Cardiac Comorbidities in Outpatient Settings: Implications for Assessment and Treatment

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Objectives

♥ Identify the most common cardiovascular comorbidities or treatments that may present in an outpatient setting
♥ Select appropriate assessment techniques based upon cardiovascular co-morbidity
♥ Select appropriate modifications to physical therapy interventions based upon selected cardiovascular co-morbidities or medical treatment

Relevance to PT

♥ Heart disease 2nd only to arthritis in limiting activity
♥ “leading cause of premature, permanent disability” (CDC, 2004)
♥ Common as a co-morbidity

Epidemiology of Cardiac Disease

• 2010 CDC – 27.1 million individuals with heart disease
• Hypertension - >74 million: “1 in 3”
• Heart failure - 5.8 million, with 670,000 new cases per year
• Peripheral Arterial disease – 8 million
• Atrial fibrillation – 2.66 million

Cardiovascular Disease Categories

• Coronary heart disease
• Hypertension
• Heart failure
• Vascular disease

Hypertension

• “Almost one fifth (21.3%) of the people with high blood pressure don’t know that they have it.” CDC, 2006
• 28% have pre-hypertension
• “because essential hypertension is manifest at varying ages and is usually asymptomatic, otherwise healthy patients need regular and ongoing blood pressure screening” Joint agenda for ACS, ADA & AHA, 2004
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**PREVALENCE**

Variations in Prevalence

- Age
- Gender
- Race
  - Heart disease – Pacific Islanders > Am. Indian > White
  - HTN – Black > Am. Indian > White

**% HTN by Race and Gender**

From: Health, US, 2004, CDC/NCHS.

**Co-morbidities in OP**

- Jette & Jette, 1996
  - 27 – 30 % with 1 co-morbidity category; 13% with 2 co-morbidity categories; 2% > 2 co-morbidity categories
- Boissonnault, 1999
  - 21% with HTN; 7% with heart disease; 3% heart attack
- Ritzwoller et al, 2006
  - 7% cardiac disease; 19% HTN; 14% – both heart disease and HTN

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Cardiac Comorbidities in Outpatient Settings:
Implications for Assessment and Treatment

Initial – Outpatient case studies

Initial – Case 1
- 65 yo female – “Eval and treat – difficulty with ADLs”
- Hx – Hyperlipidemia, 5 yrs post MI
- Meds – Beta blocker, statins, NSAIDs
- No family history of CAD
- Symptoms – SOB, Easily fatigued

Initial – Case 2
- 20 yo male – “Eval and treat – anterior knee pain”
  - Hx – Family + HTN; no other significant history
  - Symptoms – Knee pain, worse after sitting, running

Initial – Case 3
- 40 year old male - Referral – “Eval and Treat – Impingement syndrome”
  - Hx: Pacemaker for arrhythmia – had “problems after activity”; no other significant history
  - Symptoms – Right shoulder pain, worse with overhead activities

Review of common cardiac diseases

Coronary heart disease

- Subcategories
  - Myocardial
  - Valvular
  - Conduction

- Most common causes
  - Atherosclerosis
  - Rheumatic disease
  - Congenital
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Myocardial

• Inadequate circulation
  • Ischemia infarction with resultant damage to heart

• Abnormality of heart muscle
  • “Cardiomyopathy”

• All are risk factor for numerous diseases and complications

• Early symptoms
  • Fatigue, SOB, unusual heart beat

Valvular

• Two primary pathologies – both lead to decreased systemic blood flow and increased work of the heart
  • Incompetence of the valve regurgitation
  • Stiffening of the valve stenosis

• Early symptoms
  • Fatigue, SOB, dizziness palpitations

Conduction

• Numerous causes!

• Classification
  • Location of conduction abnormality
  • Type of conduction abnormality

• Symptoms
  • Related to classification
  • Arrhythmia > palpitations, “funny beat”
  • Loss of cardiac output > fatigue, syncope

• Important – may only occur with exercise!

Atrial Fibrillation

• “Arrhythmia of old age”

• Loss of normal contraction of the atra

• Associated with 4 – 5 fold increased risk of stroke

• Increased risk of clots

Hypertension

• Causes: HTN*, CHF, CAD (valvular disease), diabetes, surgery

• Symptoms: syncope, fatigue, erratic pulse (palpitations)

• Treatment goals:
  • Rate control
  • Prevention of thromboembolism
  • Correction of the rhythm disturbance

Atrial Fibrillation

• “Silent killer”
  • Often no symptom

• Increased risk of stroke, MI, atrial fibrillation, Heart failure

<table>
<thead>
<tr>
<th>Blood Pressure Classification</th>
<th>Systolic BP (mmHg)</th>
<th>Diastolic BP (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120-139</td>
<td>80-89</td>
</tr>
<tr>
<td>Stage 1 Hypertension</td>
<td>140-159</td>
<td>90-99</td>
</tr>
<tr>
<td>Stage 2 Hypertension</td>
<td>≥ 160</td>
<td>≥ 100</td>
</tr>
</tbody>
</table>

BP Classification

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Hypertension

- **Risk factors**
  - Age: Males > 45; females > 55
  - Family history of HTN
  - Race: Black
  - Atherosclerosis
  - Overweight

- **Treatment**
  - Diuretics
  - ACE inhibitors
  - Beta blockers

Heart Failure

- **Causes**: Previous MI, CAD, HTN, cardiomyopathy

- **Symptoms**
  - Dyspnea
  - Fatigue
  - Limited exercise tolerance
  - Fluid retention

- **Treatment**
  - Diuretics
  - Inotropic agents (contractility)
  - Blood thinners

Peripheral Arterial Disease

- **Risk factors**
  - Diabetes mellitus
  - Hypertension
  - Smoking
  - Obesity
  - Coronary artery disease

- **Treatment**
  - Anti-platelet
  - Anti-lipemic

Peripheral Arterial Disease

- **Causes**
  - Atherosclerosis

- **Symptoms**
  - Pain, ache or cramp with activity or rest

- **Treatment goals**
  - Improve circulation

Medical Treatments

- **Medications**
  - Prevention
  - Treatment for known disease

- **Surgery**
  - Corrective
  - Implants
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Medications

- Anti-lipemic
- Diuretic
- Anti-thrombotics
- Anti-arrhythmic
- Beta and calcium channel blocker
- Nitrates
- Cardiac glycosides
- ACE & ARB's
- Anti-platelet

Potential side effects

- Liver function
- Myalgia
- Muscle cramps
- Gastrointestinal problems
- Rash

Diuretics

Potential side effects

- Hypotension
- Weakness
- Electrolyte imbalance
- Arrhythmias
- Muscle cramps

Anti-lipemic

Potential complication

- Monitor for bleeding

Patient education

- Take aspirin or Ticlopidine with food/milk
- Avoid aspirin containing products
- Advise patient to tell all healthcare workers that on antithrombotic medications
- Vitamin K and alcohol inhibit warfarin

Anti-thrombotics

Potential Side-effects

- Many alter rest and exercise HR and BP

- Hypotension (dizziness)
- Fatigue
- Heat intolerance

Anti-arrhythmic

- Liver damage
- Lung toxicity
- Neurologic symptoms
- Arrhythmia

Beta and calcium channel blocker
Potential side effects

- Hypotension
- Dizziness

Nitrates

Potential side effects

- ACE = Angiotensin-converting enzyme inhibitor
  - Cough
  - Electrolyte imbalance → arrhythmia
- ARB = Angiotensin II Receptor Blockers
  - Electrolyte imbalance → arrhythmia
  - Rash

ACE & ARB’s

Potential side effects

- ACE = Angiotensin-converting enzyme inhibitor
  - Cough
  - Electrolyte imbalance → arrhythmia
- ARB = Angiotensin II Receptor Blockers
  - Electrolyte imbalance → arrhythmia
  - Rash

Cardiac glycosides

Potential side effects

- Nausea
- Vomiting
- Fatigue
- Confusion

Anti-platelet

Potential side effects

- ACE = Angiotensin-converting enzyme inhibitor
  - Cough
  - Electrolyte imbalance → arrhythmia
- ARB = Angiotensin II Receptor Blockers
  - Electrolyte imbalance → arrhythmia
  - Rash

Surgeries

- Correction of myocardial circulation
- Coronary Artery Bypass Graft (CABG)
- Stents
- Valve Replacement
- Pacing
- Transplant
- Augmentation of blood flow

CABG – Potential complications

- Bleeding
- Altered BP
- Cardiac arrhythmias
- Renal dysfunction
- Infection
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Devices

- Stents
- Pacemakers
- Valves
- Augmentive devices

Stents – Potential complications

- Acute occlusion of CA
- MI
- CA dissection
- Bleeding
- Compromise to circulation

Pacemakers – Potential complications

- Loss of capture
  - Irregular pace
- Setting of defibrillator
  - Activation of defibrillator set by heart rate

Valves – Potential complications

- Emboli
- Failure (regurgitation)

Ventricular Augmentation – Potential complications

- Bleeding
- Clots
- Loss of function
- Infection

65 yo female

- Rest HR – 70; BP – 140/70; RR – 17
  - Mild LE edema
  - Auscultation of Heart sounds
  - What do you want to do?????

Follow-up 1 - Case Scenario 2

- "What do you want to do?????"
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Follow-up 1 - Case Scenario 2

- Contact Physician
- Medical tests
- Echocardiograph – Heart Failure
- Pharmacological Treatment
  - Diuretic
  - Cardiac glycoside

20 yo male
- Rest HR – 55; BP – 175/95; RR – 12
- What do you want to do?????

Follow-up 1 - Case Scenario 2

- Repeat resting BP
- Complete knee exam
  - Defer resistance tests
  - Can start symptom relief treatments that are not contraindicated
- Refer to physician
- Pharmacological Treatment
  - Diuretic
  - ARB

Follow-up 1 - Case Scenario 2

40 year old male
- Rest HR – 60; BP – 110/60; RR – 14
- What do you want to do?????

Follow-up 1 - Case Scenario 3

- Complete assessment
  - Ask for more information regarding “problems with activity
  - Ask about parameters of pacemaker
  - Monitoring HR response during any activities
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Recommendations/guidelines

• ACSM Risk stratification
  Based on presence or absence of:
  • Known disease
  • Signs or symptoms suggestive of disease
  • CVD risk factors
  • Assessment of blood pressure
  • Pulses

Initial Examination

Guide to Physical Therapist Practice

• Examination
  • History
  • Systems review
    • Cardiovascular
      Heart rate
      Respiratory rate
      Blood pressure
      Edema

Risk stratification

Risk Factors

• Age
• Gender
• Family History
• Smoking
• Hypertension
• Sedentary lifestyle
• Obesity
• Dyslipidemia
• Known metabolic disease

Signs/symptoms

• Ankle edema
• Palpitations or tachycardia
• Intermittent claudication
• Dyspnea
• Pain/discomfort
• Shortness of breath
• Dizziness or syncope
• Unusual fatigue

Heart disease

• Guidelines*
  • Initial Examination
    • Heart rate and blood pressure – rest and exercise
  • Follow-up visits
    • Monitor those at increased risk – known disease or anyone with an abnormal response during the first visit

* Guidelines for initial from APTA, AHA, ACC, ACSM (among many)

Heart disease – exercise recommendations

• Aerobic (low to moderate risk)
  • 4 - 7 days per week
  • Intensity - 40 – 80% HRR or 11-16 RPE
  • Duration – 20 – 60 minutes

• Resistance activity (Low – moderate risk)
  • Very light resistance (circuit training)
  • Monitor response
Atrial Fibrillation

- Guidelines
  - Initial Examination
    - Heart rate and blood pressure – rest and exercise
  - Follow-up visits
    - Monitor those at increased risk – known disease or anyone with an abnormal response during the first visit

Hypertension

- Guidelines
  - Initial Examination
    - Heart rate and blood pressure – rest and exercise
  - Follow-up visits
    - Monitor those at increased risk – known disease or anyone with an abnormal response during the first visit

Heart Failure

- “Exercise training is beneficial as an adjunctive approach to improve clinical status in ambulatory patients with current or prior symptoms of HF and reduced LVEF‖. – ACC/AHA, 2009
- “Healthcare providers should perform periodic evaluation for signs and symptoms of HF in patients at high risk for developing HF”

Atrial Fibrillation

- Aerobic (low to moderate risk)
  - 4 - 7 days per week
  - Intensity - 40 – 60% HRR or 11-14 RPE
  - Duration – 20 – 60 minutes
- Resistance activity (Low – moderate risk)
  - Very light resistance
  - Monitor response

Hypertension

- Aerobic
  - 4 – 7 days per week
  - Session duration – 20 – 60 minutes
  - Intensity – 40-80% of exercise capacity/11-16 RPE
- Resistance
  - Light - moderate intensity resistance – large muscle groups or circuit training
  - Avoid Valsalva maneuver
  - Monitor BP response

Heart Failure

- ADLs
  - Volume status and body weight
    - Includes sitting and standing BP
  - Use of alcohol, drugs, and dietary intake

HF - Serial Clinical Assessment
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Heart Failure – exercise recommendations

- Aerobic
  - 4 – 7 days per week
  - Session duration – 20 – 40 minutes
  - Intensity – 40-70% of HRR/ 11-16 RPE
- Resistance
  - High reps, low resistance – large muscle groups or circuit training
- Monitoring
  - Heart rate, blood pressure, symptoms, edema

Pacemakers and Defibrillators

- Determine type of pacemaker
- Adapt upper body activities
  - May have altered ROM or restrictions on side of pacer
- Determine upper training HR

Upper extremity exercise

- Smaller muscle mass
  - Less mechanical efficiency
- Greater stress on heart
  - Higher heart rate
  - Higher blood pressure
- Recommendations
  - Decrease intensity of any UE exercise if required
  - Avoid high intensity UE activity if not needed, especially overhead activity

Recommendations - Case Scenario 1

65 yo female
- Intervention – After HF under control
- Exercise prescription modifications
  - RPE for aerobic exercise
  - Monitor response for exercise sessions,
  - Limit resistance to body weight, tubing (high reps, low resistance)
  - Follow guidelines for body weight, etc., monitoring

Recommendations - Case Scenario 2

20 yo male
- Intervention – after BP control
- Exercise Modifications
  - Adjust exercise based upon meds if needed
  - Monitor BP – rest and response to exercise

Recommendations - Case Scenario 3

40 year old male
- Exercise modification
  - Monitor HR during rehab
  - Keep HR at least 10 beats below defibrillator setting
Summary

"Every Patient is a Cardiopulmonary Patient"
A. Swisher, Editorial

Outpatient

"Indirect" Involvement

- ANY PATIENT!

"Indirect" Involvement

- Take a thorough history
  - Follow-up on signs & symptoms that do not fit

- Ask about medication use
  - Especially that day

- Ask about disease control

History & Interview

- Value of Pulses
  - Estimation of heart rate
  - Regularity of heart rhythm
  - Strength of blood flow to an are
  - Response to intervention

- Grading
  - 0 = Absent
  - 1 = Diminished
  - 2 = Normal
  - 3 =Bounding
    - Compare side to side or distal to proximal

Heart rate and Pulses

- When
  - Rest, pre, during & post exercise
- Where
  - Dependent on complaint and purpose
- How long
  - 1 min rest (most accurate)
  - 15 sec during exercise

Pulses
Blood Pressure

- When
  - Rest, pre & post exercise
- Where
  - Brachial artery
    - May do ankle if PAD suspected - ABI
  - Side
    - Do not take on side of major surgeries, lymphedema, access lines

Blood Pressure

- Precaution - BP > normal, but less than 200 systolic and/or 110 diastolic
- Contraindication - Resting systolic BP > 200 mmHg and/or diastolic > 110 mmHg
- Stop exercise if:
  - Drop in systolic > 10 mm Hg, with increase in activity
  - Systolic > 250 mmHg or Diastolic > 115 mmHg
  - Clinical exercise > 200 mmHg (Goodman & Snyder)

Blood Pressure

- Monitor & Physician Referral
  - SPB > 120 and/or DBP > 80, with risk factors
  - Difference in pulse pressure > 40
  - DBP more than 10 mm Hg during exercise
  - SBP > 200 with exercise
  - BP changes with other signs & symptoms
    Goodman and Snyder, 2007

Blood Pressure

- Un-resolving resting Tachycardia > 120 with symptoms
  - Immediate treatment > Valsalva maneuver; carotid massage
- Resting BP > 200 systolic or 110 diastolic
  - May not have symptoms

Emergency

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