



Principles of
Geriatric Cancer Rehabilitation

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Memorial Sloan-Kettering Cancer Center

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Learning Objectives

- Identify the rehabilitation principles when treating older adults with cancer.
- Understand the implications of age-related deficits, comorbidities, geriatric syndromes, cancer symptoms and treatment in the rehabilitation of older adults.
- Analyze key considerations that affect rehabilitation of the older adult with cancer.



Outline

- Geriatric Statistics and Profile
- Geriatric Cancer Statistics
- Theories of Cancer in Aging
- Age-Related Deficits
- Geriatric Syndromes and Co-morbidities
- Cancer Treatments
- Principles of Geriatric Cancer Rehabilitation



Definition

- Perceptions¹
- Heterogeneous
- Young old - 65-74
- Middle old - 75-84
- Oldest old - 85 and over
- Overall – 68 y.o defined as “old”



Geriatric Statistics²

Number of Older Americans (65+)

- 40 million, 13% of total population in 2010
- 72 million, 20% of total population in 2030
- 5.5 million (85+) in 2010
- 19 million (85+) in 2050

Racial and Ethnic Composition

- 2010: 80% non-Hispanic Whites, 9% Blacks, 7% Hispanics, 3% Asians
- 2050: 58% non-Hispanic Whites, 20% Hispanics, 12% Blacks, 9% Asians



Geriatric Profile²

Living Arrangements

- 72% of older men lived with their spouse compared to 42% of older women
- Older women 2x as likely to live alone than older men
- Older non-Hispanic white women and black women, and older black men are more likely to live alone

Marital Status

- Older men more likely to be married than older women (78% vs 56%)
- Women 3x more likely to be widowed
- 9% of older men and 11% of older women were divorced



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Geriatric Profile²

Participation in Labor Force

- 37% of men 65-69; 15% of men >70 in 2011
- 27% of women 65-69
- Most of the increase in labor force participation of women began in mid-1990s

Chronic Health Conditions

- Women reported higher levels of asthma, arthritis, and HTN
- Men reported higher levels of heart disease, cancer, and diabetes



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Geriatric Cancer Statistics³⁻⁵


- Cancer is associated with aging
- Median age at diagnosis for cancer of all sites was 66 y/o (2006-2010)
- Cancer is the leading cause of death among age 60-79
- Male mortality: lung, colorectal, prostate
- Female mortality: lung, breast, colorectal (2009)



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Geriatric Cancer Statistics^{3,4}

- 50% of all cancers and 70% of cancer deaths occur in those ≥ 65 y/o
- From 2010 to 2030, the % of all cancers diagnosed in older adults will increase from 61% to 70%





Theories of Aging

- Hayflick limit
 - After undergoing many cell divisions, telomeres undergo either apoptosis (cell suicide) or senescence (inactive retirement).
- Free Radical
 - Aging is due to accumulated damage by free radicals.




Theories of Aging

- Cross-linkage
 - Protein becomes impaired and unable to function after binding to glucose (diabetes, cataracts, cardiac & renal).
- Somatic Mutation
 - During each cell division, there is a chance that genes will be copied incorrectly, leading to problems in the body related to aging.


Age-Related Deficits⁶⁻⁹

ORGAN SYSTEMS	AGING PROCESS
Hematopoietic	Blood volume remain unchanged Dec bone marrow mass, Inc fat in bone marrow
Hepatobiliary	Dec liver mass (20-40%) Dec cytochrome P450 content
Renal	Dec renal mass Diffuse sclerosis of glomeruli More prone to nephrotoxicity
Cardiovascular	Inc risk for HTN and CAD Left atrium enlarges and Left ventricle stiffens Marked dec max HR in response to exercise Resting LVEF is not changed in healthy older people
Respiratory	Alveolar ducts enlarge, Dec surface for gas exchange Inc chest wall stiffness, Dec chest wall compliance TLC does not change significantly with age Inc residual volume by as much as 10%/decade Cough is less vigorous



Age-Related Deficits⁶⁻⁹


ORGAN SYSTEMS	AGING PROCESS
Musculoskeletal	Sarcopenia Type I slow-twitch fibers are less affected by age than fast-twitch Inc probability of fracture and rate of repair is slowed Dec bone mass
Integumentary	Skin atrophy, Dec elasticity & impaired reparative response Dec ability to deliver heat for excretion Dec sensory perception of skin particularly in LEs
Sensory	Presbyopia Dec adaptation to lighting More sensitive to glare Dec contrast sensitivity Presbycusis Difficulty with speech discrimination and localizing sound Loss of taste largely due to dec olfaction
Immune	Inc susceptibility to infections, cancer, and autoimmune dse
Urinary	Inc prevalence of urinary incontinence



Geriatric Comorbidities

- Congestive Heart Failure
- Diabetes
- Hypertension
- Anemia

- Depression
- COPD
- Hearing impairments
- Osteoporosis
- Arthritis



Geriatric Comorbidities- Congestive Heart Failure¹⁰⁻¹¹

- Leading cause of hospitalization for 65+
- Affects 10 per 1000 people after age 65
- 20% risk of developing CHF after 80
- Associated with decreased QOL
- Limited exercise capacity due to fatigue and dyspnea



Geriatric Comorbidities- Diabetes¹²

- 10.9 million or 26.9% of 65+ had diabetes in 2010
- Risk of death among people with diabetes is 2x that of people of similar age but without diabetes
- Complications: Heart disease and stroke, HTN, blindness and eye problems, kidney disease, neuropathy, amputations, dental disease and depression
- 2-3x more likely to report inability to walk a quarter mile, climb stairs, or do household work



Geriatric Comorbidities- Hypertension¹³⁻¹⁵

- 60-80% have HTN among age >60
- Optimum – <120/80
- Normal – 120-129/80-84
- High normal – 130-139/85-89
- Hypertension – ≥140/90
- Isolated systolic HTN - >160 with diastolic <90
- High normal BP and normal BP frequently progress to hypertension over a period of 4 years, especially in older adults
- **Most older adults require >2 antihypertensive meds**



Geriatric Comorbidities- Anemia^{16,17}

- WHO criteria for anemia: Men <13 g/dL, Women <12 g/dL
- Associated with:
 - Fatigue, lower handgrip strength, increased number of disabilities, physical decline and more depressive symptoms among older adults
 - Increased mortality and hospitalization
 - Reduced QOL and function in older adults undergoing chemotherapy



Geriatric Comorbidities- Depression¹⁸⁻²¹

- Not a normal consequence of aging
- Prevalence of depression among hospitalized older adults is over 30%
- Older adults with stroke, MI, or cancer have rates over 40%
- 50% of nursing home residents are depressed
- Suicide rates are 2x as high in older adults, with the rate highest for white men >85 y/o



Geriatric Syndromes

- Signs and symptoms that are the result of multiple causes, involve many parts of the body
- One geriatric syndrome can lead to another
- Older adults with cancer experience a higher prevalence of geriatric syndromes than those without cancer²²



Geriatric Syndromes²³

- Falls
- Frailty
- Polypharmacy
- Delirium
- Pain
- Dementia
- Vision problems
- Hearing problems
- Dizziness
- Fainting
- Pressure ulcers
- Malnutrition
- Bladder control problems



Geriatric Syndromes- Falls²⁴⁻²⁷

- 1 in 3 older adults fall each year
- Leading cause of injury death among 65+
- Rates of fall-related fractures among older women are 2x those for older men
- Fall rate is higher in older adults with cancer than in older adults without cancer



Geriatric Syndromes- Falls

- Risk factors²⁸: advanced age, Caucasian race, male gender, dementia, visual disturbance, muscle weakness, urinary incontinence, impaired balance, syncope, polypharmacy, and psychotropic medications



Geriatric Syndromes- Frailty^{29,30}

- Multi-systems decline – decreased reserve
- May be a result of disease, under nutrition, inactivity or stress
- Unintentional weight loss (10 lbs.) in the past year
- Associated with falls, impaired ADLs and mobility, hospitalization, and death



Geriatric Syndromes- Polypharmacy³¹⁻³⁴

- Number of medications increase with age
- Multiple medications for chronic conditions: e.g. HTN, DM, chronic pain
- CNS and cardiovascular meds most common
- Associated with increased fall risk, decline in function, reduced cognition and nutritional status
- Increases the possibility of “prescribing cascades”



Geriatric Syndromes- Delirium^{35,36}

- Acute confusional state
- Disorientation, disturbed sleep-wake cycle, memory impairment, perceptual disturbances, and altered psychomotor activity
- Sepsis, hypoxemia, use of physical restraints, fluid and electrolyte imbalances, and metabolic and endocrine derangements



Geriatric Syndromes- Delirium^{37,38}

- Digoxin, antihistamines, opiates, antiparkinsonian medications, antipsychotics, antidepressants and sedative-hypnotics, benzodiazepines
- High noise level, monitor alarms, bright lights in ICU



Cancer Treatments - Chemotherapy

- Chemotherapy – acts by killing cells that divide rapidly (cytotoxic), or target abnormal proteins in cancer cells (targeted therapy)
- Common side effects³⁹: anemia, n/v, appetite changes, fatigue, hair loss, neuropathy, constipation/diarrhea, fluid retention, memory changes
- Issues with Older Adults: more vulnerable to chemo toxicity, neutropenia/infections, mucositis, fatigue, myelosuppression, adherence to medications



Cancer Treatments– Radiation Therapy

- Radiation therapy – uses high doses of X-rays to kill cancer cells.
- Common side effects: fibrosis, mucositis, diarrhea, lung injury, fatigue, weakness, cardiotoxicity
- Issues with older adults⁴⁰: presence of co-morbidities, access to ambulatory radiation treatments, radiation-induced n/v, fatigue



Cancer Treatments - Surgery

- Surgery – curative, palliative, diagnosis; for solid tumors
- Older age is associated with⁴¹:
 - worse short-term outcomes after major oncologic resections
 - higher operative mortality
 - greater frequency of major complications
 - more prolonged hospital stays



Principles of Rehabilitation of the Geriatric Patient with Cancer

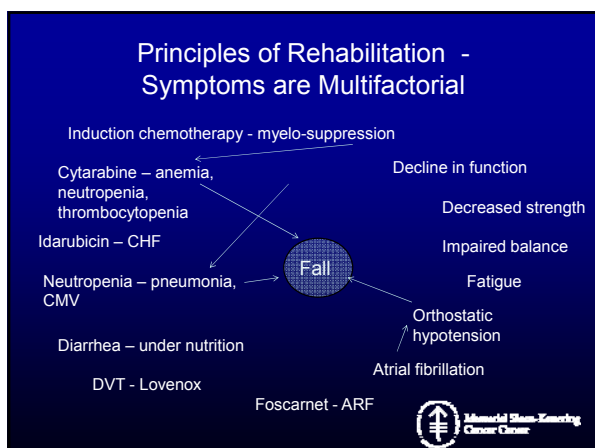
- Symptoms are multi-factorial
- Multi-disciplinary approach
- Comprehensive and individualized assessment at entry point
- Rehabilitation treatment plan recognizes geriatric considerations
- Barriers are acknowledged and addressed

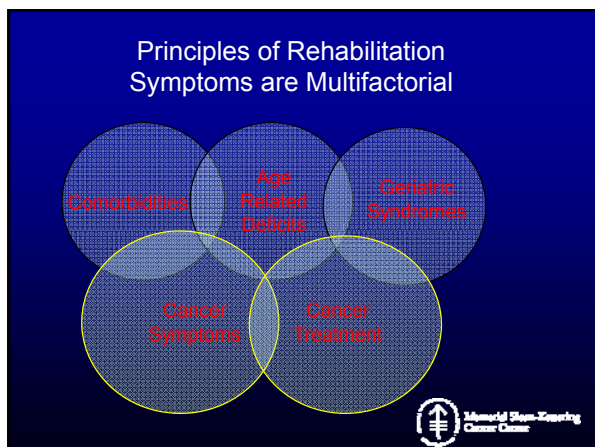


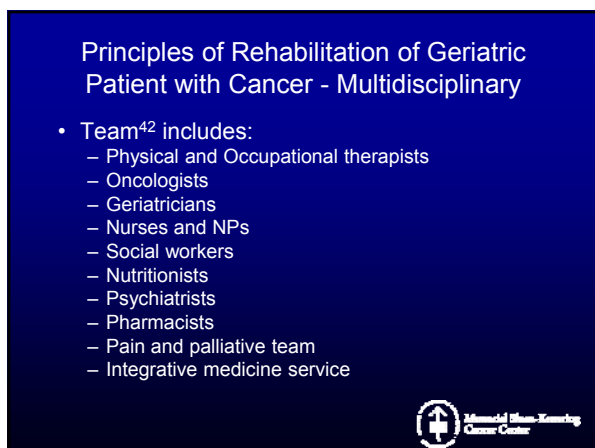
Principles of Rehabilitation - Symptoms are Multifactorial

- 68 year old male referred to PT s/p fall at home.
- Patient with AML, in remission, s/p hematopoietic stem cell transplant (HSCT), day +160.
- Patient complains of severe fatigue, asking for you to return the next day instead.
- Per wife, patient is a runner who had participated in several marathons.









Principles of Rehabilitation of Geriatric Patient with Cancer - Multidisciplinary

Comprehensive Geriatric Assessment⁴³⁻⁴⁴:

- Developed for oncology setting.
- Recognizes potentially treatable conditions that decrease tolerance to cancer treatment.
- Assesses functional reserve
- Gross estimate of individual life expectancy
- Adopts of a common language to classify older cancer patients



Principles of Rehabilitation- CGA

- Charlson's Comorbidity Scale (Charlson ME, et al., 1987)
- Cumulative Illness Rating Scale for Geriatrics (CIRS-G Miller, Paradis, & Reynolds, 1991)
- Instrumental Activities of Daily Living (IADLs Lawton & Brody, 1969)
- Physical Self-Maintenance Scale (ADL – Katz et al., 1963)
- Get Up and Go Test (Mathias, Nayak, & Isaacs, 1986)
- Mini-Mental State Exam (Folstein, Folstein, & McHugh, 1975)
- MiniCog (Borson et al., 2000)
- Geriatric Depression Scale (GDS-SF Sheikh & Yesavage, 1986)
- Clock Drawing test
- Mini Nutritional Assessment (MNA)



Principles of Rehabilitation- Physical Therapy Assessment

- History- demographics, comorbidities, cancer history/treatment, geriatric syndromes, psychosocial (marital status, living arrangement), prior functional status, adaptive device



Principles of Rehabilitation- Physical Therapy Assessment

Musculoskeletal

- MMT, ROM, gait and balance, posture, ADLs
- Steroid myopathy, sarcopenia, cachexia, immobility, GVHD, cord compression, surgery, lymphedema, fracture, metastasis
- Comorbidities, geriatric syndromes

Cardiopulmonary

- Auscultation, vital signs, 6-minute walk, Brief fatigue inventory, Borg's, ADLs
- Radiation, chemotherapy surgery, anemia, myelosuppression, congestive heart failure, orthostatic hypotension
- Comorbidities, geriatric syndromes



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Principles of Rehabilitation- Physical Therapy Assessment

Neurologic

- Gait and balance, vestibular, sensory testing, coordination, ADLs
- Chemotherapy, radiation, surgery, medications, CNS tumors, metastasis, neuropathy
- Comorbidities, geriatric syndromes

Integumentary

- Skin integrity, edema, erythema, pressure ulcers, sensation
- Radiation, lymphedema, surgery, nutrition, immobility, GVHD
- Comorbidities, geriatric syndromes



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Principles of Rehabilitation- Problems

Common Problems:

- Impaired bed mobility
- Difficulty with transfers
- Difficulty with ambulation
- Decreased ROM
- Decreased muscle strength
- Decreased cardiovascular endurance
- Impaired balance
- Pain



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Principles of Rehabilitation- Treatment Considerations

- Cancer diagnosis and treatment
- Cancer continuum and prognosis
- Co-existing geriatric syndromes and multiple comorbidities
- Precautions- anemia, neutropenia, thrombocytopenia.
- Precautions – Weight bearing, falls, mental/cognitive status, metastasis, DVTs



Principles of Rehabilitation- Treatment Considerations

- Pain
- Fatigue
- Psychosocial- caregiver support and implications, living situation




Principles of Rehabilitation- Goals of Therapy - Dietz

- Preventive – prevent complications
- Restorative – regain function
- Supportive - maintenance
- Palliative – alleviate symptoms, reduce burden




Principles of Rehabilitation- Physical Activity Guidelines (PAG)

Recommendation for Healthy Older Adults ⁴⁸	
Aerobic (moderate, 5-6/10)	5 days/wk, 30 mins/day, bouts of 10 mins each
(vigorous, 7-8/10)	3 days/wk, continuous for at least 20 mins/day
Strengthening	At least 2 days/wk, 8-10 exercises (major mm groups), 10-15 reps
Flexibility/Balance	At least 2 days/wk; for those at risk for falls- include balance



Principles of Rehabilitation- Physical Activity Guidelines

Exercise Guidelines for Cancer Survivors ^{48,49}	
General Statement	<ul style="list-style-type: none"> • Avoid inactivity. Return to normal ADLs as quickly as possible after surgery. • Individuals with known metastatic bone disease will require modifications to avoid fractures. • Individuals with cardiac conditions may require modifications and supervision for safety.
Aerobic	<ul style="list-style-type: none"> • Breast/Prostate/Colon/Hematologic/Gynecologic- Same as age-appropriate PAG for Americans • Adult HSCT- OK to exercise everyday, lighter intensity, and lower progression of intensity; avoid overtraining/vigorous ex • Colon- MD permission to engage in contact sports
Resistance	<ul style="list-style-type: none"> • Breast- supervised program with very low resistance; watch out for UE symptoms/lymphedema; fracture risk • Prostate- add pelvic floor exercise for radical prostatectomy; fracture risk • Colon- start with low resistance and progress resistance slowly for patients with stoma to avoid herniation • Adult HSCT- resistance training might be more important than aerobic ex • Gynecologic- proceed with caution if patient has lymph node removal or RT
Flexibility	<ul style="list-style-type: none"> • Breast/Prostate/Hematologic/Adult HSCT/Gynecologic- Same as age-appropriate PAG for Americans • Colon- avoid excessive abdominal pressure for patients with ostomy



Principles of Rehabilitation- Barriers ⁴⁵⁻⁴⁷

- Undertreatment, stereotyping
- Under represented in clinical trials and studies about cancer screening
- Lack of criteria for geriatric-specific treatments
- Underestimation of life expectancy
- Misconceptions about pain meds, tolerance to cancer treatments



Conclusion

- Rehabilitation of older adults with cancer must be comprehensive and multidisciplinary.
- Physical therapists should always consider implications of cancer treatment, geriatric syndromes, comorbidities, when assessing and treating older cancer patients.



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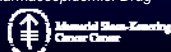
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