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Frailty and Sarcopenia

An Evidence Based Approach To Healthy Aging

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Learning Objectives

By the end of this lecture, students should be able to:

- describe healthy aging with updated knowledge through evidence- based practices.
- define frailty and sarcopenia and explain how they differ and overlap.
- identify the risk factors and clinical consequences of frailty and sarcopenia in older adults.
- recognize validated diagnostic criteria and tools for assessing frailty
- discuss the impact of frailty and sarcopenia on functional status, morbidity, and mortality.
- outline strategies for prevention, early detection, and management of frailty and sarcopenia.

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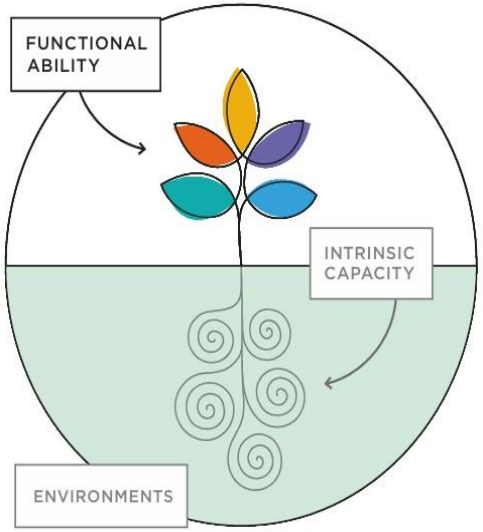
Healthy Aging

“the process of developing and maintaining the functional ability that enables well-being in older age”

FUNCTIONAL ABILITY

- Meeting basic needs for adequate standard of living
- Learn, grow and make decisions
- Be mobile
- Build and maintain relationships
- Contribute to society

(WHO, 2021)



INTRINSIC CAPACITY

- Locomotor capacity
- Sensory capacity
- Vitality
- Cognition and psychological capacity

ENVIRONMENT

- Home, community and broader society
- Products, equipment and technology
- The natural or built environment
- Emotional support, assistance and relationships provided by other people and animals
- Attitudes
- Services, systems and policies

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Healthy Aging

Sri Lankan and Global Aging

- The number of older persons worldwide (2021) is slightly more than 1 billion; about 13.5% of the global population
- By 2030, 1 in 6 persons will be 60 years of age or older
- In Sri Lanka (2023) it is around 17.2% of the population (~3,761,000)
- By 2030, it will be around 20% (~4,433,000)

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Frailty and Sarcopenia

Frailty

Frailty is a clinical syndrome characterized by a decline in an individual's physical and physiological reserves, leading to increased vulnerability to stressors. It often results in reduced strength, endurance, and overall functional ability, making a person more susceptible to adverse health outcomes such as falls, disability, hospitalization, and mortality.

Sarcopenia

Sarcopenia is the age-related progressive loss of skeletal muscle mass, strength, and function. It is a key factor contributing to physical frailty and disability in older adults. Sarcopenia can lead to reduced mobility, increased risk of falls, and loss of independence.

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Frailty

Older adults face multimorbidity, **frailty, sarcopenia**, falls, polypharmacy, and social isolation.

“a state of increased vulnerability, resulting from age-associated declines in reserve and function across multiple physiologic systems, such that the ability to cope with every day or acute stressors is compromised” (Doody et al., 2022).

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Frailty

Causes:

- Aging and biological changes
- Chronic diseases (e.g., cardiovascular disease, diabetes)
- Malnutrition
- Physical inactivity
- Cognitive decline and depression

Diagnosis:

Common tools include:

Fried Frailty Phenotype: Identifies frailty based on five criteria—unintentional weight loss, weakness (grip strength), exhaustion, slow walking speed, and low physical activity.

Frailty Index: A more comprehensive approach that counts accumulated health deficits (symptoms, diseases, disabilities).

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The Frailty Phenotype

(Fried et al., 2001)

1) **Unintentional Weight Loss**: A decrease in body weight that is not deliberate (>10 lbs in the last year)
2) **Exhaustion**: A feeling of fatigue, often measured by self-report ("I feel exhausted" 3 or more days/week)
3) **Weakness**: Low muscle strength, typically assessed by handgrip strength (in the lowest 20th percentile)
4) **Slow Walking Speed**: A slower-than-average pace when walking, often adjusted for gender and height (Slowest 20%)
5) **Low Physical Activity**: A low level of energy expenditure from physical activities (Measured by weekly energy expenditure)

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Sarcopenia

"**the age-related loss of muscle mass, plus low muscle strength, and/or low physical performance**" (Chen et al., 2020).

Progressive and generalized skeletal muscle disorder that is associated with increased likelihood of adverse outcomes including falls, fractures, physical disability and mortality.

Criteria of Sarcopenia (EWGSOP2 Consensus 2018)

1) **Low muscle strength** (presently the most reliable measure of muscle function)
2) **Low muscle quantity or quality** (micro- and macroscopic aspects of muscle architecture and composition)
3) **Low physical performance** (predicts adverse outcomes)

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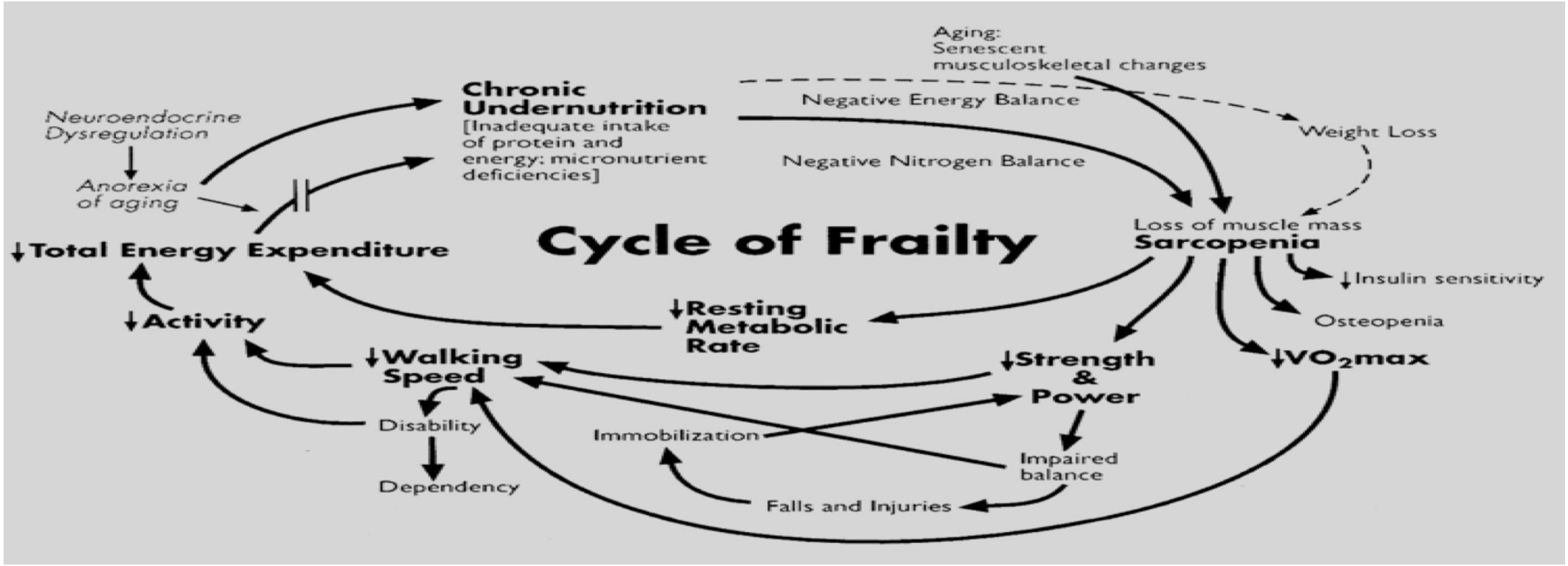
The Viscous Cycle of Frailty and Sarcopenia



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Assessment of Sarcopenia

- **Grip strength -** https://doi.org/10.1093/ageing/afr051
- **Chair stand test -** https://youtu.be/_jPl-IuRJ5A?si=S9AMiWNVaOUuaKvi
- **Appendicular skeletal muscle mass (ASMM) by Dual-energy X-ray absorptiometry (DXA) -** https://doi.org/10.3945/ajcn.115.111203
- **Muscle quality by mid-thigh or total body muscle quality by muscle biopsy, CT, MRI or Magnetic resonance Spectroscopy (MRS) -** https://doi.org/10.1016/j.ejrad.2018.04.011
- **4-meter walk test -** https://youtu.be/xLScK_NXUN0?si=3y1o4Yb181RtA5Ig
- **Short physical performance battery (SPPB) -** https://research.ndorms.ox.ac.uk/prove/documents/assessors/outcomeMeasures/SPPB_Protocol.pdf
- **Timed Up and Go test -** https://youtu.be/-XFxbaOWDCs?si=ZDtff9PI2qqeRyXf

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Detecting Frailty

a) **Walking speed** - The cut-off value is considered 0.8 m/s

b) **Timed Up and Go (TUG) Test** - Time less than 10 s is considered normal

c) **Self-Related Health** – The cut-off of less than 6 for the question "How would you rate your health on a scale of 0-10"

d) **Fried Criteria** - ≥ 3; frail, 1 – 2; pre-frailty, 0; robust

e) **FRAIL Questionnaire** – Fatigue, Resistance (ability to climb up one flight of stairs), Ambulation (ability to walk one block), Illness (> 5 comorbidities), Loss of weight (> 5%)

f) **FiND questionnaire** - Frail Non-Disabled (FiND) tool has been designed to differentiate frailty from disability

g) **PRISMA 7 questionnaire** - ≥ 3; frail

h) **Groningen Frailty Indicator** - ≥ 4; frail

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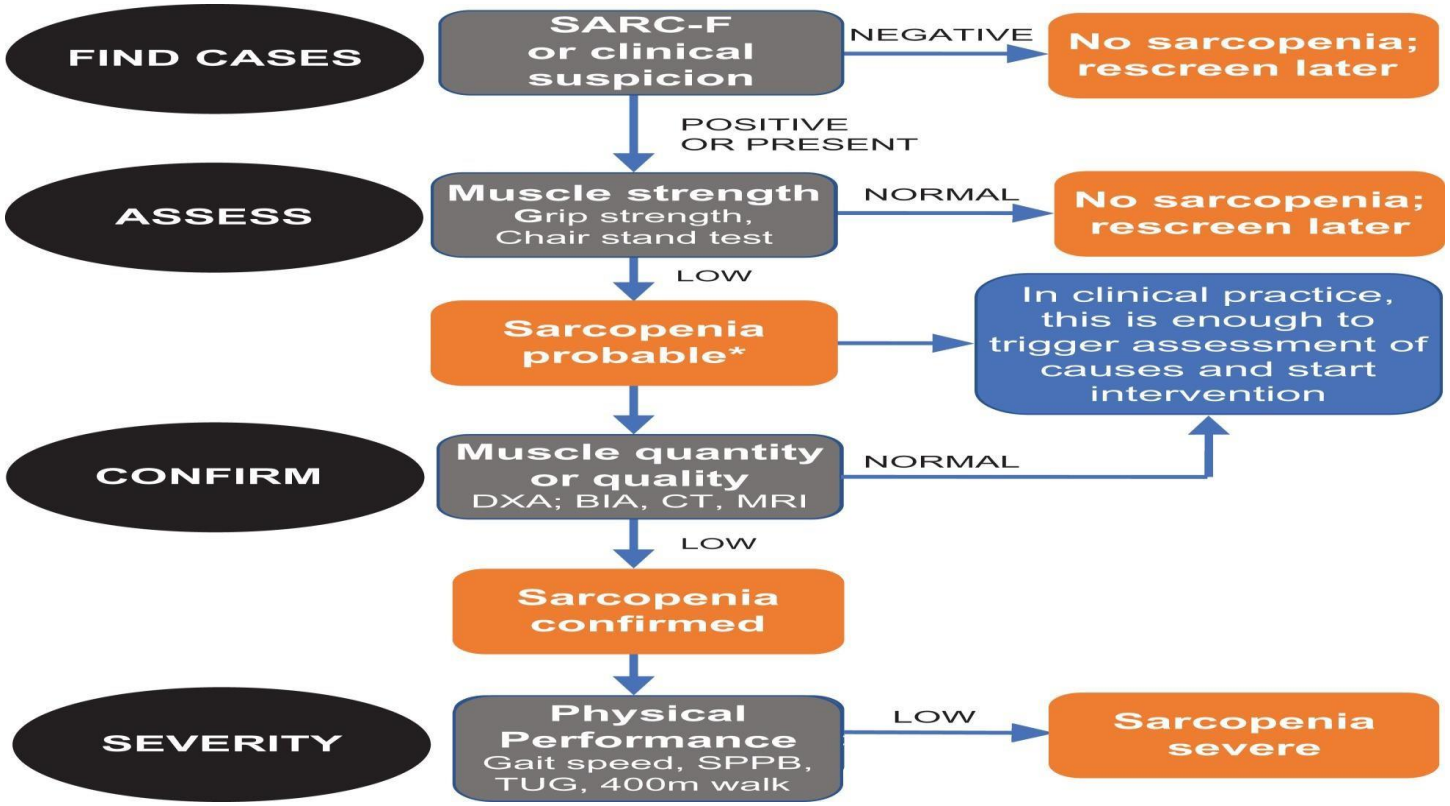
Detecting Sarcopenia



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Best Practices in Identifying and Responding for the Needs of Older Adults

- Comprehensive, multidimensional assessments that cover physical function, mobility, nutrition, and activities of daily living as the core to holistic practice and tailored therapeutic plans

- Interdisciplinary collaboration of doctors, nurses, physiotherapists, dietitians, social workers to address chronic conditions, prevention, and health promotion through tailored interventions for independence.

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Best Practices in Identifying and Responding for the Needs of Older Adults

- Person-Centered Care, emphasizing trust-building, understanding personal values and emotional states, and tailored care planning to improve satisfaction and ethical quality of care.

- Engage health systems in education, facility upgrades, and policies that are inclusive of social determinants for older adults

- Incorporating spiritual dimension for ethical and effective service delivery

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Evidence-based Practices In Management of Older Adults

Global,

Vivi frail based multicomponent exercise training programs (MCTs) for frailty and cognitive decline including resistance, balance, and cognitive training (Moradell et al., 2025)

Interprofessional collaboration in managing polypharmacy, supporting its efficacy in reducing inappropriate medications and improving patient outcomes (Perron, 2024)

Outpatient-based caregiver training programs to improve caregivers' preparedness, health-related quality of life, and reduced depressive symptoms when caring for older adults with mild cognitive impairment (TUNG et al., 2023)

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Evidence-based Practices In Management of Older Adults

Implementation of the Age-Friendly Health Systems (AFHS model), to provide comprehensive, person-centered care for older adults (Manges et al., 2023)

Remote health promotion programs to enhance access to care, especially for older adults with mobility or transportation issues (Steinman et al., 2024)

In Sri Lanka,

The WHO ICOPE framework (Integrated Care for Older People) introduced in Sri Lanka (2023–2025) for screening and management of frailty, sarcopenia, and cognitive decline (Capacity building on ICOPE in Sri Lanka; Reports from the field; 2023)

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Evidence-based Practices in Management of Older Adults

Multicomponent interventions including progressive resistance & balance training, adequate protein intake, vitamin D supplementation, and falls-prevention programs (Capacity building on ICOPE in Sri Lanka_Reports from the field; 2023)

Polypharmacy management through regular medication review and deprescribing (Perera et al., 2024)

“National Nutrition Quality Standards for Residential Care for Older People” issued by Nutrition Division, Ministry of Health, Sri Lanka

Community-based caregiver training and home-based education programs shown effective in improving quality of life of older adults (Maliga et al., 2025)

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Evidence-based Practices In Management of Older Adults

Best practices to maintain compliance with ethical and legal standards

Uphold autonomy, beneficence, non-maleficence, justice, truth-telling, dignity, and fairness across care decisions as core bioethical principles

Promote tools for autonomy and support clear communication among individuals, families, and providers as advance directives

Recognize and address elder abuse and neglect, respecting legal duties to protect vulnerable older adults from harm ensuring protection

Equip older adults with legal information to uphold rights such as consent, autonomy, and equitable care.

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Comprehensive Geriatric Assessment (CGA)

- For those with positive screens, Comprehensive Geriatric Assessment (CGA); multidomain evaluation

  - Medical: comorbidities, medications, polypharmacy
  - Functional: ADL/IADL, balance, falls risk
  - Cognitive & psychological: dementia, depression
  - Nutrition: BMI, weight changes, dietary adequacy
  - Social & environmental: home safety, caregiver support

- Identify reversible risk factors, disease risk factors and vaccination (malnutrition, untreated depression, medication side effects)

- Stratify according to frailty status (robust, pre-frail, frail)

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Comprehensive Geriatric Assessment (CGA)

- Diagnosis/ Define priority problems

➢ Convert assessment outputs into problem-focused diagnoses

➢ Apply guideline thresholds

- 0.8 m/s – Gait speed
- 10s – TUG test
- < 27 kg (men), < 16 kg (women) - Grip strength 15 sec for 5 rises - Chair rise test
- < 26/30 - MoCA (Montreal Cognitive Assessment)
- ≥ 5 - Geriatric Depression Scale (GDS-15) Unintentional weight loss > 5% in 6 months

➢ Confirm with further testing or specialist referral where needed

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Physiotherapy Management

Planning Interventions/ Tailored Care Plan and Follow Up Goals-

- Education/Prevention
  - Ensure adequate protein & energy intake; supplement vitamin D if deficient
  - Sensory correction (glasses/hearing aids), social engagement
- Short- term
  - Promote physical activity (progressive resistance, flexibility & balance training)
  - Falls prevention programs (home safety, exercise, vision, meds)
  - Mental health support (CBT; Cognitive Behavioral Therapy, social programs)
- Long -term
  - Task-specific physiotherapy, ADL training,
  - Home-based / community rehabilitation
  - Caregiver education and support to sustain function at home.

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