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Functional Exercises To Improve ADLs

Kimberly Huff, MS, CSCS

Learner Outcomes

As a result of this course, participants will be able to:

• List three evidence based benefits of aquatic functional training.

• List three static and dynamic balance exercise that can be performed in the water and techniques to use the properties of the water to increase the challenge presented by each exercise.

• List five functional exercises that can be performed in the water and techniques to use the properties of the water to increase the intensity of each exercise.

• List three progressions of aquatic functional exercises that utilize equipment to increase the intensity of each exercise.
Assistance with ADLS: statistics (Mitzner 2011)

• 40% of adults 65 and older reported some type of functional limitation – of those, 96% reported requiring informal assistance

• Informal care givers reported 30% of people need assistance with 3 or more ADLs – most frequent ADLs requiring assistance: Dressing (42%), transferring (40%) and ambulation (34%). Most frequent iADLs requiring assistance: errands (85%), transportation (76%), housework (71%)

• Formal care givers reported 51% of people need assistance with at least 1 adl – most frequent ADLs requiring assistance: bathing/showering, dressing, transferring. Most frequent iADLs requiring assistance: housework

We Need Exercises Designed To Improve Ability To Perform Activities Of Daily Living

• Loss of muscle mass resulting in reductions in muscle strength and endurance - decreases in type ii fibers resulting in decreases in power - decreases in flexibility - decline in balance ability increasing risk of falls - decline in cognitive performance impact functional mobility

• Older adults that participated in exercise of sufficient intensity and frequency reduced their risk of functional limitations 30-50% (Taylor 2014)

• Increasing physical activity is the most important intervention to improve health and maintain functional independence
Designing Function focused exercises

- Training specific movement patterns vs specific muscles
- Create movements that are relevant to a specific functional activity
  - What is the pattern of the movement – how can it be broken down
  - How is the movement stabilized
  - Static or dynamic balance
  - Muscle involvement
  - Modifications and progressions
- Programs should include physical activity, education and skill development
- Increased motivation due to desire to maintain independence

Why Aquatic Functional Training – We Function On Land

- Provides multi-directional resistance
- Unloading of the joints
- Reduces pain and edema
- Supportive environment - reduces the fear of falling
- Allows for movement re-education
- Safe, comfortable and effective alternative to land based exercise
Research Review
Aquatic Functional Training

Continuous and Interval Training Programs Using Deep Water Running
Improves Functional Fitness and Blood Pressure in the Older Adults
Thais Reichert, Ana Carolina Kanitz, Rodrigo Sudatti Delevatti, Natalia Carvalho Bagatini, Bruna Machado Barroso, Luiz Fernando Martins Krue
American Aging Association (2016) 38:20

• Aimed to investigate the effects of two deep water running (DWR) programs on functional fitness and blood pressures in older adults
• 36 men and women between 60-75 yrs old, randomly placed in continuous training (CT) group or interval training (IT) group
• Pre and post measurements included blood pressure, timed up and go, arm curl, chair stand, back scratch, chair sit and reach, 6 min walk
• Training programs: 2 times a week for 28 weeks, 45 min sessions, included DWR and upper body strengthening exercises
Results/Conclusions

- Improvements in agility and dynamic balance, upper and lower body strength, upper body flexibility with greater improvements in lower body flexibility and cardiovascular fitness in the IT group
- Improvements in SBP and DBP, with greater improvements in the CT group
- Researchers suggested increases in balance due to instability created with DWR, increases in strength due to horizontal displacement and cyclical movements of the hip and knee, increase in LB flexibility also attributed to knee and hip joint movements with DWR
- The results suggest improvements in skills such as stair climbing, walking and standing from a chair following 2 times a week of DWR sessions

The Effects of a Short Term Novel Aquatic Exercise Program on Functional Strength and Performance of Older Adults

H. Scott Kieffer, Marie Attanasi Lehman, Danielle Veacock, and Larua Korkuch

- Assess the effects of an 8 week high velocity, multidimensional aquatic exercise program that included functional movements and plyometric exercises
- 28 men and women between the ages of 65-90, randomly assigned to a traditional exercise group or a water exercise group, training sessions were 2x/wk, 45 min sessions
- Pre and post measurements included, 30 second chair stand, arm curl and timed up and go (TUG)
- Aquatics training sessions included resistance exercises, aerobic conditioning and low level plyometric training. Aerobic conditioning included multidirectional movements with frequent directional changes. The plyometric segment included bounding, single leg hops, skipping and vertical jumps
Methodology continued – results/conclusions

• The land training sessions involved walking, low impact aerobics or square dancing, did not involve resistance training activities

• The results showed significant improvements in the aquatic exercise group for all measures, while the land group only improved in the chair stand. Improvements in chair stand for the aquatic group were significantly greater than those in the land group

• The researchers suggested multidirectional movements in the aquatic session mimic ADLs resulting in greater functional improvements. The inclusion of low level plyometric exercises attributed to gains in functional mobility

Impact of the S.W.E.A.T Water Fitness Method on Activities of Daily Living for Older Women
Mary Sanders, Nobuo Takeshima, Michael E. Rogers, Juan C. Colado, and Sebastien Borreani

• Evaluate the impact of the S.W.E.A.T method as an instructional method during a water based exercise program

• 77 women over the age of 60 were assigned to a water exercise group (WEX) or a control group (C)

• Pre and post measurements included static and dynamic balance, walking speed and stride length, lb and ub strength, stair climbing and lb flexibility

• Wex - 16 week program, sessions were 3x/wk, 20-45 min

• Sessions included functional ADL progressions, cardiovascular endurance and muscular endurance. Exercise intensity was altered using the S.W.E.A.T method.
Results/Conclusions

- The results showed improvements in all functional measurements with the greatest improvements in static balance, sit to stand and arm curl.
- The researchers indicated that previous studies have identified muscular strength as a predictor of functional mobility, this study suggests that power may better predict ADL performance.

The S.W.E.A.T.™ acronym describes a method of cues that coach participants to changes in speed, surface area, impact, range of motion, planes of movement, and travel through water.

Water Based Exercise Better For Some Functional Movement
ACSM 62nd Annual Meeting 2015

- 350 participants assigned to one of five groups – walking, water exercise, resistance training, pilates, functional exercise or control group.
- Pre and post measurements included arm curl, chair stand, timed up and go, time to get up from lying on the ground, time to walk 800 m, balance and flexibility.
- Intervention groups participated in 60 min of exercise, 3x/wk for one year.
- Improvements in arm curl and chair stand were greater in resistance training group.
- Improvements in timed walk, tug, balance, flexibility were greater in water exercise group.

continued
Comparative Effects Of 2 Aqua Exercise Programs On Physical Function, Balance, Perceived Quality Of Life In Older Adults With Osteoarthritis

FISKEN, ALISON L. PHD; WATERS, DEBRA L. PHD; HING, WAYNE A. PHD; STEELE, MICHAEL PHD; KEOGH, JUSTIN W. PHD
JOURNAL OF GERIATRIC PHYSICAL THERAPY JANUARY/MARCH 2015 VOL 38 ISSUE 1 – P 17-27

• Compare The effects of an Aquatic fitness (AF) program and a hydrotherapy (HT) program on strength, function, balance, fear of falling and perceived Qol

• AF group met 2x/wk for 12 weeks. Each session was 45-60 min and included aerobic and strengthening exercises. Ht group attended a seated exercise class in 97 degree water, once a week for 12 weeks. The focus was range of motion and relaxation

• Pre and post measurements included tug, 15 second step test, sit to stand, handgrip dynamometry, 400 m walk, Qol scale, falls efficacy scale, rapid assessment of physical activity questionnaire

Results/Conclusions

• No significant differences between the groups following the intervention with the exception. AF showed a reduction in fear of falling.

• The AF group showed improvements in step test, chair stands and walk time

• Ht improved walk time and social domain scores on QOL scale

• Researchers concluded that AF beneficial in reducing fear of falling - High drop out rate of af suggest that lower level people might benefit from hi initially to improve functional ability and socialization
The Aquatic Environment

- Buoyancy
- Hydrostatic pressure
- Frontal surface area
- Lever length
- Inertia
- Acceleration
- Action/reaction
- Speed

Equipment

- Buoyant: Resistance is felt toward bottom of pool
- Drag: Resistance is felt in all directions
- Bands: Resistance is felt away from anchor point
- Noodles: Buoyant or support
- Kickboards: Drag or support
Aquatic Muscle Actions

- No equipment: concentric/concentric
- Buoyancy equipment: concentric toward pool bottom/eccentric toward surface
- Drag equipment: concentric/concentric
- Bands: concentric away from anchor point/eccentric toward anchor point

Functional movements require a combination of concentric and eccentric muscle actions.

Concentric vs Eccentric
Eccentric Options

Let’s go to the pool!
Functional movements require
Proximal stability before distal mobility

• The forces of the water create a situation in which the body is surrounded by resistance, buoyancy influences alignment, simply standing in the water challenges stability
• Balance and stability can be challenged by moving the arms and or legs and/or changing the base of support

Changes In Base Of Support

• Wide stance
• Lunge
• Feet together
• Tandem
• Heel toe
• One leg
• Hands on hips
• Eyes closed
Upper Body Movements

- Flexion/extension
- Add/Abduction
- Circumduction
- Horizontal add/abduction
- Internal and external rotation
- More so with the addition of drag equipment

Stability Can Be Further Challenged By Changing Base Of Support And Moving Arms

- Wide stance
- Right foot slightly in front – left foot slightly in front
- Lunge
- Tandem stance
- Heel Toe
- One leg stance
Rotational Movements Challenge Stability

Create Additional Challenges By Changing Arm Movements Or Base Of Support
Challenge Stability With Planks And Push Ups

Weight Shifting To Challenge Stability

- Side to side
- Front to back
- Diagonal
- Clock
Add Arm Movements to Weight Shifts

Unstable Surfaces

- Wonder board
- Noodles
- Wobble boards – balance disc
Challenge Stability By Traveling

- Walking forward – backward – sideways
- Change stride length – speed
- Step high
- Walk heel toe
- Internal and external hip rotation
- Semi circle
- BackHab (Ruth Sova)

Add Equipment To Traveling Moves
Push/Pull

- Bilateral
- Unilateral
- Diagonals
- Change base of support
- Weight shifts

![Push/Pull Image]
Reach

Squats
Lift To A Shelf

Lift And Rotate
Lift And Carry

Vacuuming
Sweeping

Shoveling
Plyometrics

- Eccentric loading of a muscle immediately followed by a powerful concentric contraction
- Low level plyometrics = repeated series of stretch shortening cycle that produces less stress on the body
- Studies of aquatic and land plyometric exercises have found that the aquatic plyometric activity provided the same performance enhancement benefits as land plyometrics (Kieffer 2012)

Options For Progressing Functional Exercises

- S.W.E.A.T Method:  S = surface area AND SPEED, W = working position (jumping, neutral, suspended, grounded), e = enlarge movement, A = work around (change planes), t = travel (Golden Waves Functional Water training for health, acsm)
- 4 S’s to increase intensity = stabilize, increase size, increase speed, increase surface (sanders 2014)
- Increase resistance - Alter movement speed by timing - changing the angle – INCREASE COMPLEXITY BY ADDING MORE JOINTS – CHANGE FROM STATIC TO DYNAMIC – INCREASE VOLUME (bending the aging curve)
- Create your own circuit based on the client/patient’s needs
S.W.E.A.T Method - jog

- **S.** = Speed up (15-30 sec)
- **S.** = Slow down (15-30 sec, recovery)
- **E.** = Enlarge range of motion (15-30 sec)
- **S.** = Speed up using large range of motion of the legs (15-30 sec)
- **S.** = Slow down, make the move smaller (15-30 sec, recovery)
- **W.** = Change the Working positions every 15 sec, jog, jog in neutral, suspended, jog
- **A.** = Work Around the body, change planes – wide job (15-30 sec)
- **T.** = travel, change direction (15-30 sec)

Functional Exercise Circuit

3 min cardio: 1 min functional exercise

- Cardio: jog traveling forward – jog traveling backward - wide jog traveling forward –wide jog traveling backward – jog sideways across pool and back
- Functional Exercise: Vertical push up (chest press), right arm with spinal rotation to the left 30 sec, left arm with spinal rotation to the right 30 sec
- Cardio: Alternate 30 sec jog traveling forward anywhere in the pool – 30 sec jog increasing rebound with each step traveling forward anywhere in the pool.
- Functional Exercise: Squats with bilateral vertical push up arms (chest press) 30 sec, Squats with unilateral vertical push up arms (alternate right and left arm) 30 sec
Functional Flexibility

• Improve range of motion for mobility
• Decrease pain and soreness
• Improve posture
• Decrease muscle tension

Thank you!!

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