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SPECIAL COMMUNICATION

Toward a National Initiative in Cancer Rehabilitation: Recommendations From a Subject Matter Expert Group

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Abstract

The health care delivery system in the United States is challenged to meet the needs of a growing population of cancer survivors. A pressing need is to optimize overall function and reduce disability in these individuals. Functional impairments and disability affect most patients during and after disease treatment. Rehabilitation health care providers can diagnose and treat patients' physical, psychological, and cognitive impairments in an effort to maintain or restore function, reduce symptom burden, maximize independence and improve quality of life in this medically complex population. However, few care delivery models integrate comprehensive cancer rehabilitation services into the oncology care continuum. The Rehabilitation Medicine Department of the Clinical Center at the National Institutes of Health with support from the National Cancer Institute and the National Center for Medical Rehabilitation Research convened a subject matter expert group to review current literature and practice patterns, identify opportunities and gaps regarding cancer rehabilitation and its support of oncology care, and make recommendations for future efforts that promote quality cancer rehabilitation care. The recommendations suggest stronger efforts toward integrating cancer rehabilitation care models into oncology care from the point of diagnosis, incorporating evidence-based rehabilitation clinical assessment tools, and including rehabilitation professionals in shared decision-making in order to provide comprehensive cancer care and maximize the functional capabilities of cancer

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survivors. These recommendations aim to enable future collaborations among a variety of stakeholders to improve the delivery of high-quality cancer care.

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Cancer survivors are a growing population in the United States with a unique set of medical and psychosocial needs.[1] These individuals frequently experience functional loss and disability as a result of the side effects of disease and treatment.[2-5] Most individuals experience cancer treatment–related functional morbidity that is amenable to rehabilitation services.[6-12] However, appropriate rehabilitation services that effectively alleviate or mitigate functional impairment and prevent disability are significantly underused in all phases of cancer care.[8,13] The unmet needs of cancer survivors are generally attributed to deficits in comprehensive cancer care delivery and more specifically to the providers' focus on achieving progression-free survival or remission rather than on maintaining function.[14,15]

Historically, the oncology care continuum has had little intersect with rehabilitation outside of severe disability.[16] Recent calls have been made for this relation to be robustly developed to meet the needs of cancer survivors.[17,18] A focus on assessment and management of physical health and function is needed to promote improved health-related quality of life.[19,20] Recommendations and standards from the Institute of Medicine and the American College of Surgeons' Commission on Cancer, among others, provide a framework for alleviating deficits in cancer care and the resulting failures to recognize and manage functional loss and disability.[21-23]

Rehabilitation professionals are an optimal addition to the cancer care team and offer expertise in functional assessment, morbidity management, and disability prevention.[24] Accumulating clinical evidence suggests that rehabilitation interventions are effective before, during, and after cancer treatment to screen for, assess, and treat patients' functional needs.[25-38] Although mounting evidence suggests strong benefit from the integration of rehabilitation into the cancer continuum,[39,40] there is uncertainty around the critical components of a model for cancer rehabilitation. Although functional assessment and measurement frameworks have been described,[41] optimal functional measurement constructs remain undefined. These issues are barriers to the successful integration of rehabilitation services into the cancer care continuum.

Methods

In 2014, an appointed dissemination taskforce of the Rehabilitation Medicine Department of the Clinical Center at the National Institutes of Health (NIH) was charged with identifying an emerging area of rehabilitation practice where the unique resources of the NIH Clinical Center could be leveraged to support practice development. The taskforce identified cancer rehabilitation as the primary area of need and recommended that the NIH Clinical Center Rehabilitation Medicine Department take on a focused effort to scope (1) the evidence base and practice standards supporting clinical aspects of cancer rehabilitation care, (2) gaps and needs for the field, and (3) recommendations that could inform key stakeholders' future planning around national initiatives in cancer rehabilitation. Based on the taskforce's recommendations, the NIH Clinical Center Rehabilitation Medicine Department convened an interdisciplinary group of subject matter experts (SMEs) in cancer rehabilitation from across the United States to participate in this exercise. The SME group included the following: both internal and external NIH participants, researchers and clinical experts in cancer rehabilitation, and representation from the National Cancer Institute and the National Center for Medical Rehabilitation Research of the Eunice Kennedy Shriver National Institute of Child Health and Human Development.

The SME group identified 4 domains germane to understanding the current environment of cancer rehabilitation practice in the United States: (1) cancer rehabilitation clinical models, (2) patient-reported outcomes measures, (3) clinical objective measures of function, and (4) interdisciplinary integration of rehabilitation.

The SME group was divided into 4 smaller work groups based on these topic areas. Individuals self-selected areas of participation based on interest and expertise. The work groups were charged with scoping the existing environment in each domain and identifying relevant gaps in rehabilitation knowledge base and current clinical practice. Systematic reviews were not practical because of the varied focus within each domain and the overall scope of the project.

Each group explored information of relevance to their domain through publications, grey literature, experience, and peer queries. Keywords and phrases were developed and agreed on within groups to identify literature and information of interest. Individuals within each work group conducted literature searches of relevant information sources. Findings were shared among work group members, and consensus was used to identify pertinent information to inform recommendations. Individual work group findings were shared with the full SME group for further synthesis, discussion, and development of overall group recommendations. No specific mechanism for quantitative synthesis was used.

The purpose of this article is to provide the work group findings and SMEs' key recommendations for enhancing the provision of rehabilitation services through the cancer care continuum.

List of abbreviations:

NIH	**National Institutes of Health**
PROM	**patient-reported outcome measure**
SME	**subject matter expert**

Cancer rehabilitation clinical models

Postacute care

Postacute cancer rehabilitation is provided in inpatient rehabilitation facilities, skilled nursing facilities, long-term care hospitals, and hospice facilities. The rehabilitation service conducts a formal functional assessment to identify impairments and provides a range of services (eg, physiatry, physical therapy, occupational therapy, speech therapy, nutrition, psychology, nursing) to assist in optimizing an individual's function.[42] Such programs demonstrate clinically effective care delivery and improved functional

outcomes that are often maintained after program completion.[43-47] Although the postacute rehabilitation model provides comprehensive rehabilitation services guided by a coordinated plan of care, this care plan is typically divorced from the oncology care plan and only in rare circumstances does one inform the other. Aside from a few specialty centers in the United States, there is notable variation in the services provided for oncology patients and a general lack of comprehensive rehabilitation care specific to their unique needs.[48] Additional factors that limit subacute rehabilitation services include payer limitations and provider awareness and attitudes regarding the benefits of rehabilitation.[49,50]

Home care

Home-based care models may include multiple medical and rehabilitative disciplines, but care coordination challenges impede the comprehensive care provided in other colocated service models. Home-based models are typically nurse-driven, with nursing staff providing initial assessment and treatment planning.[51] Home-based nursing models focus on the consistent use of screening tools and clearly defined recommendations for interventions or referral. However, if home care services focus primarily on a functional limitation, the plan of care includes physical and occupational therapy, often without nursing involvement. Because of the uncertainty of provider roles and expertise, well-articulated cancer-specific care components should be a part of comprehensive cancer care plans, rather than be attributed to an individual practitioner's role. Lacking in this model is a concerted effort to identify the unique and additional needs of cancer patients with regard to screening, intervention, and follow-up for cancer treatment—related morbidity and toxicities that affect function.[52]

Outpatient ambulatory care

Consistent, comprehensive care in the outpatient setting is a logical extension of the postacute model and complements the delivery of outpatient ambulatory oncology care through functional screening and monitoring for late effects and providing interdisciplinary intervention to alleviate functional deficits. Outpatient ambulatory models for cancer rehabilitation care are clinically effective,[53,54] promote identification and management of treatment toxicities that affect function,[25,26,55-58] and demonstrate positive effect on functional outcomes.[24,37,39,59]

Multidimensional rehabilitation program models strive to address both physical and emotional needs of patients. A multidimensional approach is more likely to help patients cope with their physical needs.[60] Multidimensional rehabilitation program models involve interval face-to-face and phone contact between a patient and a rehabilitation health professional (eg, physiatrist, nurse, physical or occupational therapist).[60]

Ambulatory cancer rehabilitation programs however have wide variance in the service offerings and little consistency as to the timing of intervention, coordination with other medical providers, coordination with the cancer care plan, and follow-up. Adaptation of the cardiac rehabilitation model for use in oncology rehabilitation has been suggested as a model[61,62] because the tenants of cardiac rehabilitation, including rehabilitation, treatment sequelae management, and healthy lifestyle development,[63] are common to oncology rehabilitation. However, limited data are available to support this approach. Emerging evidence supports the geriatric model of care and geriatric assessment as a framework that could guide rehabilitation screening, assessment, and intervention in the ambulatory care setting for the cancer population.[11,64] The main features of this model, including the focused attention to interdisciplinary input, the inclusion of nonmedical domains (eg, caregiver status, home environment assessment), and the emphasis on functional capacity and quality of life, make this an ideal framework to portray a holistic view of the many aspects of an individual's life that contribute to their overall functioning. Further work and research is needed by the rehabilitation community to identify and incorporate supportive elements of the geriatric care model.

Models for cancer rehabilitation exist across the United States, but no consensus exists on the core components that comprise comprehensive cancer rehabilitation. Shortcomings with these programs are that they are narrow in scope, focusing on one aspect of individual care, and neglect to provide the full range of services needed to restore function for the cancer survivor.[65] Many programs fail to provide comprehensive, interdisciplinary assessment and intervention, and the workforce may be minimally trained to address the complex needs of the cancer population. Further, these models fail to address the essential components of survivorship care plans as articulated by policy bodies.

Cancer survivorship care plans outline the critical components of cancer care that should be documented and provided to the patient and the health care team during and after the continuum of cancer treatment.[22] Additional elements, including psychosocial care, symptom management, and health promotion, augment comprehensive care.[66] Rehabilitation is a logical supportive service that compliments and integrates with a survivorship care plan and potentially serves as a point of quality improvement by enhancing functional outcomes.[67,68] Further, rehabilitation services are reimbursable events, making the model of intervention sustainable.

An improved care model would provide rehabilitation services specific to the patients' needs, improve communication and care coordination between oncology and rehabilitation providers, and reduce variations in care among practice settings.[17,69,70] This would include proactive impairment screening and functional assessments throughout the care continuum relevant to the adjuvant therapy rendered. It would support intervention for overt functional impairment and provide ongoing supportive services in the presence of disability. The model could serve as a linkage in the care continuum to support monitoring for treatment toxicities and late effects in addition to optimizing function throughout the life span.[71]

Clinical measurement of function

Cancer treatment introduces risk for functional impairments that increase the potential for disability. In order to accurately screen for and manage functional impairments related to treatment toxicities, a battery of functional measurement tools must be identified. Robust evidence supports specific measures of functional impairment in the cancer population[72-76]; however, these individual measures fall short of comprehensively assessing function. Function is defined as "those activities identified by the individual as essential to support physical, social, and psychological well-being."[77(p18)]

Measures of function are derived primarily in 2 ways: (1) patient-reported outcome measures (PROMs) and (2) objective clinical tests and measures. These methodologies however are frequently conflicted. Although objective clinical measures may

fail to capture the patient's perceptions of his or her level of function, reliance on PROMs often does not portray a holistic perspective on the individual's function nor does it identify emerging impairments associated with functional decline. Ideally, the application of objective measures alongside PROMs provides broader perspective on total functioning of the individual.[78]

Patient-reported outcomes measures

A patient's perception of his or her own functionality is a critical clinical outcome. The current mandate to integrate the patient's voice into clinical decision-making in oncology has increased receptivity to the use of PROMs in both clinical and research settings.[79] PROMs with strong validity and good clinical utility can be inexpensively administered, making them amenable to integration into busy oncology practice settings.

PROMs have a wide range of application and clinical relevance in cancer populations and are effective in toxicity screening and functional outcomes assessment.[41] Additionally, well-developed and targeted PROMs may efficiently assess important end points (eg, quality of life, survival).[80] Both generic and disease-specific PROMs are used to assess the functionality of patients with cancer.[81,82] Increasingly efficient and precise item response theory–derived instruments, such as the Activity Measure for Post-acute Care (available at: http://www.bu.edu/bostonroc/instruments/am-pac/) and the Patient Reported Outcome Measurement Information System (available at: http://www.nihpromis.org/), allow for the pragmatic integration of functional assessment in oncology clinic work flows and clinical trials.

The content coverage of several generic classical test theory– and item response theory–derived functional PROMs was assessed using the *International Classification of Functioning, Disability and Health* (available at: http://www.who.int/classifications/icf/icf_more/en/) as a referent framework of functional domains. The tools reviewed are presented in appendix 1. Although most of the measures provided coverage of mobility and self-care domains, the communication, learning, work/employment, and community and social participation domains were limited in representation. This imbalance in and restriction of domains contributes to inaccurate assessments of global functioning. Therefore, consideration for the use of established item response theory–modeled PROMs, such as the Patient Reported Outcome Measurement Information System and Neuro-QoL (available at: http://www.neuroqol.org/WhatandWhy/BankDevelopment/Pages/default.aspx), items banks is warranted.

Recent evidence suggests that PROMs are less effective than objective assessment tools in identifying individuals who are functionally limited compared with those not experiencing functional limitations.[83] This suggests a high risk for underdiagnosis of clinically meaningful functional limitations, a concern for the cancer population, because early identification and treatment of functional limitations reduce the risk for long-term disability.[84,85] Future research in functional measurement should seek to combine PROMs and objective measures to identify optimal methodology for measurement.

Clinical objective measures of function

High-level domains of clinical function are supported by a discrete evidence base; however, there are considerable gaps in the clinical utility of functional objective measures relevant to the cancer population.

Physical performance/fitness

Physical performance measures can identify and predict adverse events, disability, and mortality in the adult population.[86-88] Physical performance can be assessed by a single measure (eg, gait speed[86]) or a battery of assessments that effectively capture clinical symptom presentation and predict risk of disability and death.[89]

Diminished physical performance is associated with cancer treatment.[90] The consistent use of valid, reliable, performance measures is rare in the oncologic clinical setting outside of rudimentary scales, such as The Eastern Cooperative Oncology Group or the Karnofsky Performance Scale, both of which fall short of portraying an individual's discrete functional capabilities.[78,91] The Karnofsky Performance Scale is a predictor of overall survival, but it is inadequately sensitive to identify clinically meaningful improvement in function over time. Recent evidence highlights the potential for the geriatric assessment, as described by Elsawy and Higgins,[92] to be a more sensitive screening tool for the identification of treatment-related toxicities. The geriatric assessment "aids in the diagnosis of medical conditions; development of treatment and follow-up plans; coordination of management of care; and evaluation of long-term care needs and optimal placement."[93(p397)] The domains of the geriatric assessment include the following: functional status, comorbidity, medication, cognition, psychological, social, and nutrition. Hurria et al[94] have outlined valid clinical measures and patient self-reported measures relevant to each of these domains. Such a measurement construct is a logical linkage between rehabilitation and oncology care services and warrants further investigation in the cancer population.

Cognitive performance

The assessment of cognitive function during cancer treatment is demonstrably important; however, the conundrum of poor concordance with self-reported measures and objective clinical measures is apparent in this domain as well.[95] Subjective cognitive impairment is more frequently reported than prevalence rates revealed by objective assessments. It is uncertain if this is because of the lack of sensitivity in existing cognitive measures when applied to the cancer population or if the self-perceived cognitive dysfunction is more of an indicator of psychological distress rather than cognitive impairment.[96]

Strong research has emerged in the cognitive measurement domain.[97] The National Comprehensive Cancer Network's guidelines[98] for survivorship recommend assessment, evaluation, and management for cognitive dysfunction. Among the recommended nonpharmacologic interventions, referral for rehabilitation intervention by occupational therapists is noted.[98] Recent research has proposed a mobile cognitive assessment battery for assessment of cancer-related cognitive changes.[99,100]

There is a need to better integrate cognitive assessment for the cancer population.[101] Evidence suggests that preexisting cognitive impairment, in many instances mild or subclinical, may be exacerbated during cancer treatment.[102] Therefore, a comprehensive cancer rehabilitation model that includes prehabilitation or pretreatment assessment should seek to establish a cognitive baseline to optimize proactive screening.[103]

Functional mobility

Mobility is an important aspect of function; however, tools that measure mobility struggle to find their place in the cancer continuum for a variety of reasons. Assessments require a time burden, they may be proprietary and not readily available in a clinical setting, and there may be a lack of knowledge among providers about relevant mobility measures for the cancer population.

Recent advances in mobility assessment in the geriatric population have yielded comprehensive assessment tools that warrant consideration for implementation into the cancer rehabilitation evaluation and assessment battery.[104] Instruments typically used in the geriatric population are likely to offer important information about functional ambulation (timed Up and Go test, 6-minute walk distance, and others) and balance.[105-107]

Measurement challenges

Measurement challenges go beyond the psychometrics and validity of tools. Geographic location may prohibit functional assessment in patients who need to travel long distances. Technology tools (eg, activity monitors, apps, social media platforms) should be investigated as a mechanism to assist in telehealth screening and assessment.[108] These tools can capture and monitor nutritional data, activity and exercise data, sleep behavior, vital signs, and psychological information and can portray social activities. Although public acceptance of these tools has been positive, medical disciplines have only just begun to explore their relevance and accuracy in monitoring and communicating an individuals' data, and there is merit to studying their utility in functional assessment.

Health care provider perceptions of function also pose a challenge to proactive functional measurement. Individuals are diagnosed with cancer in an inherently normative functional state, when the urgency of functional decline is not apparent. The trajectory of cancer treatment precipitates a somewhat gradual decline in function as the cumulative side effects of disease treatment aggregate. The gradual onset of functional decline will only be identified if a sound baseline is established and individuals are routinely screened for clinically meaningful functional change throughout the trajectory of treatment.[39]

Both PROMs and objective tests and measures can be used to establish a baseline from which change over time is assessed. Repeated measures enable screening for treatment-related toxicities. Although initial efforts in toxicity-related impairment screening and early intervention have been positive, there is a need to greatly expand this research.[25,26,109] There is a need to understand which measures are most useful for screening and early detection of functional decline and to specify intervals for measurement, clinically meaningful change, and triage protocols for intervention on detection of meaningful change.

Interdisciplinary clinical integration of rehabilitation

Integrated care models rely on a team of health care professionals that share patient care goals and interact on a care continuum. This includes individualized consultative, interventional, and integrative services.[110] Integrated models are used in cancer care from the point of diagnosis through disease treatment and become particularly critical in transition from active disease treatment to survivorship.[111] These models however conspicuously lack rehabilitation care providers.

Cancer rehabilitation care supports the provision of high-quality oncology services.[4,17] Despite the recognized and growing need for interdisciplinary cancer rehabilitation services, significant gaps in service delivery currently exist.[4,8,11] These gaps negatively influence function, quality of life, health status, and ability to return to the workforce.[40,85] Integration of cancer rehabilitation services ideally begins at the point of cancer diagnosis, with baseline functional screening[39] and referral for prehabilitation interventions.[71] Ongoing rehabilitation assessment and management across the care continuum is also important.[24] Mechanisms are need to facilitate better clinical integration of cancer rehabilitation care using a best practices approach, based on the current evidence and expertise of rehabilitation providers.

Barriers to rehabilitation integration into oncology care include (1) insufficient capacity of the existing workforce, (2) challenges in screening for rehabilitation needs, and (3) lack of awareness among patients and caregivers regarding the benefits of rehabilitation.

Various inputs contribute to the lack of capacity, including the number of specialty trained rehabilitation professionals and a lack of knowledge among the existing workforce regarding evidence-based cancer rehabilitation care. A survey of the U.S. workforce in cancer rehabilitation was conducted in 1982 by Harvey et al[112] and identified 36 cancer programs that reportedly provided components of cancer rehabilitation services. Recent unpublished workforce data released by the Oncology Section American Physical Therapy Association reports that an estimated 5% (approximately 9000) of the currently licensed physical therapy workforce (approximately 182,000) in the country primarily practice in a cancer rehabilitation program. (Oncology Section American Physical Therapy Association, 2016; available at: http://www.abpts.org/uploadedFiles/ABPTSorg/Specialist_Certification/New_Speciality/OncologyPetition.pdf). Over 1500 cancer centers are accredited by the American College of Surgeons Commission on Cancer, and current accreditation standards mandate that programs "ensure access to rehabilitation services…either on-site or by referral."[21(p38)] This however does not assure that services are comprehensive and leaves question as to the timing and type of care delivered.

The health care workforce in general lacks knowledge about evidence-based practices for comprehensive cancer rehabilitation care. Although some examples of clinical integration exist in various cancer specialty hospitals (eg, Memorial Sloan Kettering Cancer Center), others tend to be ad hoc and often are developed around a specific impairment (eg, lymphedema program, cancer exercise program), rather than on offering comprehensive rehabilitation care. The genesis of ad hoc program development may be a result of the current curricula deficits and the dearth of medical residencies dedicated to this field.[113]

Rehabilitation integration is also challenged by the lack of screening and triage procedures to identify patients at the highest risk for functional decline or those with early functional impairment. Baseline measures of function are not routinely captured in current oncology practice,[39] and critical thresholds for risk stratification and meaningful clinical change are ill defined, resulting in a wide variation of rehabilitation referral patterns. Even in palliative care, referral to rehabilitation services is significantly underused,[50] but of great potential benefit.[24,114] Research is needed to identify optimal timing and intervals for functional assessment so that resource utilization is prudent.

Clinical integration of rehabilitation services is also hampered because survivors and caregivers are underinformed about the benefits of cancer rehabilitation care. Many are not provided with information regarding the short and long-term side effects of treatment and are unaware of the benefits of rehabilitation services.[115] Patients want to be empowered decision-makers in their care.[116] Understanding impairment risk and symptoms associated with early impairment identification activates patients toward better self-management and self-advocacy for care,[117] improves patient satisfaction and quality of life, and reduces anxiety.[118-121]

A multipronged approach that targets provider, process, and patients is needed to improve the integration of cancer rehabilitation services into the cancer continuum. Efforts are underway to improve cancer rehabilitation education and to elevate the knowledge and skills requisite of a specialty workforce.[113,122] Screening and triage procedures must be developed to enhance care delivery to the patients most at risk for functional decline and most in need of rehabilitative services.[4,39] Finally, active patient engagement in the treatment planning process that emphasizes shared decision-making and fosters survivors' self-determination and autonomy is needed.[123]

Summary and recommendations

The work of this SME group provides a sound rationale for the supportive capabilities that rehabilitation can offer to the oncology care continuum toward improving functional outcomes and quality of life for the cancer population. These recommendations are put forward to stimulate action among health care providers, policymaking bodies, research institutions, professional societies and associations, and patient advocacy organizations toward initiating advancements in the field.

Recommendations

1. Provide rehabilitation screening and assessment as a part of a comprehensive cancer care plan, from the time of diagnosis throughout the course of illness and recovery, to address the functional needs of patients. These services should be provided by trained rehabilitation professionals who use evidence-based best practices to diagnose and treat the many physical, cognitive, and functional impairments associated with this medically complex population.[4,39,124]
2. Incorporate objective assessment of a patient's functional status before active cancer treatment begins, at regular intervals during treatment, and during survivorship to preserve and optimize function and monitor for late effects of treatment.[4,39]
3. The rehabilitation community should use the Institute of Medicine's cancer-related reports to identify the survivorship care delivery components that rehabilitation services can address and support.[22,69,125]
4. In selected cancers, rehabilitation services should be offered pretreatment to optimize tolerance to surgical intervention and adjuvant treatment in order to minimize toxicity and improve outcomes.[56,71,126,127]
5. Conduct a thorough assessment of the content coverage and psychometric properties of existing clinical measurement tools and forge consensus regarding criterion standard functional measures specific to different cancer populations.

Table 1 Institute of Medicine survivorship care plan components and relevance to rehabilitation providers

IOM Care Plan Component	Rehabilitation Practice Relevance
Patient demographic information	Aware
Diagnosis, tissue information, stage, biomarkers	Aware
Prognosis	Aware
Treatment goals (curative/ palliative)	Aware
Initial treatment plan, antineoplastic treatments	Aware
Expected response to treatment	Aware
Treatment benefits and harms; toxicity screening and management, short and late effects	High Impact
Quality of life and patient experience	High Impact
Plan for who will take responsibility for aspects of the patients care	Participatory and Impactful
Advance care plans; legal documents	Aware
Estimated total costs and out-of-pocket costs	Aware and Impactful
Plan for addressing psychosocial needs; vocation, disability	High Impact
Survivorship plan; treatment summary, follow-up surveillance, and risk reduction and health promotion	Participatory and Impactful

NOTE. Aware indicates rehabilitation providers should be aware of these components of the care plan and their content to be informed about the patient's treatment plan of care.
Aware and Impactful indicates rehabilitation services can have an impact on these aspects of the plan of care and communication is warranted to align rehabilitation services with oncology care.
High Impact indicates rehabilitation providers should be closely aligned with these care plan components as they play a significant role in prevention, mitigation, identification, and treatment.
Participatory and Impactful indicates a member of the rehabilitation team should be involved with the development of these aspects of the care plan.
Abbreviation: IOM, Institute of Medicine.

6. Create a centralized electronic interface using an infrastructure, such as the Assessment Center (available at: https://www.assessmentcenter.net/), to facilitate systematic clinical collection of candidate PROMs in order to facilitate psychometric characterization of these measures, especially responsiveness, in clinically important populations and trait ranges.
7. Develop practice guidelines regarding functional assessment, screening for physical impairments, and rehabilitation interventions to enhance the selection of rehabilitation interventions, referrals, and outcomes measurement.
8. Expand cancer-related education and training among rehabilitation providers through curriculum instruction, educational courses, residency and fellowship programs, professional continuing medical education, and conferences.

9. Elevate awareness and education among health care providers, patients, and payers regarding rehabilitation as an integral part of quality cancer care.
10. Identify research gaps in cancer rehabilitation domains and promote awareness of these gaps to funding agencies that support professional training and scientific inquiry in clinical, translational, and health services research in order to increase funding mechanisms.

Foundational evidence exists to support better integration of rehabilitation into the oncology continuum and supports the rationale that rehabilitation services enhance comprehensive cancer care delivery. The relative effect of rehabilitation services can be highlighted when compared with the 13 care plan components outlined by the Institute of Medicine. Table 1 identifies the important role that rehabilitation providers can play in improving and managing care.

Opportunities to demonstrate the value of rehabilitation are emerging through initiatives such as the Commission on the Accreditation of Rehabilitation Facilities specialty program standards for cancer rehabilitation and the recent Medicare bundled payment initiative: the Oncology Care Model. Educational models for physician residency programs in oncology rehabilitation are developing, as are advanced oncology competency avenues for physical and occupational therapy professionals. These are potential test beds to assess the effect of rehabilitation on outcomes.

Future critical initiatives in cancer rehabilitation should be drawn from the recommendations put forth by this NIH panel. Such a prioritization effort will require the participation and collaboration of various stakeholders, including professional societies, advocacy organizations, research funding bodies, payment and policy regulatory bodies, and patients.

Keywords

Morbidity; Neoplasms; Recovery of function; Rehabilitation; Secondary prevention

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Appendix 1 Outcomes Measures Reviewed by the Panel

- ECOG Performance Status
- FIM
- Patient Reported Outcome Measurement Information System
  - Physical function and mobility
  - Cancer bank — physical function
  - Applied cognitive abilities and general concerns
  - Ability to participate in social roles and activities
  - Upper extremity function
- Neuro-QoL
  - Upper extremity function
  - Lower extremity function
  - Cognitive function
  - Ability to participate in social roles and activities
- Activity Measure for Post-Acute Care, computer adapted testing
  - Basic mobility, daily activities, applied cognitive
- Reintegration to Normal Living Index

Abbreviation: ECOG, Eastern Cooperative Oncology Group.

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