Applying Exercise Prescription Principles Across The Health Care Continuum For The Older Adult With Multiple Chronic Conditions

Cathy Ciolek, PT, DPT, GCS, CEEAA, University of Delaware
Greg Hartley, PT, DPT, GCS, CEEAA, University of Miami
Jill Heitzman, PT, DPT, GCS, NCS, CWS, CEEAA, FACWCS, Alabama State University
Bill Staples, PT, DHSc, DPT, GCS, CEEAA, University of Indianapolis

Disclosure

• No relevant financial relationship exists

Session Learning Objectives

1. Formulate a comprehensive exercise program to address aerobic, strength, gait and balance impairments associated with the most prevalent chronic conditions in older adults as they progress through the health care continuum.
2. Critique case examples of exercise programs commonly utilized across the continuum of care to determine if they meet the exercise principles needed to effect positive change.
3. Apply the results of the chosen tests and measure to the development of a plan of care.

Session Outline

• Introduction: Statistics on older adult population (and middle age population) who have multiple chronic conditions
• Exercise principles and components for older adults
• Setting specific considerations
• Case Studies Across the Continuum
• Questions and Answers

Percentage of population over 65 years old

Chronic diseases and conditions—such as heart disease, stroke, cancer, diabetes, obesity, and arthritis—are among the most common, costly, and preventable of all health problems.

As of 2012, about half of all adults—117 million people—have one or more chronic health conditions. One of four adults has two or more chronic health conditions.

Seven of the top 10 causes of death in 2010 were chronic diseases. Two of these chronic diseases—heart disease and cancer—together accounted for nearly 48% of all deaths.

Obesity is a serious health concern. During 2009–2010, more than one-third of adults, or about 78 million people, were obese (defined as body mass index [BMI] ≥30 kg/m²). Nearly one of five youths aged 2–19 years was obese (BMI ≥95th percentile).

Arthritis is the most common cause of disability. Of the 53 million adults with a doctor diagnosis of arthritis, more than 22 million say arthritis causes them to have trouble with their usual activities.

Diabetes is the leading cause of kidney failure, lower limb amputations other than those caused by injury, and new cases of blindness among adults.
Acute Care Admission Dx (2008)

65-84 years old
- Congestive heart failure
- Osteoarthritis
- Pneumonia
- Coronary atherosclerosis
- Cardiac dysrhythmias

85+
- Congestive heart failure
- Pneumonia
- Septicemia
- Urinary tract infection
- Cardiac dysrhythmias

• HCUP Facts and Figures
• http://www.hcup-us.ahrq.gov/reports/factsandfig

Leading Dx Among IRF Patients

Leading Dx Among SNF Patients

Leading Dx Among HHC Patients

Diagnosis and undiagnosed diabetes among people aged 20 or older in US 2012

<table>
<thead>
<tr>
<th>Age</th>
<th># with diabetes (millions)</th>
<th>Percentage with diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>4.3</td>
<td>4.1</td>
</tr>
<tr>
<td>45-64</td>
<td>13.4</td>
<td>16.2</td>
</tr>
<tr>
<td>65 and older</td>
<td>11.2</td>
<td>25.9</td>
</tr>
</tbody>
</table>


Heart Disease

- Coronary heart disease is the most common type of heart disease, killing nearly 380,000 people annually.
- Every year about 720,000 Americans have a heart attack. Of these, 515,000 are a first heart attack and 205,000 happen in people who have already had a heart attack. (Go AS. 2014)
OA Prevalence

- Overall, in the United States, OA affects 13.9% of adults aged 25 years and older and 33.6% (12.4 million) of those 65+ in 2005; an estimated 26.9 million US adults in 2005 up from 21 million in 1990 (believed to be a conservative estimate).

(Lawrence RC, 2008)

OA: Quality of Life

- Arthritis is the most common cause of disability among US adults and has been for the past 15 years.

- About 43% of adults with OA have some degree of arthritis-related activity limitation.
  - Walking ¼ mile: 6 million
  - Stooping/bending/kneeling: 8 million
  - Climbing stairs: 5 million
  - Social activity such as church and family gatherings: 2 million


OA: Hospital/Surgery

- In 2010 TKA was the most frequently performed inpatient procedure on adults aged 45 and over. Estimated 5.2 million 2000-2010
- Total hip replacements 332,000 in 2010

Physical Stress Theory & Exercise Principles

- Overload
- Intensity
- Specificity
- Progression
- Recuperation/Recovery
- Use/Disuse

Overload (Mueller 2002)

- Tissues/systems must be exposed to a load not normally exposed in order to improve.
- This principle applies to aerobic capacity (endurance), strength, balance, power, and flexibility.
- Must be individualized for intensity, duration, frequency, and time.
- Must be continuously reassessed to progress.

Overload Principle

- In order for a muscle to become stronger it must encounter adequate stimulus
- HOW DO WE MEASURE OVERLOAD?
  - Use the patient’s 1 repetition maximum (RM)
  - Take the patient’s 1 RM and calculate 60% of the 1 RM
  - 60% of 1 RM is considered MINIMAL overload necessary for significant muscle adaptation in untrained individuals (40%-60%: minor changes; below 40%: maintenance; <30%: can lose ground)
- 80% of 1 RM is the preferred workout to obtain optimal results. 48 hours of rest between
- Gradual progression from 50% is acceptable

Intensity

• Must be sufficient to overload the cardiopulmonary, musculoskeletal and/or neuromuscular systems (without over-straining).

• Must regularly monitor intensity as body adapts to the stress or load (HR, RPE, reps,) and make changes.

Specificity

• Training must reflect the type of physical performance required for the skill to be performed whether it is an ADL or running a marathon.

• Techniques/exercises must simulate velocity/acceleration/strength necessary for that performance.

• Clinicians need to prescribe intensities of exercise that follow these principles.

Specificity

• Training will only impart change to what is overloaded.

• To become better/stronger the specific exercise must target that specific system.

• i.e. To improve sit to stand quads and hip extensors must be trained in a closed chain concentric exercise with sufficient resistance to simulate body weight.

• Strapping a 5# weight on the ankle for LAQ will not improve this function!

Specificity

• Closed chain strength training does NOT increase strength in open chain exercises and vice versa (LAQ)

• This is especially important with frail individuals
  – Task specificity is essential for improved function
  – Have diminished reserve and increased bodily fatigue

• When frail patients perform task specific exercise, their strength is increased
  – Performance of ADLs may require sufficient effort to achieve threshold for strengthening (Moffroid MT, 1970)
  – “Functional improvement occurs when the exercise stimulus closely matches the desired result.” (Santana J, 2000)

Specificity

• Strengthening a movement rather than a muscle
  – “Functional training is the single most important component of geriatric rehabilitation.” (Srivula A, 2011)

• Task Specific Functional Training (Powers CM, 2010)
  – There is little basis for use of SLR to achieve a functional movement such as walking or stair climbing.
  – There is no basis for performing knee extension from a sitting position unless one is training the older individual to kick from a sitting position.
  – Challenge gait, transfers with additional weight (vest), unstable surfaces, or altered visual input.

Progression

• The patient must be continuously reassessed for baseline changes in order to insure adequate stimulus (overload) is present

• Generally if a patient can perform more than 15 repetitions they are only being overloaded at the 50% level and activity/exercise needs to adjusted to increase the load.
Progression

Initial exercise for strengthening
• First 8 weeks are more neurologically based (recruiting “sleeping” motor units).
• Changes in muscle morphology occur after this initial period

Recuperation/Recovery

• Training cannot be rushed
• Body needs time to allow physiologic mechanisms required for the activity to adapt.
• Overload training for strengthening should be performed every other day to allow healing.
• Can utilize low intensity between high intensity for recovery/or UE and LE on alternating days.
• Training intensity progressed too quickly may lead to increased risk of injury.

Use/Disuse

• “Use it or lose it”
• Muscles hypertrophy with use/atrophy with disuse
• Gains made in strength and endurance fade twice as fast as they were gained
• Maintenance program is essential following gains

Exercise Recommendations for Optimal Aging (ACSM, 2014)

<table>
<thead>
<tr>
<th>Resistance</th>
<th>Cardio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2+ days/wk</td>
</tr>
<tr>
<td>Volume</td>
<td>8-12 reps</td>
</tr>
<tr>
<td>Intensity</td>
<td>12-15 BORG</td>
</tr>
<tr>
<td>Requirements</td>
<td>Slow, day of rest btw sessions</td>
</tr>
</tbody>
</table>

Exercise Recommendations for People with Hypertension (ACSM, 2014)

<table>
<thead>
<tr>
<th>Resistance</th>
<th>Cardio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2+ days/wk</td>
</tr>
<tr>
<td>Volume</td>
<td>8-12 reps</td>
</tr>
<tr>
<td>Intensity</td>
<td>40-60% HR Max</td>
</tr>
<tr>
<td>Requirements</td>
<td>Slow, day of rest btw sessions</td>
</tr>
</tbody>
</table>
Exercise Recommendations for People with **Diabetes** *(ACSM, 2014)*

<table>
<thead>
<tr>
<th>Resistance-different</th>
<th>Cardio-different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>At least 3 day, no more than 2 day off</td>
</tr>
<tr>
<td>3 days/wk</td>
<td>Min of 150 minutes/week</td>
</tr>
<tr>
<td>Volume</td>
<td>3 sets of 8-10 reps</td>
</tr>
<tr>
<td>Intensity</td>
<td>50-70% HR Max</td>
</tr>
<tr>
<td>Requirements</td>
<td>Slow, day of rest btw sessions</td>
</tr>
</tbody>
</table>

Exercise Recommendations for People with **Arthritis** *(ACSM, 2014)*

<table>
<thead>
<tr>
<th>Resistance-different</th>
<th>Cardio-same</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2-3 days/wk of isotonic or isometric</td>
</tr>
<tr>
<td>2-3 days/wk of isotonic or isometric</td>
<td>3-5 days week (mod) 3x for vigorous</td>
</tr>
<tr>
<td>Volume</td>
<td>6-15 reps</td>
</tr>
<tr>
<td>Intensity</td>
<td>50-60% HR Max</td>
</tr>
<tr>
<td>Requirements</td>
<td>Slow, day of rest btw sessions</td>
</tr>
</tbody>
</table>

**AGS Evaluation and Management Tools Multimorbidity** *(AGS 2012)*

- Elicit and incorporate patient preferences into decision making
- Recognize the limits of the evidence base (i.e. limited studies on multimorbid older adults)
- Frame decisions within context of risk, burdens, benefits and prognosis, quality of life
- Consider treatment complexity and feasibility
- Choose therapies that optimize benefit, minimize harm and enhance quality of life

**Summary**

- Muscle weakness is related to:
  - Decreased physical function
  - Falls
- Inadequate resistance is often seen in the clinic (i.e. 3 sets of 10 repetitions with a 2 lb weight - ARBITRARY) in a w/c (lazy practice)
- 60% of 1-RM is the MINIMAL overload needed for marked muscle adaptation (strength gains)
  - 60% is indicated by 15 repetitions with deteriorating form and inability to complete full ROM during last 1-2 repetitions

**Summary**

- Patients need to be monitored while exercising for correct form, fatigue and adjustments.
- This is what makes exercise skilled therapy and requires the therapists knowledge.
- It is not just telling the patient to do 10 repetitions and walking away.
- “Strengthening without adequate stimulus is tantamount to malpractice”
EDGE Recommendations
Evaluation Database to Guide Effectiveness

• Parkinson’s Disease
  http://www.neuropt.org/professional-resources/neurology-section-outcome-measures-recommendations/parkinson-disease

• Stroke
  http://www.neuropt.org/professional-resources/neurology-section-outcome-measures-recommendations/stroke

Rehabilitation Measures Database

• Rehabilitation Institute of Chicago
  http://www.rehabmeasures.org/default.aspx

PT Now

• Functional Limitation Reporting Under Medicare
  http://www.ptnow.org/functionallimitationreporting/testsmeasures/default.aspx

• EDGE documents
• Clinical Summaries (original, peer reviewed)
• Open Door and Hooked on Evidence now housed there.
• PTNow will search across it’s own database as well as RehabMeasures. No need to search both anymore.

General Guidelines

Older adult (age 65+)

➢ Berg Balance Test
➢ Gait Speed
➢ POMA
➢ Six Minute Walk Test
➢ SPPB
➢ TUG

Hip fracture with surgical repair

➢ Gait Speed
➢ SF-36
➢ Six Minute Walk
➢ SPPB


Strength testing

5 times sit to stand
• Strength test in those who are frail
• Limited time
• Screening for more detailed strength

30 second sit to stand
• A functional strength: combines strength and endurance
• Sensitive to change

Aerobic Testing

<table>
<thead>
<tr>
<th>Endurance response over time</th>
<th>Functional endurance</th>
<th>Endurance, incapable of walking but can stand holding grab bar or walker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gait changes with fatigue</td>
<td>Cannot tolerate 6MWT</td>
<td>Limited space, time, equipment</td>
</tr>
<tr>
<td></td>
<td>• Limited time</td>
<td>Precautions for gait/antalgic in gait</td>
</tr>
</tbody>
</table>

6 min walk (6MWT) | 2 Minute Walk (2MWT) | 2 minute step test |

2 Minute Walk (2MWT) | 2 min walk (6MWT) |

6MWT: 6 minute walk test
### Gait Measures

**Gait speed**
- A measure of gait speed and capacity without turns (preferred walk and fast walk)
- Patient uses an assistive device

**Timed up and Go (TUG)**
- Screening for function
- Well studied with many diagnosis and patient populations
- May use an assistive device

### Balance Tests

**Functional Reach**
- Health fair, screening, ROM attributes
- Investigating limits of stability
- Combine range of motion in static balance
- Predictability, age norms available
- Physical screen for fear of falling

**4 Stage Balance**
- Screening for further testing
- Limited time, space, equipment
- Incorporates single limb stance

### More on TUG

**Criter and Honaker, 2016**
- “Identifying balance measures most likely to identify recent falls.”
- Small study (n=30)
- Timed Up and Go test was the most important indicator of a recent fall.
- A cutoff score of 12 or more seconds was optimal.

**GeriEDGE & STEADI**
- TUG is a component of the STEADI Program
- [http://www.cdc.gov/STEADI/](http://www.cdc.gov/STEADI/)
- They also use a cut point of 12 seconds.
- GeriEDGE: BERG and TUG most predictive of a future fall (previously presented at CSM, publication pending)

### Berg Balance Test

**Assesses a broad spectrum of balance conditions**
- Incorporates transfers; reach; body rotation; and limited BOS in 1 test
- Prognostic relationships to outcomes in stroke
- Can be used with a wide variety of diagnoses
- Helps develop a POC

### Acute Care

- Medically unstable
- Emergency
- Surgical
- Seen daily by physician
- A major role of the PT is to assess rehabilitation potential, make recommendations for post-acute care, facilitate care transitions, and prevent avoidable readmissions.
Acute Care

- 2011 acute care study concluded: "Holding all other variables constant, a patient was more likely to be readmitted when the therapist discharge recommendation was not implemented and services were lacking," compared with instances in which PT-recommended steps were taken.

- Smith BA, Fields CJ, Fernandez N. Physical therapists make accurate and appropriate discharge recommendations for patients who are acutely ill. Phys Ther. 2010;90:693-703.

Tests & Measures: Acute Care

- Vital Signs
- Rate of Perceived Exertion
- 2 Minute Walk Test
- Geriatric Depression Scale
- Gait Speed
- Timed Up and Go
- Sit-To-Stand Tests
- Elderly Mobility Scale (EMS)

Sub-Acute vs Acute Rehab

Sub-Acute
- Therapy offered 5-6 days per week but generally less than 3 hours per day
- Patients may have higher ADL assist needs
- Nursing services but may not have RN 24 hours/day
- Pt may go home, to SNE or to Acute Rehab when ready

Acute Rehab
- Considered most intense rehabilitation
- Therapy offered 5-7 days/week, 3 hours combined therapy per day
- Rehab nursing 24 hours a day
- Case Manager
- Patient plan is return home

Tests & Measures: Sub-Acute/SNF

- TUG or gait speed
- 2 Minute Step Test
- 30 sec. Sit to Stand
- 2-6 Minute Walk Test
- Grip strength
- Functional Reach
- FES or ABC Scale (fear of falling)
- Berg Balance Scale

Home Health

- Performed in the patient’s residence
- Other settings want pts to go home, we want them out of the home!
- D/C when able to rejoin community, no longer homebound

Acute Care: Commercial Tools that are helpful:

- The Boston University Activity Measure for Post Acute Care (AM-PAC)™ is an activity limitations measure that was developed specifically for use across post-acute care settings. The AM-PAC measures activity limitation in three distinct functional domains: Basic Mobility, Daily Activities and Applied Cognitive. AM-PAC items in each domain are scaled along a continuum of difficulty to create ‘item banks.’ “6-Click” Inpatient Short Form (Basic Mobility and Daily Activity domains).

- Patient Activation Measure (PAM)™: A commercial product which assesses an individual’s knowledge, skill, and confidence for managing one’s health and healthcare. Individuals who measure high on this assessment typically understand the importance of taking a pro-active role in managing their health and have the skills and confidence to do so. The PAM survey measures patients on a 0-100 scale and can segment patients into one of four activation levels along an empirically derived continuum. Each activation level yields insight into an array of health-related characteristics including attitudes, motivations, behaviors, and outcomes.
Tests & Measures: Home Health

- TUG
- 2-Minute Step Test
- 30 sec. Sit to Stand
- 4M Walk Test
- Grip strength/dynamometry
- Functional Reach
- FES or ABC Scale (fear of falling)
- Berg Balance Scale or FSST
- mCTSIB

Tests & Measures: Outpatient

- TUG
- Gait Speed
- 2-Minute Step Test
- 30 sec. Sit to Stand
- 6 Minute Walk Test
- Grip strength

+Many more!

Outpatient

- Most likely to be medically stable (but you never know!)
- All diagnosis (and combinations) are possible
- May or may not be through physician referral
- May be seeking wellness services
- Should have some level of independence to be home or have support system in place. However this system may not be working and you may be the only provider to be seeing them.

Presenting Factors

- Reason for Referral/Therapy contact:
- Age:
- Sex:
- Marital Status
- Living situation (house, apt, rural/urban)
- Current barriers to performance
  - ADL’s
  - Vocational
  - Home life
  - Socialization
- Pre admission status
- What activities are limited, why?

Patient Profile

- Work/home history
- Current Activity and Participation profile (work, avocation, driving, self-care, housework)

CASES
Relevant Medical and Social History

• Medical Diagnosis
  – Current treatments
  – Prior treatment

• Medications

• Cultural considerations

Goals of intervention

<table>
<thead>
<tr>
<th>Goals for the specific setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute: Assess function &amp; make D/C recommendations for next level of care</td>
</tr>
<tr>
<td>Acute: Maximize function to allow full participation in next level of care</td>
</tr>
<tr>
<td>Acute: mitigate likelihood of re-admission</td>
</tr>
<tr>
<td>Sub-Acute: Maximize function and likelihood of discharge to the community, prevent avoidable re-admissions</td>
</tr>
<tr>
<td>Home Health: Maximize function and ability to return to community-based activities outside of the home, prevent avoidable re-admissions</td>
</tr>
<tr>
<td>Outpatient: Maximize function, prevent avoidable re-admissions, maintain ability to remain in the community</td>
</tr>
<tr>
<td>ALL: Instruct in behaviors that support wellness and health promotion.</td>
</tr>
</tbody>
</table>

Information needed from previous setting

• Care Transitions (and prevention of hospital re-admissions)
  - http://www.apta.org/HospitalReadmissions/ |

• IMPACT Act

• CARE Tool

Case #1: Shirley W.

• Mrs. Shirley W. is a 70 year old white female s/p right subtrochanteric hip fracture due to a fall while attempting to get up from a chair. She had an ORIF upon admission to the hospital. She is WBA T on RLE. She also concurrently has dyspnea due to a recent acute exacerbation of CHF and pneumonia. Prior to the fall, she was I with all ADL/IADL.

• Past hx: COPD dx 5 years ago, MI two years ago, increased dyspnea over the last 2 months, weight gain of 10# over the last week. She reports bouts of diarrhea and occasional urinary urgency with some dribbling. She wears glasses with bifocals.

• General Information: She is a retired librarian and lives in a senior apartment community. Her husband died 2 months ago and she has a hx of depression. She has 3 adult children, one of whom lives within 10 minutes away.

• On examination the patient visually presents with kyphotic posture, labored breathing, and edematous LE’s (R > L).

Shirley W: Medication List

• Spiriva inhaler (COPD)
• Metoprolol 25 mg twice a day (MI)
• Simvastatin 5 mg daily (MI)
• Lisinopril 5 mg daily (CHF)
• Lasix 20 mg daily (CHF)
• Lorct Plus -hydrocodone/acetaminophen (pain)
• Bactrim DS twice a day (pneumonia)

Acute Care Tests and Measures

• Vitals: BP= 140/88, Resp = 19, pain = 5/10 at rest.
• H & H: 11.5/37
• Patient was unmotivated for rehab, given history, performed GDS (SF) (score = 7, suggestive of depression), spoke to MD who added duloxetine (Cymbalta).

• POD 2: Performed 30 sec Sit to Stand (score = 0) [I knew she couldn’t do 5 reps so chose 30 vs 5 rep version]. Required UE assistance.
• POD 2: 2MWT (60 feet), RPE = 14/20
• POD 3: TUG: 25 secs.
Acute Care Goals

• Perform bed mobility independently
• Transfers (sit to stand, bed to chair) with supervision
• Ambulate 100 ft with RW and supervision, WBAT with an RPE <15 and no loss of balance
• Decrease pain to 1-2/10

Acute Exercise Prescription

• Bed mobility training
• Sit to stand transfer training and using this activity for strength training as well.
• Gait training with RW, to tolerance, cues for WB and balance/safety.
• LE AROM (add resistance prn)
• Safety education with AD
• D/C to SNF on POD 4

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Intensity</th>
<th>Frequency</th>
<th>Mode</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic Capacity</td>
<td>2.0 mets, passes Talk Test</td>
<td>Twice a day</td>
<td>Walking</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>Strength</td>
<td>30-60% IRM (1 set x 12-25 reps); RPE = ‘hard’</td>
<td>Daily</td>
<td>ROM, gravity, light weight prn</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>AROM</td>
<td>To tolerance</td>
<td>Twice a day</td>
<td>AROM</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>Gait/mobility</td>
<td>Low</td>
<td>Twice a day</td>
<td>Ambulation</td>
<td>5-10 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Intensity</th>
<th>Frequency</th>
<th>Mode</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance</td>
<td>Static balance activities, safety</td>
<td>Daily</td>
<td>Incorporate into daily activities</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>Assess depression, safety education, pain mang.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Shirley W: continued in SNF

• Goal: Return to home (lives in Senior apt.)
• From Acute: 2MWT: 60’, RPE=14/20, TUG: 25s, Sit to stand: 0
• New tests:
  – Sit to stand: determined what height she could do this and found 22” she could do 3
  – Gait speed: 0.8m/sec with walker
  – mCTSIB:
    • level 1 20 sec, level 2-5 sec, level 3&4: 0
    – FR: 4”
    – ABC: 30%

Shirley Treatment Plan

• Goal: Increase aerobic capacity
  – Recumbent stepper: 40-60% intensity, 10-20 minutes
• Goal: Increase strength
  – Sit to stand: 60-80% intensity: from 22” height, working to get lower height, with goal of 8-12 reps before lowering
  – Standing:
    • RLE: flex, ext, abd: 40-60% intensity with goal of 15-25 reps
    • Step downs: Lower LLE to ground and back up from 2” step progressing as tolerated

Shirley Treatment Plan

• Goal: Increase balance: 50-60% intensity, 15 minutes
  – Standing:
    • On RLE: moving LLE in hip flex, abd, ext
    • Various surfaces: foam, mats and trying to let go of walker
    • Reaching various directions letting go of walker
• Goal: Improve gait/mobility 50-60% intensity, 15 minutes
  – Walking with walker increasing distance, around obstacles, over obstacles, and stairs
Shirley Discharge to HH

- 2MWT: 100’ with RPE 14
- TUG: 20 sec with walker
- Sit to stand: able to do 1 from standard height
- mCTSIB: level: 1 30 sec, level 2: 10 sec, level 3: 10 sec, Level 4: unable
- FR: 7”

Home Health-Tests

- Home environmental eval-fall prevention
- Access to activities, meals, etc.
- 2 min step test (endurance): 71 (RPE 7/10)
- Hand-held dynamometer:
  - Hip abd strength 18# (3/5). Bohannon found 54# norm
  - Grip strength: 25# B (norm 49.5#)
- 30 sec sit to stand LE strength: 5 reps (below 15%) SFT

Home Health-Tests

- TUG (Medicare) mobility: 18 sec.
- mCTSIB: balance:
  - Stable surface, EO: 30 sec (mean for age 30 sec)
  - Stable surface, EC: 15 sec (mean for age 30 sec)
  - Foam, EO: 15 sec (mean for age 26-28 sec)
  - Foam EC: 5 sec (mean for age 26-28)
- FES-I or ABC Scale: mean 40% confidence
  - < 50% confidence indicative of low level physical function, and being homebound

Home Health POC

- Monitor all exercises to increase intensity and challenge (overload) systems
  - Balance: different surface/support
  - Endurance: as improvement occurs add distance reps, monitor RPE
  - Strength: increase resistance 80% 1 rep max, maintain proper form

Home Health Goals

- Goals:
  - Independent function in the community
  - ↑ ABC to 60%
  - Gait without assistive device up to 1,000’ before requiring a rest (independent to communal dining area)
  - mCTSIB scores of 30 sec for all positions except foam EC: 15 sec
  - 2 min step test: 100+ (RPE 6/10)
  - 30 sec STS: 15
Home Health Intervention
- Fall risk interventions: 2nd fall & readmission
- Transverse abdominis/Kegel: incontinence
- Isolated strength hip abductors: 80% 1-rep max
- Body weight ex at kitchen counter
  - Maintain form, start with UE assist, remove UE assist, add weight if necessary to 80%
- SLS/altered surface for balance
- Gait to improve pattern and endurance
  - Monitor RPE to increase intensity 7/10
- Swiss ball for core

Case #2: Stan M.
- Mr. Stan M is a 67 year old male who was admitted to the hospital with an acute exacerbation of chronic bronchitis and emphysema.
- General information: Mr. M lives with his wife in a 2 story home on the family farm. The farm is now run by his son, though Mr. M still assists with some farming tasks. The home has two steps with a handrail to enter. Prior to admission he was active in the community with youth agriculture groups and his church. He has smoked 1-2 packs/day since age 14.
- Past Hx: Mr. M has been to the ER 3x in the past years for difficulty breathing and an unproductive cough. The last visit to ER 2 weeks ago, he was given antibiotics. He also has a history of Parkinson disease which was diagnosed 4 years ago. The PD is being managed pharmacologically (levodopa) at the present time. His family report he has been forgetful in recent months.
- He has been in the hospital for 2 days prior to the referral to PT. He is expected to be discharged within the next 2 days.

Stan M: Medication List
- Levodopa 100 mg 4 times a day (Parkinson’s Disease)
- Albuterol inhaler as needed (emphysema)
- Serevent inhaler as needed (emphysema)
- Levaquin 500 mg daily (chronic bronchitis)
- Nicotine patch

Acute Care Test and Measures
- Vitals = all managed medically and stable
- POMA = 5/28
- MoCA = 24/30 (mild cog impairment)
- 30 sec STS (score = 0) (used arms)
- TUG = unable
- 15’ with mod A and RW, RPE=15/20
- O₂ sat at rest = 92

Acute Care Goals
- Increase bed mobility to min A.
- Increase transfers (sit/stand, bed/chair) to min A.
- Ambulate with RW 25 ft with mod A.
- Perform functional mobility without increased SOB and O₂ sats > 90
- Increase POMA by 3 points to decrease risk of falls.

Acute Exercise Prescription
- Functional activities
- Sitting and standing balance activities
- High amplitude gait training (prn)
- Incentive spirometry
- Exhale on exertion
- Pursed lip breathing
### Acute Exercise Prescription

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Intensity</th>
<th>Frequency</th>
<th>Mode</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic Capacity</td>
<td>2.0 mets, passes Talk Test, RPE = 11-12</td>
<td>Twice a day</td>
<td>Standing, Walking, functional activities</td>
<td>5 minutes</td>
</tr>
<tr>
<td>Gait/mobility</td>
<td>Low/Moderate RPE = 11-12</td>
<td>Twice a day</td>
<td>Ambulation, gait training</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>Balance</td>
<td>Static balance activities, sitting and standing, safety</td>
<td>Daily</td>
<td>Incorporate into daily activities</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Functional Mobility</td>
<td>2.0 mets, RPE = 11-12</td>
<td>Twice a day</td>
<td>Bed mobility and transfer training</td>
<td>10 minutes</td>
</tr>
</tbody>
</table>

Assess cognition, safety education, cardiopulmonary.

---

### Stan M: IRF

- **Goal:** Return home (lives with wife on farm and active in community)
- **Has had an exacerbation of PD, pulmonary issues affecting aerobic capacity**
- **Will be discharged with assistive device**
- **From Acute Care: functional mobility, gait and balance affected, LE strength affected**

### Stan: IRF Tests

- **FIM:** Locomotion: 3, Stairs: 1
- **UPDRS:**
  - On the mobility tasks: scores 1 on most tasks except: 2 on Freezing, rigidity, arising from chair, gait and postural responses and 3 on walking.
- **Gait Speed:** 0.4 m/sec
- **2MWT:** 45’ w/ rolling walker + assist, RPE: 16

### Stan: Tests cont

- **Berg Balance Scale:** 13/56
  - 4: for sitting unsupported, 2: sit to stand and stand to sit, 1: for transfers, standing unsupported, FR and looking over shoulder, 0 for everything else
- **General ROM:** Trunk rotation & extension decreased
- **Overall:** Deconditioning as result of pulmonary issues, hospitalization led to loss of function which has been markedly worsened due to underlying PD which seems to have exacerbated.

---

### Stan: Treatment Plan

- **Goal:** Increase aerobic capacity
  - Recumbent stepper: 40-60% intensity, 15 minutes
- **Goal:** Increase LE strength: 60-80% intensity
  - Sit to stand from height he can do, goal 8-12 reps then lower chair height
  - Leg press for 8-12 reps
- **Goal:** Improve trunk mobility
  - Kayaking in sitting high endurance reps: 25-30
  - Work on moving adding weights on sticks, sitting on balance foam
- **Goal:** Independent gait with assistive device
  - Progressive gait distance, around obstacles
  - Treadmill at 40% intensity for reciprocal movement, may need to use body weight supported device initially
Stan: Discharge to Home with Outpatient PT

- 2MWT: 150’ with rolling walker, RPE 13
- Sit to stand: 5 in 30 seconds from standard height
- BERG: 28/56
- FIM: locomotion: 5, Stairs: 3
- Gait speed: 1.0 m/sec

Stan: Intake

- Driven to outpatient clinic about 15 minutes away by wife. She reports it takes >5 minutes for him to get his legs out of the car and she often has to assist with this.
- Stan notes he requires his wife/son to assist him to use stairs and this makes him feel isolated.
- He reports he has been sleeping in a recliner chair at night that has a feature to help him stand up. He has not been able to sit on the sofa because it is too soft and low.

Stan: Intake

- PSFS (patient specific functional scale)
  - Be able to get in and out of the car without help
    - Current rating 2
  - Be able to walk down to the basement for emergency shelter on my own
    - Current rating 1
  - Be able to get up from the couch or recliner chair on first try without help
    - Current rating 2

Stan: Examination

- Vitals- BP 120/72, HR 82, PsO2 95%
- TUG- 22 seconds (included 3 attempts before standing) with walker
- LE strength
  - Knee Ext L-250N, R-263 N (norm 380, sd 67-94)
  - Hip Abd L-172N, R-180N (norm 260, sd 49-67)
- Berg Balance Scale 29/56
- 2 minutes step test 68 (norm 86-116)
- Single leg stance <1 second each leg

Stan: Exercise Prescription for Clinic

- Be able to get in and out of the car without help
  - Trial large amplitude lifting leg into out of car (simulate with mat table) 1-2 sets 8 reps
  - Single leg stance activity (start with UE support and progress to home and then in clinic do single leg stance with other leg moving like putting leg in car) 3x 30 seconds
  - Hip abduction strengthening side lying with weights at 60-80% of 1 RM, 10x with good form

Stan: Exercise Prescription for Clinic

- Be able to walk down to the basement for emergency shelter on my own
  - Step ups onto 4” step x10 (progress with different step heights and reps)
  - Gait training on stairs with railing
  - NuStep with legs only on moderate resistance x5 minutes (monitor vitals, RPE, progress to increase time/resistance depending on if his issue is more aerobic capacity or power for stairs)
Stan: Exercise Prescription for Clinic

• Be able to get up from the couch or recliner chair on first try without help
  • Leg press 10 reps 60-80% of 1 RM (progress resistance when can do 12 reps with good form)
  • Large amplitude sit to stand 8 reps (vary surface and chair height)

Stan: Exercise Prescription for Home

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Intensity</th>
<th>Frequency</th>
<th>Mode</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic Capacity</td>
<td>2.0 mets, passes Talk Test, RPE = 11-12</td>
<td>Twice a day</td>
<td>Marching in place (at walker or counter and progressive ↓ support)</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>Gaits/mobility</td>
<td>Low/Moderate RPE = 11-12</td>
<td>Twice a day</td>
<td>Walking in house</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>Balance</td>
<td>Increasing time with decreasing support</td>
<td>Daily</td>
<td>Single leg standing at counter (progressive ↓ support)</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Functional Mobility</td>
<td>Activity should feel exaggerated large</td>
<td>Twice a day</td>
<td>Large amplitude lifting leg into out of car (can use corner of bed at home)</td>
<td>8-10 reps</td>
</tr>
</tbody>
</table>

Evie J: Medication List

• Metformin 500 mg twice a day (Type 2 diabetes)
• Ibuprofen 400 mg three times a day (OA/Pain)
• Atenolol 25mg twice a day (hypertension)
• Tramedol: 25 mg orally once a day; titrate in 25 mg increments every 3 days to reach a dose of 25 mg four times a day.

Case #3: Evie J.

• Mrs. Evie J. is a 72 year old female who underwent R TKA this morning and is referred to Physical Therapy that afternoon.
• General information: Mrs. J lives alone in a one bedroom apartment on the first floor of a senior apartment complex. She has a tub with shower. Prior to the surgery she had been using a cane to walk to the social hall for events but describes this as being in excruciating pain so had stopped doing that. She had been independent in all ADLs but had assistance for housework. She had stopped going out of the apartment complex due to being unable to walk more than one block without pain. She plans to have the L knee replaced as soon as she can.
• Past Hx: HTN, Type 2 DM, L knee arthroscopy 2 years ago, R medial menisectomy 1 year ago, severe OA of both knees.

Acute Care Test and Measures

• VAS = 1/10 at rest, 8/10 with movement
• POD 1: 30 sec STS: 0 reps (could do, but used arms), with RPE of 10/20 afterwards
• POD 1: TUG: 20 seconds with RW
• POD 1: Self-selected gait speed: 0.33 m/s
Acute Care Goals

- Decrease pain to 0/10 at rest
- Increase ROM and strength
- Increase self-selected gait speed by 0.04 m/s in 2 days.

Acute Exercise Prescription

- Functional training (including tub/shower transfer training)
- ROM (P & A)
- Strength training (reactivate quad).
  - POD 0: QS, ROM, begin functional ambulation
  - POD 1: SLR’s, SAQ/LAQ, general strengthening (L LE and UE’s), functional ambulation and transfers.
- ICE prn

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Intensity</th>
<th>Frequency</th>
<th>Mode</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gait/mobility</td>
<td>Low/Moderate</td>
<td>Twice a day</td>
<td>Ambulation, gait training</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>ROM</td>
<td>See Phase 1</td>
<td>Twice a day</td>
<td>See Phase 1</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>Strength</td>
<td>See Phase 1</td>
<td>Twice a day</td>
<td>Incorporate into daily activities, low challenge exercises</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Balance</td>
<td>Static and dynamic balance activities, standing, safety</td>
<td>Daily</td>
<td>10 minutes</td>
<td></td>
</tr>
<tr>
<td>Functional Mobility</td>
<td>2.0 mets, RPE = 13-15</td>
<td>Twice a day</td>
<td>Bed mobility and transfer training (incl. tub)</td>
<td>10 minutes</td>
</tr>
</tbody>
</table>

TKR: Phase 1 (Bade MJ 2011)

- Supine knee flexion (heel slides)
- Short arc knee extensions
- Standing bilateral squats
- Sidelying hip external rotation, with hips flexed to 45° and knees flexed to max able (clams)
- Sidelying hip adduction
- Supine ankle plantar flexion and dorsiflexion (ankle pumps)

Progression:
- When able to complete 2 x 8 repetitions without fatigue, Pain at rest, <5/10; ROM, >15-80

Preoperative:

- Assess safety, home environment, monitor for HFN, monitor blood sugar, Monitor pain. Monitor for signs of DVT

Home Care Tests/Measures

- TUG: mobility/safety 13 sec w/ cane
- Self-selected gait speed: 0.83 m/s, w/cane
- 30 sec Sit-To-Stand: 11 reps (35th percentile SFT)
- FSST (community balance): 16 sec w/ cane
- Knee Injury and Osteoarthritis Outcome Score (KOOS)
  - Better function = lower score
  - Subscores can be measured separately

KOOS

- 5 point Likert-type scale; sub scores and total score: questions (none-extreme, except sports section)
  - 5 symptoms (flexibility/swelling)
  - 2 stiffness
  - 9 pain
  - 17 ADL
  - 5 function/sports
  - 4 QoL

KOOS

- 17 questions on the Function/Daily function subscore
  - Scored a 55/85
- 9 questions on the Pain subscale
  - Scored a 40/45

Home Care Tests

- Diabetic foot check: pedal pulse present, no open wounds, filament testing 7/10
- Knee circumference: 17 ¾ in or 45 cm
- Wells Criteria: 1

Wells Clinical Prediction Rule for (DVT)

<table>
<thead>
<tr>
<th>Clinical feature</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active cancer (treatment within 6 months, or palliation)</td>
<td>1</td>
</tr>
<tr>
<td>Paralysis, paresis, or immobilization of lower extremity</td>
<td>1</td>
</tr>
<tr>
<td>Bedridden for more than 3 days because of surgery (within 4 weeks)</td>
<td>1</td>
</tr>
<tr>
<td>Localized tenderness along distribution of deep veins</td>
<td>1</td>
</tr>
<tr>
<td>Entire leg swollen</td>
<td>1</td>
</tr>
<tr>
<td>Unilateral calf swelling of greater than 3 cm (below tibial tuberosity)</td>
<td>1</td>
</tr>
<tr>
<td>Unilateral pitting edema</td>
<td>1</td>
</tr>
<tr>
<td>Collateral superficial veins</td>
<td>1</td>
</tr>
<tr>
<td>Alternative diagnosis as likely as or more likely than DVT</td>
<td>-2</td>
</tr>
</tbody>
</table>

Total points

Risk score interpretation (probability of DVT):

>3 points: high risk (75%); 1 to 2 points: moderate risk (17%); <1 point: low risk (3%)

Home Care Goals

- Enable pt to independently leave the home
  - No longer homebound
- Decrease knee effusion & edema (16.5in)
- Increase TUG to 12 sec
- Increase sit-to-stand to 15 reps
- Increase gait sped to 1.0m/sec
- Decrease FOOS to
  - 45/85 Function, 22/45 Pain

Home Care Intervention

- Functional ROM ex
- Cryotherapy
- E-stim (NMES): 50-80 Hertz, a pulse duration between 200-600µsec trending toward the higher end as tolerated between 5-20 repetitions observing for fatigue

Home Care Intervention

- Resistive exercise to quads/hamstrings/calf muscles: 1 rep max
- Functional strengthening
  - Body weight resistance at kitchen counter
  - Sit to stand exercise
- Functional mobility training including stairs
Evie J: Outpatient

- Focus for Examination (PTNow.org/clinical summaries)
- Vital Signs: 130/84, HR 90, Pso2- 96%
- Pain- right knee 1-2/10 at rest, 3-4/10 with movement. Left knee 2-3/10 at rest, 5/10 with walking
- AROM- right lacking 10-90, left lacking 5-105
- PROM- right lacking 8-93, left lacking 5-105

Evie J: Outpatient

<table>
<thead>
<tr>
<th></th>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knee flexion</td>
<td>3/5</td>
<td>3/5</td>
</tr>
<tr>
<td>Knee extension</td>
<td>MVIC 120 N*</td>
<td>MVIC 200 N*</td>
</tr>
<tr>
<td>Hip flexion</td>
<td>4/5</td>
<td>4/5</td>
</tr>
<tr>
<td>Hip extension</td>
<td>4/5</td>
<td>4/5</td>
</tr>
<tr>
<td>Hip abduction</td>
<td>3/5</td>
<td>4/5</td>
</tr>
<tr>
<td>Ankle pf</td>
<td>3 reps versus gravity</td>
<td>8 reps versus gravity</td>
</tr>
<tr>
<td>Ankle df</td>
<td>4/5</td>
<td>4/5</td>
</tr>
</tbody>
</table>

Evie J: Outpatient

- KOOS Score 47.0
- Incision- dry and 90% intact, a few areas of scabbing remain, pink/red but not inflamed
- Girth, 2.5 cm larger than left 5 cm above patella, 4cm larger at midpatella, 4 cm larger 5 cm below the patella
- Patellar mobility diminished on right all 4 directions, diminished on left superior/inferior

Evie J: Outpatient

- Transfers- independent from chair with arms, able to stand from clinic chair without arms using left foot shifted back (vs right foot)
- Bed mobility- independent
- Gait- walking with cane outdoors (car to building) for 100 feet. Show decreased stride length bilaterally but not leaning heavily on cane.

Evie J: Outpatient

- TUG- 10 seconds with cane
- Stair Climb Test- 48 seconds with railing
- 6-Minute Walk Test- 1025 feet with cane
- Observational Gait- show decreased stride length bilaterally but not leaning heavily on cane until 2’ in, + trendelenberg on right
- Vitals signs tested after 140/92, HR 104, Pso2-94%

TKR: Phase 3 (Bade MJ 2011)

- Seated single leg knee extension 2 sets 8-10 reps 50% 1 RM
- Seated single-leg knee flexion 2 sets 8-10 reps 50% 1 RM
- Single leg press 2 sets 8-10 reps 50% 1 RM
- Standing hip abd, flex, ext, add 2 sets 8-10 reps 50% 1 RM
- Step up, side step-ups, step downs 1-2x10 (progress 2-4-6”)
- Single limb stance (EO progress to EC) 3x30 seconds (with hip abd weakness likely to require touch point on parallel bar
- Wall slides to degree of knee flexion 3-5x30 seconds-1 minute with overpressure
- Forward lunging x8 Progression:
- When able to complete 2 x 8 repetitions without fatigue, Pain at rest, <3/10; ROM,>10-100
**Evie J: Outpatient**

- Aerobic - either stationary bike or nustep
- Gait training to utilize full ROM in walking
- Transfer training to share weight between legs
- Continue to monitor vital signs

**Evie J: Exercise Prescription for Home**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Intensity</th>
<th>Frequency</th>
<th>Mode</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic Capacity</td>
<td>2.0 mets, passes Talk Test, RPE = 11-12</td>
<td>Twice a day</td>
<td>Marching in place (at walker or counter and progressive ↓ support)</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>Gait/mobility</td>
<td>Low/Moderate RPE = 11-12</td>
<td>Twice a day</td>
<td>Start walking outside or indoors if needed</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>Balance</td>
<td>Increasing time with decreasing support</td>
<td>Daily</td>
<td>Single leg standing at counter (progressive ↓ support)</td>
<td>10 minutes</td>
</tr>
</tbody>
</table>

**Evie J: Exercise Prescription for Home**

<table>
<thead>
<tr>
<th>Intervenion</th>
<th>Intensity</th>
<th>Frequency</th>
<th>Mode</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROM</td>
<td>Minor discomfort</td>
<td>3x/day</td>
<td>Bag hang, Wall slides</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>Ice packs</td>
<td>na</td>
<td>2-3x/day</td>
<td>Na</td>
<td>10-15 minutes</td>
</tr>
<tr>
<td>Scar Massage</td>
<td>To tolerance</td>
<td>1-2x/day</td>
<td>Manual</td>
<td>5 minutes</td>
</tr>
</tbody>
</table>

**Evie J: Ultimiate Goals**

- As she progresses, we know she continues with OA in her left knee. Will likely have TKA there soon.
- Still has DM, HTN
- Long term exercise prescription????

**Blending the Guidelines for Evie J**

<table>
<thead>
<tr>
<th>Resistance</th>
<th>Hypertension</th>
<th>Diabetes</th>
<th>OA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2+ days/wk</td>
<td>2+ days/wk</td>
<td>3 days/wk</td>
</tr>
<tr>
<td>Volume</td>
<td>8-12 reps</td>
<td>8-12 reps</td>
<td>3 sets of 8-10 reps</td>
</tr>
<tr>
<td>Intensity</td>
<td>12-15 BORG</td>
<td>Slow, day of rest bwt sessions</td>
<td>Slow, day of rest bwt sessions</td>
</tr>
<tr>
<td>Requirements</td>
<td>Slow, day of rest bwt sessions</td>
<td>Slow, day of rest bwt sessions</td>
<td>Slow, day of rest bwt sessions</td>
</tr>
</tbody>
</table>

**Blending the Guidelines for Evie J**

<table>
<thead>
<tr>
<th>Cardio</th>
<th>Hypertension</th>
<th>Diabetes</th>
<th>OA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Min 5 days week (mod) 3x for vigorous</td>
<td>Most preferably all days week</td>
<td>At least 3 day, no more than 2 day off</td>
</tr>
<tr>
<td>Volume</td>
<td>Min 30 minutes/in 10 min groups</td>
<td>Min 30-60 minutes/in 10 min groups</td>
<td>Min of 150 minutes/wee k</td>
</tr>
<tr>
<td>Intensity</td>
<td>12-13 BORG</td>
<td>40-60% HR Max</td>
<td>50-70% HR Max</td>
</tr>
<tr>
<td>Requirements</td>
<td>Low impact, wt bearing</td>
<td>Low impact, wt bearing</td>
<td>Low impact, wt bearing</td>
</tr>
</tbody>
</table>
Questions?

---

Exercise and Physical Activity in Aging Conference II: Blending Research and Practice

July 27-30, 2016 in Indianapolis
Sponsored by the Academy of Geriatric Physical Therapy of the APTA
Hosted by the University of Indianapolis

- Precon: FOCUS 7/27/16, Prep for the GCS!
- National and international experts
- Topics on national and international initiatives, community-based interprofessional health promotion, and new developments in exercise.

Visit www.expaac2.org to Register TODAY!
ABSTRACT SUBMISSION DEADLINE 2/26/16
EARLY BIRD REGISTRATION ENDS 4/1/16

---

References

- Chodzko-Zajko W. ACSMs Exercise of Older Adults, 2013, American College of Sports Medicine.

---

References


---

References