Exercise as Medicine: A Rehabilitation Physician's Perspective on Cancer Rehabilitation

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Disclosures

- I have no disclosures.

Our learning objectives

1. Understand cancer rehabilitation and the role of the cancer rehabilitation physician, or physiatrist, in the continuum of cancer care

2. Outline the American College of Sports Medicine Exercise Guidelines for Cancer Survivors

3. Recognize that exercise can be beneficial, safe, tolerable, and achievable for patients with cancer

Who am I?

- Creighton University
- Creighton University School of Medicine
- University of Chicago Preliminary Medicine Year
- Physical Medicine & Rehabilitation Residency at the Shirley Ryan AbilityLab (formerly Rehabilitation Institute of Chicago) and Northwestern University in Chicago

Who am I? (cont'd)

- Five months of elective and selectives with medical oncologists, radiation oncologist, lymphedema certified therapist, and cancer-specific physical therapists and occupational therapists at Northwestern Medicine
- Member of the American Academy of Physical Medicine & Rehabilitation Cancer Rehabilitation Community
- Research in cancer rehabilitation* and book chapters**
  - ***Villanueva**, E., et al. Inpatient Rehabilitation Outcomes of Cancer Patients after Chimeric Antigen Receptor T-cell Therapy. Submitted to American Journal of PM&R December 2024.
  - *Flores, M., ... **Villanueva,** E., & Roy, I. (2024, November). Social vulnerability in cancer patients predicts discharge destination after inpatient rehabilitation. Presented as oral presentation at AAPM&R 2024, San Diego, CA.
  - ***Villanueva,** E., Lewis, C., & Fram, J., et al. (2023, November). Inpatient Rehabilitation Outcomes of Cancer Patients After Chimeric Antigen Receptor T-cell Therapy. Oral presentation at AAPM&R 2023, New Orleans, LA.
  - *Lewis, C., ...**Villanueva,** E., & Roy, I. (2023, February). The Inpatient Rehabilitation Facility Patient Assessment Instrument and the Functional Recovery of Patients with Cancer Diagnoses. Presented as an oral presentation at AAP 2023 Annual Meeting, Anaheim, CA.
  - ****Villanueva,** E, Kelly, R, Henderson, L, Roy, I. (2024). Muscle wasting and frailty in head and neck cancer. Head and Neck Cancer (pp). New York, New York: Springer Publishing Company.
  - **Shahpar, S., Roy, I., **Villanueva,** E., & Flores, M. (2022). Cancer Rehabilitation. Physical Medicine and Rehabilitation Pocketpedia: 4th Edition (pp 105-112). Ney York, New York: Springer Publishing Company. DOI: 10.1891/9780826156280.0012. ISBN: 978-0-8261-5627-3.

Who am I? (cont'd)

- September 2024 - Current
  - Methodist Hospital Acute Inpatient Rehabilitation Unit
    - 20 bed unit at Methodist Hospital
    - I am there 2-3 weeks per month
  - Methodist Physicians Clinic Health West - 168th and Dodge
    - 3rd floor suite with PM&R group
    - I am there 1-2 weeks per month 3-4 days per week
- Common rehabilitation diagnoses I see
  - Stroke, brain injury, spinal cord injury patients
  - Amputees
  - Patients with cancer-associated lymphedema, fatigue, neuropathy, imbalance, spasticity, amputation, cachexia, or functional impairments

Why is Cancer Rehabilitation Needed?

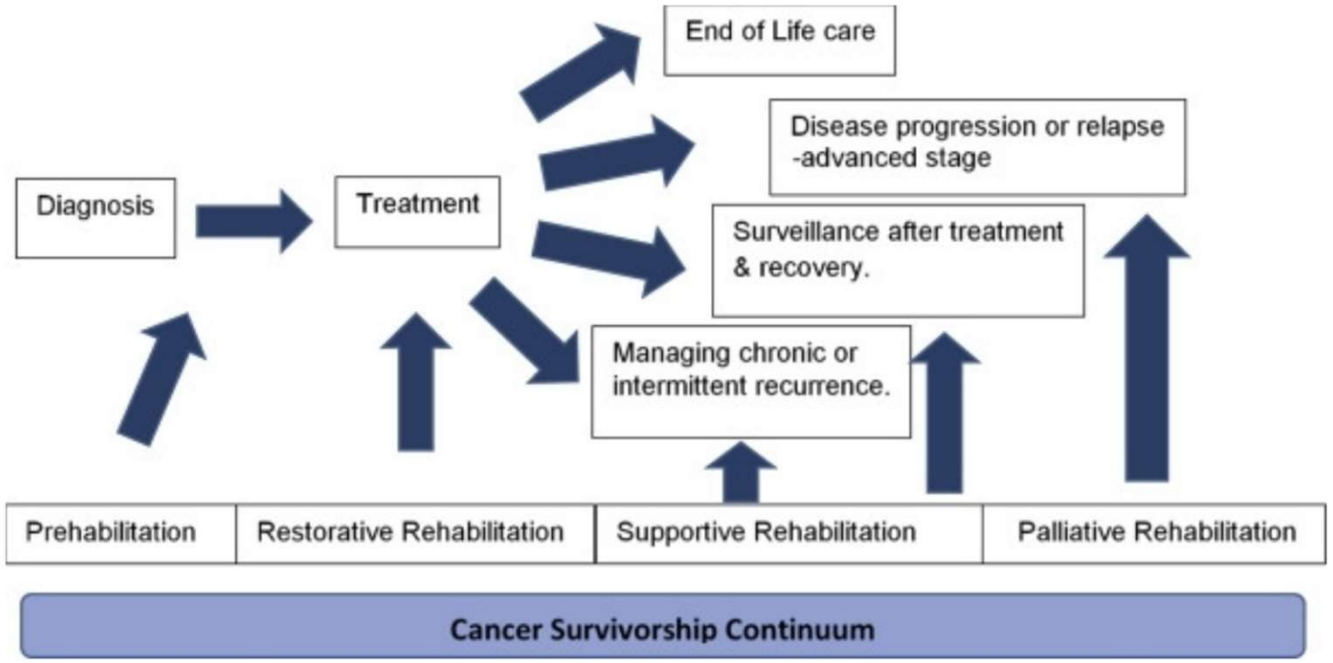
Defining cancer rehabilitation

*"Cancer rehabilitation is **medical care** that should be integrated throughout the oncology care continuum and delivered by **trained rehabilitation professionals** who have it within their scope of practice to **diagnose and treat patients' physical, psychological and cognitive impairments** in an effort to **maintain or restore function**, reduce symptom burden, maximize independence and improve **quality of life** in this medically complex population."*

Silver et al, 2015

Phases of cancer rehabilitation

Dietz Classification



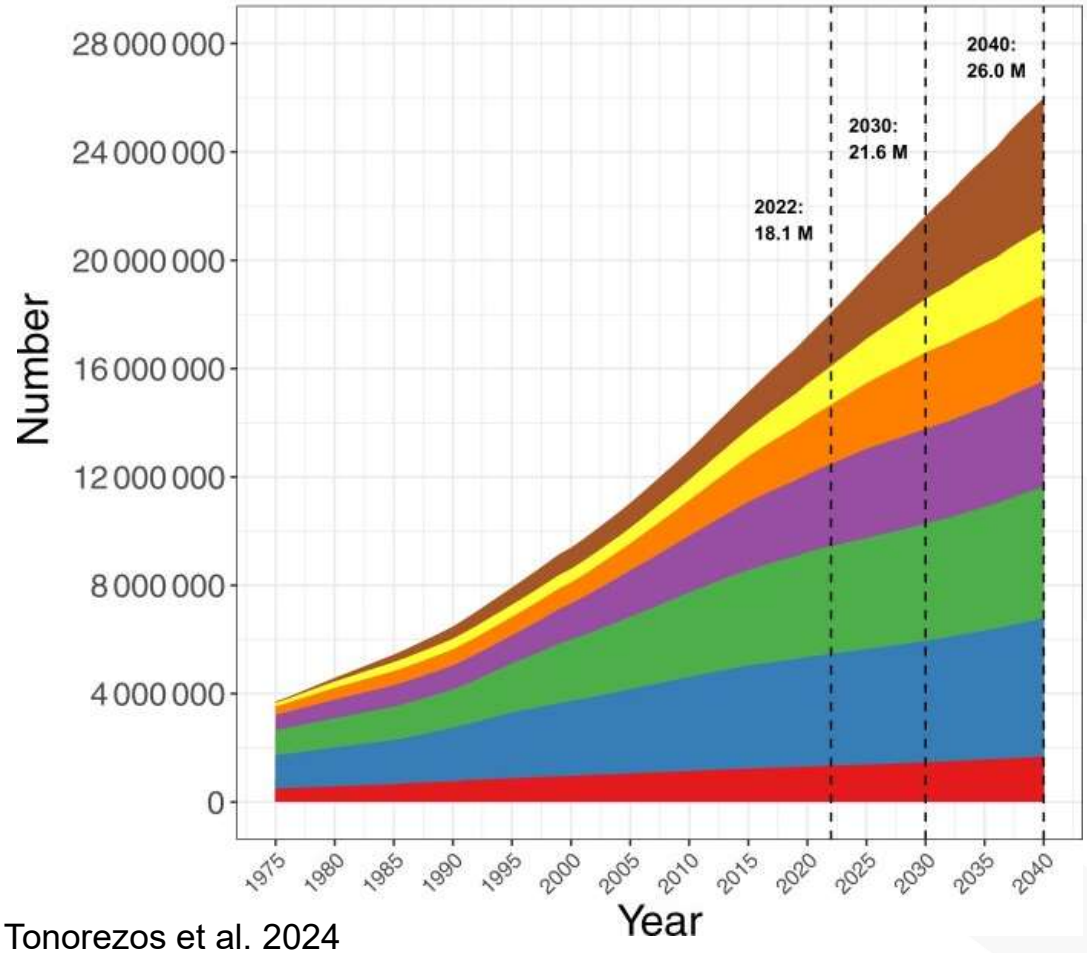
doi: 10.1016/j.jpainsymman.2020.07.030

Dietz, 1980

Four phases of cancer rehabilitation

1. Prehabilitation
2. Restorative Rehabilitation
3. Supportive Rehabilitation
4. Palliative Rehabilitation

Growing number of cancer survivors



Tonorezos et al. 2024

Key Takeaways

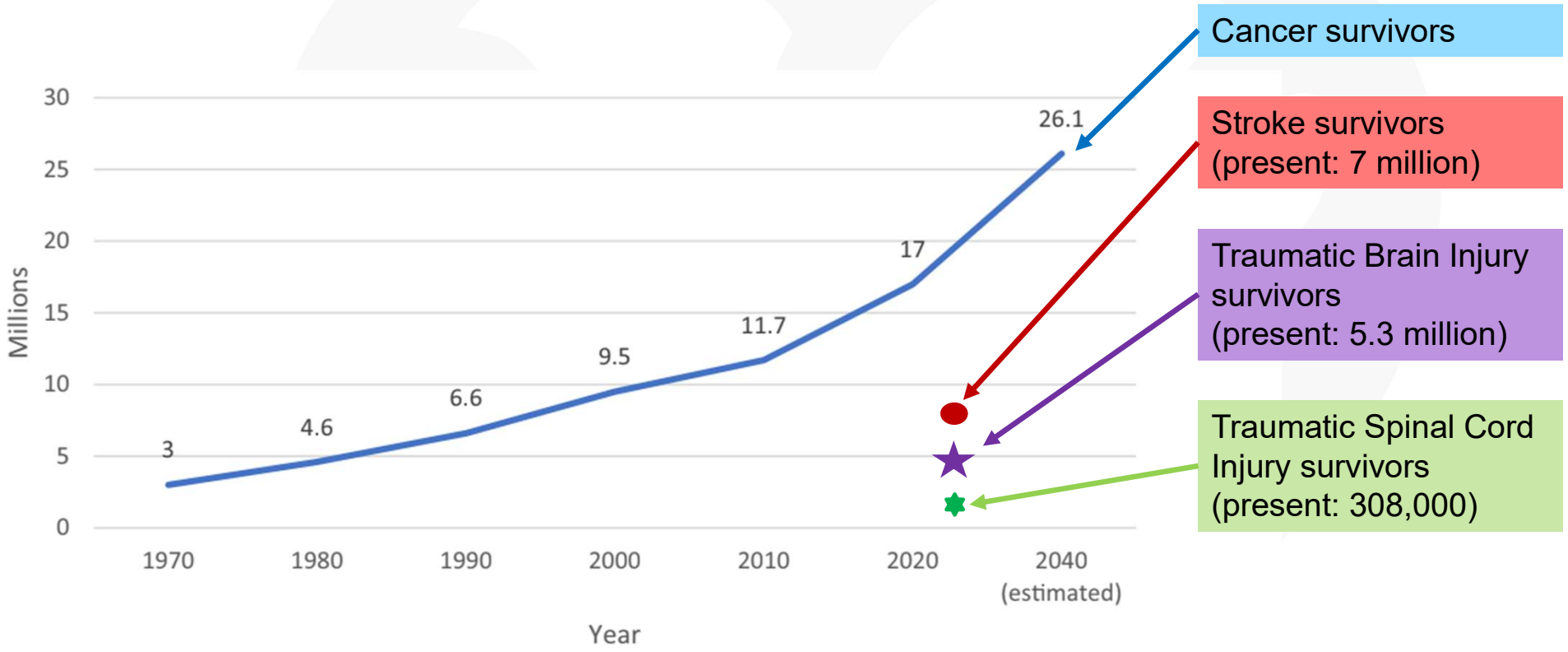
- The number of people who 1) are living after having been diagnosed with cancer and 2) are aging with cancer is increasing
- Notably, people who have had cancer for decades are living longer and are projected to live longer (widening orange, yellow, and brown segments)

Growing number of cancer survivors (cont'd)

- In the last decade, the United States has seen a 27% decline in cancer deaths
- Why?
  - **Denominator is increasing.** American population increased from 106.5 million in 1920 to 328.2 million in 2020
  - **Americans are living longer.** Percentage of Americans over the age of 65 has been increasing in part due to increased life expectancy and the majority of cancer survivors are 60+
    - Approximately 50% of American cancer survivors are over the age of 70, and 72% are over the age of 60
  - **Treatment is more effective.** Increasing cancer survival rates due to early detection and targeted treatments

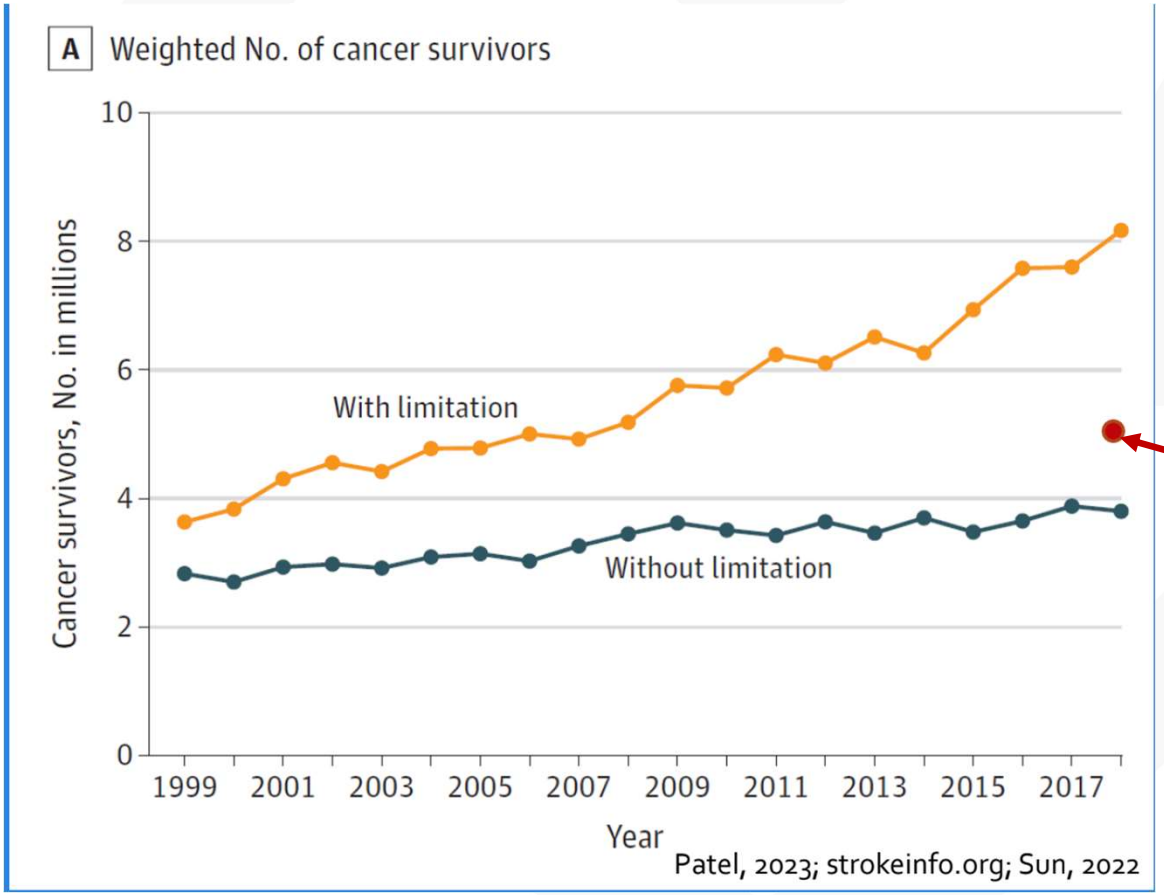
Siegel, Miller, Jemal 2019; Cancer Facts & Figures 2024

Number of cancer survivors outnumbers those with other common rehab diagnoses



Fu, 2021; strokeinfo.org; brainandspinalcord.org; National Spinal Cord Injury Statistical Center

Number of cancer survivors with limitations outnumbers stroke survivors with limitations



Stroke survivors with limitations

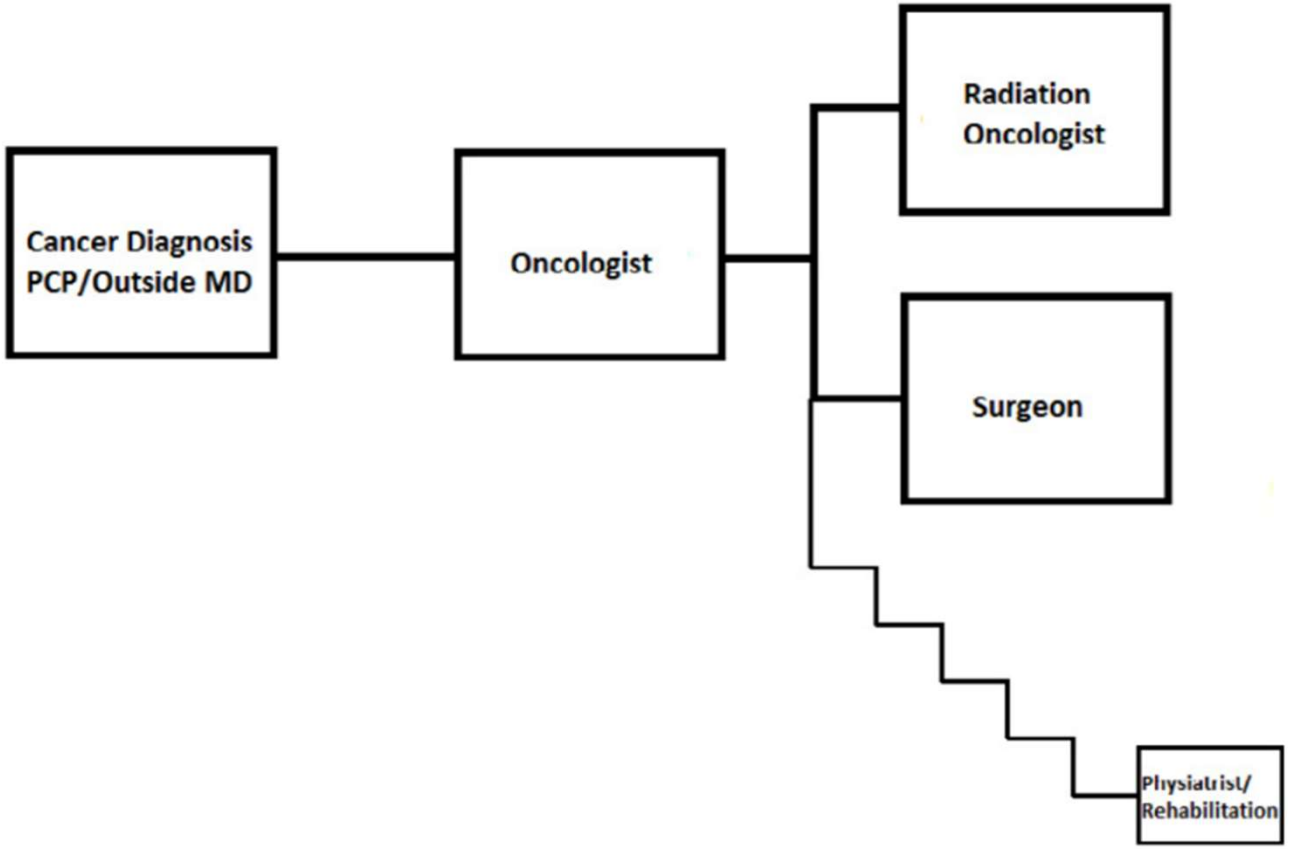
Status check

- Cancer survivors are living longer
- There are more cancer survivors than those with other common rehab diagnoses
- Many cancer survivors have functional limitations

Source: Austin Powers

CANCER REHAB IS NEEDED!

Current cancer rehabilitation

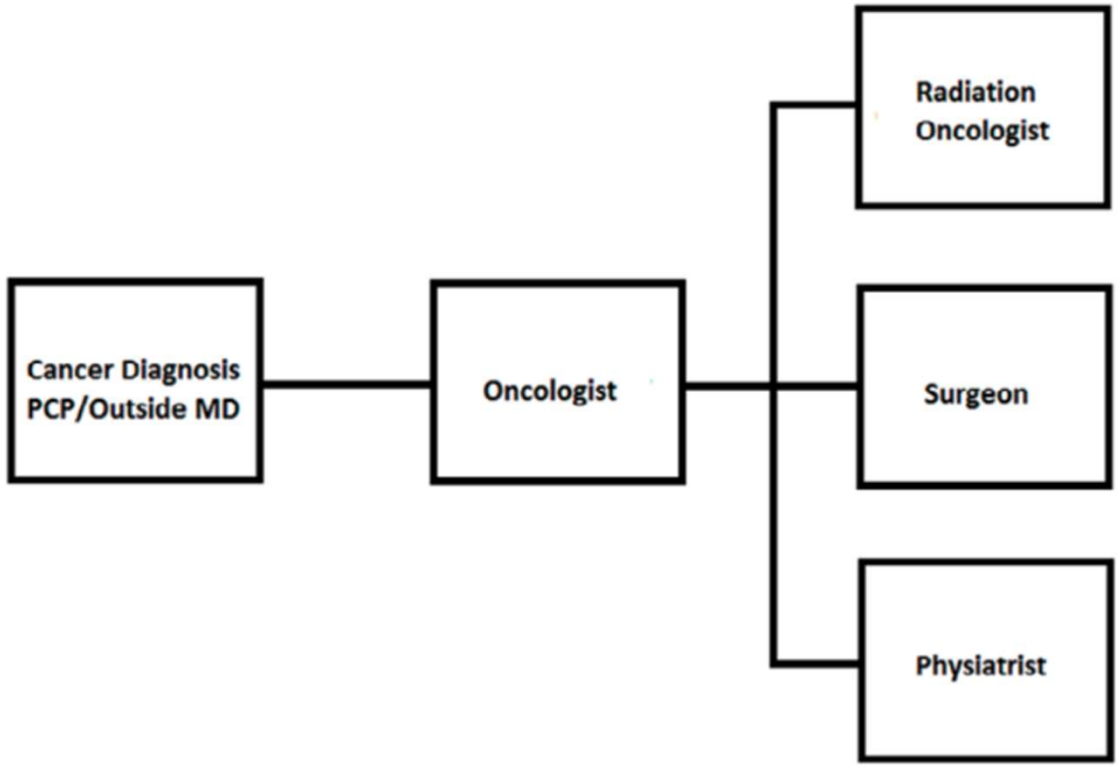


Currently, cancer rehabilitation is often under-referred or referred late in the cancer treatment process.

Fig. 3 The Present-Day Cancer Rehabilitation Referral Model

Fu, 2021

Future of cancer rehabilitation



After cancer diagnosis, patients are referred to an oncologist. In the case of a new breast cancer diagnosis, for example, the oncologist will refer the patient to a surgeon for mastectomy, a radiation oncologist for post-mastectomy radiation, and a physiatrist for prehabilitation and monitoring of the anti-inflammatory effects of exercise.

Fig. 4 The Potential Future Cancer Rehabilitation Referral Model

Fu, 2021

Unmet rehab needs of cancer survivors

- ACS-SCS II survey of 9105 cancer survivors at least 2 years after treatment (mixed diagnoses)
- Most common unmet need was physical problems (38.2%)

Symptom	Percentage with Symptom	Percentage Not Receiving Care
Poor Energy	59%	56%
Concentration Difficulty	55%	83%
Sexual Dysfunction	46%	71%
Neuropathy	42%	60%
Pain	34%	37%
Lymphedema	23%	33%
Incontinence	22%	69%

Ann-Burg, M, et al. Current Unmet Needs of Cancer Survivors: Analysis of Open-Ended Response to the American Cancer Society Study of Cancer Survivors II. *Cancer* 2015

Unmet rehab needs of cancer patients, cont'd

- Study: 163 patients with metastatic breast cancer
  - 92% found to have at least one physical impairment that can benefit from rehab
    - Less than 30% were referred for rehab
- Study: 1325 cancer patients surveyed (mixed diagnoses)
  - 43% of patients reported need for physical therapy
- Study: 87% of inpatient oncology unit patients had motor/functional needs but only 18% received consultation with rehabilitation physician

Cheville et al. 2008; Thorsen et al. 2011; Movsas et al. 2003

Physical function impacts cancer mortality

- Physical functional measures can predict mortality
- Activity of daily living (ADL) impairments can predict recurrence-free survival and overall survival
- Cancer treatment decisions may be based on physical performance status (how/when to treat and how long to continue)
- Treatment response may be better in patients who are more fit

Nakona et al. 2021; Mima et al. 2021

Fortunately, rehab works

"Studies published so far report statistically significant benefits for multidimensional interventions over usual care, most notably for the outcomes fatigue and physical function."

Mewes et al. 2012

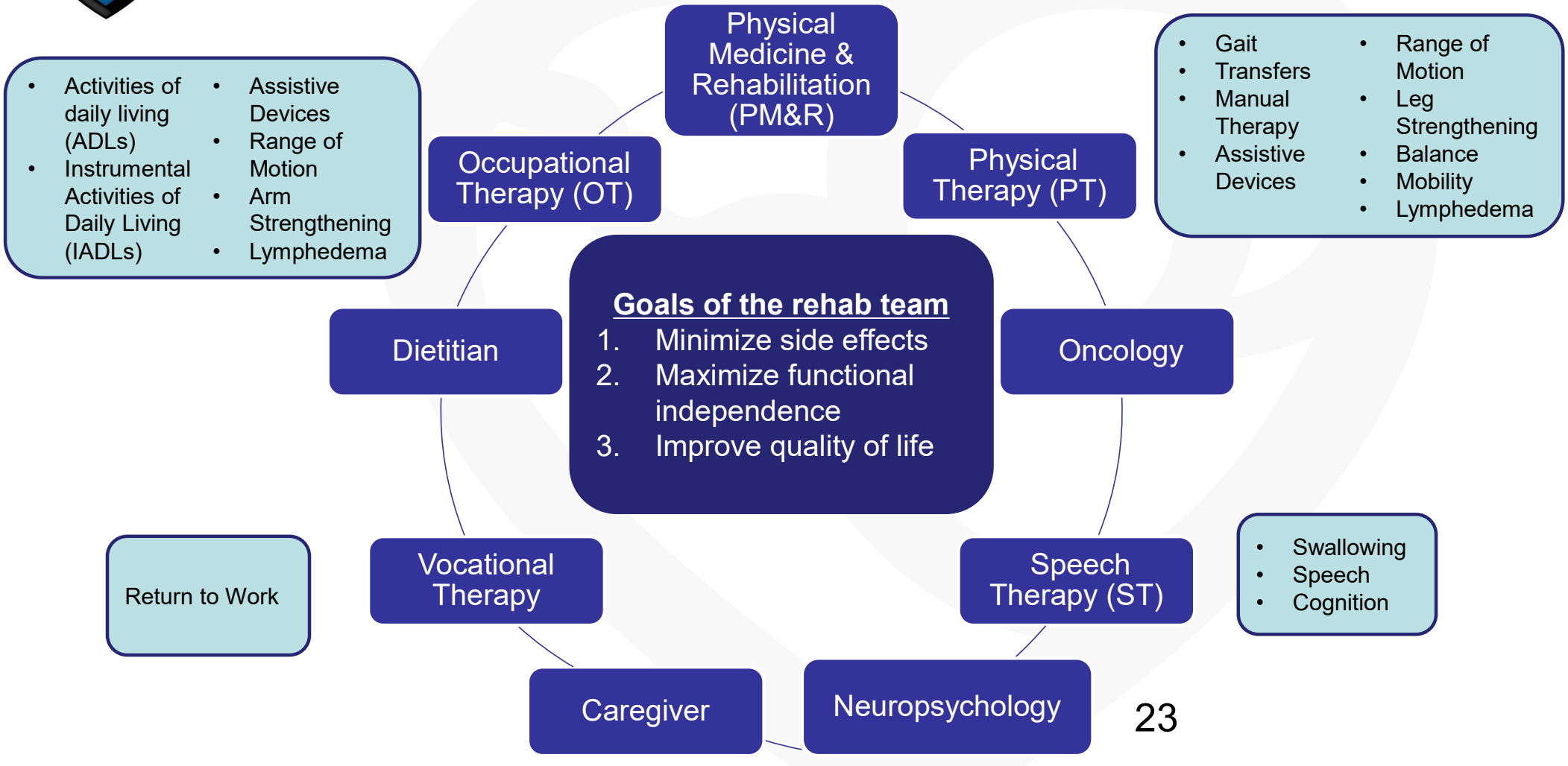
Cancer survivors under-utilize rehab, but enjoy it when they go

- Study: 1174 cancer survivors screened for rehabilitation needs
  - 46% qualified for cancer rehab referral
  - 31% received a referral
  - **8% of patients utilized the referral!!!**
- Study: 92% of cancer survivors attending outpatient physical therapy (PT) and occupational therapy (OT) recommend it:
  - They felt comfortable with the process
  - Noted observable improvements in function

Brick et al. 2023; Wood et al. 2023

What is Cancer Rehabilitation?

The cancer rehabilitation team



Physical Medicine & Rehabilitation (PM&R) physicians

- Also known as physiatrists
- Direct programs that optimize patients' function and quality of life throughout the continuum of cancer care
- Comprehensively diagnose, treat, and manage disabling impairments and symptoms that result from cancer and its treatment; with emphasis on those of neuromusculoskeletal origin
- Provide continuity in care transitions from prehabilitation through long-term survivorship
- Physiatrist-led cancer rehabilitation medicine is recognized as a standard of care in national oncology treatment guidelines and credentialing criteria

Therapy settings in cancer rehabilitation

Outpatient Therapy

- PT/OT/ST Clinic – 2-3 times per week
- Home health therapies with OT/PT/ST in home – one-hour sessions 1-2 times per week
- PM&R physician clinic

Inpatient Therapy

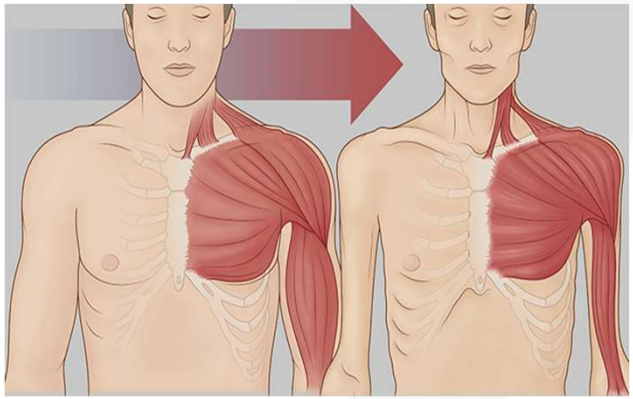
PT/OT/ST/nursing care/PM&R physician oversight in hospital – at least 3 hours of therapy 5 days per week

Common medical conditions in cancer survivors treated by PM&R physicians

- Decreased exercise tolerance and deconditioning
- Muscle weakness, spasticity, and muscle wasting
- Chemotherapy-induced peripheral neuropathy
- Cancer-related lymphedema
- Musculoskeletal pain
- Radiation fibrosis syndrome
- Neurologic dysfunction
- Post-mastectomy shoulder dysfunction, restriction, and pain
- Difficulty opening jaw
- Cancer-related fatigue
- Cognitive deficits and “chemo-brain”
- Gastrointestinal and urologic dysfunction
- Sexual health

Cachexia

- Definition – “bad appearance”
  - Body weight loss (muscle ± fat loss) due to an underlying illness
- 50% prevalence in cancer
- 80% prevalence in advanced cancer
- 30% of cancer deaths
- 50-75% develop disability



Courtesy of OSU Comprehensive Cancer Center

Morley et al. 2006; Villanueva et al. 2025

Approach to treating cachexia in clinic

Optimize nutrition

- Ideally in parallel to dietary medicine
- Focus on macro-nutrients

Address nutrition impact symptoms

- May be in parallel to palliative care or primary onc. team
- Nausea, diarrhea, constipation, appetite, fatigue

Customized physical rehab program

- Dependent on timing and extent of impairment
- Complement medical needs of cancer treatment

Courtesy of Ishan Roy, MD PhD

Approach to cancer rehabilitation

	ADLs	IADLs	Functional mobility	Activity/exercise tolerance	Goals
During cancer treatment	•PT •OT •Cycle adjusted		•PT (gait) •Exam directed HEP •Cycle adjusted	•Walking program •Exam directed HEP •CEP vs. PT (GET)	•Maintain function and mass early on •Improve function and mass in later cycles
Progressive decline	•PT •OT •Hold cancer treatment?	•PT •OT	•PT (gait) •Exam directed HEP		•Stop function decline •Maintain current function
Stable/ completed treatment	•Day Rehab vs. Outpatient	•Day Rehab vs. Outpatient PT and OT			•Improve function and mass

HEP = home exercise program; GET = graded exercise therapy; CEP = certified exercise physiologist

Courtesy of Ishan Roy, MD PhD

Exercise as Medicine

Misconceptions about exercise

- Exercise is dangerous → Exercise can be beneficial and safe
- Exercise is intolerable → Exercise can be tolerable
- Exercise is tough → Exercise can be achievable

Exercise = Physical Activity / Movement

We're in the era of exercise as medicine!

- We know rehabilitation can improve quality of life
  - …but can rehabilitation interventions help cancer survivors live longer and survive cancer?
- We know that survivors with better performance status are more likely to endure treatment and live longer
  - … but can we improve performance status through rehabilitation interventions to improve survival?

Exercise as medicine – a disclaimer

"If exercise is a medicine, it should be dosed like a medicine. We can 'underdose' or have inadequate amounts of exercise, but we can also 'overdose' or have excessive exercise […] Determining the right dose is still very much an art rather than a science."

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General benefits of exercise

- Lower risk of cardiovascular disease, type 2 diabetes mellitus, some forms of cancer, and age-adjusted all-cause mortality

- Decrease in mortality in:
  - Heart failure
  - Chronic obstructive pulmonary disease (COPD)
  - Chronic kidney disease (CKD)

Riebe et al. 2015

Cancer-specific benefits of exercise

- Breast Cancer
  - Physical activity was associated with significantly decreased hazards of cancer-specific and all-cause mortality in breast cancer survivors
  - Physical exercise can reduce cardiovascular mortality among breast cancer survivors
  - Reduce risk of recurrence
- Colorectal Cancer
  - Reduce risk of recurrence
- Prostate Cancer
  - Reduce risk of recurrence

Spei et al. 2019; Morishita et al. 2020

Exercise breaks the cycle of fatigue, inactivity, and deconditioning

Fig. 2 Breaking the Cycle of Fatigue, Inactivity and Deconditioning with Exercise

Fu, 2021

Exercise decreases inflammation in cancer survivors

- Inflammation is closely associated with all stages of development and malignant progression of most types of cancer
- Cancer treatments are pro-inflammatory
  - Fatigue, insomnia, cognitive dysfunction, anorexia, pain, dyspnea, and nausea are common inflammatory states
- Physical activity is anti-inflammatory
  - Myokines, which are anti-inflammatory cytokines produced by muscle activation, are produced with physical activity
  - Therefore, physical activity can reduce inflammation and the reduced inflammation reduces cancer related symptoms

Zhao et al 2021; Kroenke et al. 2013; Asher 2011; Seruga et al. 2008; Pederson and Fischer 2006

Exercise may potentiate the immune system in cancer

- Moderate exercise seems to exert a protective effect on the immune system of the general population

- Exercise can induce death of cancer cell and inhibit the growth of cancer in animal and in laboratory experiments, although the mechanism of these effects of exercise is not clear

Nieman and Wentz 2018; Malicka et al. 2017; Dethlefsen et al. 2017

Benefits of exercise on **cancer-related outcomes**

- In 2018, American College of Sports Medicine (ACSM) with American Cancer Society (ACS) and 20 other organizations convenes a meeting on Exercise and Cancer Prevention and Control and publishes 3 review articles concerning exercise and the following cancer-related issues:

BOX 1. List of common acute, long-term, and late effects of cancer for review of evidence for therapeutic efficacy of exercise and subsequent exercise prescriptions
• Anxiety • Bone health • Cardiotoxicity • Chemotherapy-induced peripheral neuropathy • Cognitive function • Depressive symptoms • Falls • Fatigue • Health-related quality of life • Lymphedema • Nausea • Pain • Physical function • Sexual function • Sleep • Treatment tolerance

Campbell, 2019

Benefits of exercise on **cancer-related outcomes** (cont'd)

TABLE 2. Level of Evidence for the Benefit of Exercise on Cancer-Related Health Outcomes[10]

STRONG EVIDENCE[a]	MODERATE EVIDENCE	INSUFFICIENT EVIDENCE
Reduced anxiety	Sleep	Cardiotoxicity
Fewer depressive symptoms	Bone health (for osteoporosis prevention, not bone metastases)	Chemotherapy-induced peripheral neuropathy
Less fatigue		Cognitive function
Better QOL		Falls
Improved perceived physical function		Nausea
No risk of exacerbating upper extremity lymphedema		Pain
		Sexual function
		Treatment tolerance

Abbreviation: QOL, quality of life.
[a]Effective exercise programs for improving these outcomes are thrice-weekly, moderate-intensity, aerobic and/or resistance training with one exception. Anxiety and depressive symptoms do not appear to be improved by a program of resistance training alone but do improve with aerobic training alone or in combination with resistance training. The scientific evidence review and scheme used for evidence evaluation are described in another article from the American College of Sports Medicine (ACSM) Roundtable.[10]

Schmitz et al. 2019

Exercise, physical function, and performance status

- Exercise can improve physical function, which is a related to performance status
- Performance status assesses survivors' physical function and level of self-care
- Many oncology providers consider performance status scales, such as the Eastern Cooperative Oncology Group (ECOG) and the Karnofsky performance status (KPS), when caring for cancer survivors
  - Correlates with toxicities to treatments and survivors' ability to tolerate treatment
  - Correlates with response to treatment
  - Eligibility criterion for clinical trials

Kumar et al. 2024; Perlow et al. 2019; Xi et al. 2024

Better physical function, better performance status, better outcomes

1. Performance status may impact treatment decisions
   - In a study of stage IV lung cancer survivors, nearly all physicians recommended chemotherapy for survivors with good performance status; only half for survivors with poor status
2. Performance status may relate to treatment tolerance and completion rates
   - Treatment prognosis of survivors with urothelial cancer, colorectal cancer, breast cancer, gastric cancer, bony or brain metastases
3. Performance status may correlate with survival many cancer forms
   - In non-small-cell lung cancer survivors, those with better performance status had a survival rate of twice that of survivor with poor status

1. Tisnado et al. 2016
2. Sinicrope et al. 2020; Li eta al 2019; Ma et al. 2021; Du et al. 2020; Perlow et al. 2019 Kelly and Shahrokni 2016
3. Kelly and Shahrokni 2016; O'Mahony et al. 2016; Kasmann et al. 2019

Physical activity can prevent cancer recurrence and improve survival

TABLE 1. Summary of Evidence That Physical Activity Prevents Cancer and Improves Cancer-Specific Survival[b]

LEVEL OF EVIDENCE	PHYSICAL ACTIVITY AND LOWER RISK OF DEVELOPING CANCER[a]	SEDENTARY TIME AND HIGHER RISK OF DEVELOPING CANCER[a]	PREDIAGNOSIS PHYSICAL ACTIVITY AND LOWER RISK OF CANCER-SPECIFIC SURVIVAL[b]	POSTDIAGNOSIS PHYSICAL ACTIVITY AND LOWER RISK OF CANCER-SPECIFIC SURVIVAL[b]
Strong	Colon, breast, endometrial, kidney,[c] bladder,[c] esophageal (adenocarcinoma),[d] stomach (cardia)[c]		**HIGH**	**HIGH**
Moderate	Lung[c]	Endometrial,[d] colon,[c] lung[c]	Breast, colon	Breast, colon, prostate
Limited	Myeloma and hematologic,[c] head and neck,[c] pancreas,[c] ovary,[c] prostate[c]	Liver[d]		

[a]Level of evidence was based on the Physical Activity Guidelines Advisory Committee (PAGAC)[8] and World Cancer Research Fund (WCRF)[7] reports (2018).
[b]Level of evidence was based on a review by the American College of Sports Medicine Roundtable[2].
[c]Level of evidence conclusion was only by the PAGAC[8].
[d]Level of evidence was considered limited by the WCRF[7].
[e]Level of evidence conclusion was only by the WCRF[7].

Schmitz et al. 2019

Exercise can be safe

- Sufficient evidence to confirm that exercise training and testing was generally safe for cancer survivors during and after treatment
- Every survivor should “avoid inactivity”
- The majority of evidence is derived from randomized-control trials of supervised and/or home-based prescribed exercise, and trials in breast cancer survivors
- Physical therapy or medical evaluation might be a bridge to inform appropriate modifications to an individual’s exercise program

Campbell et al. 2019

Exercise can be safe (cont'd)

- Unless you have a comorbidity listed below, there is no pre-exercise evaluation recommended
  - If you're not sure, please talk to your provider!
- There is also sufficient evidence to confirm the safety of resistance exercise training among survivors with lymphedema

TABLE 4. Adapted national comprehensive cancer network triage approach based on risk of exercise-induced adverse events.

Description of Patients	Evaluation, prescription, and programming recommendations
No comorbidities	No further preexercise medical evaluation[a] Follow general exercise recommendations
Peripheral neuropathy, arthritis/musculoskeletal issues, poor bone health (e.g., osteopenia or osteoporosis), lymphedema	Recommend preexercise medical evaluation[a] Modify general exercise recommendations based on assessments Consider referral to trained personnel[b]
Lung or abdominal surgery, ostomy, cardiopulmonary disease, ataxia, extreme fatigue, severe nutritional deficiencies, worsening/changing physical condition (i.e., lymphedema exacerbation), bone metastases	Preexercise medical evaluation[a] and clearance by physician before exercise Referral to trained personnel[b]

[a]Medical evaluation—per NCCN guidelines for specific symptoms and side effects. [b]Rehabilitation specialists (i.e., physical therapists, occupational therapists, physiatrists) and certified exercise physiologists (i.e., ACSM Certified Clinical Exercise Physiologist (ACSM-CEP), Canadian Society for Exercise Physiology Certified Exercise Physiologist (CSEP-CEP), Exercise & Sport Science Australia Accredited Exercise Physiologist (ESSA-AEP)).

Campbell et al. 2019

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Exercise among cancer survivors

- Of more than 9,000 cancer survivors surveyed, only 30-47% meet current physical activity guidelines
- In the Health Information National Trends Survey (HINTS) cohort, approximately 45% of cancer survivors reported regular physical activity
  - 32% in breast cancer versus 53% in prostate cancer survivors
- Multiple studies of breast, colorectal, prostate, and a mixed cohort of cancer survivors noted that greater than 80% of survivors were interested in receiving advice on exercise
  - Survivors report education on physical activity makes them feel better about it

Webb, Foster, Poulter 2016; Mayer et al. 2007; Schmitz et al. 2019; Fu et al. 2017

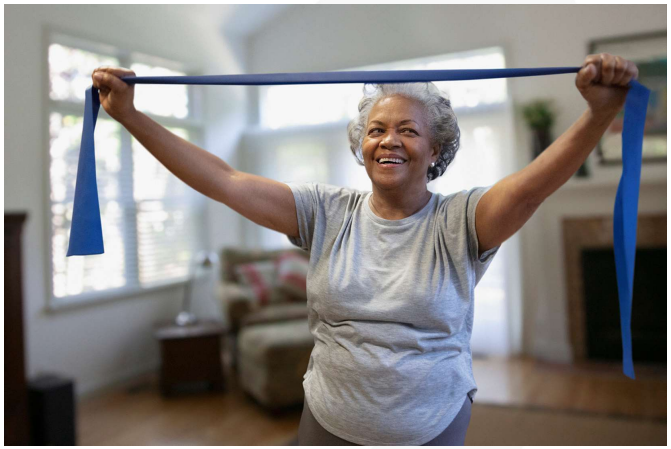
Obstacles to exercise

- Cancer survivors can have symptoms that discourage physical activity
- Cancer survivors are not aware of resources for exercise
- There is a small but growing number of cancer rehabilitation providers
  - Demand for cancer rehabilitation outpacing the supply of providers
- Oncology providers want to refer survivors for exercise programing but may have uncertainty about resources
  - A survey of 971 oncology clinicians by American Society of Clinical Oncology demonstrated that 78.9% respondents agreed that oncology clinicians should recommend physical activity to survivors

Nadler et al. 2017; Ligibel et al. 2019

Tips to improve tolerability of exercise

1. Listen to your bodies
2. Limit, modify, or skip exercise on treatment days (and potentially day after)
3. Have a goal
4. Communicate with oncologist and rehabilitation provider any symptoms limiting participation
5. Take breaks



If you are unsure, speak with a provider

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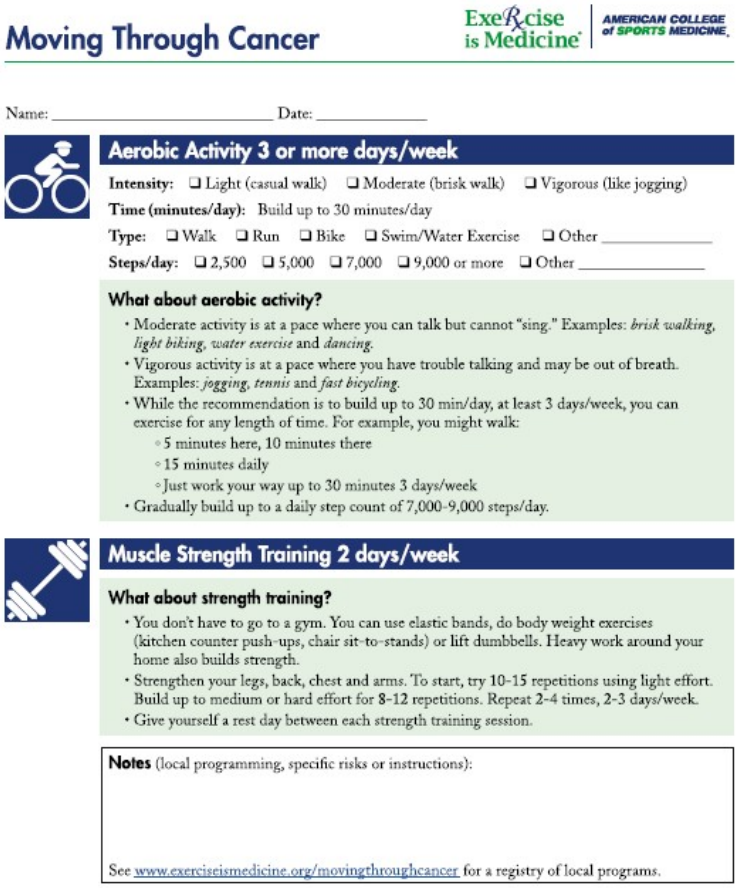
ACSM and ACS exercise guidelines for cancer survivors



Moving Through Cancer

Exercise is Medicine® | American College of Sports Medicine

Name: _____ Date: _____

Aerobic Activity 3 or more days/week

Intensity: ❑ Light (casual walk) ❑ Moderate (brisk walk) ❑ Vigorous (like jogging)

Time (minutes/day): Build up to 30 minutes/day

Type: ❑ Walk ❑ Run ❑ Bike ❑ Swim/Water Exercise ❑ Other _____

Steps/day: ❑ 2,500 ❑ 5,000 ❑ 7,000 ❑ 9,000 or more ❑ Other _____

What about aerobic activity?

- Moderate activity is at a pace where you can talk but cannot "sing." Examples: *brisk walking, light biking, water exercise* and *dancing.*
- Vigorous activity is at a pace where you have trouble talking and may be out of breath. Examples: *jogging, tennis* and *fast bicycling.*
- While the recommendation is to build up to 30 min/day, at least 3 days/week, you can exercise for any length of time. For example, you might walk:
  - 5 minutes here, 10 minutes there
  - 15 minutes daily
  - Just work your way up to 30 minutes 3 days/week
- Gradually build up to a daily step count of 7,000-9,000 steps/day.

Muscle Strength Training 2 days/week

What about strength training?

- You don't have to go to a gym. You can use elastic bands, do body weight exercises (kitchen counter push-ups, chair sit-to-stands) or lift dumbbells. Heavy work around your home also builds strength.
- Strengthen your legs, back, chest and arms. To start, try 10-15 repetitions using light effort. Build up to medium or hard effort for 8-12 repetitions. Repeat 2-4 times, 2-3 days/week.
- Give yourself a rest day between each strength training session.

Notes (local programming, specific risks or instructions):

See www.exerciseismedicine.org/movingthroughcancer for a registry of local programs.

Schmitz et al. 2019

ACSM and ACS exercise recommendations in cancer

- **Aerobic exercise**: At least 30 minutes of moderate intensity aerobic exercise three times per week (90-150 minutes per week)
  - Moderate Activity is where you can talk but not sing
  - Brisk walking, light biking, water exercise, and dancing
  - 5 minutes here, 10 minutes there, 15 minutes daily
  - Work up to 30 minutes

- **Resistance training**: two sets of 8-15 repetitions at least two times per week
  - You don't have to go to the gym
  - Use elastic bands, body weight (chair sit-to-stands), heavy work around your house
  - Strengthen your legs, back, chest, and arms
  - Give yourself a rest day between each strengthening session

Schmitz et al. 2019

You don’t have to be able to use a treadmill to exercise

CHEAP-O Approach

- Cost nothing
- Have practical relevance for daily function
- Easy for survivors to implement safely
- Adaptable for various degree of deconditioning/fatigue
- Portable – can be done anywhere
- Outcome-friendly

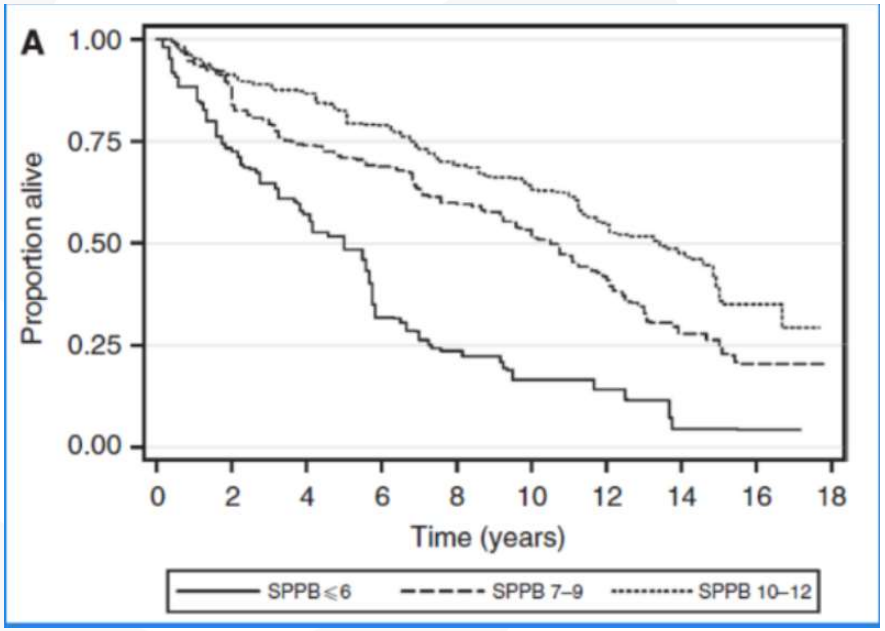
Sit-to-Stand (STS)

- Evaluates functional lower extremity strength
  - Based on movement of daily life
- Assesses exercise capacity in breast and gastrointestinal cancer to predict postoperative complications
- Used as part of remote assessment of functional mobility and strength in older cancer survivors
- Physiatrists teaching to their cancer survivors as exercise

Díaz-Balboa et al. 2022; Steffens et al. 2023; Butson et al. 2024; Blair et al. 2020; Syrkin 2023; Cristian 2023

Sit-to-Stand

- STS, as part of a short physical performance battery (SPPB), correlates with overall mortality in cancer survivors
- In a 2015 study of 413 cancer survivors during a median follow-up of 11.0 years, each 1-unit increase in the SPPB predicted a 12% reduction in mortality
  - The greater the number of STS reps, the higher the SPPB score



Brown, Harhay and Harhay 2015; Brown, Harhay and Harhay 2016.

Allow me to demonstrate

Meet one of my patients, “Dave”

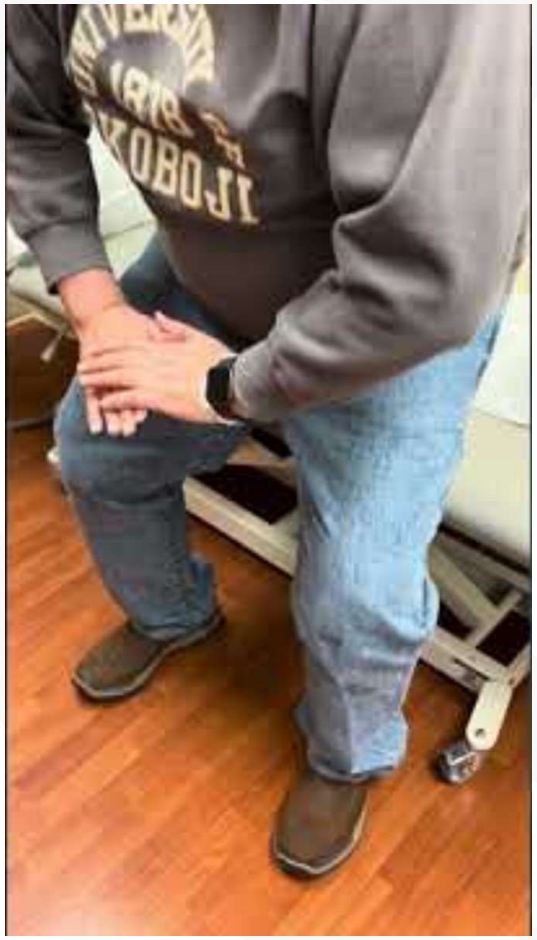
- “Dave” is in mid 60s with history of multiple myeloma
- He had metastasis to his spine with spinal cord compression and underwent surgery
- He had radiation therapy to his spine after surgery
- He is undergoing chemotherapy
- He came to my clinic with weakness in his legs, imbalance, lower back pain, neuropathy in his hands and feet, and feeling “winded” with activity

Goal: Walk to the bathroom and stand in the shower without feeling “winded”

Dave's rehabilitation plan

- Initially prescribed him outpatient physical therapy to address
  - Gait, stair climbing, low back pain, endurance, strengthening of his lower extremities, and balance
  - Asked to provide home exercise program
- Six weeks later, Dave returns…
  - Balance is improved
  - Low back pain is gone
  - He continues to feel winded and is taking a break from PT
  - He wants to stay active
- Counsel him on sit-to-stand exercises at home
  - An object in motion remains in motion….

Allow Dave to demonstrate



Sit-to-Stand exercise circuit

Sit to Stand Circuit Rules:

1. Nothing should hurt in the process. Up-and-down movement is smooth-no bouncing or lunging.
2. Seat has to be high enough to perform sit to stand comfortably with as little assistance as possible.
3. Keep the seat at the same height until you can do 3 sets of 30 reps with effort less than 5 on a scale of 1-10, 10 being the highest effort possible.
4. At the end of each set, you should not feel more than "pleasantly tired."
5. Do not advance until the last set feels no harder than the first set and effort is less than 5 out of 10.
6. Record heart rate prior to first set and after last set.

Date	Seat Height (in or cm)	Start Heart Rate (HR)	B'fast	Lunch	Dinner	End HR	Effort (0/easy -> 10/about to pass out)

Adapted from Syrkin 2023

Summary

- The number of cancer survivors is growing and with that, the number of cancer survivors who have functional impairments
- As a multidisciplinary field, cancer rehabilitation is growing to meet the needs of cancer survivors and their caregivers
- Cancer rehabilitation physicians, or physiatrists, are uniquely trained and suited to treat and support cancer survivors
- Exercise for cancer survivors can be safe, beneficial, tolerable, and achievable
- Exercise can take many forms and should be individualized
- Cancer survivors should aim for some form of physical activity most days

Thank you!

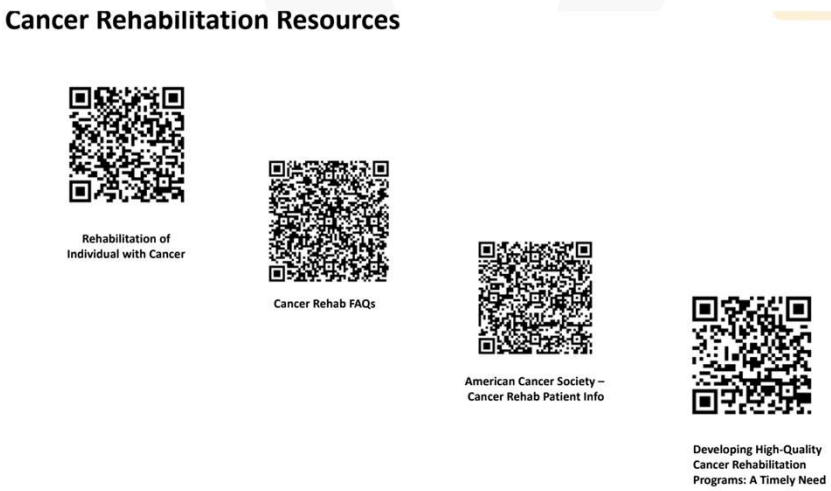
- A Time To Heal
- Methodist Health System
- Ishan Roy, MD PhD
- Madonna Klein, PT, MPT
- My patients
- My wife

Eric Villanueva, MD
16120 W. Dodge Rd, 3rd Floor
Omaha, Nebraska 68118
Clinic: (402) 354-0707
Fax: (402) 354-1338

Appendix

Exercise Resources

- https://metroymca.org/wellness-programs/livestrong-at-the-ymca
- https://www.exerciseismedicine.org/eim-in-action/moving-through-cancer-2/



Sit to Stand Resource

- https://www.sralab.org/rehabilitation-measures/30-second-sit-stand-test

Harper's Hope Wellness Classes

- For any person with current or past cancer diagnosis
- All classes taught by licensed professionals
- No one turned away for financial reasons
- All participants required to get medical clearance
- Multiple class offerings
  - Aerobics
  - Weight training
  - Pilates
  - Yoga
  - Tai Chis
  - Aquatics
  - Myofascial stretching
  - Meditation

Please contact Wendy Teetor, PT for more information: (402) 354-0847

Methodist Hospital

Methodist Hospital
8303 Dodge St.
Omaha, Nebraska 68114
(402) 354-4670
Fax: 402-354-3226

Physical Therapy
Occupational Therapy
Speech Therapy

Specialty Services:

-Amputee rehabilitation
-BalanceWear Vest fitting
-Cancer-related recovery
-Certified hand therapy
-Certified LSVT BIG and LOUD (Parkinson's)
-Concussion rehabilitation
-Driver rehabilitation
-Falls and balance (Balance Master)
-Lymphedema
-Neurologic rehabilitation
-Vestibular rehabilitation
-Wheelchair evaluation

Past, Present, and Future of Cancer Rehabilitation

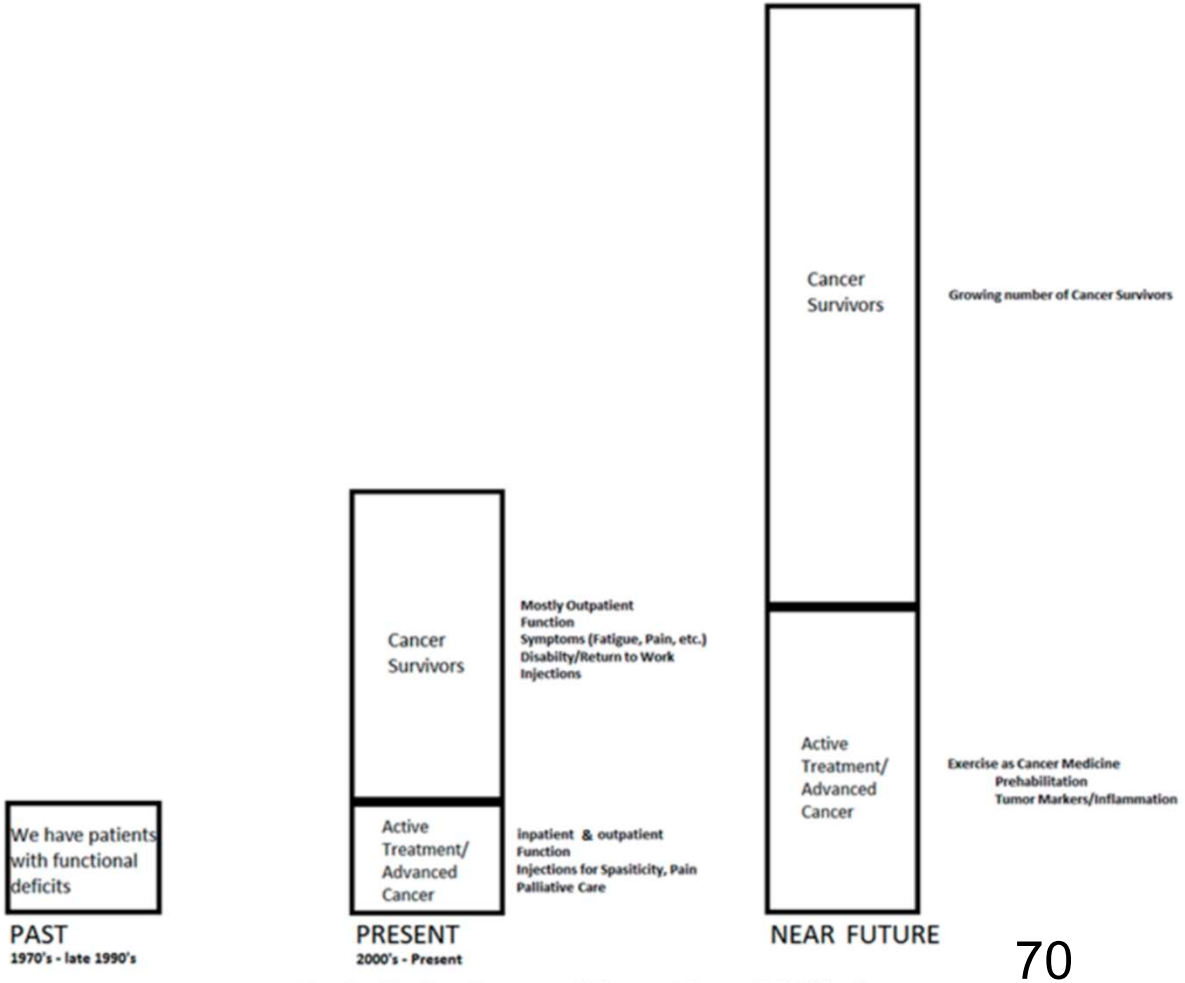


Fig. 5 The Past, Present, and Future of Cancer Rehabilitation

Fu, 2021

Cancer survivors in acute inpatient rehabilitation

- Compared to more common rehab diagnoses, like stroke, traumatic brain injury and spinal cord injury, cancer survivors in acute inpatient rehabilitation have similar:
  - Length of stay in hospital
  - Rates of community discharge
  - Rates of functional gains
- Tumor type, stage, chemo, radiation does not affect functional outcome
- Not an inordinate number of transfers back to acute care hospital due to medical complications
- True for patients who have undergone hematopoietic stem cell transplant and chimeric antigen receptor (CAR) T-cell therapy

Gallegos-Kearin et al. 2018; Villanueva et al. 2024

How does a physiatrist support a patient with lymphedema?

- Differential diagnosis
- Prescribing equipment: garments, compression pumps
- Prescribing rehabilitation
- Monitoring/measuring over time
- Evidence-based education

Benefits of exercise training by mode

BOX 3. Expected patient benefits from exercise training by mode

Aerobic	Resistance	Aerobic plus Resistance
Reduced anxiety	Less fatigue	Reduced anxiety
Fewer depressive symptoms	Better QoL	Fewer depressive symptoms
Less fatigue	No risk of exacerbating lymphedema	Less fatigue
Better QoL	Improved perceived physical function	Better QoL
Improved perceived physical function		Improved perceived physical function

Campbell et al., 2019

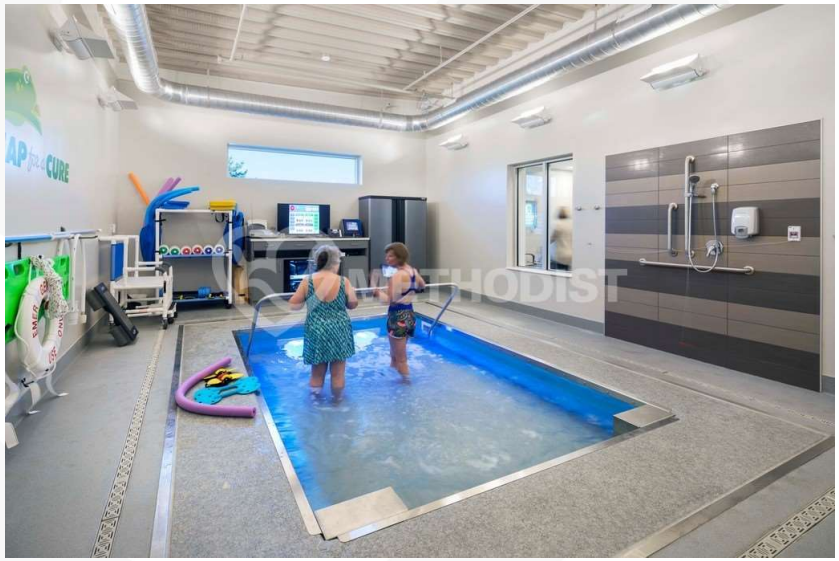
What about alternative forms of exercise?

- Pilates, yoga, Tai Chi, Qigong and various forms of dance
- May offer more accessibility and affordability
- Cancer survivors practicing yoga both during and after cancer treatment reported improved quality of life and fatigue
- More research needed to evaluate observed potential to improve sleep, depressive symptoms, anxiety/distress, and cancer-related cognitive change
- Activities counter the feelings of isolation that are experienced by many cancer survivors.
- The mindfulness dimension of yoga, Tai Chi, and Qigong has been shown to relieve stress, dysphoria, and anxiety in some cancer populations.

Ruddy et al. 2017; Danhauer et al. 2019

Aquatic therapy

- **Definition**: Aquatic therapy is a specialized type of physical therapy used in the treatment of a variety of illnesses and injuries. Sessions take place in a therapy pool, using the buoyant and supportive properties of water to speed therapy and healing for patients of all ability and mobility levels. No swimming is required.



Benefits of aquatic therapy for the cancer survivor

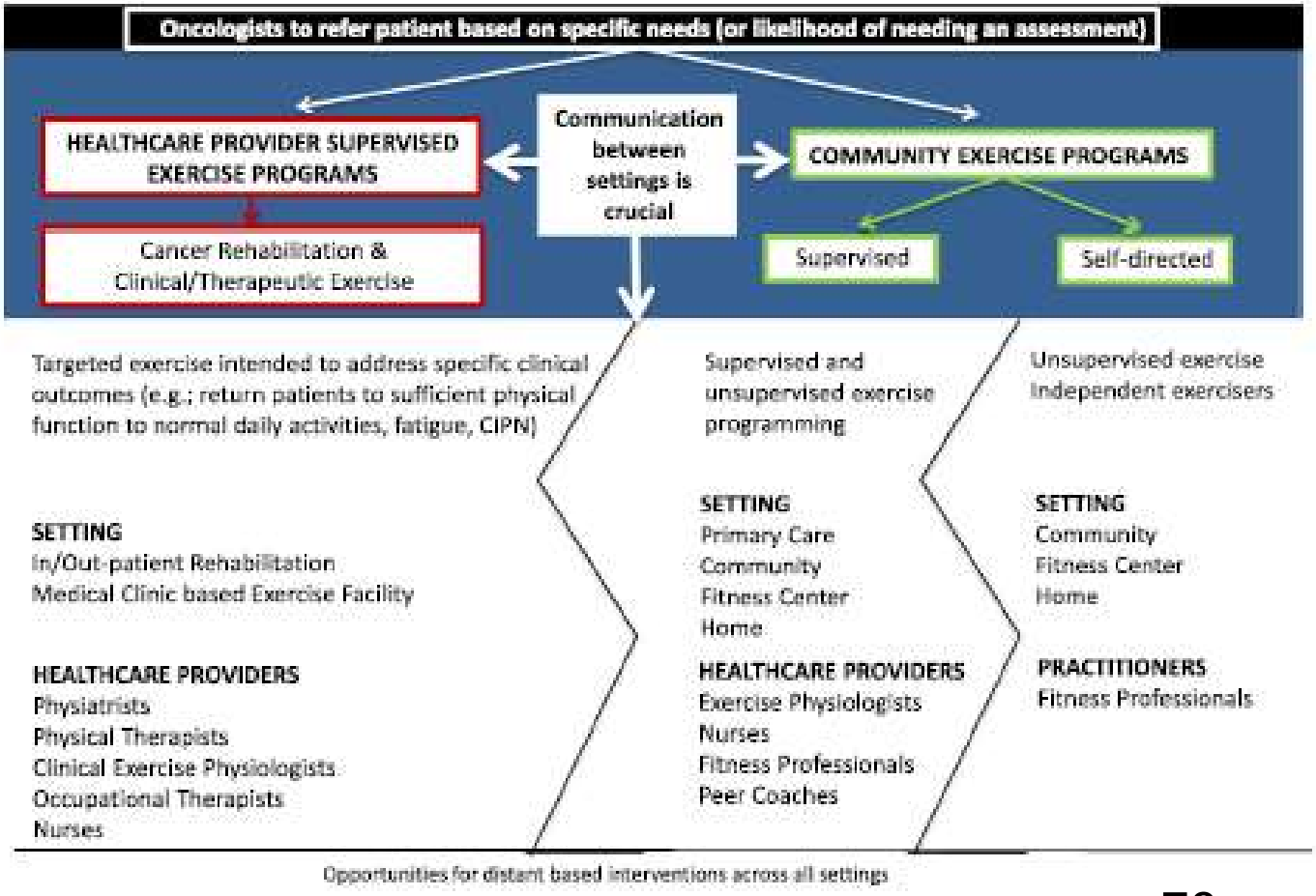
- Allows for staying active despite treatment related fatigue
- Assists with controlling weight gain issues
- Assists with neuropathy through desensitization techniques
- Improves feeling of well being, satisfaction, self confidence and body awareness
- Decreases risk for falls with exercises
- Assists with managing edema/lymphedema

Ruger et al. 2022

Our Pool – HydroWorks 2000

- Zero depth entry
- Adjustable floor/variable water depth
- Treadmill
- Waterjet technology
- Specialized system of underwater video cameras
- Temperature of pool

When and where should I exercise?



Schmitz et al. 2019

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