




A Self-Report Multidimensional Health Assessment Questionnaire (MDHAQ) for Face-To-Face or Telemedicine Encounters to Assess Clinical Severity (RAPID3) and Screen for Fibromyalgia (FAST) and Depression (DEP)

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Abstract

Purpose of Review To update the clinical value of a patient self-report multidimensional health assessment questionnaire (MDHAQ).

Recent Findings The MDHAQ includes 10 individual quantitative scores for physical function, pain, patient global assessment, fatigue, sleep, anxiety, depression, morning stiffness, change in status, and exercise status, and 5 indices, RAPID3 (routine assessment of patient index data) to assess clinical status in all diseases studied, FAST3 (fibromyalgia

assessment screening tool) and MDHAQ-Dep (depression) to screen for fibromyalgia and/or depression, RADAI self-report of specific painful joints and joint count, and a symptom checklist for review of systems, and recognition of flares and medication adverse events. The MDHAQ also uniquely queries traditional “medical” information concerning comorbidities, falls, trauma, new symptoms, illnesses, surgeries, hospitalizations, emergencies, medication changes, and medication side effects. Three MDHAQ versions include long for new patients, short for new and return patients, and telemedicine. An electronic MDHAQ (eMDHAQ) has been developed with software that can interface with any electronic medical record (EMR) through the HL7 FHIR standard. However, EMR collaboration and implementation have proven difficult.

Summary An MDHAQ provides a quantitative overview of patient status with far more information and documentation than an interview, involving minimal extra work for the physician.

Introduction

A self-report multidimensional health assessment questionnaire (MDHAQ) (Figs. 1, 2, and 3) [1, 2] collects 10 individual quantitative scores for physical function, pain, global status, fatigue, anxiety, depression, sleep quality, morning stiffness, exercise status, and change in status; 5 indices for a RADAI (rheumatoid arthritis disease activity index self-report painful joint count), symptom checklist, clinical severity, fibromyalgia, and depression; and traditional “medical” history information, a unique feature among quantitative patient questionnaires, concerning illnesses, surgery, falls, medication changes, adverse events, etc.

The MDHAQ was developed initially to assess and monitor rheumatoid arthritis (RA) but has been found informative to assess clinical status in patients with all rheumatic diseases studied [3, 4]. Development was performed in routine clinical care over 25 years as a continuous quality improvement (CQI) “plan-do-study-act” program [5], with changes based on patient feedback, clinical relevance, and prognostic value [6], rather than initially according to psychometric criteria, although quantitative MDHAQ scores and indices meet psychometric criteria [1, 2, 6–10, 11••, 12–15, 16•, 17]. The

MDHAQ provides more extensive information than a traditional interview in most patients, while saving 2–5 min for the physician and providing a more complete record.

Several versions of the MDHAQ have been developed for face-to-face and/or telemedicine encounters: a long MDHAQ for new patients, similar to a clinical “intake” questionnaire (Fig. 1), a short MDHAQ for new or return patients (Fig. 2), and a telemedicine MDHAQ, for remote completion as an attachment without protected health information (name, date of birth, medical record number), but requiring an identification number assigned by the treatment site (Fig. 3).

A secure, Health Insurance Portability and Accountability Act (HIPAA)-compliant digital electronic MDHAQ (eMDHAQ) has been developed, which incorporates HL 7 FHIR (Fast Healthcare Interoperability Resources) to interface with any electronic medical record (EMR). However, collaboration with EMR vendors has proven difficult, and independent MDHAQ databases have been found feasible and clinically informative. Further details concerning the MDHAQ are found in original reports and previous reviews [1, 2, 6–10, 11••, 12–15, 16•, 17].

Content of the MDHAQ as quantitative patient medical history scores

The MDHAQ includes scores for physical function, pain, and patient global assessment, the 3 patient self-report measures among the 7-item

MultiDimensional Health Assessment Questionnaire for telemedicine: MDHAQ®, RAPID3®, FAST3™

Please DO NOT write your name, date of birth, or medical record number on this questionnaire:

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.

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

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1. FN (0-10):

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

2. PN (0-10):

4. PTGL (0-10):

RAPID 3 (0-30)

3. JT SCR

Tele#

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 IT COULD BE

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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	i. RIGHT FINGERS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. LEFT WRIST	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	j. RIGHT WRIST	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. LEFT ELBOW	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	k. RIGHT ELBOW	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. LEFT SHOULDER	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	l. RIGHT SHOULDER	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. LEFT HIP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	m. RIGHT HIP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. LEFT KNEE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	n. RIGHT KNEE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. LEFT ANKLE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	o. RIGHT ANKLE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. LEFT TOES	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	p. RIGHT TOES	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
q. NECK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	r. BACK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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 POORLY

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

<input type="checkbox"/> Fever	<input type="checkbox"/> Lump in your throat	<input type="checkbox"/> Paralysis of arms or legs
<input type="checkbox"/> Weight gain (>10 lbs)	<input type="checkbox"/> Cough	<input type="checkbox"/> Numbness or tingling of arms or legs
<input type="checkbox"/> Weight loss (>10 lbs)	<input type="checkbox"/> Shortness of breath	<input type="checkbox"/> Fainting spells
<input type="checkbox"/> Feeling sickly	<input type="checkbox"/> Wheezing	<input type="checkbox"/> Swelling of hands
<input type="checkbox"/> Headaches	<input type="checkbox"/> Pain in the chest	<input type="checkbox"/> Swelling of ankles
<input type="checkbox"/> Unusual fatigue	<input type="checkbox"/> Heart pounding (palpitations)	<input type="checkbox"/> Swelling in other joints
<input type="checkbox"/> Swollen glands	<input type="checkbox"/> Trouble swallowing	<input type="checkbox"/> Joint pain
<input type="checkbox"/> Loss of appetite	<input type="checkbox"/> Heartburn or stomach gas	<input type="checkbox"/> Back pain
<input type="checkbox"/> Skin rash or hives	<input type="checkbox"/> Stomach pain or cramps	<input type="checkbox"/> Neck pain
<input type="checkbox"/> Unusual bruising or bleeding	<input type="checkbox"/> Nausea	<input type="checkbox"/> Use of drugs not sold in stores
<input type="checkbox"/> Other skin problems	<input type="checkbox"/> Vomiting	<input type="checkbox"/> Smoking cigarettes
<input type="checkbox"/> Loss of hair	<input type="checkbox"/> Constipation	<input type="checkbox"/> More than 2 alcoholic drinks per day
<input type="checkbox"/> Dry eyes	<input type="checkbox"/> Diarrhea	<input type="checkbox"/> Depression - feeling blue
<input type="checkbox"/> Other eye problems	<input type="checkbox"/> Dark or bloody stools	<input type="checkbox"/> Anxiety - feeling nervous
<input type="checkbox"/> Problems with hearing	<input type="checkbox"/> Problems with urination	<input type="checkbox"/> Problems with thinking
<input type="checkbox"/> Ringing in the ears	<input type="checkbox"/> Gynecological (female) problems	<input type="checkbox"/> Problems with memory
<input type="checkbox"/> Stuffy nose	<input type="checkbox"/> Dizziness	<input type="checkbox"/> Problems with sleeping
<input type="checkbox"/> Sores in the mouth	<input type="checkbox"/> Losing your balance	<input type="checkbox"/> Sexual problems
<input type="checkbox"/> Dry mouth	<input type="checkbox"/> Muscle pain, aches, or cramps	<input type="checkbox"/> Burning in sex organs
<input type="checkbox"/> Problems with smell or taste	<input type="checkbox"/> Muscle weakness	<input type="checkbox"/> Problems with social activities

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5. Sx chkslt

6. FTG

FAST4

Tele#

Please check (✓) here if you have had none of the above over the last month:

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

FATIGUE IS A NO 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 MAJOR PROBLEM

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

<input type="checkbox"/> No <input type="checkbox"/> Yes: An operation or new illness	<input type="checkbox"/> No <input type="checkbox"/> Yes: Change(s) of arthritis or other medication
<input type="checkbox"/> No <input type="checkbox"/> Yes: Medical emergency or stay overnight in hospital	<input type="checkbox"/> No <input type="checkbox"/> Yes: Change(s) of address
<input type="checkbox"/> No <input type="checkbox"/> Yes: A fall, broken bone, or other accident or trauma	<input type="checkbox"/> No <input type="checkbox"/> Yes: Change(s) of marital status
<input type="checkbox"/> No <input type="checkbox"/> Yes: An important new symptom or medical problem	<input type="checkbox"/> No <input type="checkbox"/> Yes: Change job or work duties, quit work, retired
<input type="checkbox"/> No <input type="checkbox"/> Yes: Side effect(s) of any medication or drug	<input type="checkbox"/> No <input type="checkbox"/> Yes: Change of medical insurance, Medicare, etc.
<input type="checkbox"/> No <input type="checkbox"/> Yes: Smoke cigarettes regularly	<input type="checkbox"/> No <input type="checkbox"/> Yes: Change of primary care or other doctor

8. Please explain any "Yes" answer above, or any other information you would like your care team to know:

SEX: Female, Male ETHNIC GROUP: Asian, Black, Hispanic, White, Other

Your Occupation _____ Please circle the number of years of school you have completed:

Work Status: Full-time, Part-time, Disabled 1 2 3 4 5 6 7 8 9 10
 Homemaker, Self-Employed, Retired, 11 12 13 14 15 16 17 18 19 20
 Seeking work, Other _____

Please indicate Your Weight: _____ pounds. Please indicate your Height: _____ feet _____ inches.

Please indicate Your Year of birth (NOT date of birth) _____ Please indicate today's date _____

Fig. 3. Telemedicine MDHAQ

RA core data set [18] (Figs. 1, 2, 3). The physical function score is based on 10 activities, 8 verbatim from each of the 8 categories of 2 or 3 items on the standard HAQ reported in 1980 [19], and 2 “advanced” activities to “walk 2 miles or 3 kilometers” and “participate in recreational activities and sports as you wish” [1, 2]. The 10 activities are each scored 0–3, for a total of 0–30, which is divided by 3 for an adjusted total of 0–10, using a template on a paper MDHAQ (Figs. 1, 2, and 3).

Three “psychological” items for sleep quality, anxiety, and depression are queried in the patient-friendly HAQ format, scored 0–3.3 for a total of 0–9.9 as a “psychological index” [1, 2], which has not been widely adopted and is not included among the 5 MDHAQ indices in this review. It has been reported recently that the depression query can contribute to a screening index (see below) [16•].

Pain and patient global assessment are assessed according to 0–10 visual numeric scales (VNS), with 21 circles numbered at intervals of 0.5, rather than a traditional visual analog scale (VAS) line from 0 to 10 or 0–100. Advantages of the VNS include patient preference, ease of scoring by professionals, and absence of a need for an exact 10 cm line when printing or photocopying [20]. A 0–10, 21 circle fatigue VNS similar to the pain and global VNS is found on the MDHAQ (but not on the HAQ) [21]. Queries concerning morning stiffness [22], change in status, and exercise status [23, 24•, 25] may contribute to clinical decisions in many patients but are not included in the telemedicine MDHAQ (Fig. 3).

The MDHAQ is unique among quantitative patient questionnaires in querying traditional “medical” history information concerning recent surgeries, illnesses, medical emergencies, falls, hospitalization, new symptoms, medication changes and side effects, and changes in work duties or physician [6, 8, 26] (Figs. 1–3).

A long 2-page (four-sided) “new patient” MDHAQ queries a “past medical history,” similar to clinical “intake” questionnaires to record past illnesses, surgeries, family history, allergies, social history, and medications (Fig. 1). Patient self-report has been used for many decades [27] to collect a “subjective” medical history [28], which is entered by the physician into an encounter note, but without quantitative scores or indices. By contrast, most quantitative assessments of function, pain, fatigue, and other constructs by an observer or self-report, including the HAQ [19], Short-Form 36 (SF-36) [29], and PROMIS [30], do not query traditional “medical” history information [29, 30] (Table 1). The MDHAQ queries both traditional “medical” information and more recently developed quantitative self-report scores.

Patient questionnaire scores are quantitative, protocol-driven, reproducible components of a patient medical history, which meet the criteria of the “scientific method” [14, 31]. Patient self-report scores are as reproducible as formal joint counts or serology laboratory tests [7] and are correlated significantly with these measures [32]. Self-report patient questionnaire scores are more significant than traditional joint count or laboratory measures to distinguish active from control treatments in RA clinical trials [33]. Physical function scores are more significant than laboratory tests or radiographs to predict severe long-term outcomes of RA such as work disability, costs, joint replacement surgery, and premature death [24•, 34–42].

Table 1. Five self-report rheumatology questionnaires completed by patients in 5–10 min

Questionnaire:		MDHAQ	HAQ	WOMAC	SF-36	PROMIS29
Contents:	First report	1999	1980	1988	1976	2004
Basic quantitative scores	Physical function	10 items	20 items	17 items	10 items	4 items
	Pain	21 circle VNS	10 cm VAS	5 items	10 items	5 items
	Patient global	21 circle VNS	10 cm VAS	No	2 scales	No
	Stiffness	AM stiffness	No	2 items	No	No
"Medical" history items	Fatigue	21 circle VNS	No	No	1 item	4 items
	RADAI pain JC	18 jts 0-54	No	No	No	No
	Symptom (Sx)	60 Sx	No	No	No	No
	Medical history	Yes	No	No	No	No
Psychological scores	Anxiety	2 items	No	No	4 items	4 items
	Depression	2 items	No	No	6 items	4 items
	Sleep quality	2 items	No	No	No	4 items
Role items	Social role	1 item	No	No	2 items	4 items
	Work capacity	1 item	No	No	4 items	No
Social history	Demographics	Yes	No	No	No	No
	Social history	Yes	No	No	No	No
Indices	Clinical status	RAPID3	HAQ-DI	3 scores	8 scores	8 scores
	Fibromyalgia	FAST3	No	No	No	No
	Depression	MDHAQ-Dep	No	No	6 items	4 items
	Adverse events	Symptom checklist	No	No	No	No
Scoring templates		Yes	Yes	No	Computer	Computer

Five MDHAQ indices: RAPID3 (routine assessment of patient index data) to assess clinical status, FAST3 (fibromyalgia assessment screening tool), MDHAQ-Dep (depression), RADAI self-report painful joint count, and symptom checklist for review of systems, early recognition of disease flares and comorbidities, and adverse events of medications

MDHAQ scores may be compiled into 5 indices (Fig. 4), all based on individual measures within a 2-page MDHAQ:

1. RAPID3 (routine assessment of patient index data) includes physical function, pain, and patient global assessment, each scored 0–10 for a total of 0–

5 indices on 2-page MDHAQ for routine care

**RAPID3 (0-30)=
FN (0-10) + PN (0-10) + PATGL (0-10)**

**FAST3-P ≥2/3=FM
PN ≥6=1, RADA1
≥16=1, SxList ≥16=1**

**MDHAQ-Dep: Yes on
either item = positive
depression screen**

60 Symptom Checklist- Review of systems, Detect Flares or Medication adverse events

RADA1-Self-report painful joint count

Fig. 4. Five MDHAQ indices

30 [43, 44•]. Early reports indicated scoring of 0–10 for RAPID3 [45, 46]. These reports presented studies to compare RAPID3 to “RAPID4” and “RAPID5,” which also included a patient self-report or physician-performed joint count and/or physician global assessment. Since indices under study included different numbers of measures, division by the number of measures was performed to give similar 0–10 scores for comparison [45, 46]. The other RAPID indices added little to RAPID3, and RAPID3 with scoring of 0–30 was recommended in all subsequent reports since 2009.

RAPID3 provides similar results in RA clinical trials and clinical care to DAS28 (Disease Activity Score 28) [47] and CDAI (Clinical Disease Activity Index) [48] [33, 44•, 49–52], which include formal joint counts. RAPID3 is more likely to be abnormal in new RA patients than ESR, and more likely than ESR to document incomplete responses to methotrexate [53•]. RAPID3 is informative in osteoarthritis (OA) [9, 10, 54, 55], systemic lupus erythematosus (SLE) [54–57], ankylosing spondylitis (AS) [54, 58–60], psoriatic arthritis (PsA) [54, 61], gout [54], vasculitis [62], polymyalgia rheumatica (PMR) [4, 63], and others [4, 8, 54, 64, 65•] and even in non-rheumatic diagnoses [11••].

RAPID3 severity categories are > 12 = severe, 6.1–12 = moderate, 3.1–6 = low, and 0–3 = remission. In clinical trials, patients are selected for high disease activity; high RAPID3, DAS28, and CDAI scores generally indicate high inflammatory activity. In routine clinical care, high index scores may be based not only on inflammatory activity but also on joint damage and/or fibromyalgia [66•, 67•, 68••, 69•], just as an elevated ESR may be based on inflammatory activity, infection, and/or a lymphoma.

Similar considerations pertain to DAS28 and CDAI; patients who have no swollen joints and a normal ESR of 20 mm/h, but high tender joint counts

and/or patient global assessment, may have moderate or high DAS28, CDAI, and RAPID3 (Table 2). Most routine clinical care databases indicate that fewer than 50% of patients are classified as in remission or even low activity according to an RA index, although many patients may have minimal inflammation, as high index scores may result from joint damage [66•, 67•], fibromyalgia [67•, 68••], and/or other comorbidities or distress [67•, 69•].

2. FAST (fibromyalgia assessment screening tool) are cumulative indices to screen for fibromyalgia on the same MDHAQ used to score RAPID3 (Figs. 1–3) [12, 13•]; 1 point each is scored for a pain VNS ≥ 6 , fatigue VNS ≥ 6 , painful RADAI joint count ≥ 16 , and symptom checklist ≥ 16 . FAST3-P includes pain, RADAI, and symptoms, each scored 0 or 1, for a total of 0–3. FAST3-F includes fatigue, RADAI, and symptoms, again each scored 0 or 1 for a 0–3 total. FAST4 includes pain, fatigue, RADAI, and symptom checklist for a 0–4 total score [12, 13•]. Scores of 2/3 on FAST3-P or FAST3-F or 3/4 on FAST4 indicate a positive screen for fibromyalgia, which agree 89.4–91.7% with formal 2011 revised fibromyalgia criteria [12, 13•, 70]. The three versions of FAST indices have similar sensitivity and specificity to screen for fibromyalgia; FAST4 may provide greater specificity and generally is used by the authors in routine care. Longitudinal studies in progress may provide new information concerning an optimal choice. A diagnosis of fibromyalgia is made by a physician, but positive screening may be helpful and explain in part poor treatment responses according to a “treat to target” directive [71] in certain RA patients.
3. MDHAQ-Dep (depression) indicates positive screening on the same MDHAQ if either of 2 depression items on the MDHAQ are present, either a score of ≥ 2.2 on the four-point scale or a check on the 60-symptom depression item [16•]. A positive screen for MDHAQ-Dep agrees 83.3%

Table 2. Indices to assess patients with rheumatoid arthritis who have no swollen joints and erythrocyte sedimentation rate of 20 mm/h

Measure	Pt #1	Pt #2	Pt #3	Pt #4	Pt #5
Tender joint count (TJC)	2	4	8	12	16
Swollen joint count (SJC)	0	0	0	0	0
Physician global (DOCGL)	1	1	2	3	3
Erythrocyte sedimentation rate (ESR)	20	20	20	20	20
C-reactive protein (CRP)	8	8	8	8	8
Patient physical function	1	1	1	2	2
Pain visual numerical scale (VNS)	4	5	5	6	8
Patient global assessment VNS)	4	4	5	8	8
DAS28 ESR	3.73M	4.34M	4.80M	5.16H	5.46H
DAS28 CRP	3.38M	3.99M	4.45M	4.72M	5.11H
CDAI	11M	13M	17M	23H	27H
RAPID3	9M	10M	11M	14H	18H

with Patient Health Questionnaire-9 (PHQ-9) [72] and 81.7% with the depression scale on the Hospital Anxiety and Depression Scale (HADS-D) [73], comparable to 82.2% agreement of these 2 reference screening scales for depression with one another [16•]. Again, a definitive diagnosis of depression is made by a physician, but a screening tool without requiring an additional questionnaire may be clinically useful and may explain poor responses to therapies in some patients.

4. A self-report painful joint count on a rheumatoid arthritis disease activity index (RADAI) [74] is correlated significantly with a physician-performed tender joint count and at lesser levels with a swollen joint count. The RADAI painful joint count is informative in patients with many rheumatic diseases [75] and is included in the FAST indices [12, 13•].
5. A 60-symptom checklist can serve as a review of systems and to screen for early detection of disease flares, comorbidities, and adverse effects of medications [11••]. This checklist is included in FAST and MDHAQ-Dep indices and has been reported to be of considerable value for early recognition of adverse events of medications and documentation of their resolution [11••].

The MDHAQ provides quantitative data concerning fatigue [21] and 5 indices, which are not available on the HAQ, DAS28, or CDAI. MDHAQ scores and indices provide “multidimensional” information such as found on other comprehensive “generic” questionnaires, such as the SF-36 [29] and PROMIS [30] (see [14]) (Table 1).

A non-electronic, telemedicine MDHAQ is designed for the rheumatologist to send as a paper MDHAQ attachment to an Email (Fig. 3). The telemedicine MDHAQ specifically excludes personal health identifiers such as name, medical record number, or date of birth (although it does include year of birth to calculate age, which is often a confounder of variable scores). The patient prints the attachment, completes it in pencil, and returns it to the clinical site through an email or can bring it to the clinic for a face-to-face encounter. This version does require that the site which sends the telemedicine MDHAQ to a patient has some type of identifier, usually just a serial number. An electronic version is currently under development.

A digital eMDHAQ

Digital eMDHAQ versions have been developed for patient completion at home, any clinical setting, or anywhere the internet is available to report current clinical status and possible intercurrent problems such as disease flares, adverse effects of medications, or new comorbidities [15, 76]. Analyses of the eMDHAQ versus a paper version in 98 patients indicated that mean levels of 4 individual scores and 3 indices were all within 2%, with intraclass correlation coefficients of 0.86–0.98 (Table 3) [15]. Among 98 patients, 72% expressed a preference for an eMDHAQ, compared to 7% for the paper version, while 21% expressed no preference [15]. The eMDHAQ is secure and HIPAA-compliant [15] and includes the capacity to interface with any EMR through the HL 7 FHIR standard [77], but implementation into routine care has not been possible to date, as discussed in further detail below.

Table 3. Mean scores (SD) and test-retest reliability of patient reported measures on the MDHAQ in paper versus electronic format for 98 patients seen in routine care

	Paper	iPad	Diff. (95%CI)	ICC (95%CI)
Pain VAS (0–10)	4.7 (3.1)	4.9 (3.2)	– 0.1 (– 1.0, 0.7)	0.95 (0.92, 0.97)
Fatigue VAS (0–10)	3.3 (3.0)	3.5 (3.1)	– 0.1 (– 1.0, 0.7)	0.95 (0.93, 0.97)
PATGL VAS (0–10)	4.2 (2.7)	4.4 (2.8)	– 0.2 (– 1.0, – 0.6)	0.96 (0.95, 0.98)
Physical function (0–10)	1.8 (1.6)	1.8 (1.6)	0.003 (– 0.4, 0.5)	0.97 (0.97, 0.98)
RAPID3 (0–30)	10.8 (7.0)	11.2 (6.9)	– 0.4 (– 2.3, 1.6)	0.98 (0.97, 0.99)
Symptom checklist (0–60)	9.9 (8.8)	9.7 (8.6)	0.3 (– 2.1, 2.7)	0.86 (0.79, 0.91)
RADAI-48 (0–48)	10.5 (10.1)	9.7 (9.4)	0.7 (– 2.0, 3.5)	0.92 (0.88, 0.95)

Abbreviations: *MDHAQ*, multidimensional health assessment questionnaire; *RAPID3*, routine assessment of patient index data; *PATGL*, patient global estimate; *RADAI*, rheumatoid arthritis disease activity index; *VAS*, visual analog scale

Source: Pincus T, Castrejon I, Riad M, Obreja E, Lewis C, Krogh NS. Reliability, Feasibility, and Patient Acceptance of an Electronic Version of a Multidimensional Health Assessment Questionnaire for Routine Rheumatology Care: Validation and Patient Preference Study. *JMIR Form Res.* 2020 May 27;4(5):e15815. PMID: 32459182. doi: 10.2196/15815.(15)

Patient questionnaires generally are not included in most EMRs as of February 2021, other than “intake” questionnaires to provide a medical history. This information generally is entered into the EMR by a physician, scribe, or other health professional. A wide range of administrative, logistic, financial, regulatory, design, workflow, and other problems contribute to barriers to integrate patient questionnaires into the EMR, discussed in further detail below.

Barriers to integration of patient questionnaires into an EMR resulting from limitations of the EMR in management of chronic diseases

The EMR was introduced in the early 2000s with extensive optimism that doctors and patients would enjoy improved convenience and outcomes [78–80]. The “P” in HIPAA stands for “portability,” suggesting easy transfer of medical information from one facility to another. The EMR was projected to increase revenue by capturing information that previously had been omitted from reimbursement [78–80].

An electronic format for an EMR does provide advantages in legibility compared to handwriting, accessibility across medical settings that use the same EMR, storage, and prevention of data loss with appropriate back-up. The EMR provides convenience of templates for review of systems, physical examination, joint count, medications, etc. However, many anticipated advances of the EMR remain unmet, and many unanticipated problems have emerged in EMR implementation, particularly in the management of chronic diseases [78–80].

A majority of physicians report that the EMR does not improve efficiency [81], with excessive clerical tasks [81] and interference with face-to-face patient care [82]. Several reports document that physicians spend at least as much time on their EMR tasks as in face-to-face clinical care [82–84]. Many physicians work after hours to complete their EMR tasks [82].

In 2020, most patients continue to complete different intake paper or electronic questionnaires at different care settings despite the similarity of much (often most) of the queried information. Portability is hardly more available than in the paper record era and often even less available [78]. Composition of EMR encounter notes often requires considerably more time than a pen-and-paper format, but many physicians find EMR notes less informative. The EMR is regarded by many, if not most, physicians as a source of stress [78–80, 85], which is reported to be rising [86].

The proposed goal of increased revenue through thorough documentation in an EMR may be met in acute inpatient settings but generally is not met in outpatient management of chronic diseases. Although revenue per encounter may be higher through capture of more information by the EMR, fewer encounters occur, leaving a net decrease in overall revenue in most settings.

Barriers to integration of a patient questionnaire into an EMR: design of the EMR according to a “biomedical model” for acute inpatient care with limited attention to a complementary “biopsychosocial model” for outpatient chronic disease management

One matter that is not addressed in a growing literature concerning limitations of the EMR is the design of the EMR according to a “biomedical model” [87, 88, 89••, 90, 91], the overarching paradigm of twentieth century medicine. In a biomedical model, “objective” data from a laboratory or imaging source are regarded as superior to “subjective” patient medical history narrative information [28] to inform clinical decisions. Patient self-report questionnaires are rarely included, other than as “intake” forms for new patients, from which selected information is entered into the EMR by a physician, scribe, or other health professional, as noted above.

In a biomedical model, information elicited in an interview with a health professional is regarded as more accurate and relevant to clinical decisions than patient self-report questionnaire data. Outcomes of diseases are regarded as resulting primarily from actions of health professionals; actions and attitudes of patients are regarded as of little importance [87, 88, 89••, 90, 91].

A biomedical model characterizes accurately many spectacular advances in medicine over the last 150 years [92] and remains the dominant paradigm of medical care. However, this model is most relevant to acute inpatient medical activities and is limited to characterize management and outcomes of chronic diseases. Nonetheless, dramatic acute medical events remain a staple of perceptions of “health care” of the public (e.g., television shows) and even many health professionals, with limited (or no) attention to matters such as shared decisions for chronic diseases such as rheumatoid arthritis. Furthermore, the acute care hospital remains the setting of most medical education and training, reinforcing the dominance of the biomedical model.

Many aspects of outpatient management of chronic rheumatic diseases (and chronic diseases in general) over long periods may involve a complementary

“biopsychosocial model” in addition to a traditional biomedical model [87, 92, 93]. In a biopsychosocial model, information from a patient medical history, rather than laboratory tests or ancillary studies, accounts for more than 50% of clinical decisions in diagnosis and management of RA, unlike many chronic diseases such as hypertension or diabetes [94••]. Scores for physical function on a quantitative patient questionnaire and patient socioeconomic status generally are (far) more significant in the prognosis of long-term RA clinical outcomes such as work disability [34, 35, 95, 96] and premature mortality [35, 97–100] than laboratory tests or imaging. Physical function and exercise responses on a patient questionnaire are more significant to predict mortality in the general population than smoking [24•]. Patient attitudes and behaviors may be as important in outcomes of chronic rheumatic diseases as the actions of health professionals and medications [87, 92].

The design of an EMR according to a biomedical model oriented to acute medical care has left patient questionnaires generally not only excluded but also difficult to introduce into routine care [87, 92, 93]. Differences in workflow in management of acute inpatient medical problems versus outpatient management of chronic diseases may not have been recognized as problematic when traditional paper records were used, but may explain some of the problems of rheumatologists in using patient questionnaires in the EMR era [35, 42, 100].

The dominance of a biomedical model in medical education and training leaves patient questionnaires regarded as “adjuncts” to patient care, not central to clinical decisions by many rheumatologists. Patient questionnaires generally are not included in most medical school curricula and rheumatology fellowship training programs (35 years after physical function was documented to be more significant to predict mortality than laboratory tests or imaging [35]). Therefore, development of the EMR according to a biomedical model may explain in part structural features of EMRs which limit the introduction of patient self-report questionnaires.

Barriers to integration of a patient questionnaire into an EMR: some physician concerns about the possible value of patient questionnaires for clinical decisions

Many physicians, including rheumatologists, continue to believe that information collected by a health professional is invariably more accurate than information provided by a patient on a self-report questionnaire, despite recognition of the accuracy of patient self-report medical history information over many decades [27]. Of course, health professionals know more than patients about pathophysiology, diagnosis, and treatment. Nonetheless, 80% of patients know more about their details of family history, surgeries, symptoms, medication compliance, levels of pain or fatigue, and other matters. A reader of this article likely can provide more accurate medical information concerning past medical history through self-report than through an interview by a health professional (do you agree?).

Another concern of some physicians is that a patient questionnaire such as an MDHAQ is designed to replace conversation with the patient. On the contrary, the questionnaire serves to enhance the conversation through emphasis on the

primary concerns of both patient and doctor to improve doctor-patient communication. Self-report of medical history information always requires interpretation by a knowledgeable and caring health professional based on information elicited in doctor-patient communication, just as data from a laboratory, imaging, or any source. For example, a high score for pain may be based on inflammatory activity, joint damage, and/or fibromyalgia, just as a high ESR may be based on inflammatory activity, infection, and/or a lymphoma.

A further concern is that collection of more data invariably leads to more work on the part of the physician. However, almost all the additional work in completion of patient questionnaires is performed by the patient rather than the physician; availability of the data at the encounter generally saves time for the doctor, provided that guidelines to workflow are observed. The opportunity to save time while having more thorough and accurate information may be even greater with electronic versions of patient questionnaires, again requiring attention and adjustments to workflow.

“Workarounds” to address limitations of EMRs to incorporate patient questionnaires: use of only RAPID3 in contrast to the full MDHAQ

Limitations to link patient questionnaires into EMRs [15, 76, 101•] have led to various “workarounds.” The most widely used involves continued use of paper questionnaires, 12 years after widespread introduction of EMRs, which are then scanned into the EMR as PDFs. A second involves stand-alone Web-based tools that interact with the EMR [101•], as proposed in this article. A third involves inclusion of only limited data, such as only RAPID3 from the MDHAQ, discussed in greater detail below.

RAPID3 is the most widely used RA index among US rheumatologists [102] and provides similar results to disease-specific questionnaires in all rheumatic diseases studied [3, 4, 43, 54, 56, 65•], and even in non-rheumatic diagnoses [65•]. RAPID3 includes only about 30% of the full MDHAQ and omits scores for fatigue, exercise, morning stiffness, change in status, FAST3, MDHAQ-Dep, patient self-report painful joint count, 60-symptom checklist, and medical history information. All published reports concerning the development of RAPID3 have presented the index as a component of the full MDHAQ (see [9, 15, 103••]). The full MDHAQ requires 5–10 min versus 2–3 min for RAPID3 — the additional time is that of the patient. The authors suggest that any possible advantage to collection of only RAPID3 appears outweighed considerably by the absence of much relevant information that requires no more work on the part of the physician.

Encounter workflow to optimize the use of MDHAQ and eMDHAQ

It is critical to collect the MDHAQ before the doctor sees the patient. Traditionally, the clinic receptionist presents a paper MDHAQ to each patient upon registration for the visit. The same MDHAQ (albeit in different versions — Figs. 1–3) is used for patients with all diagnoses at all visits. An eMDHAQ (Fig. 3) can

be completed at home, including for telemedicine visits.

Most patients require no instructions to complete an MDHAQ. Reproducibility of responses is highest when responses are from only a single observer (the patient) without any input from a health professional or family member [19]. Any query from a patient that "I am not sure how to fill this out," should elicit a response from office staff that "whatever you say is correct." Sometimes help from a family member or staff professional is needed and should be willingly offered, but with as little "help" as possible to respond to a query — "whatever you say is correct." It is a good practice for the treating physician to review the MDHAQ report briefly before engaging in conversation with patient.

Conclusion

The MDHAQ provides clinically important quantitative patient data to assist the clinician in their assessment and management in all rheumatic diseases studied. When appropriately integrated into the clinical workflow, the MDHAQ can save time for the doctor and patient, while increasing available medical history information. Although an electronic version of the MDHAQ is available with capacity for EMR integration, implementation has proven difficult to date. A separate electronic MDHAQ database and/or scanning of questionnaires into an EMR are feasible alternatives, and the absence of EMR integration should not be a barrier to the collection of an MDHAQ from each patient in routine care. It is recommended that the use of the entire MDHAQ provides significant incremental information beyond a RAPID3 score, while requiring 5–10 min versus 2–5 min of patient time and providing considerably more medical history information to the clinician. Considerable further details concerning the paper and eMDHAQ can be found in previous review articles [6, 8, 15, 65, 76]. The authors welcome queries from health professionals, administrators, EMR vendors, and patients.

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