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Exercise Assessment & Program Design for Preventing Falls
Recorded January 16, 2018

Course Type: Recorded 1 Hour Webinar

Course Level: All Levels

Course Objectives
After completing this course, you will be able to:
1. Discuss the statistics for falls and fall-related injuries.
2. Identify intrinsic and extrinsic risk factors for falls.
3. Describe 3 key concepts for Falls Defense Systems, with prevention and intervention strategies and how the strategies can change with age.

Course Description
Over 1/3 of older adults fall each year, with many of them resulting in injuries, fractures and/or loss of independence. In fact, falls are the number one cause of accident-related deaths in older adults. The problem is so pervasive because there are over 160 independent risk factors that can lead to falls, including internal factors such as age-related sensory changes or medication interactions and external factors such as bad weather conditions or poor lighting. Exercise has been shown to be effective at reducing falls but it is difficult to determine the appropriate components for an individualized exercise program due to the variety of physical factors (e.g., muscle strength/power, balance, gait) that contribute to fall risk.
This webinar will instruct viewers on how to perform three validated physical assessments that quantify an individual's fall risk. Viewers will then learn how to interpret these results to construct an individualized, multi-component exercise program for any older adult. Finally, a systematic approach to exercise progression and regression will be introduced.

About the Presenter
Christian J. Thompson, PhD
Christian J. Thompson is an Associate Professor in the Department of Kinesiology at the University of San Francisco and the owner of Thompson Fitness Solutions, LLC. Christian has published scientific articles on exercise programming for older adults in peer-reviewed journals such as *Medicine and Science in Sports and Exercise, Journal of Aging and Physical Activity,* and *Journal of Applied Research*.
At USF, Christian is engaged in numerous research and community projects investigating exercise programming for falls prevention in older adults. These projects, including Brain Body Trainer (neuroscape.ucsf.edu) and Always Active (www.alwaysactive.org) have been externally funded by the National Institutes of Health, San Francisco Department of Aging and Adult Services, Kaiser Permanente Community Benefit Foundation, and the Moore Foundation. These works resulted in Christian receiving the Outstanding Young Researcher Award from the Council on Aging and Adult Development in 2009 and provide numerous research opportunities for undergraduate students at USF.

Christian's professional service includes involvement with the American College of Sports Medicine by serving as Chair of the Interest Group on Aging, the Health & Fitness Summit Planning Committee and previous service to the Professional Education Committee.
Christian is a featured author on older adult exercise for the PTA Global certification program and also developed educational content for IDEA, the National Academy of Sports Medicine, TRX Training, the American College of Sports Medicine and the American Senior Fitness Association. He serves as an advisor to many industry groups including the Functional Aging Institute and has written for numerous lay publications such as the *ACSM Health Fitness Journal, IDEA Fitness Journal, San Francisco Chronicle, Cleveland Clinic Health Newsletter, Arthritis Advisor,* and *GOLF Magazine*.

Course Outline

Exercise Assessment & Program Design for Preventing Falls
Falls Data

- Over 1/3 of people aged 65+ fall annually
- In 2014, almost 2 million seniors were treated in ERs for fall-related injuries
- Approx. 400,000 fall-related fractures annually
- Over 20% of hip fractures fatal w/in 1 yr
- Problem will only increase with changing demographics

Factors Affecting Falls
Extrinsic Factors
External Issues

- Weather or outdoor conditions
- House clutter and obstacles
- Poor lighting
- Lack of adaptive devices in the home
- Inappropriate footwear/clothing

Intrinsic Factors
Internal Issues

- History of Falling
- Chronic Diseases & Medical Conditions
- Sensory/Vestibular Impairments
- Medication Effects
- Functional Level (Strength, Posture, Gait)

Risk increases linearly with # of risk factors present

Our Falls Defense Systems
(and how they change with age)
What To Do About It??
IDENTIFY Balance Control Deficits
CONSTRUCT Corrective Strategies
MODIFY Based on Functional Capabilities
IDENTIFY Balance Control Deficits
What Makes a Good Assessment?
Application To Daily Life
Underlying Principle - SPECIFICITY
Appropriate Level of Challenge
Underlying Principle - SENSITIVITY
This is what FUNCTIONAL means!!!!
THE KEY: Choose the Right Assessment for the Right Person!
One Size Does Not Fit All!

Requires Knowledge & Experience - Scope of Practice
Consider:
- Goals
- Capabilities
- Lifestyle

OAS Assessment Batteries
- Utilize a "Catch All" Approach
- Time Consuming (in many cases)
- Sometimes Subjective Scoring

Clinical Examples
- Performance Oriented Mobility Assessment (Tinetti, 1986)
- Berg Balance Scale (Berg, 1992)
- Dynamic Gait Index (Shumway-Cook, 1997)

Fitness Examples
- Senior Fitness Test (Rikli & Jones, 1999)
- Fullerton Advanced Balance Scale (Rose, 2006)

OAS Stand-Alone Assessments
- Useful for Identification of Specific Issues
- Limited Application - May Miss Something(s)
- Often Objective Outcome Data - May Miss Something(s)

Examples
- Timed Up-And-Go (Podsiadlo & Richardson, 1991)
- Functional Reach Test (Duncan, 1990)
- Ten Meter Walk Test (Bohannon, 1997)

CONSTRUCT Corrective Strategies

Joint Mobility Exercises

The ANKLE & HIP are KEY!
- Strategies used to recover balance during standing & movement
- Menz (2005) found reduced proprioceptive input from inflexible joint structures with aging

Include both ISOLATED OPEN CHAIN EXERCISES and INTEGRATED CLOSED CHAIN EXERCISES
- Develops BOTH mobility and stability (MOSTABILITY)
- OC: Ankle Circles, Hip Steps
- CC: Rotating Punches, Reach Backs

Muscle Strength/ Power Exercises
- Muscle function is strongly related to falls risk reduction & independent living (Signorile, 2016)
  - Sarcopenia & Dynapenia
- Include focus on ECCENTRIC control - teach your clients how to decelerate gravity - this trains RECOVERABILITY!

Selected Exercises
- Chair Stands
- Chair Sits (emphasize eccentric)
- Foot Stomps
- Perturbation Training (remember SOP!)

Sensory Stimulation Exercises
- Our Falls Defense Mechanisms CAN IMPROVE!

    - Ricci (2010) & Hansson (2007) reviews found that vestibular training is effective at reducing falls risk & improving static and dynamic balance
    - Rose (2010) includes visual tracking exercises in comprehensive falls reduction programs
    - The exercises challenge postural control and stabilization capacity
- Include exercises that challenge 1 or 2 mechanisms at a time
    - Head Turns from Staggered Stance
    - Eye Tracking from Staggered Stance
    - Progress With Ambulation

Balance and Gait Issues

- Why not just stand still on one foot??
    - Falls occur during MOVEMENT (Tinetti, 1986)
    - Proprioception is a DYNAMIC PROCESS and is most responsive to motion
    - These exercises increase balance confidence and self-efficacy
- Exercises should be CHALLENGING - 75% success rate is good target
    - Tandem Stance Forward Reach (static)
    - Step/Return Patterns (dynamic)
    - High Knee Side Stepping (gait)

MODIFY Based on Functional Capabilities

Basic Strategy for Progression & Regression of Exercises

Lower Body

1. Wide Stance
2. Narrow Stance
3. Stagger Stance
4. Tandem Stance
5. Single Leg Stance

Upper Body

1. Both Hands
2. Alternating Hands
3. Single Hand

Additional Considerations

External Support, Stability of Surface, Multijoint Exercises, Sensory Modifications...etc.

Question and Answer Segment

REFERENCES

- CDC. Bergen G, Stevens MR, Burns ER. Falls and Fall Injuries Among Adults Aged ≥65 Years — United States, 2014. MMWR Morb Mortal Wkly Rep 2016;65:993–998. DOI: http://dx.doi.org/10.15585/mmwr.mm6537a2
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- Hansson, EE., (2007) 'Vestibular rehabilitation - For whom and how? A systematic review', Advances in Physiotherapy, 9:3, 106 - 116.

Resources:

- www.sralab.org/rehabilitation-measures/tinetti-performance-oriented-mobility-assessment
- www.sralab.org/rehabilitation-measures/berg-balance-scale
- www.sralab.org/rehabilitation-measures/dynamic-gait-index
- http://geriatrictoolkit.missouri.edu/fab/index.htm
- www.sralab.org/rehabilitation-measures/timed-and-go
- www.sralab.org/rehabilitation-measures/functional-reach-test-modified-functional-reach-test
- www.sralab.org/rehabilitation-measures/10-meter-walk-test