Time to Score Quantitative Rheumatoid Arthritis Measures: 28-Joint Count, Disease Activity Score, Health Assessment Questionnaire (HAQ), Multidimensional HAQ (MDHAQ), and Routine Assessment of Patient Index Data (RAPID) Scores

YUSUF YAZICI, MARTIN BERGMAN, and THEODORE PINCUS

ABSTRACT. ***Objective.*** To analyze the time required to score different measures used to assess patients with rheumatoid arthritis (RA), as a guide to feasibility in standard care. The measures studied were a 28-Joint Count, Disease Activity Score (DAS), Health Assessment Questionnaire (HAQ), Multidimensional HAQ (MDHAQ), and various Routine Assessment of Patient Index Data (RAPID) scores derived from the MDHAQ.

Methods. Three rheumatologists at 3 sites performed and timed 28-joint counts in 20 different patients at each site. Each rheumatologist scored and timed identical data in 5 groups of 10 from the same 50 patients seen in standard clinical care, including 50 DAS28 indices using the DAS Website, 50 identical HAQ, and 50 identical MDHAQ from the same patients. The MDHAQ includes 10 activities self-assessed for physical function, 21 circle visual analog scales (VAS) (rather than 10 cm lines), and scoring templates on the questionnaire for physical function, patient self-report joint count and RAPID composite scores. RAPID3 includes the 3 Core Data Set measures, RAPID4 adds the self-report joint count to RAPID3, and RAPID5 adds a physician global estimate to RAPID4.

Results. The median number of seconds to complete a 28-joint count was 90, compared to 41.9 s for a HAQ, 9.6 s for an MDHAQ RAPID3, and 19.4 s for RAPID5.

Conclusion. MDHAQ RAPID3 scores can be calculated in considerably less time than other RA measures, using scoring templates on the MDHAQ, to provide informative, feasible, quantitative measures for standard rheumatology clinical care. (First Release Mar 1 2008; J Rheumatol 2008; 35:603–9)

Key Indexing Terms:
RHEUMATOID ARTHRITIS
MULTIDIMENSIONAL HEALTH ASSESSMENT QUESTIONNAIRE
ROUTINE ASSESSMENT OF PATIENT INDEX DATA
PATIENT QUESTIONNAIRE
JOINT COUNT
DISEASE ACTIVITY SCORE

Quantitative assessment of rheumatoid arthritis (RA) has been extensively advanced over the last 3 decades[1]. However, quantitative measures and indices are included primarily in clinical trials and clinical research, but not in standard rheumatology care, most of which continues to be conducted largely according to qualitative "gestalt" impressions. Most patient visits in standard care do not include formal joint counts[2] or patient questionnaires[3]. Consequently, although advantages of quantitation of clinical status at each visit have been documented in recent clinical trials[4,5], such advantages are not available to the majority of patients with RA, but only to relatively few patients in research studies.

No single measure can serve as a "gold standard" to assess and monitor all individual patients with RA; therefore, pooled indices[6] such as the American College of Rheumatology (ACR) Core Data Set[7-9], Disease Activity Score (DAS)[10,11], Simplified Disease Activity Index (SDAI)[12], and Clinical Disease Activity Index (CDAI)[12] have been developed. Quantitative measures and indices for rheumatic diseases have been analyzed extensively for validity and reliability[1]. However, relatively little attention has been directed to feasibility in busy clinical settings, and acceptability to patients and health professionals[13]. Many measures and indices appear too complex for collection and calculation at a standard clinical visit. A simplified measure or index may facilitate quantitative clinical assessment and documentation in usual clinical care.

From New York University Hospital for Joint Diseases, New York, New York, and Arthritis and Rheumatology, Taylor Hospital, Ridley Park, Pennsylvania, USA.

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Y. Yazici, MD; T. Pincus, MD, NYU Hospital for Joint Diseases; M. Bergman, MD, Arthritis and Rheumatology, Taylor Hospital.

Address reprint requests to Dr. Y. Yazici, NYU Hospital for Joint Diseases, 301 East 17th Street, New York, NY 10003.

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A Patient Activity Score (PAS) index of only the 3 ACR Core Data Set patient-reported outcome (PRO) measures — physical function, pain, and global estimate — is correlated significantly with the DAS in clinical settings[14]. Further indices that include only PRO measures distinguish active from control treatments at levels similar to the ACR Core Data Set and DAS in clinical trials involving leflunomide[15,16], methotrexate[15,16], and adalimumab[17], and are correlated significantly with the DAS in these trials[15-17].

A multidimensional Health Assessment Questionnaire (MDHAQ)[18] has been adapted from the Health Assessment Questionnaire (HAQ)[19] for standard clinical care (Figure 1). All 3 PRO measures are on 1 side of 1 page for rapid review ("eye-balling") and scoring by a health professional, without a ruler, calculator, computer, or Website. In this report, we analyze the time to score various measures used to assess RA, including a 28-joint count, Disease Activity Score (DAS)[11], HAQ, MDHAQ, and Routine Assessment of Patient Index Data (RAPID) scores.

MATERIALS AND METHODS

Patients. Patients were seen in standard care by 3 rheumatologists (MB, TP, YY). Each rheumatologist has been administering patient questionnaires in his practice for 7 years (YY), 4 years (MB), or 25 years (TP), and has been practicing rheumatology for more than 8 years (YY), 20 years (MB), or 32 years (TP). YY sees patients at both a private practice setting and at an academic center; MB sees patients at a private practice setting; and TP sees patients at an academic setting. Each patient with any diagnosis completes a version of the MDHAQ at each visit as a component of the infrastructure of clinical care[20]. Patients provided signed consent for results to be sent anonymously to a data center. Our study was approved by the Vanderbilt University and local institutional review boards for the protection of human subjects.

Joint count. A 28-joint count for tender and swollen joints[21] was performed by each of the 3 rheumatologists in 20 patients with RA as a convenience sample. The data were recorded on a standard form, and the number of seconds required was recorded by an observer. The median time required to perform these 20 joint counts was recorded for each rheumatologist, and the median time required to perform all 60 was estimated as the time required to perform a single 28-joint count.

DAS scoring. Three identical lists from 50 actual patients with RA were provided to each rheumatologist, including the number of swollen and tender joints on a 28-joint count, erythrocyte sedimentation rate (ESR), and patient global estimate, to score a DAS28 using the DAS Website calculator (www.das-score.nl). The number of seconds required to score 10 DAS indices in 5 groups was recorded by each rheumatologist for the 50 patients. The median of all 15 groups of 10 scores (5 from each rheumatologist) was divided by 10 to provide an estimate of the time required to score a single DAS when data are available for scoring.

HAQ scoring. A HAQ was completed by 100 patients with RA (in addition to the routine MDHAQ) in each of the 3 sites. Fifty HAQ forms that had been completed by 15–20 consecutive patients from each site were photocopied and distributed to each of the 3 rheumatologists for scoring of 3 variables — physical function, pain, and estimate of global status — in groups of 10, similar to DAS scoring. One rheumatologist scored physical function and the two 10-cm VAS for pain and global status, one for physical function only, and one scored the 3 HAQ variables using both approaches. The number of seconds to score 50 HAQ in 5 groups of 10 was recorded; the median of 10 groups of 10 scores was divided by 10 to provide an estimate of the time required to score a single HAQ.

MDHAQ scoring. Fifty MDHAQ forms[18] from the same patients whose HAQ were scored were photocopied into 3 sets. Each rheumatologist scored and timed the 3 Core Data Set variables — physical function, pain, global estimate — on the 50 MDHAQ in 5 groups of 10. The median of 15 groups (5 from each rheumatologist) of 10 scores was divided by 10 to provide an estimate of the time to score a single MDHAQ.

RAPID scores. RAPID scores are calculated in raw units of 0–20, 0–30, 0–40, and 0–50, based on inclusion of 2, 3, 4, or 5 measures, respectively. Each rheumatologist again scored and timed 50 identical questionnaires, again in 5 groups of 10 each for RAPID2, RAPID3, RAPID4, and RAPID5. The median time required for each rheumatologist to score 10 RAPID in 5 groups was recorded (see below for more complete description); the median of 15 groups of 10 scores from all 3 rheumatologists was divided by 10 to estimate the time required for one RAPID score in each MDHAQ format.

The prototype RAPID3 (Table 1) includes the 3 patient Core Data Set measures, identical to a Patient Activity Score (PAS) except that the total score is 0–30 rather than 0–9. Scores for physical function, pain VAS, and global VAS, all 0–10, are added for a total of 0–30, with a rationale that an index of the 3 scores distinguishes active from control treatment in clinical trials at levels comparable to ACR20, 50, 70, or DAS criteria[16,17,22]. All work is done by the patient, with no assessment by a health professional other than to calculate a score.

RAPID2 (Table 1) includes physician and patient estimates of global status, each scored 0–10 for a total of 0–20, with a rationale that global estimates generally distinguish active versus control treatments at higher levels than other physician/assessor or patient measures[23].

RAPID4 adds a self-report Rheumatoid Arthritis Disease Activity Index (RADAI) joint count to RAPID3 for a total of 0–40. The joint count may involve scores of 0–66, 0–28, or a self-report RADAI joint count, which is scored 0–48, and, as noted, converted to 0–10. The RADAI and standard joint count are correlated at a level of about $r = 0.6$[24], similar to the level of correlation of ESR and C-reactive protein (CRP). The rationale for RAPID4 is that physicians regard the joint count as the most valuable measure to assess patients with RA[3].

RAPID5 adds both a physician estimate of global status and RADAI joint count to RAPID3 for a total of 0–50, based on the rationale noted above for each of these measures.

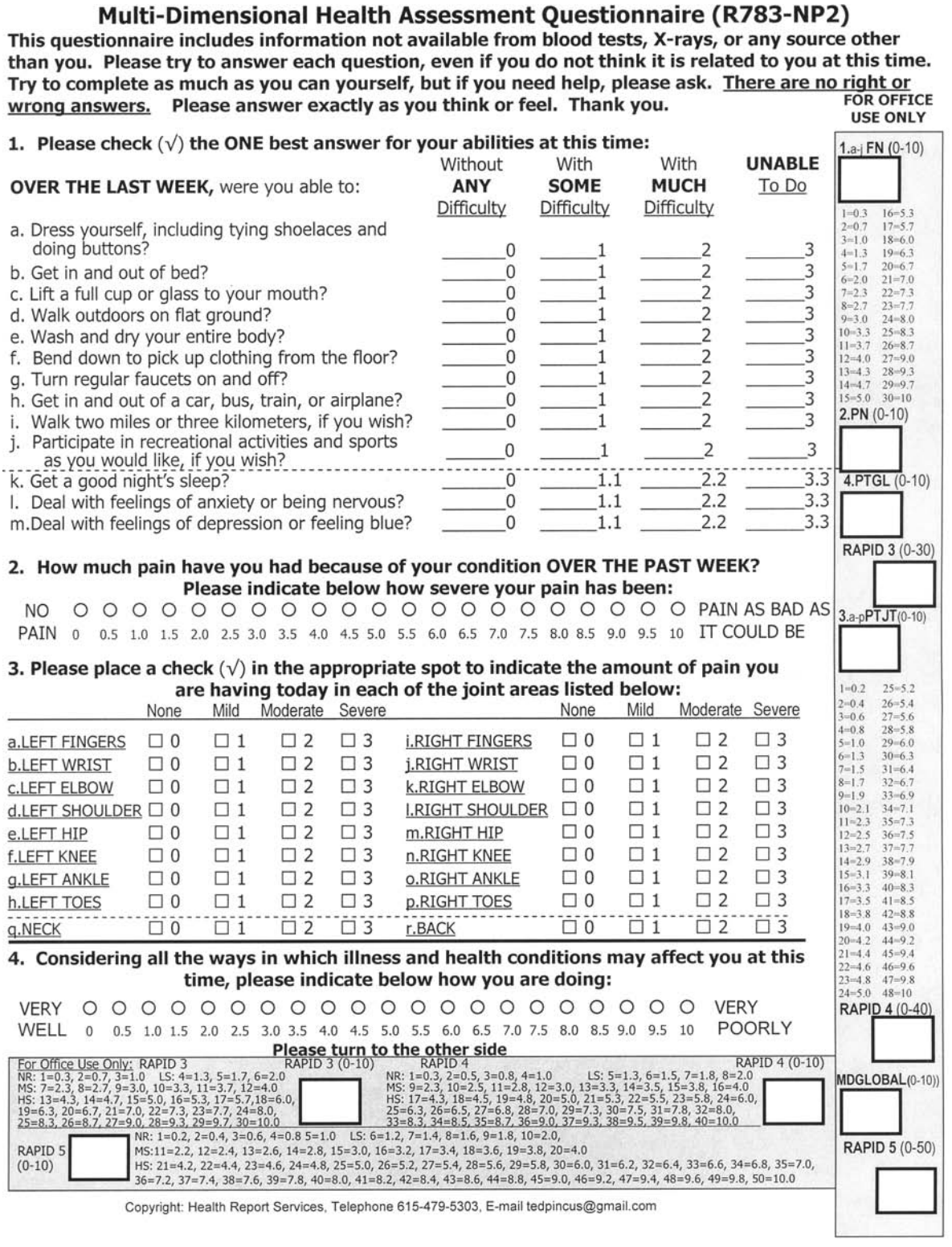
Data from the same 50 patients whose HAQ were scored were photocopied into 3 sets, a different set (with identical data) to score each RAPID. After this study was completed, scoring templates were added to the bottom of Page 1 of the MDHAQ to adjust each of the RAPID raw scores to 0–10, dividing by the number of included measures, i.e., 2, 3, 4, or 5, to give a composite score of 0–10. With templates on the MDHAQ, scoring of an adjusted RAPID requires about 1–2 additional seconds.

Statistical analysis. Only descriptive statistics were calculated to provide data concerning time to score various measures.

RESULTS

The median time required to perform twenty 28-joint counts was 90 s (range 71–113 s; Table 2). Differences between the 3 rheumatologists were 1.6-fold, the widest range of all measures scored by the 3 rheumatologists, explained in part by the fact that the 28-joint count was the only measure for which the 3 rheumatologists did not measure identical patient data, as each rheumatologist assessed his own patients.

Computation of a DAS28 using the DAS Website in groups of 10 required a median of 14.6 s (range 12.9–16.8 s) for each DAS (Table 2). The total for a 28-joint count and DAS would be 104.6 s, not including the time to assign a patient global estimate score and assemble laboratory and other data.



Multi-Dimensional Health Assessment Questionnaire (R783-NP2)

This questionnaire includes information not available from blood tests, X-rays, or any source other than you. Please try to answer each question, even if you do not think it is related to you at this time. Try to complete as much as you can yourself, but if you need help, please ask. There are no right or wrong answers. Please answer exactly as you think or feel. Thank you.

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

OVER THE LAST WEEK, were you able to:	Without **ANY** Difficulty	With **SOME** Difficulty	With **MUCH** Difficulty	**UNABLE** To Do
a. Dress yourself, including tying shoelaces and doing buttons?	0	1	2	3
b. Get in and out of bed?	0	1	2	3
c. Lift a full cup or glass to your mouth?	0	1	2	3
d. Walk outdoors on flat ground?	0	1	2	3
e. Wash and dry your entire body?	0	1	2	3
f. Bend down to pick up clothing from the floor?	0	1	2	3
g. Turn regular faucets on and off?	0	1	2	3
h. Get in and out of a car, bus, train, or airplane?	0	1	2	3
i. Walk two miles or three kilometers, if you wish?	0	1	2	3
j. Participate in recreational activities and sports as you would like, if you wish?	0	1	2	3
k. Get a good night's sleep?	0	1.1	2.2	3.3
l. Deal with feelings of anxiety or being nervous?	0	1.1	2.2	3.3
m. Deal with feelings of depression or feeling blue?	0	1.1	2.2	3.3

1.a-j FN (0-10)

1=0.3 2=0.7 3=1.0 4=1.3 5=1.7 6=2.0 7=2.3 8=2.7 9=3.0 10=3.3 11=3.7 12=4.0 13=4.3 14=4.7 15=5.0 16=5.3 17=5.7 18=6.0 19=6.3 20=6.7 21=7.0 22=7.3 23=7.7 24=8.0 25=8.3 26=8.7 27=9.0 28=9.3 29=9.7 30=10

2.PN (0-10)

4.PTGL (0-10)

2. How much pain have you had because of your condition OVER THE PAST WEEK? Please indicate below how severe your pain has been:

NO PAIN 0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10 PAIN AS BAD AS IT COULD BE

RAPID 3 (0-30)

3.a-pPTJT(0-10)

1=0.2 2=0.4 3=0.6 4=0.8 5=1.0 6=1.3 7=1.5 8=1.7 9=1.9 10=2.1 11=2.3 12=2.5 13=2.7 14=2.9 15=3.1 16=3.3 17=3.5 18=3.8 19=4.0 20=4.2 21=4.4 22=4.6 23=4.8 24=5.0 25=5.2 26=5.4 27=5.6 28=5.8 29=6.0 30=6.3 31=6.4 32=6.7 33=6.9 34=7.1 35=7.3 36=7.5 37=7.7 38=7.9 39=8.1 40=8.3 41=8.5 42=8.8 43=9.0 44=9.2 45=9.4 46=9.6 47=9.8 48=10

3. Please place a check (√) in the appropriate spot to indicate the amount of pain you are having today in each of the joint areas listed below:

	None	Mild	Moderate	Severe		None	Mild	Moderate	Severe
a.LEFT FINGERS	☐ 0	☐ 1	☐ 2	☐ 3	i.RIGHT FINGERS	☐ 0	☐ 1	☐ 2	☐ 3
b.LEFT WRIST	☐ 0	☐ 1	☐ 2	☐ 3	j.RIGHT WRIST	☐ 0	☐ 1	☐ 2	☐ 3
c.LEFT ELBOW	☐ 0	☐ 1	☐ 2	☐ 3	k.RIGHT ELBOW	☐ 0	☐ 1	☐ 2	☐ 3
d.LEFT SHOULDER	☐ 0	☐ 1	☐ 2	☐ 3	l.RIGHT SHOULDER	☐ 0	☐ 1	☐ 2	☐ 3
e.LEFT HIP	☐ 0	☐ 1	☐ 2	☐ 3	m.RIGHT HIP	☐ 0	☐ 1	☐ 2	☐ 3
f.LEFT KNEE	☐ 0	☐ 1	☐ 2	☐ 3	n.RIGHT KNEE	☐ 0	☐ 1	☐ 2	☐ 3
g.LEFT ANKLE	☐ 0	☐ 1	☐ 2	☐ 3	o.RIGHT ANKLE	☐ 0	☐ 1	☐ 2	☐ 3
h.LEFT TOES	☐ 0	☐ 1	☐ 2	☐ 3	p.RIGHT TOES	☐ 0	☐ 1	☐ 2	☐ 3
q.NECK	☐ 0	☐ 1	☐ 2	☐ 3	r.BACK	☐ 0	☐ 1	☐ 2	☐ 3

4. Considering all the ways in which illness and health conditions may affect you at this time, please indicate below how you are doing:

VERY WELL 0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10 VERY POORLY

RAPID 4 (0-40)

Please turn to the other side

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NR: 1=0.3, 2=0.7, 3=1.0 LS: 4=1.3, 5=1.7, 6=2.0
MS: 7=2.3, 8=2.7, 9=3.0, 10=3.3, 11=3.7, 12=4.0
HS: 13=4.3, 14=4.7, 15=5.0, 16=5.3, 17=5.7,18=6.0, 19=6.3, 20=6.7, 21=7.0, 22=7.3, 23=7.7, 24=8.0, 25=8.3, 26=8.7, 27=9.0, 28=9.3, 29=9.7, 30=10.0

RAPID 4 RAPID 4 (0-10)

NR: 1=0.3, 2=0.5, 3=0.8, 4=1.0 LS: 5=1.3, 6=1.5, 7=1.8, 8=2.0
MS: 9=2.3, 10=2.5, 11=2.8, 12=3.0, 13=3.3, 14=3.5, 15=3.8, 16=4.0
HS: 17=4.3, 18=4.5, 19=4.8, 20=5.0, 21=5.3, 22=5.5, 23=5.8, 24=6.0, 25=6.3, 26=6.5, 27=6.8, 28=7.0, 29=7.3, 30=7.5, 31=7.8, 32=8.0, 33=8.3, 34=8.5, 35=8.7, 36=9.0, 37=9.3, 38=9.5, 39=9.8, 40=10.0

MDGLOBAL(0-10))

RAPID 5 (0-50)

RAPID 5 (0-10)

NR: 1=0.2, 2=0.4, 3=0.6, 4=0.8 5=1.0 LS: 6=1.2, 7=1.4, 8=1.6, 9=1.8, 10=2.0,
MS:11=2.2, 12=2.4, 13=2.6, 14=2.8, 15=3.0, 16=3.2, 17=3.4, 18=3.6, 19=3.8, 20=4.0
HS: 21=4.2, 22=4.4, 23=4.6, 24=4.8, 25=5.0, 26=5.2, 27=5.4, 28=5.6, 29=5.8, 30=6.0, 31=6.2, 32=6.4, 33=6.6, 34=6.8, 35=7.0, 36=7.2, 37=7.4, 38=7.6, 39=7.8, 40=8.0, 41=8.2, 42=8.4, 43=8.6, 44=8.8, 45=9.0, 46=9.2, 47=9.4, 48=9.6, 49=9.8, 50=10.0

Figure 1. Multidimensional Health Assessment Questionnaire (MDHAQ)[18], derived from the standard HAQ[19], designed for routine clinical care. The front side includes 10 activities, 8 derived from the HAQ and 2 complex activities, as well as 2 VAS for pain and patient global estimate of status, and a self-report joint count from a Rheumatoid Arthritis Disease Activity Index (RADAI)[24]. Scoring templates for these 4 measures, as well as for Routine Assessment of Patient Index Data (RAPID) composite indices are also available on the front side. The reverse side includes a review of systems, recent medical history, fatigue VAS, and demographic data.

5. Please check (√) if you have experienced any of the following over the last month:

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5.ROS ☐ 6. AM ☐ 7.CHG ☐ 8. EX ☐ 9. FT ☐ 10.HX ☐

__Fever	__Lump in your throat	__Paralysis of arms or legs
__Weight gain (>10 lbs)	__Cough	__Numbness or tingling of arms or legs
__Weight loss (<10 lbs)	__Shortness of breath	__Fainting spells
__Feeling sickly	__Wheezing	__Swelling of hands
__Headaches	__Pain in the chest	__Swelling of ankles
__Unusual fatigue	__Heart pounding (palpitations)	__Swelling in other joints
__Swollen glands	__Trouble swallowing	__Joint pain
__Loss of appetite	__Heartburn or stomach gas	__Back pain
__Skin rash or hives	__Stomach pain or cramps	__Neck pain
__Unusual bruising or bleeding	__Nausea	__Use of drugs not sold in stores
__Other skin problems	__Vomiting	__Smoking cigarettes
__Loss of hair	__Constipation	__More than 2 alcoholic drinks per day
__Dry eyes	__Diarrhea	__Depression - feeling blue
__Other eye problems	__Dark or bloody stools	__Anxiety - feeling nervous
__Problems with hearing	__Problems with urination	__Problems with thinking
__Ringing in the ears	__Gynecological (female) problems	__Problems with memory
__Stuffy nose	__Dizziness	__Problems with sleeping
__Sores in the mouth	__Losing your balance	__Sexual problems
__Dry mouth	__Muscle pain, aches, or cramps	__Burning in sex organs
__Problems with smell or taste	__Muscle weakness	__Problems with social activities

6. When you awakened in the morning OVER THE LAST WEEK, did you feel stiff? ☐No ☐Yes
If "No," please go to Item 7. If "**Yes**," **please indicate the number of minutes**_____, **or hours** _____ until you are as limber as you will be for the day.

7. How do you feel TODAY compared to ONE WEEK AGO? Please check (✓) only one.
Much **B**etter ☐ (1), **B**etter ☐ (2), the **S**ame ☐ (3), **W**orse ☐ (4), **M**uch **W**orse ☐ (5) than one week ago

8. How often do you exercise aerobically (sweating, increased heart rate, shortness of breath) **for at least one-half hour** (30 minutes)**? Please check (✓) only one.**
☐ 3 or more times a week (3) ☐ 1-2 times per month (1)
☐ 1-2 times per week (2) ☐ Do not exercise regularly (0) ☐ Cannot exercise due to disability/ handicap (9)

9. How much of a problem has UNUSUAL fatigue or tiredness been for you OVER THE PAST WEEK?

FATIGUE IS NO PROBLEM ○ FATIGUE IS A MAJOR PROBLEM
0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10

10. Over the last 6 months have you had: [Please check (√)]

☐No ☐Yes An operation	☐No ☐Yes Change(s) of arthritis drugs or other drugs
☐No ☐Yes Inpatient hospitalization	☐No ☐Yes Change(s) of address
☐No ☐Yes A new illness, accident or trauma	☐No ☐Yes Change(s) of marital status
☐No ☐Yes An important new symptom	☐No ☐Yes Change job or work duties, quit work, retired
☐No ☐Yes Side effect(s) of any drug	☐No ☐Yes Change of medical insurance, Medicare, etc
☐No ☐Yes Smoke cigarettes regularly	☐No ☐Yes Change of primary care or other doctor

Please explain any "Yes" answer below, or indicate any other health matter that affects you:

_____

_____

SEX: ☐ Female, ☐ Male **ETHNIC GROUP:** ☐ Asian, ☐ Black, ☐ Hispanic, ☐ White, ☐ Other_____

Your Occupation _____
Work Status: ☐ Full-time, ☐ Part-time, ☐ Disabled
☐ Homemaker, ☐ Self-Employed, ☐Retired,
☐ Seeking work, ☐ Other_____

Please circle the number of years of school you have completed:
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20

Please write your weight: _____ lbs. height: _____ inches

Your Name_____ **Date of Birth** _____ **Today's Date** _____

Page 2 of 2 Thank you for completing this questionnaire to help keep track of your medical care. R783NP2

FOR OFFICE USE ONLY: I have reviewed [check(✓)]: ___FN, ___ PN, ____GL, ___RADAI, ___RAPID, ____ROS, ____HX
Name: _____ Signature_____

A HAQ, including a 10 cm pain VAS and global VAS, was scored by 2 of the 3 rheumatologists with a median time of 41.9 s (Table 2); agreement over less than 1 s between the 2 rheumatologists was seen. The third rheumatologist scored only the HAQ physical function scale, and a second rheumatologist also scored 50 HAQ in this manner (as well as 50 HAQ including the 2 VAS). This method required 24 s, again with agreement over less than 1 s (Table 2).

The MDHAQ, with 10 activities, 21 circle VAS, and scoring templates on the questionnaire, was scored with a median time of 7.5 s (range 6.4–8.5 s; Table 2). RAPID2, which includes only the 2 global estimates by the patient and

physician, required a median of 4.3 s (range 4.0–4.4 s; Table 2). RAPID 3, a composite of physical function, pain, and global scores on the MDHAQ, required a median of 9.6 s (range 9.1–12.1 s; Table 2). RAPID4 scores, with addition of RADAI self-report joint count to RAPID3, added about 9.5 s, for a median of 19 s (range 15.3–22.8 s; Table 2). RAPID5, with addition of both a physician global score and RADAI self-report joint count to RAPID3, required a median of 19.4 s (range 17.5–27.3 s; Table 2).

A comparison of the most commonly used measures is illustrated in Figure 2, indicating times to score of 90 s for a 28-joint count, 41.9 s for a HAQ, 9.6 s for a PAS or RAPID3, and 19.4 s for RAPID5. Therefore, a RAPID score including a patient self-report RADAI joint count and physician estimate of global status in an index requires about one-half the time to score compared to a HAQ, and one-fourth the time compared to a 28-joint count. RAPID3, which gives virtually identical results to RAPID5, and similar results to a DAS[16,17,22], can be scored in about one-fourth the time to score a HAQ and one-eighth the time to perform a 28-joint count.

DISCUSSION

The time required to score various quantitative measures to assess patients with RA varied over about a 10-fold range, from about 7.5 s for the 3 patient-reported outcome (PRO) Core Data Set measures on the MDHAQ to about 90 s for a 28-joint count for tender and swollen joints. RAPID3, which provides an index of the 3 PRO measures, results similar to a DAS[16,17,22], required about 10 s using scoring templates on the questionnaire, less than one-tenth of the 104 s to perform a 28-joint count and enter numbers to calculate a DAS28, and one-fourth the 42 s to score a HAQ. Even a RAPID5 score, which adds a self-report RADAI joint count and physician/assessor estimate of global status, required about 20 s, using scoring templates on the questionnaire, less than one-fourth of the time to perform a 28-joint count and enter numbers to calculate a DAS28, and one-half the time to score a HAQ.

The joint count is the most specific measure for RA, and a careful examination of joints is required to formulate clinical management decisions. A patient questionnaire certainly is not regarded as a substitute for a joint examination, as confirmation and interpretation of any questionnaire data on examination is required for decisions in patient management. However, a qualitative joint count, which generally is performed by most rheumatologists, supplemented by a self-report RADAI joint count, may be adequate for most patient care, and certainly preferable to no quantitative data at all, which is usually the case in contemporary care.

It may appear that much information may be lost in an index of PRO measures only, without physician/assessor joint counts, in patients with RA. However, relative efficiencies of patient questionnaire measures to distinguish active from control treatments in clinical trials are similar to or often greater than physician joint counts. An index of 3 PRO measures distinguishes active from control treatment in clinical trials of leflunomide[16], methotrexate[16], adalimumab[17], and abatacept[22] at levels similar to ACR and DAS criteria. In analysis of the abatacept clinical trials AIM and ATTAIN, RAPID 3, 4, and 5 scores performed similarly to one another and to the DAS to distinguish active from control treatments[22]. Further, physical function on a patient questionnaire — not a joint count, laboratory test, or radiograph —

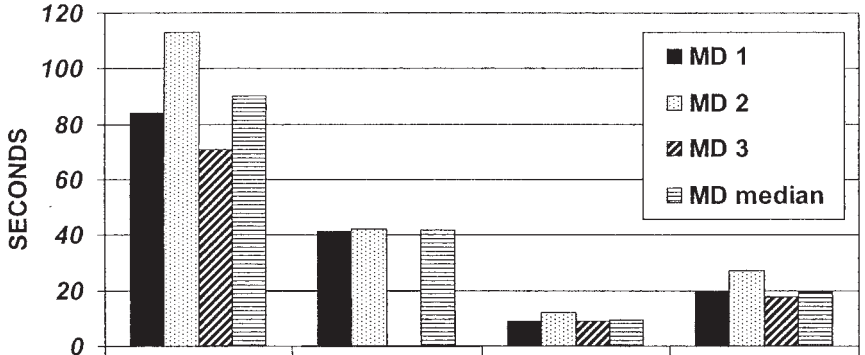
Table 1. Composition of Routine Assessment of Patient Index Data (RAPID) indices.

Index	Physical Function	Pain	Patient Global Estimate	Patient Joint Count (RADAI)	Assessor Global Estimate
RAPID2			✓		✓
RAPID3	✓	✓	✓		
RAPID4	✓	✓	✓	✓	
RAPID5	✓	✓	✓	✓	✓

Table 2. Median number of seconds required to score various measures to assess patients with RA.

Measure	Rheumatologist 1, median	Rheumatologist 2, median	Rheumatologist 3, median	Median of 1, 2, and 3
28-joint count	84	113	71	90
DAS 28 — enter numbers	12.9	16.8	14.6	14.6
HAQ function + pain, global VAS	41.5	42.2		41.9
HAQ without VAS		23.9	24.1	24.0
MDHAQ function + pain, global VAS	6.4	8.5	7.5	7.5
RAPID2	4.3	4.4	4.0	4.3
RAPID3 = function, pain, global	9.2	12.1	9.1	9.6
RAPID4MD = RAPID3 + physician global	11.8	16.1	12.0	12.2
RAPID4JC = RAPID3 + JC	19.0	22.8	15.3	19.0
RAPID5	19.4	27.3	17.5	19.4

DAS: Disease Activity Score; HAQ: Health Assessment Questionnaire; MDHAQ: multidimensional HAQ: VAS: visual analog scale; RAPID: Routine Assessment of Patient Index Data; JC: joint count.



	28 JT	HAQ-DI *	RAPID3	RAPID5
MD 1	84	41.5	9.2	19.4
MD 2	113	42.2	12.1	27.3
MD 3	71	—	9.1	17.5
MD median	90	41.9	9.6	19.4

Figure 2. Summary of time needed to score various measures to assess RA, including a 28-joint count, Disease Activity Score 28 (DAS28), Health Assessment Questionnaire (HAQ), Routine Assessment of Patient Index Data (RAPID)3, and RAPID5 on a multidimensional HAQ (MDHAQ). Note that RAPID3 requires less than one-eighth the time required for a 28-joint count, and one-fourth the time to score a HAQ. *MD 2 and MD 3 only.

provides the most significant clinical prognostic indicators of most severe 5–10 year outcomes of RA (other than radiographic damage), including work disability, costs, and mortality[25].

Our study has several limitations. First, the conditions are likely to underestimate the time required to score each of the measures, although comparative times appear to provide reasonably accurate relative estimates. Second, the exercise was performed by only 3 rheumatologists, but the relative times to score were similar in order of magnitude, e.g., the difference between RAPID3 and a 28-joint count was 8 to 9-fold greater for all 3 rheumatologists. We did not attempt to estimate the possible saving of time at a patient visit using the MDHAQ scale, as well as review of systems and recent medical history data[26].

These findings appear pertinent to efforts to introduce quantitative measurement into standard rheumatology care. The MDHAQ was developed from the standard HAQ, designed for standard clinical care, with 10 rather than 20 physical function activities, each scored 0–3, VAS for pain and global estimate composed of 21 numbered circles rather than a 10 cm line to eliminate a need for a ruler, scored 0–10 at 0.5 intervals, and a self-report joint count from an RA Disease Activity Index (RADAI)[24], scored 0–48. As noted, scoring templates are available on certain versions of the MDHAQ to convert raw physical function, RADAI, and RAPID composite scores to 0–10 scores.

A receptionist, nurse clinician, or other assistant can be taught easily to calculate MDHAQ and RAPID scores using the scoring templates on the MDHAQ as used by the authors in this study. MDHAQ RAPID scores appear to provide valid, reliable, feasible, and acceptable measures for standard clinical care.

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