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Geriatric Strengthening: Defining the Dosage and Debunking the Myth

1. **Strengthening without equipment for an individual that c/o knee pain, therapists should:**

   A. Make adjustments to surface heights can for an acceptable compensation in to achieve pain free strengthening
   B. Ask the individual to work through pain for the first 3 weeks of training
   C. Assign deep flexion squats with counter, chair, or table support
   D. Only options a and b are correct

2. **According to the American College of Sports Medicine, people over 75 years of age should:**

   A. Perform only 1 set of 3 repetitions of resistance based exercise per muscle group or body part, yet adhere to all other strengthening parameters (repetitions, days of the week and percentage of 1RM).
   B. Exercise 3x per week with 90% of their 1RM to prevent sarcopenia
   C. Avoid strengthening exercises if they have osteoporosis
   D. None of the above

3. **Patients with moderate and severe knee DJD should:**

   A. Continue to do resistance exercises to strengthen. They are often most successful in a closed fashion
   B. Use pain as a guide in strength exercise; yet push through pain in endurance training
   C. Exercise for 1 week and take 2 full weeks off to recover
   D. Not engage in strength training as it is not proven to help knee pain in OA

4. **Evidence revealed in this course cited the best answer from the choices below for strengthening patients with Rheumatoid arthritis (RA) is:**

   A. Land based resistance training set at a perceived exertion of 4-6/10, mode of exercise based on patient preference: stationary bike, weights, elliptical, other
   B. Water or aquatic-based, using 33% body height submersion
   C. Long distance walking with assistive device as needed
   D. None of the above are indicated in RA

5. A _____ can be an effective and reliable means by which to test muscular endurance over time with a given geriatric patient.

A. 60 second sit to stand test
B. 1 RM arm curl
C. Standing broad jump
D. 400m sprint

6. Which of these below is a normal age-related change?

A. Dementia
B. Increased maximal heart rate
C. Reduction in sarcopenia
D. None of the above

7. Normal age-related changes include:

A. Reduction in nerve conduction velocity
B. Reduced skin elasticity
C. Reduced mitochondrial capacity
D. All of the above

8. Safe core strengthening in geriatric fundamentals (providing dosage and limited harm) should include:

A. Modified prone planks
B. Seated activities with a spinal stability-focus
C. Recumbent or stationary cycling for safety
D. None of the above

9. Cardiovascular endurance training recommendations from ACSM include:

A. Sustained activity, whole body as able
B. 30 minutes consistent
C. 10 minutes, 3+/day acceptable/cumulative
D. All of the above

10. Frail geriatric reconditioning considerations include

A. Nutrition
B. Modified measurement to document and encourage with gains
C. Skeletal/positional concerns with osteoporosis after prolonged bed rest
D. All of the above

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CONTINUED

Geriatric Strengthening

Defining the Dosage and Debunking the Myth

Mike Studer, PT, MHS, NCS, CEEAA, CSST, CWT

CONTINUED

Learning Outcomes

After this course, participants will be able to:

- Identify the correct dosage of geriatric conditioning based on recent research presented in the course: muscular strength
- Identify the correct dosage of geriatric conditioning based on recent research presented in the course: muscular endurance
- List three geriatric conditioning interventions for the geriatric patient

CONTINUED

Expectations in Aging: Prevalent Mindset

- Memory decline is normal
- Endurance, strength decrease with age
- Falling is a part of aging
- People can maintain, but not GAIN strength
- Dizziness is a part of aging

What we see...

What we could hear…

- Big engine mechanic
- Former college FB player
- Enjoys golf, was competitive
- Proud grandfather of 8
- Concerns: burden on wife

Expectations in Aging: The future

- Memory decline is a factor of attention – and limited stimulation in routine environments
- People can make endurance, strength improvements at any age
- Falling is often a “Use it or lose it” problem of balance or a person to task mismatch of routine experience vs new environment. This may be in the form of physical or cognitive.

Epidemiology in Geriatrics: 2020

- U.S. population <65 growing 9%
- Growth rate of 65 to 74, increasing by 71%
- Rate 75 years and over will increase 26%
- Physical limitations* at >65 increases 21%
- Increasing to 50% for those > 75
- *Physical assist to perform some ADL/MRADLs

Physiology of aging: NORMAL

- Hair, hearing, vision, conduction velocity
- Mitochondrial capacity
- Loss of motor units and muscle cells*
- Skin
- VO2 max

- Type I and preferential loss of Type II

Physiology of aging: Motor Units

- Type I, Type IIa, and Type IIx

- Preferential loss of Type IIx

Pathophysiology of aging:
Comorbidities more prevalent with age

- Multi-infarct dementia
- Degenerative Joint Disease
- Degenerative Disc Disease
- Anklyosing spondylitis
- Fibromyalgia and Polymyalgia
- Cardiomyopathies/pulmonary fibrosis
- Macular degeneration
- Dementia

Fictional accounts of aging

- Strength – Cannot GAIN strength after…
- Endurance – Cannot GAIN endurance after…
- Balance – A natural consequence of aging…
- Flexibility
- Memory
- Independence

Point by point… HOW to intervene

- Muscular strength
- Power (neuromuscular)
- Muscular endurance
- Cardiovascular endurance

- PLUS…Balance and Flexibility

Point by point… HOW to intervene

- Muscular strength:

- Resistance tolerated 8-12 reps
- RPE 6-8/10
- 3-4 days/week
- 2-3 sets
- Expect soreness

STRENGTH vs. POWER….?

- Sit to stand
- Stair climbing or descending
- Standing on one leg
- Reacting from a missed-step
- Carrying an item while walking
- Pulling yourself up to standing
- Hurrying to the bathroom
- Recovering from a strong perturbation/nudge

Strength

- Sit to stand repetitions
- Climbing stairs
- Getting up from the floor
- Lifting a bag of groceries
- Getting up into a high bed
- Pushing a door open
- Lifting a dog, suitcase

Power

- Timed sit to stand
- Timed stair climb
- Weightlifting reps in timeframe
- Machine-based steps/min
- Quick step to catch balance
- Running across the street

Point by point… HOW to intervene

- Power:
  - Resistance tolerated 5-8 reps
  - Resistance 70% of 1RM
  - 2-3 days/week
  - 2-3 sets
  - Expect soreness*
- How do I determine their maximum?

Power: Use it or lose it!!

Photo: tableatny flickr

Philpottm [CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0

Strength, Aging and Parkinson's

- EVERYONE is getting older….YET - -
- EVERYONE has ROOM to IMPROVE strength
- EVERYONE has ROOM to IMPROVE power

Strength and power are a science… but what ARE the facts



Vhines200 flickr



WyrdLight.com [CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0)]

The benefits of intensity in exercise

- Less time spent, more benefits/improvement
- Benefits across all areas of fitness
- Strength, power, endurance, balance
- Cognitive stimulation
- Immune system improvements
- Bone density*
- Neuroprotection
- Psychologically stimulating, envigorating

Point by point… HOW to intervene

- Muscular endurance

- Resistance 15-20 repetitions
- RPE 6-8/10
- 3-4 days/week
- Multiple sets

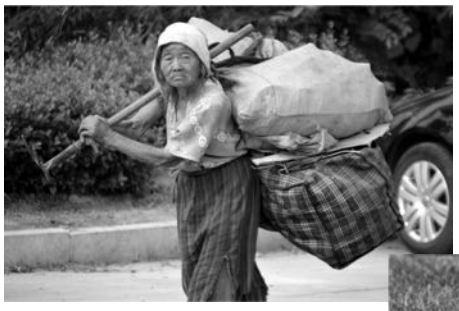
Point by point… HOW to intervene

- Cardiovascular endurance

- Sustained activity, whole body as able
- 30 minutes
- 10 minutes, 3 +/day acceptable (cumulative)
- 4-7 days/week

Core Strengthening: Why?

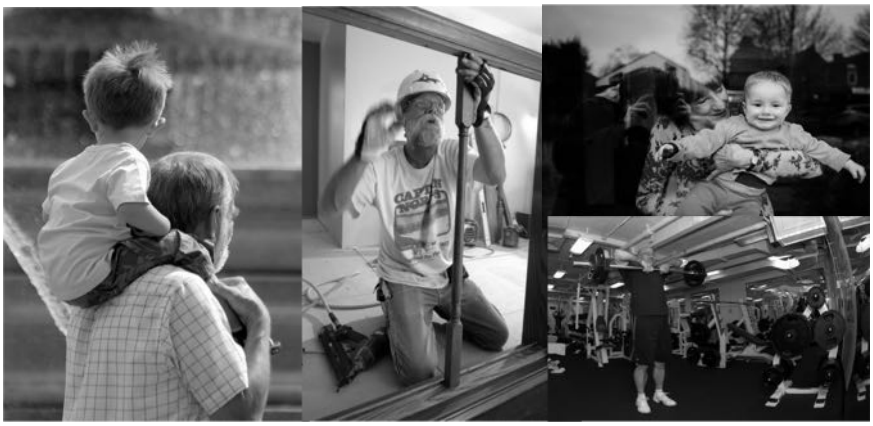
- Who has too much strength, core strength?
- Ability to carry objects
- Ability to maintain upright posture, endure
- Ability to tolerate a perturbation
- Ability to change directions quickly



Ability to…
carry objects

Peter Griffin (publicdomainpictures.net)

Ability to carry objects



(U.S. Air Force photo/Delanie Stafford)

…Create force, hold position

….tolerate a perturbation

Rytis Mikelskas [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0/)]

U.S. Air Force photo by Airman 1st Class Susan Roberts

Power: Change directions quickly

- Add senior here

Photo: Steven Pisano, flickr Elderly Woman Walking in Chinatown, NYC.

Ability to carry objects

Core strengthening in geriatrics

- Principles:
  - Prone CAN BE challenging, painful, time consuming and ineffective
  - Most will not go prone for home exercise
  - Convenience is a MUST
  - Pain-free and kinesthetically sensible

Core strengthening options

- Resisted sit to stand
- Resisted gait multidirectional
- Minimal chair height
- Unsteady surface row
- Limited ROM resisted flex/ext

Point by point… HOW to intervene

- Muscular strength
- Power
- Muscular endurance
- Cardiovascular endurance
- Flexibility
- Balance

Flexibility

- “No benefit” to stretch BEFORE exercising
- Tissues are easiest to stretch AFTER ex.
- Consistency 1-2x/day, every day indicated
- Most common needs: calf, hip, back
- Mindful to recover after strengthening
- Practical aging applications...

Strength in Balance

- Consistency : daily
- Task specific (imitates real world)
- Must be individualized to provoke imbalance at least 30% trials
- Too easy = no benefit
- Too hard = fall or frustration
- How….reaction speed, accuracy, experience

Fit, Frail, Functional

Parameter	Frail	Functional	Fun
Gait speed	< 1.0 m/sec **2.2mph**	1.0-1.5 m/sec **2.2-3.3mph**	>1.5 m/sec **3.3mph**
6 min walk	< 1200’	1200-1750’	1750’
30 second sit to stand	< 8 repetitions	8-12 repetitions	>12 repetitions
Berg Balance	<45/56	45-49/56	>49/56

(Modified by Mike Studer. Original by Marilyn Moffat 2009, CEEAA course 2, San Marcos CA)

From frail to functional…

- Measures
- Interventions
- Considerations

From frail to functional…

- Measures
- Minimal Chair Height Stand Test
- 10m Walk Test
- 5x STS or 30 second STS test
- Timed bed mobility
- TUGO

From frail to functional…

- Interventions

- 1. Follow ACSM guidelines for all parameters
- 2. Education regarding soreness
- 3. Mitigate soreness, precipitate recovery
- 4. Tie to measurements, personal preferences

- Considerations

Rehabilitating the frail geriatric

- Strength dosage prior to power
- Nutritional concerns
- Vital signs
- Musculoskeletal concerns
- Multifactorial nature of balance
- Educating expectations: soreness, time frame

From functional to fit…

- Measures

- Minimal Chair Height Stand Test*
- 2 or 6 MWT
- 10m Walk Test
- 5x STS or 30 second STS test
- 4SST

From functional to fit…

- Measures

- Minimal Chair Height Stand Test
- https://youtu.be/BIP4M3-cvb0

- * Currently in research

From functional to fit…

- Measures

- Timed Up and Go Shuttle Exam*
- https://youtu.be/Fkf36lKVu1Y
- TUSHE

- * Currently in research

From functional to fit…

- Interventions

- https://youtu.be/uE5W2SiMAGM
- Resisted sit to stand

From functional to fit…

- Interventions

- 1. Follow ACSM guidelines for all parameters
- 2. Education regarding soreness
- 3. Mitigate soreness, precipitate recovery
- 4. Tie to measurements, personal preferences

- Considerations

From fit to fun…

- Measures

- Minimal Chair Height Stand Test
- 10m Walk Test
- 2 or 6 min Walk Test
- 30 or 60 second STS test

From fit to fun…

- Interventions

- 1. Follow ACSM guidelines for all parameters
- 2. Education regarding soreness
- 3. Mitigate soreness, precipitate recovery
- 4. Tie to measurements, personal preferences

- Considerations

Testing for GeriAthletics™

- Safety
- Prescription
- Recovery
- Peaking for competition

Testing for GeriAthletes™

- SAFE
- Senior
- Athlete
- Fitness
- Exam

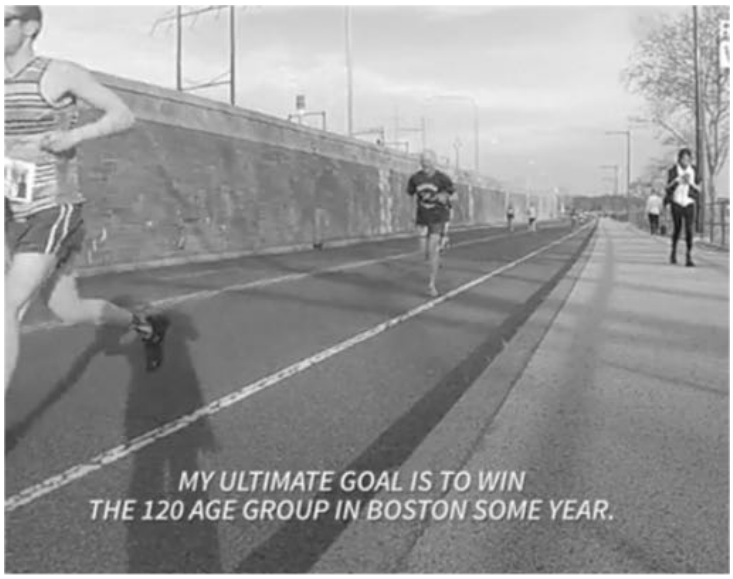
- Jordre, R University of South Dakota

Senior Athlete Fitness Exam

- Health history
- Activity of interest
- Body mass/anthropometrics
- Cardiovascular
- Flexibility
- Balance
- Strength
- Gait speed/function
- Endurance

GeriAthletics

- Origin of the term
- Senior Games qualification = 50 years
- Masters = 40 years
- What sports have age-based trends?
- Why are age-based records falling?
- Redefining “old”



Aging: Adjusting our expectations

- What does “aging” look like?

https://youtu.be/3qaEqQlhaQY
Adjusting our expectations of age

17 x 7 = 119?

Performance Expectations

- What does “aging” look like?

Performance Testing
https://youtu.be/vNdXLFNTGaw

72 yo triathlete/marathoner

CONTINUED

Performance Expectations

- What does “aging” look like?

CONTINUED

Training for GeriAthletics™

- Interest
- Safety
- Prescription with consideration for extended recovery time
- Recovery science
- Peaking for and understanding competition
- Managing injury and impact: https://youtu.be/K3-9z21aL4A reACT trainer

CONTINUED

GeriAthlete™ Evolution

- 71-year old Jeannie Rice Runs Wsub-1:40 Half to Set Age Group World Record
- Ed Whitlock age 85 completed the Toronto Waterfront Marathon in 3 hours 56 minutes 34 seconds to become the oldest person to run 26.2 miles under four hours and the first person over 70 to run a marathon in less than 3 hours.
- Harriette Thompson age 94 became the oldest woman to complete a half marathon (in 2017) with a time of 3hrs 42 minutes and 56 seconds.

Home Programs:

Self measurements to drive intensity on their own

- Sit to stand repetitions
- Weights/repetitions
- Gait speed
- Long walk
- Time standing in tandem
- Head rotation while walking
- Height of surface (Minimal Chair Height)
- Others….

What we see..

What we will hear...

- Active farmer
- Needs power training working with animals and machines
- Needs uneven-ground and slip training
- Strength and endurance – long days

Videos

- https://youtu.be/vNdXLFNTGaw
  Performance Testing
- https://youtu.be/uE5W2SiMAGM

Resisted sit to stand

- https://youtu.be/K3-9z21aL4A
  reACT trainer

Videos

- https://youtu.be/Fkf36lKVu1Y
  TUSHE

Your questions…

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