A Skilled Physical Therapist's Approach to Alzheimer's Disease

Combined Sections Meeting
February 4-7, 2015
Indianapolis, IN

Presenters
Meleah Murphy, PT, DPT, NCS
Jennifer Nash, PT, DPT, NCS, CEEAA
Christy Ross, PT, DPT, GCS

Cleveland Clinic
Lou Ruvo Center for Brain Health
Las Vegas, Nevada

Objectives
- Describe the phases of Alzheimer's Disease, diagnostic criteria, and clinical features to enhance clinical management
- Identify functional and subjective outcome measures appropriate for individuals with Alzheimer’s Disease and their caregivers
- Discuss skilled physical therapy interventions as well as exercise recommendations for individuals throughout all stages of Alzheimer’s Disease
- Develop a skilled plan of care with realistic goals based on the individual's functional and cognitive status.
- Identify community resources for the individual and the caregiver to maximize motivation, self-efficacy, and adherence of the home exercise program and active lifestyle

Presentation outline
- Alzheimer’s Disease
- Examination
- Interventions
- Advocacy

Alzheimer's Disease (AD):
A Major Public Health Threat
- 5.5 million cases in US now
- One new case every 67 seconds
- 6th leading cause of death
- $214B in annual costs now
- 13.5 million unpaid caregivers

Property of Murphy, Nash, and Ross, not to be copied without permission.
Alzheimer’s Disease

- Alzheimer’s Disease affects about 5 million Americans

- Most are 65 years and older with prevalence reaching nearly 50% at age 85 and older

Incidence of Alzheimer’s Disease: 1 Million New Cases Per Year in US by 2050

Worldwide Prevalence of Alzheimer’s Disease in 2050: > 100 Million Cases

Cost to US of AD in 2050: $1.2 Trillion!

Variations of Dementia

- <65 years of age
- >65 years of age

Clinical Features and Diagnosis

- Insidious onset, slow progression
- Recent memory usually involved first
- Remote memory, language, visuospatial skills gradually impaired
- Motor skills and walking preserved until late
- Fatal
- 6-15 year time course
A Skilled Physical Therapist's Approach to Alzheimer's Disease

**Spectrum of Alzheimer's Disease**

- **Pre-Clinical**
  - No Cognitive Symptoms

- **Mild Cognitive Impairment (MCI)**
  - Mild Cognitive Symptoms

- **Alzheimer's Disease Dementia**
  - Cognitive dysfunction needs to be treated to prevent AD dementia

Three Phases of Alzheimer’s Disease

- **No Cognitive Symptoms; Biomarkers Abnormal**
  - No Symptoms

- **Mild Cognitive Symptoms; Biomarkers Abnormal**

- **Dementia; Biomarkers Abnormal**

**Phases of Alzheimer’s Disease**

- **AD Risk (Presymptomatic AD)**
  - Normal Cognition

- **Prodromal AD**
  - Memory impairment (episodic)

- **AD Dementia**
  - Impaired cognition & function

**Diagnosis with Biomarkers**

**AD Progression**

- Cerebrospinal Fluid (CSF) analysis

**Alzheimer's Disease Exists on a Continuum from No/Minimal Symptoms to Dementia**

**Mild Cognitive Impairment (MCI)**

- Intermediate stage that involves problems with:
  - Memory
  - Language
  - Thinking
  - Judgment

- May be aware that memory or mental function has “slipped”

- ADL's Preserved

---

Property of Murphy, Nash, and Ross, not to be copied without permission.
Therapeutic Care Continuum

- Framework for planning care for individuals with neurodegenerative diseases

Early Stage
- Pre-clinical
- Mild cognitive impairment

Middle Stage
- Alzheimer's Disease

Late Stage
- Dementia

Pre-clinical
- Minimal impairments
- Minimal functional limitations
- No disability

MCI
- Increasing number of impairments
- Increasing severity of limitations
- Mildly/moderately functionally limited
- Some disability

AD Dementia
- Numerous impairments
- Severely functionally limited
- Dementia disabilities

Brain Atrophy is Revealed by MRI: Memory Areas (Hippocampus) are Most Severely Affected

Healthy Elderly

Alzheimer's Disease

Histopathology of Alzheimer's Disease

Neurofibrillary Tangles

Neuritic Plaques

Treatment of Alzheimer's Disease

- Current
  > Transmitter-based therapies
  > Acept, Exelon, Namenda
  > Temporary symptomatic benefit

- Emerging
  > Disease-modifying therapies
  > Slow progression
  > Prevent or delay onset

Risk Factors for Alzheimer's Disease (United States)
Brain Health: You Are In Charge

- Physical Exercise
- Mental Activities
- Food and Nutrition
- Social Interaction
- Health Management
- Sleep, Stress Management

Examination – Functional and Subjective Outcome Measures

Christy Ross, PT, DPT, GCS
Cleveland Clinic
Lou Ruvo Center for Brain Health

Subjective Examination
Completed with Individual & Caregiver

- Functional limitations
- History of Falls
- Prior Level of Function
- Physical Activity
- Community Activities
- Social Interaction
- Living Environment
- Behavior Changes
- Goals from Individual and Caregiver

Quality of Life in Dementia Scales

- Mild Dementia
  - Schedule For Evaluation of Individual Quality of Life
- Mild –Moderate Dementia
  - Quality of Life Alzheimer’s Disease Scale
- Advanced Dementia
  - Qualidem and Discomfort Scale
  - People receiving residential care

Caregiver Burden Scales

- 35 general scales
- 16 dementia specific scales

Caregiver Burden Scales

Zarit Burden Interview

- Self administered 22-item questionnaire given to caregivers
- 5 item response set ranging from “never” to “nearly always”.
- Scoring:
  - 0-20 points = little or no burden,
  - 21-40 points = mild to moderate burden,
  - 41-60 points = moderate to severe burden,
  - 61-88 points = severe burden

Property of Murphy, Nash, and Ross, not to be copied without permission.
Functional Assessment Staging Scale (FAST)

<table>
<thead>
<tr>
<th>FAST Characteristics</th>
<th>LEVEL</th>
<th>Differential Dx Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Functional Decline – Subjective or Objective</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>Forgetfulness Complaints</td>
<td>2</td>
<td>Anxiety, Depression</td>
</tr>
<tr>
<td>Subjective Work Difficulties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased function in demanding situations</td>
<td>3</td>
<td>Depression, Subtle manifestations of medical pathologies</td>
</tr>
<tr>
<td>Difficulty traveling to new places</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased ability to perform complex tasks (finances, shopping, planning trips)</td>
<td>4</td>
<td>Depression, Psychosis, Focal Cerebral Process</td>
</tr>
<tr>
<td>Require assistance selecting attire and coating to bath</td>
<td>5</td>
<td>Depression</td>
</tr>
</tbody>
</table>

Functional Assessment Staging Scale (FAST)

<table>
<thead>
<tr>
<th>FAST Characteristics</th>
<th>LEVEL</th>
<th>Differential Dx Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty dressing</td>
<td>6a</td>
<td>Arthritis</td>
</tr>
<tr>
<td>Requires assistance bathing (near)</td>
<td>6b</td>
<td>Sensory deficit</td>
</tr>
<tr>
<td>Difficulty with toileting</td>
<td>6c</td>
<td>Stroke, Depression</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>6d</td>
<td>UTI, Other causes of Urinary incontinence</td>
</tr>
<tr>
<td>Fecal incontinence</td>
<td>6e</td>
<td>Infection, Malabsorption Syndrome, Other causes of fecal incontinence</td>
</tr>
</tbody>
</table>

Functional Assessment Staging Scale (FAST)

<table>
<thead>
<tr>
<th>FAST Characteristics</th>
<th>LEVEL</th>
<th>Differential Dx Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocabulary limited to 1 to 5 words</td>
<td>7a</td>
<td>Stroke</td>
</tr>
<tr>
<td>Intelligible vocabulary lost to 1 word</td>
<td>7b</td>
<td>Other Dementing Disorder</td>
</tr>
<tr>
<td>Ambulatory ability lost</td>
<td>7c</td>
<td>Parkinsonism/Neurodegenerative-induced or other Secondary extrapyramidal syndrome, Frontotemporal Dementia, Normal Pressure Hydrocephalus, Stroke, Hip Fracture, Arthritis, Overmedication</td>
</tr>
</tbody>
</table>

Functional Assessment Staging Scale (FAST)

<table>
<thead>
<tr>
<th>FAST Characteristics</th>
<th>LEVEL</th>
<th>Differential Dx Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to sit still</td>
<td>7d</td>
<td>Arthritis, Contractures</td>
</tr>
<tr>
<td>Ability to smile left</td>
<td>7e</td>
<td>Stroke</td>
</tr>
<tr>
<td>Ability to hold up head lost</td>
<td>7f</td>
<td>Head trauma</td>
</tr>
<tr>
<td>Supine or coma</td>
<td></td>
<td>Tachyarrhythmia, Other medical abnormalities, Overmedication, Encephalitis, Other Causes</td>
</tr>
</tbody>
</table>

Cognitive Testing

Completed by Neurologist / Neuropsychologist

- Global Functioning
  - MMSE
  - Alzheimer’s Disease Activity Scale - Cognitive
  - Severe Impairment Battery
  - MOCA

- Executive Functioning
  - Verbal Fluency Test - Category
  - Verbal Fluency Test - Letters
  - Clock Drawing Test

- Attention
  - Digit Span Forward
  - Digit Span Backwards
  - Trail Making Test - A
  - Trail Making Test – B

- Memory
  - Visual Reproduction Test
  - Eight Word Test
  - Logical Memory Test

Valid and Reliable in Individuals with Dementia

Cognitive Screening

- Important to establish baseline level of functioning
- Allows for objective documentation of cognition
- Allows for assistance in delivery of PT interventions
  - Ex: Education, instructions, and cuing
- Indicates why additional skilled care may be required for safe completion of PT interventions
Objective Examination

- Strength
- Trunk and Extensors, LE power/Functional testing, Grip strength
- ROM
- Functional Performance, Contractures
- Tone
- Increasing primitive muscle tone, Gegenhalten tone
- Myoclonus
- Reflexes
  - Proprioceptive reflexes, primitive reflexes
- Sensation and skin integrity
- Vision and Hearing
- Motor Renshaw
- Movement Patterns and Coordination

Objective Examination

- Bed mobility
- Sit <> stand
- Sitting balance
- Standing balance
- Gait speed and analysis
- Curb/step/ramp/stair negotiation
- Physical Performance Testing

Physical Performance Testing

- Timed Up and Go Test (TUG)
- Six Minute Walk Test (6MWT)
- Gait Speed: Preferred & Fast / 6 Meter Walk
- Groningen Meander Walking Test (GMWT)
- Functional Reach Test (FRT)
- Physical Performance Test (PPT)/ Modified PPT
- Short Physical Performance Battery
- Timed / POMA
- Barthel Index of ADLs
- Single Leg Stance – Eyes Open
- Walking 15m and Walking 15m x 2 with 180 degree turn (Preferred/Fast)
- 15 Second Step Test

Our “Go-To” Tools

<table>
<thead>
<tr>
<th>Mobility</th>
<th>Endurance Capacity</th>
<th>Balance/Fall Risk</th>
<th>Muscle Strength/Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>TUG</td>
<td>6MWT</td>
<td>Berg Balance Scale</td>
<td>5x Sit to Stand</td>
</tr>
<tr>
<td>TUG Cognitive</td>
<td></td>
<td></td>
<td>30 Sec Chair Rise</td>
</tr>
<tr>
<td>TUG Manual</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Meter Walk/Gait Speed: Preferred &amp; Fast</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groningen Meander Walking Test</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Reliable and Valid in Testing for individuals with Dementia

Timed Up and Go Test

- Reliable & Valid for Individuals with Dementia
- Ries 2009: MDC = 4.09s
- Slower TUG time is associated with poor performance cognitive function [Friesen 2013; Douglas 2012]

MCI: [Kwokman 2010]
- MCI may have normal TUG
- MCI parameters and quality changed
- MCI Group: Less walking consistency, more required steps and noted less axial rotation during turn to walk
- Could represent motor function decline that may parallel MCI

Later Stages of Dementia:
- Modifications may be necessary (cone at line, cues/demo, 2-step command)

TUG Cognitive

- TUG with cognitive dual task component
- Counting from 100 backwards by 3’s
- Recalling every other letter of alphabet (research@uwi .edu)
- Document number of errors and time, required cuing
- Difference > 4.5 sec between TUG and TUG Cog = increased fall risk in healthy elderly adults (research@uwi .edu)
- Good psychometrics in healthy aging adult
- More research needs to be performed on this measure

Property of Murphy, Nash, and Ross, not to be copied without permission.
TUG Manual
- TUG with manual dual task component
- Document any spilling of water, required cueing
- Good psychometrics in healthy aging adult
- More research needs to be performed on this measure

Berg Balance Scale
- Modified Berg has potential as a predictor of falls in older adults living in dementia-specific assisted living.
- Shows correlation with TUG (Peltola et al., 2011)
- MDC(95%) = 6.2 points
- MDC = 7 points Individuals with Balance Deficits (Kiel, 2002)

Six Minute Walk Test
- Reliable & Valid Test for Individuals with Dementia
- Able to measure sensitivity to change
- Used in Excellent/Good RCTs
- MCI:
  - Poor Performance in 6MWT correlated with reduced cerebral gray matter volume in temporal and occipital gyri and hippocampus
- Moderate Dementia:
  - Used 6MWT to measure success post walking program for nursing home elderly with AD
  - Modifications may be necessary (functional task for distracting from length of test, complete 2MWT instead)

Groningen Meander Walking Test
- Performed in 2 parts: forth and then back
- "Please walk over the path, fast and accurately as possible"
- Record time & # of times stepping outside of lines
- Final score of Time = Mean time of both trials
- Final Score of Oversteps = Mean steps of both trials
- MDCs are available

Gait Speed and Gait Analysis
- Gait disorders are common in MCI (Dawson, 2007)
- Alterations in walking may be detected early in the course of dementia and even the prodromal stage of MCI.
- MCI and slow gait speed (<1.00 m/s) are twice as likely to develop dementia.
- Fast Gait Speed = more sensitive measure in discriminating levels of cognition
- Poor performance in Fast Gait speed = more predictive of significant cognitive decline over 3 yr (J Prim Prev, 2011)
- MDC available for temporal and spatial gait parameters

Mini-BESTest
- Most appropriate for MCI and early stages of dementia
- May not be appropriate for individuals with later stages of dementia due to:
  - Level of complexity of test tasks
  - Possible difficulty with instructions
- Individuals with balance deficits, compared Mini-BESTest vs. Berg
  - Mini-BESTest: MDC(95%) = 3.5 points
  - No floor or ceiling effect in mixed neurologic cohort

Property of Murphy, Nash, and Ross, not to be copied without permission.
5x Sit to Stand
- LE strength and power & fall risk
- Best LE strength measure for those who are not able to understand instructions for MMT
- Community-Dwelling 60+ years old (Relative Risk)
  - Norms
    - 60-69 years: 11.4 sec (mean time)
    - 70-79 years: 12.6 sec
    - 80-89 years: 12.7 sec
  - MDC = 4.2 s in healthy elderly (October 2003)

Minimal Detectable Change in PPT for Dementia
Ries 2009:
- TUG = 4.09 s
- 6MWT = 33.5m (110ft)
- Gait Speed = 9.4 cm/s (0.308 ft/s)

Bosers 2014:
- Groningen MWT:
  - FW = 10.35 s; No AD = 2.96 s
  - Overslip Score = 4.38 Overslips

Selecting the Appropriate Test
- Test should provide an obvious unambiguous test assignment
  - To meet impaired executive functioning
  - Short instructions with maximum of a 3 step command
  - To meet impaired memory and attention
  - Cueing during testing negatively affects test results
  - Short duration of testing to avoid fatigue and enable participation of test to protocol
    - May decrease MDC otherwise
  - Select test with your goal purpose: balance/activity tolerance/LE power

Tips for Successful Administration of Tests
- Use clear speech
- Friendly facial expression
- Eye contact during speed
- Instructions to be repeated while demonstrating task
- Ask individual if instructions are understood
- Understand that when testing an individual with lower cognitive level may lead to less reliable outcome scores.
- Attempt to diminish extra auditory stimuli and extraneous distraction

Skilled Physical Therapy Intervention
Jennifer Nash, PT, DPT, NCS, CEEAA
Cleveland Clinic
Lou Ruvo Center for Brain Health

“What if we had an overlooked drug that was clinically proven in randomized controlled trials to increase cognitive function and hippocampal volume in older adults, slow cognitive decline in individuals with mild cognitive impairment, enhance neurogenesis, and reduce beta-amyloid in animal models? What if this drug also had other health benefits throughout the body and had minimal side effects?”
Physical Activity and Dementia

- Aerobic exercise attenuates cognitive impairment and reduces dementia risk
  - Neuroprotective effects
  - Mitigation of cerebrovascular risk
- Additional benefits:
  - Reducing agitation behavior
  - Improving cognitive function
  - Reducing fall risk
  - Improving mood and fitness level

Prevention is Evident

- Modifying risk factors decreases cognitive decline and risk of dementia
  - [Study](https://www.ncbi.nlm.nih.gov/pubmed/22564734)
- Exercise volume moderates brain atrophy of medial temporal lobe, key for memory and executive function
  - [Study](https://www.ncbi.nlm.nih.gov/pubmed/26698234)
- Relative risk of dementia and AD were lowest in those with the highest level of physical activity (28% and 45% reduction in risk respectively)
  - [Study](https://www.ncbi.nlm.nih.gov/pubmed/29098073)

Improvement is Possible

- In frail older adults, high-intensity exercise produced greater improvement in function than did low-moderate intensity exercise
  - [Study](https://www.ncbi.nlm.nih.gov/pubmed/26698234)
- Studies of exercise interventions for patients with dementia... do consistently show improvement in physical performance, behavior, and mood
  - [Study](https://www.ncbi.nlm.nih.gov/pubmed/25530179)
- One year of cardiovascular exercise has been shown to increase hippocampal volumes and better spatial memory and reduced age-related gray matter shrinkage
  - [Study](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3519096/)

Startling Statistic

- About 21% (>1.1 million) of AD cases in the US alone can be attributed to physical inactivity in the elderly
  - [Study](https://www.ncbi.nlm.nih.gov/pubmed/20872043)

Physical Exercise and Cognitive Performance in Older Adults: A Theoretical Model.

Using ICF to Guide Us...

- ... a map describing the interactive and evolutionary process of an individual's journey toward meaningful life participation after the onset of a challenging health condition

Property of Murphy, Nash, and Ross, not to be copied without permission.
Skilled Physical Therapy Goals

Therapeutic Care Continuum

Physical Activity Guidelines

Aerobic Exercise

Property of Murphy, Nash, and Ross, not to be copied without permission.
Strength Training

- At least 2 days a week, older adults should do muscle-strengthening activities that involve all the major muscle groups.
- These are the muscles of the legs, hips, chest, back, abdomen, shoulders, and arms.

Strength Training - Intensity

- Skilled component
  - Determining moderate or high intensity
  - Ensure good form and technique for every repetition
  - Identify substitution/muscle fatigue
  - Progress as appropriate (5%) – Overload principle
- Fairly light
- Somewhat hard
- Hard
- "stop on a dime"

Otago Exercise Programme


Balance

- All 6 balance domains measured by BESTest became increasingly worse with severity of cognitive impairment.
- Balance training 3 or more days/week is recommended
  - Backward walking
  - Sideways walking
  - Heel walking
  - Toe walking
  - Sit to stand

Home Exercise Plan

- CUSTOMIZED
- Written in simple, clear language
- Communicated thoroughly
- Big print
- Stand up folder
- Avoid difficulty – decreased reasoning skills

Physical Activity Behavior Change in Persons With Neurologic Disorders

- Self-efficacy
- Outcome expectations
- Goals
- Facilitators
  - Caregivers
  - Family
  - Personal trainers

Property of Murphy, Nash, and Ross, not to be copied without permission.
Errorless Learning
- A principle used to teach new information or skills to people with cognitive impairment
- Provide positive experiences
- Use imagination
- Enjoy the moment

Keys to success
- Work in their reality
- Notice pain behaviors
- Monitor vital signs
- Vary experiences
- Collaborate with the spouse and/or caregivers
- Incorporate personal likes; avoid dislikes

More Keys to Success
- Be creative
- Be flexible
- Be prepared
- Increase cognitive load
  - Semantics
  - Start/stop/pause
  - Functional tasks
- Blend social interactions and physical activity together
- Have fun!!!

Strategies to Address Cognitive Barriers to Exercise Participation
- Providing exercise instructions in easy-to-remember increments
- High repetition and practice
- A cognitively intact exercise partner
- Providing written and visual memory cues
- Making the exercise fun and individualized

Medicare Update
- "...skilled therapy services are covered when an individualized assessment of the patient's condition demonstrates that skilled care is necessary for the performance of a safe and effective maintenance program."
- "even if no improvement is expected"

Advocacy and Comprehensive Care Resources for People with Alzheimer's and their Caregivers

Cleveland Clinic
Lou Ruvo Center for Brain Health
Lou Ruvo Center for Brain Health
Offering patients with degenerative brain disorders a continuum of care:

- Diagnostic evaluation
- Memory testing
- Treatment
- Clinical trials for new treatments
- Neuroimaging
- Family Social Services & Education
- Family care
- Physical therapy
- Occupational Therapy

Family Social Services & Education

- Offering supportive services and programs for those impacted by neurocognitive diseases – caregivers, families and patients
  - maximizing their knowledge, skills and wellbeing
- All are welcome
- Free of charge

Supporting the Caregiver

Complementing excellent medical care, our focus on caregivers affirms that brain disorders impact not just the patient, but everyone involved in care and support.

Find Answers to Caregiving Questions

Lynne Ruffin-Smith Library

- A specialized resource for caregivers and patients
- Walk-in hours: Mon, Tues, Thurs
  - 10 am – 2 pm
  - Wed 10 am – 3 pm
- Trained volunteers offer personalized assistance
- Open to the community
Education

A broad curriculum designed to increase knowledge & skills:

- Lunch & Learn
  - Wednesdays 12 noon – 1 pm

- Healthier Living
  - 6 week program helping caregivers and individuals develop skills for success

Education, cont.

- Art Lecture
  - 1st & 3rd Tuesdays, 11 am – 12 noon through live videoconference with the Cleveland Museum of Art

- Art in the Afternoon
  - 4th Monday, 11 am – 12:15 pm
  - For individuals with cognitive impairment & their care partners
  - RSVP required: 702.483.6055

Support Groups

A welcoming place to meet others in similar circumstances:

- Huntington’s Disease Support Groups
  - Monthly support groups for gene-positive individuals and adult family members
  - 4th Tuesday each month, 12 noon – 1 pm

- Memory Loss Support Group
  - Weekly support group for adult family members of individuals with Alzheimer’s or dementia
  - Wednesdays, 1:15 pm – 2:45 pm

Support Groups (continued)

- Frontotemporal Disorders (FTD) and Primary Progressive Aphasia (PPA)
  - 1st and 3rd Tuesday in evening
  - To attend, contact: SupportGroup@KeepMemoryAlive.org

- Parkinson’s Disease
  - Monthly support groups for individuals with Parkinson’s disease and adult family members
  - 2nd Tuesday each month, 11:30 am – 12:30 pm

Counseling

- Individual, Couples & Family Therapy
  - Available to assist patients and caregivers in maintaining their emotional well-being
Community Exercise Classes

- MOVE I
- MOVE II
- Rock Steady Boxing Classes

Other Resources

- Keep Memory Alive website
- Academy of Geriatrics Cognitive and Mental Health SIG
- Alzheimer’s Association
- National Institute on Aging
- Day programs
- Respite care

Lou Ruvo Center for Brain Health

References

- Alzheimer’s Assoc. Changing the Trajectory of AD. 2010
- heart.org/HEARTORG/GettingHealthy/PhysicalActivityFitnessBasics/Ameri can-Heart-Association-Recommendations-for-Physical-Activity-Infographic_UCM_490754_SubHomePage.jsp

Property of Murphy, Nash, and Ross, not to be copied without permission.
References