Frailty: Diagnosis and Mangement

Amy Thomas, MD

Geriatrician VAPSHCS/Clinical Instructor UW

Disclosures

- No financial or non-financial disclosures
- Opinions shared in the presentation are mine and do not represent the University of Washington or the Veteran's Health Administration

Agenda

- Background
- Frailty: Definition and Conceptual Models
- Frailty Screening and Use Examples
- Frailty Treatment

Background

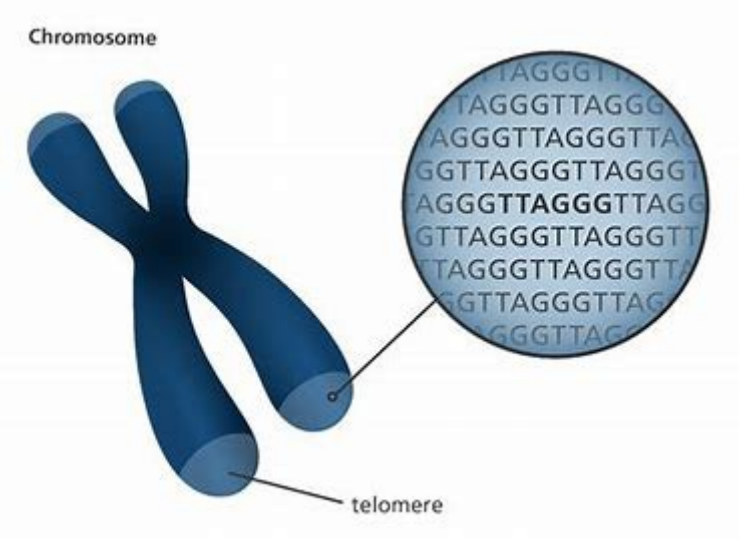
Aging is inevitable

- 12 molecular, cellular and systemic hallmarks of aging
- Can be counterbalanced with 3 hallmarks of health

López-Otín C, Blasco MA, Partridge L, Serrano M, Kroemer G. Hallmarks of aging: An expanding universe. Cell. 2023 Jan 19;186(2):243-278. doi: 10.1016/j.cell.2022.11.001. Epub 2023 Jan 3. PMID: 36599349.

Hallmarks of Health/Cellular Aging Changes

- Organizational features of spatial compartmentalization (avoidance of entropy)
  - Altered intercellular communication
- Maintenance of homeostasis
  - Genomic Instability, Telomere Attrition
  - Epigenetic alterations (e.g., methylation)
  - Loss of proteostasis
  - Disabled macroautophagy
  - Deregulated nutrient sensing
  - Mitochondrial dysfunction
  - Dysbiosis
  - Stem cell exhaustion
  - Cellular senescence
- Adequate responses to stress
  - Chronic Inflammation

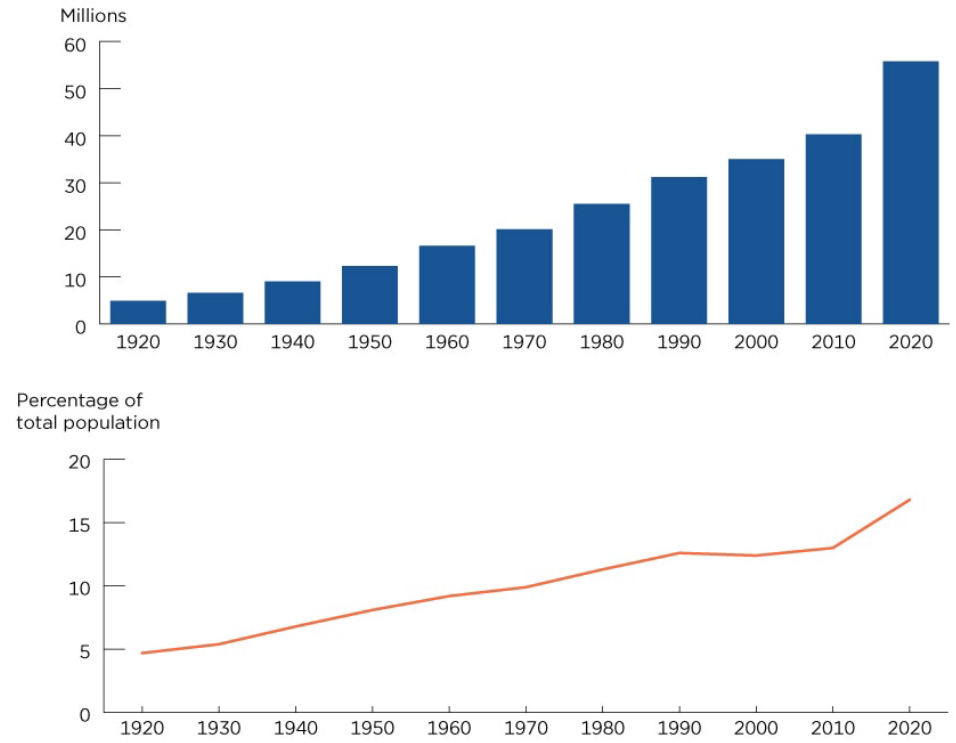


López-Otín C, Blasco MA, Partridge L, Serrano M, Kroemer G. Hallmarks of aging: An expanding universe. Cell. 2023 Jan 19;186(2):243-278. doi: 10.1016/j.cell.2022.11.001. Epub 2023 Jan 3. PMID: 36599349.

Aging is Common

- In 2020, about 1 in 6 people in the United States were age 65 and over. In 1920, this proportion was less than 1 in 20.

Figure 1.
Population 65 Years and Over by Size and Percentage of Total Population: 1920 to 2020



Note: For information on data collection, confidentiality protection, nonsampling error, and definitions, refer to <https://www2.census.gov/programs-surveys/decennial/2020/technical-documentation/complete-tech-docs/demographic-and-housing-characteristics-file-and-demographic-profile/2020census-demographic-and-housing-characteristics-file-and-demographic-profile-techdoc.pdf>.

Source: U.S. Census Bureau, Decennial Census of Population, 1900 to 2000; 2010 Census Summary File 1, and 2020 Census Demographic and Housing Characteristics File (DHC).

Caplan, Zoe. "U.S. Older Population Grew from 2010 to 2020 at Fastest Rate since 1880 to 1890." Census.Gov, 25 May 2023, www.census.gov/library/stories/2023/05/2020-census-united-states-older-population-grew.html#:~:text=In%202020%2C%20the%2065-74%20age%20group%3A%201%20Was,mil%C2%ADlion%20in%202010%20to%2033.1%20million%20in%202020.

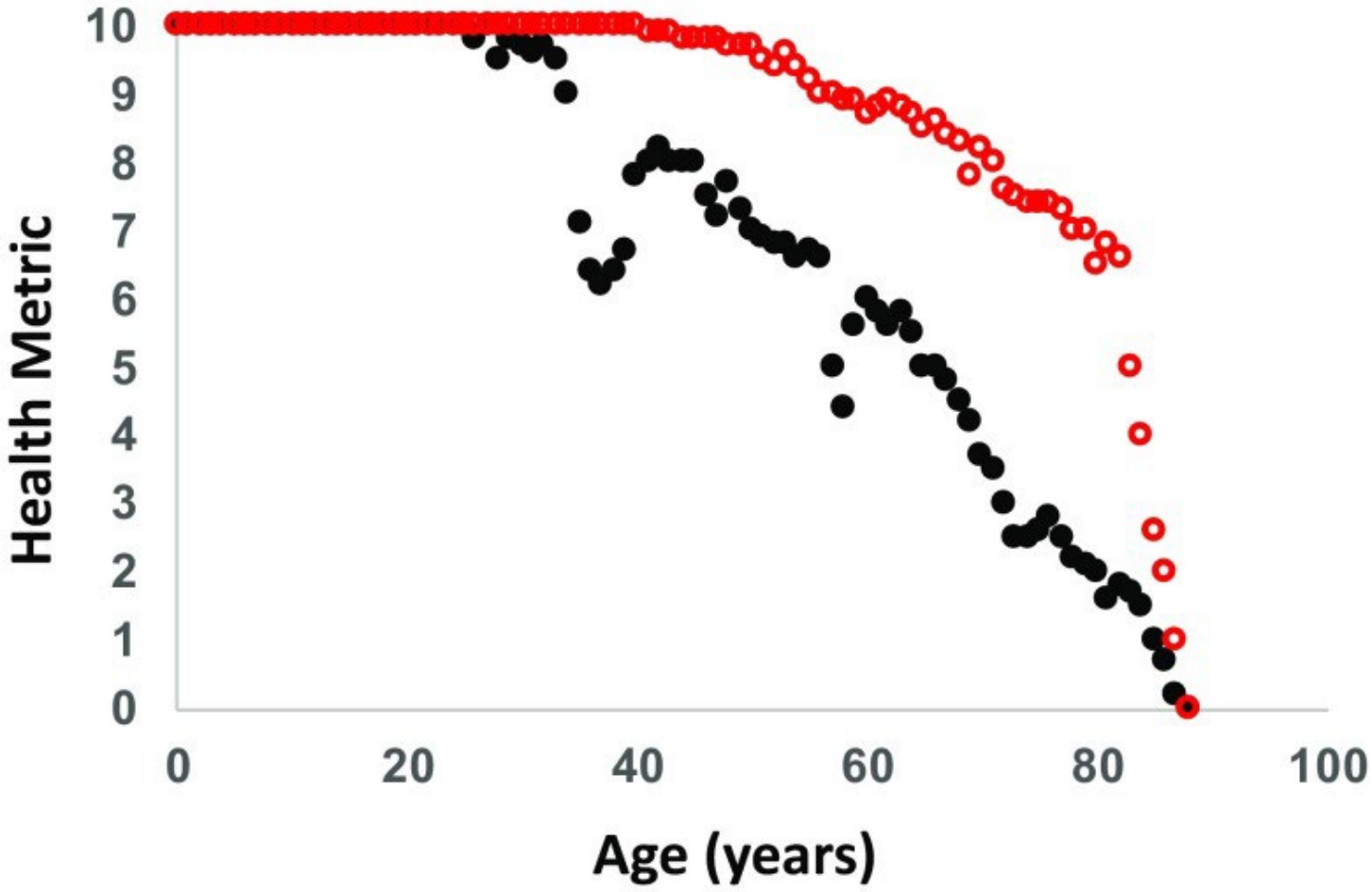
Aging is Diverse

Betty White, active work as a comedian into her late 90’s

Yūichirō Miura, climbed Mt. Everest at 80 years old

Increased Healthspan

- Concept that Lifespan (# of years) may be less important goal then healthspan (goal for longer “healthy” years)
- Controversy about how to measure healthy vs. unhealthy years.

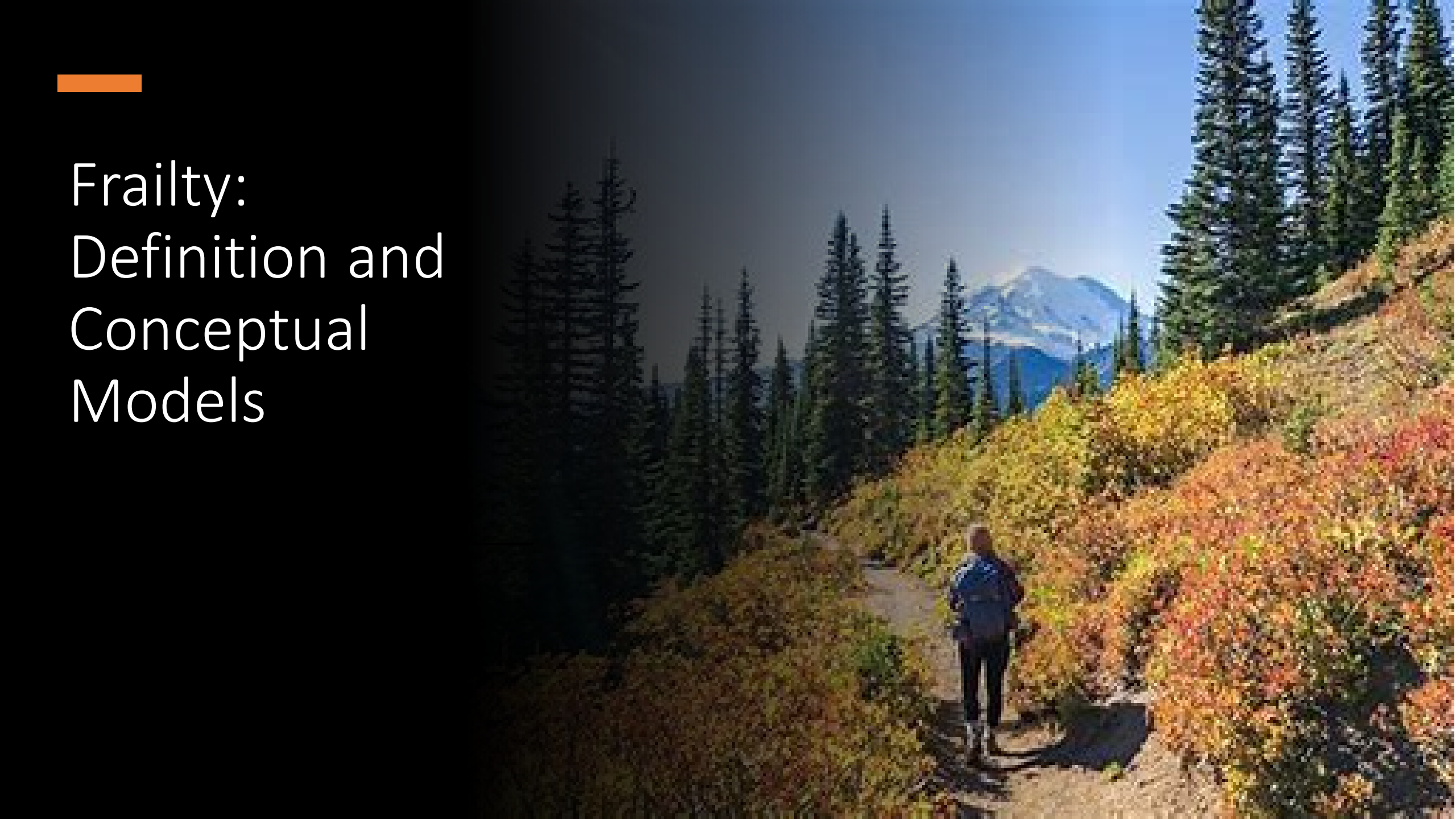


Kaeberlein M. How healthy is the healthspan concept? Geroscience. 2018 Aug;40(4):361-364. doi: 10.1007/s11357-018-0036-9. Epub 2018 Aug 6. PMID: 30084059; PMCID: PMC6136295.

Healthcare is a Finite Resource

- Target resources to those in most need
- Offer preventive care to maximize quality of life and minimize functional losses with aging
- Offer interventions to those most likely to benefit and least likely to be harmed
- Avoid bias (including ageism)
- Ensure interventions offered match patient priorities

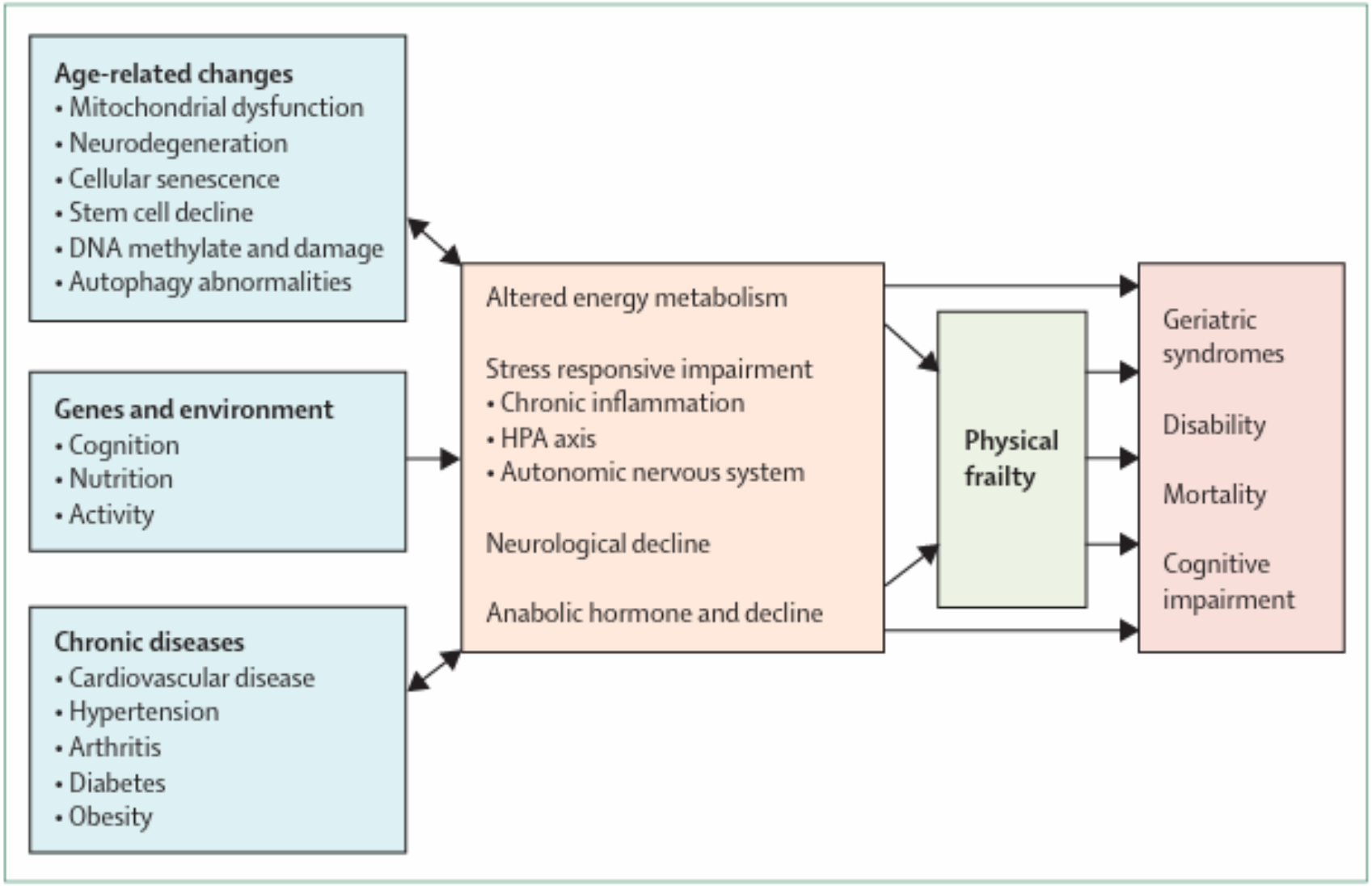
Frailty: Definition and Conceptual Models



Definition

- “Frailty is characterized by a decline in functioning across multiple physiologic systems accompanied by increased vulnerability to stressors and increased morbidity/mortality

Loewenthal J, Berning MJ, Wayne PM, Eckstrom E, Orkaby AR. Holistic frailty prevention: The promise of movement-based mind-body therapies. Aging Cell. 2023 Sep 12:e13986. doi: 10.1111/acel.13986. Epub ahead of print. PMID: 37698149.



Dent E, Martin FC, Bergman H, Woo J, Romero-Ortuno R, Walston JD. Management of frailty: opportunities, challenges, and future directions. Lancet. 2019 Oct 12;394(1206):1376-1386. doi: 10.1016/S0140-6736(19)31785-4. PMID: 31609229.,
Michel JP, Beattie BL, Martin FC, Walston J, eds. Oxford textbook of geriatric medicine, 3rd edn. Oxford: Oxford University Press, 2017.

Concept Confusion

- Aging (Aging is inevitable, Frailty is not)
  - Frailty can help explains the difference in outcomes of people the same age
- Failure to Thrive (? End-stage frailty)
- Multimorbidity/Complexity (can contribute to frailty)
- Weakness/Sarcopenia (can contribute to frailty)
- Resilience (loss of resilience can contribute to frailty)
- Disability/Functional Dependence (can result from frailty)

Conceptual Overlap

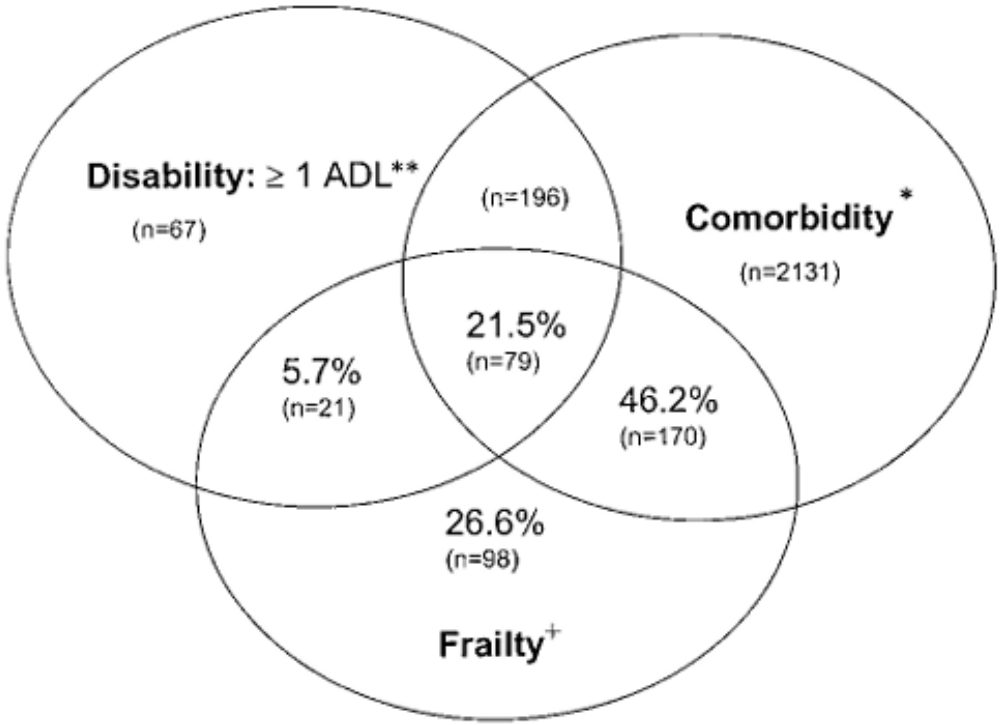


Figure 3. Venn diagram displaying extent of overlap of frailty with ADL disability and comorbidity (≥2 diseases). Total represented: 2,762 subjects who had comorbidity and/or disability and/or frailty. *n* of each subgroup indicated in parentheses. + Frail: overall $n = 368$ frail subjects (both cohorts). *Comorbidity: overall $n = 2{,}576$ with 2 or more out of the following 9 diseases: myocardial infarction, angina, congestive heart failure, claudication, arthritis, cancer, diabetes, hypertension, COPD. Of these, 249 were also frail. **Disabled: overall $n = 363$ with an ADL disability; of these, 100 were frail.

Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. J Gerontol A Biol Sci Med Sci 2001;

Frailty-Additional Clarification

- Frailty is not inevitable/can be preventable
- Frailty is not necessarily permanent (dynamic measure)
- Frailty can be challenging to “eye-ball”

2 Conceptual Models

- Both circa 2001:
  - Fried-Phenotypic Frailty
  - Rockwood-Cumulative Deficits

Fried (Phenotypic Frailty)

- Weight loss (>=10 lbs unintended in one year or >5% total body weight)
- Low energy (self-report)
  - -I felt that everything I did was an effort this week
  - -I could not get going in the past week
- Low muscle strength (grip)-measured with dynamometer (BMI and gender)
- Low physical activity (self report, gender)
- Slow walking speed- measured with 15 ft walk (gender)

Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. J Gerontol A Biol Sci Med Sci 2001;

Fried (Phenotypic Frailty)

- 3 or greater components (+) = Frail
- 1-2 components (+) = Pre-Frail
- 0 components (+) = Robust

**

Note accuracy of self reported measures can strongly influence classification.

Rockwood (Cumulative Deficit Model)

- Cognition
- Nutrition
- Morbidity
- Mental Health
- Physical Function

Rockwood K, Mitnitski A. Frailty in relation to the accumulation of deficits. *J Gerontol A Biol Sci Med Sci* 2007; **62:** 722–27.

Rockwood (Cumulative Deficit Model)

- Numerator: Total # Deficits counted for patient
- Denominator: Total # of pre-determined deficits
- Score: Between 0 and 1. (Frail 0.25 and greater)
- Choice of health deficits influences score greatly.
  - Acquired
  - Age-associated
  - Associated with an adverse outcome
  - Represent multiple domains of function/organ systems
  - Prevalence not less than 1%

Frailty –missing concepts

- Social capital “Social Frailty”
- Socioeconomic Status “Economic Frailty” (diet, environmental access to safe outdoors space/exercise options)

Epidemiology

- Higher rates with age
- Higher rates in women
- Higher rates in lower SES (less education, lower income)
- Higher rates in non-white populations
- Actual prevalence estimates vary on screening method used and population examined (4-59%).

Hoogendijk EO, Afilalo J, Ensrud KE, Kowal P, Onder G, Fried LP. Frailty: implications for clinical practice and public health. Lancet. 2019 Oct 12;394(10206):1365-1375. doi: 10.1016/S0140-6736(19)31786-6. PMID: 31609228.

Significance

- Patients who are frail have been shown to have:
  - Higher risk of falls and hip fractures
  - Higher risk of hospitalization
  - Higher risk of delirium while hospitalized
  - Higher rates of adverse outcomes in surgery
  - Higher risk of mortality

Hoogendijk EO, Afilalo J, Ensrud KE, Kowal P, Onder G, Fried LP. Frailty: implications for clinical practice and public health. Lancet. 2019 Oct 12;394(10206):1365-1375. doi: 10.1016/S0140-6736(19)31786-6. PMID: 31609228.

Frailty Screening and Use Examples

Screening

- >65 different screening instruments in the published literature
- No current wide consensus on which screener to use
  - Site-specific/Specialty Specific Screeners may be needed (e.g. SNF population vs clinic population)
- EMR based vs. Patient/caregiver completed vs. medical team completed.

Frailty in Geriatric Consults HMC

Clinical Frailty Scale

1 Very Fit

- Robust, active, energetic and motivated
- Commonly exercise regularly
- Among the fittest for their age

2 Well

- No active disease symptoms
- Less fit than category 1
- Exercise or are very active occasionally, e.g. seasonally

3 Managing Well

- Have medical problems that are well controlled
- Are not regularly active beyond routine walking

4 Vulnerable

- Not dependent on others for daily help
- Symptoms do, however, limit activities
- A common complaint is being 'slowed down', and/or being tired during the day

5 Mildly Frail

- More evident slowing
- Need help in high-order IADs
- Mild frailty progressively impairs activities outside and inside the home

6 Moderately Frail

- Need help with all outside activities and with keeping house
- Often have problems with stairs and bathing in the home
- Might need minimal assistance with dressing

7 Severely Frail

- Completely dependent for personal care
- However, are still stable and not at a high risk of dying (within 6 months)

8 Very Severely Frail

- Completely dependent
- Approaching the end of life
- Typically, could not recover from even a minor illness

9 Terminally Ill

- Approaching the end of life
- A life expectancy of <6 months
- However, they are not otherwise evidently frail

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common symptoms vary for the degree.

In **mild dementia**
- Forgetting the details of a recent event
- Though still remembering the event itself
- Repeating the same question/story
- Social withdrawal

In **moderate dementia**
- Recent memory is very impaired
- Though they seemingly can remember past life events well
- Can complete personal care with prompting

In **severe dementia**
- Cannot complete personal care without help

Source: Canadian Study on Health and Aging Revised 2008; K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. *CMAJ*. 2005;173(5):489–95. Used with permission.

Clinical Frailty Scale Strengths

- Short/Easy to Administer/no special staff or physical measurements needed
- Uses ADL/IADL functional measurements to help score which are regularly collected in the hospital by Occupational Therapy
- Good evidence for predicting outcomes of older adults hospitalized with acute illness (mortality, need for nursing home stay, length of hospital stays).
- At Harborview used as part of a Comprehensive Geriatric Assessment to guide Geriatric Consultation Recommendations to hospitalized patients on multiple services.

Basic D, Shanley C. Frailty in an older inpatient population: using the clinical frailty scale to predict patient outcomes. J Aging Health. 2015 Jun;27(4):670-85.

Frailty in Peri-Operative Clinic VA

- Risk Analysis Index (RAI-C)
- 14 items, between 0-81 points, estimate 2 minutes to complete. All by provider survey to patients.
- Score influenced by age, chronic conditions (e.g. cancer, kidney disease), living environment (community vs. assisted vs. nursing home) and function.
- Validated in a Veteran's Affairs Surgical Population
- Being used currently on elective knee and hip surgeries to guide need for pre-habilitation (physical therapy, nutrition and geriatrics consultations)

Hall DE, Arya S, Schmid KK, et al. Development and Initial Validation of the Risk Analysis Index for Measuring Frailty in Surgical Populations. JAMA Surg. 2017;152(2):175–182. doi:10.1001/jamasurg.2016.4202

Frailty in Peri-Operative Clinic VA

C. Cognition, Residence & Activity of Daily Living

9. Do you reside in a setting other than independent living?
   If yes, check answer: Skilled nursing facility □ Assisted living □ Nursing home □
   No= 0 Yes= 8 _____

   If yes, were you admitted within the past 3 months? No □ Yes □

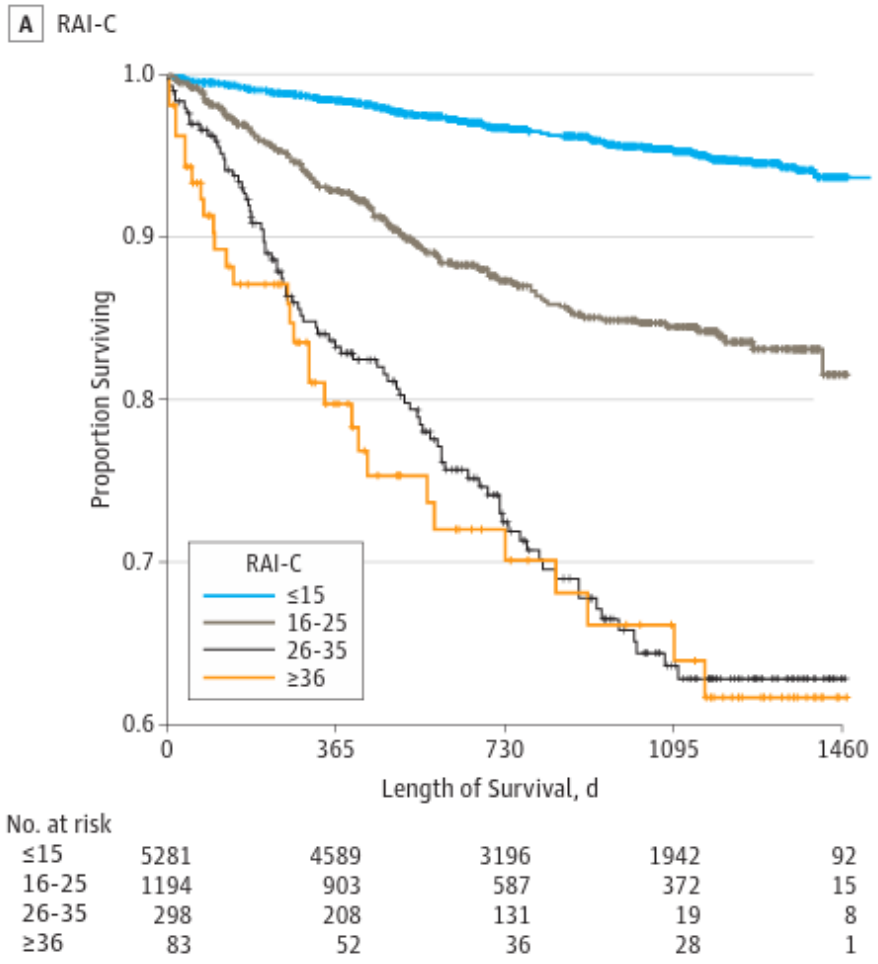
D. Activities of Daily Living & Cognitive Decline (*Circle score for each ADL*)

10. Mobility/Locomotion	11. Eating	12. Toilet Use	13. Personal Hygiene
0. Independent	0. Independent	0. Independent	0. Independent
1. Supervised	1. Supervised	1. Supervised	1. Supervised
2. Limited assistance	2. Limited assistance	2. Limited assistance	2. Limited assistance
3. Extensive assistance	3. Extensive assistance	3. Extensive assistance	3. Extensive assistance
4. Total Dependence	4. Total Dependence	4. Total Dependence	4. Total Dependence

14. Have your cognitive skills or status deteriorated over the past 3 months? No □ Yes □ (*see score chart*)

Hall DE, Arya S, Schmid KK, et al. Development and Initial Validation of the Risk Analysis Index for Measuring Frailty in Surgical Populations. JAMA Surg. 2017;152(2):175–182. doi:10.1001/jamasurg.2016.4202

Frailty in Peri-Operative Clinic VA



Hall DE, Arya S, Schmid KK, et al. Development and Initial Validation of the Risk Analysis Index for Measuring Frailty in Surgical Populations. JAMA Surg. 2017;152(2):175–182. doi:10.1001/jamasurg.2016.4202

Frailty in EMR

- VA examples: VA-FI and CAN
- National Health Service (NHS)/England: eFI
- Used in primary care to identify at risk patients requiring additional resources
- In NHS use to determine resource allocation (e.g. annual medication review/Physical Therapy consultations)
- Cumulative Deficits Model
- Deficits Chosen can be unique to health system/EMR

Frailty in Oncology Care Guidelines

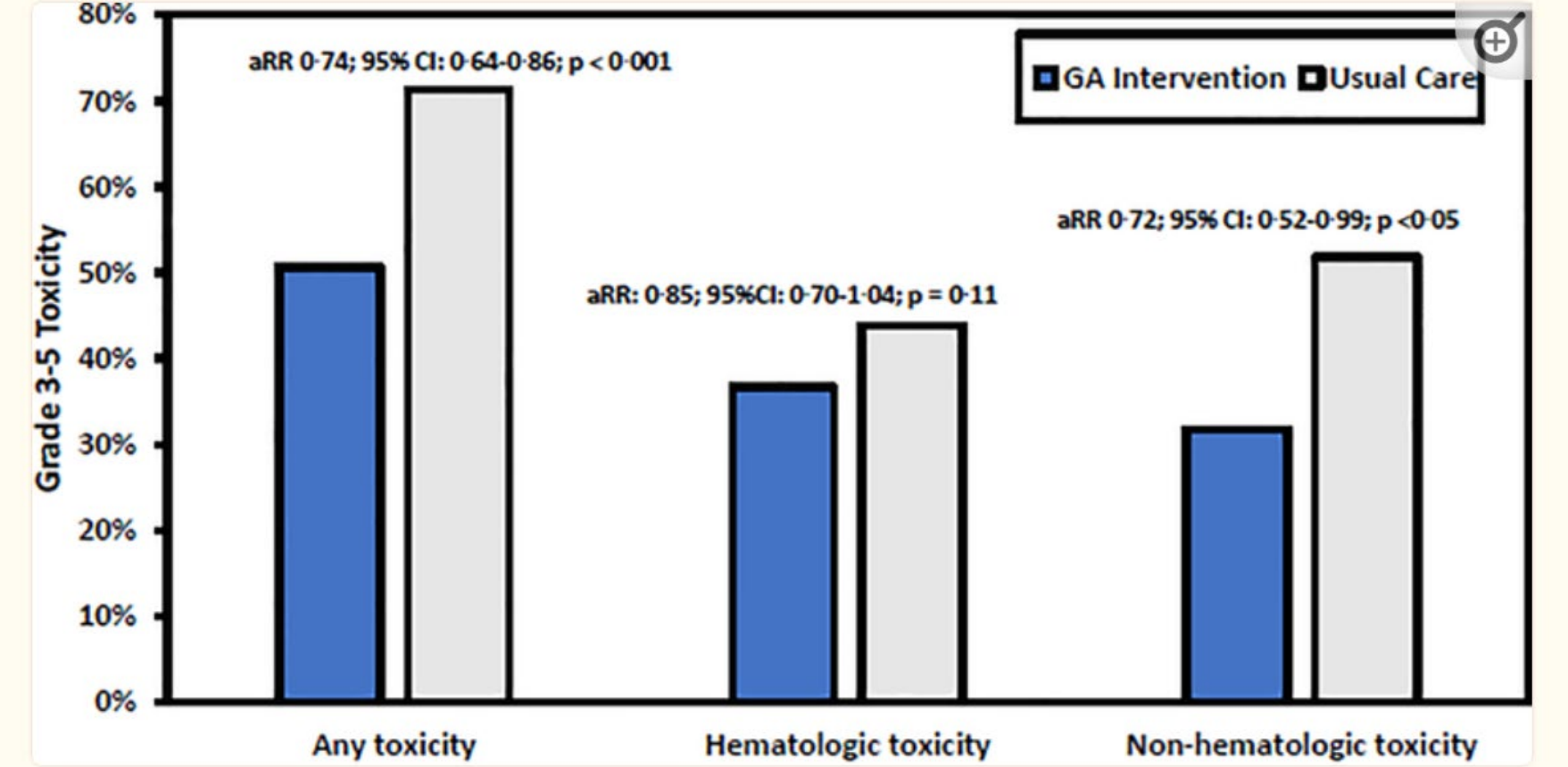
- Frailty associated with increased risk of chemotherapy intolerance, poorer treatment responses as well as increased post-operative complications
- Large number of older cancer patients (70% >65), frailty rates estimated as up to 50%
- ECOG and Karnofsky performance scales do a poor job of estimating chemotherapy toxicity in older patients

Goede V. Frailty and Cancer: Current Perspectives on Assessment and Monitoring. Clin Interv Aging. 2023 Mar 28;18:505-521. doi: 10.2147/CIA.S365494. PMID: 37013130; PMCID: PMC10066705.

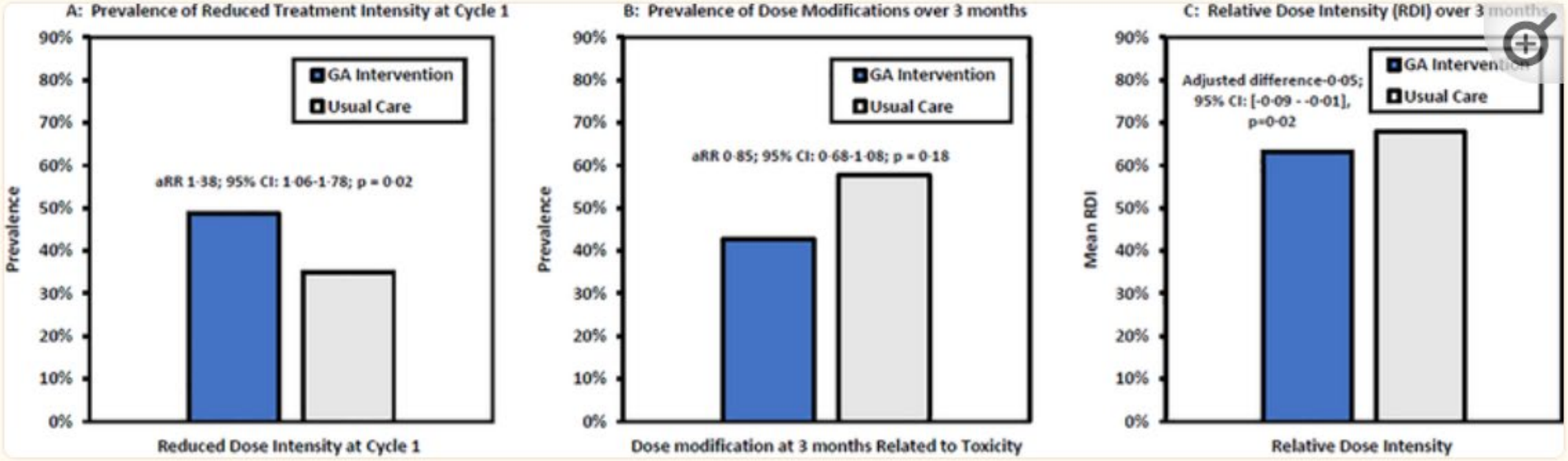
Frailty in Oncology Care Guidelines

- American Society of Clinical Oncology 2018 Guidelines recommend screening patients 65 and up receiving chemotherapy with a Geriatric Assessment to include:
  - IADLs for function
  - Comorbidities
  - Falls question
  - Geriatric Depression Scale
  - Mini Cog or Blessed Orienation Memory Concentration Test
  - Unintentional Weight Loss(>10% from baseline)
  - CARB (Cancer and Aging Research Group) or CRASH (Chemotherapy Risk Assessment Scale for High-Age patients)
  - Geriatric-8 or Vulnerable Elders Survey 13 to predict mortality
  - Reference e-Prognosis tools to estimate noncancer based life expectancy

Mohile SG, Dale W, Somerfield MR, Schonberg MA, Boyd CM, Burhenn PS, Canin B, Cohen HJ, Holmes HM, Hopkins JO, Janelsins MC, Khorana AA, Klepin HD, Lichtman SM, Mustian KM, Tew WP, Hurria A. Practical Assessment and Management of Vulnerabilities in Older Patients Receiving Chemotherapy: ASCO Guideline for Geriatric Oncology. J Clin Oncol. 2018 Aug 1;36(22):2326-2347. doi: 10.1200/JCO.2018.78.8687. Epub 2018 May 21. PMID: 29782209; PMCID: PMC6063790..



Mohile SG, Mohamed MR, Xu H, Culakova E, Loh KP, Magnuson A, Flannery MA, Obrecht S, Gilmore N, Ramsdale E, Dunne RF, Wildes T, Plumb S, Patil A, Wells M, Lowenstein L, Janelsins M, Mustian K, Hopkins JO, Berenberg J, Anthony N, Dale W. Evaluation of geriatric assessment and management on the toxic effects of cancer treatment (GAP70+): a cluster-randomised study. Lancet. 2021 Nov 20;398(10314):1894-1904. doi: 10.1016/S0140-6736(21)01789-X. Epub 2021 Nov 3. PMID: 34741815; PMCID: PMC8647163.



Mohile SG, Mohamed MR, Xu H, Culakova E, Loh KP, Magnuson A, Flannery MA, Obrecht S, Gilmore N, Ramsdale E, Dunne RF, Wildes T, Plumb S, Patil A, Wells M, Lowenstein L, Janelsins M, Mustian K, Hopkins JO, Berenberg J, Anthony N, Dale W. Evaluation of geriatric assessment and management on the toxic effects of cancer treatment (GAP70+): a cluster-randomised study. Lancet. 2021 Nov 20;398(10314):1894-1904. doi: 10.1016/S0140-6736(21)01789-X. Epub 2021 Nov 3. PMID: 34741815; PMCID: PMC8647163.

Frailty in Cardiology

- 5 meter gait speed included in peri-operative risk assessment prior to cardiovascular surgery
- 109 surgical centers, 15,171 patients aged 60 years or older undergoing coronary artery bypass graft, aortic valve surgery, mitral valve surgery, or combined procedures.
- Gait speed is an independent predictor of adverse outcomes after cardiac surgery, with each 0.1-m/s decrease conferring an 11% relative increase in mortality.

Afilalo J, Kim S, O'Brien S, et al. Gait Speed and Operative Mortality in Older Adults Following Cardiac Surgery. JAMA Cardiol. 2016;1(3):314–321. doi:10.1001/jamacardio.2016.0316

Rapid Mobility assessments in older adults

- Gait speed
- Sit to Stand
- 4 Stage Balance Test

https://www.nejm.org/doi/10.1056/NEJMvcm2009406?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Frailty in Resource Allocation/Covid Pandemic

- During the COVID-19 pandemic some medical societies recommended use of frailty screening as a way to allocate ICU resources more equitably then based on age cut-offs (NICE Guidance NG-159, Belgian Society of Intensive Care Medicine)
- Ballelli et al study, 43 item Frailty Index (Cumulative Deficit Model), independent predictor of ICU admission and mortality in an Italian COVID cohort.

Bellelli G, Rebora P, Valsecchi MG, Bonfanti P, Citerio G; COVID-19 Monza Team members. Frailty index predicts poor outcome in COVID-19 patients. Intensive Care Med. 2020 Aug;46(8):1634-1636. doi: 10.1007/s00134-020-06087-2. Epub 2020 May 25. PMID: 32451583; PMCID: PMC7246290.

Comprehensive Geriatric Assessment On-Line Calculator

- CGA-FI
- Developed by Dr. Dae Kim
- Senior Health Calculator: Online Tool for Providers | BIDMC of Boston

Frailty Treatment

Frail and Pre-Frail Treatment Options

- Strong Evidence for:
  - Multi-component physical activity programs
  - Physical Activity Programs with Progressive Resistance Training
  - Comprehensive care plans that address Polypharmacy, Treatable causes of weight loss, causes of fatigue (depression, hypothyroidism, hypotension, anemia, low B12)
  - Social Support to address unmet needs/encourage adherence to treatment plans
- Consensus agreement that cognitive therapy, giving Vit D if no deficit, and hormone therapy have no clear evidence of benefit
- Weak Evidence for Nutritional Supplementation

Dent E, Morley JE, Cruz-Jentoft AJ, et al. Physical frailty: ICFSR international clinical practice guidelines for identification and management. J Nutr Health Aging. 2019;23(9):772.

Local Treatment Options

- YMCA Silver Sneakers Program
- VA Gero-FIT program (longitudinal, PT based)
- Request Otago exercise programs with PT
  - Otago Exercise Program (OEP) was originally developed in New Zealand as a home-based exercise program to prevent falls among older people living in the community
  - Emphasizes balance training and progressive resistance training

Yi M, Zhang W, Zhang X, Zhou J, Wang Z. The effectiveness of Otago exercise program in older adults with frailty or pre-frailty: A systematic review and meta-analysis. Arch Gerontol Geriatr. 2023 Nov;114:105083. doi: 10.1016/j.archger.2023.105083. Epub 2023 Jun 22. PMID: 37390692.

Severe Frailty: Avoid the risk of Being Rehabbed to Death

- “Inpatient providers think, “I know this person is declining. But if she can’t go home, where will we send her besides a post-acute care facility?” The post-acute care providers think, “This person is clearly declining. Why did they send her here without talking about goals of care?” Patients and families think, “How did we end up in a nursing home? Aren’t there any other options?” Often, no one mentions the possibility of death or discusses the goals of care. In treating discharge to a post-acute care facility as a routine event, we are missing an opportunity to improve care for seriously ill older adults.”

Flint LA, David DJ, Smith AK. Rehabbed to Death. N Engl J Med. 2019 Jan 31;380(5):408-409. doi: 10.1056/NEJMp1809354. PMID: 30699322.

In Summary

- Frailty is a decline in physiological capacity across multiple systems resulting in increased susceptibility to stressors
- No gold standard for screening. Current screeners incorporate aspects of Fried and Rockwood conceptual models
- Frailty is used in many areas of the health system to allocate resources, anticipate risk of poor outcomes, tailor care to patient needs/priorities.
- Evidence for treatment to prevent frailty is still developing but is strongest in exercise/physical therapy interventions

Questions?

Interested in Adding Frailty Considerations into your outpatient clinic?

- Consider asking about exercise
- Consider functional screening for ADL/IADL independence
- Consider asking patient if they can stand from chair without pushing off with hands
- Consider 4 stage balance test
- Consider watching patient gait as they enter or exit your exam room