

Universal Health Outcome Measures for Older Persons with Multiple Chronic Conditions

*Working Group on Health Outcomes for Older Persons with Multiple Chronic Conditions**

Older adults with multiple chronic conditions (MCCs) require considerable health services and complex care. Because the persistence and progression of diseases and courses of treatments affect health status in multiple dimensions, well-validated universal outcome measures across diseases are needed for research, clinical care, and administrative purposes. An expert panel meeting held by the National Institute on Aging in September 2011 recommends that older persons with MCCs complete a brief initial composite measure that includes general health; pain; fatigue; and physical health, mental health, and social role function, along with gait speed measurement. Suitable composite measures include the Medical Outcomes Study 8 (SF-8) and 36 (SF-36) -item Short-Form Survey and the Patient Reported Outcomes Measurement Information System 29-item Health Profile. Based on responses to items in the initial measure, short follow-on measures should be selectively targeted to symptom burden, depression, anxiety, and daily activities. Persons unable to walk a short distance to assess gait speed should be assessed using a physical function scale. Remaining gaps to be considered for measure development include disease burden, cognitive function, and caregiver burden. Routine outcome assessment of individuals with MCCs could facilitate system-based care improvement and clinical effectiveness research. *J Am Geriatr Soc* 60:2333–2341, 2012.

Key words: geriatrics; chronic disease; comorbidity; outcome assessment; quality measurement

Chronic illnesses and conditions develop and accumulate with aging, resulting in a large heterogeneous older population with multiple chronic conditions (MCCs).

More than three-fourths of Americans aged 65 and older have two or more chronic conditions.¹ The intensity and complexity of treating persons with MCCs accounts for a large proportion of healthcare costs, accounting for more than 80% of Medicare expenditures.²

Chronic disease treatments are developed and tested for their effect on disease-specific outcomes, frequently in populations with a single disease or a few comorbidities. Individuals with MCCs typically receive multiple interventions, each of which may affect other coexisting conditions (positively or negatively) and potentially interact with other interventions. Therefore, the persistence and progression of diseases and conditions and courses of treatments along multiple dimensions affect the health status of an individual with MCCs. Consequently, “universal” outcome measures across diseases are needed for research and clinical care.³ Outcome measures may also be applied to quality improvement and payment.

This report describes the recommendations of an expert panel convened by the National Institutes of Health (NIH) to address patient-centered health outcomes for older individuals with MCCs.

CONSENSUS MEETING

The National Institute on Aging (NIA), in collaboration with the Agency for Healthcare Research and Quality, convened an expert panel on health outcome measures for older persons with MCCs September 27 and 28, 2011. The panel included 14 independent experts from several disciplines, including geriatrics, primary care, health services research and administration, epidemiology, and clinical trials (Appendix A). An additional 43 participants from universities, U.S. government agencies, and a national quality healthcare organization attended and participated in discussions. Participants were invited on the basis of their research or clinical or administrative expertise relevant to the evaluation of treatment of older adults with MCCs. An attempt was made to include broad representation of various disciplines while keeping the meeting small enough to promote open and frank discussion.

The charge to the expert panel was to develop criteria and recommend the content of a core set of well-validated, universal, patient-centered outcome measures that could be

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routinely measured and recorded widely in healthcare delivery. The criteria for evaluating potential outcome measures were developed in conference calls and applied using consensus. Special consideration was given to how the Centers for Medicare and Medicaid Services (CMS) might apply outcome measures for individuals with MCCs for coverage decisions, quality measurement, and health care innovation, and CMS leadership presented an overview.

SELECTION CRITERIA FOR POTENTIAL OUTCOME MEASURES

Application in routine practice, in payment systems, and in clinical research requires instruments with relevant content, demonstrated measurement properties, brevity, and acceptability to respondents and practitioners, ensuring maximum completion rates.^{4–6} The initial criteria were that instruments be brief (administrable in <15 minutes), reliable, and valid and that they ascertain meaningful health status information for older persons with MCC⁷ and that measures be meaningful and interpretable by patients and clinicians, and demonstrate responsiveness to change. The panel also considered the suitability of measures for use in clinical research and practice, particularly the ability to inform clinical decision-making. Specific data on variation and change in health status were desirable in the MCC population. On a population level, it was desired that the instrument be valid across a spectrum of patient demographics and be applicable in a variety of healthcare and residential settings.

Finally, the panel was interested in the professional and patient burden of administration, including feasibility of self- and proxy reporting and degree of expertise needed for interpretation. Potential costs associated with administration were considered, as well as feasibility of being incorporated into electronic health records.

DIMENSIONS OF OUTCOMES

It was desired that measures permit the assessment of outcomes that are meaningful to patients and their families,

as well as the evaluation of interventions designed to improve these outcomes. Dimensions of such outcomes include general health, physical and mental morbidity (including chronic conditions, symptom burden, chronic pain, injury, geriatric syndromes, functional status, and disability), complications of care, physical and mental well-being, role function at work, and social function. Other outcomes might include utilization outcomes such as hospitalization, cost of care to individuals, and time to changes in health status.

OVERALL RECOMMENDATIONS

The panel recommended that a brief composite outcome measure be administered initially, along with gait speed measurement, and those results used to target appropriate short follow-on measures (Figure 1). The composite measures that the panel recommended included a few physical symptoms, such as pain and fatigue, and mental health symptoms such as anxiety and depression, as well as basic tasks and mobility (Table 1). The pain item in Medical Outcomes Study (MOS) 8 (SF-8) and 36 (SF-36)-item

Table 1. Content of Recommended Composite Outcome Measures

Content Areas	SF-8	SF-36	PROMIS-29
General health	✓	✓	
Pain	✓ ^a	✓ ^a	✓
Fatigue/energy	✓	✓	✓
Physical function	✓	✓	✓
Sleep	✓	✓	✓
Mental health	✓	✓	✓
Social role	✓	✓	✓
Recommended additions	Pain ^a	Pain ^a	General health ^b

^a Persons who report any pain should rate it on a numerical scale (0–10), an expanded scale compared with the Medical Outcomes Study 8 (SF-8) and 36 (SF-36)-item Short-Form Survey.
^b Self-evaluation of health in general, with a response scale from excellent to poor, which is not part of Patient-Reported Outcomes Measurement Information System 29-item Health Profile (PROMIS-29).

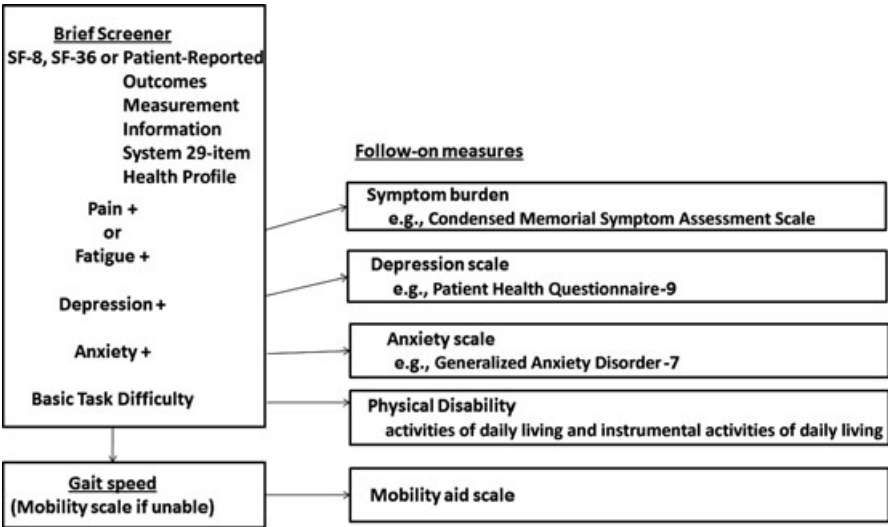


Figure 1. Recommended outcome measurement in older persons with multiple chronic conditions. SF = Medical Outcomes Study Short-Form Survey.

Short-Form Survey has fewer response categories, so individuals with MCCs who report pain should rate it on a numerical scale (0–10).

The panel reviewed evidence on the performance of potential outcome measures in older persons with MCCs. Three composite measures were recommended equally for initial outcome measurement in the MCC population. The SF-8 and SF-36⁸ and the Patient-Reported Outcomes Measurement Information System 29-item Health Profile (PROMIS-29)^{9,10} have good evidence of reliability supporting their use in individuals and groups and good evidence of validity and responsiveness (Table 2). All three are short and suitable for self-administration, computer administration, or administration by a trained interviewer over the telephone or in person and can be integrated into an electronic health record.¹¹ There is extensive published evidence of MOS instruments in older adults with MCCs in a wide variety of settings.^{11,12} PROMIS has recently published its results in more than 20,000 adults, many with MCCs.¹³ The instruments are accessible on-line or as listed in Appendix B.

Gait speed measurement over a short distance (e.g., 4 m) is reliable in people without known impairments that should affect gait and different patient populations.¹⁴ Its validity has been demonstrated according to correlations between measurements of gait speed and other functional measurements, and it can be completed in approximately 2 minutes.¹⁵

The panel recommends that follow-on measures be used as indicated to better evaluate somatic symptoms, depression, anxiety, and physical function. Persons reporting symptoms of pain or fatigue should be asked about symptom burden using a scale such as the Condensed Memorial Symptom Assessment Scale (CMSAS).¹⁶ A longer screen such as the Patient Health Questionnaire (PHQ-9)¹⁷ should be administered to those who report depressive symptoms on the composite measure; similarly for anxiety, an instrument like the Generalized Anxiety Disorder 7 (GAD-7)¹⁸ should be used. Persons who have difficulty with basic tasks should be assessed with activities of daily living (ADLs) and instrumental activities of daily living (IADLs).^{19,20} Persons unable to walk a short

distance to assess gait speed should be assessed using the PROMIS physical function scale with mobility aid short form.²¹ The panel believes that triggers should be developed for the secondary measurements and that overall periodicity should be based on clinical considerations such as time to improvement or worsening.

GENERAL HEALTH

Self-rated general health, a comprehensive integration of various concepts, including the individual's knowledge and perceptions, predicts a variety of future care use and outcomes, including mortality. The prototypical question asks about how respondents would say their health is, in general, with a response scale from excellent to poor. The general health question is included in the SF measures but should be added when using PROMIS-29.

PHYSICAL HEALTH OUTCOMES: SYMPTOM BURDEN

In uncomplicated patients, specific symptoms can be ascribed to a single disease, such as dyspnea to chronic pulmonary disease or to heart failure or pain to arthritis or to cancer, but in persons with MCCs, it is often difficult or impossible to attribute a specific symptom to a single condition. Furthermore, symptom burden is typically greater in individuals with multiple conditions than in those with a single condition. Because symptom management is a major goal of the treatment of chronic diseases, individuals with MCCs prioritize symptom relief as a desirable health outcome.²¹ Although universal symptom assessment may not be necessary, persons who report pain or fatigue should complete a brief symptom inventory, such as the CMSAS,¹⁶ which takes 2 to 4 minutes to administer, and includes presence and bothersome nature of 11 physical and three psychological symptoms. Several panelists recommended routine symptom assessment for all individuals with MCCs.

Comorbidity itself is an outcome; the panel did not find a suitable measure and identified disease burden as a gap.²⁰

Table 2. Summary of Properties of Recommended Initial Outcome Measures

Outcome Measure	Validity of Content and Reliability ^a	Range of Experience in Clinical Practice and Research ^{a,b}	Time to Administer, minutes	Mode of Administration	Feasibility of Use in Electronic Health Records	Sensitivity to Differences Across Broad Range of Levels of Outcome ^{a,c}	Responsiveness to Change ^a
Medical Outcomes Study 8-item Short-Form Survey	+++	+++	2	Self, interviewer, online	Yes	+++	+++
Medical Outcomes Study 36-item Short-Form Survey	+++	+++	5–10	Self, interviewer, online	Yes	+++	+++
Patient-Reported Outcomes Measurement Information System 29-item Health Profile	+++	+++	4–8	Self, interviewer, online	Yes	+++	+++
Gait speed	+++	+++	2–4	Observer	Yes	+++	++

^a 0, no numerical results reported; +, weak evidence; ++, adequate evidence; +++, good evidence.

^b Populations with different clinical status, ethnicity, and socioeconomic status.

^c Lack of floor and ceiling effects.

PHYSICAL FUNCTION AND MOBILITY

Functional decline (including physical impairment, mobility decline, and disability) is a distressing health outcome in people with MCCs that confers health and social consequences.²² Mobility loss and disability predict further decline, nursing home admission, other healthcare services and costs, and mortality. Gait speed predicts the onset of disability and mortality in diverse populations.²³ The panel recommends gait speed and self-reported measurement of physical function, with additional assessment for low-functioning individuals.

Persons unable to walk 4 m should complete the PROMIS physical function with mobility aid short form,²⁴ and those reporting difficulty with basic tasks such as shopping should complete the IADL and ADL questionnaires (adapted for the National Health and Nutrition Examination Survey).^{25,26} These questionnaires include 10 and 14 questions, respectively, about daily tasks, which can be reported by an observer. The ADL and IADL tasks are routinely assessed in nursing homes and national surveys. Although these measures will better characterize persons' difficulties, their responsiveness to intervention may be limited.^{6,11,27}

MENTAL HEALTH OUTCOMES: MOOD AND AFFECT

Chronic disease can negatively affect mood and affect, and depression and anxiety are prevalent yet underrecognized in the older population.^{28,29} The recommended composites specifically assess anxiety and depression, and some include positive aspects, such as well-being.²⁹ The SF-36 includes two subscales useful for screening and monitoring depressive disorders. The panel recommends that the additional brief depression instrument, the PHQ-9,¹⁷ a validated self-administered tool that mirrors diagnostic criteria for major depression, has adequate sensitivity and specificity, and exhibits responsiveness to therapy, be routinely administered to persons who report depressive symptoms on the composite measure or have a history of depressive disorder. Persons expressing nervousness or anxiety should be assessed using the GAD-7, an instrument that is sensitive and specific for anxiety disorders.¹⁸

COGNITIVE FUNCTION

Cognitive function, which includes memory, orientation, thought, perception, reasoning, and behavior, may decline progressively or acutely. Despite its clinical importance and high prevalence in individuals with MCCs, cognitive deficits often are undetected or misdiagnosed. Dementia and delirium, which can co-occur, are the two most common cognitive disorders.³⁰ They may result from neurodegenerative or other illness and may occur in association with acute physical health problems; delirium may resolve once the underlying illness is successfully treated.

Individuals with cognitive impairment have a higher level of comorbidity than those who are cognitively intact.³¹ The effects of cognitive impairment and chronic medical illnesses are synergistic, resulting in greater morbidity (especially functional decline), more preventable hospitalizations, and poorer survival. Cognitive impair-

ment may impair communication, lead to inaccurate symptom reporting, delay or interfere with comorbid condition treatment, and reduce adherence to therapies. When cognitive impairment coexists with depression, adherence to prescribed therapies, and thus outcomes, is poor. The panel noted several reasons for measuring cognitive status as an outcome measure (identifying delirium, monitoring deteriorating cognition) and also recommended cognitive assessment to interpret the individual's history and vulnerability, but existing instruments may not adequately balance brevity with validity and severity assessment and correlate poorly with education levels. Thus the panel recommended measurement of cognitive status as an outcome once suitable measures become available.

SOCIAL HEALTH OUTCOMES

Individuals with MCCs may require family or caregiver support and may have limited social participation. Family and friends accompany nearly 40% of older adults to routine medical encounters, frequently for health or transportation needs.^{32,33} Patient-centered care³⁴ and shared decision-making³⁵ must incorporate family involvement to optimize outcomes. Factors such as personality, attitude, and economics may further affect social health and well-being. Although substantial research demonstrates the effect of isolation and networks on health, there is less evidence to demonstrate diminished social health results from MCCs.³⁶ The panel recommended assessment of social health through the composite measures.

The high prevalence and persistence of family involvement in routine medical and personal care³⁷ illustrates the need for outcomes that encompass the health and well-being of the family, including the full range of health outcomes, employment, productivity, and financial effects on caregivers.³⁸ Although the panel acknowledged the importance of this dimension of care, it decided that specific recommendations about outcomes of family members were beyond the scope of its charge.

GAPS AND LIMITATIONS

The recommended composite measures have several limitations. These include assessment of cognitive function and psychological status and the potential for floor or ceiling effects in measuring physical function and disability. The measures are superior to some alternatives with respect to measurement of change over time and measurement at the extremes.^{5,10,39} They do not incorporate patient preferences⁴⁰ and may not adequately capture the full range of positive outcomes, including individual outcomes that differ from universally applied outcomes. The shortest composite measure (SF-8) is less reliable than longer measures and cannot discriminate among more-severe levels of disability. The panel identified three important areas where it could not offer a consensus recommendation but where further research or instrument development are needed: disease burden, cognitive function, and caregiver burden. The panel's concerns in each of these areas revolved around the feasibility of existing measures in busy clinical practice, availability of existing data, and responsiveness of available measures to change over time.

Chronic diseases may differ in their effect on the individual, and a scale of disease burden attempts to distinguish this and addresses the cumulative burden of multiple diseases. Whether subjectively weighted or a simple count of conditions, disease burden is an important consideration for individuals with MCCs that could ultimately be included as an outcome measure.

The role of proxy respondents is particularly important given that some older adults—particularly those with low literacy or cognitive impairment—may be unable or unwilling to self-report responses.⁴¹ Although the degree of patient-proxy concordance of symptom assessment and function varies according to severity, frequency, and nature of symptoms and function,^{42–44} MCC outcome measurement should provide for appropriate proxy reporting.

POTENTIAL USES OF OUTCOME MEASURES

A brief core set of health outcome measures for individuals with MCCs is urgently needed for research, policy, and practice. Care of such individuals is complex, with potential interactions between providers, treatments, and conditions. Relevant outcomes include general health, symptom burden, function, and effect on life. The panel briefly considered mortality as an outcome, including cause-specific mortality and mortality adjusted for quality of life. Although mortality measures are important to individuals and for research, they have drawbacks as potential quality measures.⁴⁵ Universal morbidity outcomes are more central to the individual with MCCs than condition-specific morbidity outcomes such as specific symptoms and disease severity and progression.

Clinical Research

Universal outcome measures have emerged as a strong complement to disease-specific measures for comparative effectiveness research on the population of older adults with MCCs. Their routine use would facilitate meaningful and interpretable results that individual and providers can use to better communicate the balance of benefit and risk. Individuals with MCCs who receive numerous interventions may wish to base treatment priorities on the potential health benefits for broad outcomes. Demonstrated evidence of improved health outcomes in the older population is one of the major criteria for CMS to approve new items and services for Medicare coverage.

Quality Measurement and Improvement

CMS and other organizations have been measuring quality along the dimensions of safety, timeliness, effectiveness, and efficiency and have adopted numerous measures in recent years. Previously, quality measure development was centered on diseases and delivery points, but the National Quality Forum is developing a framework applicable to individuals with MCCs with complex care and numerous treatment interactions or contraindications. Driving MCC care improvement toward better health outcomes requires valid outcome measures, attention to the population of interest (denominator), and outcome measurement and analytical methods to permit comparisons within and between health-care settings. The analytical approaches should include stratification and risk adjustment. Further work will be necessary

to assemble the data to consider these outcomes for quality measure approval by the National Quality Forum.

Innovations in Healthcare Payment

CMS's activities in changing the healthcare and payment systems have focused on improving value. The predominance and great care needs of individuals with MCCs in CMS's populations (Medicare and Medicaid) necessitates that evaluations of changes to the healthcare delivery system attend to universal outcomes and costs. In particular, these outcomes incorporate many dimensions of health and safety that changes to the system might affect. Broadly monitoring outcomes as payment changes might detect potential unintended consequences.

The panel identified a range of potential uses of outcome measures by several organizations, with particular attention to CMS in view of its national role and influence on healthcare practices for elderly adults and because CMS reporting requirements, policies, and decision-making will strongly influence the feasibility and adoption of MCC outcome measures in clinical practice.

HOW THIS ALL FITS INTO CLINICAL PRACTICE

Routine measurement of outcomes of individuals with MCCs could be accomplished efficiently through linkage of streamlined self-reported health data to the electronic health record. The recommendation to measure gait speed routinely requires a change to practice, but incorporation into practice goes well beyond just collecting the data, to using it in patient care and clinical decision-making and transforming the system. The practical uses of routine measurement include screening and monitoring the effects of treatment.

Several recommended measures are valid screening measures that, upon intervention, ultimately may lead to improved health outcomes. For example, the U.S. Preventive Services Task Force recommends depression screening in certain instances,⁴⁶ and several suitable screening instruments are available. Although the panel did not consider improved outcomes as an absolute requirement to justify routine data collection, it would be an important consideration for a quality improvement tool.

Another clinical application of outcome measures is to evaluate the progress of treatment. The recommended measures are sensitive to change over time in response to treatment and may be useful for decision-making about adding or modifying therapeutic strategies. Further work is needed to recommend frequency of outcome measurement.

Based on evidence review and consensus, the panel recommends routine outcome measurement with a composite measure (SF-8, SF-36, or PROMIS-29) and gait speed in older persons with MCCs, followed by a short selection of outcomes targeted at symptoms, depression, anxiety, and basic tasks. Although this approach is now feasible in clinical research, further implementation research and development is required before routine clinical application or use in quality measurement or improvement.

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John E. Ware, Jr., PhD, is Chief Science Officer and Founder, John Ware Research Group (JWRG), Inc., a for-profit business funded by NIH SBIR grants and unrestricted gifts or industry grants to develop and integrate generic and disease-specific patient-reported outcome measures for use in research and improving healthcare outcomes. He has received grants from NIH, NIA, and the Agency for Healthcare Research and Quality and various honoraria from academic institutions (<\$5,000 annually). He is a consultant to the medical products industry on measurement issues and clinical trial results and interpretations (< 10,000 annually), is the principal shareholder of JWRG, Inc., and has provided expert testimony in Food and Drug Administration review panel hearings (3 in past 5 years). He is the primary or co-inventor for numerous patents, all sold with the sale of QualityMetric, Inc. in March 2010.

Author Contributions: Marcel E. Salive drafted the paper. The members of the working group contributed to the manuscript, made editorial comments, and approved the final manuscript.

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APPENDIX A: WORKING GROUP ON HEALTH OUTCOMES FOR OLDER PERSONS WITH MULTIPLE CHRONIC CONDITIONS

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APPENDIX B: PATIENT-REPORTED OUTCOME MEASUREMENT SYSTEM INFORMATION SYSTEM (PROMIS)-29 PROFILE VERSION 1.0 QUESTIONNAIRE

Physical Function	Without Any Difficulty	With a Little Difficulty	With Some Difficulty	With Much Difficulty	Unable to Do
Are you able to do chores such as vacuuming or yard work?	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
Are you able to go up and down stairs at a normal pace?	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
Are you able to go for a walk of at least 15 minutes?	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
Are you able to run errands and shop?	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

Anxiety	Never	Rarely	Sometimes	Often	Always
In the past 7 days...					
I felt fearful	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
I found it hard to focus on anything other than my anxiety	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
My worries overwhelmed me	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
I felt uneasy	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Depression	Never	Rarely	Sometimes	Often	Always
In the past 7 days...					
I felt worthless	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
I felt helpless	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
I felt depressed	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
I felt hopeless	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

(Continued)

Appendix B. Contd.

Fatigue	Not at All	A Little Bit	Somewhat	Quite a Bit	Very Much
During the past 7 days...					
I feel fatigued	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
I have trouble starting things because I am tired	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
In the past 7 days...					
How run-down did you feel on average?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
How fatigued were you on average?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Sleep Disturbance	Very Poor	Poor	Fair	Good	Very Good
In the past 7 days...					
My sleep quality was	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
In the past 7 days...					
My sleep was refreshing	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
I had a problem with my sleep	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
I had difficulty falling asleep	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Satisfaction with Social Role	Not at All	A Little Bit	Somewhat	Quite a Bit	Very Much
In the past 7 days...					
I am satisfied with how much work I can do (include work at home)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
I am satisfied with my ability to work (include work at home)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
I am satisfied with my ability to do regular personal and household responsibilities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
I am satisfied with my ability to perform my daily routines	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Pain Interference	Not at All	A Little Bit	Somewhat	Quite a Bit	Very Much
In the past 7 days...					
How much did pain interfere with your day to day activities?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
How much did pain interfere with work around the home?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
How much did pain interfere with your ability to participate in social activities?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
How much did pain interfere with your household chores?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Pain Intensity											
In the past 7 days...											
How would you rate your pain on average?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9	☐ 10
No pain	Worst imaginable pain										

Gait speed measurement:

Ask participant to walk over a 4-m course or, if adequate space is not available, a 3-m course. Instruct participant to stand with both feet at the starting line and to start walking after a specific verbal command. Begin timing when the command is given. The subject can use a cane, a walker, or other walking aid but not the aid of another person. Record the time to complete the entire path at the usual pace. The test may be repeated using the faster of two walks. Calculate average gait speed by dividing the length of the walk (in meters) divided by the time (in seconds).

(Adapted from Guralnik JM, Fried LP, Simonsick EM, Kasper JD, Lafferty ME, eds. *The Women's Health and Aging Study: Health and Social Characteristics of Older Women with Disability*. Bethesda, MD: National Institute on Aging, 1995; NIH Pub. No. 95-4009.

Available <http://www.grc.nia.nih.gov/branches/ledb/whasbook/title.htm>. Accessed July 12, 2012).

Sources and Instruments for Recommended Measures. Medical Outcomes Study, Short-Form 8 (SF-8) is available at http://www.sf-36.org/tools/pdf/SF-8_4-Week_Sample.pdf

Medical Outcomes Study, Short-Form 36 (SF-36) is available at http://www.sf-36.org/tools/pdf/SF-36v2_Standard_Sample.pdf