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Geriatric Syndromes

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Authors

- Asha Wettasinghe, University of Colombo, Sri Lanka
- KRM Chandrathilaka, University of Colombo, Sri Lanka
- Kaveera Senanayake, University of Colombo, Sri Lanka
- Sabela Rivas Neira, University of A Coruña, Spain
- Jamile Vivas Costa, University of A Coruña, Spain

Consortium CAPAGE

- University of Applied Sciences FH JOANNEUM, Austria
- JAMK University of Applied Sciences, Finland
- Santa Maria Health School, Portugal
- University of A Coruña, Spain
- Eastern University, Sri Lanka
- General Sir John Kotelawala Defence University, Sri Lanka
- University of Colombo, Sri Lanka
- University of Jaffna, Sri Lanka
- University of Peradeniya, Sri Lanka
- University of Ruhuna, Sri Lanka

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Lecture outcomes

- Identify different major components of geriatric syndromes
- Analyze the multifactorial causes and risk factors contributing to each geriatric syndrome
- Evaluate the clinical presentations and consequences of geriatric syndromes
- Apply appropriate assessment strategies for identifying and monitoring geriatric syndromes in clinical practice

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Geriatric syndrome:

- Definition:

Geriatric syndrome is a term used to describe ***unique health conditions in elderly patients that are multifactorial in cause and do not fit into discrete organ-based categories.***

Tran, H. T., & Leonard, S. D. (2017). Geriatric Assessment for Primary Care Providers. *Primary Care: Clinics in Office Practice*, *44*(3), 399-411. https://doi.org/10.1016/j.pop.2017.05.001

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Overview of geriatric syndromes

- **Highly prevalent** among older, especially **frail**, adults
- To be considered a geriatric syndrome, these conditions must interfere with a person's daily life
- **Substantial impact** on quality of life and disability
- **Multifactorial in origin**, often involving multiple organ systems
- Symptoms may not reflect the site of the underlying pathologic process

Inouye, S. K., Studenski, S., Tinetti, M. E., & Kuchel, G. A. (2007). Geriatric Syndromes: Clinical, Research, and Policy Implications of a Core Geriatric Concept. Journal of the American Geriatrics Society, 55(5), 780-791. https://doi.org/10.1111/j.1532-5415.2007.01156.x

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Common geriatric conditions

- Falls and mobility Issues
- Cognitive impairment
- Urinary incontinence
- Frailty
- Polypharmacy

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Falls and mobility Issues

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Falls - overview

- Definition: A fall is

"an unexpected event in which the participant comes to rest on the ground, floor, or lower level" (Lamb et al. 2005)

- Epidemiology:
  - About one-third of adults aged ≥65 years fall each year
  - The rate increases with age and frailty
  - Leading cause of injury-related morbidity and mortality in the older adults

- Lamb, S. E., Jørstad-Stein, E. C., Hauer, K., Becker, C., & Prevention of Falls Network Europe and Outcomes Consensus Group (2005). Development of a common outcome data set for fall injury prevention trials: the Prevention of Falls Network Europe consensus. *Journal of the American Geriatrics Society*, *53*(9), 1618–1622. https://doi.org/10.1111/j.1532-5415.2005.53455.x
- World Health Organization. (2007). WHO Global Report on Falls Prevention in Older Age. https://www.who.int/publications/i/item/9789241563536

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Risk factors for falls

- **Intrinsic Factors**:
- Muscle weakness, sarcopenia
- Gait and balance disorders
- Neurological conditions: Parkinson's disease, stroke, peripheral neuropathy
- Vision and vestibular deficits
- Cognitive impairment (e.g., dementia)
- Orthostatic hypotension
- Age > 80
- History of prior falls

Ambrose AF, Paul G, Hausdorff JM. (2013). *Risk factors for falls among older adults: a review of the literature*. *Maturitas*, 75(1), 51–61.

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Risk factors for falls

Extrinsic Factors:

- Medications (polypharmacy)
- Environmental hazards (loose rugs, poor lighting)
- Footwear and assistive device misuse

Ambrose AF, Paul G, Hausdorff JM. (2013). *Risk factors for falls among older adults: a review of the literature*. *Maturitas*, 75(1), 51–61.

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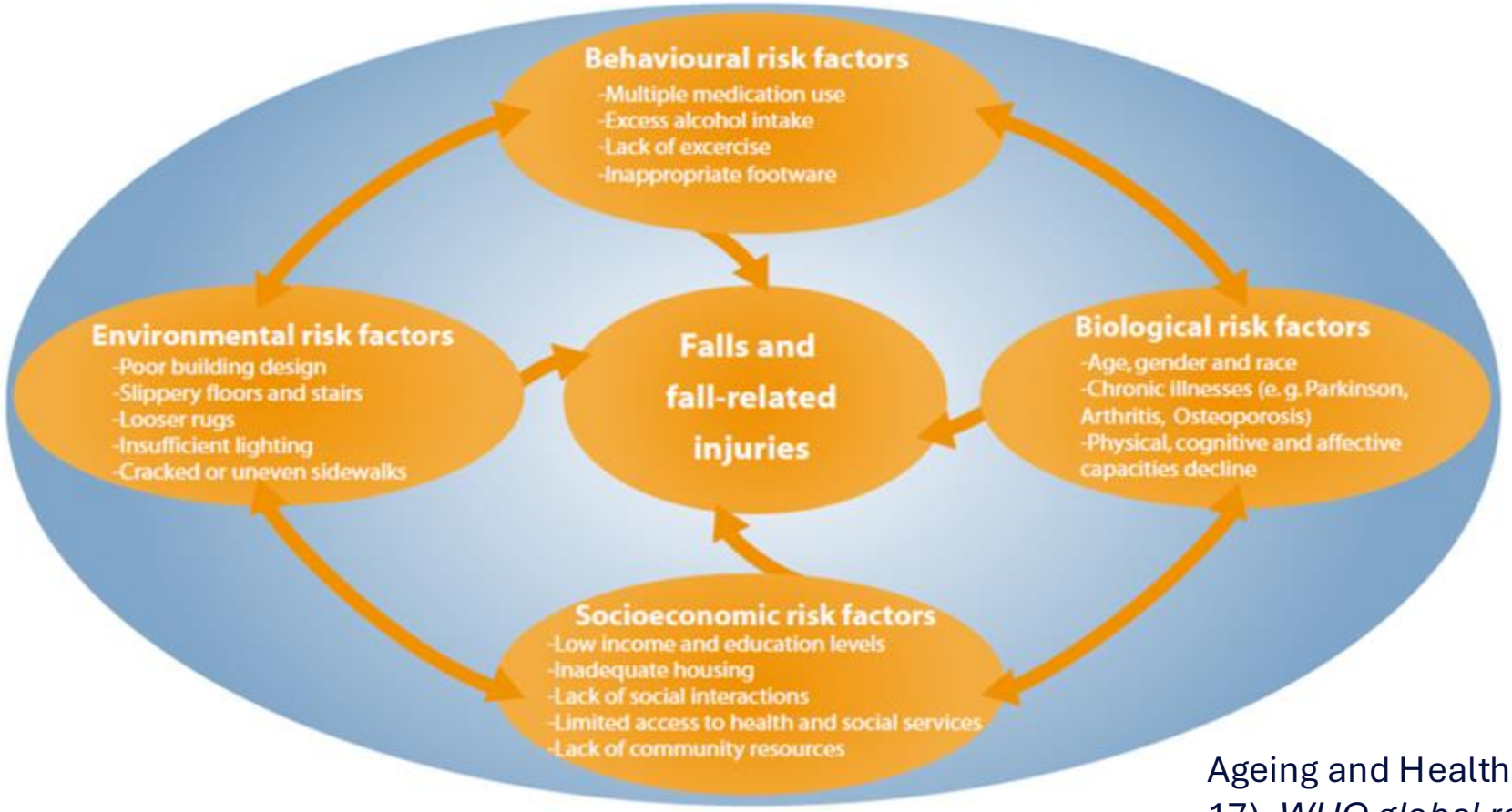
Model of risk factors in older adults



Ageing and Health (AAH). (2008, March 17). *WHO global report on falls prevention in older age*. https://www.who.int/publications/i/item/9789241563536

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Complications of falls

Injuries

- Painful soft tissue injuries
- Fractures Eg: Hip, femur, humerus, wrist, ribs

Subdural hematoma

Hospitalization

- Complications of immobilization

Disability

- Impaired mobility because of physical injury
- Impaired mobility from fear, loss of self-confidence, and restriction of ambulation

Increased risk of death

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Consequences of falls

- Falls and consequent injuries are major public health problems that often require medical attention
- Falls lead to 20-30% of mild to severe injuries, and are underlying cause of 10-15% of all emergency department visits
- More than 50% of injury-related hospitalizations among people over 65 years and older
- The major underlying causes for fall-related hospital admission are hip fracture, traumatic brain injuries and upper limb injuries
- With the increasing age and frailty level, older person are likely to remain in hospital after sustaining a fall-related injury for the rest of their life
- Subsequently to falls, 20% die within a year of the hip fracture
- In addition, falls may also result in a post fall syndrome that includes dependence, loss of autonomy, confusion, immobilization and depression, which will lead to a further restriction in daily activities
- Falls account for 40% of all injury deaths

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Consequences of falls

Physical:	• Fractures (hip, wrist, spine) • Head injury, traumatic brain injury (TBI) • Pressure sores from long lie
Psychological:	• Fear of falling → activity restriction → deconditioning
Social and Economic:	• Loss of independence, institutionalization • Increased healthcare costs

Sterling DA, O'Connor JA, Bonadies J. (2001). *Geriatric falls: injury severity is high and disproportionate to mechanism. Journal of Trauma*, 50(1), 116–119.

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Impact of quality of life

- Falls can lead to a **downward spiral**:

Fear → less mobility → weakness → increased fall risk

Fear of falling →	• Reduced mobility and activity avoidance
Activity Limitations →	• Decreased physical function and daily living abilities
Participation Restrictions →	• Social isolation and withdrawal from community engagement
Compromised Quality of Life →	• Overall decline in physical, psychological, and social well-being

Zijlstra GA, et al. (2007). *Interventions to reduce fear of falling in community-living older people: a systematic review*. *Journal of the American Geriatrics Society*, 55(4), 603–615.

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Assessment Tools

- **Clinical assessments**:
- Timed Up and Go (TUG): assesses mobility and fall risk
- Berg Balance Scale: evaluates balance performance
- Functional Reach Test: estimates dynamic balance

There are many more…

Podsiadlo D, Richardson S. (1991). *The Timed "Up & Go": a test of basic functional mobility for frail elderly persons. Journal of the American Geriatrics Society*, 39(2), 142–148.

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Falls prevention

- ‘Exercise’ interventions may be the most appropriate falls prevention intervention for older adults in RAC and community settings as it is beneficial for multiple fall-related outcomes (falls, fall-related fractures, and people who have had a fall).

- **Reference articles for exercise protocols for falls prevention**:

✓https://www.cambridge.org/core/journals/ageing-and-society/article/abs/systematic-review-of-older-peoples-perceptions-of-facilitators-and-barriers-to-participation-in-fallsprevention-interventions/1D7E4BF3061874634A69D68A9CBB1190

✓https://bjsm.bmj.com/content/51/24/1750.long

✓https://bmcgeriatr.biomedcentral.com/counter/pdf/10.1186/s12877-023-04624-4.pdf

✓https://agsjournals.onlinelibrary.wiley.com/doi/epdf/10.1111/j.1532-5415.2010.03234.x

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Cognitive Impairments

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Cognitive impairment

- Definition: ***Cognitive impairment refers to difficulties with thinking, memory, attention, language, and decision-making beyond what is expected from normal aging.***

- Types:
  - **Delirium**: Acute, fluctuating disturbance in attention and awareness
  - **Dementia:** Chronic, progressive decline in cognitive function
  - **Mild Cognitive Impairment (MCI):** Intermediate stage between normal aging and dementia

American Psychiatric Association. (2013). *DSM-5: Diagnostic and Statistical Manual of Mental Disorders (5th ed.)*.

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Cognitive Decline and Aging

- Brain structure and function change with age, potentially leading to cognitive decline
- Not all cognitive domains or individuals are equally affected
- Some older adults may maintain or even outperform younger adults in certain cognitive functions
- Memory and perception are the most commonly affected functions, potentially impacting complex tasks like decision-making and language

Glisky EL Changes in cognitive function in human aging. In: Riddle DR, editor. *Brain aging: models, methods, and mechanisms*. Boca Raton (FL): CRC Press; 2007

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Prevalence and Impact

- Affects ~20–25% of people aged ≥65 years
- Incidence increases with age:
  - Dementia: ~5–7% prevalence in those over 65
  - MCI: ~10–20% in community-dwelling older adults
- Associated with increased risk of falls, hospitalization, institutionalization, and mortality

Petersen RC, et al. (2018). *Mild cognitive impairment: a concept in evolution*. *J Intern Med*, 275(3), 214–228.

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Continuum of Cognitive Impairment

- Cognitive decline progresses from:
  - Age-related cognitive decline
  - Mild cognitive impairment (MCI)
  - Dementia

➢MCI is noticeable but does not significantly interfere with daily function

➢Dementia involves severe cognitive changes that impair daily activities

Care CTF on PH, Pottie K, Rahal R, Jaramillo A, Birtwhistle R, Thombs BD, et al. Recommendations on screening for cognitive impairment in older adults. CMAJ 2016;188:37–46. https://doi.org/10.1503/cmaj.141165.

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Delirium

- Delirium is defined as an acute disorder of attention and cognition
- It is a common, serious, and often fatal condition among older patients
- Although often underrecognized, delirium has serious adverse effects on the individual's function and quality of life, as well as broad societal effects with substantial health care costs.
- Societal Impact:
  - Affects the individual, caregivers, healthcare systems, and communities
  - Negatively impacts function and quality of life

Oh ES, Fong TG, Hshieh TT, Inouye SK. Delirium in Older Persons: Advances in Diagnosis and Treatment. *JAMA*. 2017;318(12):1161–1174. doi:10.1001/jama.2017.12067

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Risk factors for delirium

- Immobility
- functional decline
- visual or hearing impairment
- Dehydration
- sleep deprivation

Oh ES, Fong TG, Hshieh TT, Inouye SK. Delirium in Older Persons: Advances in Diagnosis and Treatment. *JAMA*. 2017;318(12):1161–1174. doi:10.1001/jama.2017.12067

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Assessments for delirium

- Brief screening tools with high sensitivity and specificity;
  - 3-Minute Diagnostic Assessment
  - 4 A's Test
  - Family Confusion Assessment Method

➢Measures of severity, such as the Confusion Assessment Method–Severity Score, can aid in monitoring response to treatment, risk stratification, and assessing prognosis

Oh ES, Fong TG, Hshieh TT, Inouye SK. Delirium in Older Persons: Advances in Diagnosis and Treatment. *JAMA*. 2017;318(12):1161–1174. doi:10.1001/jama.2017.12067

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Dementia

- Dementia is a term for several diseases that affect memory, thinking, and the ability to perform daily activities

- **Definition**: Progressive cognitive decline interfering with **daily functioning**
- The illness gets worse over time
- It mainly affects older people but not all people will get it as they age
- Dementia is a growing source of morbidity and mortality in older adults

World Health Organization: WHO & World Health Organization: WHO. (2025, March 31). *Dementia*. https://www.who.int/news-room/fact-sheets/detail/dementia

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Dementia

Types:

- Alzheimer's disease (~60–80%)
- Vascular dementia
- Lewy body dementia
- Frontotemporal dementia

Symptoms:

- Memory impairment
- Language difficulties
- Executive dysfunction
- Behavioral and psychological symptoms (e.g., agitation, hallucinations)

Alzheimer's Association. (2024). *2024 Alzheimer's Disease Facts and Figures*. *Alzheimers Dement*, 20(3), 421–610.

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Prevalence of dementia

- **Global Dementia Prevalence (2023)**
  - Over 55 million people are living with dementia
  - Nearly 10 million new cases annually
  - The global prevalence in people aged 60 and above is estimated to be around 5–8%

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Prevalence of dementia

- **Higher Prevalence in South Asia Compared to Global Averages**
  - South Asian countries generally show higher prevalence rates due to under-diagnosis, limited awareness, and fewer healthcare resource
  - A meta-analysis estimated dementia prevalence in South Asia to be 6.5–10% in adults over 60

Risk of developing dementia

- age (more common in those 65 or older)
- high blood pressure (hypertension)
- high blood sugar (diabetes)
- being overweight or obese
- smoking
- drinking too much alcohol
- being physically inactive
- being socially isolated
- depression

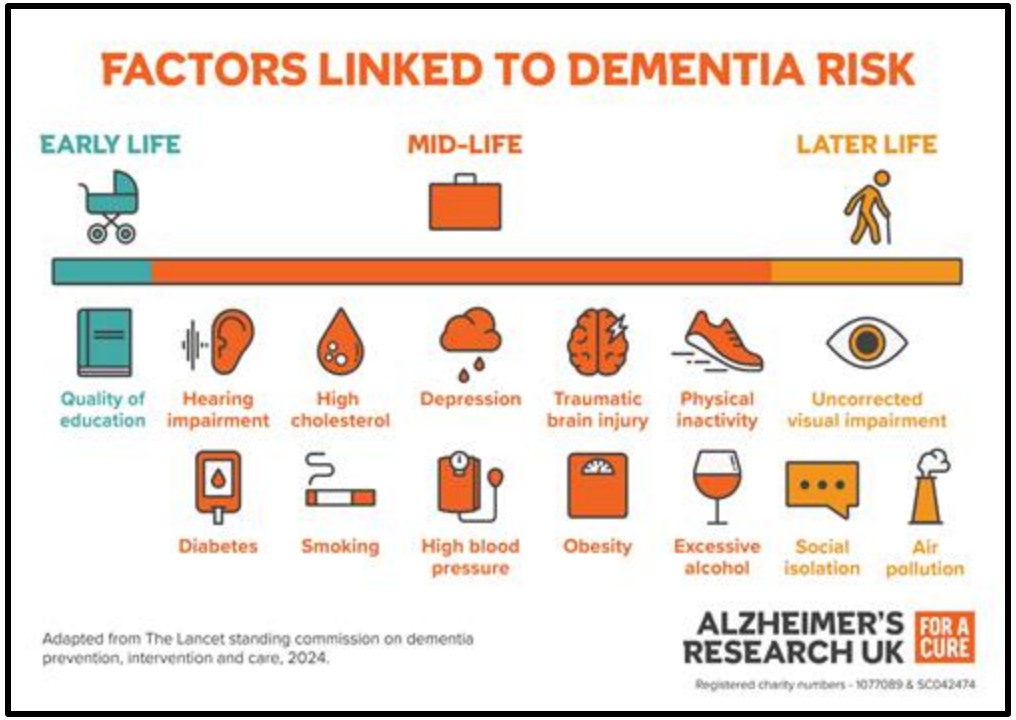

Image source: https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.summerfieldredlands.com%2Funderstanding-the-umbrella-of-dementia%2F&psig=AOvVaw1Odsg5Sgh0waD1revDsBYW&ust=1759721692163000&source=images&cd=vfe&opi=89978449&ved=0CBUQjRxqFwoTCIiQ86SQjJADFQAAAAAdAAAAABAE

World Health Organization: WHO & World Health Organization: WHO. (2025, March 31). *Dementia*. https://www.who.int/news-room/fact-sheets/detail/dementia

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Assessment tools

- Mini mental state examination (MMSE)
- Montreal Cognitive Assessment (MoCA)

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Mild cognitive impairment (MCI)

- Cognitive impairment occurs in a continuum, starting with aging-related cognitive decline, transitioning to mild cognitive impairment and ending with dementia
- Mild cognitive impairment (MCI) is the intermediate stage between the cognitive changes of normal aging and dementia
- Constitutes a high risk group for dementia

Geda, Y.E. Mild Cognitive Impairment in Older Adults. *Curr Psychiatry Rep* **14**, 320–327 (2012). https://doi.org/10.1007/s11920-012-0291-x

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Subtypes of MCI

- Classification is based on the presence or absence of memory domain involvement, as well as the number of cognitive domains involved,
- thus resulting in four categories:
- (i) MCI single domain, memory type
- (ii) MCI-single domain, non-memory type
- (iii) multi-domain, including memory domain
- (iv) multi-domain without memory involvement

Winblad B, Palmer K, Kivipelto M, Jelic V, Fratiglioni L, Wahlund LO, et al. Mild cognitive impairment–beyond controversies, towards a consensus: report of the International Working Group on Mild Cognitive Impairment. J Intern Med. 2004;256:240–6

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Assessment for MCI

- **Mini-Mental State Examination (MMSE)**
- Scored out of 30
- Cut-off for cognitive impairment: below 23–24, depending on age and education
- Cut-off for mild cognitive impairment: 27–28, but with variable sensitivity
- Clinically significant change: 1.4 to 3 points
- Commonly used in primary care

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Assessment for MCI

- **Montreal Cognitive Assessment (MoCA)**
- Scored out of 30
- Interpretation:
  - Mild impairment: 18–26
  - Moderate impairment: 10–17
  - Severe impairment: <10
- Widely used in clinical settings

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Urinary Incontinence

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Urinary Incontinence (UI)

- Urinary Incontinence (UI) is the involuntary loss of urine that is sufficient to be a problem
- Common in older adults, affecting up to 30–60% of women and 10–35% of men over 65 years

DuBeau CE, Kuchel GA, Johnson T 2nd, et al. (2010). Incontinence in the frail elderly: report from the 4th International Consultation on Incontinence. *Neurourol Urodyn*, 29(1), 165–178.

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Types of Urinary Incontinence

Stress Incontinence	• Leakage with physical exertion (coughing, sneezing) • Common in women with pelvic floor weakness
Urge Incontinence (Overactive bladder)	• Sudden urge to urinate followed by involuntary leakage
Mixed Urinary Incontinence	• Involuntary leakage associated with urgency an also with exertion

Abrams P, Cardozo L, Fall M, et al. (2002). The standardization of terminology of lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society. *Neurourol Urodyn*, 21(2), 167–178.

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Risk Factors for UI

- Age-related changes (decreased bladder capacity, detrusor overactivity)
- Pelvic floor muscle weakness (especially post-childbirth or post-menopause)
- Neurological conditions (stroke, Parkinson's disease, dementia)
- Medications (diuretics, sedatives, anticholinergics)
- Mobility or cognitive impairments

Resnick NM, Yalla SV. (1985). Detrusor hyperactivity with impaired contractile function. *An unrecognized but common cause of incontinence in elderly patients*. JAMA, 253(22), 3071–3075.

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Consequences in Older Adults

- Social isolation, embarrassment, and depression
- Increased risk of falls and fractures (especially with urgency incontinence)
- Skin breakdown and risk of pressure ulcers
- May lead to institutionalization in severe cases

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Management of UI

- **Non-Pharmacologic:**
  - Bladder training
  - Pelvic floor muscle exercises (Kegels)
  - Prompted voiding
  - Lifestyle modifications: weight loss, caffeine reduction, fluid management
  - Environmental modifications for those with mobility issues

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Management of UI

Pharmacologic:

- Antimuscarinics (e.g., oxybutynin, tolterodine) — for urge incontinence
- Beta-3 agonists (e.g., mirabegron) — alternative with fewer cognitive side effects
- Caution: Many agents may cause cognitive impairment or constipation in the older adults

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Frailty

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Frailty in older adults

- Definition: **clinically identifiable state of diminished physiological reserve and increased vulnerability to a broad range of adverse health outcomes**
- becomes more common as populations age
- prevalence of frailty among community dwelling persons ranged from 11% among those who were 50 to 59 years of age to 51% among those who were 90 years of age or older

Kim, D. H., & Rockwood, K. (2024). Frailty in older adults. *New England Journal of Medicine*, *391*(6), 538-548.

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Characteristics of frailty

Frailty can be described through the measurement of five physical features,

- Unintentional weight loss
- Weakness (low hand grip-strength)
- Exhaustion
- Slow walking speed
- Low physical activity

➢ frailty is present when three of these features are present, and pre-frailty when 1–2 features are present

- Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, Seeman T, Tracy R, Kop WJ, Burke G, et al. Frailty in older adults: evidence for a phenotype. J Gerontol A Biol Sci Med Sci. 2001;56(3):M146–56.
- Lewis, E., Coles, S., Howorth, K. *et al*. The prevalence and characteristics of frailty by frailty phenotype in rural Tanzania. *BMC Geriatr* **18**, 283 (2018). https://doi.org/10.1186/s12877-018-0967-0

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Assessment of frailty

Assessing frailty enables clinicians to;

- predict the outcomes and risks of health conditions
- target the delivery of evidence-based interventions
- tailor clinical management, including decisions about stressful treatments.

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Assessment of frailty

- Frailty assessment should serve to promote patient-centered care rather than as a reason to withhold treatments
- The focus should be on enhancing physiological reserve to build resilience against stressor
- While effective interventions like exercise and nutritional supplementation are recognized in clinical trials, their consistent application in routine care faces challenges
- The advantages of routine frailty screening have been demonstrated in high-risk settings like oncology and surgery, but its value in primary care is still uncertain

Kim, D. H., & Rockwood, K. (2024). Frailty in older adults. *New England Journal of Medicine*, *391*(6), 538-548.

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Implications of frailty

Poor Clinical Outcomes:

- Frailty is strongly associated with adverse outcomes:
- Increased risk of **falls**, **hospitalizations**, **disability**, **institutionalization**, **dementia**, and **mortality**

Predictive Value:

- Certain indicators, especially **gait speed (<0.8 m/s or <1 m/s)** and **grip strength**, are strong predictors of poor outcomes and useful as screening tools

Overlap with Disability and Dementia:

- Frailty can coexist with or precede disability and dementia
- The addition of cognitive impairment to frailty models increases predictive power for functional decline and mortality

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Implications of frailty

Impact on Quality of Life and Socioeconomics:

- Frailty is associated with **lower health-related quality of life** and **lower socioeconomic status**
- It can exacerbate health disparities in aging populations

Increased Healthcare Utilization and Costs:

- Frail individuals are more likely to need acute care, long-term care, and assistive services, increasing the healthcare burden

- Rockwood, K., Song, X., MacKnight, C., Bergman, H., Hogan, D. B., McDowell, I., & Mitnitski, A. (2005). A global clinical measure of fitness and frailty in elderly people. *Canadian Medical Association Journal, 173*(5), 489–495. https://doi.org/10.1503/cmaj.050051
- Abellan van Kan, G., Rolland, Y., Houles, M., Gillette-Guyonnet, S., Soto, M., & Vellas, B. (2010). The assessment of frailty in older adults. *Clinics in geriatric medicine*, *26*(2), 275–286. https://doi.org/10.1016/j.cger.2010.02.002

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Polypharmacy

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Polypharmacy in older adults

- Polypharmacy: the use of multiple medications by one individual
- High prevalence of multimorbidity often leads to the use of multiple medications in older patients
- While sometimes necessary, polypharmacy can become **inappropriate** or **harmful**, especially in:
  - ➢ Nursing homes
  - ➢ Very old individuals
  - ➢ End-of-life care

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Polypharmacy in older adults

- Prevalence ranges from 4% among community-dwelling older people to over 96.5% in hospitalized patient
- Literature greatly varies depending on the age group, definition, healthcare setting and region
- Associated negative outcomes:
  - Falls
  - Frailty
  - Increased mortality

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Clinical consequences of polypharmacy

Polypharmacy and Frailty

- Polypharmacy and frailty are both common in older adults
- A strong bidirectional association exists between polypharmacy/hyper-polypharmacy and frailty
- ~75% of older adults with polypharmacy are pre-frail or frail
- Longitudinal studies show polypharmacy increases the risk of developing frailty (e.g., 2.5× risk over 8 years with ≥7 drugs)
- Evidence is limited and inconclusive regarding causality
- Polypharmacy in frail/prefrail individuals is associated with higher mortality, disability, hospitalizations, and ED visits

Pazan, F., & Wehling, M. (2021). Polypharmacy in older adults: a narrative review of definitions, epidemiology and consequences. *European Geriatric Medicine*, *12*(3), 443–452. https://doi.org/10.1007/s41999-021-00479-3

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Clinical consequences of polypharmacy

Polypharmacy and Death

- Meta-analysis shows dose-response relationship: more medications = higher mortality risk
- Confounding by indication (due to multimorbidity) complicates interpretation
- Some studies show no independent association after adjusting for chronic diseases
- Other large cohort studies show persistent risk even after adjustment: e.g., 3% mortality increase per additional medication

Pazan, F., & Wehling, M. (2021). Polypharmacy in older adults: a narrative review of definitions, epidemiology and consequences. *European Geriatric Medicine*, *12*(3), 443–452. https://doi.org/10.1007/s41999-021-00479-3

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Clinical consequences of polypharmacy

Polypharmacy and Hospitalization

- Linked to increased risk of:
- Any hospitalization
- Unplanned/re-hospitalizations
- Fracture-specific hospitalizations
- Risk applies in both community and nursing home settings
- Polypharmacy (≥9 drugs) linked to more frequent and longer hospital stays
- Also associated with emergency department visits and time to first hospitalization

Pazan, F., & Wehling, M. (2021). Polypharmacy in older adults: a narrative review of definitions, epidemiology and consequences. *European Geriatric Medicine*, *12*(3), 443–452. https://doi.org/10.1007/s41999-021-00479-3

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Clinical consequences of polypharmacy

Polypharmacy and Falls

- Associated with increased fall risk.
- Example: 21% higher fall rate with ≥5 drugs; 50% higher with ≥10 drugs
- Association weakens when adjusting for fall-risk-increasing drugs (FRIDs)
- Strong evidence in both community and institutional settings

Pazan, F., & Wehling, M. (2021). Polypharmacy in older adults: a narrative review of definitions, epidemiology and consequences. *European Geriatric Medicine*, *12*(3), 443–452. https://doi.org/10.1007/s41999-021-00479-3

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Clinical consequences of polypharmacy

Polypharmacy and Cognitive Impairment

- Linked with cognitive decline, especially with psychotropics and anticholinergic drugs
- Associated with:
- Dementia onset
- Cognitive decline in nursing homes
- Lower MMSE scores in Parkinson's patients
- Poorer cognitive outcomes with longstanding polypharmacy

Pazan, F., & Wehling, M. (2021). Polypharmacy in older adults: a narrative review of definitions, epidemiology and consequences. *European Geriatric Medicine*, *12*(3), 443–452. https://doi.org/10.1007/s41999-021-00479-3

Clinical consequences of polypharmacy

Polypharmacy and Physical Function

- Associated with physical impairments and disability
- A bidirectional link exists: poorer physical function ↔ polypharmacy
- Causality not confirmed—based mostly on observational studies
- One multicenter study found no link with functional decline in nursing homes
- Polypharmacy also associated with higher rates of disability

Pazan, F., & Wehling, M. (2021). Polypharmacy in older adults: a narrative review of definitions, epidemiology and consequences. *European Geriatric Medicine*, *12*(3), 443–452. https://doi.org/10.1007/s41999-021-00479-3

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Take home message

- Geriatric syndromes are common, complex conditions in older adults with multifactorial causes.
- They significantly affect independence, function, and quality of life.
- Common syndromes include falls, cognitive impairment, urinary incontinence, frailty, and polypharmacy.
- Early detection and comprehensive, multidimensional assessment are essential.
- Management should be individualized and evidence-based.
- A holistic, interdisciplinary approach improves patient outcomes and supports healthy aging.

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