To treat or not to treat: Isn’t that always the question?

A look at clinical decision making in the acute care environment

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Objectives

At the end of this course, participants will be able to:
• Identify areas in acute care practice where there is current evidence to support treatment decisions
• Discuss some common absolute and relative contraindications to physical therapy intervention in the acute care setting
• Recall data sources (i.e. lab values, EKG, patient examination, vitals, etc.) that may be available to the acute care therapist and demonstrate ability to synthesize this data in order to form a clinical judgment

Inspiration…

• Study Purpose: Look at current practice trends in acute care using a case-based clinical decision making survey
• Subjects: Acute and Cardiovascular Pulmonary section members
• Methods: Chose between “treat” or “not to treat” based on 8 clinical vignettes
• Responses analyzed by educational training and years of experience

Case 1

72 year old Caucasian female

• Walked 1 mile/day pre-op

Findings POD #2:
• +Tenderness in calf region
• Well’s clinical decision rule is >2
• Doppler + for proximal DVT
• She is given Lovenox (1.5 mg/kg SC 1x/day) and has on thigh length compression stockings.
• In the pm: she is to be “out of bed and ambulating with a walker”

• Treat or not? Why?
What are the facts?

• Common symptoms of DVT:
  – swelling, pain, warmth, and discoloration in the involved extremity
• Accurate diagnosis is essential!
  – High risk for serious disease with proximal DVT that is not treated
  – Potential risk of anti-coagulating a patient who does not have a DVT
• In up to 40-50% of those with proximal DVT, silent PE has already occurred by the time that the patient is seen

Well’s Clinical Prediction Rule for DVT

<table>
<thead>
<tr>
<th>Clinical feature</th>
<th>Score</th>
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<tbody>
<tr>
<td>Active Cancer (treatment ongoing or within the last 6 months or palliative)</td>
<td>1</td>
</tr>
<tr>
<td>Paralysis, paresis, or recent plaster immobilization of the lower extremities</td>
<td>1</td>
</tr>
<tr>
<td>Recently bedridden for more than 3 days or major surgery, within past 4 weeks</td>
<td>1</td>
</tr>
<tr>
<td>Localized tenderness along the distribution of the deep venous system</td>
<td>1</td>
</tr>
<tr>
<td>Calf swelling by more than 3 cm when compared to the asymptomatic leg (measured below tibial tuberosity)</td>
<td>1</td>
</tr>
<tr>
<td>Pitting edema (greater in the symptomatic leg)</td>
<td>1</td>
</tr>
<tr>
<td>Collateral superficial veins (nonvaricose)</td>
<td>1</td>
</tr>
<tr>
<td>Alternative diagnosis as likely or more like that of DVT</td>
<td>-2</td>
</tr>
</tbody>
</table>

Scoring

<table>
<thead>
<tr>
<th>Scoring</th>
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<tbody>
<tr>
<td>High probability</td>
<td>3 or greater</td>
</tr>
<tr>
<td>Moderate probability</td>
<td>1 or 2</td>
</tr>
<tr>
<td>Low probability</td>
<td>0 or less</td>
</tr>
<tr>
<td>If history of previous DVT:</td>
<td>Add 1 to score</td>
</tr>
<tr>
<td>DVT likely</td>
<td>2 or greater</td>
</tr>
<tr>
<td>DVT unlikely</td>
<td>1 or less</td>
</tr>
</tbody>
</table>

Well’s Clinical Prediction Rule for DVT


Testing for DVT

• D-Dimer (lab test)
  – a degradation product of cross-linked fibrin
  – detectable at levels >500 ng/mL of fibrinogen equivalent units in nearly all patients with venous thromboembolism (VTE)
  – commonly present in hospitalized patients, particularly the elderly, those with malignancy, recent surgery, and many other conditions, including the second and third trimester of a normal pregnancy
  – So it’s sensitive, but not as specific to VTE

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Testing for DVT

- Contrast venography
  - Gold standard
  - X-ray with constant infusion of dye into veins
  - not recommended as an initial screening due to patient discomfort, exposure to dye and radiation, and $$$

- Compression ultrasonography
  - Abnormal compressibility of the vein or Abnormal Doppler color flow = DVT

Treatment of DVT

- Unfractionated heparin
  - Unpredictable
  - Administered by IV
  - Monitored by activated partial thromboplastin time (aPTT) or heparin levels, and then titrated
  - Target aPTT in the range of 1.5 to 2.5 times the patient’s aPTT baseline value
  - corresponds to a heparin blood level of 0.3 to 0.7 units/mL by the amidolytic anti-factor Xa assay

- Low Molecular Weight Heparins (LMWH)
  - Lovenox, Fragmin
  - Injected, allows for OP treatment
  - Allows for a fixed dose
  - Very reliable—no labs needed
  - Duration of the anticoagulant effect is greater
  - Peak effect • 3 to 5 hours following subcutaneous injection

What’s the history? What’s the evidence?

- Old adage: DVT = Don’t touch them!!
- Today’s evidence:
  - “In patients with acute DVT, we suggest early ambulation over initial bed rest.”
  - Early ambulation was “not associated with a higher risk of progression of DVT, new PE or death”, “safe”, and “clinicians should be confident in prescribing ambulation in this population”
Recommendation: Treat.

- Current evidence supports “to treat” as she is being medically managed with Lovenox and compression stockings and is safe to participate in mobilization activities
- Almost 40% of survey respondents chose to not treat due to:
  - Timeframe regarding anticoagulation
  - Peak for Lovenox is 3-5 hours after administration
  - Need to check labs prior (PT, aPTT, INR)
  - These tests are insensitive measures of Lovenox
  - Decision making most likely more due to institutional guidelines or not taking into account the anticoagulant being used

What information do we have?

- Normal values \(\text{adults on no antihypertensive medications and who are not acutely ill}\)
  - BP
    - Normal: \(<120\text{ SBP} <80\text{ dBP}\)
    - PreHTN: \(120-139\ 80-89\)
    - Stage 1 HTN: \(140-159\ 90-99\)
    - Stage 2 HTN: \(>159\ >99\)
  - HR (at rest): \(50-100\text{ bpm}\)
  - RR (at rest): \(12-20\text{ breaths/minute}\)
  - SpO2 (O2 sats): \(>95\%

Case 2

- 62 year old African American obese man (BMI 31)
- History of HTN and high cholesterol
- Day 1 post MI
- Current meds during hospitalization:
  - Inderol
  - Ticlid
  - Lipitor

- Resting HR = 86 bpm with normal sinus rhythm (2-3 PVCs/min)
- BP 146/92
- RR 16
- SpO2 90% on room air
- Patient with c/o mild chest discomfort radiating into left arm with ST level depression on EKG by 1 mm
- You are to begin Phase 1 cardiac rehab

Treat or Not? Why?

ACC/AHA Guidelines for Exercise Testing

Absolute contraindications:
- Acute myocardial infarction (within 2 d)
- Unstable angina not previously stabilized by medical therapy
- Uncontrolled cardiac arrhythmias causing symptoms or hemodynamic compromise
- Symptomatic severe aortic stenosis
- Uncontrolled symptomatic heart failure
- Acute pulmonary embolus or pulmonary infarction
- Acute myocarditis or pericarditis
- Acute aortic dissection

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ACC/AHA Guidelines for Exercise Testing

Relative Contraindications
- Left main coronary stenosis
- Moderate stenotic valvular heart disease
- Electrolyte abnormalities
- Severe arterial hypertension (SBP>200, DBP>110)
- Tachyarrhythmias or bradyarrhythmias
- Hypertrophic cardiomyopathy and other forms of outflow tract obstruction
- Mental or physical impairment leading to inability to exercise adequately
- High-degree atrioventricular block

ECG Review

Step 1: Locate the P wave
- Absence of P waves may occur secondary to atrial fibrillation
- Check the rate
  - Bradycardia is < 60
  - Tachycardia is >100

Step 2: Establish the relationship between P waves and the QRS complex
- i.e. 1:1 ratio?

Step 3: Analyze the QRS

Step 4: Check regularity
- Is it regularly irregular or irregularly irregular?

Step 5: Correlate with the clinic picture

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Atrial fibrillation

- Caused by a loss in atrial contraction due to multiple ectopic foci & can lead to emboli
- P-wave not seen, wavy baseline is seen instead.
- Irregularly irregular ventricular response
- Patient may have symptoms of lowered CO or hemodynamic instability especially with rapid ventricular response
  - Palpitations, Dyspnea, Chest pain, Hypotension, Lightheadedness, presyncope or syncpe
- Will feel irregularly irregular on palpation

Premature Ventricular Contraction (PVC)

- Rate → variable
- P wave → usually obscured by the QRS, PST or T wave of the PVC
- QRS → wide > 0.12 seconds; morphology is bizarre with the ST segment and the T wave opposite in polarity
- Rhythm → irregular. PVC's may occur in singles, couplets or triplets; or in bigeminy, trigeminy or quadrigeminy.

ECG with ischemia or infarct

With ischemia and infarction, most common are ST segment changes (e.g. depression or elevation) associated with T wave flattening or inversion


Recommendation: Do not treat.

- Patient is presenting with sign and symptoms of myocardial ischemia or "unstable angina"
  - Chest discomfort into left arm and ST depression
  - Unstable angina is an absolute contraindication for initiating an exercise test or aerobic activities per AACVPR and ACSM
  - 82% correct responses on survey
Case 3
66 year old male
• post Q wave MI
• 24 hour delay in admission

• Swan Ganz catheter reading pulmonary capillary wedge pressure of 18-24mm Hg
• Patient c/o:
  – dyspnea when reclined
  – 3+ pedal edema
  – B swollen jugular veins
  – SpO2 88% on 2L with crackles audible over lower 50% of lungs
• Labs + for significant rise in CK-MB and troponins

What do we know?
• Non-invasive lines
  – ECG
  – Pulse Oximetry
• Invasive lines
  – Arterial line (a-line, art-line)
  – Central venous pressure (CVP)

More invasive lines
• Pulmonary Artery Catheter (Swan Ganz)
• Intraaortic Balloon Pump

More invasive lines
• Chest tubes
• Intracranial pressure monitoring
  – Ventriculostomy, lumbar drain
• Mechanical Ventilation

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Cardiac Labs

- Troponins
  - Proteins associated with cardiac muscle
  - Released into blood after myocardial injury or infarction
- Creatinine Kinase-Myoglobin (CK-MB)
  - Released after cell death
- Brain natriuretic peptide (BNP)
  - Hormone released primarily from the heart, particularly the ventricles
  - Most patients with HF and dyspnea have values above 400 pg/mL

Heart Failure

- Commonly the result of Cardiac Muscle Dysfunction (CMD)
- CHF symptoms are a:
  - “sequence of events with a resultant increase in fluid in interstitial spaces of the lungs, liver, subcutaneous tissues, and serous cavities”
- Causes of CMD and CHF:
  - HTN
  - CAD/MI
  - Cardiac dysrhythmias
  - Renal insufficiency
  - Cardiomyopathy
  - Heart valve abnormalities
  - Pericardial effusion
  - PE/Pulmonary HTN
  - SCI
  - Age-related changes

Heart Failure Descriptions

- Right sided
  - RV fails to pump effectively with back up into periphery
- Left sided
  - LV fails to pump effectively with back up in to lungs
- Biventricular
  - LV fails to back up into lungs → PA pressures rise → increased RV resistance causing it to fail too
- Low output
  - Low CO at rest and with exertion
- High output
  - Results from fluid overload on heart with decreased contractility
- Systolic
  - Impaired contractility of ventricles = low stroke volume and low Ejection Fraction (EF)
- Diastolic
  - Inability of ventricles to accept blood from atria at rest or with activity

Heart Failure Symptoms

- Dyspnea
  - Increased RR and/or tidal volume
- Paroxysmal Nocturnal Dyspnea
  - Due to supine position
- Orthopnea
  - Dyspnea in recumbent position
- Fatigue

Heart Failure Signs

- Weight Gain
- Peripheral edema
- Hepatomegaly
- Jugular Vein Distension
- Crackles/Rales
- Abnormal heart sounds on auscultation
- Sinus tachycardia
- Decreased exercise tolerance
Case 4
46 year old obese man
BMI 38
Waist 43"
History of DM II

- 2 days post R BKA
- He has just given himself an insulin injection with current blood glucose of 82 mg/dL
- Resting HR 114 bpm
- He is confused and anxious

What to do?

Recommendation: Do not treat

- Labs indicate active MI
- Classic signs and symptoms of “uncontrolled/decompensated CHF”
- 90% correct on survey

Medication management of type 2 DM

- Metformin
  - recommended at the time of diagnosis
  - May not be appropriate in those with impaired renal function, liver disease, heart failure, history of lactic acidosis, or decreased tissue perfusion
  - Less hypoglycemia than other meds

- Insulin secretagogues
- Sulfonylureas
  - Glipiizide (Glucocontrol) and others
  - Effectiveness decreases over time
  - Higher risk of hypoglycemia
- Repaglinide (Prandin)
  - Can be used in patient with chronic kidney disease
**Medication management-Insulin**

- **Rapid acting**
  - Humalog
  - Novolog
  - Apidra
- **Short acting**
  - Humulin or novolin
- **Intermediate acting**
  - NPH
  - Lente
- **Long acting**
  - Ultralente
  - Lantus
  - Levemir or detemir
- **Pre-mixed (2x/day)**
  - Humulin 70/30
  - Novolin 70/30
  - Novolog 70/30
  - Humulin 50/50
  - Humalog mix 75/25

**What does the evidence tell us about exercise in persons with diabetes?**

- Exercise results in improved glycemic control independent of weight loss.
- Higher levels of aerobic fitness are associated with lower mortality no matter a person’s weight.
- A single bout of aerobic exercise alters insulin sensitivity for 24-72 hours.
- Resistance training has been found to be safe and beneficial.

**Exercise when glycemic control is suboptimal**

- **Hyperglycemia**
  - Light or moderate exercise should help lower plasma glucose levels.
  - Make sure patient is adequately hydrated and ketones are negative.
- **Hypoglycemia**
  - Rare in those not treated with insulin or insulin secretagogue.
  - ADA suggests carb be ingested prior to exercise if glucose levels are <100 mg/dL for those on insulin or insulin secretagogue.
  - Beta blockers can blunt the symptoms.

**Recommendation: Do not treat**

- Classic symptoms of hypoglycemia
  - High resting HR
  - Anxiety
  - Confusion
- Almost 40% opted to treat on survey with caveat of “close monitoring” or “low level bedside activity”.
Case 5

- 58 year old female
- Receiving bone marrow transplant following diagnosis of leukemia
- Prior to transplant, immunosuppression has been induced trying to kill off neoplastic cells in her blood and marrow

- Lab values:
  - WBC = 2,200
  - Hgb = 7.4
  - HCT 21%
  - Platelets = 3,200
- Vitals:
  - Resting HR = 114 bpm
  - BP 114/64
  - SpO2 92% on room air
  - Respiratory rate = 16

Acute Care Section-APTA Lab Values Resource Update 2012

- “It is the professional responsibility of the physical therapist to interpret available laboratory values as a component of the examination and evaluation of a patient/client, to suggest laboratory testing when indicated, and to use lab values to guide the determination of safe and effective interventions for the patient/client.”

Lab Value Norms

- Hematocrit (Hct):
  - % RBCs in blood
    - Adult male: 41-51%
    - Adult female: 36-47%
- Hemoglobin (Hgb):
  - Protein in RBCs that allow for binding to O2
    - Adult male: 14-17 gm/DL
    - Adult female: 12-16 gm/DL
- White Blood Cells:
  - # of WBCs
    - 3900-10,700 cells
- Leukocytosis when values are > 11,000
- Neutropenia is when ANC < 1500
- Platelets:
  - 150,000-450,000
  - Thrombocytopenia
    - <10,000-15,000
    - Thrombocytosis
      - >400,000
Practice Guidelines

- **Hematocrit/Hemoglobin**
  - <25%/<8 g/dL
    - Light ROM, isometrics. Avoid aerobic or progressive programs
  - 25-35%/8-10 g/dL
    - ADLs with assistance as needed for safety, light aerobics, light weights (1-2#)
  - >35%/>10 g/dL
    - Ambulation and self care as tolerated, resistance exercises

- **Platelets**
  - <10,000 and/or temp >100.5
    - Hold therapy
  - 10,000-20,000
    - Exercise/bike without resistance
  - >20,000
    - Exercise/bike with or without resistance

Case 6

- 54 year old male
- 2 days post TKA
- Long history of HTN and CAD
- He is comfortable at rest
- Complaints of “chest tightness” with usual activity
- EKG shows 2 mm ST segment depression
- He appears pale

Recommendation: Treat

- Many of her labs are below levels often thought to be contraindications for activity
- But,
  - She’s young, not a fall risk, and receiving treatment that is causing these changes.
  - Vitals were relatively normal
  - Treatment would be limited in physiologic cost (ie bed activities) and patient would need to be monitored closely

  - Survey says: 57% opted to treat

Recommendation: Do not treat

- Already has history of cardiovascular disease
- Signs of MI with activity: pallor, chest tightness, ST depression
- Risk of cardiac event outweighs the benefits of mobilization after arthroplasty

- 94% in survey opted to not treat
Case 7
- 72 year old female
- POD #1 THA
- Known history of dysrhythmias

- Goes into ventricular tachycardia during activity
- Terminate activity and notify medical personnel

- Without EKG, this patient will demonstrate symptoms associated with lack of blood perfusion:
  - Chest pain
  - Palpitations
  - Anxiety
  - Diaphoresis
  - Syncope
  - It is a pulseless rhythm so initiate code protocol

Abnormal cardiovascular responses to activity
- SBP: rapid increase, blunted rise and NOT on beta blockers, any decrease
- DBP: >10 mm Hg rise
- HR: rapid rise, blunted rise and NOT on medications that alter HR, any decrease
- SpO2: Decrease from baseline
- EKG: Becomes irregular, more PVCs than at resting

Case 8
- Patient is day 2 post CABG
- Vitals at rest:
  - HR 94
  - BP 114/64
  - SpO2 92% on RA
  - RR 16
- Vitals with activity:
  - Sinus tachycardia (HR 110)
  - BP 132/70
  - SpO2 94% on RA
  - RR 20

Recommendation: Treat
- These vitals demonstrate normal physiologic response to activity
- HR increased by < 30 bpm as recommended for patients post-CABG
- 95% of respondents opted for “treat”
More about the study…

• Limitations:
  – Survey constructed by one author, not peer reviewed
  – Cases were hypothetical and only a “snapshot” of info
  – Low response rate
  – Possible bias with those that did respond

• Outcomes:
  – 80% of survey participants answered 5/8 in accord with the survey constructor
  – N = 356
  – PTs with 10+ years experience coupled with advanced degrees had the highest scores

In summary…

• We often need to educate other health care providers on our role as exercise and activity specialists
  ◦ Understanding the existing evidence and guidelines can help with this

• Medicine is changing all the time and therapy in the acute care environment is no exception

• Thanks for listening!!!

References


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