A Systematic Review of Rehabilitation and Exercise Recommendations in Oncology Guidelines

Nicole L. Stout, DPT, CLT-LANA 1,2; Daniel Santa Mina, PhD 3,4; Kathleen D. Lyons, ScD, OTR 5,6; Karen Robb, PhD, BSc 7,8; Julie K. Silver, MD 9,10,11,12

Abstract: Guidelines promote high quality cancer care. Rehabilitation recommendations in oncology guidelines have not been characterized and may provide insight to improve integration of rehabilitation into oncology care. This report was developed as part of the World Health Organization (WHO) Rehabilitation 2030 initiative to identify rehabilitation-specific recommendations in guidelines for oncology care. A systematic review of guidelines was conducted. Only guidelines published in English, for adults with cancer, providing recommendations for rehabilitation referral and assessment or interventions between 2009 and 2019 were included. 13840 articles were identified. After duplicates and applied filters, 4897 articles were screened. 69 guidelines were identified with rehabilitation-specific recommendations. Thirty-seven of the 69 guidelines endorsed referral to rehabilitation services but provided no specific recommendations regarding assessment or interventions. Thirty-two of the 69 guidelines met the full inclusion criteria and were assessed using the AGREE II tool. Twenty-one of these guidelines achieved an AGREE II quality score of ≥ 45 and were fully extracted. Guidelines exclusive to pharmacologic interventions and complementary and alternative interventions were excluded. Findings identify guidelines that recommend rehabilitation services across many cancer types and for various consequences of cancer treatment signifying that rehabilitation is a recognized component of oncology care. However, these findings are at odds with clinical reports of low rehabilitation utilization rates suggesting that guideline recommendations may be overlooked. Considering that functional morbidity negatively affects a majority of cancer survivors, improving guideline concordant rehabilitative care could have substantial impact on function and quality of life among cancer survivors. CA Cancer J Clin 2021;71:149-175. © 2020 American Cancer Society.

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Introduction

A majority of individuals living with and beyond cancer will experience compromised physical and cognitive function due to cancer treatments and side effects. 1-3 These functional morbidity negatively impact an individual’s participation in social 4-6 and vocational roles, 7-9 minimize quality of life, 10,11 and can result in reduced survival. 12,13 The negative impact of cancer treatment-related morbidity is identifiable across many different types of cancers, 14-17 impacting multiple body systems 18-22 and domains of function, 23-27 and spans the trajectory of the individuals’ lifespan during and after active medical treatments. 28-31

Rehabilitation and exercise interventions reduce the negative impact of treatment-related symptoms and improve function of individuals living with and beyond cancer. 32-42 Despite growing evidence and recommendations for better integration of rehabilitation into oncology care, 43-46 rehabilitation is a relatively underutilized service. 47-50 This care gap is well characterized internationally and contributes to a growing morbidity burden as the population of cancer survivors...
The purpose of this report is to summarize the findings of a systematic review of guidelines for cancer care and characterize guideline endorsed recommendations for rehabilitation service referral and interventions.

Methods

Methods for this review were informed by the objectives of the WHO Rehabilitation 2030 initiative described elsewhere, and followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology. For this project, a Technical Working Group (TWG) was established by the WHO in 2019 comprised of the authors of this report. The TWG was charged with conducting a systematic review of clinical practice guidelines in oncology and rehabilitation according to a methodology standardized to develop the Package of Rehabilitation Interventions. The group was advised by a liaison officer from the WHO. An information specialist from the National Institutes of Health (NIH) biomedical library consulted with the group to support search strategies.

The review sought to identify cancer treatment and cancer treatment-related symptom management clinical practice guidelines for adults published between January 1, 2009 through June 30, 2019 (10.5 years) that included rehabilitation-related recommendations. The inclusion and exclusion criteria for this review are presented in Table 1. Clinical practice guidelines were operationally defined as documents that meet all of the following criteria; (i) systematically searched

| Inclusion | Exclusion |
|-----------|-----------|
| A document that provides guidance, recommendations, or clinical pathways and meets all of the following criteria: | Does not include recommendations for rehabilitation interventions or services |
| Includes a systematic review of the evidence OR references that a systematic review of the evidence was conducted to support the guideline | Published prior to 2009 |
| Follows a systematic process for guideline development including a process for literature review, a process for achieving consensus of experts, and a process for public review and commentary | Developed for health conditions other than cancer or cancer-related symptoms and impairments. (eg Cancer prevention guidelines, health and fitness guidelines for general health maintenance) |
| Provides a classification system for the strength of the recommendations put forward | Guidelines funded by a commercial company, (eg, pharmaceutical or device company) |
| Is endorsed by an organization or association representing oncology or rehabilitation health disciplines or professionals | Complementary and alternative medicine interventions that are not used in rehabilitation practice (eg, herbal remedies, essential oils etc.) or include interventions that are not movement-based or functional activities. (eg, Reiki, energy therapy etc.) |
| Published in English | Guidelines for managing the psychological impact of cancer treatment (eg, anxiety, depression, sexual desire) |
| Adult population (≥ 18 years old) including adult survivors of childhood cancers | Guidelines for pharmacological interventions only with no functional therapeutic recommendations |
| Exclusive to an oncology population | |
| Published between January 1, 2009 through June 1, 2019 | |

continues to increase. Alleviating this deficit should be a priority in oncology care as the population of cancer survivors will nearly double world-wide in the coming decades.

In 2017, the World Health Organization (WHO) initiated Rehabilitation 2030 - a call to action to advance global access to high-quality rehabilitation as an essential health care service for individuals with noncommunicable diseases. The objective of the initiative is to create a Package of Rehabilitation Interventions that will strengthen health systems to provide rehabilitation services through better awareness of and accessibility to resources for rehabilitation to improve population health. Given the acute, persistent, and late effects of cancer and its associated treatments, the WHO designated oncology as a priority area for this initiative. This systematic review represents the first step in developing the Package of Rehabilitation Interventions for oncology.

Guideline-concordant care is a tenant of high quality cancer care as guidelines recommend standardized interventions for a particular condition or disease type based on the highest levels of evidence. Guidelines have the potential to improve health care quality and safety as well as to enhance the translation of research into practice. Best practices for guideline development are outlined by the National Academies of Science Engineering and Medicine and include robust systematic review of the evidence, expert consensus to synthesize the evidence and formulate recommendations, and endorsement by a professional society or organization. These criteria aim to improve the rigor with which guidelines are developed and optimize transparency in the development process.

While guidelines and clinical pathways for cancer disease treatment and symptom management are abundant, evidence suggests that they may not be optimally followed to address supportive care. The degree to which rehabilitation is included in oncology guidelines has not been characterized and therefore contributes to uncertainty regarding the evidence for when individuals with cancer should access rehabilitation services. To improve the quality of and accessibility to rehabilitation services for individuals with cancer, a comprehensive review of guidelines pertaining to oncology rehabilitation is essential.

The purpose of this report is to summarize the findings of a systematic review of guidelines for cancer care and characterize guideline endorsed recommendations for rehabilitation service referral and interventions.
and reviewed the literature using a standardized review process providing a ranking of the quality of evidence, and (ii) developed recommendations using a consensus-based approach among interdisciplinary subject matter experts who provided a ranking of the strength of their recommendations, and (iii) received input from multiple stakeholders through a public review and feedback, and (iv) are published in the peer review literature or through a health care professional organization, society, or governmental agency. The absence of any one of these criteria excluded the guideline from review.

For the purposes of this review, rehabilitation was operationally defined to include the following disciplines and approaches to rehabilitation:63; physiatry, physical therapy, occupational therapy, speech and language pathology, vocational rehabilitation, recreational therapy, neuropsychology, behavioral therapy, palliative care, integrative and lifestyle medicine, and nutrition,51,64-66 and to encompass physical and cognitive domains of functioning. Our definition of rehabilitation is intentionally broad and may be more inclusive than what is recognized as routine clinical practice. We chose this broad definition with the understanding that the scope of clinical rehabilitation services varies substantially around the world as does the role of various clinical professionals in providing the services described herein.

Guidelines that addressed psychological function, specifically distress, anxiety and depression were excluded from this review as the primary intervention pathways for these conditions falls outside of the rehabilitation scope of practice. Guidelines that focused exclusively on pharmacological interventions were excluded, as were guidelines exclusive to complementary and alternative medicine interventions. If, however, an included guideline made recommendations regarding pharmacological interventions or complementary and alternative interventions, those recommendations are reported.

Search Strategy
The search strategy employed three approaches to identify guidelines. First, a search of indexed databases including; PubMed, CINAHL, PEDro, Google Scholar, and Web of Science, was conducted by a biomedical librarian. The search criteria were bound by the terms cancer AND rehabilitation followed by an extensive list of rehabilitation sub-terms using the OR Boolean operator with filters for ‘guidelines’, ‘consensus statements’, ‘expert opinion’, ‘expert panel’, ‘clinical pathways’, ‘recommendations’, ‘English’, ‘Humans’, ‘Title/abstract/full text’, ‘Adults’. The full search string is provided in Supplemental Table 1. Database search results were collated by the information specialist and all data were imported into EndNote (Version X9.2) reference manager software.

Second, a hand-search of online guideline repositories was undertaken by the TWG. The WHO provided a comprehensive list of international repositories and the authors contributed additional sites based on their knowledge of international cancer guideline developing bodies. Due to the relative lack of standardization among guideline website repositories, a modified search string was developed using the primary search terms “cancer” and “rehabilitation”. Websites were hand-searched if they did not have a search engine function. All guideline and professional society websites were reviewed by two separate authors to assure completeness of the search and fidelity of the findings. A list of the repositories used by the TWG and search results are provided in Supplemental Table 2.

Third, a survey of international cancer rehabilitation providers was conducted to identify additional guidelines that may have been missed in our search. These individuals were identified from among the work group’s professional contacts, as well as from a web search of international organizations in physical medicine and rehabilitation that have cancer-related special interest groups. The survey asked participants to: (i) identify professional society guidelines for cancer rehabilitation; (ii) identify oncology treatment guidelines that included recommendations for rehabilitation services; and (iii) identify regional, or national governmental guidelines for oncology treatment in their country.

The results from each of the search mechanisms were aggregated and reviewed for duplicate entries. After the removal of duplicates, the EndNote citation database was imported to Covidence (Melbourne, Australia), a software program that facilitates the systematic review process through blinded author reviews, tracks inclusion and exclusion, and enables resolution of conflict between reviewers.

Review Process
Three levels of screening were conducted to determine inclusion: (i) title and abstract; (ii) full text review; (iii) quality review using AGREE II. AGREE II uses 23 criteria to assess and quantify a guidelines’ bias and provides insight on the rigor of the guideline development process.67 Through each level of screening all articles were assessed by two authors and disagreements were reconciled by a third author. Articles that made reference to a guideline were included for full text review and flagged to cross-reference to assure that the referenced guideline was included. These articles were then excluded after the referenced guideline was identified.

Following full text review, the included guidelines were divided into two categories. Category A guidelines were those that provided recommendations for specific rehabilitation assessments and interventions. Category B guidelines were those that endorsed referral to rehabilitation
services but had no further discrete recommendations for assessment or interventions. All Category A guidelines were then reviewed and scored by two authors using the AGREE II tool. The co-authors received the AGREE II manual and held one training session to discuss each criteria before initiating blinded scoring. Reviewer agreement in AGREE II scoring was calculated using intraclass correlation coefficients (ICC) (Cronbach’s alpha (95% CI)). A value above 0.80 is considered almost perfect agreement.68 AGREE II scores are provided in Supplemental Table 3. As per WHO project criteria, all Category A guidelines that achieved an AGREE II score of ≥ 45 were included for final extraction for the full report. Extracted variables included rehabilitation referral, assessment, and intervention recommendations, the professional association or organization developing the guideline and any additional organizations endorsing the guideline. Category A guidelines that fell below the AGREE II threshold were not extracted but are identified and briefly summarized in our results. All Category B guidelines were reviewed, and a brief summary of the rehabilitation referral indication is provided.

Results
The PRISMA diagram is presented in Figure 1. Supplemental Table 2 provides the database search findings which yielded 13840 articles. Fifteen responses to our professional contact survey were received which directed us to six different guidelines that were found to be duplicates of those from the database search. After cross referencing all data sets to remove duplicates, 4915 articles were imported to Covidence. The Covidence software program identified an additional 18 duplicate articles based on metadata, leaving 4897 articles for screening. After completion of title and abstract and full text screening, 69 unique guidelines with recommendations for cancer rehabilitation services were included.

Thirty-two of the 69 guidelines met the full inclusion criteria of providing recommendations for rehabilitation referrals, assessments, and interventions, were classified as Category A, and underwent AGREE II scoring. AGREE II scoring between reviewers demonstrated very high agreement (mean intraclass correlation coefficient = 0.969, SD ± 0.025). Twenty-one of the 32 Category A guidelines achieved an AGREE II score of ≥45 and were fully extracted (Table 2). The remaining 11 Category A guidelines that fell below the AGREE II threshold were not extracted but are described in Table 2.69-100

The remaining 37 guidelines endorsed rehabilitation referrals but provide no specific recommendations for rehabilitation assessments or interventions and were classified as Category B. The Category B guidelines were not extracted, however, the referral recommendations made by these guidelines are outlined in Table 3.101-137

Recommendations for rehabilitation services were identified in guidelines from 46 different international,
### TABLE 2. Category A Guidelines

| Disease Specific Guidelines | Recommendations |
|----------------------------|-----------------|
| **Breast**                 | **American Cancer Society/American Society of Clinical Oncology Breast Survivorship**[^69] |
| **Referral**               | - Lymphedema - Refer to a therapist knowledgeable about the diagnosis and treatment of lymphedema, such as a PT, OT or lymphedema specialist  
- Cognitive function - Refer for neurocognitive assessment and rehabilitation, including group cognitive training if available  
- Pain - Refer to an appropriate specialist, depending on the etiology of the pain once the underlying etiology has been determined (eg, PT, OT etc.)  
- Sexual health - Refer for psychoeducational support, group therapy, sexual counseling, marital counseling, or intensive psychotherapy when appropriate  
| **Assessment**             | - Fatigue - Assess for fatigue and treat any causative factors  
- Musculoskeletal health - Assess for musculoskeletal symptoms, including pain, by asking patients about their symptoms at each clinical encounter  
- Pain - Assess for pain and contributing factors for pain with a simple pain visual analog scale and comprehensive history of the patient’s complaint  
- Sexual health - Assess for signs and symptoms of sexual dysfunction or problems with sexual intimacy, assess for reversible contributing factors to sexual dysfunction and treat when appropriate  
| **Rehabilitation Intervention** | - Fatigue - Counsel patients to engage in regular physical activity and refer for cognitive behavioral therapy as appropriate  
- Musculoskeletal health - Offer one or more of the following interventions based on clinical indication: acupuncture, physical activity, and therapeutic exercise  
- Pain - Acetaminophen, nonsteroidal anti-inflammatory drugs, physical activity, and/or acupuncture  
- Sexual health - For patients with vaginal dryness offer nonhormonal, water-based lubricants and moisturizers  
| **Health promotion**       | - Counsel survivors to achieve and maintain a healthy weight  
- Limit consumption of high-calorie foods and beverages and increase physical activity to promote and maintain weight loss in individuals who are overweight or obese  
- Engage in regular physical activity consistent with the ACS guideline, specifically: (a) avoid inactivity and return to normal daily activities as soon as possible after diagnosis (b) aim for at least 150 minutes of moderate or 75 minutes of vigorous aerobic exercise per week and (c) include strength training exercises at least 2 days per week and emphasize strength training for women treated with adjuvant chemotherapy or hormone therapy  
- Counsel survivors to achieve a dietary pattern that is high in vegetables, fruits, whole grains, and legumes; low in saturated fats; and limited in alcohol consumption  
- Counsel survivors to avoid smoking and refer survivors who smoke to cessation counseling and resources.  
| **Society for Integrative Oncology Integrative Therapies in Breast Cancer**[^70] |
| **Rehabilitation Intervention** | - Anxiety  
- Fatigue  
- Pain  
- Lymphedema  
| **Below AGREE II Threshold** | - German Gynecological Oncology Group[^71]  
Rehabilitation for symptom management in advanced and metastatic disease |
TABLE 2. (Continued)

| Disease Specific Guidelines | Cancer Type | Recommendations |
|----------------------------|-------------|-----------------|
| Prostate                   | American Cancer Society Prostate Survivorship72 | **Referral**  
- Refer to a physical therapist for pelvic floor rehabilitation; at a minimum, instruct survivors about Kegel exercises  

**Rehabilitation Intervention**  
- Health promotion  
  ◦ Counsel survivors to achieve and maintain a healthy weight by limiting consumption of high-calorie foods and beverages and promoting increased physical activity  
  ◦ Counsel survivors to engage in at least 150 minutes per week of physical activity, this may include weight-bearing exercises  

National Institute for Health and Care Excellence73 | **Referral**  
- Offer people who are starting or having androgen deprivation therapy supervised resistance and aerobic exercise at least twice a week for 12 weeks to reduce fatigue and improve quality of life  
- Ensure that people who have troublesome urinary symptoms after treatment have access to specialist continence services for assessment, diagnosis, and conservative treatment  

**Rehabilitation Interventions**  
- Conservative treatments include:  
  ◦ Coping strategies  
  ◦ Pelvic floor muscle re-education  
  ◦ Bladder retraining  
  ◦ Pharmacotherapy |
| Head and Neck | American Cancer Society Head and Neck Survivorship74 | **Referral**  
- Primary care physicians should refer survivors with spinal accessory nerve palsy occurring post-radical neck dissection to a rehabilitation specialist to improve range of motion and ability to perform daily tasks  
- Refer to a rehabilitation specialist for comprehensive neuromusculoskeletal management if cervical dystonia or neuropathy is found  
- Refer to a rehabilitation specialist to improve pain, disability, and range of motion where shoulder morbidity exists  
- Refer to rehabilitation specialists and dental professionals to prevent trismus and to treat trismus as soon as it is diagnosed  
- Refer to a speech-language pathologist for instrumental evaluation of swallowing function to assess and manage dysphagia and possible aspiration  
- Refer to an experienced speech-language pathologist if communication disorder exists  

**Rehabilitation Intervention**  
- Prescribe nerve stabilizing agents, such as pregabalin, gabapentin, and duloxetine, or refer to a specialist for botulinum toxin type A injections into the affected muscles for pain management and spasm control as indicated  
- Prescribe nerve-stabilizing agents to combat pain and spasms, which may also ease physical therapy and stretching devices  
- Recommend antacids, sleeping with a wedge pillow or 3-inch blocks under the head of the bed, not eating or drinking fluids for 3 hours before bedtime, tobacco cessation, and avoidance of alcohol for those with reflux  
- Treat lymphedema with manual lymphatic drainage and, if tolerated, compressive bandaging  
- Counsel survivors to engage in regular physical activity for fatigue  
- Counsel survivors on nutrition strategies to maintain a healthy weight for those at risk for cachexia  
- Counsel survivors to avoid inactivity and return to normal daily activities as soon as possible after diagnosis and aim for at least 150 minutes of moderate or 75 minutes of vigorous aerobic exercise per week and include strength training exercises at least 2 days per week  

Below AGREE II Threshold  
United Kingdom National Multidisciplinary Guidelines75  
Nutrition management guideline for head and neck cancer |
| Lung | American College of Chest Physicians Cough Management in Lung Cancer76 | **Rehabilitation Intervention**  
- Provide cough suppression exercises as alternative or in addition to pharmacological therapy  

Below AGREE II Threshold  
European Respiratory Society/European Society of Thoracic Surgery77  
- Individuals who are surgical candidates should be referred for a pre-operative and perioperative lung fitness program |
Disease Specific Guidelines

Cancer Type Recommendations

**Thyroid Cancer**

- **American Thyroid Association Anaplastic Thyroid**
  - Refer to a comprehensive palliative care team with expertise to manage pain, symptom control, and psychosocial and spiritual issues
  - **Rehabilitation Intervention**
    - Humidity and breathing exercises
    - Energy conservation strategies
  - **American Academy of Otolaryngology Voice Management**
    - **Assessment**
      - Document assessment of voice prior to surgery and reassess for voice changes 2 weeks to 2 months after thyroid surgery
      - Assess vocal fold mobility
    - **Referral**
      - Speech and language pathology or other specialist to examine and document changes in vocal fold mobility
      - Speech and language pathology when voice change or abnormal vocal fold mobility is identified
    - **Rehabilitation Intervention**
      - Preoperative education for potential impact of surgery on voice
      - Voice rehabilitation for voice change or if abnormal vocal fold mobility is identified

**Survivorship across all cancer types**

- **National Comprehensive Cancer Network Survivorship Guideline**
  - **Assessment**
    - Annual assessment is recommended for all survivors to determine any needs and necessary interventions. This should include assessment of:
      - Current disease status
      - Functional performance status
      - Medication use
      - Comorbidities
      - Prior cancer treatment history
      - Family history
      - Psychosocial factors
      - Weight and health behavior
      - Cognitive Function - Assess with standardized scale
      - Fatigue - Assess with visual analog scale
      - Lymphedema - Assess subjective symptoms and objective limb measures, and functional mobility
      - Hormone-related symptoms in women - Assess vasomotor symptoms, vaginal dryness, sexual dysfunction, mood disturbance, cognitive dysfunction, fatigue, arthralgia/myalgia
      - Hormone-related symptoms in men - Assess vasomotor symptoms, anemia, sexual dysfunction, sleep disturbance, mood disturbance, cognitive dysfunction, arthralgia/myalgia, fatigue
      - Pain - Assess pain syndrome with visual analog scale
      - Sleep
        - Comorbidities
        - Medications
        - Vasomotor symptoms
        - Sleep/wake timing or sleep log/diary
        - Review caffeine intake
        - Assess pain
        - Assess fatigue
        - Assess work schedule
        - Assess current coping strategies
    - **Referral**
      - Cognitive Function - Refer to occupational therapy, speech therapy or neuropsychologist upon presentation of impairment
      - Fatigue - Self-reported fatigue ≥ 4/10 consider referral for PT, exercise professionals or community exercise programs. Focused evaluation of disease treatment, disease status, comorbidities, medications, emotional distress, sleep, pain, nutrition, deconditioning
      - Lymphedema - Refer to certified lymphedema therapist for continued surveillance and monitoring
      - Pain Syndromes - Consider referrals for:
        - Post amputation syndrome to PT, OT, cognitive behavior therapist
        - Post-radical neck dissection to PT, SLP
        - Post mastectomy syndrome to PT
        - Skeletal vertebral compression to Physiatrist, PT
        - Myofascial pain to PT, Physiatrist
        - Pelvic pain syndrome to pelvic floor specialty PT, Physiatrist
        - Post-radiation pain to PT
      - Sexual function
        - Refer to pelvic floor specialty PT
### Rehabilitation Interventions

- **Cognitive Function**
  - Teach enhanced organization strategies
  - Encourage patients to do the most cognitively demanding tasks at the time of day when energy is highest
  - Provide information about relaxation and stress management skills
  - Recommend daily physical activity
  - Recommend limited use of alcohol and other agents that alter cognition and sleep
  - Consider meditation, yoga, mindfulness-based stress reduction and cognitive training
- **Fatigue**
  - Patient/family counseling for energy conservation and self-monitoring
  - Recommendations to maintain adequate level of physical activity
- **Lymphedema**
  - Compression garments
  - Progressive resistance training under supervision
  - Manual lymphatic drainage
  - Range of motion exercises
- **Hormone-related symptoms in women**
  - Acupuncture
  - Physical activity and exercise
  - Lifestyle modification
  - Integrative therapies (yoga, cognitive behavior therapies)
- **Hormone-related symptoms in men**
  - Acupuncture
  - Physical activity and exercise
  - Lifestyle modification
  - Integrative therapies (yoga, cognitive behavior therapies)
- **Pain Syndromes**
  - Post-Amputation pain
    - Desensitization
    - Mirror therapy
    - Cognitive therapies
  - Post-Radical Neck Dissection pain
    - Stretching
    - Range of motion
    - Soft tissue massage
    - Myofascial release
    - Trigger point injections
    - Botulinum toxin injections
  - Post-Mastectomy pain
    - TENS
  - Myalgia, Arthralgia pain
    - Physical activity
    - Heat
    - Cold pack
    - Aquatic therapy
    - Massage
    - Acupuncture
    - Yoga
  - Skeletal or Vertebral Compression pain
    - Bracing
    - Mobility
    - Weight bearing exercise when pain improves
    - Thoracic and lumbar stabilization exercises
  - Myofascial pain syndrome
    - Physical activity
    - Range of motion exercises
    - Strength exercises
    - Soft tissue myofascial release
    - Ultrasonic stimulation
    - Acupuncture

| Disease Specific Guidelines | Recommendations |
|-----------------------------|-----------------|
| **Cancer Type**             | **Recommendations** |

**TABLE 2. (Continued)**
### Disease Specific Guidelines

#### Cancer Type Recommendations

- **Pelvic pain syndrome**
  - Pelvic floor exercises
  - Hydration

- **Pelvic floor exercises**

- **Hydration**

- **Sexual function**
  - Female low libido, lack of desire, pain with sexual activity, problems with orgasm
  - Topical vaginal therapies
  - Vaginal dilators
  - Pelvic floor physical therapy
  - Vibrator or clitoral stimulation device

- **Male low libido, erectile dysfunction, problems with orgasm**
  - Physical activity
  - Smoking cessation
  - Weight loss
  - Pelvic physical therapy
  - Voiding diary
  - Vibrator therapy

- **Sleep disorder**
  - Sleep hygiene education
  - Cognitive behavioral therapies

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#### Below AGREE II Threshold

- **Pan Canadian**
  - Survivorship guideline for individuals transitioning from active cancer treatment to extended living

- **Germany, Austria, and Switzerland Consensus Recommendations**
  - Rehabilitation indications for individuals with chronic graft-versus-host disease

- **American Society for Parenteral and Enteral Nutrition (ASPEN)**
  - Nutrition guideline for individuals who are candidates for hematopoietic stem cell transplantation

- **Gastroenterological Society of Taiwan**
  - Nutrition guideline

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#### Symptom or Condition Management Guidelines

| Symptom or Condition | Recommendation |
|----------------------|----------------|
| **Cancer-related Fatigue** | **National Comprehensive Cancer Network**
| **Assessment** | All individuals with cancer >12 years old should be screened for fatigue at regular intervals |
| **Referral** | Individuals reporting ≥ 4/10 fatigue on a self-reported visual analog scale (VAS) should be referred for rehabilitation |
| **Rehabilitation Intervention** | Cognitive behavioral therapies |
| | Exercise prescription |
| **Pan Canadian** | Screen at first intake visit with a health provider, throughout treatment at a specific interval, post treatment at follow up visits, and as clinically indicated with disease or treatment status change |
| | Complete a focused assessment if screened positive for fatigue (≥2/10 on VAS) and consider appropriate referrals based on identified causes of fatigue |
| **Referral** | A referral to a specialist in rehabilitation should be considered for individuals who are obese, physically inactive, and those who require tailored regimes (ie peripheral neuropathy, pain, lymphedema) |
| | Referral to experts trained in cognitive behavioral therapy should be offered to those with chronic cancer fatigue |
**Rehabilitation Intervention**

- Counsel all patients as is safe to engage in moderate-intensity physical activity 55 - 75% HR max for at least 30 minutes on five or more days of the week, or vigorous-intensity physical activity for at least 20 minutes on three or more days of the week (eg fast walking, cycling or swimming)
  - Progressive resistance training a minimum of three days per week is also beneficial in combination with other physical activity
  - There is a lack of consensus on optimal exercise dose
  - Physical activity has a role in advanced disease. Optimal dose is not clear, but exercise should be supervised and based on tolerance
- All types of physical activity at lower levels of intensity (eg walking, yoga) likely will contribute to decreasing fatigue during active treatment and posttreatment survivorship
- Patients should be advised that there is preliminary evidence that yoga is likely to improve cancer fatigue
- Promote access to multi-component, group psycho-education programs targeted to self-management of fatigue. Components likely to be beneficial include:
  - Coping with emotions
  - Understanding of fatigue
  - Healthy sleep
  - Positive peer reinforcement
  - Overcoming barriers
  - Opportunity to share experiences

**Assessment**

- All health care providers should routinely screen for the presence of fatigue from the point of diagnosis onward, including after completion of primary treatment
- All patients should be screened for fatigue as clinically indicated and at least annually
- Screening should be performed and documented using a quantitative or semiquantitative assessment

**Referral**

- Survivors at higher risk of injury (eg, those living with neuropathy, cardiomyopathy, or other long-term effects of therapy) and patients with severe fatigue interfering with function should be referred to a physical therapist or exercise specialist. Breast cancer survivors with lymphedema should also consider meeting with an exercise specialist before initiating upper body strength training
- Individuals with cognitive impairments should be referred to psychosocial service providers who specialize in cancer and are trained to deliver empirically based interventions

**Rehabilitation Intervention**

- Education
  - All patients should be offered specific education about fatigue after treatment (eg, information about the difference between normal and cancer-related fatigue, persistence of fatigue after treatment, and causes and contributing factors)
  - Patients should be offered advice on general strategies that help manage fatigue
  - If treated for fatigue, patients should be observed and re-evaluated on a regular basis to determine whether treatment is effective or needs to be reassessed
- Physical Activity and Exercise
  - Initiate/maintain adequate levels of physical activity to reduce cancer-related fatigue in post-treatment survivors
  - Engage in a moderate level of physical activity after cancer treatment (eg 150 minutes of moderate aerobic exercise [such as fast walking, cycling, or swimming] per week with an additional two to three strength training [such as weight-lifting] sessions per week, unless contraindicated)
  - Walking programs are generally safe for most cancer survivors; and can be initiated after physician consultation but without formal exercise testing
- Cognitive Behavioral Therapy
  - Psychoeducational therapies/educational therapies can reduce cancer-related fatigue in post-treatment survivors

**Pain**

**Referral**

- Consider physical medicine evaluation and PT/OT rehabilitation/mobility specialty consultation

**Rehabilitation Intervention**

- Physical modalities including: supportive devices; positioning instruction; instruction in therapeutic and conditioning exercise; energy conservation and pacing of activities; massage; heat and/or ice; transcutaneous electrical nerve stimulation (TENS); acupuncture or acupressure; ultrasonic stimulation

**Below AGREE II Threshold**

- European Society of Medical Oncology
- Cancer-related pain management in adults
### Disease Specific Guidelines

**Cancer Type Recommendations**

**Lymphedema**

**American Physical Therapy Association**

**Secondary Upper Quadrant Lymphedema**

**Assessment**

- Palpate the upper quadrant for fibrosis, pitting, and overall tissue quality
- Clinical examination, using the Modified Head and Neck External Lymphedema and Fibrosis assessment criteria for patients with head and neck lymphedema, may be used in conjunction with circumferential measurement for diagnostic purposes
- Self-reported swelling, heaviness, and numbness should be investigated to facilitate early diagnosis and should signal clinicians to use other secondary upper quadrant lymphedema measures
- The following questionnaires assist in the diagnosis of secondary upper quadrant lymphedema:
  - Norman Questionnaire
  - Morbidity Screening Tool
- Bioimpedance analysis should be used to detect lymphatic transport impairments and diagnose subclinical and early stage lymphedema in patients at risk for breast cancer–related lymphedema (Stage 0 and 1)
  - In moderate to late stage breast cancer–related lymphedema, as fibrosis and tissue changes occur, BIA may be utilized as a diagnostic tool; however, clinicians must be aware of the potential for decreasing extracellular fluid even with increased tissue volume
- Circumferential measurement should be used to diagnose upper extremity lymphedema (with or without hand involvement) at Stage 1 or greater
  - *For hand lymphedema, figure-of-8 method of circumferential measurement may be used as an assessment tool for determining hand volume; however, this method has not been studied as a diagnostic test*
  - *For head and neck lymphedema, circumferential measurement taken at a single point of the upper neck (under the jawline) may be useful for assessment but has not been studied as a diagnostic test*
- Water displacement may be used to diagnose lymphedema with volumetry
  - *≤200 mL when compared to the contralateral arm and with volumes >10% interlimb difference*
- Perometry may be used for assessment of volume but not as a diagnostic tool
- **Other Diagnostic Measures**
  - Tissue Dielectric Constant may not be used as a diagnostic tool but can be used for assessment
  - Ultrasound should be used as a diagnostic tool and to identify tissue changes
  - Dual-energy X-Ray Absorptiometry may not be used as a diagnostic tool but can be used for assessment to calculate arm volume
  - Magnetic Resonance Imaging may be used as a diagnostic tool
  - Computed Tomography may be used as a diagnostic tool
  - Lymphoscintigraphy may be used to detect lymphatic system impairment
  - Lymphography may be used to detect lymphatic system impairment
  - Tonometry is not recommended as a diagnostic tool

**Referral**

- L-Dex® score of >7.1 should be used as a diagnostic criteria for breast cancer–related lymphedema when no preoperative assessment is available
- L-Dex® score >10 above preoperative baseline measures should be used as diagnostic criteria
- A volume ratio of 1.04 may be indicative of upper extremity lymphedema
- Calculated volume differential between sides (≥ 200 ml) will help rule in lymphedema, but values below 200 ml cannot be used to rule out.
- If preoperative measures are available, a 5% or greater volume change from baseline above and below the elbow is diagnostic of upper extremity lymphedema

**Below AGREE II Threshold**

**Latin American Lymphology Association**

Lymphedema condition management guideline

**Exercise**

**Cancer Care Ontario**

**Assessment**

- A pre-exercise assessment to evaluate for any effects of disease, treatments, and comorbidities is recommended for all people living with cancer before they start an exercise intervention

**Rehabilitation Intervention**

- It is recommended that, where possible, people living with cancer exercise in a group or supervised setting, because that environment might provide a superior benefit or outcome in quality of life and muscular and aerobic fitness
- Clinicians should advise their patients to engage in exercise consistent with the recommendations:
  - A goal of 150 minutes of moderate-intensity aerobic exercise spread over 3–5 days and resistance training at least 2 days per week is recommended
  - Resistance sessions should involve major muscle groups 2–3 days per week (8–10 muscle groups, 8–10 repetitions, 2 sets)
  - Each session should include a warm-up and cool-down
  - People living with cancer perform exercise at a moderate intensity (3–6 times the baseline resting state) on an ongoing basis as a part of their lifestyle so that improvements in quality of life and muscular and aerobic fitness can be maintained for the long term

**Below AGREE II Threshold**

**American College of Sports Medicine**

Exercise guideline for cancer survivors

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**TABLE 2. (Continued)**

| Disease Specific Guidelines | Cancer Type | Recommendations |
|----------------------------|-------------|-----------------|
| **Lymphedema** | **American Physical Therapy Association** | **Secondary Upper Quadrant Lymphedema** |
| **Assessment** | | - Palpate the upper quadrant for fibrosis, pitting, and overall tissue quality |
| | | - Clinical examination, using the Modified Head and Neck External Lymphedema and Fibrosis assessment criteria for patients with head and neck lymphedema, may be used in conjunction with circumferential measurement for diagnostic purposes |
| | | - Self-reported swelling, heaviness, and numbness should be investigated to facilitate early diagnosis and should signal clinicians to use other secondary upper quadrant lymphedema measures |
| | | - The following questionnaires assist in the diagnosis of secondary upper quadrant lymphedema: |
| | | - Norman Questionnaire |
| | | - Morbidity Screening Tool |
| | | - Bioimpedance analysis should be used to detect lymphatic transport impairments and diagnose subclinical and early stage lymphedema in patients at risk for breast cancer–related lymphedema (Stage 0 and 1) |
| | | - In moderate to late stage breast cancer–related lymphedema, as fibrosis and tissue changes occur, BIA may be utilized as a diagnostic tool; however, clinicians must be aware of the potential for decreasing extracellular fluid even with increased tissue volume |
| | | - Circumferential measurement should be used to diagnose upper extremity lymphedema (with or without hand involvement) at Stage 1 or greater |
| | | - For hand lymphedema, figure-of-8 method of circumferential measurement may be used as an assessment tool for determining hand volume; however, this method has not been studied as a diagnostic test |
| | | - For head and neck lymphedema, circumferential measurement taken at a single point of the upper neck (under the jawline) may be useful for assessment but has not been studied as a diagnostic test |
| | | - Water displacement may be used to diagnose lymphedema with volumetry |
| | | - ≤200 mL when compared to the contralateral arm and with volumes >10% interlimb difference |
| | | - Perometry may be used for assessment of volume but not as a diagnostic tool |
| | | - **Other Diagnostic Measures** |
| | | - Tissue Dielectric Constant may not be used as a diagnostic tool but can be used for assessment |
| | | - Ultrasound should be used as a diagnostic tool and to identify tissue changes |
| | | - Dual-energy X-Ray Absorptiometry may not be used as a diagnostic tool but can be used for assessment to calculate arm volume |
| | | - Magnetic Resonance Imaging may be used as a diagnostic tool |
| | | - Computed Tomography may be used as a diagnostic tool |
| | | - Lymphoscintigraphy may be used to detect lymphatic system impairment |
| | | - Lymphography may be used to detect lymphatic system impairment |
| | | - Tonometry is not recommended as a diagnostic tool |
| **Referral** | | - L-Dex® score of >7.1 should be used as a diagnostic criteria for breast cancer–related lymphedema when no preoperative assessment is available |
| | | - L-Dex® score >10 above preoperative baseline measures should be used as diagnostic criteria |
| | | - A volume ratio of 1.04 may be indicative of upper extremity lymphedema |
| | | - Calculated volume differential between sides (≥ 200 ml) will help rule in lymphedema, but values below 200 ml cannot be used to rule out. |
| | | - If preoperative measures are available, a 5% or greater volume change from baseline above and below the elbow is diagnostic of upper extremity lymphedema |
| **Below AGREE II Threshold** | | **Latin American Lymphology Association** |
| | | Lymphedema condition management guideline |
| **Exercise** | **Cancer Care Ontario** | **Assessment** |
| | | - A pre-exercise assessment to evaluate for any effects of disease, treatments, and comorbidities is recommended for all people living with cancer before they start an exercise intervention |
| **Rehabilitation Intervention** | | - It is recommended that, where possible, people living with cancer exercise in a group or supervised setting, because that environment might provide a superior benefit or outcome in quality of life and muscular and aerobic fitness |
| | | - Clinicians should advise their patients to engage in exercise consistent with the recommendations: |
| | | - A goal of 150 minutes of moderate-intensity aerobic exercise spread over 3–5 days and resistance training at least 2 days per week is recommended |
| | | - Resistance sessions should involve major muscle groups 2–3 days per week (8–10 muscle groups, 8–10 repetitions, 2 sets) |
| | | - Each session should include a warm-up and cool-down |
| | | - People living with cancer perform exercise at a moderate intensity (3–6 times the baseline resting state) on an ongoing basis as a part of their lifestyle so that improvements in quality of life and muscular and aerobic fitness can be maintained for the long term |
| **Below AGREE II Threshold** | | **American College of Sports Medicine** |
### Disease Specific Guidelines

| Cancer Type           | Recommendations                                                                 |
|-----------------------|----------------------------------------------------------------------------------|
| **Bone Metastasis**   | Japanese Society of Medical Oncology, Japanese Orthopedic Association, Japanese Urological Association and Japanese Society for Radiation Oncology |
| **Rehabilitation Intervention** | - Rehabilitation is beneficial to improve ADLs and QOL, and to prevent disuse syndrome  |
|                       | - Rehabilitation is beneficial in providing pain relief, prevention of degeneration, improvement of ADL and QOL, and increased survival |

### Age Group Specific Guidelines

#### Age Group Recommendation

| Age Group          | Recommendation                                                                 |
|--------------------|----------------------------------------------------------------------------------|
| **Adolescent and Young Adult** | National Comprehensive Cancer Network |
| **Referral**       | - Refer to rehabilitation therapist for ongoing assessment of physical condition |
| **Rehabilitation Intervention** | - Provide education of physical conditioning and related health risks following cancer |

| **Older Adults**   | National Comprehensive Cancer Network |
| **Assessment**     | - Monitor for peripheral neuropathy |
|                    | - Monitor for cognitive dysfunction |
|                    | - Assess balance and gait difficulties |
|                    | - Conduct Comprehensive Geriatric Assessment to quantify: |
|                    |   - Functional status |
|                    |   - Cognition/memory |
|                    |   - Social support/caregiver burden |
|                    |   - Psychological status/anxiety/depression |
|                    |   - Nutrition |
| **Rehabilitation Intervention** | - Insomnia - Cognitive behavioral therapy and lifestyle modification  |
|                       | - Falls - Early and preventive use of durable medical equipment, assistive devices, and home safety evaluation |

### American Society for Clinical Oncology Older Adults Receiving Chemotherapy

| **Assessment** | Geriatric assessment (GA) should be used to identify vulnerabilities or geriatric impairments that are not routinely captured in oncology assessments |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------|
|                | - ADL/IADL function - Assess thorough history or validated tool for comorbidity; single question for falls |
|                | - Depression - Geriatric Depression Scale |
|                | - Cognition - Mini-Cog or Blessed Orientation-Memory-Concentration Test |
|                | - High toxicity risk patients - Cancer and Aging Research Group or Chemotherapy Risk Assessment Scale for High-Age Patients |
|                | - High mortality risk - Geriatric 8 or Vulnerable Elders Survey-13 |
|                | - Nutrition - Assess nutrition if patient experiences unintentional weight loss |
| **Rehabilitation Interventions** | - IADL deficits or falls |
|                       |   - PT and/or OT should prescribe strength and balance training, assistive device evaluation, home exercise program, and safety evaluation |
|                       |   - Fall prevention discussion |
|                       |   - Home safety evaluation |
|                       | - High comorbidity - Involve caregiver in discussions to assess risks of therapy and management of comorbidities; Involve primary care physician and/or geriatrician in decision making for treatment and management of comorbidities; consider referral to geriatrician |
|                       | - Medication considerations - Review medication list and minimize medications as much as possible; consider involving a pharmacist; assess adherence to medications; have patient bring in medications to review |
|                       | - Cognitive dysfunction |
|                       |   - Assess decision-making capacity and ability to consent for treatment |
|                       |   - Identify health care proxy and involve proxy in decision making for treatment, including signing consent forms with patient |
|                       |   - Delirium risk counseling for patient and family |
|                       |   - Medication review to minimize medications with higher risk of delirium |
|                       |   - Consider further work-up with geriatrician or cognitive specialist |
|                       |   - > 10% weight loss |
|                       |   - Nutrition counseling |
|                       |   - Referral to nutritionist/dietician to assess need for extra support for meal preparation and institute support interventions if necessary (e.g. caregiver, Meals-on-Wheels) |
## Disease Specific Guidelines

### Cancer Type Recommendations

### Nutrition Guidelines

| Disease or Condition | Recommendation |
|----------------------|----------------|
| **Head and Neck Cancer** | **Cancer Council Australia**<sup>98</sup> |
| **Assessment** | - Malnutrition screening should be undertaken at diagnosis and repeated at intervals through each stage of treatment  
- Validated nutrition screening tool such as the Malnutrition Screening Tool should be used to identify individuals at high risk  
- Weekly follow up for monitoring by a dietitian during radiotherapy and monthly follow up for 6 weeks post treatment up to 6 months |
| **Referral** | - If high risk for malnutrition, refer to dietitian  
- Individuals receiving radiation therapy should be referred to dietitian |
| **Rehabilitation Intervention** | - Nutrition intervention including counselling, supplements, or tube feeding improves nutrition status during radiotherapy and chemotherapy and may improve patient-centered outcomes  
- Nutrition intervention for 3 months post treatment to improve/maintain nutritional status and improve/maintain quality of life  
- Energy and protein intake of at least 125kJ/kg/day and 1.2 g protein/kg/day in individuals receiving radiotherapy or chemotherapy  
- Energy and protein intake should remain elevated post treatment to maintain weight. Weight should be monitored, and intervention adjusted as appropriate  
- Early oral feeding post primary total laryngectomy (from as early as 1 day post op to 7 days) should be considered to reduce length of stay  
- Dietary counselling and/or nutritional supplements are effective methods of nutrition intervention. Weekly dietitian contact during radiotherapy  
- Patients who are unable to eat and are reliant on tube feeding should be screened for distress and provided with psychosocial support to assist with quality of life |

| **General Cancer** | **European Society for Clinical Nutrition and Metabolism**<sup>99</sup> |
| **Assessment** | - To detect nutritional disturbances at an early stage, regular evaluation of nutritional intake, weight change, and BMI should begin with cancer diagnosis and be repeated depending on the clinical situation  
- In individuals with abnormal screening, objective and quantitative nutritional intake, nutrition impact symptoms, muscle mass, physical performance and the degree of systemic inflammation should be assessed  
- For all individuals undergoing either curative or palliative surgery an enhanced recovery after surgery (ERAS) program is recommended; within this program every patient should be screened for malnutrition and if deemed at risk, given additional nutritional support  
- Screen for and manage dysphagia and to encourage and educate patients on how to maintain their swallowing function during enteral nutrition  
- Routinely screen all patients with advanced cancer for inadequate nutritional intake, weight loss and low body mass index, and if found at risk, assess these patients further for both treatable nutrition impact symptoms and metabolic derangements |
| **Rehabilitation Intervention** | - Protein intake should be above 1g/kg/day up to 1.5 g/kg/day  
- In weight-losing patients with insulin resistance increase the ratio of energy from fat to energy from carbohydrates to increase the energy density of the diet and to reduce the glyceric load  
- Nutritional intervention is recommended to increase oral intake in individuals who are able to eat but are malnourished or at risk of malnutrition. This includes dietary advice, the treatment of symptoms and derangements impairing food intake (nutrition impact symptoms) and offering oral nutritional supplements  
- If oral food intake has been decreased severely for a prolonged period of time, increase (oral, enteral or parenteral) nutrition only slowly over several days and to take additional precautions to prevent a refeeding syndrome  
- Maintain or increase level of physical activity to support muscle mass, physical function and metabolic pattern including individualized resistance exercise in addition to aerobic exercise to maintain muscle strength and muscle mass  
- Consider corticosteroids to increase the appetite of individuals who are anorexic with advanced disease for a restricted period of time (1-3 weeks) but to be aware of side effects (eg muscle wasting, insulin resistance, infections)  
- There are insufficient data to recommend cannabinoids to improve taste disorders or anorexia  
- In patients with advanced cancer undergoing chemotherapy and at risk of weight loss or malnourished, use supplementation with long-chain N-3 fatty acids or fish oil to stabilize or improve appetite, food intake, lean body mass and body weight  
- During radiotherapy, specifically in head and neck, thorax and gastrointestinal tract cancer, individualized nutritional counseling and/or use of oral nutritional supplements (ONS) is recommended to avoid nutritional deterioration, maintain intake and avoid treatment interruptions  
- During intensive chemotherapy and after stem cell transplantation maintain physical activity and to ensure an adequate nutritional intake This may require enteral and/or parenteral nutrition |

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**TABLE 2. (Continued)**
professional societies and organizations representing more than 13 countries. Sixteen of the Category A guidelines provided rehabilitation assessment and intervention recommendations within a disease-specific context (e.g., breast, prostate, etc.). Ten of the Category A guidelines provided rehabilitation-specific assessment and intervention recommendations for symptom or condition management (e.g., fatigue, lymphedema, etc.) across all cancer types. One Category A guideline addressed recommendations for adult survivors of childhood cancers, and two Category A guidelines address recommendations for older adults. Rehabilitation recommendations for nutrition considerations were included in three Category A guidelines.

Twenty Category B guidelines offered rehabilitation referral endorsements in disease-specific guidelines and four Category B guidelines offered condition-specific rehabilitation referral recommendations. Two Category B guidelines addressed rehabilitation referrals for adult survivors of childhood cancers and rehabilitation referral for palliative care was endorsed in three Category B guidelines. Detailed recommendations offered in each Category A guideline are outlined in Table 2, and specific indications identified by Category B guidelines are described in Table 3. Guideline findings are synthesized here by disease type, symptom or condition, and by specific age groups.

Disease-Based Guidelines

Breast

Two Category A guidelines broadly address rehabilitation needs of patients with breast cancer related to common impairments. The American Cancer Society (ACS)/American Society for Clinical Oncology (ASCO) breast cancer guideline recommends rehabilitative interventions in the presence of impairments that minimize an individual’s ability to function, such as, fatigue, cognitive deficits, pain, neuropathy, and other side effects or late effects. Intervention is also recommended when clinical symptoms of lymphedema, musculoskeletal impairment, and sexual dysfunction are present.

Interventions such as music therapy for pain management, massage for lymphedema, pain management, and quality of life, and yoga for fatigue, quality of life, and sleep disturbance are endorsed by the Society for Integrative Oncology.

Several Category B guidelines recommended referral for rehabilitation based on treatment timing and symptom onset to address issues such as upper extremity exercises after surgery, lymphedema management, and sexual and hormone-related symptoms.

Prostate

Two Category A guidelines, one from the ACS and one from the National Institute for Health and Care Excellence (NICE) advise pelvic floor interventions to address urinary incontinence and endorse rehabilitation to support health promotion through exercise interventions. The NICE guideline also recommends weight bearing resistance and aerobic exercise training for individuals on androgen deprivation treatment. One Category B guideline endorses rehabilitation referrals for men who are initiating anti-androgen therapies.

Head and neck

One Category A guideline from the ACS provides an extensive list of recommendations for rehabilitation referrals and interventions in the presence of impairments that involve speech, swallowing, cervical spine mobility, lymphedema, temporomandibular joint dysfunction, among many others. One Category A guideline from Cancer Council Australia focuses on nutritional interventions for individuals with head and neck cancer who are both over and underweight and is reported in detail in the Nutrition section of Table 2. Five Category B guidelines endorse rehabilitation

| Disease Specific Guidelines |
|-----------------------------|
| **Cancer Type** | **Recommendations** |
| **Category A** guidelines provided rehabilitation assessment and intervention recommendations within a disease-specific context (e.g., breast, prostate, etc.). Ten of the Category A guidelines provided rehabilitation-specific assessment and intervention recommendations for symptom or condition management (e.g., fatigue, lymphedema, etc.) across all cancer types. One Category A guideline addressed recommendations for adult survivors of childhood cancers, and two Category A guidelines address recommendations for older adults. Rehabilitation recommendations for nutrition considerations were included in three Category A guidelines. Twenty Category B guidelines offered rehabilitation referral endorsements in disease-specific guidelines and four Category B guidelines offered condition-specific rehabilitation referral recommendations. Two Category B guidelines addressed rehabilitation referrals for adult survivors of childhood cancers and rehabilitation referral for palliative care was endorsed in three Category B guidelines. Detailed recommendations offered in each Category A guideline are outlined in Table 2, and specific indications identified by Category B guidelines are described in Table 3. Guideline findings are synthesized here by disease type, symptom or condition, and by specific age groups. |

**TABLE 2. (Continued)**

| Disease Specific Guidelines | **Recommendations** |
|-----------------------------|---------------------|
| **Breast** | **Cancer** |
| **Prostate** | **Category A** guidelines provide an extensive list of rehabilitation referrals and interventions in the presence of impairments that involve speech, swallowing, cervical spine mobility, lymphedema, temporomandibular joint dysfunction, among many others. One Category A guideline from Cancer Council Australia focuses on nutritional interventions for individuals with head and neck cancer who are both over and underweight and is reported in detail in the Nutrition section of Table 2. Five Category B guidelines endorse rehabilitation |

**Abbreviations:** ACS, American Cancer Society; ADL, activities of daily living; BIA, bioimpedance analysis; BMI, body mass index; HNC, head and neck cancer; HR, heart rate; IADL, instrumental activities of daily living; NCCN, National Comprehensive Cancer Network; OT, occupational therapy; PT, physical therapy; QOL, quality of life; ROM, range of motion; SLP, speech and language pathology; TENS, transcutaneous electrical nerve stimulation; VAS, visual analog scale.

**Notes:**
- Adaptation of the NCCN Guideline for fatigue.
- New exercise guidelines were published by ACSM in October 2019 but were beyond the timeline of this review.
| Condition/Disease | Recommendation |
|------------------|----------------|
| **Breast** |  |
| **European Society for Medical Oncology**<sup>104</sup> | All patients should not be denied access to rehabilitation services  |
| **National Institute for Health and Care Excellence**<sup>102,106</sup> | Referral to rehabilitation is indicated for:  |
|  | • Individuals with early and locally advanced disease for symptom management  |
|  | • Individuals with advanced cancer who:  |
|  | ▪ Are at risk for or experience lymphedema  |
|  | ▪ Have fungating tumors  |
|  | ▪ Experience cancer-related fatigue  |
|  | ▪ Have brain surgery or radiation therapy  |
| **European School of Oncology and European Society for Medical Oncology** | Endorsed by: European Society of Breast Cancer Specialists, European Society of Radiation Oncology, Union for International Cancer Control, Senologic International Society, and Federatio´n Latino Americana de Mastologia<sup>101</sup>  |
| **Japanese Breast Cancer Society**<sup>103</sup> | Referral to rehabilitation is indicated for symptom management in individuals with advanced cancer  |
| **Prostate** | European Society for Medical Oncology  |
| **Referral to rehabilitation is indicated for patients entering into androgen deprivation therapy age 55-69 years old**<sup>105</sup> and individuals receiving luteinizing hormone-releasing hormone agonist therapy<sup>107</sup>  |
| **Head and Neck** | **Japan Society for Head and Neck Cancer**<sup>108</sup>  |
| Individuals who have neck dissection surgery for cervical lymph node metastases should be referred to rehabilitation post-operatively  |
| **French Otorhinolaryngology Head and Neck Surgery Society**<sup>109-111</sup> | Referral to rehabilitation is indicated for individuals  |
|  | • Experiencing pain after surgery, chemotherapy, or radiation therapy  |
|  | • After flap harvesting surgery  |
| **Lung** | **American College of Chest Physicians**<sup>112</sup>  |
| Rehabilitation referral is indicated upon presentation of distressing treatment-related physical symptoms  |
| **Scottish Intercollegiate Guidelines Network (SIGN)**<sup>113</sup> | Rehabilitation referral is indicated for anyone diagnosed with lung cancer experiencing treatment-related symptoms impairing function  |
| Enhanced Recovery after Surgery and the European Society for Thoracic Surgery<sup>114</sup>  |
| Rehabilitation is a component of Enhanced Recovery after Surgery protocols and exercise is implemented preoperatively and within 24 hours after surgery  |
| **European Respiratory Society/European Society of Thoracic Surgery**<sup>115</sup>  |
| Individuals who are considered high risk and will be treated with curative-intent surgery should be referred to rehabilitation for general symptom management. High risk is defined as PPO FEV<sub>1</sub> or PPO D LCO, 60% and O<sub>2</sub> max, 10 mL/kg/min or; 35%  |
| **Colorectal** | **Scottish Intercollegiate Guidelines Network**<sup>116</sup>  |
| Individuals with treatment-related symptoms that are difficult to control or individuals with advanced disease should be referred to rehabilitation specialists  |
| **New Zealand Guidelines Group**<sup>117</sup> | Referrals should be made to rehabilitation for symptom management as symptoms present  |
| **Association of Coloproctology of Great Britain & Ireland**<sup>118</sup> | Rehabilitation referrals are indicated throughout treatment and after for general treatment-related symptom management  |
| **Hematologic** | **Hematology Oncology Subgroup of the British Committee for Standards in Hematology & British Society for Bone Marrow Transplant**<sup>119</sup>  |
| Individuals with chronic graft-versus-host disease with sclerodermoid disease should be referred for rehabilitation management  |
| **Soft Tissue** | **National Comprehensive Cancer Network**<sup>120</sup>  |
| Sarcoma | Referral for physical and occupational therapy is indicated for all stages of disease to support symptom management  |
| **Myeloma** | **British Society of Haematology**<sup>121</sup>  |
| Any preventive or restorative indications identified by the core-team among survivors should be addressed by rehabilitation referral  |
| **Esophageal** | **European Society of Medical Oncology**<sup>122</sup>  |
| Rehabilitation referrals should be considered for general symptom management before, during, and after disease treatment  |
| **Brain** | **National Institute for Health and Care Excellence**<sup>123</sup>  |
| Individuals >16 years old with any type of brain tumor should be referred for rehabilitation consultation upon diagnosis and at every stage of following up, including with metastatic disease  |
| **Cutaneous** | **Scottish Intercollegiate Guidelines Network**<sup>124</sup>  |
| **Melanoma** | • After lymphadenectomy, upon presentation of symptoms or if lymphedema develops, individuals should be referred to rehabilitation professionals  |
| • Upon identification of metastatic disease, referral to rehabilitation should be made  |
referral based on the type of surgery, timing of cancer treatments, and symptom presentation.

**Lung**

A single *Category A* guideline from the American College of Chest Physicians provides recommendations for rehabilitation interventions, to manage persistent cough in lung cancer survivors. Four *Category B* guidelines advise rehabilitation referrals based on symptom presentation and severity. The European Respiratory Society/European Society of Thoracic Surgery guideline recommends referral to rehabilitation for individuals at high risk for adverse surgical outcomes and outlines specific criteria for this risk threshold. One *Category B* guideline endorses prehabilitation referral for supervised exercise as a component of an Enhanced Recovery After Surgery (ERAS) protocol.

**Thyroid**

A *Category A* guideline from the American Thyroid Association provides recommendations for rehabilitation...
interventions including breathing exercises and energy conservation strategies indicated for all individuals with symptoms of shortness of breath or fatigue.\textsuperscript{78} One \textit{Category A} guideline from the American Academy of Otolaryngology recommends voice management rehabilitation including vocal cord mobility assessment and voice restoration interventions as indicated for all individuals after surgery.\textsuperscript{79}

\textbf{Cancer survivorship}

One \textit{Category A} guideline from the National Comprehensive Cancer Network (NCCN) broadly addresses survivorship across all cancer types. This guideline offers recommendations for rehabilitation referral based on symptom presentation and symptom severity thresholds, and intervention recommendations across many common symptoms including pain, fatigue, hormone-related symptoms in men and women, and lymphedema, and for impairments negatively impacting cognitive function, sexual function, and sleep.\textsuperscript{80}

\textbf{Other cancer types}

\textit{Category B} guidelines were identified for colorectal\textsuperscript{116-118} hematologic\textsuperscript{52,83,119}, soft tissue sarcoma\textsuperscript{120}, myeloma\textsuperscript{121} esophageal\textsuperscript{84,122} brain\textsuperscript{123}, and cutaneous melanoma.\textsuperscript{124} These guidelines advise referral to rehabilitation services based on specific symptom presentation, at identified time points along the cancer care continuum, or based on disease treatments that are delivered.

\textbf{Symptom or Condition Management Guidelines}

\textbf{Fatigue}

Three \textit{Category A} cancer-related fatigue guidelines were identified from the NCCN, ASCO, and the Pan Canadian society, and provide rehabilitation specific recommendations.\textsuperscript{85-87} Additionally, fatigue management recommendations are found in disease-specific guidelines for breast and head and neck cancer, as well as in integrative, palliative, and general survivorship guidelines.\textsuperscript{69,70,74,80} In general, fatigue assessment is advised at intervals throughout cancer treatment using a Visual Analog Scale (VAS) with self-reported fatigue $\geq 4/10$ identified as clinically meaningful warranting referral for management. Referral recommendations include physical therapy (PT) and occupational therapy (OT) for exercise-based interventions, OT, speech and language pathology (SLP) and behavioral therapists for cognitive therapies, counseling, and energy conservation interventions. Exercise recommendations varied across guidelines but generally moderate intensity exercise, 150 minutes accumulated weekly, is recommended. Low intensity exercise, such as walking, is also endorsed. All guidelines support referral to rehabilitation or exercise specialists for a supervised exercise intervention in the presence of clinically significant fatigue ($\geq 4/10$ on VAS).

\textbf{Pain}

One \textit{Category A} guideline from the NCCN recommends non-pharmacologic rehabilitation interventions and modalities for pain management including transcutaneous electrical nerve stimulation (TENS), and movement-based therapies.\textsuperscript{88} The NCCN survivorship guideline defines several cancer-related pain syndromes including myalgias, post-mastectomy, post-amputation, post-neck dissection, neuropathic, and others, with detailed algorithms for assessing and managing these pain syndromes, and providing detailed rehabilitation indications and recommended interventions.\textsuperscript{80}

Two \textit{Category B} guidelines advise referral to rehabilitation services based on pain presentation.\textsuperscript{89,125} Pain management is also addressed in general guidelines for cancer survivorship and palliative care.\textsuperscript{80,137}

\textbf{Lymphedema}

One \textit{Category A} guideline from the American Physical Therapy Association specifically addresses recommendations for screening and assessment of limb and tissue changes over time using clinical objective and patient-reported subjective measures.\textsuperscript{90} The guideline recommends a number of different assessment options that may be used to clinically diagnose and quantify the severity of the condition including tissue palpation, patient-reported outcomes measures, and clinical tests and measures including Bioimpedance Analysis, circumferential limb measures, and water displacement. One \textit{Category A} guideline from the Latin American Lymphology Society addressed lymphedema condition management providing a range of therapeutic options.\textsuperscript{91} Additional recommendations for lymphedema management were identified in diseasespecific guidelines for breast and head and neck cancer and in the NCCN general survivorship guideline.\textsuperscript{69,70,74,80,102} In general, guidelines recommend referral to a lymphedema specialist for multimodality treatments including manual lymphatic drainage, exercise, and compression therapy.\textsuperscript{80}

\textbf{Exercise}

Two \textit{Category A} guidelines, from Cancer Care Ontario and from the American College of Sports Medicine, provide specific indications for rehabilitation referrals, assessments, and rehabilitation interventions.\textsuperscript{92} Broadly identifying exercise prescription needs, the Cancer Care Ontario guideline suggests assessment elements prior to initiating an exercise prescription, and specific recommendations for intervention time, intensity, and duration. The American College of Sports Medicine offers similar recommendation for referral to rehabilitation for exercise interventions across common cancer treatment-related impairments.\textsuperscript{93} In general, several disease-specific guidelines identify the importance of maintaining physical activity levels and engaging in exercise as a recommended component of cancer care, most recommending adherence to the American Cancer Society recommendation that cancer survivors aim to achieve 150 minutes of moderate intensity physical activity each week.\textsuperscript{73,74,80,99,139}
Bone metastasis

One Category A guideline from a collaborative group across Japanese oncology and medical societies endorses rehabilitation referral and mobility-based interventions to prevent disuse syndromes and improve quality of life for individuals with bone metastasis. 94

Other cancer treatment-related symptoms

Many common treatment-related symptoms and conditions such as cognition, hormone-related symptoms, sleep, and health promotion lack dedicated guidelines. These symptoms however are addressed within the Category A NCCN survivorship guideline80 with extensive recommendations for assessment, referral indications, and rehabilitative interventions. Additionally, Category B guidelines were identified for sexual problems126,127 and dementia128 that endorse referrals for rehabilitation upon symptom presentation.

Age Group Specific Guidelines

Adult survivors of childhood cancers

One Category A guideline from the NCCN for adolescent and young adult (AYA) cancer survivors recommends interventions for physical conditioning and ongoing rehabilitation assessment following treatment. 95 Two Category B guidelines recommend rehabilitation referrals for symptom monitoring and management when it interferes with function129 and for general condition management for adult survivors of childhood hematopoietic stem cell transplants.130 AYA and childhood stem cell recipients are recommended to have continuing interval assessment by a rehabilitation provider to assess physical performance and to address health promotion, exercise and physical activity, and emerging functional impairments.

Geriatrics

Two Category A guidelines for older adults, from the NCCN and from ASCO, recommend a geriatric assessment (eg Comprehensive Geriatric Assessment or other) at intervals during cancer treatment in order to introduce relevant supportive services and optimize function.96,97 These guidelines recommend assessment of; cognition, nutrition, activities of daily living (ADL), balance/gait, social support, and psychological status. Referral to PT or OT is recommended with compromised function in ADLs or with balance/gait deficits. Referral to OT or SLP is advised with cognitive deficits. Rehabilitation intervention recommendations include cognitive therapies, balance and mobility exercise, strengthening, ADL training, family and caregiver support, and nutrition support.

Nutrition Guidelines

Three Category A guidelines provide nutrition recommendations.98–100 The European Society for Clinical Nutrition and Metabolism and The French Speaking Society of Clinical Nutrition and Metabolism offer general nutrition guidelines, while the Cancer Council Australia guideline is specific to head and neck cancer-related nutrition assessment and intervention.98 In general, these guidelines recommend ongoing, interval screening and assessment of nutrition status for individuals through the duration of cancer treatment and provide specific dietary intake interventions. Two Category B guidelines advise referral for nutrition counseling for individuals at risk for malnutrition.132,133

Palliative Care Guidelines

Three Category B guidelines recommend rehabilitation or referral to multidisciplinary teams consisting of rehabilitation providers for individuals who have elected to pursue palliative care.135–137 All guidelines propose that referrals to rehabilitation and supportive care should be made as soon as the treatment plan for palliation is made so that services are provided expeditiously.

Discussion

This report synthesizes rehabilitation-specific recommendations from 69 published guidelines representative of international best practices in cancer care. Recommendations for rehabilitation services are prevalent across cancer disease treatment guidelines as well as for many commonly occurring consequences of cancer treatment. While this report focused only on adult cancer and adult survivors of childhood cancers, rehabilitation recommendations were identified for various adult age groups and spanned the disease treatment trajectory, with recommendations for rehabilitation before, during, and after cancer treatment as well as for palliative care.

Although we are able to aggregate and describe guideline recommendations across various organizations and societies, we are unable to collectively report on the overall strength of the evidence put forward to support the recommendations unique to each guideline. Many prominent societies and organizations such as the National Comprehensive Cancer Network140 (NCCN), the National Institute for Health and Care Excellence141 (NICE), the European Society for Medical Oncology142 (ESMO) and others cite a quality threshold that evidence must exceed in order to be included in a guideline. However, there is a lack of parity in the grading scales and grade definitions across guideline publications. Nonetheless, the findings we report as Category A derive from guidelines that received an AGREE II score ≥ 45 indicative of a highly rigorous guideline development process. AGREE II scores reflect the quality of the process used to develop the guideline but are not indicative of the strength of the evidence within the guideline.
The 32 Category A guidelines recommend specific rehabilitation assessments and interventions for a wide variety of cancer treatment-related issues across cognitive and physical functional domains and should be considered a comprehensive synthesis of the evidence available to inform care delivery for individual’s receiving cancer treatment. The additional 37 Category B guidelines that recommend referral to rehabilitation services at critical points in the clinical pathway are an important key to integrating rehabilitation services into oncology care. Collectively, the findings synthesized in Tables 2 and 3 represent the most effective use of rehabilitation services and interventions in oncology.

Although our findings suggest that recommendations for rehabilitation services are relatively prevalent across oncology guidelines, current evidence identifies a high functional morbidity burden associated with cancer treatments, impacting >60% of individuals living with or beyond cancer with only 2-9% of individuals being referred to rehabilitation services for cancer treatment-related impairment and disability. The disparity between measurable morbidity and the use of rehabilitation services is concerning because it indicates that individuals may not be getting the care that they need to support their functional needs throughout cancer treatments. Comparing the frequency with which rehabilitation recommendations are provided in the guidelines identified herein to the published utilization data identifies a disconnect between what guidelines suggest is optimal care, and the care that patients are actually receiving. There are many reasons for this disconnect, but the commonly cited causes center on lack of awareness among oncology providers as to the benefit of rehabilitation services, inadequate integration of rehabilitation services into oncology care, as well as a lack of awareness among patients about the availability and benefit of these services. While awareness among individual oncology providers may be lacking, our findings suggest that oncology treatment guidelines commonly recognize the benefits of rehabilitation and recommend these services suggesting that it is the implementation of guideline concordant care in oncology that may be lacking.

The specificity of the Category A guidelines provides strong rationale for rehabilitation services and specific direction for referral and intervention. The lack of rehabilitation referral may be occurring because oncology providers are unaware of guideline-based referral thresholds and therefore are unlikely to direct care accordingly. There is also a discordance that exists between measuring and managing symptoms of disease treatment and measuring and managing treatment-related functional decline although symptom severity is intimately associated with function.

While treatment-related toxicities are commonly monitored, intervention for symptom severity tends to be pharmacologically driven despite the growing evidence and indications for non-pharmacologic exercise and rehabilitative-based interventions that may complement symptom management and reduce the deleterious impact on function. The guidelines we have identified through this review provide ample evidence for critical thresholds of symptom interference and functional decline that should enable referral to rehabilitation and exercise interventions. Enacting clinical processes that adhere to guideline-endorsed rehabilitation referrals and interventions is a key to eliminating this dissonance.

The onus for this care gap also falls on rehabilitation professionals. The volume of Category A and B guidelines suggests that professional societies and guideline development groups in oncology recognize that the evidence for supportive care and rehabilitation is of a sufficient level so as to be included in their guideline development efforts. Table 3 shows that guidelines for breast, prostate, head and neck, lung, colorectal, hematologic, sarcoma, myeloma, esophageal, brain, and melanoma cancers all encourage referral to rehabilitation based on specific criteria of functional need or based on a timeframe in the trajectory of cancer treatment. Therefore, as a referral or consultative service, rehabilitation medicine professionals should have evidence-based clinical care pathways established for these conditions. However, rehabilitation medicine’s infrastructure in oncology care is relatively under-developed administratively and clinically, which introduces challenges in meeting the referral needs of oncology care and may be a barrier to implementing guideline concordant care. Relatively few oncology rehabilitation guidelines, both disease based and symptom-based, exist. There is a small number of discipline-specific guidelines that have been developed by individual rehabilitation professions, focusing on the unique responsibilities of their professional group. However, these are largely inadequate to address comprehensive care, especially in oncology where interdisciplinary team-based approaches are the expected standard. Providers in rehabilitation disciplines often cite that rehabilitation is poorly integrated into oncology care delivery and that services for restoring function are marginalized in favor of antineoplastic therapies. Our findings suggest that pathways for better integration could be realized by leveraging guidelines that seem to be underutilized by both rehabilitation and oncology professionals.

Limitations

The search terms and selection criteria used in this project specifically excluded guidelines that did not
provide recommendations for rehabilitation-specific services. Therefore, our findings do not provide a comprehensive assessment of the degree to which rehabilitation is included across all international guidelines, nor do they address whether those guidelines excluded from this review would counter or disagree with the guideline recommendations presented in our findings.

This systematic review included a large body of publications. However, the evidence-base is continually changing and advancing. Several new guidelines for exercise and rehabilitation care in oncology were published since the time scope of this project and many organizations update their recommendations on an ongoing basis. This project required a time point beyond which further review of new literature could not take place. Rehabilitation professionals will need to continually apprise the new and revised guidelines published by oncology professional societies to maintain awareness of the evolving evidence for rehabilitation-specific recommendations. Additionally, only guidelines that had a published version in English were included, this may limit our findings as additional endorsements for rehabilitation may exist internationally.

The guidelines included in this review represent the work of 46 different professional societies around the world. Each professional society uses slightly different nomenclature to rank the strength of the evidence used to support their recommendations. Additionally, each uses different scales to convey the overall strength of their guideline recommendations. The disparity across these taxonomy limited us from drawing conclusions about the overall strength of the evidence for the rehabilitation recommendations made within these guidelines.

The very broad definition of rehabilitation used in this project was intended to recognize that the scope of rehabilitation providers’ practice may vary internationally. For example, recreation therapy (RT) is a professional designation in the United States and is a common component of a rehabilitation medicine department. The scope of practice for these professionals may include such interventions as music therapy. Further, in the United Kingdom and in Japan, nutrition is considered a component of rehabilitation services. Therefore, the guideline recommendations for interventions presented herein should be considered within the context of the providers scope of practice and should consider whether rehabilitation professionals are available in a system of care. The guideline recommendations for rehabilitation interventions, as described in this review, do not necessarily imply that these interventions are exclusively in the domain of the rehabilitation professional nor that referral to specialists in rehabilitation is requisite for concordance with the guideline recommendations. For example, an oncologist or a primary care professional may make exercise or nutrition recommendations based on these guidelines or may choose to refer the patient to a rehabilitative specialist. The assessments and interventions described herein, while within the scope of practice of rehabilitation professionals, to not necessarily imply mandated referrals for services.

Due to the volume and complexity of pharmacological guidelines, specifically for pain management, guidelines that focused only on medication indications were excluded from this review. Rehabilitation providers, physiatrists especially, commonly prescribe medication for pain, spasticity, inflammation, and other common cancer treatment–related symptoms however the extent and depth of these recommendations would be more adequately addressed in a separate review.

Guidelines that focused exclusively on complementary and alternative medicine (CAM) interventions were excluded. Interventions such as herbal remedies and supplements, essential oils, and other CAM interventions are not commonly included in the rehabilitation professional’s scope of practice. However, this review did include a breast-cancer specific guideline from the Society of Integrative Oncology. Integrative Oncology is defined as a discipline that integrates evidence-based complementary medicine interventions with more conventional supportive care, lifestyle, and behavioral interventions and, similar to palliative care, includes rehabilitation professionals on its service. As the field of Integrative Oncology develops, CAM interventions may be used more prevalently across the scope of rehabilitation practice.

**Future Direction**

Although this manuscript identifies that rehabilitative referral indications and interventions are endorsed through a wide variety of oncology guidelines, this contrasts with current evidence demonstrating low utilization of rehabilitation services for individuals with cancer and suggests that patients may not be receiving guideline concordant care. This deficit must be remedied to improve the quality of cancer survivorship. Policy forums and accrediting bodies speak of the need for quality cancer care and promote guideline concordant care as a tenet of cancer care delivery. Greater attention is needed to promote guideline adherence for rehabilitation services in oncology care. Nationally-focused health care quality improvement organizations such as the National Institute for Health and Care Excellence in the United Kingdom, the National Quality Forum in the United States, the Australian Commission on Safety and Quality in Health Care, and accrediting organizations such as the American College of Surgeons Commission on Cancer (CoC), should seek to better understand and fill these gaps in care.
One opportunity to improve the alignment of rehabilitation with cancer care is to leverage the new standards from the CoC\textsuperscript{161}, specifically standard 4.8 Survivorship Program. Integrating a rehabilitation provider onto the survivorship care team can enhance continuity of functional assessment throughout the continuum of cancer care and promote the use of existing guideline recommendations.

Although oncology providers may adhere to disease treatment guidelines, we highlight a substantial gap in providing symptom management and supportive care, specifically regarding rehabilitation. Research and cancer care quality improvement initiatives should track symptom burden along with patient reported functional morbidity and identify how guideline-based thresholds for referral can be incorporated into care. Time points in the care continuum, symptom severity, and type of treatment interventions are identified across many guidelines as events that should trigger rehabilitation referrals. Exploring better use of electronic health records\textsuperscript{163} and multidimensional team-based care\textsuperscript{164,165} co-location of rehabilitation services\textsuperscript{166,167}, and extending navigation work processes to include rehabilitation\textsuperscript{168} could improve guideline concordant care. Such research questions provide insight on opportunities to substantially improve quality of life and function among survivors. A recent agenda for health services-related research aims to improve integrated care delivery.\textsuperscript{169} and our findings could provide insights to drive this agenda forward.

While the rehabilitative interventions described in these recommendations may not exclusively require the services of a rehabilitation professional, oncology and primary care providers with limited time and expertise in rehabilitation should consider the benefit of referring patients who need comprehensive care. Oncology clinical workflows that incorporate screening tools for exercise\textsuperscript{170} and nutrition\textsuperscript{99} can better discern when rehabilitation referrals are needed.

Inviting rehabilitation professionals to participate on oncology guideline development panels could lead to improvement in awareness and implementation of guidelines. Representation from rehabilitation providers can enhance integration and interpretation of the evidence for rehabilitative and exercise interventions. Further, these professionals can improve awareness and dissemination of guidelines among the rehabilitation community and promote the development of rehabilitation-based clinical pathways ideally to improve integrated care delivery.

Collaborative clinical models that integrate rehabilitation providers in oncology care can enhance guideline concordant symptom and condition management by promoting more timely assessment of functional morbidity and efficient referral to rehabilitation care.\textsuperscript{44,166,168} Recent calls for escalating the use of Patient Reported Outcomes\textsuperscript{171} (PROs) and use of detailed functional assessment batteries, such as the Geriatric Assessment (GA) will only improve outcomes if they are used to go beyond characterizing the suitability of an individual for antineoplastic therapies or determining the superiority of an agent in drug comparison trials. A better understanding of the definition of function and improved accuracy of functional assessment can be enhanced by rehabilitation professionals, but more so, can establish the much needed linkage so that providers optimize the use of PROs and functional assessment to enable referrals for services that actually enhance function.\textsuperscript{172}

Administrative leaders must also understand the existing oncology guidelines, their relevance to comprehensive oncology care, and should seek to remove administrative barriers so that collaborative care models can be developed. Guideline implementation, in general, is challenging and often limited by the dichotomy of real-world clinical practices and theoretical synthesis of optimal evidence-based care.\textsuperscript{173} Issues such as staffing, workforce knowledge and awareness, clinical workflows, decision support tools, and program sustainability, are attributed as practical barriers to implementing guidelines.\textsuperscript{174} However, these are also the very elements that should inform strategies for broader dissemination and implementation of integrated models of care.\textsuperscript{175}

Eliminating administrative barriers and facilitating streamlined services by an amply educated workforce is critical.\textsuperscript{175} Additional consideration should be given to developing pathways that include community-based and fitness center-based exercise providers and to foster these relationships as a part of interdisciplinary care for individuals with cancer.\textsuperscript{176} Our findings should be used by clinical staff in oncology rehabilitation and exercise physiology to develop standards and protocols for their patients, to complement resources for clinical education and training of students and professionals, and support workforce planning that can improve care provision for individuals with cancer.

Lastly, there is currently no comprehensive rehabilitation guideline or clinical pathway for cancer care. Multidimensional, interdisciplinary rehabilitation is the optimal model of care\textsuperscript{164} ideally implemented using a prospective surveillance approach whereby baseline measures of performance and function are repeatedly monitored over time to identify critical thresholds of symptomatology or clinically meaningful functional change and initiate guideline concordant rehabilitation interventions.\textsuperscript{177} Without relevant interdisciplinary rehabilitation guidelines in place, efforts will fall short of addressing the totality of patients’ functional needs.
Conclusion
Evidence-based guidelines support the use of rehabilitation assessment and interventions to treat individuals’ physical and cognitive impairments across many different disease types and to manage various oncology treatment-related symptoms and conditions. Many oncology guidelines include recommendations for rehabilitation referral and interventions suggesting that rehabilitation is a recognized and needed service in oncology care. The guideline recommendations highlighted in this article should be leveraged by rehabilitation professionals to improve integration of rehabilitative interventions into cancer care. The oncology community should seek a more active role in leveraging guideline recommendations to encourage participation in rehabilitative care in order to optimize function and quality of life for individuals living with and beyond cancer.

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