7-2016

Oncology EDGE Task Force on Prostate Cancer Outcomes: A Systematic Review of Outcome Measures for Functional Mobility

Claire Davies
Baptist Health Lexington

Genevieve Colon
University of Michigan - Flint

Hannah Geyer
University of Dayton

Lucinda Pfalzer
University of Michigan - Flint

Mary Insana Fisher
University of Dayton, mary.fisher@udayton.edu

Oncology EDGE Task Force on Prostate Cancer Outcomes:

A Systematic Review of Outcome Measures for Functional Mobility

Claire C. Davies, PT, PhD, CLT[1]
Genevieve Colon, DPT, MBA [2]
Hannah Geyer, SPT [3]
Lucinda Pfalzer, PT, PhD, FACSM, FAPTA[4]
Mary Insana Fisher, PT, PhD, OCS, CLT [5]

[1] Physical Therapist, Rehabilitation Services, Baptist Health Lexington, Lexington, KY

[2] Physical Therapist, Physical Medicine and Rehabilitation, Covenant Healthcare, Saginaw, MI

[3] Student Physical Therapist, University of Dayton, Dayton, OH

[4] Professor Emerita, Physical Therapy Department, University of Michigan – Flint, Flint, MI

[5] Associate Professor, Department of Physical Therapy, University of Dayton, Dayton, OH

Corresponding Author: Claire C. Davies PT, PhD, CLT-LANA

Rehabilitation Services, Baptist Health Lexington

1800 Nicholasville Road, Lexington, Kentucky 40503, USA

Tel +1 859 260 6673, Fax +1 859 260 6431

claire.davies@bhsi.com.

ABSTRACT

Background: The medical treatments for prostate cancer result in multiple impairments in body structure and declines functional abilities resulting in activity limitations and participation restrictions. Measurement of functional mobility is an essential outcome measure in survivorship care.

Purpose: The purpose of this systematic review is to make recommendations of the best measurement tools to assess functional mobility in men treated for prostate cancer based on psychometric properties and clinical utility.

Methods: Multiple electronic databases were searched from February to March, 2014. Studies of tools used to assess functional mobility were included if they met the following criteria: reported psychometric properties, were clinically feasible methods, and were published in the English language. Each outcome measure was reviewed independently and rated by two reviewers separately. A single Cancer EDGE Task Force Outcome Measure Rating Form was completed for each measure of functional mobility, and a recommendation was made using the 4-point Cancer EDGE Task Force Rating Scale.

Results: Of the original 38,373 articles found, 152 were included in this review.

Conclusions: Seven tests are highly recommended by the Oncology EDGE Task Force: 2-Minute Walk Test and 6-Minute Walk Test, 10-Meter Timed Walk, the Timed-Up and Go (TUG), 5 times sit to stand, the Short Performance Physical Battery, and the Physical Performance Battery for Patients with Cancer, based on good clinical utility and psychometric properties.

Key words: Psychometrics, outcome measures, prostate neoplasms, functional mobility

Manuscript word count: 3972

INTRODUCTION

Prostate cancer (PC) is the most common cancer in men in the United States, and the second leading cause of cancer death among males.[1] The American Cancer Society (ACS) estimates that approximately 181,000 new cases of PC will be diagnosed in 2016, with mortality at less than 27,000.[2] This means approximately 1 in 7 men will be diagnosed with PC during their lifetime, and most are living many years after the diagnosis. The relative 5-year survival rate in the United States is almost 100% for all stages of PC, while the 10-year and 15-year survival rates are 99% and 94%; respectively.[3] According to ACS, more than 2.9 million men in the United States diagnosed with PC are still living as of January of 2016.[2]

As the number of men surviving prostate cancer (PCS) continues to grow, research has demonstrated that many PCS will have significant impairments of body structures and function.[3] These impairments often go undetected and/or untreated, and consequently may result in frailty.[3] Men treated for prostate cancer will experience a decrease in lean muscle mass and strength during the first year of androgen deprivation therapy (ADT) with an estimated 50% of PCS receiving this treatment in the early stages.[4] A typical course of ADT treatment may last anywhere from 2-3 years. During the first year of ADT, PCS will experience a deficiency in sex hormones, insulin resistance, increased central/visceral adiposity, decreased bone density, decreased lean muscle mass and whole body muscle strength.[4] Adverse changes in muscle composition may exacerbate normal sarcopenia, further reducing muscular strength and endurance as well as functional mobility and independence.[5] A study of older PCS (mean age 69 years) found that these men are at a greater risk for other comorbid conditions and physical limitations (for example, cardiovascular disease, diabetes, osteoporosis, skeletal fractures,

impaired balance and falls) that may dramatically affect their muscle performance and physical function.[6]

Evidence of the impact of ADT and cancer treatments on PCS is consistently strong in terms of a detrimental effect on functional abilities. In a recent study of PCS post-treatment, 24% had impairments in activities of daily living (ADLs), 42% had impairment in instrumental activities of daily living (IADLs), 56% had abnormal Short Physical Performance Battery (SPPB) findings, and 22% reported falls within the previous three months.[4] Within the SPPB, deficits occurred within all subcomponents (balance, walking, and chair stands). Using a univariate analysis, age, deficits in ADLs and IADLs, and abnormal cognitive and functional screen findings were associated with an increased risk of decreased physical performance for PCS.[6] When compared to age-matched healthy controls, survivors had a slower walking speed, poorer physical performance and lower levels of patient-reported physical function. Decreased gait speed is associated with mobility limitations, disability, and increased mortality. Deficits in ADLs, the use of an assistive device, and abnormal functional screening findings were associated with an increased risk of falling.[6] Falls may lead to more serious injuries such as an increased risk of fractures and hospitalizations, thereby decreasing the quality of life and level of independence for survivors. In summary, the multitude of physiological changes resulting from ADT treatment of prostate cancer profoundly impacts the functional mobility of these men. It is therefore essential to measure functional mobility in order to identify deficits, risks for further injury such as falls, and design and assess the effectiveness of appropriate treatment regimens.

In 1991, the Task Force on Standards for Measurement in Physical Therapy of the American Physical Therapy Association (APTA) established the criteria for valid, reliable, objective, and standardized tests and measures to assist clinicians in providing the highest quality

of care.[7] The assessment of appropriate outcome measures needs to consider the following elements: 1) which domain within the International Classification of Functioning, Disability, and Health (ICF) that the test measures; 2) the purpose of the measure relevant to obtaining discriminative, predictive, or evaluative information; 3) whether the measure is disease specific or more generic, and whether it is a self-report vs. performance-based measure; 4) the patient's ability and goals, and the clinic's requirements; 5) the psychometric properties, particularly reliability, validity, diagnostic accuracy, minimal detectable change, and minimal clinical important difference; and 6) the feasibility, including the time, equipment, cost, space and training required to administer and score the test results, overall burden on the patient to complete the test, and consideration of culture and language barriers.[8] The use of standardized outcome measures is an essential component of evidence-based practice and enhances communication with patients and payers.[9] The leading barriers to a standardization of physical therapy outcome measures are primarily the lack of knowledge of the psychometric strength of measures as well as the clinical utility of these measures including the length of time and level of difficulty for patients to complete the test as well as the time necessary for clinicians to administer and interpret the results of the tests.[10] The Evaluation Database to Guide Effectiveness (EDGE) Task Force was developed to address these barriers in the physical therapy profession.

In 2010, the APTA's Oncology Section created an EDGE Task Force to develop recommendations for outcome measures used when assessing the status of cancer survivors.[11] The reliability, validity, minimal detectable change (MDC) and/or minimal clinically important difference (MCID) are important psychometric properties which need to be evaluated to justify clinical use of outcome measures.[8] Additionally, tools used to track and measure patient

outcomes should be validated in the population in which they are used to be most beneficial. Lastly, these tools need to be evaluated in light of clinical utility, including the availability of resources, cost, ease of use, and availability of normative data. To date, Oncology EDGE Task Forces have reviewed quality of life measures and measures of strength and muscular endurance for the prostate cancer population.[12,13] These reviews are in addition to 13 reviews completed for the breast cancer population,[14-26] four reviews completed for the head and neck cancer population,[27-30] and one review for the colorectal cancer population.[31] The purpose of this systematic review is to make recommendations of the best methods to evaluate functional mobility in PCS based on psychometric properties and clinical utility.

METHODS

Search Strategy

The authors systematically assessed the literature for outcome measures that either directly measured or utilized patient self-report to evaluate functional mobility with the express purpose of evaluating the psychometric properties and clinical utility of these measures for patients with prostate cancer. The primary literature search took place from February to March 2014 using electronic databases such as Google Scholar, Ovid, Pubmed/Medline, CINAHL, Sports Discus, Web of Science, Cochrane Review, and PEDro. Search terms focused on prostate cancer and functional mobility (refer to Appendix A for a full list of search terms).

Studies of tests of functional mobility had to report psychometric properties, present clinically feasible methods, have adults (preferably male) as participants, and be published in the English language to be included in this review. Articles were taken into consideration if published after 1995 through March 2014. The authors chose to search from 1995 in order to include any seminal research pertinent to the measures investigated. The prostate cancer

population took first priority within the search, however, if no studies included this population, patients with other cancers, geriatric patients, other medically complex patients, and the general population were considered for review. With the use of such inclusion criteria, we were unable to provide evidence on all tests searched, and therefore the list of such tests exceeds the number included in the final review.

After completion of the literature search, the relevant articles were classified into three functional categories consisting of: Walk Tests; Activities of Daily Living (ADL) functional tests (physical and self-report); and Self-Reported Community Participation. Each functional category included a series of tests and assessments. Refer to Appendix B for measures within each category.

Data Extraction and Analysis

Each outcome measure was appraised by two reviewers independently using the Cancer EDGE Task Force Outcome Measure Rating Form.[32] Pertinent information regarding population studied, psychometric information related to the measure of interest, and evidence of clinical utility was gathered. Assessment of psychometric properties included reliability, where excellent reliability = >0.90; good reliability = 0.76-0.89; moderate reliability = 0.50-0.75; and poor reliability <0.50.[33] Concurrent, discriminative, criterion-related and construct validity values are reported when available, as well as measures assessing responsiveness to change such as MDC and MCID; the standardized response mean was also reported if that was the only measure of responsiveness available.

Outcome measures were then rated 1–4 (lowest to highest recommendation) on the Cancer EDGE Rating Scale, taking into consideration both psychometric qualities and clinical

utility (see Figure 1). If the two reviewers agreed on the rating of the outcome measure, the rating stood. If an outcome measure rating was found to be in disagreement between the two independent reviewers, the disagreement was resolved by discussion with all five reviewers until agreement was obtained. Finally, all articles reviewed for an outcome measure were included in a reference section of the EDGE form for each appropriate measure.

RESULTS

The initial literature search of electronic databases and bibliographic review for functional mobility assessments of those treated for prostate cancer resulted in 38,373 articles including duplicates. After title and abstract review, and removal of duplicates, 248 articles were retrieved and assessed for eligibility. A total of 152 articles met inclusion criteria and were included in the final review. Figure 2 delineates the flow of the literature search.

Each functional mobility category included multiple tests. For ten walk tests, 100 articles were reviewed. For five activities of daily living functional tests, 22 articles were reviewed. In the Self-Report of Community Participation, 30 articles were reviewed for the seven measures assessed. Some research studies included psychometric analysis of multiple measurement tools such that the number of articles included within each category is not mutually exclusive.

Overall, seven measures are highly recommended (rated 4) by the Oncology EDGE Task Force. All highly recommended measures are in the walk test category: 2- and 6-Minute Walk Tests, 10-meter timed walk, TUG, 5xSTS, SPPB, and the Physical Performance for Patients with Cancer (PPB). Three Activities of Daily Living Tests are recommended (rated 3) by the Task Force, and include: the Assessment of Life Habits (LIFE-H), the Functional Independence Measure (FIM), and the Activity Measure for Post-Acute Care (AM-PAC). Table 1 provides summary information regarding recommended measurement tools.

Table 2 lists outcome measures not recommended by the EDGE task force with a description of weaknesses of the measures. The Oncology EDGE Task Force is unable to recommend (rated 2B) the 12-minute walk test or the Timed 25 Foot Walk in the Walk Test category, or the Barthel Index and the Canadian Occupational Performance Measure in the ADL Functional Mobility category. No measures in the Self-Reported Community Participation Measures achieved a rating of 3 or 4. The Impact on Participation and Autonomy Questionnaire (IPAQ), the Life Satisfaction Questionnaire (LISAT-9), the Modified Rankin Scale and the Participation Objective, Participation Subjective (POPS) are rated 2B, unable to recommend, and the Participation Survey of Mobility Limited People (PARTS-M), Functional Status Examination (FSE), the High Level Mobility Assessment Tool (HiMAT), and the Reintegration to Normal Living/Life Index, are all not recommended (rated 1) by the Task Force.

Table 3 provides details on clinical utility of recommended measures. A summary of psychometric properties for the recommended measures are found in table 4 (reliability and responsiveness data) and table 5 (validity data).

DISCUSSION

The purpose of this systematic review is to make recommendations of the best methods to evaluate functional mobility in PCS based on psychometric properties and clinical utility. Men treated for PC with ADT are known to have reduced lower body strength by 22% and decreased bone density compared to healthy controls;[5,34-36] combined with increased age, this combination sets-up increased risk for falling with functional activities such as rising from a chair, dynamic balance activities such as reaching, and slowing gait speed with ambulation.[36] It is important to assess walking, balance and functional ability in the home and community environments during

the initial examination to determine the presence of physical impairments, functional deficits and activity limitations, and participation restrictions, in order to identify the impact of cancer treatment on the individual's overall function, including fall risk.

Within the ICF, functional mobility is included in the mobility domain, and intersects with ADLs and participation within environment and life situation contexts. This review includes multiple measures of walking, ADLs, and self-reported community function. The seven highly recommended (rating of 4) and three recommended (rating of 3) measures are discussed; the remaining measures reviewed that lack either psychometric support or clinical utility are not recommended for use by the EDGE Task Force. Included highly recommended measures are: 2-MWT and 6-MWT, the 10-meter timed walk, the (TUG), the 5xSTS, the SPPB, and the PPB. Recommended measures include the LIFE-H, the FIM and the AM-PAC. Most of the recommended measures, seven, are from the walk test category while three are from the ADL category.

Walk Tests

The ability to walk safely and competently is essential for an individual to move around the environment. The 2MWT and 6MWT involve the individual walking as far as they can in 2 or 6 minutes respectively. A participant may rest at any time and use a walking aid as needed. These tests demonstrated good-excellent reliability in older adults, neurological populations and amputees (ICC=0.83-0.96).[37-39] The reliability of the 6MWT was examined in a mixed cancer cohort and is excellent with an ICC = 0.93.[40] Discriminant validity was established with community dwelling adults and those in long term care.[37] The 2MWT has moderate to high concurrent validity with the TUG, as well as other walk tests such as the 6- and 12-MWT, and the 10-meter timed walk.[37,39,41,42] There is moderate concurrent validity of the 6-MWT with

SPPB and 5xSTS;[42] it also demonstrates moderate concurrent validity with the physical function subscale (r=0.50) of the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36),[43] and the perceived physical function (r=0.55) on the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-30).[40] Both the 2- and 6-MWT are easy to administer clinically and their common clinical use and available normative data[37,44,45] allows for rapid interpretation by the clinician. The established MDC_{95} for the 6-MWT is 5.2%,[46] and the MCID of 140 feet is reported for PCS.[47] The 2-MWT may have a slight edge in terms of clinical utility as it takes less time to administer, may be more feasible for those with significant levels of fatigue or muscle weakness, or a gait dysfunction which results in greater energy consumption.[48] Both the 2-MWT[49] and the 6-MWT[40,47,50] have been used to assess outcomes in research studies involving PCS.

The 10-meter timed walk test is also highly recommended for use by the Oncology EDGE Task Force. This test measures the time it takes to walk the distance of 10 meters. Gait speed is calculated as the time it took to complete the test is divided by the distance. The 10-meter walk test has been used in studies among men with prostate cancer, and demonstrates excellent reliability (ICC=0.90-0.97).[51-60] Furthermore, this test was validated with dependence in self-care, domestic life, and mobility, with IADLs, the Barthel Index, the 6-MWT and the TUG.[57,61,62] The responsiveness of the 10-meter timed walk has been investigated and the MDC is 0.013-0.25m/s. [52,53,61,63] The ease of administration of this test and available normative data[56,59,64,65] makes it a good test to utilize clinically.

Another highly recommended test is the Timed Up and Go. This test involves an individual rising from sitting in a standard armchair, walking for 3 meters, then turning and walking back to the chair and sitting down.[66] The time to complete this test is recorded. The

TUG has moderate to excellent reliability, ICC=0.85-0.96.[38,46,67] Concurrent validity was established with 2-MWT and FIM.[68] In the cancer population, the time on the TUG predicts falls within 3-12 months of diagnosis.[67] Normative data is available for the TUG for community dwelling elders as well as for PCS.[47,69-72] In addition to psychometric data related to PCS, the TUG has been used as an outcome measure in research with men treated for PC.[47,73]

The 5xSTS is also highly recommended. This test involves rising from a standard chair 5 times as fast as possible, with arms folded across the chest, and is focused on transitional movements and lower extremity strength.[74] The time to complete the test is recorded in seconds. This test is easy to administer in the clinic and is reliable in older female adults (ICC=0.95).[75] The 5xSTS was validated with the 6-MWT[42] and the TUG.[75] The MDC in older female adults is 2.5 seconds.[75] Additionally, this test was used in research on the prostate cancer population.[50,76,77] This test incorporates assessment of both transitional movement and a functional measure of lower extremity strength making this a useful clinical tool.

Two functional performance batteries, the Short Performance Physical Battery (SPPB), and the Physical Performance Battery for Patients with Cancer (PPB), are highly recommended by the EDGE Task Force. The SPPB is a collection of physical tests that determine function in activities of daily living. The SPPB is easy to administer and involves walking at a normal pace, a balance task, and incorporates the 5xSTS.[78] The design of the test makes it relatively easy to administer in a clinical setting, and seeks to quantify physical performance on a number of simple skills required for functional mobility.[78] Reliability is good (ICC=0.83-0.89)[79-82] and it is validated with self-reported mobility and ADL with associated disability.[78] The MDC in the elderly population is 1.42 – 2.9 points[83,84] and in a population of older adults status post hip

fracture, the MDC is 3.42 points.[85] This test was utilized in research with individuals with advanced cancer, including prostate cancer.[86]

The PPB was specifically designed for the oncology population, and has been used in research with men treated for prostate cancer.[87] The PPB includes nine tests, and although it may take up to 40 minutes to complete, the test demonstrated moderate to excellent reliability, ICC=0.69-0.99, in a general cancer population.[88] Concurrent validity of the separate sub-tests (walk, sit-to-stand, 6-MWT) was established with the TUG [67] and with the Functional Status Index.[88] The PPB was designed for use with those with cancer and includes a comprehensive evaluation of physical performance making this a promising test to incorporate into clinical measurement.

The remaining walk tests, including the 12-MWT and the Timed 25 Foot Walk are both rated 2B, unable to recommend, by the EDGE Task Force. Both of these tests have lower psychometric strength or lack adequate testing of psychometric qualities. The 12-MWT may be difficult to administer in an individual with a lower level of function secondary to the duration of the test, and the Timed 25 Foot Walk has only been tested with a neurological population, making generalization to men treated for prostate cancer difficult.

Activity of Daily Living Functional Tests

Three ADL functional tests are given a rating of 3, recommended, the highest rating given by the EDGE Task Force in this category. They are the LIFE-H, the FIM, and the AM-PAC. The LIFE-H has a long and short form, covering 12 domains, with the number of items being 240 and 69 respectively.[89-93] The domains include: personal care, interpersonal relationships, nutrition, community life, recreation and mobility, with the intent to assess the perception of one's ability to participate socially. The scoring is complex and the time to

administer the test (one hour for the short form and two hours for the long form) may impact its clinical utility. However, sound psychometric properties and the comprehensive nature of the test warrant the investment of time. The validity of the LIFE- H has not been reported in a cancer population.

The FIM contains 18 items comprised of 5 cognitive and 13 motor tasks. The FIM is used to assess quality of life in persons with a disability and the need for assistance to complete activities within the individual's environment.[94] The FIM has good psychometric properties,[95-98] however the FIM's clinical utility may be restrictive as the FIM has a cost associated with use, takes 30 - 40 minutes to administer, and is scored via consensus with other health care providers. Also, therapists need to be trained to utilize the tool. Despite these barriers to implementation, the EDGE Task Force recommends this tool because of the comprehensive nature of the assessment, which provides the clinician with a clear picture of the impact of function on quality of life and daily activity. Use of the FIM has not been reported in the prostate cancer population.

The AM-PAC was developed to assess functional status of all individuals across the continuum of care.[99] Based on ICF domains, the AM-PAC is a self-report 41-item comprehensive scale to test physical and movement activity (10 items), personal care and instrumental activity (16 items), and applied cognitive activity (15 items). The test-retest reliability is excellent (ICC=0.91-0.97),[99-101] and validation with proxy scoring is moderate-good (ICC=0.68-0.90).[100] Furthermore, shortened computer assisted testing versions are available that demonstrate excellent concurrent validity with the full version (r>0.90).[101-103] Although a broad population was recruited to examine the psychometric properties of this tool, this measure has not been specifically reported in the cancer population.

The Task Force is unable to recommend the remaining ADL measures including the Barthel Index and the Canadian Occupation Performance Measure because of limited psychometric support and lack of evidence of use in a cancer population.

Self-Reported Community Participation Measures

No measures in this category are recommended due to poor psychometric properties, poor clinical utility, and lack of evidence of use in a cancer population. The IPAQ, the LISAT-9 Modified Rankin Scale, and the POPS are all rated 2B. The PARTS-M, HiMAT, FSE, and Reintegration to Normal Living/Life Index are all not recommended by the Task Force.

Limitations and Future Research

Evidence based practice requires that the best evidence available is utilized in clinical judgement, along with clinician expertise and patient values. The EDGE Task Force investigating measures of functional mobility for use with PCS acknowledges limitations to this study. The literature search was completed in March of 2014, and therefore does not include any studies published thereafter which might color the lens through which the analysis of findings is viewed. It is possible that newer studies would provide additional psychometric data to evaluate existing measures, or that new measures may have been developed. Limiting the search to English publications could also limit the access to evidence supporting particular measures. The Task Force recommendations are made with the best available evidence at the time, but in using these measures, the reader is encouraged to continue to use best judgement in applying these recommendations to the individual patient.

Clearly, additional research is needed in validating all of these measures in the prostate cancer population. Studies examining reliability and responsiveness to change of these measures in men treated for prostate cancer is a significant gap in the evidence database. More studies

utilizing these measure as outcomes need to be developed. Perhaps most importantly, better measures of assessing functional mobility within the context of community participation need to be developed.

Conclusion

In patients with prostate cancer, with or without ADT, the assessment of functional mobility is important to assess impairment, functional deficits, activity limitations, and participation restrictions. Multiple assessment tools exist to assess walking and ADLs, however, limited research in Self-Reported Community Participation tools render them inadequate at this time. Seven tests are highly recommended by the Oncology EDGE Task Force; 2- and 6-MWT, 10-meter timed walk, the TUG, the 5xSTS, the SPPB, and the PPB, based on good clinical utility and psychometric properties. Three tests are recommended but lack use in the cancer population: LIFE-H, the FIM, and AM-PAC. Further research is needed to establish psychometric properties of other current measures including validation among PCS, or to develop new assessment tools in the prostate cancer population.

REFERENCES

1. American Cancer S. Cancer Survivorship Facts & Figures 2014. Accessed October 22, 2015.
2. Key Statistics for Prostate Cancer. 2016. Accessed April, 19, 2016.
3. Algotar AM, Thompson PA, Ranger-Moore J, et al. Effect of aspirin, other NSAIDS, and statins on PSA and PSA velocity. *Prostate.* 2010;70(8)883-888.
4. Bylow K, Dale W, Mustian K, et al. Falls and physical performance deficits in older patients with prostate cancer undergoing androgen deprivation therapy. *Urology.* 2008;72(2):422-427.
5. Galvão DA, Taaffe DR, Spry N, Joseph D, Turner D, Newton RU. Reduced muscle strength and functional performance in men with prostate cancer undergoing androgen suppression: a comprehensive cross-sectional investigation. *Prostate Cancer Prostatic Dis.* 2009;12(2):198-203.
6. Stone P, Hardy J, Huddart R, A'Hern R, Richards M. Fatigue in patients with prostate cancer receiving hormone therapy. *Eur J Cancer.* 2000;36(9):1134-1141.
7. Rothstein J, Campbell S, Echternach J, Jette A, Knecht H, Rose S. Task Force on Standards for Measurement in Physical Therapy: Standards for tests and measurements in physical therapy practice. *Phys Ther.* 1991;71(8):589-622.
8. Potter K, Fulk GD, Salem Y, Sullivan J. Outcome measures in neurological physical therapy practice: Part I. Making sound decisions. *J Neurol Phys Ther.* 2011;35(2):57-64.
9. Jette DU, Halbert J, Iverson C, Miceli E, Shah P. Use of standardized outcome measures in physical therapist practice: Perceptions and applications. *Phys Ther.* 2009;89(2):125-135.

10. Coster WJ, Haley SM, Jette AM. Measuring patient-reported outcomes after discharge from inpatient rehabilitation settings. *J Rehabil Med.* 2006;38(4):237-242.

11. Levangie PK, Fisher MI. Oncology Section Task Force on Breast Cancer Outcomes: An introduction to the EDGE TASK Force and clinical measures of upper extremity function. *Rehabil Oncol.* 2013;31(1):6-10.

12. Harrington S, Lee J, Colon G, Alappattu M. Oncology Section EDGE Task Force on Prostate Cancer: A Systematic Review of Outcome Measures for Health-Related Quality of Life. *Rehabil Oncol.* 2016;34(1):27-35.

13. Fisher MI, Davies CC, Colon G, Geyer H, Pfalzer L. Oncology Section EDGE Task Force on Prostate Cancer Outcomes: A Systematic Review of Clinical Measures of Strength and Muscular Endurance. *Rehabil Oncol.* 2015;33(2):37-44 38p.

14. Fisher MI, Lee J, Davies CC, Geyer H, Colon G, Pfalzer L. Oncology Section EDGE Task Force on Breast Cancer Outcomes: A Systematic Review of Outcome Measures for Functional Mobility. *Rehabil Oncol.* 2015;33(3):19-31 13p.

15. Drouin JS, Morris GS. Oncology Section EDGE Task Force Breast Cancer Outcomes: A Systematic Review of Clinical Measures of Cardiorespiratory Fitness Tests. *Rehabil Oncol.* 2015;33(2):24-36 13p.

16. Perdomo M, Sebelski CA, Davies C. Oncology Section Task Force on Breast Cancer Outcomes: Shoulder and glenohumeral outcome measures. *Rehabil Oncol.* 2013;31(1):19-26 18p.

17. Harrington S, Gilchrist L, Sander A. Breast Cancer EDGE Task Force Outcomes: Clinical Measures of Pain. *Rehabil Oncol.* 2014;32(1):13-21.

18. Farnen Price W, Doherty D, Adams A, Bohde E. Breast Cancer EDGE Task Force Outcomes: Evidence-based Cancer-related Fatigue Measurement Tools. *Rehabil Oncol.* 2014;32(3):32-39 38p.

19. Fisher MI, Davies C, Beuthin C, Colon G, Zoll B, Pfalzer L. Breast Cancer EDGE Task Force Outcomes: A Systematic Review of Clinical Measures of Strength and Muscular Endurance. *Rehabil Oncol.* 2014;32(4):6-15 10p.

20. Harrington S, Miale S, Ebaugh D. Breast Cancer EDGE Task Force Outcomes: Clinical Measures of Health Related Quality of Life. *Rehabil Oncol.* 2015;33(1):5-31 27p.

21. Fisher MI, Levangie PK. Oncology Section Task Force on Breast Cancer Outcomes: Scapular assessment. *Rehabil Oncol.* 2013;31(1):11-18 18p.

22. Min HH, Blackwood J, Croarkin E, Wampler-Kuhn M, Colon G, Pfalzer L. Oncology Section Task Force on Breast Cancer Outcomes: Clinical Measures of Balance - A Systematic Review. *Rehabil Oncol.* 2015;33(1):18-27 10p.

23. Hile E, Levangie P, Ryans K, Gilchrist L. Oncology Section Task Force on Breast Cancer Outcomes: Clinical Measures of Chemotherapy-induced Peripheral Neuropathy - A Systematic Review. *Rehabil Oncol.* 2015;33(3):32-50 11p.

24. Perdomo M, Davies C, Levenhagen K, Ryans K. Assessment Measures of Secondary Lymphedema in Breast Cancer Survivors. *Rehabil Oncol.* 2014;32(1):22-35 14p.

25. Davies C, Ryans K, Levenhagen K, Perdomo M. Quality of Life and Functional Outcome Measures for Secondary Lymphedema in Breast Cancer Survivors. *Rehabil Oncol.* 2014;32(1):7-12 16p.

26. Miale S, Harrington S, Kendig T. Oncology Section Task Force on Breast Cancer Outcomes: Clinical Measures of Upper Extremity Function. *Rehabil Oncol.* 2013;31(1):27-34.

27. Eden MM, Flores AM, Galantino ML, Spinelli BA. Recommendations for Patient-reported Outcome Measures for Head and Neck Cancer-related Shoulder Dysfunction: A Systematic Review. *Rehabil Oncol.* 2014;32(3):6-19.

28. Flores AM, Spinelli BA, Eden MM, Galantino ML. EDGE Task Force on Head and Neck Cancer Outcomes A Systematic Review of Outcome Measures for Quantifying External Lymphedema. *Rehabil Oncol.* 2015;33(2):15-23.

29. Galantino ML, Eden MM, Spinelli BA, Flores AM. EDGE Task Force on Head and Neck Cancer Outcomes: A Systematic Review of Outcome Measures for Temporomandibular-related Dysfunction. *Rehabil Oncol.* 2015;33(2):6-14.

30. Spinelli BA, Galantino ML, Eden MM, Flores AM. Recommendations for Patient-reported Outcome Measures for Head and Neck Cancer-related Neck Dysfunction: A Systematic Review. *Rehabil Oncol.* 2014;32(3):20-31.

31. Burgess F, Galambos L, Howland A, Yalamanchili M, Pfalzer LA. Oncology EDGE Task Force on Colorectal Cancer Outcomes: A Systematic Review of Clinical Measures of Strength and Muscular Endurance. *Rehabil Oncol.* 2016;34(1):36-47.

32. Levangie PK, Fisher MI. Oncology Section Task Force on Breast Cancer Outcomes: an introduction to the EDGE TASK Force and clinical measures of upper extremity function. *Rehabil Oncol.* 2013;31(1):6-10 15p.

33. Portney LG, Watkins MP. *Foundations of Clinical Research: Applications to Practice.* Vol 3. New Jersey: Pearson Prentice Hall; 2009.

34. Basaria S, Lieb J, Tang AM, et al. Long-term effects of androgen deprivation therapy in prostate cancer patients. *Clin. Endocrinol.* 2002;56(6):779-786.

35. Williams G, Robertson V, Greenwood K, Goldie P, Morris ME. The high-level mobility assessment tool (HiMAT) for traumatic brain injury. Part 1: Item generation. *Brain Inj.* 2005;19(11):925-932.

36. Murphy R, Wassersug R, Dechman G. The role of exercise in managing the adverse effects of androgen deprivation therapy in men with prostate cancer. *Phys Ther Rev.* 2011;16(4):269-277.

37. Connelly DM, Thomas BK, Cliffe SJ, Perry WM, Smith RE. Clinical utility of the 2-minute walk test for older adults living in long-term care. *Physiother Can.* 2009;61(2):78-87.

38. Hiengkaew V, Jitaree K, Chaiyawat P. Minimal detectable changes of the Berg Balance Scale, Fugl-Meyer Assessment Scale, Timed "Up & Go" Test, gait speeds, and 2-minute walk test in individuals with chronic stroke with different degrees of ankle plantarflexor tone. *Arch Phys Med Rehabil.* 2012;93(7):1201-1208.

39. Rossier P, Wade DT. Validity and reliability comparison of 4 mobility measures in patients presenting with neurologic impairment. *Arch Phys Med Rehabil.* 2001;82(1):9-13.

40. Schmidt K, Vogt L, Thiel C, Jager E, Banzer W. Validity of the six-minute walk test in cancer patients. *Int J Sports Med.* 2013;34(7):631-636.

41. Brooks D, Davis AM, Naglie G. Validity of 3 physical performance measures in inpatient geriatric rehabilitation. *Arch Phys Med Rehabil.* 2006;87(1):105-110.

42. Bean JF, Kiely DK, Leveille SG, et al. The 6-minute walk test in mobility-limited elders: What is being measured? *J Gerontol A Biol Sci Med Sci.* 2002;57(11):M751-M756.

43. Moriello C, Mayo NE, Feldman L, Carli F. Validating the six-minute walk test as a measure of recovery after elective colon resection surgery. *Arch Phys Med Rehabil.* 2008;89(6):1083-1089 1087p.

44. Gijbels D, Alders G, Van Hoof E, et al. Predicting habitual walking performance in multiple sclerosis: relevance of capacity and self-report measures. *Mult Scler.* 2010;16(5):618-626.

45. Gijbels D, Eijnde BO, Feys P. Comparison of the 2- and 6-minute walk test in multiple sclerosis. *Mult Scler.* 2011;17(10):1269-1272.

46. Resnik L, Borgia M. Reliability of outcome measures for people with lower-limb amputations: distinguishing true change from statistical error. *Phys Ther.* 2011;91(4):555-565.

47. Alibhai SM, Breunis H, Timilshina N, et al. Impact of androgen-deprivation therapy on physical function and quality of life in men with nonmetastatic prostate cancer. *J Clin Oncol.* 2010;28(34):5038-5045.

48. Solway S, Brooks D, Lacasse Y, Thomas S. A qualitative systematic overview of the measurement properties of functional walk tests used in the cardiorespiratory domain. *Chest.* 2001;119(1):256-270.

49. Lauwick S, Kim DJ, Mistraletti G, Carli F. Functional walking capacity as an outcome measure of laparoscopic prostatectomy: the effect of lidocaine infusion. *Br J Anaesth.* 2009;103(2):213-219.

50. Galvão DA, Taaffe DR, Spry N, Joseph D, Newton RU. Combined resistance and aerobic exercise program reverses muscle loss in men undergoing androgen suppression therapy for prostate cancer without bone metastases: a randomized controlled trial. *J Clin Oncol.* 2010;28(2):340-347.

51. Steffen T, Seney M. Test-retest reliability and minimal detectable change on balance and ambulation tests, the 36-item short-form health survey, and the unified Parkinson disease rating scale in people with parkinsonism. *Phys Ther.* 2008;88(6):733-746.

52. Eng JJ, Dawson AS, Chu KS. Submaximal exercise in persons with stroke: test-retest reliability and concurrent validity with maximal oxygen consumption. *Arch Phys Med Rehabil.* 2004;85(1):113-118.

53. van Hedel HJ, Wirz M, Dietz V. Assessing walking ability in subjects with spinal cord injury: Validity and reliability of 3 walking tests. *Arch Phys Med Rehabil.* 2005;86(2):190-196.

54. Scivoletto G, Tamburella F, Laurenza L, Foti C, Ditunno JF, Molinari M. Validity and reliability of the 10-m walk test and the 6-min walk test in spinal cord injury patients. *Spinal Cord.* 2011;49(6):736-740.

55. Wolf SL, Catlin PA, Gage K, Gurucharri K, Robertson R, Stephen K. Establishing the reliability and validity of measurements of walking time using the Emory Functional Ambulation Profile. *Phys Ther.* 1999;79(12):1122-1133.

56. Bohannon RW. Comfortable and maximum walking speed of adults aged 20-79 years: reference values and determinants. *Age Ageing.* 1997;26(1):15-19.

57. Flansbjer UB, Holmback AM, Downham D, Patten C, Lexell J. Reliability of gait performance tests in men and women with hemiparesis after stroke. *J Rehabil Med.* 2005;37(2):75-82.

58. Hollman JH, Beckman BA, Brandt RA, Merriwether EN, Williams RT, Nordrum JT. Minimum detectable change in gait velocity during acute rehabilitation following hip fracture. *J Geriatr Phys Ther.* 2008;31(2):53-56.

59. Bowden MG, Balasubramanian CK, Behrman AL, Kautz SA. Validation of a speed-based classification system using quantitative measures of walking performance poststroke. *Neurorehabil Neural Repair.* 2008;22(6):672-675.

60. Van Loo MA, Moseley AM, Bosman JM, De Bie RA, Hassett L. Test - re-test reliability of walking speed, step length and step width measurement after traumatic brain injury: A pilot study. *Brain Inj.* 2004;18(10):1041-1048.

61. Paltamaa J, Sarasoja T, Leskinen E, Wikström J, Mälkiä E. Measures of physical functioning predict self-reported performance in self-care, mobility, and domestic life in ambulatory persons with multiple sclerosis. *Arch Phys Med Rehabil.* 2007;88(12):1649-1657.

62. Tyson S, Connell L. The psychometric properties and clinical utility of measures of walking and mobility in neurological conditions: A systematic review. *Clin Rehabil.* 2009;23(11):1018-1033.

63. Burns AS, Delparte JJ, Patrick M, Marino RJ, Ditunno JF. The reproducibility and convergent validity of the walking index for spinal cord injury (WISCI) in chronic spinal cord injury. *Neurorehabil Neural Repair.* 2011;25(2):149-157.

64. Lemay JF, Nadeau S. Standing balance assessment in ASIA D paraplegic and tetraplegic participants: Concurrent validity of the Berg Balance Scale. *Spinal Cord.* 2010;48(3):245-250.

65. Olmos LE, Freixes O, Gatti MA, et al. Comparison of gait performance on different environmental settings for patients with chronic spinal cord injury. *Spinal Cord.* 2008;46(5):331-334.

66. Podsiadlo D, Richardson S. The Timed "Up & Go": a test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc.* 1991;39(2):142-148.

67. Overcash JA, Rivera HR. Physical performance evaluation of older cancer patients: a preliminary study. *Crit Rev Oncol Hematol.* 2008;68(3):233-241.

68. Brooks D, Davis AM, Naglie G. Validity of 3 physical performance measures in inpatient geriatric rehabilitation. *Arch Phys Med Rehabil.* 2006;87(1):105-110.

69. Hofheinz M, Schusterschitz C. Dual task interference in estimating the risk of falls and measuring change: a comparative, psychometric study of four measurements. *Clin Rehabil.* 2010;24(9):831-842.

70. Shumway-Cook A, Brauer S, Woollacott M. Predicting the probability for falls in community-dwelling older adults using the Timed Up & Go Test. *Phys Ther.* 2000;80(9):896-903.

71. dos Santos Caixeta GC, Doná F, Gazzola JM. Cognitive processing and body balance in elderly subjects with vestibular dysfunction. *Braz J Otorhinolaryngol.* 2012;78(2):87-95.

72. Storer TW, Miciek R, Travison TG. Muscle function, physical performance and body composition changes in men with prostate cancer undergoing androgen deprivation therapy. *Asian J Androl.* 2012;14(2):204-221.

73. Joly F, Alibhai SMH, Galica J, et al. Impact of androgen deprivation therapy on physical and cognitive function, as well as quality of life of patients with nonmetastatic prostate cancer. *J Urol.* 2006;176(6 Pt 1):2443-2447.

74. Bohannon RW. Reference Values For The Five-Repetition Sit-To-Stand Test: A Descriptive Meta-Analysis Of Data From Elders. *Percept Mot Skills.* 2006;103(1):215-222.

75. Goldberg A, Chavis M, Watkins J, Wilson T. The five-times-sit-to-stand test: Validity, reliability and detectable change in older females. *Aging Clin Exp Res.* 2012;24(4):339-344.

76. Galvão DA, Nosaka K, Taaffe DR, et al. Resistance training and reduction of treatment side effects in prostate cancer patients. *Medicine and science in sports and exercise.* 2006;38(12):2045-2052.

77. Monga U, Garber SL, Thornby J, et al. Exercise prevents fatigue and improves quality of life in prostate cancer patients undergoing radiotherapy. *Arch Phys Med Rehabil.* 2007;88(11):1416-1422 1417p.

78. Guralnik JM, Ferrucci L, Simonsick EM, Salive ME, Wallace RB. Lower-extremity function in persons over the age of 70 years as a predictor of subsequent disability. *N Engl J Med.* 1995;332(9):556-562.

79. Studenski S, Perera S, Wallace D, et al. Physical performance measures in the clinical setting. *J Am Geriatr Soc.* 2003;51(3):314-322.

80. Ostir GV, Volpato S, Fried LP, Chaves P, Guralnik JM. Reliability and sensitivity to change assessed for a summary measure of lower body function: Results from the Women's Health and Aging Study. *J Clin Epidemiol.* 2002;55(9):916-921.

81. Gómez JF, Curcio C-L, Alvarado B, Zunzunegui MV, Guralnik J. Validity and reliability of the Short Physical Performance Battery (SPPB): A pilot study on mobility in the Colombian Andes. *Colomb Med.* 2013;44(3):165-171.

82. Freire AN, Guerra RO, Alvarado B, Guralnik JM, Zunzunegui MV. Validity and reliability of the short physical performance battery in two diverse older adult populations in Quebec and Brazil. *J Aging Health.* 2012;24(5):863-878.

83. Perera S, Mody SH, Woodman RC, Studenski SA. Meaningful change and responsiveness in common physical performance measures in older adults. *J Am Geriatr Soc.* 2006;54(5):743-749.

84. Latham NK, Mehta V, Nguyen AM, et al. Performance-based or self-report measures of physical function: Which should be used in clinical trials of hip fracture patients? *Arch Phys Med Rehabil.* 2008;89(11):2146-2155.

85. Mangione KK, Craik RL, McCormick AA, et al. Detectable changes in physical performance measures in elderly African Americans. *Phys Ther.* 2010;90(6):921-927.

86. Litterini AJ, Fieler VK, Cavanaugh JT, Lee JQ. Differential effects of cardiovascular and resistance exercise on functional mobility in individuals with advanced cancer: A randomized trial. *Arch Phys Med Rehabil.* 2013;94(12):2329-2335.

87. Demark-Wahnefried W, Clipp EC, Morey MC, et al. Lifestyle intervention development study to improve physical function in older adults with cancer: Outcomes from Project LEAD. *J Clin Oncol.*. 2006;24(21):3465-3473 3469p.

88. Simmonds MJ. Physical function in patients with cancer: psychometric characteristics and clinical usefulness of a physical performance test battery. *J Pain Symptom Manage.* 2002;24(4):404-414.

89. Fougeyrollas P, Noreau L, Bergeron H, Cloutier R, Dion SA, St-Michel G. Social consequences of long term impairments and disabilities: Conceptual approach and assessment of handicap. *Int J Rehabil Res.* 1998;21(2):127-141.

90. Desrosiers J, Rochette A, Noreau L, Bourbonnais D, Bravo G, Bourget A. Long-term changes in participation after stroke. *Top Stroke Rehabil.* 2006;13(4):86-96.

91. Noreau L, Desrosiers J, Robichaud L, Fougeyrollas P, Rochette A, Viscogliosi C. Measuring social participation: Reliability of the LIFE-H in older adults with disabilities. *Disabil Rehabil.* 2004;26(6):346-352.

92. Poulin V, Desrosiers J. Reliability of the LIFE-H satisfaction scale and relationship between participation and satisfaction of older adults with disabilities. *Disabil Rehabil.* 2009;31(16):1311-1317.

93. Noreau L, Fougeyrollas P, Vincent C. The LIFE-H: Assessment of the quality of social participation. *Technol Disabil.* 2002;14(3):113-118.

94. Graham JE, Granger CV, Karmarkar AM, et al. The Uniform Data System for Medical Rehabilitation. *Am J Phys Med Rehabil.* 2014;93(3):231-244 214p.

95. Ottenbacher KJ, Hsu Y, Granger CV, Fiedler RC. The reliability of the functional independence measure: A quantitative review. *Arch Phys Med Rehabil.* 1996;77(12):1226-1232.

96. Pollak N, Rheault W, Stoecker JL. Reliability and validity of the FIM for persons aged 80 years and above from a multilevel continuing care retirement community. *Arch Phys Med Rehabil.* 1996;77(10):1056-1061.

97. Hobart JC, Lamping DL, Freeman JA, et al. Evidence-based measurement: Which disability scale for neurologic rehabilitation? *Neurology.* 2001;57(4):639-644.

98. Hsueh IP, Lin JH, Jeng JS, Hsieh CL. Comparison of the psychometric characteristics of the functional independence measure, 5 item Barthel index, and 10 item Barthel index in patients with stroke. *J Neurol Neurosurg Psychiatry.* 2002;73(2):188-190.

99. Haley SM, Coster WJ, Andres PL, et al. Activity outcome measurement for postacute care. *Med Care.* 2004;42(1):I49-I61.

100. Andres PL, Haley SM, Ni PS. Is patient-reported function reliable for monitoring postacute outcomes? *Am J Phys Med Rehabil.* 2003;82(8):614-621.

101. Haley SM, Coster WJ, Andres PL, Kosinski M, Ni P. Score comparability of short forms and computerized adaptive testing: Simulation study with the activity measure for post-acute care. *Arch Phys Med Rehabil.* 2004;85(4):661-666.

102. Haley SM, Gandek B, Siebens H, et al. Computerized adaptive testing for follow-up after discharge from inpatient rehabilitation: II. Participation outcomes. *Arch Phys Med Rehabil.* 2008;89(2):275-283.

103. Haley SM, Ni P, Jette AM, et al. Replenishing a computerized adaptive test of patient-reported daily activity functioning. *Qual Life Res.* 2009;18(4):461-471.

104. Kosak M, Smith T. Comparison of the 2-, 6-, and 12-minute walk tests in patients with stroke. *J Rehabil Res Dev.* 2005;42:103-107.

105. Curb JD, Ceria-Ulep CD, Rodriguez BL, et al. Performance-based measures of physical function for high-function populations. *J Am Geriatr Soc.* 2006;54(5):737-742.

106. Peters DM, Fritz SL, Krotish DE. Assessing the reliability and validity of a shorter walk test compared with the 10-meter walk test for measurements of gait speed in healthy, older adults. *J Geriatr Phys Ther.* 2013;36(1):24-30.

107. Kidd D, Stewart G, Baldry J, et al. The Functional Independence Measure: a comparative validity and reliability study. *Disabil Rehabil.* 1995;17(1):10-14 15p.

108. Kohler F, Dickson H, Redmond H, Estell J, Connolly C. Agreement of functional independence measure item scores in patients transferred from one rehabilitation setting to another. *Eur J Phys Rehabil Med.* 2009;45(4):479-485.

109. Turner-Stokes L, Siegert RJ. A comprehensive psychometric evaluation of the UK FIM FAM. *Disabil Rehabil.* 2013;35(22):1885-1895.

110. Jette AM, Haley SM, Tao W, et al. Prospective evaluation of the AM-PAC-CAT in outpatient rehabilitation settings. *Phys Ther.* 2007;87(4):385-398.

111. Cheville AL, Yost KJ, Larson DR, et al. Performance of an item response theory-based computer adaptive test in identifying functional decline. *Arch Phys Med Rehabil.* 2012;93(7):1153-1160.

112. Corrigan JD, Smith-Knapp K, Granger CV. Validity of the functional independence measure for persons with traumatic brain injury. *Arch Phys Med Rehabil.* 1997;78(8):828-834.

Table 1: Summary of Recommended Outcome Measures

Measure	Prostate Cancer EDGE Task Force Rating	Features
2-Minute Walk (2-MWT)	4	Quick and easy administer, no training required, used in PCS
6-Minute Walk (6-MWT)	4	Free, easy to administer, no training required, evidence cancer populations and used in PCS
10-Meter Timed Walk (10-MTW)	4	Free and easy to administer, measures gait speed, not used in PCS
Timed-Up and Go (TUG)	4	Performance-based, predicts falls, commonly used in clinical setting. Evidence with PCS
5 times sit-to-stand (5xSTS)	4	Quick and easy to administer, no training required, assesses functional mobility and strength, not used in PCS
Short Performance Physical Battery (SPPB)	4	Easy to administer, measures function of ADLs.
Physical Performance Battery for Patients with Cancer (PPB)	4	Specific to the cancer population. Comprehensive physical performance assessment.
Assessment of Life Habits (LIFE-H)	3	Takes time to complete and is difficult to score. Low clinical utility
Functional Independence Measure (FIM)	3	Cost to purchase. 30-40 minutes to complete. Not used in cancer population but has good psychometric properties
Activity Measure for Post-Acute Care (AM-PAC)	3	Based on ICF domains; has computer assisted testing short versions.

Abbreviations: PCS survivors of prostate cancer; ADLs activities of daily living

Table 2: Summary of Outcome Measures NOT Recommended

Measure	Prostate Cancer EDGE Task Force Rating	Features
12-Minute Walk Test	2B	Lower psychometrics; may be difficult to administer to lower functioning individuals. Used with/validated in a primarily neurological population.
Timed 25 Foot Walk	2B	Lacks comprehensive psychometric testing and only tested with multiple sclerosis.
Barthel Index	2B	Only adequate internal consistency. Validated in primarily geriatric and Parkinson's populations.
Canadian Occupational Performance Measure	2B	Fee to use, used by occupational therapists more than physical therapists. Validated only in a neurological population.
Impact on Participation and Autonomy Questionnaire (IPAQ)	2B	30 minutes to complete, focuses on autonomy and participation. Limited psychometrics. Primarily used with the neurologically impaired.
Life Satisfaction Questionnaire (LISAT-9)	2B	10 - 30 minutes to complete, developed for SCI and used with other neurological pathology such as CVA, TBI, MS.
Modified Rankin Scale	2B	Developed for CVA, 6-30 minutes to complete, experience raters needed to decrease bias.
Participation Objective, Participation Subjective (POPS)	2B	Poor psychometrics in traumatic brain injury. 6- 30 minutes to complete.
Participation Survey of Mobility Limited People (PARTS-M)	1	20 - 40 minutes to complete online or 60 - 90 minutes hard copy. Used with a neurologically impaired population such as cerebral palsy, movement disorders, MS, SCI.
Hi-Level Mobility Assessment Tool	1	Developed specifically for high level traumatic brain injury
Functional Status Examination	1	Assesses ADL function and cover ICF but lengthy to administer; only used in traumatic brain injury
Reintegration to Normal Living/Life Index	1	Covers multiple domains for normal social interaction; lacks robust psychometrics.

Abbreviations: CVA cerebral vascular accident; TBI traumatic brain injury; MS multiple sclerosis, ICF International Classification of Functioning and Health.

Table 3: Clinical Usefulness of Recommended Measures

Measure	Equipment Needed	Cost	Ease of Use	Scoring/ Interpretation	Normative Data
Two-Minute Walk	Yes – Stopwatch	Free	High	Easy	Yes
Six-Minute Walk	Yes – Stopwatch	Free	High	Easy	Yes
Ten-Meter Timed Walk	Yes - Stopwatch	Free	Medium – varied procedures	Easy	Yes
Timed-Up & Go	Yes – Stopwatch, chair, measuring tape	Free	High	Easy	Yes
Five Times Sit-to-Stand	Yes – Stopwatch, standard chair	Free	High	Easy	Yes
Short Performance Physical Battery	Yes – Stopwatch, chair, measuring tape, cones	Free	High	Easy	Yes
Physical Battery for Patients with Cancer	No	Free	High	Difficult	Yes
Assessment of Life Habits	No	Minimal	High	Difficult	Yes
Functional Independence Measure	Yes – varies based on category	Moderate	Low – Training Required	Moderate	Yes
Activity Measure for Post-Acute Care	No	Minimal	Medium	Moderate	Yes

Table 4: Psychometric Properties of Recommended Measures Related to Reliability and Responsiveness

Test	Test-Retest Reliability	Intra-rater Reliability	Inter-rater Reliability	Sensitivity to Change MDC/MCID
Walk Tests				
Two-Minute Walk Test (2-MWT) (distance in meters)	Older Adults:[37] ICC=0.94-0.95 CVA:[38] ICC=0.98 (0.97-0.99) Neurological Population:[39] ICC=097 Amputee:[46] ICC=0.83 (0.71-0.90)	Older Adults:[37] ICC=0.94-0.96 CVA[104] ICC=0.85	Older Adults:[37] ICC=0.94-0.96 CVA:[104] ICC=0.85	Older Adults:[37] MDC_{90}=12.2-14.7 CVA:[38] MDC_{95}=13.4 (23%) Amputee:[46] MDC_{90}=34.3
Six-Minute Walk Test (6-MWT) (distance in meters)	Amputee:[46] ICC=0.97 (0.95-0.99) Cancer population:[40] ICC=0.93 Healthy:[105] *r* =0.90	CVA:[104] ICC=0.78	CVA:[104] ICC=0.74	Amputee:[46] MDC_{90}=4%, MDC_{95}=5.2% Prostate Cancer:[47] MCID=140 feet
10-Meter Timed Walk (10-MTW) (time in seconds)	Healthy Older Adults:[106] ICC=0.98 (0.96-0.99) Neurological Population:[39] ICC=0.93			Healthy Older Adults:[106] $MDC_{90/95}$ =0.01m/s Older Adults:[83] MCID=.05m/s Substantial change=0.1m/s
Timed-Up & Go Test(s) (TUG(s)) (time in seconds)	CVA:[38] ICC=0.97 (0.94-0.99) Amputee:[46] ICC=0.88 (0.80-0.94) Cancer Population:[67] TUG with Walk Subtest on PPB: r=0.85 TUG with Sit stand subtest on PPB: r=0.75 TUG with 6MW subtest on PBB: r=-0.62			CVA:[38] MDC_{95}=7.84 Amputee:[46] MDC_{90}=3.6 seconds Cancer Pop – Falls within 3-12 mos:[67] ROC=0.85 Cancer Pop – Falls since Ca Dx:[67] ROC=0.74 Prostate Cancer:[47] MCID= 1s

Five Times Sit-to-Stand Test (5xSTS) (time in seconds)	Older female adults:[75] ICC=0.95			Older Female Adults:[75] MDC_{95}=2.5(17.5%)
Short Physical Performance Battery (SPPB)	ICC=0.83-0.89			Older Adults[83] MCID=0.5 points, Substantial change= 1
Physical Performance Battery for Cancer (PBB)	Ca general:[88] ICC=0.69-0.99		Ca general:[88] ICC=0.98-0.99	Walk subtest Falls within 3-12 mos:[67] ROC=0.60-0.69 Since Ca Dx:[67] ROC=0.55 Sit-stand Subtest Fall within 3-12 mos:[67] ROC=0.72-0.80 Since Ca Dx:[67] ROC=0.61 6-MWT subtest Fall within 3-12 mos:[67] ROC=0.29-0.35 Since Ca Dx:[67] ROC=0.30
ADL Functional Tests				
Assessment of Life Habits	Neurological Population Long form:[89,93] ICC=0.74-0.89 Short Form:[93] ICC=0.83 Older Adults:[91,92] ICC≥0.84		Neurological Population:[93,107] ICC=0.89	Neurological Population:[90] MCID=0.5 points
Functional Independence Measure (FIM)	Elderly Adults Motor: ICC=0.90[96] Cognitive: ICC= 0.80[97] Neurological Population:[107] Total scale *r*=0.90		Across Populations:[108] ICC= 0.124-0.661	Effect Size (neurological population):[109] Motor: Cohen's *d* =1.24 Cognitive: Cohen's *d*= 1.05
Activity Measure for Post-Acute Care (AM-PAC)	Mixed post-acute dx:[100] Daily activity: ICC=0.96 Mobility: ICC=0.97 Applied Cognition: ICC=0.91		Mixed post-acute dx:[100] Daily activity: ICC=0.90 Mobility: ICC=0.86	MDC_{95} (points):[110] Daily activity: 3.7 Mobility: 4.28 Applied Cognition: 5.55

			Applied Cognition: ICC=0.68	MCID (late stage lung ca):[111] AM-PAC CAT = 2 points Orthopedic/neurological/complex medical populations:[10] SRM = -0.02-0.10

Abbreviations: Ca = cancer; CAT = computer assisted testing; CVA = cerebrovascular accident; dx = diagnosis; ICC = interclass correlation coefficient; MDC = minimal detectable change; MCID = minimal clinically important difference; mos. = months; *r* = Pearson's correlation coefficient; ROC = receiver operating characteristic curve; SRM = standardized response mean

Table 5: Psychometric Properties of Recommended Measures Related Validity

	Criterion Validity		Construct Validity	
Test	**Concurrent Validity**	**Predictive Validity**	**Convergent**	**Discriminant**
Walk Tests				
Two-Minute Walk Test (2-MWT)	TUG: *r*=-0.87[37], *r=-0*.68 to -0.81[41] Berg Balance[37]*: r*=0.88 6-MWT*: r*=0.93[37], *r*=0.99[104] t-test *p*=0.82[45] 12-MWT:[04] *r*=0.99 10-Meter Timed Walk:[39] ICC= -0.61 FIM:[41]: r=0.47-0.59	Neurological Population[39] Between those with/ without assistive device *p<0.*001 Between those with/ without sensory loss *p=0*.022		CI_{95} for mean between group difference among long term care and community dwelling older adults:[37] (44.2, 101.6)
Six-Minute Walk Test (6-MWT)	2-MWT:[104] *r*=0.99 12-MWT: [104] *r*=0.99 Short Physical Perf Battery:[42] *r=0*.61 5xSTS:[42] *r*=-0.62 With VO_{2peak}:[40] *r=0*.67 With W_{max}:[40] r=0.70 With Perceived Phys Function (ERTOC QQ-C30 Physical Function):[40] *r=0*.55 With SF-36:[43] *r=0*.50		Pre- to post-operative abdominal surgery:[43] SRM = 0.70 Post-operative two time points:[43] SRM = 0.54	Pre- to Post-operative abdominal surgery:[43] *r=0*.75-0.87
10-Meter Timed Walk	Neurological Population[39] 2-MWT: ICC=-0.61			
Timed-Up & Go (TUG)	2-MWT:[41] *r*=-0.68 to -0.81 FIM:[41] *r*=-0.42 to -0.59			
Five Times Sit-to-Stand Test (5xSTS)	6-MWT:[42] *r=0*.61 TUG:[75] r=0.64 Functional reach:[75] r=0.36			
Short Physical Performance Battery (SPPB)	6-MWT:[42] *r*=0.61			
Physical Performance	Walk Subtest with TUG:[67] r=0.85 STS subtest with TUG:[67] r=0.75			

Battery for Cancer (PBB)	6-MWT subtest with TUG:[67] r=-0.62 With Functional Status Index[88] Overall: r=0.25-0.51 personal care: r=0.11-0.53 mobility: r=0.15-0.44			
ADL Functional Tests				
Assessment of Life Habits (LIFE-H)	With CHART physical independence):[93] r=0.76 With CIQ:[93] r=0.54-0.75		Long Form Internal Consistency:[93] Cronbach's α=0.90 Short Form Internal Consistency:[93] Cronbach's α=0.82	
Functional Independence Measure (FIM)	SCI with Barthel Index:[98] *r* =0.92-0.94	Minutes of Assistance:[112] 83% Supervision:[112] 82%	Internal consistency - SCI[98] Total: Cronbach's α=0.91-0.92 Motor: Cronbach's α=0.91-0.92 Cognitive: Cronbach's α=0.90. Internal consistency – Neuro population[109] Total: Cronbach's α=0.98 Motor: Cronbach's α=0.97 Cognitive: Cronbach's α=0.96	
Assessment of Life Habits (AM-PAC)		Point score decline associated with symptom worsening and adverse events in lung cancer:[111] 2 point decline: OR = 1.12-1.38 5 point decline: OR = 1.18-1.77	Internal consistency – mixed populations:[99] Cronbach's α = 0.92-0.94	

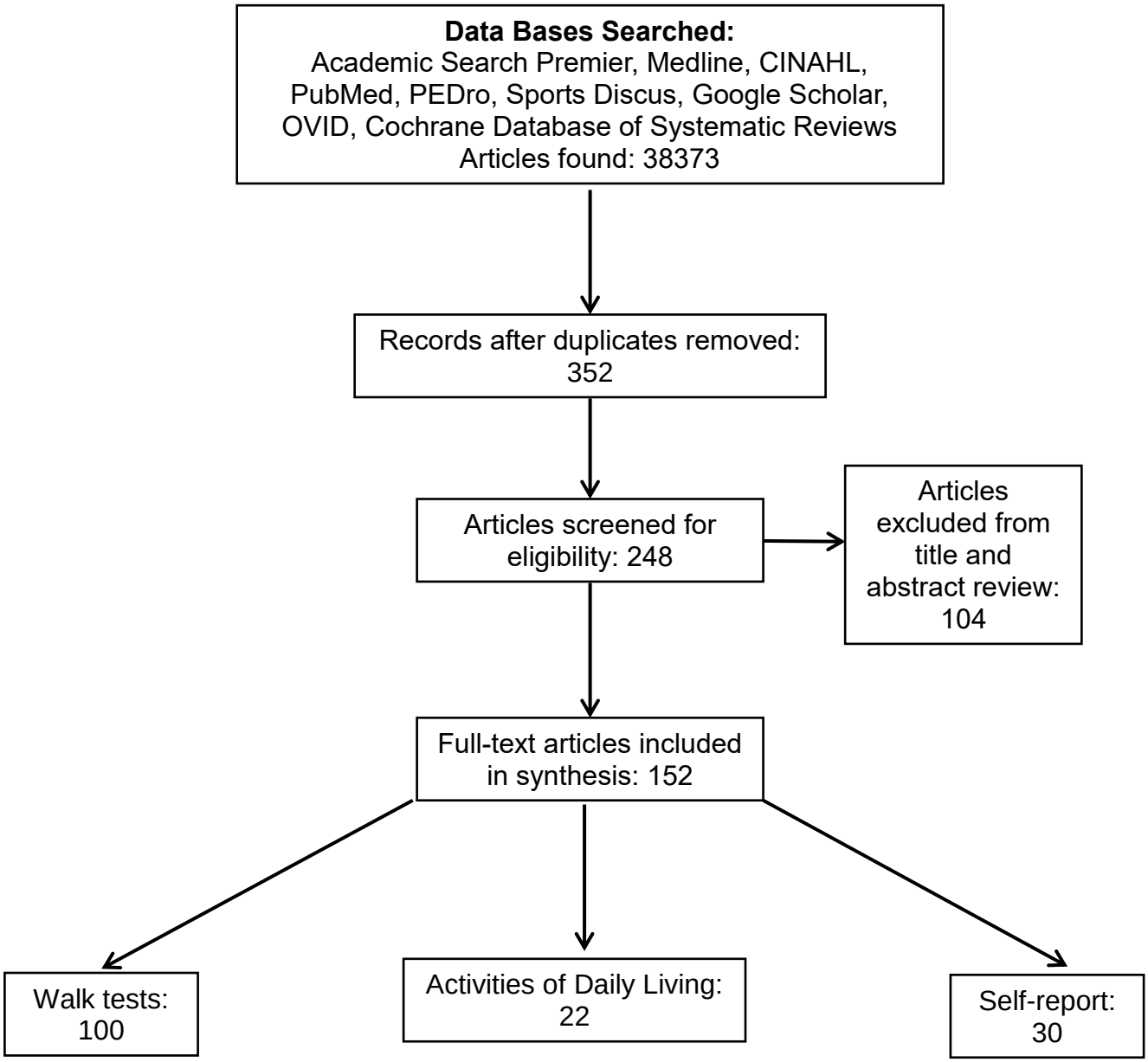
		10 point decline: OR = 0.99-2.15 New/progressive brain metastasis:[111] 2 point decline: OR = 1.28 5 point decline: OR = 1.77 10 point decline: OR = 2.15		

Abbreviations: α = alpha; CHART = Craig Handicap Assessment and Reporting Technique; CIQ=Community Integration Questionnaire; OR = odds ratio; *r* = Pearson's correlation coefficient; SCI = spinal cord injury; SRM = standardized response mean

Figure 1: Cancer Task Force EDGE Rating Scale

4	**Highly Recommend**	The outcome has good psychometric properties and good clinical utility; the measure has been used in research on individuals with or post cancer.
3	**Recommend**	The outcome measure has good psychometric properties and good clinical utility; no published evidence that the measure has been applied to research on individuals with or post cancer.
2A	**Unable to Recommend at this time**	There is insufficient information to support a recommendation of this outcome measure; the measure has been used in research on individuals with or post cancer.
2B	**Unable to Recommend at this time**	There is insufficient information to support a recommendation of this outcome measure; no published evidence that the measure has been applied to research on individuals with or post cancer.
1	**Do not Recommend**	Poor psychometrics &/or poor clinical utility (time, equipment, cost, etc.)

Figure 2. Flow of literature search.



Appendix A

Primary search terms: prostate cancer, neoplasm, function, mobility, functional mobility, activities of daily living, and walking.

Secondary search terms:

- Five Times Sit to Stand (5xSTS)
- 10-Meter Timed Walk
- Two-Minute Walk Test (2-MWT)
- Six-Minute Walk Test (6-MWT)
- 12-Minute Walk Test (12-MWT)
- Activity Measure for Post-Acute Care (AM-PAC)
- Assessment of Life Habits (LIFE-H)
- Barthel Index
- Canadian Occupational Performance Measure (COPM)
- Clinical Test of Sensory Interaction and Balance (CTSIB)
- Community Balance and Mobility Scale
- Functional Independence Measure (FIM)
- Functional Reach Test/Modified Functional Reach Test
- Functional Self-Assessment
- Functional Status Examination (FSE)
- Goal Attainment Scale
- Hauser Ambulation Index
- High Level Mobility Assessment Tool (HiMAT)
- Impact of Participation and Autonomy Questionnaire (IPAQ)
- Life Satisfaction Questionnaire (LISAT 9)
- Modified Rankin Scale
- Motor Activity Log
- Motricity Index
- Participation Objective, Participation Subjective (POPS)
- Participation Survey of Mobility Limited People (PSM)
- Physical Performance Battery for Patients with Cancer (PPB for Ca)
- Reintegration to Normal Living/Life Index
- Short Performance Physical Battery (SPPB)
- Timed 25 Foot Walk
- Timed Up and Go (cognitive and manual) (TUG)

Appendix B: Categories of Functional Mobility Testing and Respective Tests

Walk Test Category	ADL Functional Tests Category (Physical and self-report)	Self-Report Community Participation Category
• Two Minute Walk Test (2-MWT) • Six Minute Walk Test • (6-MWT) • 12-Minute Walk Test (12-MWT) • 10-Meter Timed Walk (10-MTW) • 5 Times Sit-to-Stand (5xSTS) • Timed 25 Foot Walk • Timed Up & Go (Cognitive and Manual) (TUG) • High-Level Mobility Assessment Tool (HiMAT) • Short Performance Physical Battery (SPPB) • Physical Performance Battery for Patients with Cancer (PPB)	• Assessment of Life Habits (LIFE-H) • Activity Measure for Post-Acute Care (AM-PAC) • Canadian Occupational Performance Measure (COPM) • Barthel Index • Functional Independence Measure (FIM) • Functional Self-Assessment	• Impact on Participation and Autonomy Questionnaire (IPAQ) • Life Satisfaction Questionnaire (LISAT-9) • Functional Status Examination (FSE) • Modified Rankin Scale • Participation Objective, Participation Subjective (POPS) • Participation Survey of Mobility Limited People (PARTS-M) • Reintegration to Normal Living/Life Index