TOWARD A MULTIDIMENSIONAL HEALTH ASSESSMENT QUESTIONNAIRE (MDHAQ)

Assessment of Advanced Activities of Daily Living and Psychological Status in the Patient-Friendly Health Assessment Questionnaire Format

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Objective. To develop components of a multidimensional Health Assessment Questionnaire (MDHAQ) through the addition of new items in the "patient-friendly" HAQ format, including advanced activities of daily living (ADL), designed to overcome "floor effects" of the HAQ and modified HAQ (MHAQ) in which patients may report normal scores although they experience meaningful functional limitations, and psychological items, designed to screen efficiently for psychological distress in routine care.

Methods. The new MDHAQ items, as well as scales for pain, fatigue, helplessness, and global health status on a 2-page questionnaire, were completed by 688 consecutive patients with various rheumatic diseases, including 162 with rheumatoid arthritis (RA), 114 with fibromyalgia, 63 with osteoarthritis, 34 with systemic lupus erythematosus, 20 with vasculitis, 18 with psoriatic arthritis, 16 with scleroderma, and 261 with various other rheumatic diseases, over 2 years at a weekly academic rheumatology clinic.

Results. The new MDHAQ items have good testretest reliability and face validity. MHAQ scores were highest in patients with RA, and scores for other scales

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were highest in patients with fibromyalgia. On the advanced ADL, 58% of patients reported difficulty with errands, 68% with climbing stairs, 79% with walking two miles, 87% with participating in sports and games, and 94% with running or jogging two miles. On the psychological items, 75% of patients reported difficulty with sleep, 63% with stress, 61% with anxiety, and 57% with depression. Normal MHAQ scores were reported by 23% of patients and normal HAQ scores by 16% of patients who completed these questionnaires, while fewer than 5% had normal scores on the MDHAQ.

Conclusion. The MDHAQ items overcome in large part the "floor effects" seen on the HAQ and MHAQ, and are useful to screen for problems with sleep, stress, anxiety, and depression in the "patient-friendly" HAQ format. These data support the value of completion of a simple 2-page patient questionnaire by each patient at each visit to a rheumatologist.

The Health Assessment Questionnaire (HAQ) (1) and its derivatives, the modified HAQ (MHAQ) (2,3) and clinical HAQ (CLINHAQ) (4-6), are widely used to assess and monitor patients with rheumatic diseases (7). In patients with rheumatoid arthritis (RA), questionnaire data are as effective as any available clinical measure, including laboratory tests and radiographs, to predict functional disability (8-10), work disability (11), costs (12), joint replacement surgery (13), and premature mortality (14-16), as well as to detect changes in status in clinical trials (17). Data from the MHAQ are correlated significantly with data from traditional physical, radiographic, and laboratory measures (3). The HAQ, MHAQ, and CLINHAQ have also been found to be clinically informative in all rheumatic diseases (in addition to RA) in which they have been used,

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This questionnaire includes information from you to provide a record of your health status today. Please try to answer each question, even if you do not think it is related to your situation. There are no right or wrong answers. Please answer exactly as you think or feel. Thank you.

1. Please check (1/2) the ONE best answer for your abilities at this time:

Al	THIS MOMENT, are you able to:	Without ANY Difficulty	With SOME Difficulty	With MUCH Difficulty	UNABLE To Do
a.	Dress yourself, including tying shoelaces and			<u>+</u>	
	doing buttons?	1	2	3	4
b.	Get in and out of bed?	1	2	3	4
С.	Lift a full cup or glass to your mouth?	1	2	3	4
d.	Walk outdoors on flat ground?	1	2	3	4
e.	Wash and dry your entire body?	1	2	3	4
f.	Bend down to pick up clothing from the floor?	1	2	3	4
g.	Turn regular faucets on and off?	1	2	3	4
ĥ.	Get in and out of a car, bus, train or airplane?	1	2	3	4
i.	Run errands and shop?	1	2	3	4
j.	Climb up a flight of stairs?	1	2	3	4
k.	Walk two miles?	1	2	3	4
I.	Run or jog two miles?	1	2	3	4
m.	Drive a car 5 miles from your home?	1	2	3	4
n.	Participate in sports and games as you would like?	1	2	3	4
0.	Get a good night's sleep?	1	2	3	4
р.	Deal with the usual stresses of daily life?	1	2	3	4
q.	Deal with feelings of anxiety or being nervous?	1	2	3	4
r.	Deal with feelings of depression or feeling blue?	1	2	3	4

2. How much pain have you had because of your condition IN THE PAST WEEK? Place a mark on the line below to indicate how severe your pain has been:

NO	PAIN AS BAD AS
PAIN	IT COULD BE

3. The statements below concern your personal beliefs. Please circle the number beside each statement that best describes how you feel about the statement. There are no right or wrong answers.

		STRONGLY DISAGREE	DISAGREE	DO NOT AGREE OR DISAGREE	AGREE	STRONGLY AGREE
a.	My condition is controlling my life.	1	2	3	4	5
b.	l would feel helpless if I couldn't rely on other people for help with my condition.	1	2	3	4	5
С.	I am concerned that medicines cannot help me.	1	2	3	4	5
d.	The side effects of medicines are often worse than the disease.	1	2	3	4	5
e.	I often do not take my medicines as directed.	1	2	3	4	5
f.	No matter what I do, or how hard I try, I just can't seem to get relief from my symptoms.	1	2	3	4	5
g.	I am not coping effectively with my condition.	1	2	3	4	5
ĥ.	It seems as though fate and other factors beyond my control affect my condition.	1	2	3	4	5

4. How much of a problem has UNUSUAL fatigue or tiredness been for you OVER THE PAST WEEK? Place a mark on the line below.

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FATIGUE IS NO PROBLEM	<u> </u>	FATIGUE IS A MAJOR PROBLEM	
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Figure 1. Multidimensional Health Assessment Questionnaire, which includes the modified Health Assessment Questionnaire, advanced activities of daily living, and psychological items in the format of the Health Assessment Questionnaire, as well as visual analog scales for pain and fatigue, and the Rheumatology Attitudes Index to assess helplessness between the pain and fatigue scales.

including systemic lupus erythematosus (SLE) (18,19), fibromyalgia (18,20), ankylosing spondylitis (21), osteoarthritis (OA) (18,22), and scleroderma (18,23).

The MHAQ (2) was developed from the HAQ (1) initially for 3 purposes. First, most (but not all) of the information in the 20 HAQ items could be captured in 8 items, leaving space within a 2-4-page questionnaire for additional information concerning change in, and satisfaction with, status (2), pain (24), psychological distress (25-28), fatigue, medications, and other data (2,3,24,29-31), for routine clinical care. Second, scoring of the HAQ involves the highest score among 2 or 3 items in 8 categories, which may leave comparison of one activity of daily living (ADL) with another ADL from one iteration to another. Although this has not been a major problem in clinical use, there may be potential measurement advantages to scoring the same ADL at each iteration, as is done in the MHAQ (2). Third, scores on the HAQ are increased on the basis of patient use of aids and devices, which could occasionally result in a higher score despite improvement in function. For example, a patient may report that walking on flat ground is performed "with some difficulty" (score of 1), be given a cane and enjoy better walking, but continue to report "with some difficulty," which raises the score from 1 to 2, although function is improved.

While the HAQ, CLINHAQ, and MHAQ appear as useful clinically as any available questionnaire in the rheumatic diseases, 2 problems have been observed over the years in certain clinical applications. First, these questionnaires address relatively simple ADL, and a patient may report a normal score, but nonetheless experience meaningful functional limitations. This phenomenon, known as a "floor effect" (a ceiling effect for questionnaires in which higher scores indicate better status) (32), has become more prominent as goals of rheumatologic care have become more aggressive (33,34). Second, although responses on the HAQ appear to reflect patient psychological status (35), the HAQ does not directly assess psychological constructs which appear of considerable importance in patient outcomes (28, 36 - 38).

These considerations have led to further modification of the MHAQ toward a multidimensional HAQ (MDHAQ) to address 2 additional domains in the "patient-friendly" and widely accepted HAQ format. These domains include 1) assessment of functional status in 6 advanced ADL, including 5 not found on the HAQ, and 2) psychological items to assess depression, anxiety, poor sleep, and incapacity to deal with daily stress. In this report, we present analyses of the validity, reliability, and clinical utility of these new items in 688 consecutive patients with various rheumatic diseases seen over a 2-year period in a weekly academic rheumatology clinic.

PATIENTS AND METHODS

Patients. Since 1982, each patient seen at the Vanderbilt University rheumatology clinic by TP has routinely completed a 2–4-page patient self-report questionnaire at each visit, to assess functional status, pain, fatigue, helplessness, medications, and the presence of 57 symptoms, as described in detail elsewhere (30,39). A questionnaire, mounted on a clipboard, is given to each patient upon registration for the visit by the receptionist (in a cheerful and enthusiastic manner [39]). Patients generally complete the questionnaire in 10–15 minutes while waiting to see the physician. About 25% of patients require help from a family member or health professional to complete the questionnaire, which is willingly provided (30,39).

During the period of May 1994 through July 1997, the patient self-report questionnaire was completed by 688 consecutive patients, including 162 with RA, 114 with fibromyalgia, 63 with OA, 34 with SLE, 20 with vasculitis, 18 with psoriatic arthritis, 16 with scleroderma, and 261 with various other rheumatic diseases. Many patients completed the questionnaire on multiple occasions; the score on the first completion is included in the database that is analyzed in this report.

Patient questionnaire. The version of the questionnaire analyzed in this report included the 8 simple ADL in the MHAQ (2,3) (Figure 1), with 4 standard response options: 1 = "Without any difficulty"; 2 = "With some difficulty"; 3 = "With much difficulty"; 4 = "Unable to do." In addition, 6 advanced ADL (Figure 1) were queried as follows: "At this moment, are you able to: Run errands and shop? (from the standard HAQ); Climb up a flight of stairs?; Walk two miles?; Run or jog two miles?; Drive a car five miles from your home?; and Participate in sports and games as you would like?" The questionnaire also included 4 items reflecting psychological distress (Figure 1). These were assessed with the following questions: "At this moment, are you able to: Get a good night's sleep?; Deal with the usual stresses of daily life?; Deal with feelings of anxiety or being nervous?; and Deal with feelings of depression or feeling blue?"

The questionnaire also included visual analog scales to assess pain, fatigue, and global health status, the Rheumatology Attitudes Index (RAI) to assess the psychological construct of helplessness (25–28,40), and a checklist of 57 common symptoms which may be incorporated into a structured "review of systems."

Reliability, face validity, and convergent validity of the new items. The routine clinic is used as a setting for questionnaire development, since each patient completes a 2–4-page patient self-report questionnaire at each visit (30,39). During certain periods, patients are asked to complete a second 2–4-page questionnaire at the end of the visit, to provide data for additional analyses of properties of the questionnaire. In studies presented in this report, 1 of 2 additional questionnaires were completed over different periods by 112 and 144 patients.

		M	Mean formal education	Mean duration of disease,	<i>c</i> / · 1		
	n	Mean age, years	level, years	years	% married	% white	% female
Rheumatoid arthritis	162	54.7	12.9	10.3	69.6	93.8	69.8
Fibromyalgia	114	46.5	13.4	7.3	68.0	92.8	93.7
Osteoarthritis	63	63.4	13.4	12.2	74.1	91.9	82.5
Systemic lupus erythematosus	34	43.5	13.1	9.3	51.6	79.4	94.1
Vasculitis	20	49.9	14.1	4.9	80.0	95.0	70.0
Psoriatic arthritis	18	50.2	13.8	8.9	77.8	88.9	55.6
Scleroderma	16	56.0	12.9	6.8	71.4	81.3	93.8
Other rheumatic diseases	261	49.0	13.3	5.8	67.4	87.6	67.4
Total	688	51.2	13.2	7.9	68.6	90.0	75.4
Р		< 0.001	0.78	< 0.001	0.02	0.12	< 0.001

Table 1. Demographic data on the 688 patients with rheumatic diseases studied in this report

The first additional questionnaire was a 2-page questionnaire identical to the "standard" questionnaire, designed to assess test-retest reliability (reproducibility) of the various items on the questionnaire; this questionnaire was completed by 112 patients over a 5-week period. The second additional questionnaire was a 4-page questionnaire that included the standard HAQ, Beck Depression Inventory (BDI) (41,42), Centers for Epidemiologic Studies Depression (CES-D) scale (43,44), and Arthritis Impact Measurement Scales (AIMS) anxiety and depression scales (45,46), and was designed to compare scores on these questionnaires to scores on the new items; this questionnaire was completed by 144 patients over a 6-week period. Convergent validity was analyzed in comparisons of individual items on the MHAQ and the new items.

Statistical analyses. The data were entered, maintained, and analyzed using MEDLOG time-oriented software (MEDLOG, Incline Village, NV). Test-retest reliability (reproducibility) of each of the 8 items on the MHAQ and 10 new items were analyzed according to kappa statistics. Scores for each item were computed and compared with scores on the basic MHAQ, with patients grouped into 6 diagnostic categories: RA, fibromyalgia, OA, SLE, vasculitis, and "other." Patients who had normal scores on the standard HAQ (score of 0) or basic MHAQ (score of 1) were analyzed for comparison with scores on the new items, to study the possible capacity to overcome "floor effects" on the MHAQ and HAQ. Mean scores for the new items were compared with those on other self-report questionnaires, including the MHAQ, visual analog scale for pain and fatigue, RAI helplessness scale (25-27), AIMS (45,46) anxiety and depression scales, the BDI (41,42), and the CES-D (43,44); the latter 2 were also assessed with exclusion of items that may reflect somatic disease through "criterion contamination" of depression scales (47-50). Spearman's correlation coefficients (rho) were computed for correlation of questionnaire scores with demographic measures and other questionnaire scores.

RESULTS

Patient population. The mean age of all patients was 51 years, including 55 years for RA, 47 years for fibromyalgia, 63 years for OA, 44 years for SLE, 50 years

for vasculitis, 50 years for psoriatic arthritis, 56 years for scleroderma, and 49 years for other rheumatic diseases (Table 1). Patients with OA were significantly older, and patients with SLE significantly younger, than the other patients (P < 0.001). The formal education level varied from 12.9 years in patients with RA and scleroderma to 14.1 years in patients with vasculitis (P = 0.78), and duration of disease from 4.9 years in patients with vasculitis to 12.2 years in patients with OA (P < 0.001).

Overall, 69% of the patients were married, and 90% were white. Patients with SLE and fibromyalgia were 94% female, compared with 70% of patients with RA and 67% of those with other rheumatic diseases

Table 2. Mean scores for the 8-item basic modified Health Assessment Questionnaire (MHAQ), 6 advanced activities of daily living (ADL), and 4 psychological items in 688 patients with rheumatic diseases, according to diagnosis*

	n	MHAQ score	Advanced ADL score†	Psychological items score
Rheumatoid arthritis	162	1.73 ± 0.64‡	2.46 ± 0.82	1.82 ± 0.64
Fibromyalgia	114	1.64 ± 0.49	2.49 ± 0.73	2.30 ± 0.67 §
Osteoarthritis	63	1.52 ± 0.40	2.37 ± 0.70	1.77 ± 0.61
Systemic lupus erythematosus	34	1.37 ± 0.37	2.49 ± 0.73	2.02 ± 0.60
Vasculitis	20	1.39 ± 0.48	2.33 ± 0.84	1.60 ± 0.62
Psoriatic arthritis	18	1.72 ± 0.52	2.40 ± 0.72	1.79 ± 0.56
Scleroderma	16	1.48 ± 0.54	2.30 ± 0.74	1.67 ± 0.37
Other rheumatic diseases	261	1.46 ± 0.51	2.28 ± 0.76	1.83 ± 0.69
Total	688	1.56 ± 0.54	2.38 ± 0.77	1.90 ± 0.68
Р		< 0.001	0.196	< 0.001

* Scores are the mean \pm SD.

 $\dagger P < 0.01$ (no significant differences).

‡ Significant difference versus systemic lupus erythematosus and versus "other rheumatic diseases."

§ Significant difference versus osteoarthritis, versus rheumatoid arthritis, and versus "other rheumatic diseases."

100 (63)

	All 68	38 patients	160 patients with a	n normal basic MHAQ score
	Mean score	No. (%) with abnormal score	Mean score on advanced ADL	No. (%) with abnormal score on advanced ADL
MHAQ				
Dress yourself, including tying shoelaces and doing buttons?	1.62 ± 0.69	353 (51)	NA	NA
Get in and out of bed?	1.61 ± 0.68	344 (50)	NA	NA
Lift a full cup or glass to your mouth?	1.31 ± 0.55	182 (27)	NA	NA
Walk outdoors on flat ground?	1.60 ± 0.74	317 (46)	NA	NA
Wash and dry your entire body?	1.53 ± 0.71	287 (42)	NA	NA
Bend down to pick up clothing from the floor?	1.73 ± 0.76	381 (55)	NA	NA
Turn regular faucets on and off?	1.44 ± 0.66	243 (35)	NA	NA
Get in and out of a car, bus, train or airplane?	1.66 ± 0.69	367 (53)	NA	NA
Mean 8-item MHAQ score	1.56 ± 0.54	527 (77)	NA	NA
Advanced ADL				
Run errands and shop? (included on HAQ)	1.84 ± 0.87	402 (58)	1.12 ± 0.38	17 (11)
Climb up a flight of stairs?	2.03 ± 0.89	470 (68)	1.22 ± 0.47	33 (21)
Walk two miles?	2.60 ± 1.14	541 (79)	1.70 ± 0.90	77 (48)
Run or jog two miles?	3.32 ± 0.94	644 (94)	2.75 ± 1.14	129 (81)
Drive a car 5 miles from your home?	1.54 ± 0.95	213 (31)	1.13 ± 0.58	9 (6)
Participate in sports and games as you would like?	2.94 ± 1.11	597 (87)	1.98 ± 1.04	95 (59)
Mean 6-item advanced ADL score	2.38 ± 0.77	660 (96)	1.65 ± 0.52	137 (86)
Psychological items				
Get a good night's sleep?	2.23 ± 0.97	516 (75)	1.60 ± 0.75	74 (46)
Deal with the usual stresses of daily life?	1.82 ± 0.75	431 (63)	1.39 ± 0.53	59 (37)
Deal with feelings of anxiety or being nervous?	1.79 ± 0.75	419 (61)	1.43 ± 0.59	62 (39)
Deal with feelings of depression or feeling	1.75 ± 0.76	395 (57)	1.38 ± 0.58	53 (33)

Table 3. Mean scores for the MHAQ, advanced ADL, and psychological items in 688 consecutive patients with rheumatic diseases, including 160 who had normal scores on the 8 basic ADL of the MHAQ*

* An abnormal score is defined as a score of ≥ 2 for an individual item (>1 for total scores) (see Figure 1). NA = not applicable (see Table 2 for other definitions).

579 (84)

 1.90 ± 0.68

(P < 0.001). These results appear typical for patients with these rheumatic diseases.

Mean 4 psychological item score

Test-retest reliability of each of the 8 items on the MHAQ and 10 new items. Test-retest reliability (reproducibility) of each of the 8 items on the MHAQ and 10 additional MDHAQ items was analyzed by computing kappa statistics for the responses provided by 112 consecutive patients who completed the questionnaire as a component of routine care at the beginning of the visit and who were asked to complete an identical questionnaire a second time at the end of the visit. Kappa scores for all items ranged from 0.65 to 0.81 (all P < 0.001), indicating good-to-excellent test-retest reliability for these items (data not shown).

Analysis of the advanced activities in patients with various rheumatic diseases. Mean MHAQ scores in the patient groups ranged from 1.37 to 1.73 (range 1–4), while mean scores for advanced activities ranged from 2.28 to 2.49 (range 1–4), which was at least .68 units higher than the mean MHAQ scores in each group (Table 2). Mean MHAQ scores were highest in patients with RA and psoriatic arthritis, followed by patients with fibromyalgia, OA, scleroderma, vasculitis, SLE, and other rheumatic diseases (Table 2), similar to data previously reported in various rheumatic diseases (18). Differences in scores for advanced ADL between patients with various rheumatic diseases were not statistically significant.

 1.45 ± 0.49

The highest mean scores for the 6 advanced ADL were 3.32 for "run or jog two miles," 2.94 for "participate in sports and games as you would like," and 2.60 for "walk two miles" (Table 3). More than 58% of all patients reported at least some difficulty for each of 5 advanced ADL—all but "drive a car five miles from your home"—including 79% for "walk two miles," 87% for "participate in sports and games as you would like," and 94% for "run or jog two miles."

Scores for advanced ADL were correlated significantly at high levels (r = 0.75) with those on the MHAQ (Table 4), and with scores for pain, fatigue, helplessness, and depression at statistically significant, but lower, levels. Correlations of MHAQ and advanced ADL

	8 basic	6 advanced	4 psychological
	MHAQ	ADL	items
Demographic variables			
Age	0.08^{+}	0.16§	-0.12‡
Duration of disease	0.12‡	0.14‡	0.01
Formal education level	-0.24§	-0.27§	-0.24§
Other patient questionnaire measures			
Basic MHAQ	_	0.75§	0.50§
Advanced ADL	0.75§	_	0.53§
Psychological items	0.50§	0.53§	_
Pain-visual analog scale	0.57§	0.58§	0.51§
Fatigue—visual analog scale	0.46§	0.50§	0.60§
Rheumatology Attitudes Index helplessness scale	0.51§	0.55§	0.59§
Other depression and anxiety scales			
AIMS—anxiety scale	0.33§	0.32‡	0.71§
AIMS—depression scale	0.43§	0.48§	0.75§
Complete BDI	0.49§	0.59§	0.69§
BDI—somatic items excluded	0.39§	0.47§	0.62§
Complete CES-D	0.45§	0.52§	0.74§
CES-D—somatic items excluded	0.42§	0.47§	0.66§

Table 4. Correlations of scores on the 8-item basic MHAQ, 6-item advanced ADL, and 4 psychological items with demographic measures and other patient self-report questionnaire scores*

* Values are Spearman's rho coefficients. AIMS = Arthritis Impact Measurement Scales; BDI = Beck Depression Inventory; CES-D = Center for Epidemiologic Studies Depression Scale (see Table 2 for other definitions).

scores with formal education level were higher than those seen with age or duration of disease (Table 4), as in previous studies (18).

Individual advanced ADL items were compared with individual MHAQ items to analyze convergent validity. For example, 369 (54%) of 688 people reported on the MHAQ that they were able to "walk outdoors on flat ground" "without any difficulty" (Table 5). Among these patients, 138 (37%) reported on the new items that they could "walk two miles" "without difficulty," 138 (37%) reported "with some difficulty," and 42 (11%) reported "with much difficulty," while 51 (14%) reported that they were "unable" to "walk two miles" (Table 5). More than 70% of patients who reported "with some difficulty" regarding their ability to "walk outdoors on flat ground" noted "much difficulty" or "unable to do" in response to "walk two miles." All 11 people who reported "unable" to "walk outdoors on flat ground" were "unable" to "walk two miles," and 55 of 70 patients who reported "with much difficulty" in response to "walk outdoors on flat ground" reported "unable to do" with respect to "walk two miles." These data illustrate a reduction of the floor effect on the MHAQ by a new item.

Analysis of psychological items on the MDHAQ in patients with various rheumatic diseases. Mean scores on the 4 psychological items were highest in patients

Table 5. Comparison of responses regarding ability to walk outdoors on flat ground on the MHAQ scale versus ability to walk two miles on anadvanced ADL scale*

	MHAQ—walk outdoors on flat ground					
Advanced ADL— walk two miles	Without any difficulty	With some difficulty	With much difficulty	Unable to do	Total	
Without any difficulty	138 (37)	7 (3)	1(1)	0 (0)	146 (21)	
With some difficulty	138 (37)	60 (25)	3 (4)	0 (0)	201 (29)	
With much difficulty	42 (11)	69 (29)	11 (16)	0 (0)	122 (18)	
Unable to do	51 (14)	100(42)	55 (79)	11 (100)	217 (32)	
Total	369 (100)	236 (100)	70 (100́)	11 (100)	686 (100)	

* Values are the number (%) of respondents. See Table 2 for definitions.

[†]P < 0.05.

 $[\]ddagger P < 0.01.$

P < 0.001.

	n	Sleep	Stress	Anxiety	Depression	Total
Rheumatoid arthritis	162	2.13	1.83	1.69	1.66	1.82
Fibromyalgia	114	2.80	2.23	2.19	2.12	2.30
Osteoarthritis	63	1.97	1.74	1.67	1.66	1.77
Systemic lupus erythematosus	34	2.33	1.82	1.94	1.91	2.02
Vasculitis	20	1.75	1.65	1.40	1.60	1.60
Psoriatic arthritis	18	2.17	1.72	1.61	1.67	1.79
Scleroderma	16	2.13	1.69	1.63	1.25	1.67
Other	261	2.22	1.77	1.78	1.71	1.83
Total	688	2.23	1.82	1.79	1.75	1.90

Table 6. Mean scores on 4 psychological items in 688 consecutive patients seen in a weekly rheumatology clinic, according to diagnosis

with fibromyalgia, followed by patients with SLE, RA, psoriatic arthritis, OA, scleroderma, and vasculitis (Table 2). Mean scores were 2.23 for "Get a good night's sleep," 1.82 for "Deal with the usual stress of daily life," 1.79 for "Deal with feelings of anxiety or being nervous," and 1.75 for "Deal with feelings of depression or feeling blue" (Table 3). Mean scores for poor sleep were highest among the 4 items in patients within each diagnostic group (Table 6). Among all patients, the proportions reporting abnormal scores (≥ 2) were 75% for "Get a good night's sleep," 63% for "Deal with the usual stress of daily life," 61% for "Deal with feelings of anxiety or being nervous," and 57% for "Deal with feelings of depression or feeling blue" (Table 3). Scores for psychological items were correlated significantly with MHAQ and advanced ADL scores, and with scores for pain, fatigue, and helplessness (r = 0.50-0.60) (Table 4). Each of the 4 psycho-

logical items was correlated significantly with these scales (Table 7). Again, scores for individual psychological items as well as mean scores were correlated at higher levels with the level of formal education than with age or duration of disease (Table 7).

Significant correlations were seen between the depression item "Deal with feelings of depression and feeling blue" (Table 7) and scores on the CES-D scale, BDI, and AIMS anxiety and depression indices on a second questionnaire completed by 144 patients. Patients with a score of 1 ("without any difficulty") on the depression item had median scores of 3 (range 0–60) on the CES-D, median of 4 (range 0–63) on the BDI, and median of 1.3 (range 0–10) on the AIMS depression scale (Table 8). In contrast, patients with scores of 3 ("with much difficulty") or 4 ("unable to do") on the depression item had median scores of 31 on the CES-D,

	Sleep	Stress	Anxiety	Depression	Total
Demographic variables					
Age	-0.11†	-0.11†	-0.06	-0.11†	-0.12†
Duration of disease	0.01	0.01	0.01	0.03	0.01
Formal education level	-0.20	-0.25†	-0.23‡	-0.21†	-0.24‡
Other patient questionnaire measures					
Basic MHAQ	0.51‡	0.44‡	0.35‡	0.37‡	0.50‡
Advanced ADL	0.50‡	0.45‡	0.38‡	0.39‡	0.53‡
Pain-visual analog scale	0.51‡	0.42‡	0.35‡	0.37‡	0.51‡
Fatigue-visual analog scale	0.54‡	0.52‡	0.48	0.47‡	0.60
Rheumatology Attitudes Index	0.46‡	0.55‡	0.51‡	0.48‡	0.59‡
helplessness scale					
Other depression and anxiety scale					
AIMS—anxiety scale	0.48^{+}	0.57‡	0.66‡	0.66‡	0.71‡
AIMS—depression scale	0.47†	0.66‡	0.61	0.68‡	0.75‡
Complete BDI	0.45‡	0.69‡	0.61	0.61‡	0.69‡
BDI-somatic items excluded	0.31‡	0.59‡	0.53‡	0.57‡	0.62‡
Complete CES-D	0.47‡	0.64‡	0.59‡	0.64‡	0.74‡
CES-D—somatic items excluded	0.26‡	0.43‡	0.43‡	0.43‡	0.66‡

Table 7. Correlations of 4 individual psychological items to assess sleep, stress, anxiety, and depression with scores on other self-report scales*

* Values are Spearman's rho coefficients. See Tables 2 and 4 for definitions.

 $\dagger P < 0.01.$

 $\ddagger P < 0.001.$

Table 8. Scores on the multidimensional Health Assessment Questionnaire (MDHAQ) depression item compared with mean scores on the Center for Epidemiologic Studies Depression Scale (CES-D), Beck Depression Inventory (BDI), and Arthritis Impact Measurement Scales (AIMS) depression index*

MDHAQ depression score	Number of patients	Complete CES-D	CES-D— somatic items deleted	Complete BDI	BDI—somatic items deleted	AIMS depression scale
Number of items on questionnaire		20	16	21	15	6
Score $= 1$	72	3 (5.5)	4 (4.9)	4 (4.9)	1 (2.3)	1.3(1.3)
Score $= 2$	55	13 (13.5)	10 (9.7)	9 (10.2)	4 (5.3)	3.0 (2.8)
Score $= 3 \text{ or } 4$	17	31 (31.0)	23 (22.8)	15 (18.4)	11 (12.4)	5.9 (5.6)

* Values are the median (mean) score, except where otherwise indicated.

15 on the BDI, and 5.9 on the AIMS depression scale, indicative of depression. Those with scores of 2 had intermediate scores on the more elaborate depression scales. Similar dose-response relationships were seen when somatic items on the CES-D and BDI were deleted from the scoring (Table 8).

Analyses of new items in patients with normal scores on the MHAQ and HAQ. Among the 688 patients, 160 (23%) reported a standard MHAQ score of 1, indicating no functional disability, including 22% with RA, 17% with fibromyalgia, 13% with OA, 27% with SLE, 45% with vasculitis, 0% with psoriatic arthritis, 38% with scleroderma, and 28% with other rheumatic diseases. However, only 23 of the 160 patients with normal scores on the MHAQ also reported normal scores for advanced ADL, i.e., ab-

normal scores were reported by 86% of those with a normal MHAQ score, or 96% of the 688 consecutive patients (Table 3).

The standard 20-item HAQ was completed by the 144 consecutive patients who completed the depression scales after they had completed the MHAQ, in order to compare responses on the HAQ with responses to the 5 advanced ADL not included in the HAQ and with responses to the 4 psychological items (Table 9). Twenty-three of these 144 patients (16%) reported normal HAQ scores of 0. However, 20 of these 23 patients (87%) reported some abnormality on the advanced ADL, and 11 of 23 (48%) reported some abnormality on the psychological items. Among the 23 patients with normal HAQ scores, 8 (35%) reported at least some difficulty in response to "walk two miles," 14

Table 9. Mean scores for each of 6 advanced activities of daily living (ADL) and 4 psychological items in 144 consecutive patients with rheumatic diseases, including 23 who had normal scores on the 20 ADL of the Health Assessment Questionnaire (HAQ)*

	All 144 patients		23 patients with a normal standard HAQ score	
	Mean score	No. (%) with abnormal score	Mean score	No. (%) with abnormal score
Advanced ADL				
Run errands and shop? (included on HAQ)	1.7	80 (56)	1.1	2 (9)
Climb up a flight of stairs?	1.9	95 (66)	1.3	5 (22)
Walk two miles?	2.5	108 (75)	1.6	8 (35)
Run or jog two miles?	3.3	137 (95)	2.7	20 (87)
Drive a car five miles from your home?	1.4	33 (23)	1.0	1 (4)
Participate in sports and games as you would like?	3.0	123 (85)	2.0	14 (61)
Mean of 6 advanced ADL	2.3	135 (94)	1.6	20 (87)
Psychological items				
Get a good night's sleep?	2.0	96 (67)	1.4	9 (39)
Deal with the usual stresses of daily life?	1.7	85 (59)	1.1	3 (13)
Deal with feelings of anxiety or being nervous?	1.7	79 (55)	1.3	5 (22)
Deal with feelings of depression or feeling blue?	1.6	72 (50)	1.1	3 (13)
Mean psychological items score	1.8	111 (77)	1.2	11 (48)

* A normal score was defined as a score of 0.

(61%) reported difficulty to "participate in sports and games as you would like," and 20 (87%) reported difficulty to "run or jog two miles" (Table 9).

DISCUSSION

The HAQ, MHAQ, and CLINHAQ are as sensitive as any self-report questionnaires available in rheumatology clinical care, and perform excellently in patients who have substantial limitations in simple ADL. These questionnaires document clinically relevant data that are often poorly documented in the medical record, including functional disability and pain on the HAQ, with addition of fatigue and psychological distress on the CLINHAQ and MHAQ (7).

Nonetheless, certain patients may report no difficulty in performing simple ADL, but nonetheless experience difficulty in performing more advanced ADL. Some advanced ADL have been termed "instrumental activities of daily living" (51–53), defined as activities "necessary to reside in the community" (54). Because ADL such as "walk two miles," "run or jog two miles," or "participate in games and sports as you would like" are not necessary to reside in the community, the term "advanced" appears to be preferred to "instrumental" for the ADL included in the MDHAQ.

The phenomenon in which a patient may have a normal score on the HAQ, MHAQ, or CLINHAQ, but nonetheless experience functional limitations not detected on the questionnaire, is known as a "floor effect" (32) ("ceiling effect" if a higher score indicates better function). Such floor effects may not have been as apparent in rheumatology practice during the 1970s when the HAQ was developed (1). However, as goals of rheumatology care have become oriented toward a more normal capacity to function in ADL (33,34), floor effects may be more prominent in contemporary use of questionnaires in usual clinical care.

The problem of floor effects is greater for the MHAQ than for the HAQ or CLINHAQ, the ADL section of which is identical to the HAQ (4). The 8 ADL included on the MHAQ were deliberately selected from each of the 8 categories on the HAQ as those most likely to be performed by most individuals each day, and were found to be associated with lower scores (a lower level of difficulty) than other ADL on the HAQ (2). Nonetheless, floor effects are seen on the HAQ and CLINHAQ, which may be overcome, in large part, through the advanced ADL (Table 9).

Scores on the HAQ, CLINHAQ, and MHAQ are correlated significantly with measures of psychological

status (26,55), and may be interpreted in part to indicate a "psychological" component to responses on the questionnaire (35). However, the functional status scales do not directly address psychological status, which appears of considerable importance in the courses and outcomes of rheumatic diseases (28,36–38). Information concerning psychological status is captured in the CLINHAQ (4) through the AIMS anxiety and depression scales (45), and in the MHAQ (2) through a scale to assess helplessness (25–28,40), which has been administered with the MHAQ for many years. However, the AIMS anxiety and depression scales require about one-half of a page of additional questionnaire space, and the 5-item helplessness scale requires about one-quarter of a page.

The HAQ format has been found very "patientfriendly," easily understood, and readily responded to by patients. The CLINHAQ and MHAQ have been completed by every patient at every visit over the last 15 years, including many people with low levels of formal education, in 2 nonselected rheumatology clinical settings of TP and FW (30,56). Although most reports concerning these questionnaires involve patients with RA, the questionnaire has been found useful in assessing patients with SLE (18,19), fibromyalgia (18,20), ankylosing spondylitis (21), OA (18,22), and scleroderma (18,23). The 688 consecutive patients reported herein had all types of rheumatic diseases, and the MDHAQ appeared quite applicable to all of these patients.

It is obviously possible to overcome floor effects and assess psychological status on the HAQ, CLIN-HAQ, or MHAQ using additional questionnaires and formats. However, the capacity to screen for advanced ADL, anxiety, depression, poor sleep, and coping with stress in 10 lines (depression in only 1 line) in the HAQ format may provide valuable information to a clinician in a small amount of space. Furthermore, among the 4 psychological items, difficulty with sleep is the most frequently reported abnormal response-by ~75% of people seen in a rheumatology clinic. Sleep is addressed in the CLINHAQ as a separate scale (4,57), but is not assessed on the HAQ. Although a single item cannot replace full scales such as the AIMS depression scale, CES-D scale, or BDI, the 1 line does provide a useful screening tool for depression, since more elaborate scales are generally not used in usual clinical care.

The HAQ is generally labeled an "arthritisspecific" questionnaire (35), in contrast to a "generic" questionnaire (58) such as the Short Form 36 (59), for use in many types of diseases. However, these labels may reflect the fact that the HAQ was developed in rheumatology clinical settings, rather than being a reflection of the intrinsic properties of the questionnaire. All people would like to be able to perform usual ADL without difficulty. The HAQ, CLINHAQ, and MHAQ may be useful in all types of medical care, even including health appraisal screening, particularly with inclusion of advanced ADL and psychological items on an MDHAQ. For the present, we suggest that the traditional HAQ and MHAQ be scored separately from the new scales in settings where earlier data are available. Further development of the MDHAQ is regarded as an ongoing research activity, with introduction of possible additional modifications based on clinical experience and clinical research.

In conclusion, introduction of 6 advanced ADL can overcome the "floor effects" concerning ADL in both the HAQ and MHAQ in which patients report normal scores although they experience meaningful functional limitations. In addition, psychological items may be used to screen for problems with sleep, stress, anxiety, and depression, within the "patient-friendly" HAQ format. These items provide valid and reliable data in a feasible format as part of an MDHAQ, and add further support to the value of distributing a simple 2-page questionnaire to each patient at each visit in medical care.

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REFERENCES

- Fries JF, Spitz P, Kraines RG, Holman HR. Measurement of patient outcome in arthritis. Arthritis Rheum 1980;23:137–45.
- Pincus T, Summey JA, Soraci SA Jr, Wallston KA, Hummon NP. Assessment of patient satisfaction in activities of daily living using a modified Stanford Health Assessment Questionnaire. Arthritis Rheum 1983;26:1346–53.
- Pincus T, Callahan LF, Brooks RH, Fuchs HA, Olsen NJ, Kaye JJ. Self-report questionnaire scores in rheumatoid arthritis compared with traditional physical, radiographic, and laboratory measures. Ann Intern Med 1989;110:259–66.
- Wolfe F. A brief health status instrument: CLINHAQ [abstract]. Arthritis Rheum 1989;32 Suppl 4:S99.
- Wolfe F, Kleinheksel SM, Cathey MA, Hawley DJ, Spitz PW, Fries JF. The clinical value of the Stanford Health Assessment Questionnaire Functional Disability Index in patients with rheumatoid arthritis. J Rheumatol 1988;15:1480–8.
- Hawley DJ, Wolfe F. Sensitivity to change of the Health Assessment Questionnaire (HAQ) and other clinical and health status measures in rheumatoid arthritis: results of short-term clinical trials and observational studies versus long-term observational studies. Arthritis Care Res 1992;5:130–6.
- Wolfe F, Pincus T. Listening to the patient: a practical guide to self-report questionnaires in clinical care. Arthritis Rheum 1999; 42:1797–1808.

- Pincus T, Callahan LF, Sale WG, Brooks AL, Payne LE, Vaughn WK. Severe functional declines, work disability, and increased mortality in seventy-five rheumatoid arthritis patients studied over nine years. Arthritis Rheum 1984;27:864–72.
- Pincus T, Callahan LF. Rheumatology function tests: grip strength, walking time, button test and questionnaires document and predict longterm morbidity and mortality in rheumatoid arthritis. J Rheumatol 1992;19:1051–7.
- Gardiner PV, Sykes HR, Hassey GA, Walker DJ. An evaluation of the health assessment questionnaire in long-term longitudinal follow-up of disability in rheumatoid arthritis. Br J Rheumatol 1993;32:724–8.
- Callahan LF, Bloch DA, Pincus T. Identification of work disability in rheumatoid arthritis: physical, radiographic and laboratory variables do not add explanatory power to demographic and functional variables. J Clin Epidemiol 1992;45:127–38.
- Lubeck DP, Spitz PW, Fries JF, Wolfe F, Mitchell DM, Roth SH: A multicenter study of annual health service utilization and costs in rheumatoid arthritis. Arthritis Rheum 1986;29:488–93.
- 13. Wolfe F, Zwillich SH. The long-term outcomes of rheumatoid arthritis: a 23-year prospective, longitudinal study of total joint replacement and its predictors in 1,600 patients with rheumatoid arthritis. Arthritis Rheum 1998;41:1072–82.
- Pincus T, Callahan LF, Vaughn WK. Questionnaire, walking time and button test measures of functional capacity as predictive markers for mortality in rheumatoid arthritis. J Rheumatol 1987; 14:240–51.
- Pincus T, Brooks RH, Callahan LF. Prediction of long-term mortality in patients with rheumatoid arthritis according to simple questionnaire and joint count measures. Ann Intern Med 1994; 120:26–34.
- Callahan LF, Pincus T, Huston JW III, Brooks RH, Nance EP Jr, Kaye JJ. Measures of activity and damage in rheumatoid arthritis: depiction of changes and prediction of mortality over five years. Arthritis Care Res 1997;10:381–94.
- Wolfe F, Pincus T. Standard self-report questionnaires in routine clinical and research practice—an opportunity for patients and rheumatologists. J Rheumatol 1991;18:643–6.
- Callahan LF, Smith WJ, Pincus T. Self-report questionnaires in five rheumatic diseases: comparisons of health status constructs and associations with formal education level. Arthritis Care Res 1989;2:122–31.
- Engle EW, Callahan LF, Pincus T, Hochberg MC. Learned helplessness in systemic lupus erythematosus: analysis using the Rheumatology Attitudes Index. Arthritis Rheum 1990;33:281–6.
- Callahan LF, Pincus T. A clue from a self-report questionnaire to distinguish rheumatoid arthritis from noninflammatory diffuse musculoskeletal pain: the P-VAS:D-ADL ratio. Arthritis Rheum 1990;33:1317–22.
- Daltroy LH, Larson MG, Roberts WN, Liang MH. A modification of the Health Assessment Questionnaire for the spondyloarthropathies. J Rheumatol 1990;17:946–50.
- Brooks RH, Callahan LF, Pincus T. Use of self-report activities of daily living questionnaires in osteoarthritis. Arthritis Care Res 1988;1:23–32.
- Steen VD, Medsger TA Jr. The value of the Health Assessment Questionnaire and special patient-generated scales to demonstrate change in systemic sclerosis patients over time. Arthritis Rheum 1997;40:1984–91.
- 24. Callahan LF, Brooks RH, Summey JA, Pincus T. Quantitative pain assessment for routine care of rheumatoid arthritis patients, using a pain scale based on activities of daily living and a visual analog pain scale. Arthritis Rheum 1987;30:630–6.
- Nicassio PM, Wallston KA, Callahan LF, Herbert M, Pincus T. The measurement of helplessness in rheumatoid arthritis: the development of the Arthritis Helplessness Index. J Rheumatol 1985;12:462–7.

- Callahan LF, Brooks RH, Pincus T. Further analysis of learned helplessness in rheumatoid arthritis using a "Rheumatology Attitudes Index." J Rheumatol 1988;15:418–26.
- 27. DeVellis RF, Callahan LF. A brief measure of helplessness in rheumatic disease: the helplessness subscale of the Rheumatology Attitudes Index. J Rheumatol 1993;20:866–9.
- Callahan LF, Cordray DS, Wells G, Pincus T. Formal education and five-year mortality in rheumatoid arthritis: mediation by helplessness scale scores. Arthritis Care Res 1996;9:463–72.
- Pincus T. Why should rheumatologists collect patient self-report questionnaires in routine rheumatologic care? Rheum Dis Clin North Am 1995;21:271–317.
- Wolfe F, Pincus T. Data collection in the clinic. Rheum Dis Clin North Am 1995;21:321–58.
- Pincus T. Analyzing long-term outcomes of clinical care without randomized controlled clinical trials: the consecutive patient questionnaire database. Advances 1997;13:3–32.
- 32. Bindman AB, Keane D, Lurie N. Measuring health changes among severely ill patients: the floor phenomenon. Med Care 1990;28:1142–52.
- Emery P, Salmon M. Early rheumatoid arthritis: time to aim for remission? Ann Rheum Dis 1995;54:944–7.
- 34. Pincus T, Stein CM, Wolfe F. "No evidence of disease" in rheumatoid arthritis using methotrexate in combination with other drugs: a contemporary goal for rheumatology care? Clin Exp Rheumatol 1997;15:591–6.
- Fries JF, Ramey DR. "Arthritis specific" global health analog scales assess "generic" health related quality-of-life in patients with rheumatoid arthritis. J Rheumatol 1997;24:1697–702.
- Bradley LA. Psychosocial factors and disease outcomes in rheumatoid arthritis: old problems, new solutions, and a future agenda. Arthritis Rheum 1989;32:1611–4.
- 37. Blalock SJ, DeVellis BM, DeVellis RF, Giorgino KB, van H Sauter S, Jordan JM, et al. Psychological well-being among people with recently diagnosed rheumatoid arthritis: do self-perceptions of abilities make a difference? Arthritis Rheum 1992;35:1267–72.
- Bradley LA. Psychological dimensions of rheumatoid arthritis. In: Wolfe F, Pincus T, editors. Rheumatoid arthritis: pathogenesis, assessment, outcome, and treatment. New York: Marcel Dekker; 1994. p. 273–95.
- Pincus T. Documenting quality management in rheumatic disease: are patient questionnaires the best (and only) method? Arthritis Care Res 1996;9:339–48.
- Smith TW, Peck JR, Ward JR. Helplessness and depression in rheumatoid arthritis. Health Psychol 1990;9:377–89.
- Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry 1961;4: 561–71.
- Beck AT, Steer RA, Garbin MG. Psychometric properties of the Beck Depression Inventory: twenty-five years of evaluation. Clin Psychol Rev 1988;8:77–100.
- 43. Radloff LS. The CES-D scale: a self-report depression scale for

research in the general population. Appl Psychol Meas 1977;1: 385-401.

- 44. Radloff LS, Teri L. Use of the Center for Epidemiological Studies-Depression Scale with older adults. In: Brink TL, editor. Clinical gerontology: a guide to assessment and intervention. New York: Haworth Press; 1986. p. 119–35.
- 45. Meenan RF, Gertman PM, Mason JH. Measuring health status in arthritis: the Arthritis Impact Measurement Scales. Arthritis Rheum 1980;23:146–52.
- Meenan RF. The AIMS approach to health status measurement: conceptual background and measurement properties. J Rheumatol 1982;9:785–8.
- 47. Pincus T, Callahan LF, Bradley LA, Vaughn WK, Wolfe F. Elevated MMPI scores for hypochondriasis, depression, and hysteria in patients with rheumatoid arthritis reflect disease rather than psychological status. Arthritis Rheum 1986;29:1456–66.
- Blalock SJ, DeVellis RF, Brown GK, Wallston KA. Validity of the Center for Epidemiological Studies Depression Scale in arthritis populations. Arthritis Rheum 1989;32:991–7.
- Peck JR, Smith TW, Ward JR, Milano R. Disability and depression in rheumatoid arthritis: a multi-trait, multi-method investigation. Arthritis Rheum 1989;32:1100–6.
- Pincus T, Callahan LF. Depression scales in rheumatoid arthritis: criterion contamination in interpretation of patient responses. Patient Educ Couns 1993;20:133–43.
- Nagi SZ. An epidemiology of disability among adults in the United States. Milbank Q 1976;54:439–67.
- Lawton MP, Brody E. Assessment of older people: self-monitoring and instrumental activities of daily living. Gerontologist 1969;9: 179.
- Kempen GIJM, Meyers AM, Powell LE. Hierarchical structure in ADL and IADL: analytical assumptions and applications for clinicians and researchers. J Clin Epidemiol 1995;48:1299–305.
- Spector WD, Fleishman JA. Combining activities of daily living with instrumental activities of daily living to measure functional disability. J Gerontol 1998;53B:S46–57.
- Wolfe F, Hawley DJ. The relationship between clinical activity and depression in rheumatoid arthritis. J Rheumatol 1993;20:2032–7.
- Pincus T, Wolfe F. Patient self-report questionnaires as integral to clinical care: health and psychological instruments, behavioral measurement database services. Behav Meas Lett 1997;5:3–7.
- 57. Wolfe F. Data collection and utilization: a methodology for clinical practice and clinical research. In: Wolfe F, Pincus T, editors. Rheumatoid arthritis: pathogenesis, assessment, outcome, and treatment. New York: Marcel Dekker; 1994. p. 463–514.
- Patrick DL, Deyo RA. Generic and disease-specific measures in assessing health status and quality of life. Med Care 1989;27: S217–32.
- Ware JE Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. Med Care 1992;30:473–81.