THE ARTHRITIS IMPACT MEASUREMENT SCALES

(Staehelin, 1980, revised 1991)

Purpose

The self-administered Arthritis Impact Measurement Scales (AIMS) cover physical, social and emotional well-being and were designed as an indicator of the outcome of care for arthritic patients.

Conceptual Basis

Meenan criticized the measurements traditionally used with arthritic patients for their focus on disease activity and functional abilities to the exclusion of other components identified in the WHO definition of health (1). "The major argument in favor of the new questionnaire-based approaches is that they focus on the components of outcome that are the most relevant to the physician and the patient, both of whom are primarily interested in how the patient feels and how he or she functions" (2, p168). The AIMS were intended to be comprehensive and practical, with an emphasis on proven reliability and validity (3).

Description

The AIMS was revised in 1991, but as much of the evidence for validity and reliability was collected using the original version, both are described here. The original AIMS instrument included 45 items grouped into nine scales that assess mobility, physical activity (walking, bending, lifting), dexterity, household activity (managing money, medications, housekeeping), social activities, activities of daily living, pain, depression, and anxiety. It was shown in the second edition of Measuring Health. The dexterity and pain scales were developed by Meenan, while other items were adapted from Katz's Index of ADL, the Rand instruments, and the Quality of Well-Being Scale (1). Items were selected for inclusion on the basis of Guttman analyses and internal consistency correlations (3). A total health score was formed by adding the values for six of the scales: mobility, physical and household activities, dexterity, pain, and depression. The instrument is self-administered and takes about 15 minutes to complete.

The revised version, the AIMS2, was first presented in 1991 as a more comprehensive and sensitive instrument (4). It contains 78 items, of which the first 57 are grouped into 12 scales that extend the coverage of the original AIMS (see Exhibit 10.1). The 12 scales can be further grouped...
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into five components: Physical (mobility, walking and bending, hand and finger function, arm function, self-care and household tasks); Symptoms (arthritis pain); Role (work); Social Interaction (social activities and social support), and Affect (tension and mood). A further 44 questions cover satisfaction with health, the impact of the patient’s arthritis on their function, and the patient’s priorities for improvement. The 57 core items shown in the exhibit were derived from the original AIMS, but all were reworded. The nine topic areas of the AIMS were renamed and sections were added on arm function, social support, and work. The answer format was altered to make responses more closely standard across the sections. The complete questionnaire and a seven-page user’s guide are available online from Dr. Meenan’s web site: http://dcc2.bumc.bu.edu.rmeenan/. The user’s manual is also available from www.qolid.org/public/aims/cadre/guide.pdf. The AIMS2 takes about 20 minutes for respondents to complete. The instrument is copyrighted and investigators must obtain permission to use it.

Scoring is straightforward and is explained in the user’s manual. Certain questions use a reversed phrasing, so are reversed so that high scores indicate poor health. Scores for items in each of the 12 scales are then added, and converted to a range of 0 to 10, using simple standardization formulae for each section. These are shown for the original AIMS (5), while formulae for the AIMS2 are given in Table 1 of the revised manual. The dimension scores can then be added to form the five components indicated above; occasionally only three (Physical, Affect and Symptoms) are used.

Reliability

Original AIMS. For the original AIMS, the Guttman coefficients of scalability and reproducibility exceeded 0.60 and 0.90, respectively, for all but the household activity scale, which had a coefficient of reproducibility of 0.88 (3, Table 2). In a study of 625 arthritics, Guttman reproducibility coefficients for all scales exceeded 0.90 (6, Table 2).

The alpha internal consistencies of all nine scales exceeded 0.60; six exceeded 0.80 (2, Table 2). In another study, alpha coefficients exceeded 0.70 for all scales except physical activity (0.63) and social activity (0.69) (6, Table 2).

Test-retest correlations for the nine scales exceeded 0.80 after a two-week delay; the mean test-retest correlation was 0.87 for 100 patients (1; 2; 6). These results were replicated in several diagnostic groups (6). Test-retest reliability ranged from 0.63 to 0.89 for the scales in three groups of patients with chronic disease (7, p352).

AIMS2. For the AIMS2, 10-day retest ICC coefficients for each item ranged from 0.34 to 0.90 with a median of 0.65 (8, Table 1). In Meenan’s original article, test-retest reliability for the 12 scales ranged
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from 0.78 to 0.94. Alpha coefficients were quoted for two patient groups and ranged from 0.72 to 0.96 (4, Table 2).

Validity

Original AIMS. Correlations between the scales and a number of criterion variables were examined. These included age (on the expectation of a reduction in function with age), the patient's perception of general health and of recent disease activity, and a physician's report of functional activity, joint count, and disease activity (3). Meenan et al. commented:

The performance-oriented scales generally correlated closely with age, and all 9 scales were significantly correlated with the patient's estimates of general health and disease activity. Finally, when the psychological scales are excluded, agreement between the scale scores and the doctor's report was significant in 16 of 21 pairs (76%). (3, p150)

Similar analyses were carried out using the data from the study of 625 arthritics. For 444 of the patients, the nine scales were correlated with disease activity ($r$ between 0.14 and 0.52) and with the American Rheumatism Association (ARA) functional class ($r$ between 0.24 and 0.52) (2, Table 4). Scales measuring physical functioning showed higher associations with the disease indicators than did the psychological and social scales. Several studies have compared the AIMS and the Health Assessment Questionnaire (HAQ). The correlation of the overall scores was 0.75 in a French study of 70 patients (9); the physical scales correlated 0.91, while the pain scales in the two instruments correlated 0.64 in a study of 48 arthritics (6). In a study of 106 hip replacement patients a lower correlation of 0.48 was obtained between the short AIMS and the modified HAQ, while the AIMS correlated 0.76 with the Functional Status Questionnaire (10, Table 3). Kazis et al. found that the mobility and general health perceptions scales predicted mortality outcomes (11).

A factor analysis of the nine scales provided three factors: physical function, psychological and pain (6). These results were subsequently precisely replicated (12). Reflecting the three-component factor structure, the results of a multivariate approach to criterion validation showed stronger associations than did the single-variate analyses reported here. Using multiple regression analyses, the AIMS scores achieved multiple correlation coefficients of 0.61 with disease activity and 0.66 with the ARA functional class index (6, p1050). Multiple correlations with a three-item measure of global health status and a visual analogue measure of arthritis impact were 0.84 and 0.75, respectively (6, p1050). Mason et al. subsequently reconsidered the three-factor solution, arguing that it was theoretically restrictive. They proposed a five-factor solution that presented scores for lower extremity function (mobility, ADL, and physical activity), upper extremity function (dexterity), affects (anxiety and depression), pain, and social interaction (13).

Sensitivity of the AIMS to change has been studied by several authors. Changes in the scores were correlated with changes in a rating of health following treatment for 120 patients; correlations fell between 0.24 and 0.67 (1; 6). Kazis et al. studied the responsiveness of the AIMS in a study of...
injectable gold. Seven of the AIMS scales achieved effect sizes that were small; physical activity gave a moderate effect size; and the pain scale gave a large effect size (14, Table 2). In a second trial, effect sizes for pain and anxiety scores were large; those for physical activity and depression were moderate and the rest were small (14, Table 3). The AIMS scales provide similar effect sizes for rheumatoid and osteoarthritis; again, the pain scale showed the largest effect of treatment in two clinical trials (15). The AIMS total score showed a more significant change in patients following hip replacement surgery than did the McMaster Health Index Questionnaire (16, Table IV). In a more comprehensive comparison of five scales by Liang et al., the pain, mobility, and overall scores of the AIMS were clearly superior in terms of effect size to those of the SIP, the Quality of Well-Being Scale, the Health Assessment Questionnaire, and the Functional Status Index (17, Table 2). For the global and mobility scores the sample size required by the AIMS to demonstrate a significant difference would be less than half that required for most of the other measures (17, Table 3).

AIMS2. Meenan et al. compared AIMS2 scores according to the patients’ own identification of each area as being a problem for them; scores showed clear contrasts in response pattern (4, Table 3). Comparisons with the Health Assessment Questionnaire include a correlation of 0.75 for the overall scores in a French study of 70 patients (9); in another study the AIMS and HAQ overall scores correlated 0.89 (18). Other figures include 0.86 (Physical scores), 0.76 (Symptom scores)-0.84 (Affect scores) (19, Table 2), and 0.78 for the overall score (20, Table 1). Correlations with the SF-36 include -0.73 (Physical scales) and -0.78 (Symptoms) (19, Table 2). Correlations with measures of disease activity, such as grip strength, morning stiffness and functional class, were reported for patients with psoriatic arthritis. Values were low to moderate, typically 0.3 to 0.5. The AIMS2 scores correlated much less highly, however, with measures of disease severity (number of affected joints, ARA anatomic stage) (21, Tables 3 and 4). Similar figures were reported from a study of patients with ankylosing spondylitis; here, correlations with a range of clinical assessments of disease severity were almost identical for the AIMS2 and for the HAQ (20, Table 2).

In terms of sensitivity to change, in a study of arthritis patients, the AIMS2 physical function score provided slightly greater sensitivity to change than the modified Health Assessment Questionnaire; the pain score was more sensitive than a visual analogue pain scale (22, Table 2). The sensitivity of each item to change was reported by Guillemín et al. The mean was 0.28, with a range from 0.18 to 0.73 (8, Table 1). For patients who reported improvement in their condition, standardized response means were 0.77 (Physical score), 1.21 (Symptoms), and 1.21 (Role). For patients who felt much worse, response means were -1.47 for Physical scores, -1.83 for Symptoms and -0.75 for Role (19, Table 3). In a study of rheumatoid arthritis, standardized response means were very comparable for the physical scales from the Modified HAQ, the AIMS2 and the SF-36. The SF-36 and AIMS2 pain scales also provided similar responsiveness, but a Visual Analogue Scale was superior (SRM 2.0 compared to 1.2 for the AIMS2) (23, Table 5). Husted et al. compared responsiveness of the SF-36, the HAQ and the AIMS2. The results differed according to which criterion was used to identify change, but the overall impression was of a slight advantage to the SF-36, and comparable results for the HAQ and the AIMS2 (24, Table 7).
Alternative Forms

An abbreviated form of the original AIMS included 18 items divided into nine scales. The two items with the highest internal consistency and correlation with the total AIMS score were selected from the original AIMS scales. The instrument takes 6-8 minutes to complete (25). Alpha reliability was only slightly lower than that of the full AIMS, and test-retest reliability was virtually identical (25, Table 2). Likewise, concurrent validity coefficients were very similar for long and short forms (Table 3). In a study of hip patients, the abbreviated version of the AIMS proved more sensitive to change than did the SIP, SF-36, or Functional Status Questionnaire (10, Table 4).

A 26-item abbreviation of the AIMS2 has been described (8; 19; 26). This provides Physical, Symptom, Role, Social Interaction and Affect components; alpha coefficients ranged from 0.32 (Social Interaction) to 0.87 (Physical) (2284), Table 4). Haarvardsholm et al. reported correlations of 0.96 and 0.97 between the AIMS2 and the short form; intraclass correlations for the 12 scales ranged from 0.85 to 0.97, with all but one being 0.95 or above (19, Table 1). They proposed that the Role scale be slightly modified, by replacing item 42 with item 38. Other suggested changes include replacing item 33 on the Social Interaction scale with item 42.

The AIMS has been used with children (average age, 9.3 years) with mixed success. The pain scale appeared the most reliable; limited variability on the mobility and ADL scales suggested that they may require modification for use with children (28, p823).

A version suited to geriatric patients (the GERI-AIMS) has been described (29).

The AIMS and AIMS2 have been translated into many languages, including Spanish (30-34), Swedish (35; 36), Dutch (37-39), Italian (40), Japanese (41), Canadian French (42) and (of course) British English (43). A French version of the AIMS2 has been tested for validity and reliability (44; 45). A Dutch version showed internal consistency alphas in excess of 0.80 for six scales and $\alpha$ between 0.6 and 0.7 for the rest (39, Table II). Validity correlations with an independent assessment of functional status ranged from 0.7 to 0.8 for the physical functioning scales (Table IV). Internal consistency for the subscales ranged from 0.57 to 0.90 in the Swedish version; the physical function scales correlated with the Swedish version of the HAQ (36). Information on the availability of translations may be obtained from www.qolid.org/public/AIMS.html

Reference Standards

Meenan et al. recorded mean scores and standard deviations for samples of rheumatoid and osteoarthritis patients (4, Table 1).

Commentary

The AIMS is one of the most widely used outcome measures in arthritis research. It is well documented and clearly described, and there is strong evidence for the reliability and validity of the
original version, while evidence for the AIMS2 is accumulating, especially in European countries. While the AIMS is intended mainly for research, Kazis et al. described a clinical report format that summarized patient profiles on one page; this may make the instrument suitable for routine clinical use (46). Although relatively long, the AIMS deserves serious consideration as an outcome indicator for use with arthritic patients.

Address

The AIMS2 User’s Manual is available online from www.qolid.org/public/aims/cadre/guide.pdf. General information on the AIMS2, and a copy of the scale, is provided on Dr. Meenan’s web site: http://dcc2.bumc.bu.edu/rmeenan/pdfs/aims2.pdf

References


(9) Taccari E, Spadaro A, Rinaldi T, Riccieri V, Sensi F. Comparison of the Health Assessment Questionnaire and Arthritis Impact Measurement Scale in patients with psoriatic arthritis. Revue Du


(34) Danao LL, Padilla GV, Johnson DA. An English and Spanish quality of life measure for


Exhibit 10.1 The Arthritis Impact Measurement Scales, version 2 (AIMS2). The answer scales are shown at the end of the exhibit.

Please answer the following questions about your health. Most questions ask about your health during the past month. There are no right or wrong answers to the questions and most can be answered with a simple check (X). Please answer every question.

Please check (X) the most appropriate answer for each question.

These questions refer to **MOBILITY LEVEL**.

**DURING THE PAST MONTH....** (answer scale A)
1. How often were you physically able to drive a car or use public transportation?
2. How often were you out of the house for at least part of the day?
3. How often were you able to do errands in the neighborhood?
4. How often did someone have to assist you to get around outside your home?
5. How often were you in a bed or chair for most or all of the day?

These questions refer to **WALKING AND BENDING**.

**DURING THE PAST MONTH....** (answer scale A)
6. Did you have trouble doing vigorous activities such as running, lifting heavy objects, or participating in strenuous sports?
7. Did you have trouble either walking several blocks or climbing a few flights of stairs?
8. Did you have trouble bending, lifting or stooping?
9. Did you have trouble either walking one block or climbing one flight of stairs?
10. Were you unable to walk unless assisted by another person or by a cane, crutches, or walker?

These questions refer to **HAND AND FINGER FUNCTION**.

**DURING THE PAST MONTH....** (answer scale A)
11. Could you easily write with a pen or pencil?
12. Could you easily button a shirt or blouse?
13. Could you easily turn a key in a lock?
14. Could you easily tie a knot or a bow?
15. Could you easily open a new jar of food?
These questions refer to **ARM FUNCTION**.

**DURING THE PAST MONTH...**

16. Could you easily wipe your mouth with a napkin?
17. Could you easily put on a pullover sweater?
18. Could you easily comb or brush your hair?
19. Could you easily scratch your low back with your hand?
20. Could you easily reach shelves that were above your head?

These questions refer to **SELF-CARE TASKS**

**DURING THE PAST MONTH...**

21. Did you need help to take a bath or shower?
22. Did you need help to get dressed?
23. Did you need help to use the toilet?
24. Did you need help to get in or out of bed?

These questions refer to **HOUSEHOLD TASKS**

**DURING THE PAST MONTH...**

25. If you had the necessary transportation, could you go shopping for groceries without help?
26. If you had kitchen facilities, could you prepare your own meals without help?
27. If you had household tools and appliances, could you do your own housework without help?
28. If you had laundry facilities, could you do your own laundry without help?

These questions refer to **SOCIAL ACTIVITY**

**DURING THE PAST MONTH...**

29. How often did you get together with friends or relatives?
30. How often did you have friends or relatives over to your home?
31. How often did you visit friends or relatives in their homes?
32. How often were you on the telephone with close friends or relatives?
33. How often did you go to a meeting of a church, club, team or other group?

These questions refer to **SUPPORT FROM FAMILY AND FRIENDS**
34. Did you feel that your family or friends would be around you if you needed assistance?
35. Did you feel that your family or friends were sensitive to your personal needs?
36. Did you feel that your family or friends were interested in helping you solve problems?
37. Did you feel that your family or friends understood the effects of your arthritis?

These questions refer to **ARTHRITIS PAIN**

38. How would you describe the arthritis pain you usually had?

39. How often did you have severe pain from your arthritis?
40. How often did you have pain in two or more joints at the same time?
41. How often did your morning stiffness last more than one hour from the time you woke up?
42. How often did your pain make it difficult for you to sleep?

These questions refer to **WORK**

43. What has been your main form of work?

If you answered unemployed, disabled or retired, please skip the next four questions and go to the next page.

44. How often were you unable to do any paid work, housework, or school work?
45. On the days that you did work, how often did you have to work a shorter day?
46. On the days that you did work, how often were you unable to do your work as carefully and accurately as you would like?
47. On the days that you did work, how often did you have to change the way your paid work, housework or school work is usually done?

These questions refer to **LEVEL OF TENSION**

48. How often have you felt tense or high strung?
49. How often have you been bothered by nervousness or your nerves?
50. How often were you able to relax without difficulty?
51. How often have you felt relaxed and free of tension?
52. How often have you felt calm and peaceful?

These questions refer to **MOOD**

**DURING THE PAST MONTH....** (answer scale B)

53. How often have you enjoyed the things you do?
54. How often have you been in low or very low spirits?
55. How often did you feel that nothing turned out the way you wanted it to?
56. How often did you feel that others would be better off if you were dead?
57. How often did you feel so down in the dumps that nothing would cheer you up?

**Answer scales:**
A. (1) All days, (2) Most Days, (3) Some Days, (4) Few Days, (5) No Days
B. (1) Always, (2) Very Often, (3) Sometimes, (4) Almost Never, (5) Never
C. (1) Severe, (2) Moderate, (3) Mild, (4) Very Mild, (5) None

Adapted from an original provided by Dr. Meenan.