apex
  - Seen with ventricular failure/CHF
- S4 – occurs late in diastole, just before S1; la-lub-dub; associated with atrial contraction; atrial gallop; use bell; seen with increased resistance to ventricular filling; heard at the apex
  - Seen with HTN, CAD, CABG, MI; pulmonary disease

Assessment: Lung Auscultation

- Normal
- Adventitious
- Absent
- Consolidation
- Hyperinflation
Lung Auscultation: Normal Breath Sounds

- Vesicular – soft low pitched, heard primarily on inspiration over lung
- Bronchial (tubular) – loud high pitched, heard over trachea
- Bronchovesicular – softer version of bronchial, heard at junction of mainstem and segmental bronchi


Lung Auscultation: Adventitious Breath Sounds

- Wheezes – continuous, constant pitch (usually high) and varying duration; seen with airway obstruction
  - Rhonchi – Low pitched (continuous) wheeze– seen with upper airway secretions
  - Stridor – Monophonic, continuous sound heard on inspiration, monophasic sound seen with upper airway obstruction
- Crackles (Rales) – discontinuous brief bursts of popping bubbles, on inspiration
- Pleural rubs – inspiratory and expiratory sound like 2 pieces of leather rubbing

References

Heart sound information was taken from Medical Instrumentation and Design by John G. Webster (the BIOE 402 textbook) and the Wikipedia Heart Sounds page. Lung sound information was taken from the Colorado State University’s Auscultation Library online, as well as from the Wikipedia Respiratory Sounds page.
Lung Auscultation

Assessment: Lung Auscultation
- Advanced auscultation
  - Egophony- "E" sounds like "A"
  - Bronchophony- 99
  - Whispering pectoriloquy
- Describe sound
  - Continuous/discontinuous, pitch, intensity, duration, time of occurrence (inspiration vs. expiration)
    - Shallow, rapid, labored, irregular, absent
    - Stronger, louder sound with consolidation
    - Weaker, softer sound with hyperinflation

Assessment: Inspection/Palpation
- Cyanosis
  - Central
  - Peripheral
- Cough production
  - Strength, depth and quality of cough
    - Ability to clear airway
  - Sputum quantity, consistency, color, smell
Assessment: Palpation

- Chest configuration and movement
  - Resting and dynamic
  - Expansion- AP/Lateral
  - Symmetry and sequence
  - Accessory muscles
  - Chest wall discomfort
  - Rate, rhythm, quality of movement
- Tracheal deviation

Practical Guide to Examination

http://meded.ucsd.edu/clinicalmed/lung.htm

Assessment: Function

- Functional Assessment
  - OBSERVE PATIENT RESPONSE; SIGNS & SYMPTOMS
  - How pt. responds to movement/activity
  - Start at base level & progress gradually
  - Quality of movement
  - Transitional movements: lying, sitting, standing
  - ROM/posture/functional strength
Assessment: Function

- Functional/mobility status
  - Assistance
  - Balance
  - Adaptive/assistive devices
  - Activity tolerance
  - Gait
  - Muscle strength (functional/gross); ROM

- Objective measures/scales
- Quality of Life Measures

Scales and Measures

- Borg, dyspnea, anginal scales, MET’s, NYHA guidelines

- Best used in the cognitively aware, honest person with normal perception

- RPE gained from a GXT can be used to prescribe exercise intensity levels
  - Can also use HR, METs

Dyspnea Scale: Subjective Rating of Intensity

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1+</td>
<td>Mild, noticeable to patient but not observer</td>
</tr>
<tr>
<td>2+</td>
<td>Mild, some difficulty, noticeable to observer</td>
</tr>
<tr>
<td>3+</td>
<td>Moderate difficulty, but can continue</td>
</tr>
<tr>
<td>4+</td>
<td>Severe difficulty, patient cannot continue</td>
</tr>
</tbody>
</table>
### Dyspnea Levels

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Able to count to 15 easily w/o taking an additional breath</td>
</tr>
<tr>
<td>1</td>
<td>Able to count to 15, but must take one additional breath</td>
</tr>
<tr>
<td>2</td>
<td>Must take 2 additional breaths to count to 15</td>
</tr>
<tr>
<td>3</td>
<td>Must take 3 additional breaths to count to 15</td>
</tr>
<tr>
<td>4</td>
<td>Unable to count</td>
</tr>
</tbody>
</table>

### Angina Scale: Subjective Rating of Intensity

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1+</td>
<td>Light, barely noticeable</td>
</tr>
<tr>
<td>2+</td>
<td>Moderate, bothersome</td>
</tr>
<tr>
<td>3+</td>
<td>Severe, very uncomfortable; preinfarction pain</td>
</tr>
<tr>
<td>4+</td>
<td>Most severe pain ever experienced infarction pain</td>
</tr>
</tbody>
</table>

### Borg Rate of Perceived Exertion (RPE)*

- Self report
- 6-20 scale
  - Relates to heart rate
  - Warm up: 9-11 range
    - 12-13 equivalent to 60%MHR; 16 equivalent to 85% MHR
  - Peak activity: 13-15 range
- 1-10 scale
  - Often less confusing for patients to use

### NYHA Functional Classification of Heart Disease

<table>
<thead>
<tr>
<th>Functional Class</th>
<th>Description</th>
<th>Exercise Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Patient w/ cardiac disease w/out any resulting limitations of physical activity; ordinary physical activity does not cause undue fatigue, palpitations, dyspnea or anginal pain</td>
<td>6-10 METs</td>
</tr>
<tr>
<td>II</td>
<td>Slight limitations of physical activity; comfortable at rest, but ordinary physical activity results in fatigue, palpitations, dyspnea or anginal pain</td>
<td>4-6 METs</td>
</tr>
<tr>
<td>III</td>
<td>Marked limitation of physical activity; comfortable at rest, but less than ordinary activity causes symptoms, as above.</td>
<td>2-3 METs</td>
</tr>
<tr>
<td>IV</td>
<td>Unable to carry out any physical activity w/ discomfort, symptoms of cardiac insufficiency or anqina may be present even at rest; discomfort w/ exertion</td>
<td>&lt;2 METs</td>
</tr>
</tbody>
</table>

### MET Chart

<table>
<thead>
<tr>
<th>METs</th>
<th>Exercise Recreational Activities of Daily Living</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5-2.0</td>
<td>Strolling 1-1.5 mph Knitting; Playing cards; Sewing; Watching TV Brushing hair/teeth, Light housework, Making bed; toileting</td>
</tr>
<tr>
<td>2.0-3.0</td>
<td>Walking, level 2.0-2.5 mph, Horseback riding (walk); Light golf (power cart); Playing musical instrument; Shuffleboard; Woodworking Cooking; Driving car; Ironing; riding lawn mower; Scrubbing floor; walls, cars, windows; Showering; Sweeping; Tub bath</td>
</tr>
<tr>
<td>3.0-4.0</td>
<td>Bowling; Canoeing; Golf (pulling cart); Climbing stairs (slowly); General Housework; Sexual intercourse; Vacuuming</td>
</tr>
<tr>
<td>4.0-5.0</td>
<td>Walking 3.0-4.0 mph, Ballet; Dancing; Gardening Golf (carrying clubs) Raking leaves, shoveling light loads</td>
</tr>
<tr>
<td>5.0-6.0</td>
<td>Walking/jogging, 4.0-5.0 mph, Backpacking (light); Hiking; Skiing (cross country 2.5 mph); Lawn mowing (push mower); Snow shoveling (light snow)</td>
</tr>
<tr>
<td>7.0-8.0</td>
<td>Walking, 5 mph, Basketball (non-game); golf (carrying bag)</td>
</tr>
<tr>
<td>8.0-9.0</td>
<td>Jog/run 5.5 mph, Biking (outdoors) 13 mph Basketball (non-game); Handball/squash/racquetball</td>
</tr>
<tr>
<td>9.0-10.0</td>
<td>Jog/run, 6 mph, Football (competitive); sledding/tobogganing Ascending stairs carrying 54 lb</td>
</tr>
<tr>
<td>11.0+</td>
<td>Run 7 mph (11.5 METs), Competitive sports: Basketball, Handball, Racquet, Rowing</td>
</tr>
</tbody>
</table>

### Assessment: Endurance

- **Endurance Testing**
  - Objective Measurements: RPE, vitals, ECG
  - Check vitals (q2-3min), progress slowly
  - Record duration, frequency, intensity of activity
  - Use progressive activity: walking, cycling, treadmill
  - GXT (monitored): use progressive activity to test aerobic capacity/ stress testing, treadmill, step test, 6 min. walk, ergometer
Assessment: Aerobic Capacity

- Vital signs/physiologic measures
- Auscultation
- RPE, dyspnea, anginal scales
- Myocardial demand measures
  - RPP = HR x SBP

Graded Activity

- Walking
- Arm Ergometry
- Leg Ergometry
- Combined Arm and Leg
- Treadmill
- Stair Climbing/Stairmaster
- Rower
- Elliptical

Walk Tests

- Timed walk tests
  - 12 minute walk test
  - 6 minute walk test
  - 2, 3 minute walk test
  - Field endurance tests (1 mile walk)
- Defines patient’s ability to exercise
  - Intensity performed or to where symptoms begin
- Improved results w/ 2nd test d/t learning effect
  - Demonstration prior to test
- Described differently in different references
- Studies uses walk distance, walk time, walk work as outcomes
Six Minute Walk Test

- Patient walks at fastest pace possible
  - Record distance, time and rests taken
  - Calculate walking speed and compute METs
    - 100’ course
  - Circular vs. straight
- Monitor BP/HR, pt. hx sitting
- Instruct in RPE, scales, etc.
- Monitor and record responses pre, during, after
  - Chairs placed periodically for rests if needed
- Stop based on patient’s S/S
- Valid, reliable measure
  - Correlates with VO2 max for elderly, COPD, CHF
  - Predictive of death w/ mild to moderate CHF

Chair Step Test

Standard Cycle Ergometry: YMCA Sub-Maximal Protocol

- 3 minutes stages of continuous exercise
  - 2-3 minutes per stage
- 50 RPMs maintained throughout
- 25 watts- 1st stage
  - 10-15 watts for older individuals
- Seat adjusted with 10° knee flexion
Supported Cycling

Advantages – Cycle

- BP, EKG or Pulse accurately monitored
- Patient feels safe/balance relative to TM
- Less compensatory movement
- Portable
- Use w/ musculoskeletal problems that don’t allow weightbearing

Disadvantages - Cycle

- 25% lower VO₂ max than TM
- Seat pain/leg pain may limit activity
- Fatigue faster than on TM
Other Issues

- Body weight
- Level of alertness
- Signs of distress
- Fever
- Skin appearance

Stop and Decide

- Does your patient show signs/symptoms of instability?
- What tests show these signs/symptoms?

Stop and Decide

Has my patient had a normal or abnormal response to tests and measures?
Evaluation: Heart Rate Response

- Normal: Linear increase in activity = linear increase in HR
- Too rapid increase
  - Activity level too high for condition, age
- Too slow increase or decline
  - Poor LV function
  - Onset of arrhythmia

Evaluation: Blood Pressure Response

- Normal
  - SBP should rise 7-10 mmHG w/ each MET increase in activity
  - With submax activity, rises until steady state reached
  - DBP minimal to no increase/decrease with activity
    - Max 10mmHG
- Abnormal
  - Blunted response to activity
  - Hypertensive/hypotensive SBP/DBP response

Evaluation: Signs of Physiological Stress

- Circulatory Status:
  - Cap refill, skin color/temp, edema
  - Peripheral pulses
- Positional Responses
  - Supine increases venous return, heart has to work harder-if having angina, sit them upright!!!
- Neck: Jugular vein distension
Cardiovascular Dysfunction:
Abnormal Symptoms

- Palpitations
- Chest pain
  - Bronchospasm, esophageal spasm
- Dyspnea
- Angina
- Dizziness
- Pallor
- Fatigue

Evaluation: Dyspnea

- Normal
  - Should be moderate at submaximal steady state exercise
- Abnormal
  - Occurs at rest or is out of proportion with activity
- Measurement scales

Evaluation: Respiratory Rate, Pattern

- Normal
  - Rate and depth should increase linearly with exercise intensity until steady state reached
  - Use of neck accessory muscles on inspiration and some abdominal muscles on expiration with submax exercise
- Abnormal
  - Paradoxical breathing
  - Irregularity of respiration
  - Increase use of neck muscles
  - Leaning on objects or fixing arms
  - Tachypnea/bradypnea at rest
- Symptomatic with activity?
Oxygen Saturation (SpO2)

- **Normal** response to activity:
  - Stays the same or increases
  - Measured clinically by pulse oximeter

SaO2: Activity Guidelines

<table>
<thead>
<tr>
<th>SaO2</th>
<th>PaO2</th>
<th>S/B</th>
</tr>
</thead>
<tbody>
<tr>
<td>95-100</td>
<td>80-100</td>
<td>Normal</td>
</tr>
<tr>
<td>90-94</td>
<td>60-80</td>
<td>TWR, ↑ RR</td>
</tr>
<tr>
<td>80-89</td>
<td>50-69</td>
<td>Oozy, restless, ♦ RR+TV</td>
</tr>
<tr>
<td>Below 80</td>
<td>35-55</td>
<td>ECG changes, confusion</td>
</tr>
<tr>
<td>Below 80</td>
<td>25-35</td>
<td>Cardiac arrest, renal failure</td>
</tr>
</tbody>
</table>

Signs of Respiratory Instability

- **Respiratory Rate** Over 25 per min
- **O₂ Sat** Less Than 85%
- **Somnolence, Poor Mentation**
- **Unable to Speak**
Signs of Instability: SOB, Increased RR

- Cardiac/LV dysfunction
  - BP, RPP
- Pulmonary dysfunction
  - PFTs, ABGs, SaO2
- Anemia
- Acidosis
- Deconditioning

Signs of Instability: Lightheadedness/Dizziness

- Hypotension
- Inadequate CO
- Peripheral vasodilation
- Cerebral ischemia
  - ICP
- Hyperventilation
- Hypoglycemia
- Arrhythmias

Signs of Instability: Chest Pain

- Myocardial ischemia
  - ECG
- Pericarditis
  - Echocardiogram
- Musculoskeletal
- Pulmonary Embolism
  - VQ scan
- Referred pain
  - Esophagus, gall bladder, hiatal hernia
Signs of Instability: Angina

- Differentiate by how reproduced
  - Angina = exercise induced
  - Musculoskeletal = palpation, deep breathing
  - Neurologic = constant, follows a nerve root/dermatome

- Stable angina
- Unstable angina
  - Preinfarction angina
  - Variant angina
    - Prinzmetal’s angina

Evaluation: Angina vs. MI

<table>
<thead>
<tr>
<th></th>
<th>Angina</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lasts</td>
<td>5-15 min</td>
<td>Lasts 30 min</td>
</tr>
<tr>
<td>Location</td>
<td>Substernal</td>
<td>Substernal</td>
</tr>
<tr>
<td>Quality</td>
<td>Not sharply localized; c/o pressure, tightness</td>
<td>Localized, usually c/o severe squeezing</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Dyspnea, nausea, uneasiness, assoc w/ belching</td>
<td>Apprehension, nausea, dyspnea, diaphoresis, fatigue, dizziness, tachycardia</td>
</tr>
</tbody>
</table>

Evaluation: Angina vs. Nonanginal Discomfort (Irwin, Techlin)

<table>
<thead>
<tr>
<th>Stable Angina</th>
<th>Nonanginal Discomfort (chest wall pain)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relieved by nitro</td>
<td>Nitro generally no effect</td>
</tr>
<tr>
<td>Predictable onset (HR/BP) relieved by rest (lasts only a few minutes)</td>
<td>Occurs any time, lasts for hours</td>
</tr>
<tr>
<td>Not palpable</td>
<td>Muscle/joint soreness evoked by palpation or deep breaths</td>
</tr>
<tr>
<td>Ass w/ feelings of doom, cold sweats, SOB</td>
<td>Minimal additional symptoms</td>
</tr>
<tr>
<td>Often seen w/ ST segment depression</td>
<td>No ST segment depression</td>
</tr>
</tbody>
</table>
Evaluation: Chest Pain

- If patient presents w/ signs of unstable angina, stop or defer treatment
  - Notify nurse/doctor after assess patient’s signs and symptoms
- OLD CART
- What therapists should look for:
  - In the elderly, excessive sweating notes something is wrong
  - Diabetic patients: n. endings to heart may be damaged & self description of angina may be inaccurate
  - 55-65% EF is normal

Evaluation: Chest Pain

- Is angina stable or unstable?
  - Chest pain that occurs w/ increasing frequency
  - Onset of pain that is provoked at rest or w/ minimal exertion
  - Chest pain that is not relieved by nitroglycerin
- Hypo/hypertension
- Tachycardia/bradycardia
- Irregular pulse

Stop and Decide

- If my patient is stable and safe:
  - Which step in the O2 transport is most likely limiting activity?
  - What are the impairments?
  - What level of activity was tolerated?
  - How well did the patient perform?
  - What activity/intervention can I perform to meet everyone’s goal?
Assessment: Case Study

- The patient is a 68 year old black male referred for outpatient therapy following a hip contusion sustained when he fainted 2 weeks ago. The patient is ambulating without assistive devices, but presents with pain (7/10) at the hip on weight bearing. The patient has a history of coronary artery disease and had a MI one year ago.
- Referral: Evaluate and treat

Chart Review

- PMH: HTN, hyperlipidemia, MI 1 year ago, CAD
- PSH: Appendectomy>10 years
- Psychosocial hx: The pt. denies smoking, alcohol and drug use.
- Family Situation: He is retired and lives with his wife in a duplex with bedrooms upstairs. He drives and does chores around the house.
- Medications: Propranolol (inderal), furosemide (lasix), esomeprazole (nexium)
- V/S: Temp. 99 degrees, B/P:150/84, RHR:100, RR: 20; SpO2: 92% at rest

Consider the Following:

- What assessments would you do with this patient
- What findings are significant and what impact will they have on this patient's plan of care
- What are the patient’s primary problems; what practice pattern would you apply?
- What additional information would be helpful for you to know about this patient?

STAY OR GO?
Questions

Contact information: blunt@nova.edu

No portion of this presentation can be reproduced without written permission of Bini Litwin PT DPT PhD MBA

Resources

- Ball, Michel, Cahalin, 1997
- Cahalin, Sermignan, Kazmerek, 1997
- Collett & Ljøststrand 1924; Mies DS et al. JAP 57:366-70, 1984
- Gappmaier E et al. MSSE 33:S130 #740

Resources

- Guide to PT Practice, APTA 3rd Ed.
- Jones and Campbell N Eng J Med 293:541 1975
- NHLBI, National Heart Lung and Blood Institute
Resources

- O’ Sullivan & Schmitz. Physical Rehabilitation: Assessment and Treatment, 5th Ed. FA Davis Co.
- Sawka MN. Ex Sport Science Reviews vol 14, 1986
- Taylor, Brown, et al., ACP Journal Club, Nov-Dec, 2004; AHA, 2005
- University of Iowa Hospitals and Clinics, 200 Hawkins Drive. Iowa City, Iowa 52242

Internet Resources

- http://www.yourdiseaserisk.wustl.edu/
- http://nursing411.org/Courses/MD0531_Taking_Vital_Signs/3-4_taking_vital_signs
- http://www.med.ucla.edu/wilkes/Homebann er.htm
- http://meded.ucsd.edu/clinicalmed/lung.htm