

Functional assessment measures in rheumatologic disorders

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Abstract

Rheumatologic disorders cause functional impairment and significantly affect health-related quality of life. Functional assessment and health-related quality of life scales are increasingly being used as outcome measures to assess the influence of the diseases and health outcome in clinical studies of patients with rheumatologic diseases. In this article, we review the functional assessment and health-related quality of life measures which have been commonly used as outcome measures in rheumatologic disorders. These measures are Short form-36 (SF-36), SF-12, Nottingham Health Profile, Sickness Impact Profile, EuroQol, SF-6D, Health Utilities Index mark 2 and 3, Stanford Health Assessment Questionnaire, Rheumatoid Arthritis Quality of Life Questionnaire, Arthritis Impact Measurement Scales, McMaster Toronto Arthritis Patient Preference Disability Questionnaire, Western Ontario and McMaster Universities Osteoarthritis Index, Lequesne Index, Knee Disability and Osteoarthritis Outcome Score, Knee Disability and Osteoarthritis Outcome Score-Physical Function Short-form, Hip Disability and Osteoarthritis Outcome Score, Hip Disability and Osteoarthritis Outcome Score-Physical Function SF, Fibromyalgia Impact Questionnaire, Psoriatic Arthritis Quality of Life Scale, Gout Assessment Questionnaires, Dougados Functional Index, Bath Ankylosing Spondylitis Functional Index, and Ankylosing Spondylitis Quality of Life Scale.

Key words: Ankylosing spondylitis; Osteoarthritis; Psoriatic arthritis; Quality of life; Rheumatoid arthritis

Core tip: Health-related quality of life is an increasing important outcome in health care. This article presents an overview of the most important health-related quality of life and functional assessment measures, which have been commonly used in rheumatologic disorders.

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INTRODUCTION

Millions of people around the world suffer from the effects of musculoskeletal disorders such as long-term pain and physical impairment^[1]. In a study from eight countries in Europe and America, musculoskeletal disorders were reported as one of the most frequently conditions among the chronic conditions^[2]. The financial costs of rheumatologic diseases including both direct costs of medical interventions and indirect costs of premature mortality and disability are estimated as 1%-2.5% of the gross national product of European countries^[3].

Rheumatologic disorders have negative influence on functional status and the health-related quality of life in terms of daily life activities, bodily pain, social and emotional functioning^[4].

Functional assessment

Functional assessment is defined as the measurement of the level of a patient's disability. Disability is a condition of having a physical limitation in individuals' body functions, which may cause personal and social challenges^[5].

Functional assessment is important in estimating burden of disease, monitoring outcomes in clinical practice, and as end points in clinical trials^[6].

Table 1 Overview of quality of life measures commonly used in rheumatologic disorders

Generic measures	Disease specific measures					
	Rheumatoid arthritis	Osteoarthritis	Fibromyalgia	Psoriatic arthritis	Ankylosing spondylitis	Gout
SF-36	HAQ	WOMAC	FIQ	PsAQoL	DFI	GAQ 1.0
SF-12	RAQoL	Lequesne			BASFI	GAQ 2.0
NHP	AIMS	KOOS			ASQoL	
SIP	AIMS-2	KOOS-PS				
EQ-5D	MACTAR	HOOS				
SF-6D		HOOS-PS				
HUI-2						
HUI-3						

SF: Short form; SIP: Sickness impact profile; EQ-5D: EuroQol; HUI-2: Health Utilities Index mark 2; HAQ: Health Assessment Questionnaire; RAQoL: Rheumatoid Arthritis Quality of Life Questionnaire; AIMS: Arthritis impact measurement scales; MACTAR: McMaster Toronto Arthritis Patient Preference Disability Questionnaire; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index; KOOS-PS: Knee Disability and Osteoarthritis Outcome Score-Physical Function Short-form; HOOS-PS: Hip Disability and Osteoarthritis Outcome Score-Physical Function Short-form; FIQ: Fibromyalgia Impact Questionnaire; PsAQoL: Psoriatic Arthritis Quality of Life; DFI: Dougados Functional Index; BASFI: Bath Ankylosing Spondylitis Functional Index; ASQoL: Ankylosing Spondylitis Quality of Life; GAQ: Gout Assessment Questionnaire; NHP: Nottingham Health Profile.

Health-related quality of life

Quality of life is the subjective well-being and pleasure taken from life^[7]. World Health Organization defines health-related quality of life as individuals' perceptions of their conditions in life, with regard to their objectives, expectations, norms and concerns, within the context of their own cultural and value systems^[8]. Fitzpatrick has defined the dimensions of quality of life as physical, emotional and social functioning, role performance, pain and other symptoms including fatigue, nausea and disease specific symptoms^[9].

Health-related quality of life is an outcome measure that is increasingly used to assess health outcome in clinical studies of patients with rheumatologic diseases^[10].

Various generic and specific scales have been used to evaluate health-related quality of life. This paper provides an overview of functional assessment and health-related quality of life measures, commonly used in rheumatologic disorders.

FUNCTIONAL ASSESSMENT/HEALTH-RELATED QUALITY OF LIFE MEASURES USED IN RHEUMATOLOGIC DISORDERS

Generic scales are applicable for a wide range of populations and interventions—for example, Short form-36 (SF-36), which is the most widely used instrument for evaluating health-related quality of life. Specific scales are designed to be associated with specific health problems and can measure a few areas of interest—for example Fibromyalgia Impact Questionnaire^[11,12].

Health-related quality of life measures that are used in clinical practice ensure that the assessments and the treatment concentrate on the patient instead of the disease. Quality of life measures can be used: (1) in monitoring disease and response to treatment; (2) in clinical trials; (3) in evaluating psychosocial problems in individual patient care; (4) in clinical audit; and (5) in cost-utility analyses^[10,13]. Health-related quality of life measures which

are most commonly used in rheumatologic disorders are shown in Table 1.

GENERIC MEASURES: PROFILES

SF-36 (The Medical Outcomes Study 36-Item, Short-Form Health Survey)

The SF-36 is a self administered questionnaire including 36 items with eight dimensions, which assess: (1) limitations in physical functions; (2) limitations in social functions; (3) role limitations because of functional impairment; (4) role limitations because of psychological status; (5) bodily pain; (6) mental health; (7) energy; and (8) general health. It takes 5-10 min to complete. A specific advantage of SF-36 is that it also includes “energy” dimension, which is not included in the core set of outcome measures, but regarded as important by the patients^[14-17]. It has been commonly used as an outcome measure in various rheumatologic disorders including rheumatoid arthritis, connective tissue disorders, ankylosing spondylitis, osteoarthritis, and fibromyalgia^[17-21]. Also in a study of Andresen *et al*^[22], it was reported that it could be used as a health-related quality of life measure among patients with spinal cord injury. In some studies, SF-36 was found to be inadequate in evaluating health related quality of life of the elderly patients with comorbidities^[23,24].

Short form-12

The SF-12 is an abbreviated version of SF-36, developed by Ware *et al*^[25] in 1996 to be used in general and specific populations^[26]. In a study of Hurst *et al*^[27], it was found to be useful and valid measure, but slightly less reliable and less responsive than SF-36 in rheumatoid arthritis.

Nottingham Health Profile

The Nottingham Health Profile (NHP) is a 45-item generic questionnaire, designed to measure quality of life in terms of physical, psychological and social functions. It has two parts. First part has 38 questions that assess six components of health including sleep, energy, bodily

pain, and physical, social and emotional functioning. Second part includes seven aspects of daily life influenced by health status such as interests, personal relationships, social and sexual life and vacations. Scores range from 0 to 100. Higher scores indicate a poorer level of health status^[28,29]. The NHP has shown good construct validity, reliability and responsiveness^[30,31]. It was reported that it was a valid instrument as an outcome measure in rheumatoid arthritis^[32]. It has been also used for evaluating health-related quality of life of the patients with ankylosing spondylitis and osteoarthritis^[33,34].

Sickness Impact Profile

The Sickness Impact Profile is a generic health-related quality of life profile, developed in 1975. It consists of 189 items in 14 categories including social and family interaction, ambulation, mobility, sleeping and resting, nutrition, daily work, family administration, body motions, communicating, recreation and hobbies, intellectual and emotional functions, and hygiene. Its disadvantage is that it takes at least 35 min to complete^[35].

GENERIC MEASURES: UTILITY INSTRUMENTS

Utility instruments are measures that represent strength of an individual's preferences for various dimensions of health. The most important ones are EuroQol (EQ-5D), the SF-6D, and the Health Utilities Index (HUI)^[36].

EQ-5D

The EQ-5D is a generic utility instrument which is used in the clinical and economic assessment of health care and in clinical trials^[37]. The EQ-5D defines five components of health status as mobility, self-care, common activities, bodily pain and emotional status. It consists of 243 different health states^[5]. The EQ-5D has been commonly used in the studies of injury and diseases^[5,37]. It was reported that it was a valid instrument in measuring health-related quality of life of patients with rheumatoid arthritis^[38], while its reliability was fairly poor^[39].

SF-6D

The SF-6D is a six-dimensional utility instrument, revised from SF-36. It evaluates health status in terms of physical and social functions, role limitations, pain, mental status, and energy^[40]. The EQ-5D was found to be more responsive to deterioration and the SF-6D more responsive to improvement in early inflammatory disease, when compared^[41].

HUI mark 2 and 3

The HUI-2 and the HUI-3 are comprehensive, reliable, responsive and valid measures of health status and health-related quality of life. The HUI-2 comprises seven dimensions including sense, mobility, feeling, cognition, self-care, pain, and fertility. The HUI-3 includes eight di-

mensions: vision, hearing, speaking, ambulation, dexterity, emotion, cognition, and pain^[42].

DISEASE SPECIFIC MEASURES

Stanford Health Assessment Questionnaire

The Stanford Health Assessment Questionnaire (HAQ) is one of the most widely used instrument, developed in 1980 as an outcome measure in rheumatoid arthritis but has also been used in osteoarthritis, juvenile rheumatoid arthritis, systemic lupus erythematosus, fibromyalgia, spondyloarthritis, psoriatic arthritis, and systemic sclerosis. It is approved by the American College of Rheumatology for evaluating functional impairment in the patients with rheumatoid arthritis^[43,44]. The disability index of the scale includes 20 items and eight dimensions in terms of dressing, ascending, eating, walking, hygiene, reach, grip, and usual activities. It is commonly used as the HAQ scale, and sometimes as the HAQ disability index^[5,45].

A shortened version of the HAQ, modified HAQ (mHAQ) was developed by Pincus *et al*^[46] in 1983. It has eight items. Both the HAQ and the mHAQ are sensitive to change in clinical studies, but the HAQ was found to be more effective in determining alterations to the therapy, when compared with mHAQ^[47].

The Rheumatoid Arthritis Quality of Life Questionnaire

The Rheumatoid Arthritis Quality of Life Questionnaire (RAQoL) is a rheumatoid arthritis-specific measure that includes 30 questions about psychological state, public life, interests, daywork, personal and social relationships, and physical contact. The RAQoL has shown good construct validity, reliability, and responsiveness in rheumatoid arthritis^[39,45]. It was reported that the RAQoL was the most responsive instrument when compared with HAQ, EQ-5D, SF-6D, and HUI^[45].

HAQ and RAQoL have greater ability to assess functional status and detect smaller changes in rheumatoid arthritis, compared with generic measures^[48].

Arthritis impact measurement scales

The arthritis impact measurement scales (AIMS) was developed by Meenan *et al*^[49] in 1980 to measure disease-specific health-related quality of life in patients with arthritis. The AIMS consists of 45 items and nine dimensions including locomotion, physical activities, dexterity, family activities, social activities, daily living activities, pain, and psychological status^[49].

The expanded version of the AIMS (AIMS-2) was developed in 1992. It comprises 101 items and 12 dimensions including limb functions, social assistance, and work^[50].

Both AIMS and AIMS-2 were specifically developed for use among adults with rheumatoid arthritis and osteoarthritis, but they have been used in different conditions such as spondyloarthritis, psoriatic arthritis, fibromyalgia, and nerve entrapment syndromes^[23].

McMaster Toronto Arthritis Patient Preference Disability Questionnaire: The McMaster Toronto Arthritis Patient Preference Disability Questionnaire is a rheumatoid arthritis-specific questionnaire that assesses impairment in functional activities selected by the patient. It includes 5 items assessing the ability to perform the activities that have been affected by arthritis^[51]. It is valid and responsive instrument to evaluate change in functional status of the patients with early active rheumatoid arthritis, but its feasibility is limited^[52]. Evaluating each people according to different activities may be problematic. Also it was noted that the scoring system was complex and required amendments^[53].

Western Ontario and McMaster Universities Osteoarthritis Index: The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) is a multi-dimensional, self-administered instrument that assesses health status in patients with hip and/or knee osteoarthritis. It includes 24 items and three dimensions including pain, stiffness and functional impairment^[54,55]. The WOMAC has been shown to be a reliable, valid and responsive outcome measure in the patients with hip and/or knee osteoarthritis^[56]. It was specifically developed for use among adults with knee or hip osteoarthritis, but it has been used among patients with rheumatoid arthritis^[57], and fibromyalgia^[58].

Lequesne Index: The Lequesne Index is a 10-item self-administered instrument, designed to evaluate health status in patients with knee and/or hip osteoarthritis. It includes three dimensions which assess pain, discomfort and morning stiffness; maximum distance walked and walking aid used; and activities of daily living. Total score ranges from 0 to 24^[59,60]. In a study of Theiler *et al*^[61], the Lequesne index was found to be less responsive than the WOMAC in patients with osteoarthritis of the lower limbs.

Knee Disability and Osteoarthritis Outcome Score: The Knee Disability and Osteoarthritis Outcome Score (KOOS) is a knee-specific functional assessment measure, developed by Roos *et al*^[62] in 1998. It has 42 items that assess five outcomes: pain, other symptoms, daily life activities, sport and recreational activities, and knee-related quality of life.

KOOS-Physical Function SF: The KOOS-Physical Function SF is a shortened version of KOOS, developed by Perruccio *et al*^[63] in 2008. It consists of seven questions about physical functions of knee^[64]. It was found to be responsive to medical treatment among participants with knee OA^[65].

Hip Disability and Osteoarthritis Outcome Score: The Hip Disability and Osteoarthritis Outcome Score (HOOS) is a hip osteoarthritis-specific functional assessment measure, developed by Klässbo *et al*^[66] in 2003. It

includes 40 items, which assess five dimensions: pain, other symptoms comprising stiffness and limitation of range of motion, daily life functions, sport and recreational activities, and hip-related quality of life. It was found to be more responsive than the WOMAC in total hip replacement^[67].

HOOS-Physical Function SF: It is the shortened version of HOOS, developed by Davis *et al*^[68] in 2008. It comprises five questions including climbing down the stairs, getting in or out of bath, sitting, running and twisting on loaded leg. The psychometric properties of the HOOS-Physical Function SF were found to be comparable to those of the WOMAC and Lequesne^[69].

Fibromyalgia Impact Questionnaire: The Fibromyalgia Impact Questionnaire (FIQ) is a 10-item, fibromyalgia-specific questionnaire that evaluates physical ability, work status, psychological status, sleeping, pain, stiffness, fatigue, and well-being in patients with fibromyalgia^[70]. The FIQ was found to be the optimal outcome measure in sensitivity to changes in perceived clinical enhancement in fibromyalgia^[71].

The Psoriatic Arthritis Quality of Life Scale: The Psoriatic Arthritis Quality of Life is the first patient reported, 20-item psoriatic arthritis-specific health-related quality of life instrument^[72]. It has shown reliability and construct validity^[73]. Its sensitivity to changes was demonstrated^[74].

Gout Assessment Questionnaire 1.0: The Gout Assessment Questionnaire 1.0 (GAQ 1.0) is a 21-item disease specific measure that collects information about gout impact on health-related quality of life in terms of pain, well-being, productivity, and treatment satisfaction. The GAQ 1.0 has acceptable psychometric properties^[75,76].

The expanded version of the GAQ (GAQ 2.0) was developed in 2008 by Hirsch *et al*^[77]. It has 24 items that evaluate the impact of acute and chronic gout on health-related quality of life. It has shown acceptable reliability and validity characteristics^[76,78].

Dougados Functional Index: The Dougados Functional Index (DFI) is an index of functional impairment in ankylosing spondylitis^[79]. It has 20 items about performing various daily living activities including dressing, getting in bath tub, standing for ten minutes, ascending one flight of steps, running, sitting down, getting up from a chair, getting into a car, bending over to pick up an object, crouching, lying down, turning in bed, getting out of bed, sleeping on their back and stomach, doing your daily activities, coughing or sneezing, and breathing deeply. Low responsiveness in the DFI scores was reported in clinical studies^[79,80].

Bath Ankylosing Spondylitis Functional Index: The Bath Ankylosing Spondylitis Functional Index (BASFI) is a 10-item questionnaire that evaluates functional status

in patients with ankylosing spondylitis^[81]. Patients define their ability to put on their clothes, to bend forward from the waist to pick up an object from the floor, to reach up to a high shelf, to get up out of an armless chair, to get up off the floor from lying on their back, to stand for ten minutes without any difficulty, to ascend the stairs, to look over their shoulder without turning their body, to perform physical activities, and to perform daily activities. Total score ranges from 0 to 10^[80,81]. It was reported that the BASFI performed better than the DFI in symptom modifying antirheumatic drug and disease controlling antirheumatic therapy clinical trials^[82].

Ankylosing Spondylitis Quality of Life Scale: The Ankylosing Spondylitis Quality of Life is an ankylosing spondylitis-specific health-related quality of life instrument, developed by Doward *et al.*^[83]. It has 18 questions that evaluate impact of ankylosing spondylitis on the health-related quality of life. It has shown reliability and construct validity.

CONCLUSION

Musculoskeletal diseases have negative impact on functional status and health-related quality of life in terms of daily life activities, bodily pain, and social and emotional functioning. Functional assessment and health-related quality of life measures are increasingly being used to evaluate health outcome in clinical studies of patients with rheumatologic diseases.

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