Prehabilitation for Cancer Survivors: Concepts & Evidence for Impairment Driven Rehabilitation

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Disclosures

None
Translating science into clinical care is challenging.

Problems often begin with various groups of researchers and/or and clinicians not speaking the same language, including basic definitions.
3 Key Steps to Enhancing Patients’ Physical & Functional Outcomes

1. Know the definition of cancer rehabilitation
2. Know the definition of cancer prehabilitation
3. Work backwards from the known impairments or other problems
Core rehabilitation professionals who treat specific impairments such as PM&R physicians, occupational and speech therapists are not mentioned in this article.
Physician (Oncologist or PCP)

Physiatrist
PT, OT, SLP
(+ nurses, dieticians, mental health professionals & other clinicians)

Fitness Professional

Impairments treated here

Physician (Oncologist or PCP)

Fitness Professional

Would this model for prehab work?
Starting a Surgical Home

Michael J. Englesbe, MD, Alisha D. Lussiez, BSE, Jeffrey F. Friedman, MSE, June A. Sullivan, MBA, and Stewart C. Wang, MD, PhD

A.H. is an 84-year-old patient who presented to the emergency department with abdominal pain, nausea, and vomiting. On physical examination, the patient was found to have a palpable mass in the right lower quadrant. Laboratory tests revealed a low hemoglobin level and an elevated white blood cell count. A computed tomography scan of the abdomen showed a large, fluid-filled mass in the right lower quadrant. The patient was admitted to the hospital for further evaluation and management.

After consultation with the surgical team, the patient was diagnosed with a large, malignant mass in the right lower quadrant. The team recommended surgical resection of the mass to improve the patient's symptoms and prolong his life. The patient and his family were informed of the diagnosis and the surgical options available.

The team recommended a minimally invasive surgical procedure to remove the mass. The patient and his family were informed of the risks and benefits of the procedure, including potential complications such as bleeding, infection, and damage to surrounding structures. The patient and his family agreed to proceed with the surgical procedure.

A. A minimally invasive surgical procedure was performed to remove the mass. The patient tolerated the procedure well and was discharged from the hospital on postoperative day 3.

B. The patient's symptoms improved significantly after the procedure. He was able to return to his normal activities and was discharged from the hospital on postoperative day 3.

C. The patient was followed up with at regular intervals for the next few months. During this time, he did well and required no additional interventions.

D. The patient was discharged from the hospital on postoperative day 3 and was able to return to his normal activities. He did well and required no additional interventions during the follow-up period.

FIGURE 1. Preoperative phase of care steps in MSHOP.
Is “Move, Breathe, Eat and Relax” Training for Major Surgery Effective?

To the Editor:

We congratulate Englesbe et al for describing their experience with starting a surgical home. The patient-centered medical home was introduced by the American Academy of Pediatrics in 1967, and the model of a surgical home is an extension of it. The surgical home is a physician led paradigm for care that is patient-centered and has the goals of improving clinical outcomes, care coordination, and compliance with best practices, which then results in reduced costs. In short, this involves a multidisciplinary team that focuses on risk assessment, decision making, and pre-, peri- and postoperative optimization. The days or weeks leading up to surgery is called prehabilitation, and is a long established initial part of the rehabilitation care continuum. By definition prehabilitation includes physical and psychological assessments that establish a baseline functional level, identify impairments, and provide interventions that promote physical and psychological health to reduce the incidence and/or severity of should be quantified in the context of a structured program including a goal for intensity and frequency. Although a recent systematic review confirms that preoperative exercise training in abdominal or thoracic surgery can improve fitness, there was limited or no impact on postoperative outcomes. Of note, the exercise interventions were aerobic training, not simply “movement.” Therapeutic exercise should take into account not only aerobic fitness but also flexibility and strength training. Similarly, the primary goal of preoperative nutritional assessment is to evaluate physiological reserve, and intervene to promote anabolism and meet energy requirements. By integrating exercise and nutrition supplements, muscle protein synthesis can be maximized and this translates into greater strength and functional capacity. The relationship between diet and exercise and the need for both interventions to work synergistically with each other is a well-established and intensely studied paradigm in the sports medicine literature.

Implementation of these interventions must be evaluated in the context of each surgical procedure to verify whether they meet the intended goal to improve fitness in a short period, are embraced by patients and are safe. At present, there is simply no and patient recovery. Prehabilitation was used in the context of an established ERP where length of stay was already low (median 4 days). Prehabilitation increased preoperative walking distance before surgery in 50% of patients, and the increased levels of activity were maintained after surgery. However, this beneficial effect did not reduce duration of hospital stay (which remained at 4 days), complications, or health related quality of life. How do the authors explain the very significant decrease in hospital stay of 2 days they report using their change in preoperative care alone?

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We Are Doing It Because They Demanded It

Reply:

We appreciate the opportunity to respond to these excellent comments. Our vision for the perioperative surgical home was inspired by the excellent work of Dr. Carli and his colleagues at McGill.

As we began trials in prehabilitation, we noted strong patient preference to participate in preoperative training programs, giving us pause about assigning to the control group. Focus groups noted patient empowerment, clinical engagement, and fear alleviation as powerful positive forces. This motivated our development of the current nonresearch, clinical program.

This inexpensive patient-centered clinical program has now enrolled more than 1000 patients. The primary outcomes have been financial, in an effort to build a business case for this patient-centered program. Our attempts to implement this simple, home-based intervention across the state of Michigan have been daunting. Patient-tailored, complex, and nonhome-based programs suggested by the authors will never be able to be implemented across broad populations.

Studies that follow physiologic outcomes are important to understand mechanism; they do not provide pragmatic solutions to the problems that our patients face. Understanding why our program works requires partnerships with social scientists and psychologists; this work is underway. In the mean time, we will continue with this program because preoperative positive psychology is good for patients and good for business.

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REFERENCE

Step #1

Know the definition of 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.”

Step #2

Know the definition of cancer prehabilitation
“Prehabilitation is a process on the cancer continuum of care that occurs between the time of cancer diagnosis and the beginning of acute treatment and includes physical and psychological assessments that establish a baseline functional level, identify impairments, and provide interventions that promote physical and psychological health to reduce the incidence and/or severity of future impairments.”

Prehabilitation in the Surgical Care Continuum

- Prehabilitation
  - Preoperative Phase
- Enhanced Recovery Program
  - Perioperative Phase
- Postoperative Rehabilitation
  - Postoperative Phase

- Cancer Diagnosed
- Surgery
- Next Cancer Treatment
Example of Multimodal Prehabilitation Components

- General Conditioning Exercise
- Nutritional Support
- Specific Targeted Exercise
- Smoking Cessation
- Stress Reduction
Nutrition: Prehabilitation

Preoperative nutritional support in cancer patients with no clinical signs of malnutrition-prospective randomized controlled trial.

Kabata P¹, Jastrzębski T, Kakol M, Król K, Bobowicz M, Kosowska A, Jaśkiewicz J.

Take Home Point
The control group had a significantly higher number of serious post-op complications.
Does the location of prehabilitation services delivery matter?

Where is my patient getting high quality cancer care?

- Within the Oncology/Surgery Department (Onsite)
- Within the Rehabilitation Medicine Department (Onsite but different department)
- Within the hospital system but not under Oncology or Rehab Med Departments (Onsite but decentralized location)
- Community based (Offsite)

The farther the patient is from the oncologist/surgeon, the less control the physician has over care delivery.
Step #3

Work backwards from the known impairments or other problems
Prehabilitation to Enhance Perioperative Care

Francesco Carli, MD, MPhil, FRCA, FRCP,*, Celena Scheede-Bergdahl, MSc, PhD,a,b

KEYWORDS
- Surgery
- Elderly
- Cancer
- Prehabilitation
- Exercise
- Nutrition

KEY POINTS
- Despite advances in surgical care, there remain patients with suboptimal recovery; elderly patients, especially those with cancer and limited protein reserve are at highest risk for negative postsurgical outcomes.
- Although more traditional approaches have targeted the postoperative period for rehabilitation, it has been shown that the preoperative period is most effective for intervention.
- Surgical prehabilitation is an emerging concept, deriving from the realization that effective perioperative care must include in addition to the clinical and pharmacological preparation of the surgical preparation, preoperative physical, nutritional and psychological optimization.

THE STRESS OF SURGERY AND TRAJECTORY OF RECOVERY

Tissue trauma, physical inactivity, quasi-starvation and psychological distress represent major stresses to the body. In turn, immediate systemic changes are initiated,
A systematic review of enhanced recovery care after colorectal surgery in elderly patients.

Bagnall NM, Malietzis G, Kennedy RH, Athanasiou T, Faiz O, Darzi A.

Abstract

AIM: Enhanced recovery after surgery (ERAS) can decrease complications and reduces hospital stay. Less certain is whether elderly patients can fully adhere to and benefit from ERAS. We aimed to determine the safety, feasibility and efficacy of enhanced recovery after colorectal surgery in patients aged ≥ 65 years old.

METHOD: A systematic search of Medline, EMBASE and Cochrane was performed to identify (i) studies comparing elderly patients managed with ERAS vs traditional care, (ii) cohort studies of ERAS with results of elderly vs younger patients and (iii) any case series of ERAS in elderly patients. End-points of interest were length of hospital stay, complications, mortality, readmission and re-operation, and ERAS protocol adherence.

RESULTS: Sixteen studies were included. Two randomized controlled trials demonstrated shorter hospital stay in elderly patients with ERAS compared with elderly patients with non-ERAS (9 vs 13.2 days, P < 0.001; 5.5 vs 7 days, P < 0.0001). Fewer complications occurred with ERAS in both randomized controlled trials (27.4% vs 58.6%, P < 0.0001; 5% vs 21.1%, P = 0.045). The majority of observational studies did not show differences in outcome between elderly and younger patients in terms of hospital stay, morbidity or mortality. Inconsistent findings between cohort studies may reflect the disparities in ERAS protocol definitions or differences in study populations.

CONCLUSION: ERAS can be safely applied to elderly patients to reduce complications and shorten length of hospital stay. Further studies are required to assess whether elderly patients are able to adhere to, and benefit from, ERAS protocols to the same extent as younger patients.
Example #1

Lung Cancer
Lung Cancer

• What do we know?
  – Leading cause of cancer-related death in men and women (U.S. & worldwide)
  – Two most important risk factors: tobacco & advanced age
  – 87% mortality rate, because most are diagnosed at advanced stage (surgery = possible cure)
  – 5-year survival rate is approximately 15%
  – Low dose lung CT screening reduces 5-year mortality by up to 20%
  – Medicare has now agreed to cover low dose CT screening in high risk patients
  – There is anticipated growth in the number of patients who will be diagnosed with early stage lung cancer
  – More patients will go to surgery, but many of them will be “high risk”

*What is the opportunity for prehabilitation and rehabilitation?*
J. Timothy Sherwood, MD, Thoracic Surgeon, Mary Washington Healthcare

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AONN+ Annual Navigation and Survivorship Conference Poster Abstract

Prehabilitation Improves the Physical Functioning of a Newly Diagnosed Lung Cancer Patient Before and After Surgery to Allow for a Safe Surgical Resection and Decreased Hospital Length of Stay: A Case Report

Elizabeth Hunt, RN, MSN, CRRN, CCM; Kristen VanderWijst, PT; Bobbi Stokes, PTA; Regina Kenner, RN; Kathryn Duval, MS, CCC-SLP; Messina Corder, RN, BSN, MBA
Mary Washington Healthcare
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The IHI Triple Aim
The IHI Triple Aim is a framework developed by the Institute for Healthcare Improvement that describes an approach to optimizing health system performance. It is IHI’s belief that new designs must be developed to simultaneously pursue three dimensions, which we call the “Triple Aim”:

- Improving the patient experience of care (including quality and satisfaction);
- Improving the health of populations; and
- Reducing the per capita cost of health care.

Triple Aim in Cancer Care
Can you make your patients happier and healthier--with fewer visits, fewer unnecessary tests (e.g. metastatic workups for musculoskeletal problems) and less cost?

**YES, if you prevent some impairments and identify others early – treating them efficiently and effectively.**
Lung Cancer: Prehabilitation

Chemotherapy
Radiation therapy
Surgery
Inpatient hospitalization
Average program = 10 weeks in the hospital setting

Pulmonary rehabilitation during induction chemoradiotherapy for lung cancer improves pulmonary function.

Tanami T1, Yokomise H1, Otooh M1, Kasai Y1, Matsuura N1, Chang SH1, Go T1.

Abstract

OBJECTIVE: Chemoradiotherapy for non-small cell lung cancer can impair pulmonary function, particularly when it is followed by surgery. This study aimed to document the changes in respiratory function as a result of a perioperative intensive pulmonary rehabilitation program in patients with non-small cell lung cancer who underwent induction chemoradiotherapy.

METHODS: A total of 82 consecutive patients underwent pulmonary resection after undergoing induction chemoradiotherapy. A pulmonary rehabilitation program was started at the same time as the induction chemoradiotherapy. Standard respiratory function tests were performed before and after induction chemoradiotherapy. Treatment-related mortality and the incidence of postoperative respiratory complications were investigated. The Wilcoxon signed-rank test was used to analyze the differences in spirometric changes.

RESULTS: All patients underwent a pulmonary rehabilitation program for an average of 10 weeks. Significant increases were observed in forced vital capacity (+6.4%, P = 0.006) and forced expiratory volume in 1 second (+10.4%, P < 0.001). Diffusing capacity of the lung for carbon monoxide decreased (-14.0%, P < 0.0001). Patients with respiratory impairment (forced vital capacity <80% predicted or forced expiratory volume in 1 second/forced vital capacity <70%) showed significant improvements in forced vital capacity (+13.9%, P = 0.0025) and forced expiratory volume in 1 second (+22.5%, P < 0.0001). Significant increases were observed in forced vital capacity (+7.0%, P = 0.0042) and forced expiratory volume in 1 second (+18.8%, P = 0.0001) in patients with a smoking history. There was no mortality, and postoperative respiratory mortality was 6.1%.

CONCLUSIONS: A pulmonary rehabilitation program for patients with non-small cell lung cancer undergoing induction chemoradiotherapy seems to improve respiratory function. It is particularly recommended for smokers and patients with respiratory impairment.
Prehabilitation: Prevention is better than cure

Karen J. Dickinson, MBBS, and Shanda H. Blackmon, MD, MPH

See related article on pages 569-73.

The benefit of pulmonary rehabilitation for patients undergoing lung resections for non–small cell lung cancer (NSCLC) or, indeed, any thoracic surgery is well established.¹ Gaining momentum in many surgical specialties, often as part of enhanced recovery pathways, is the concept of prehabilitation.²-⁶ This describes presurgical exercise interventions used in an attempt to reduce morbidity and mortality. With so much emphasis being placed on smoking cessation to prevent lung cancer, one may wonder why prehabilitation before thoracic surgery is not routine practice.

Tarumi and colleagues¹⁰ provide evidence for improved pulmonary function in patients undergoing prehabilitation during chemoradiotherapy with subsequent lung resection for NSCLC. This is an important patient group to study, because the patients are classically associated with increased surgical morbidity. We recognize that this was an observational study without randomization or matching, and therefore translation into improved clinical outcome is less clear.¹¹ There was no significant difference between the rate of complications between those patients with and without respiratory impairment (6.1% vs 6.1%, P = .9908). Berry and colleagues¹² demonstrated that in patients with impaired pulmonary function, preoperative

Clinical opportunity?
How would you build a prehab protocol for lung cancer survivors?

- General Conditioning Exercise
- Nutritional Support
- Smoking Cessation
- Stress Reduction
- Specific Targeted Exercise
Example #2

Breast Cancer
What do we know about breast cancer-related impairments and function?

1. What types of impairments? Diagnoses?
2. What are some of the results of those impairments?
3. What would we need to know around the time of diagnosis in order to demonstrate enhanced outcomes with prehab/rehab?
4. What interventions might work?
“Breast and arm symptoms are as strongly associated with being on sick leave as types of breast and/or axillary surgery. Early self-reported symptoms are important to consider in guidelines for sick leave and rehabilitation after breast cancer surgery.”

Aromatase Inhibitors

- Drug-induced tendinopathy is an underestimated problem
- 4 classes of drugs cause problems—recent addition is **aromatase inhibitors (AIs)**

**(AIs, statins, glucocorticoids and quinolones)**

- 50% of patients may have musculoskeletal (MSK) problems
- 20% may discontinue drug due to MSK problems
- 60% of symptoms in the hands and wrists
- 90% or more show periarticular changes on ultrasound
- 50% may have baseline problems that worsen with starting an AI
- 2 months—mean time from treatment initiation to symptom onset or worsening
- Prior chemotherapy, particularly a taxane, increases the risk of MSK problems
- MSK problems include trigger fingers, DeQuervain’s tenosynovitis, and tenosynovitis of finger extensors and flexors

Cancer rehabilitation and prehabilitation may reduce disability and early retirement.

Silver JK¹.

Hospital LOS
Metastatic work ups
RTW
Cluster symptoms
How would you build a prehab protocol for breast cancer survivors?

- General Conditioning Exercise
- Specific Targeted Exercise
- Nutritional Support
- Smoking Cessation
- Stress Reduction
Many institutions are not waiting for the definitive study in order to implement clinical prehabilitation and rehabilitation, because the scientific principles make sense.
Most National Cancer Institute-Designated Cancer Center Websites Do Not Provide Survivors with Information About Cancer Rehabilitation Services

Julie K. Silver¹ - Vishwa S. Raj² - Jack B. Fu³ - Eric M. Wisotzky⁴ - Sean Robinson Smith⁵ - Sasha E. Knowlton¹ - Alexander J. Silver⁶

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Abstract This study is the first to evaluate the existence and quality of patient-related cancer rehabilitation content on the websites of National Cancer Institute (NCI)-Designated Cancer Centers. In 2016, a team of cancer rehabilitation physicians (physiatrists) conducted an analysis of the patient-related rehabilitation content on the websites of all NCI-Designated Cancer Centers that provide clinical care (N = 62 of 69). The main outcome measures included qualitative rating of the ease of locating descriptions of cancer rehabilitation services on each website, followed by quantitative rating of the quality of the cancer rehabilitation descriptions found. More than 90% of NCI-Designated Cancer Centers providing clinical care did not have an easily identifiable patient-focused description of or link to cancer rehabilitation services on their website. Use of a website’s search box and predetermined terms yielded an additional 13 descriptions (21%). Therefore, designers of nearly 70% of the websites evaluated overlooked an opportunity to present a description of cancer rehabilitation services. Moreover, only 8% of the websites included accurate and detailed information that referenced four core rehabilitation services (physiatry and physical, occupational and speech therapy). Further research is needed to confirm the presence of cancer rehabilitation services and evaluate access to these types of services at NCI-Designated Cancer Centers providing clinical care.

~ 90% of NCI-designated cancer centers websites don’t have a link to cancer rehabilitation services

~8% of the websites include accurate and detailed information about cancer rehabilitation services
Surgical Prehabilitation in Patients with Cancer
State-of-the-Science and Recommendations for Future Research from a Panel of Subject Matter Experts

Francesco Carli, MD, MPhil1,*, Julie K. Silver, MD1, Liane S. Feldman, MBA1, Andrea McKee, MD2, Sean Gilman, MD2, Chelsea Gilles, MSc, RMT, Celena Scheede-Bergdahl, PhD1, Ann Gamsa, PhD1, Nicole Stout, DPT, CET-ANA0, Bradford Hirsch, MD3

SUMMARY
Prehabilitation in patients with cancer may offer an opportunity to preserve or enhance physiologic integrity and optimize surgical recovery. This panel of subject matter experts reached consensus on the following recommendations for future research on surgical prehabilitation.

RESEARCH RECOMMENDATIONS
1. Determine the impact of prehabilitation on physical and psychological health in patients with cancer
   a. which patients are most likely to benefit
   b. whether prehabilitation can increase surgical candidacy in high-risk patients
2. Determine the impact of prehabilitation on
   a. health care utilization
   b. perioperative complications
   c. the metabolic response to surgery
   d. physical functioning
   e. timing of recommended oncologic treatment
   f. adherence to recommended oncologic treatment
3. Characterize the performance of measures to assess baseline status and evaluate effectiveness of prehabilitation.
4. Identify procedure-specific prehabilitation assessments and interventions for specific patient populations.
NIH Panel: Cancer Rehabilitation Recommendations

1. Provide rehabilitation screening and assessment as part of a comprehensive cancer care plan, from the time of diagnosis, throughout the course of illness and recovery, to address the functional needs of patients. These services should be provided by trained rehabilitation professionals who utilize evidence-based best practices to diagnose and treat the many physical, cognitive and functional impairments associated with this medically complex population.

2. In selected cancers, rehabilitation services should be offered pre-treatment to optimize tolerance to surgical intervention and adjuvant treatment in order to minimize toxicity and improve outcomes.

Lung Cancer References

NCCN Lung Cancer Screening Guidelines 2014

