Health-related quality of life in multiple musculoskeletal conditions: a cross-sectional population based epidemiological study. II. The MAPPING study

F. Salaffi, R. De Angelis, A. Stancati, W. Grassi, on behalf of the MArche Pain Prevalence INvestigation Group (MAPPING) Study*

Dipartimento di Patologia Molecolare e Terapie Innovative, Cattedra di Reumatologia - Università Politecnica delle Marche, Italy

Abstract

Objective

Musculoskeletal conditions are a major burden on individuals, health systems, and social care systems. The objective of the MAPPING study was to assess the impact of musculoskeletal conditions on health-related quality of life (HRQL) in an Italian population sample.

Methods

Trained rheumatologists carried out structured visits in which subjects were asked about musculoskeletal symptoms and socio-demographic characteristics, completed validated instruments for measuring HRQL, such as the Short Form 36 items status survey questionnaire (SF-36), the EUROQoL five item questionnaire (EQ-5D), and chronic pain severity (Chronic Pain Grade - CPG questionnaire), and underwent a standardized physical examination. We considered a sample size of 576 patients diagnosed as having had musculoskeletal conditions. For the purposes of this study, musculoskeletal diseases were classified into 4 diagnostic groups: inflammatory rheumatic diseases (IRD), symptomatic peripheral osteoarthritis (SPOA), low back pain (LBP), and soft tissue disorders (STD). Cases were defined by previously validated criteria.

Results

The 4 major musculoskeletal disease groups, compared to non-sufferers, significantly impaired all eight health concepts of the SF-36 in the following order of magnitude: IRD, SPOA, STD, and LBP. Similar results were found for EQ-5D. The most striking impact was seen for SF-36 physical measures. On multiple regression modelling the physical component (PCS) of the SF-36 was influenced by female sex, age, high BMI, and low educational level (all at a p level < 0.001), and by manual occupation ($p = 0.028$) and chronic co-morbidity ($p = 0.035$) in LBP. In SPOA, factors influencing physical function were age ($p = 0.0001$), low educational level ($p = 0.006$), female sex ($p = 0.028$), and chronic co-morbidity ($p = 0.037$). Moreover, an association on chronic co-morbidity and low educational level (both at a p level < 0.001), age ($p = 0.004$), and manual occupation ($p = 0.035$) was found with IRD, as well as of chronic co-morbidity and low educational level (both at a p level < 0.001), female sex ($p = 0.006$) and high BMI ($p = 0.036$) with STD were also found. Similar results were found for EQ-5D.

Conclusions

The MAPPING study indicates that musculoskeletal conditions have a clearly detrimental effect on the HRQL and one third of the adult population in Italy visited at least one physician for musculoskeletal problem in the past year. These results enable a comparison to be made of the burden of musculoskeletal conditions with that of other common chronic conditions.

Key words

Musculoskeletal conditions, health-related quality of life, pain, disability, health survey.

Fausto Salaffi, MD, PhD, Assistant Professor of Rheumatology; Rossella De Angelis, MD, PhD, Researcher; Andrea Stancati, MD; Walter Grassi, Head, Professor of Rheumatology.

**Members of the MAPPING study are shown in the appendix.*

Please address correspondence to: Fausto Salaffi, MD, PhD, Dipartimento di Patologia Molecolare e Terapie Innovative, Cattedra di Reumatologia, Università Politecnica delle Marche, Ospedale A. Murri, Via dei Colli no. 52, 60035 Jesi (Ancona), Italy
E-mail: fsalaff@tin.it

Received on March 5, 2005; accepted in revised form on October 28, 2005.

Introduction

The Bone and Joint Decade 2000-2010 has been established to increase awareness of the impact of musculoskeletal conditions on the individual, the health care system and society (1). To describe the global burden of musculoskeletal diseases now and in the future is a central goal of the decade (1). Comparative studies on the impact of musculoskeletal conditions across countries can help to provide an understanding of country-specific factors contributing to the burden of disease and can help to target the patients' needs specifically (2, 3). However, few studies have been performed in the past decade and many of those available have methodological shortcomings (4-9). In addition, the organization and quality of healthcare provided to patients can influence the disease severity, and socioeconomic characteristics can influence the perceived health status (10-12).

Increasingly, health status is being measured using health-related quality of life (HRQL) instruments (13). HRQL is a multi-domain construct that refers to those aspects of human life and activities that are generally affected by health conditions or health services (14), although, in the case of disease, almost all aspects of life can become health related (15). Specific examples of HRQL domains include pain, functional status, psychological distress, fatigue, and other key patient symptoms (16). The Medical Outcomes Study Short Form 36 (SF-36) items status survey questionnaire (17) and the EUROQoL five item questionnaire (EQ-5D) for measuring HRQL (18, 19) are emerged as being the most widely used generic instruments for measuring perceived health status in various diseases and conditions, and has also been suggested to be the most appropriate generic instrument for use in musculoskeletal conditions. The SF-36 has been translated and validated in several countries including Italian (20), and has been found to be a valid measure of change in population health (21-23). These instruments have been shown acceptable psychometric properties in patients with rheumatoid arthritis (RA) (21-30) osteoarthritis (OA) (31-35), chronic back disorders (36, 37), chronic widespread pain and fibromyalgia (38-41) and has been used as a HRQL measure in clinical studies in a variety of musculoskeletal conditions (42-45). Most of these studies focused on only one musculoskeletal disease, but co-morbidity of musculoskeletal conditions is common. In addition, comparison between studies is often limited owing to differences in study design, case definition and selection, age group, presentation of the data, and probably also language and culture. Data on HRQL in patients with different musculoskeletal conditions should preferably be based on a single large dataset and should take into account the coexistence of musculoskeletal diseases. In this paper we present data on HRQL (using both SF-36 and EQ-5D) for different musculoskeletal conditions as assessed in a population-based survey in Italy.

Patients and methods

Sample and data collection procedures

We considered a sample size of 576 patients diagnosed as having had musculoskeletal conditions. For the purposes of this study, musculoskeletal conditions were classified into 4 diagnostic groups: inflammatory rheumatic diseases (IRD), symptomatic peripheral osteoarthritis (SPOA), low back pain (LBP), and soft tissue disorders (STD). At the time of HRQL assessment, patients underwent complete clinical and laboratory investigations. The methods used for definitions and case identification made on the basis of the American College of Rheumatology (ACR, formerly the American Rheumatism Association) criteria (46-53), the criteria of other international study groups (54, 55), or internationally used criteria (56-63) have been detailed elsewhere (64) (Table I).

In all patients, the presence of co-morbidities was also assessed. These were ascertained through patient's self-reports using additional questions probed for the presence of nine specific co-morbid conditions (hypertension, myocardial infarction, lower extremity arterial disease, major neurological

Table I. Classification criteria in the MAPPING study.

Disease	Criteria
Rheumatoid arthritis	At least 4 of the American Rheumatism Association (ARA) 1987 classification criteria (46).
Seronegative spondyloarthropathies	Classification criteria for spondyloarthropathies from European Spondyloarthropathy Study Group (54).
* Ankylosing spondylitis	Back pain > 3 months, bilateral sacroiliitis or more and/or syndesmophytes and/or squared vertebrae in radiographs (54).
* Psoriatic arthritis	Psoriasis with peripheral arthritis and/or axial involvement, excluding RF-positive polyarthritis (56).
* Reactive arthritis	Previous gastrointestinal or urogenital tract infection associated with peripheral synovitis or with axial inflammatory signs and positive culture or elevated levels of antibodies against bacteria associated with reactive arthritis (59).
* Arthritis associated with inflammatory bowel diseases	Ulcerative colitis or Crohn disease with history or present inflammatory spinal pain/asymmetric arthritis (54).
* Other spondyloarthropathies	Inflammatory back pain with scintigraphic or magnetic resonance imaging sacroiliitis or with peripheral arthritis with or without dactylitis or enthesitis (54, 57).
Connective tissue diseases	
* Systemic sclerosis	Diffuse or limited scleroderma according to the classification criteria proposed (47).
* Systemic lupus erythematosus	At least 4 criteria according to the 1982 revised criteria (48).
* Sjögren syndrome	At least 4 of the preliminary diagnostic criteria proposed by the European Community Study Group (55).
* Undifferentiated connective tissue disease	Presence of clinical symptoms and serologic abnormalities suggestive of an autoimmune disease, but not sufficient to fulfil the diagnostic criteria of defined connective tissue disease (61).
Rheumatic polymyalgia	At least 3 of the proposed classification criteria (58).
Crystal induced arthritis	
* Gout	Typical clinical picture with elevated serum acid uric level or with monosodium urate crystals in synovial fluid (49).
* Chondrocalcinosis	Typical clinical picture with calcium pyrophosphate or chondrochalcinosis in radiographs (60).
Symptomatic peripheral osteoarthritis	
* Osteoarthritis (knee, hand, hip)	Osteoarthritis of the knee is present if the items present are 1, 2, 3, 4 (or 1, 2, 5 or 1, 4, 5) of the American College of Rheumatology (ACR) criteria (50). Osteoarthritis of the hand is present if the items present are 1, 2, 3, 4 (or 1, 2, 3, 5) of the ACR criteria (51). Osteoarthritis of the hip is present if the items present are 1, 2, 3 (or 1, 2, 4 or 1, 3, 4) of the ACR criteria (52).
Low back pain	Pain localized in the back area between the lower limits of the chest and the gluteal folds, either radiating or not along a lower extremity (62).
Soft tissue disorders	
* Fibromyalgia	Chronic widespread pain and at least 11 of 18 specified tender points (53).
* Carpal tunnel syndrome	Diagnosis supported by clinical examination (Tinel nerve percussion and Phalen test), combined with electrophysiological median neuropathy (63).

problem, diabetes, gastrointestinal disease, chronic respiratory disease, kidney disease, and poor vision). The algebraic sum of positive responses was calculated for each subject, giving a comorbidity factor with a possible range from 0 to 9. Moreover, HRQL assessment was performed in a group of 1579 healthy subjects as controls. These subjects had also participated in the survey about the occurrence of musculoskeletal pain, details of which are given in the part I of the Mapping study (64). The medical ethics committee approved the study and all patients gave their written consent.

Questionnaires

The questionnaire sought socio-demographic data (age, gender, education, employment status, occupation, body mass index-BMI), information on musculoskeletal pain, and a validated instrument for assessing chronic pain severity and HRQL. Age is given in years. Educational level was separated into three categories based on the Italian school system: 1 = primary school, 2 = secondary school, and, 3 = high school or university. The BMI was derived from the self-reported height and weight (body weight divided by the square of the height).

Chronic pain assessment. Chronic pain severity was assessed using the Chronic Pain Grade (CPG) questionnaire (65). The CPG consists of the following seven items. Current pain intensity, worst pain intensity, and average pain intensity in the past six months were assessed by three items using an 11-point rating scale (0 =''no pain'', 10 =''pain as bad as could be''). One item assessed the number of days during that period that the respondent has been kept from his/her usual activities (work, school or housework). The remaining three items assessed disability in the past six months. The extent of interfer-

ence with daily activities, the ability to take part in recreational, social and family activities, and the ability to work (including housework) was assessed using an 11-point rating scale (0 = "no interference", 10 = "unable to carry on any activities"). The questionnaire classifies chronic pain into four hierarchical grades: Grade I (low disability - low intensity), Grade II (low disability - high intensity), Grade III (high disability - moderately limiting), and Grade IV (high disability - severely limiting) (65). The CPG is valid and reliable for use as a self-completion postal questionnaire in the general population (66) and is responsive to change over time (67).

Quality of life assessment. The HRQL was assessed using the Medical Outcomes Study 36-Item Short-Form (SF-36) Health Survey questionnaire (17) and EQ-5D (18,19). The SF-36 general health questionnaire is a generic instrument with scores that are based on responses to individual questions, which are summarized into 8 scales, each of which measures a health concept (17). These eight health concepts are Physical Functioning (PF), Role function-Physical aspect (RP), Bodily Pain (BP), General Health perception (GH), Vitality (VT), Social Functioning (SF), Role function Emotional aspect (RE), and Mental Health (MH) (17). For each of the SF-36 scales, necessary items are recoded so that higher values indicate better health, and then added. The summed scores are transformed to a 0-100 scale following its designated scoring algorithm, with higher scores reflecting better quality of life. The SF-36 has been validated for use in Italy (20) and most people can complete it within 15 min. Recently, the originators of the SF-36 have developed algorithms to calculate two psychometrically based summary measures: the Physical Component Summary Scale Score (PCS) and the Mental Component Summary Scale Score (MCS) (68). The PCS and MCS provide greater precision, reduce the number of statistical comparisons needed, and eliminate the floor and ceiling effects noted in several of the subscales (68).

The EQ-5D is a standardised, self-administered questionnaire that classifies the patient into one of 243 health states (18, 19). It describes HRQL in terms of five dimensions: mobility, self-care, usual activities (work, study, housework, family or leisure), pain/discomfort, and anxiety/depression. Each dimension is subdivided into three levels indicating no problem, a moderate problem or an extreme problem. A five-digit code number relating to the relevant level of each dimension can describe different health states. A perception of "own health state" VAS is also part of the EQ-5D but is scored separately. The anchors for this graduated 20 cm thermometer (0-100 points), with 100 are "Worst imaginable health state" at 0, and "Best imaginable health state" at 100. Respondents classify and rate their health on the day of the survey. Therefore, data from EQ-5D can be represented in three distinct forms; Part 1 may be presented either as a profile ($EQ\text{-}5D_{profile}$), based on the unweighted responses indicating a patient's level of problem in each of the five domains, or as a health index ($EQ\text{-}5D_{utility}$), by applying a suitable weighting system such as the utilities obtained from the UK national survey (18, 19, 69). Utility scores range from -0.59 to 1.00, with 0 being dead and 1.00 the state of full health. The VAS rating in Part 1 can be interpreted directly as a quantitative measure of the patients's valuation of their own global health status ($EQ\text{-}5D_{vas}$). EQ-5D is self-completed by respondents and ideally suited for use in postal surveys, clinics and face-to-face interviews. The $EQ\text{-}5D_{utility}$ and $EQ\text{-}5D_{vas}$ scores were used in this study. The validity and reliability of the EQ-5D have been found acceptable in Europe among different populations and patient groups (69, 70). Despite the limited number of dimensions and levels, the instrument has been found to be sensitive to improvements in HRQL (71).

Statistical analysis

Excel (Microsoft), SPSS (version 11.0), and MedCalc® software (version 7.4.2.0) for Windows XP, were used to perform all analyses. Mann-Whitney non-parametric analysis was used to compare mean values. The Spearman's correlation coefficient was used to evaluate the relationship between pain measures and the mental component of SF-36. A probability value of $p < 0.05$ was considered significant; 95% confidence intervals (CI) were given where relevant.

A chi-square analysis was also used to evaluate for differences in demographic characteristics and various health and illness variables between persons with musculoskeletal diseases and those without musculoskeletal diseases. A variety of factors shown by chi-square detection to be significantly associated with poor HRQL in major rheumatic groups were identified for further analysis: age (as a continuous variable); sex (as a dichotomous variable; 0 = male; 1 = female); BMI (as a continuous variable); educational level (years of education as a continuous variable); and manual or non-manual occupation (as a dichotomous variable: 1 = manual occupation; 0 = non-manual occupation), and reported co-morbid conditions. All these factors were then introduced as covariates in multiple regression models in which SF-36 PCS and EQ-5D score were dependent variables. Variables were entered simultaneously.

Results

Demographics

576 patients (358 females, 218 males) with musculoskeletal conditions, classified into 4 diagnostic groups, were studied: IRD (N = 66 patients), SPOA (N = 193 patients), LBP (N = 127 patients), and STD (N = 190 patients). The mean age of the group with musculoskeletal conditions was 61.5 ± 13.5 yr. The mean age of the control group of 1579 healthy subjects was 55.2 ± 19.2 yr, with a significant difference ($p < 0.001$). In total, we found that 30.1% of the subjects in the sample (576 patients diagnosed as having had musculoskeletal conditions plus 1579 healthy controls) had visited a physician for musculoskeletal problems in the past year. Extrapolating the Italian's adult population, more than 14 million people consult a physician with a problem related to the musculoskeletal system annually.

Severity of pain and health-related quality of life

The percentage of patients reporting severe chronic pain (grade III and IV) on CPG questionnaire, resulting in high disability, was highest for IRD (22.7%), intermediate for LBP (12.6%), and lowest for SPOA and STD (10.4% and 9.5%, respectively) (Fig. 1). There were significant differences in the distribution of grades of pain between men and women ($p < 0.005$), and the frequency of the more severe pain grades increased with age ($p < 0.001$). Table II provides statistics summarizing the mean, standard deviation, and 95% confidence intervals for the mean for each of the aspects of health status covered by the SF-36 and EQ-5D for the different diagnostic groups and controls. Mann-Whitney non-parametric analysis was performed to test for differences. The 4 major rheumatic disease groups, compared to non-sufferers, significantly impaired all eight health concepts of the SF-36 in the following order of magnitude: IRD, SPOA, STD, and LBP. Similar results were found for EQ-5D (Table II). The most striking impact was seen for SF-36 physical measures "physical role" and "physical functioning", as well as "bodily pain" (Fig. 2). Women and older age adults tended to report lower SF-36 scores. For the SF-36 summary scales (SF-36 PCS and SF-36 MCS), we have strong evidence that the mean (95% CI for mean) of the scores differ significantly between the CPG groups ($p < 0.0001$) (Fig. 3). We also investigated the relationship between pain scores with SF-36 MCS in all suffering patients. The SF-36 health concept Bodily Pain and pain intensity of the CPG questionnaire correlated well (both at a $p < 0.0001$) with the SF-36 MCS scale scores.

Risk factors associated with poor health-related quality of life

To test the association between the musculoskeletal conditions and the SF-36 PCS scores, we first studied the bivariate effect of different variables on these scores. The factors associated with worse SF-36 PCS scores in the bivariate analysis were female sex ($p < 0.001$), age ($p < 0.001$), low education-

Table II. Descriptive statistics and features of HRQL score distributions for patients with musculoskeletal disorders (no. of patients = 576) and healthy controls (no. of subjects = 1579).

	IRD (n = 66)		SPOA (n =193)		LBP (n = 127)		STD (n = 190)		Controls (n = 1579)	
	Mean score (SD)	95% CI for mean	Mean score (SD)	95% CI for mean	Mean score (SD)	95% CI for mean	Mean score (SD)	95% CI for mean	Mean score (SD)	95% CI for mean
SF-36 subscales										
Physical function	55.4 (24.7)‡	49.3-61.4	51.7 (23.8)‡	48.3-55.1	65.6 (24.5) †	61.4-70.0	67.8 (23.3) †	64.5-71.2	82.5 (20.7)	81.8-83.9
Role limitations (physical)	35.6 (31.5)‡	25.9-45.5	37.9 (35.6)‡	32.7-43.2	44.3 (37.2)‡	37.7-50.8	41.9 (38.7) ‡	36.5-47.5	73.1 (36.7)	71.3-74.9
Bodily pain	44.3 (20.1)‡	39.3-49.2	49.8 (15.6)‡	47.6-52.1	50.0 (21.3)‡	46.4-53.6	50.2 (21.3)‡	47.1-53.2	78.5 (20.8)	77.5-79.6
Energy/vitality	45.2 (20.9)‡	40.1-50.4	47.9 (18.9)‡	45.2-50.6	46.5 (17.5)‡	43.4-49.5	48.1 (17.3)‡	45.6-50.6	56.8 (15.4)	56.1-57.7
Role limitation (emotional)	45.5 (40.4)‡	34.5-56.4	50.4 (42.5)‡	44.2-56.4	54.8 (36.3) †	48.5-61.3	52.9 (43.6)‡	46.7-59.2	72.1 (38.1)	70.1-73.9
Mental health	54.5 (19.0) †	49.8-59.1	56.9 (18.8) †	54.2-59.6	56.7 (17.8) †	53.4-59.8	57.4 (19.1) †	54.7-60.2	63.6 (16.8)	62.8-64.5
Social function	56.4 (23.5) †	50.6-62.2	60.7 (22.8) †	57.5-63.9	62.1 (23.1) †	58.1-66.2	61.1 (22.5) †	57.9-64.3	71.6 (20.0)	70.6-72.6
General health perceptions	38.2 (20.6)‡	33.2-43.3	46.4 (19.4)‡	43.4-48.9	49.7 (19.6)‡	46.3-53.2	47.2 (18.2)‡	44.6-49.8	60.1 (18.1)	59.2-60.9
SF-36 PCS (mean=50;SD=10)	35.8 (8.3)‡	33.8-37.9	36.6 (8.2)‡	35.4-37.7	40.1 (9.8)‡	37.0-41.9	40.0 (8.0)‡	38.5-41.2	49.6 (8.9)	49.2-50.1
SF- 36 MCS (mean=50;SD=10)	41.3 (10.3)†	38.7-43.8	43.1 (10.8) *	41.6-44.7	41.9 (9.5) †	40.3-43.6	41.8 (10.7) †	40.3-43.3	45.6 (9.4)	43.1-46.1
EQ-5D										
EQ-5D utility	0.58 (0.20)‡	0.53-0.63	0.62 (0.12)‡	0.61-0.66	0.68 (0.13) †	0.65-0.71	0.64 (0.17) †	0.60-0.67	0.79 (0.11)	0.76-0.83
EQ-5D VAS	50.1 (16.5)‡	47.1-55.3	57.5 (17.5)‡	55.1-61.4	60.5 (16.2) †	57.2-64.4	61.8 (17.4) †	58.3-64.3	75.9 (15.5)	72.2-79.7

PCS: Physical Component Summary scale score; MCS: Mental Component Summary scale score; EQ-5D: European Quality of Life Questionnaire.
Significances were tested using non-parametric Mann-Whitney U test: *Significantly different from healthy controls at $p < 0.01$; †significantly different from healthy controls at $p < 0.001$; ‡ significantly different from healthy controls at $p < 0.0001$.

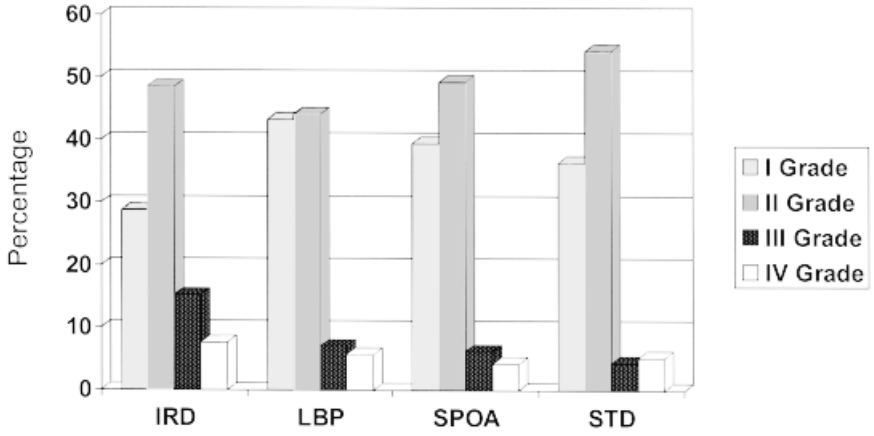

Fig. 1. Reported chronic pain severity by diagnostic groups (inflammatory rheumatic diseases -IRD, symptomatic peripheral osteoarthritis - SPOA, low back pain -LBP, soft-tissue disorders - STD).

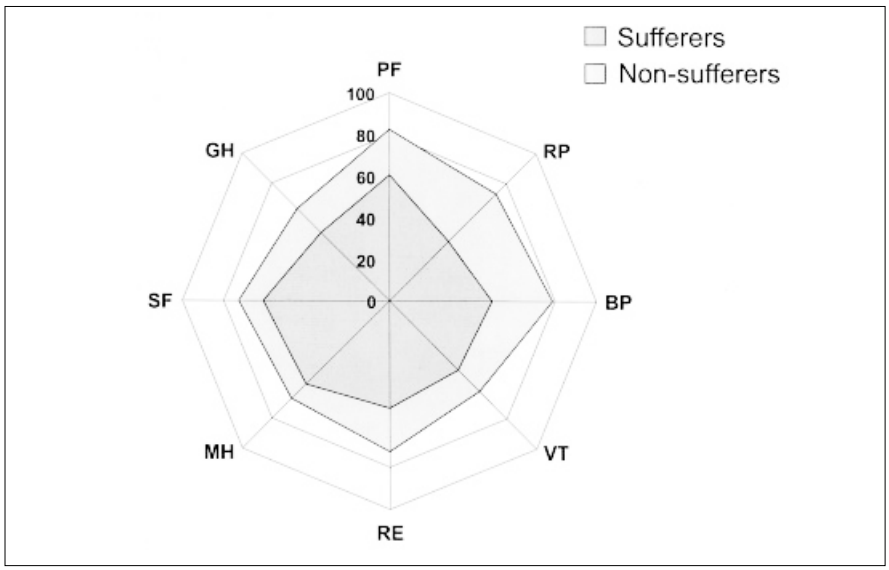

Fig. 2. Comparison of Medical Outcomes Short Form-36 health survey scores between sufferers and non-sufferers. Higher scores represent better health status.
Physical Functioning (PF), Role function - Physical aspect (RP), Bodily Pain (BP), Vitality (VT), Role function - Emotional aspect (RE), Mental Health (MH), Social Functioning (SF), and General Health perception (GH).

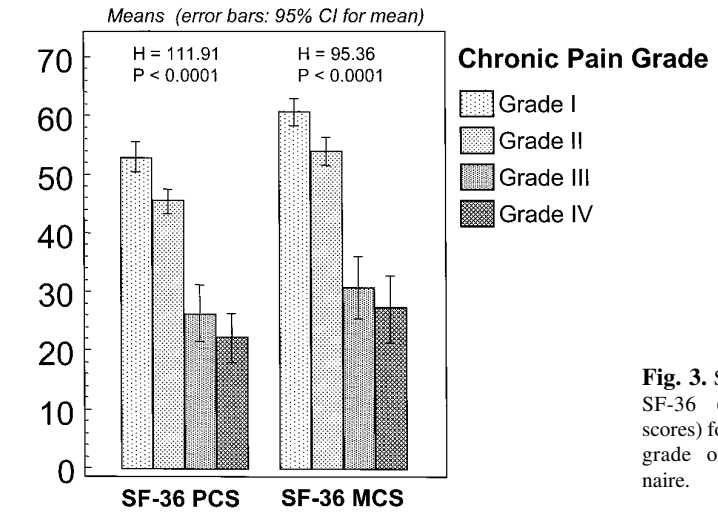

Fig. 3. Summary scores of SF-36 (PCS and MCS scores) for each hierarchical grade of CPG questionnaire.

al level ($p < 0.005$), high BMI ($p < 0.008$), manual occupation ($p < 0.03$), and having a diagnosis of co-morbid conditions ($p < 0.001$). All these factors were introduced as covariates in a multiple regression model in which SF-36 PCS score was dependent variable. The physical component (PCS) of the SF-36 was influenced by female sex, age, high BMI, and low educational level (all at a p level < 0.001), and by manual occupation ($p = 0.028$) and chronic co-morbidity ($p = 0.035$) in LBP. In SPOA, factors influencing physical function were age ($p = 0.0001$), low educational level ($p = 0.006$), female sex ($p = 0.028$), and chronic co-morbidity ($p = 0.037$). Moreover, an association on chronic co-morbidity and low educational level (both at a p level < 0.001), age ($p = 0.004$), and manual occupation ($p = 0.035$) was found with IRD, as well as of chronic co-morbidity and low educational level (both at a p level < 0.001), female sex ($p = 0.006$) and high BMI ($p = 0.036$) with STD were also found (Table III).

With regard to the mental component (SF-36 MCS), no association were found with age, high BMI, manual occupation and with low educational level, and the only significant associations appeared to be with female sex ($p < 0.01$) and with a diagnosis of any chronic diseases ($p < 0.005$) in SPOA and LBP. Concerning the EQ-5D, it was influenced by female sex, age, (both at a p level < 0.001), and chronic co-morbidity and low educational level (both at a p level < 0.01) in SPOA and STD. Similar association of female sex, chronic co-morbidity and low educational level (all at a p level < 0.01) in LBP, and by a chronic co-morbidity and low educational level (both at a p level < 0.01) in IRD were found.

Discussion

To the best of our knowledge, this is the first time that the burden of musculoskeletal conditions in adults, in terms of impact on HRQL have been described in a general sample of the Italian adult population. HRQL is not only a primary concern of patients, their families, and clinicians, but is also of policy interest. Estimates of the relative im-

Table III. Factors influencing physical function (SF-36 PCS): a multiple regression models.

IRD: Sample size 66 patients (regression equation)

Independent variables	Coefficient	Std. error	t	p
(Constant)	-11.62027			
Age	0.07808	0.02588	3.016	0.0038
Manual occupation	0.37663	0.17741	2.123	0.0358
Co-morbidity	0.18017	0.05072	3.553	0.0005
Educational level	-0.70670	0.20233	-3.493	0.0009

F ratio 35.2778 $p < 0.001$

LBP: Sample size 127 patients (regression equation)

Independent variables	Coefficient	Std. error	t	p
(Constant)	-16.19407			
Manual occupation	-1.35791	0.61198	2.219	0.0284
Age	0.37879	0.04182	2.857	0.0008
Co-morbidity	0.37663	0.17741	2.123	0.0358
Female sex	0.55491	0.04780	2.909	0.0009
Educational level	0.18017	0.05072	-3.553	0.0005
Body Mass Index	0.37473	0.29819	3.157	0.0007

F ratio 89.0715 $p < 0.01$

SPOA: Sample size 193 patients (regression equation)

Independent variables	Coefficient	Std. error	t	p
(Constant)	-21.28852			
Age	0.38129	0.08356	4.563	0.0001
Educational level	-0.20828	0.07532	-2.765	0.0063
Female sex	0.40643	0.20541	2.083	0.0288
Co-morbidity	0.40343	0.36474	1.987	0.0377

F ratio 48.0484 $p < 0.001$

STD: Sample size 190 patients (regression equation)

Independent variables	Coefficient	Std. error	t	p
(Constant)	-19.87788			
Educational level	0.54293	0.17877	-3.037	0.0007
Female sex	0.09586	0.03467	2.765	0.0063
Co-morbidity	0.18017	0.05072	3.553	0.0005
Body Mass Index	0.39484	0.01871	2.110	0.0362

F ratio 79.0715 $p < 0.001$

IRD: inflammatory rheumatic diseases; LBP: low back pain; SPOA: symptomatic peripheral osteoarthritis; STD: soft tissue disorders.

pact of chronic diseases on HRQL are needed to better plan and allocate resources for research, training, and health care.

The strength of our study is the assessment of multiple musculoskeletal conditions. The study confirms the severe multidimensional impact on HRQL reported in patients with musculoskeletal conditions, typically in the areas of pain, physical functioning or mobility, role limitation due to physical health problems, and usual activities (72-78). The worst quality of life patterns were found for IRD and LBP. The results were similar for both SF-36 and EQ-5D. In addition, the percentage of patients reporting severe chronic pain (CPG grade III or IV), resulting in high disability, was highest for IRD (22.7%), intermediate for LBP (12.6%), and lowest for SPOA and STD (10.4% and 9.5%), respectively. The results show that there are differences in scores between individuals according to their CPG in both summary scale score measured by the SF-36. As the grade increases from I to IV, mean scores on the SF-36 physical and mental dimension become progressively lower. This confirms the widespread impact of chronic musculoskeletal pain on all aspects of health, and supports the multidimensional view. Other studies have also shown that chronic musculoskeletal pain has severe impact on health status measured with SF-36 (40, 79, 80). The impact on the different health concepts has been reported to vary in regional pain syndromes, depending on location. Birrell *et al*. (81) found that hip pain had impact on physical function and pain, but only a small impact on wider aspects of health status, such as general health, vitality and mental health. Specifically, musculoskeletal diseases are associated with some of the poorest quality-of-life issues, particularly in terms of physical functioning, role functioning and bodily pain, were quality of life is lower than for gastrointestinal disorders, urogenital conditions, psychiatric disorders, chronic respiratory diseases, cerebrovascular/neurologic conditions, and cardiovascular conditions (28, 82-87). Our findings are also consistent with those found by Becker *et al*. (79) in chronic non-malignant pain (such as facial, thoracic, or rectal) patients referred to a multidisciplinary pain centre. This has important implications for the quantity and type of healthcare needed. Our findings that one out of three physician office visits was made for musculoskeletal conditions is similar to data (27%) found over a 2-week period in Finland (88) or that (29.7%) observed over a 1-yr period in the USA (89). Apart from the higher prevalence in women for nearly all of the rheumatic conditions analysed (with the exception of SpA and gout) (64), we also found that women had poorer HRQL than men in all dimensions of SF-36. These findings are consistent with those of previous reports (77, 90). In a Spanish epidemiological study, the SF-12 - a shortened version of SF-36 - was used to measure HRQL of adults with pain problems (73). The study found that persons reporting RA, LBP and OA of the knee scored lower on the SF-36 PCS but not on the SF-36 MCS (73). In a study carried out in Scotland analysing the impact on chronic pain in the community, it was found that chronic musculoskeletal pain was associated with poor health in all dimensions of SF-36 (91). Similar to the Scottish study (91), we found that chronic pain was associated with a decrease in health in all of the dimensions of SF-36. We also observed, in agreement with the Spanish study (73), that the

physical dimensions of the SF-36 were more strongly affected by pain than the psychological dimensions. Epidemiological studies have reported that apart from the gender difference there are other differences in the distribution of chronic musculoskeletal pain in the population. Several studies have found that socio-economic factors such as low education and psychological factors are associated with chronic pain-associated disability (75, 77, 92, 93). Years of formal education have been reported to be a risk factor for presence of chronic musculoskeletal pain and physical function in the community (92, 94). In outpatients with SPOA, Callahan *et al*. (94) found education to be related to pain severity as measured by a simple visual analogue scale. Previously, we found education to be related to physical function and pain as measured by Arthritis Impact Measurement Scales (AIMS2) (95) and Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index (34, 35). Our present data shows that a low educational level was not a risk factor of LBP and SPOA (64), but of LBP and SPOA disability. This is in line with the results of previous studies (65, 91, 96). The mechanism by which education influences pain disability or psychological process is unclear but may be related to enhanced self-efficacy and sense of control allowing the patient to take advantage of a greater number of pain reducing modalities. Co-morbidity between musculoskeletal conditions as well as other medical problems has been discussed (75, 82). Several studies, using data from the National Health Interview Survey Supplement on Aging (97) and Longitudinal Supplement on Aging (98), the Framingham Study (99), the Ontario Health Survey (90), and the Women's Health and Aging Study (100) have demonstrated the role of co-morbidities in the relationship between OA and disability. There is a growing amount of evidence to suggest that musculoskeletal pain-associated disability and psychological variables such as anxiety and depression may be an indicator for more severe pain behaviour, which has a central role in the chronic pain-processes (101, 102). In this study we didn't tried to examine these other components, but the high degree of interrelationship between pain scores (SF-36 bodily pain and CPG - pain intensity) and the SF-36 MCS, strongly supports the concept that pain intensity is a major component of the patient's global health response. As age, sex, educational level, occupation, and other chronic diseases were likely to be confounders, we controlled for these factors in the analyses as described above. A possible problem with this study was a selection bias due to non-response. This non-response might have exerted a differential bias across conditions. For example, one could imagine that persons with severe levels of musculoskeletal pain or disability are expected to be more motivated to complete a lengthy questionnaire than those with mild levels of disease (103, 104). Second, in a number of data sets the selection of patients was limited with respect to socio-demographic characteristics. Third, the representativeness may also have been affected adversely by limited sample size. Finally, the number of sub-samples per condition varies considerably. Clearly, the larger the number of subsamples the more likely the combination of samples will provide a representative picture of the particular disease. Despite these limitations, the data are expected to provide a realistic representation of these musculoskeletal conditions in the Italy, given the diversity and magnitude of the eight data sets, the face validity of the results, and the concordance with results from the literature.

In conclusion, this inception investigation demonstrates that the musculoskeletal conditions have a clearly detrimental effect on the HRQL and one third of the adult population in Italy visited at least one physician for musculoskeletal problem in the past year. This observation is in line with previous studies (73, 88, 89, 105). The physical domain is predominantly affected, but mental and social function are also impaired in comparison with control group findings. The SF-36 and the EQ-5D may be used as generic instruments to measure HRQL; they performed equally well in assessing HRQL in patients with musculoskeletal conditions. Longitudinal studies are required to identify factors associated with poor HRQL.

Acknowledgments

We acknowledge the inestimable help of council authorities and the GP of the cities involved in the study. The MAPPING study was supported partly through an unrestricted educational grant from Pfizer, Italy. Pfizer has neither provided funding to authors for preparation of the manuscript nor has Pfizer influenced the manuscript content.

Appendix

The full members of the MAPPING study given in alphabetical order, are as follows: D. Avaltroni, P. Blasetti, D. Brecciaroli, M. Carotti, A. Cerioni, A. Ciapetti, A. Farina, E. Filippucci, R. De Angelis, P. Del Medico, G. Garofalo, S. Gasparini, W. Grassi, M. Gutierrez, F. Salaffi, C.A. Silvestri, S. Scalini, A. Stancati.

References

1. WOLLHEIM FA: Scandinavia and the Bone and Joint Decade 2000-2010. A timely initiative. *Scand J Rheumatol* 1999; 28: 267-8.
2. SOKKA T: National databases and rheumatology research I: longitudinal databases in Scandinavia. *Rheum Dis North Am* 2004; 30: 851-67.
3. ALARCON GS: Epidemiology of rheumatoid arthritis. *Rheum Dis Clin North Am* 1995; 21: 589-604.
4. AMIT M, GUEDJ D, WYSENBEEK AJ: Expression of rheumatoid arthritis in two ethnic Jewish Israeli groups. *Ann Rheum Dis* 1996; 55: 69-72.
5. HAMEED K, GIBSON T: A comparison of the clinical features of hospital out-patients with rheumatoid disease and osteoarthritis in Pakistan and England. *Br J Rheumatol* 1996; 35: 994-9.
6. CIMMINO MA, PARISI M, MOGGIANA GL, MAIO T, MELA GS: Prevalence of self-reported peripheral joint pain and swelling in an Italian population: the Chiavari study. *Clin Exp Rheumatol* 2001; 19: 35-40.
7. AKAR S, BIRLIK M, GURLER O *et al*.: The prevalence of rheumatoid arthritis in an urban population of Izmir-Turkey. *Clin Exp Rheumatol* 2004; 22: 416-20.
8. CHIKANZA IC, STEIN M, LUTALO S, GIBSON T: The clinical, serologic and radiologic features of rheumatoid arthritis in ethnic black Zimbabwean and British Caucasian patients. *J Rheumatol* 1994; 21: 2011-15.
9. ADEBAJO AO, REID DM: The pattern of RA in West Africa and comparison with a

cohort of British patients. *Q J Med* 1991; 292: 633- 40.
10. WALTZ M: The disease process and utilization of health services in rheumatoid arthritis: The relative contributions of various markers of disease severity in explaining consumption patterns. *Arthritis Care Res* 2000; 13: 74-88.
11. FITZPATRICK F, BADLEY M: An overview of disability. *Br J Rheumatol* 1996; 35: 184-7.
12. BREKKE M, HJORTDAHL P, THELLE DS, KVIEN TK: Disease activity and severity in patients with rheumatoid arthritis: relations to socio-economic inequality. *Soc Sci Med* 1999; 48: 1743-50.
13. RUSSAK SM, CROFT JD, FURST DE *et al.*: The use of rheumatoid arthritis health-related quality of life patient questionnaires in clinical practice: lessons learned. *Arthritis Care Res* 2003; 49: 574-84.
14. PATRICK DL, CHIANG YP: Measurement of health outcomes in treatment effectiveness evaluations: conceptual and methodological challenges. *Med Care* 2000; 38 (Suppl. 9): II14-25.
15. GUYATT GH, FEENY DH, PATRICK DL: Measuring health-related quality of life. *Ann Intern Med* 1993; 118: 622-9.
16. FRANCHIGNONI F, SALAFFI F: Generic and specific measures for outcome assessment in orthopaedic and rheumatologic rehabilitation. *In*: M. BARAT, F. FRANCHIGNONI. *Assessment in Physical Medicine and Rehabilitation - Advances in Rehabilitation*. Eds. 2004; 16: 45-77.
17. WARE JE JR, SHERBOURNE CD: The MOS 36-item short form health survey (SF-36). 1. Conceptual frame-work and item selection. *Med Care* 1992; 30: 473-81.
18. BROOKS R, RABIN R, DE CHARRO F: The measurement and valuation of health status using the EQ-5D: A European perspective. Dordrecht: Kluwer; 2003.
19. DOLAN P: Modeling valuations for EuroQol health states. *Med Care* 1997; 35: 1095-108.
20. APOLONE G, MOSCONI P: The Italian SF-36 Health Survey: translation, validation and norming. *J Clin Epidemiol* 1998; 51: 1025-36.
21. TALAMO J, FRATER A, GALLIVAN S, YOUNG A: Use of the short Form 36 (SF-36) for health status measurement in rheumatoid arthritis. *Br J Rheumatol* 1997; 36: 463-9.
22. RUTA DA, HURST NP, KIND P, HUNTER M, STUBBINGS A: Measuring health status in British patients with rheumatoid arthritis: reliability, validity and responsiveness of the short form 36- item health survey (SF-36). *Br J Rheumatol* 1998; 37: 425-36.
23. SALAFFI F, STANCATI A, CAROTTI M: Responsiveness of health status measures patients with rheumatoid arthritis. *Clin Rheumatol* 2002; 21: 478-87.
24. HILL CL, PARSONS J, TAYLOR A, LEACH G: Health related quality of life in a population sample with arthritis. *J Rheumatol* 1999; 26: 2029-35.
25. ANGST F, AESCHLIMANN A, STEINER W, STUCKI G: Responsiveness of the WOMAC osteoarthritis index as compared with the SF-36 in patients with osteoarthritis of the legs undergoing a comprehensive rehabilitation intervention. *Ann Rheum Dis* 2001; 60: 834-40.
26. KVIEN TK, KAASA S, SMEDSTAD LM: Performance of the Norwegian SF-36 Health Survey in patients with rheumatoid arthritis II. A comparison of the SF-36 with disease-specific measures. *J Clin Epidemiol* 1998; 51: 1077-86.
27. BIRRELL FN, HASSELL AB, JONES PW, DAWES PT: How does the short form 36 health questionnaire (SF-36) in rheumatoid arthritis (RA) relate to RA outcome measures and SF-36 population values? A cross-sectional study. *Clin Rheumatol* 2000; 19: 195-9.
28. STAVEM K, LOSSIUS MI, KVIEN TK, GULDVOG B: The health-related quality of life of patients with epilepsy compared with angina pectoris, rheumatoid arthritis, asthma and chronic obstructive pulmonary disease. *Qual Life Res* 2000; 9: 865-71.
29. HUSTED JA, GLADMAN DD, FAREWELL VT, COOK RJ: Health-related quality of life of patients with psoriatic arthritis: a comparison with patients with rheumatoid arthritis. *Arthritis Rheum* 2001; 45: 151-8.
30. LEARDINI G, SALAFFI F, MONTANELLI M, GERTZELI S, CANESI B: A multicenter cost-of-illness study on rheumatoid arthritis in Italy. *Clin Exp Rheumatol* 2002; 20: 505-15.
31. FRANSEN M, EDMONDS J: Reliability and validity of the EuroQol in patients with osteoarthritis of the knee. *Rheumatology* 1999; 38: 807-13.
32. BRAZIER JE, HARPER R, MUNRO J, WALTERS SJ, SNAITH ML: Generic and condition-specific outcome measures for people with osteoarthritis of the knee. *Rheumatology* 1999; 38: 870-7.
33. LEARDINI G, SALAFFI F, CAPORALI R, ROVATI L, CANESI B, MONTANELLI R, and the Italian group for Study of the Costs of arthritis (GISCA): Direct and indirect costs of osteoarthritis of the knee. *Clin Exp Rheumatol* 2004; 22: 699-706.
34. SALAFFI F, LEARDINI G, CANESI B, MANNONI A, FIORAVANTI A, CAPORALI R, on behalf of Gonarthrosis and Quality Of Life Assessment (GOQOLA) Study Group: Reliability and validity of the Western Ontario and McMaster Universities (WOMAC) Osteoarthritis index in Italian patients with osteoarthritis of the knee. *Osteoarthritis Cartilage* 2003; 11: 551-60.
35. SALAFFI F, CAROTTI M, GRASSI W: Health-related quality of life in patients with hip or knee osteoarthritis: comparison of generic and disease-specific instruments. *Clin Rheumatol* 2005; 24: 29-37.
36. GARRATT AM, KLABER MOFFETT J, FARRIN AJ: Responsiveness of generic and specific measures of health outcome in low back pain. *Spine* 2001; 26: 71-7.
37. SUAREZ-ALMAZOR ME, KENDALL C, JOHNSON JA, SKEITH K, VINCENT D: Use of health status measures in patients with low back pain in clinical settings. Comparison of specific, generic and preference-based instruments. *Rheumatology* 2000; 39: 783-90.
38. WOLFE F, HAWLEY DJ: Measurement of the quality of life in rheumatic disorders using the EuroQol. *Br J Rheumatol* 1997; 36: 786-93.
39. STROMBECK B, EKDAHL C, MANTHORPE R, WIKSTROM I, JACOBSSON L: Health-related quality of life in primary Sjögren's syndrome, rheumatoid arthritis and fibromyalgia compared to normal population data using SF-36. *Scand J Rheumatol* 2000; 29:20-8.
40. NEUMANN L, BERZAK A, BUSKILA D: Measuring health status in Israeli patients with fibromyalgia syndrome and widespread pain and healthy individuals: utility of the short form 36-item health survey (SF-36). *Semin Arthritis Rheum* 2000; 29: 400-8.
41. BERGMAN S, JACOBSSON LTH, HERRSTRÖM, PETERSSON IF: Health status as measured by SF-36 reflects changes and predicts outcome in chronic musculoskeletal pain: a 3-year follow up study in the general population. *Pain* 2004: 108: 115-23.
42. WANG C, MAYO NE, FORTIN PR: The relationship between health related quality of life and disease activity and damage in systemic lupus erythematosus. *J Rheumatol* 2001; 28: 525-32.
43. RINALDI S, DORIA A, SALAFFI F *et al.*: Health-related quality of life in Italian patients with systemic lupus erythematosus. I. Relationship between physical and mental dimension and impact of age. *Rheumatology* 2004; 43: 1574-9.
44. SALAFFI F, STANCATI A, CAROTTI M, LORENZETTI R, GRASSI W: The impact of vertebral fractures on quality of life in postmenopausal women with osteoporosis. Validity of the Italian version of mini-Osteoporosis Quality of Life Questionnaire. *Reumatismo* 2005; 57: 81-94.
45. CHORUS AMJ, MIEDEMA HS, BOONEN A, VAN DER LINDEN SJ: Quality of life and work in patients with rheumatoid arthritis and ankylosing spondylitis of working age. *Ann Rheum Dis* 2003; 62: 1178-84.
46. ARNETT FC, EDWORTHY SM, BLOCH DA *et al.*: The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. *Arthritis Rheum* 1988; 31: 315-24.
47. SUBCOMMITTEE FOR SCLERODERMA CRITERIA OF THE AMERICAN RHEUMATISM ASSOCIATION DIAGNOSTIC AND THERAPEUTIC CRITERIA COMMITTEE: Preliminary criteria for the classification of systemic sclerosis (scleroderma). *Arthritis Rheum* 1980; 23: 581-90.
48. TAN EM, COHEN AS, FRIES JF, MASI AT, MCSHANE DJ, ROTHFIELD NF: The 1982 revised criteria for the classification of systemic lupus erythematosus. *Arthritis Rheum* 1982; 25: 1271-7.
49. WALLACE SL, ROBINSON H, MASI AT, DECKER JL, MCCARTY DJ, YU TF: Preliminary criteria for the classification of the acute arthritis of primary gout. *Arthritis Rheum* 1977; 20: 895-900.
50. ALTMAN RD, ASCH E, BLOCH DA *et al.*: Development of criteria for the classification and reporting of osteoarthritis: classification of osteoarthritis of the knee. *Arthritis*

Rheum 1986; 29: 1039-49.
51. ALTMAN R, ALARCON G, APPELROUTH D *et al*.: The American College of Rheumatology criteria for the classification and reporting of osteoarthritis of the hand. *Arthritis Rheum* 1990; 33: 1601-10.
52. ALTMAN R, ALARCON G, APPELROUTH D *et al*.: The American College of Rheumatology criteria for the classification of osteoarthritis of the hip. *Arthritis Rheum* 1991; 34: 505-14.
53. WOLFE F, SMYTHE HA, YUNUS MB *et al*.: The American College of Rheumatology 1990 criteria for the classification of fibromyalgia. Report of the Multicenter Criteria Committee. *Arthritis Rheum* 1990; 33: 160-72.
54. DOUGADOS M, VAN DER LINDEN S *et al*.: The European Spondylarthropathy Study Group preliminary criteria for the classification of spondylarthropathy. *Arthritis Rheum* 1991; 34: 1218-27.
55. VITALI C, BOMBARDIERI S, MOUTSOPOULOS HM *et al*.: Preliminary criteria for the classification of Sjögren's syndrome: results of a prospective concerted action supported by the European Community. *Arthritis Rheum* 1993; 36: 340-7.
56. MOLL JMH, WRIGHT V: Psoriatic arthritis. *Semin Arthritis Rheum* 1973; 3: 55-78.
57. RUDWALEIT M, VAN DER HEIJDE D, KHAN MA, BRAUN J, SIEPER J: How to diagnose axial spondyloarthritis early. *Ann Rheum Dis* 2004; 63: 535-43.
58. BIRD HA, ESSELINCKX W, DIXON AS, MOWAT AG, WOOD PH: An evaluation of criteria for polymyalgia rheumatica. *Ann Rheum Dis* 1979; 38: 434-9.
59. SIEPER J, RUDWALEIT M, BRAUN J, VAN DER HEIJDE D: Diagnosing reactive arthritis. Role of clinical setting in the value of serologic and microbiologic assay. *Arthritis Rheum* 2002; 46: 319-27.
60. MCCARTY DJ: Calcium pyrophosphate dihydrate crystal deposition disease. *In*: SCHUMACHER HR JR, editor. *Primer on the rheumatic diseases*. 10th ed. Atlanta: Arthritis Foundation; 1993: 219-22.
61. BODOLAY E, CSIKI Z, SZEKANEK Z *et al*.: Five-year follow-up of 665 Hungarian patients with undifferentiated connective tissue disease (UCTD). *Clin Exp Rheumatol* 2003; 21: 313-20.
62. FRANK JW, KERR MS, BROOKER AS *et al*.: Disability resulting from occupational low back pain: I: What do we know about primary prevention? A review of the scientific evidence on prevention before disability begins. *Spine* 1996; 21: 2908-17.
63. ATROSHI I, GUMMESSON, JOHNSSON, R, ORNSTEIN E, RANSTAM J, ROSÈN I: Prevalence of carpal tunnel syndrome in a general population. *JAMA* 1999; 281: 153-8.
64. SALAFFI F, DE ANGELIS R, GRASSI W, on behalf of the MArche Pain Prevalence INvestigation Group (MAPPING) Study. Prevalence of musculoskeletal disorders in an Italian population sample: results of a regional community-based study. I. The MAPPING study. *Clin Exp Rheumatol* 2005; 23: 819-28.
65. VON KORFF M, ORMEL J, KEEFE F, DWORKIN SF: Grading the severity of chronic pain. *Pain* 1992; 50: 133-49.
66. SMITH BH, PENNY KI, PURVES AM *et al*.: The Chronic Pain Grade questionnaire: validation and reliability in postal research. *Pain* 1997; 71: 141-7.
67. ELLIOTT AM, SMITH BH, SMITH WC, CHAMBERS WA: Changes in chronic pain severity over time: the Chronic Pain Grade as a valid measure. *Pain* 2000; 88: 303-8.
68. WARE J, KOSINSKI M, BAYLISS M, ROGERS WH, RAZEC A: Comparison of methods for the scoring and statistical analysis of SF-36 health profile and summary measures: summary of results from the Medical Outcomes Study. *Med Care* 1995; 4: AS264-79.
69. KIND P, DOLAN P, GUDEX C, WILLIAMS A: Variations in population health status: results from a United Kingdom national questionnaire survey. *Br Med J* 1998, 316: 736-41.
70. ELVIK R: The validity of using health state indexes in measuring the consequences of traffic injury for public health. *Social Science and Medicine* 1995, 40: 1385-98.
71. TIDERMARK J, BERGSTROM G, SVENSSON O, TORNKVIST H, PONZER S: Responsiveness of the EuroQol (EQ 5-D) and the SF-36 in elderly patients with displaced femoral neck fractures. *Qual Life Res* 2003; 12: 1069-79.
72. ROUX CH, GUILLEMIN F, BOINI S *et al*.: Impact of musculoskeletal disorders on quality of life: an inception cohort study. *Ann Rheum Dis* 2005; 64: 606-11.
73. CARMONA L, BALLINA J, GABRIEL R, LAFFON A, on behalf of the EPISER Study Group: The burden of musculoskeletal diseases in the general population of Spain: results from a national survey. *Ann Rheum Dis* 2001; 60: 1040-5.
74. URWIN M, SYMMONS D, ALLISON T *et al*.: Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. *Ann Rheum Dis* 1998; 57: 649-55.
75. BINGEFORS K, ISACSON D: Epidemiology, co-morbidity, and impact on health-related quality of life of self-reported headache and musculoskeletal pain - a gender perspective. *Eur J Pain* 2004; 8: 435-50.
76. PICAVET HSJ, HOEYMANS N: Health-related quality of life in multiple musculoskeletal diseases: SF-36 and EQ-5D in the DMC3 study. *Ann Rheum Dis* 2004; 63: 723-9.
77. ANDRIANAKONOS AA, MIYAKIS S, TRONTZAS P *et al*.: The burden of the rheumatic diseases in the general adult population of Greece: the ESORDIG study. *Rheumatology* 2005; 44: 932-8.
78. WOOLF AD, PFLEGER B: Burden of major musculoskeletal conditions. B*ulletin World Health Organization* 2003; 81: 646-56.
79. BECKER N, BONDEGAARD THOMSEN A *et al*.: Pain epidemiology and health related quality of life in chronic non-malignant pain patients referred to a Danish multidisciplinary pain center. *Pain* 1997; 73: 393-400.
80. PICAVET HSJ, SCHOUTEN JSAG: Musculoskeletal pain in the Netherlands: prevalences, consequences and risk groups, the DMC3-study. *Pain* 2003; 102:167-78.
81. BIRRELL F, CROFT P, COOPER C, HOSIE G, MACFARLANE G, SILMAN A: Health impact of pain in the hip region with and without radiographic evidence of osteoarthritis: a study of new attenders to primary care. The PCR Hip Study Group. *Ann Rheum Dis* 2000; 59: 857-63.
82. REGINSTER J-Y. The prevalence and burden of arthritis. *Rheumatology* 2002; 41 (Suppl. 1): 3-6.
83. SPRANGERS MAG, DE REGT EB, ANDRIES F *et al*.: Which chronic conditions are associated with better or poorer quality of life ? *J Clin Epidemiol* 2000; 53: 895-907.
84. GARRATT AM, RUTA DA, ABDELLA MI, BUCKINGHAM JK, RUSSELL IT: The SF-36 health survey questionnaire: an outcome measure suitable for routine use within the NHS ? *BMJ* 1993; 306: 1440-4.
85. KEMPEN GIJM, ORMEL J, BRILMAN EI, RELYVELD J: Adaptive responses among Dutch elderly: the impact of eight chronic medical conditions on health-related quality of life. *Am J Public Health* 1997; 87: 38-44.
86. JOHNSON JA, COONS SJ: Comparison of the EQ-5D and SF-12 in an adult US ample. *Qual Life Res* 1998; 7: 155-66.
87. LYONS RA, VUI LO S, LITTLEPAGE BNC: Comparative health status of patients with 11 common illnesses in Wales. *J Epidemiol Community Health* 1994; 48: 388-90.
88. REKOLA KE, KEINANEN-KIUKAANNIEMI S, TAKALA J: Use of primary health services in sparsely populated country districts by patients with musculoskeletal symptoms: consultations with a physician. *J Epidemiol Community Health* 1993; 47: 153-7.
89. YELIN E, CALLAHAN LF, for the National Arthritis Data Work Group: The economic cost and social and psychological impact of musculo-skeletal conditions. *Arthritis Rheum* 1995; 38: 1351-62.
90. BADLEY EM, RASOOLY I, WEBSTER GK: Relative importance of musculoskeletal disorders as a cause of chronic health problems, disability and health care utilization: findings from the 1990 Ontario Health Survey. *J Rheumatol* 1994; 21: 505-14.
91. SMITH B, ELLIOTT A, CHAMBERS W, SMITH W, HANNAFORD P, PENNY K: The impact of chronic pain in the community. *Fam Pract* 2001; 18: 292-9.
92. ETHGEN O, VANPARIJS P, DELHALLE S, ROSANT S, BRUYERE O, REGINSTER JY: .Social support and health-related quality of life in hip and knee osteoarthritis. *Qual Life Res* 2004; 13: 321-30.
93. SMITH BH, ELLIOTT AM, HANNAFORD PC, CHAMBERS WA, SMITH C: Factors related to the onset and persistence of chronic back pain in the community. *Spine* 2004; 29: 1032-40.
94. CALLAHAN LF, SMITH WJ, PINCUS T: Self-report questionnaires in five rheumatic diseases. *Arthritis Care Res* 1989; 2: 122-31.
95. SALAFFI F, PIVA S, BARRECA C, CACACE E, CIANCIO G, LEARDINI G, on behalf of Gonarthrosis and Quality of Life (GOQUOLA) Study Group: Validation of an Italian

version of the arthritis impact measurement scales 2 (ITALIAN-AIMS2) for patients with osteoarthritis of the knee. *Rheumatology* 2000; 39: 720-6.

96. GOUBET L, CROMBEZ G, DE BOURDEAUDHUIJ I: Low back pain, disability and back pain myths in a community sample: prevalence and interrelationships. *Eur J Pain* 2004; 8: 385-94.
97. VERBRUGGE LM, CATES DM, IKE RW: Risk factors for disability among U.S. adults with arthritis. *J Clin Epidemiol* 1991; 44: 167-82.
98. VERBRUGGE LM: Disability transitions for older persons with arthritis. *J Aging Health* 1992; 4: 212-43.
99. GUCCIONE AA, FELSON DT, ANDERSON JJ *et al*.: The effects of specific medical conditions on the functional limitations of elders in the Framingham Study. *Am J Public Health* 1994; 84: 351-8.
100. HOCHBERG MC, KASPER J, WILLIAMSON J, SKINNER A, FRIED LP: The contribution of osteoarthritis to disability: preliminary data from the women's health and aging study. *J Rheumatol* 1995; 22 (Suppl. 43): 16-8.
101. SALAFFI F, CAVALIERI F, NOLLI M, FERRACCIOLI GF: Analysis of disability in knee osteoarthritis. Relationship with age and psychological variables but not with radiographic score. *J Rheumatol* 1991; 18: 1581-6.
102. RÉTHELYI JM, BERGHAMMER R, KOPP MS: Co-morbidity of pain-associated disability and depressive symptoms in connection with socio-demographic variables: results from a cross-sectional epidemiological survey in Hungary. *Pain* 2001; 93: 115-21.
103. RUSTOEN T, WAHL AK, HANESTAD BR, LERDAL A, PAUL S, MIASKOWSKI C: Prevalence and characteristics of chronic pain in the general Norwegian population. *Eur J Pain* 2004; 8: 555-65.
104. BERGMAN S, HERRSTROM P, HOGSTROM K, PETERSSON IF, SVENSON B, JACOBSSON LT: Chronic muskuloskeletal pain, prevalence rates, and sociodemographic associations in a Swedish populations study. *J Rheumatol* 2001; 28: 1369-77.
105. MÄNTYSELKA P, KUMPUSALO E, AHONEN R *et al*.: Pain as a reason to visit the doctor: a study in Finnish primary health care. *Pain* 2001; 89: 175-80.