

The Usage of a Software to Process the SF-36 Data

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Abstract: - The SF-36 (the "SF" stands for "Short Form" and the "36" for "thirty-six questions") Health Survey provides a comprehensive way to measure health from the patient's point of view and is also a widely used measure of health-related quality of life. The purpose of this paper was to establish the reliability and validity of the SF-36 questionnaire in a non-clinical general population and to evaluate the clinical utility of the SF-36 in differentiation between generally healthy persons who differ in health states. All respondents's answers to SF-36 were analyzed using a software that made data processing a lot easier and it established the final results of the self-evaluation.

Key-Words: - SF-36, Merlin™ software, validity, reliability, health status, data process.

1 Introduction

The Short Form-36 is a multi-purpose, health survey with only 36 questions.

SF-36 is the best-known questionnaire amongst experts in measuring health status. This is partly because it was so carefully developed in the first place, so that the results it produces are statistically reliable and valid. It is also because the issues it explores with the 36 questions apply to people having many different types of treatment, and in all the different states of health, from good to bad. It is one of the most widely used generic measures of health-related quality of life and has been shown to discriminate between subjects with different chronic conditions and between subjects with different severity levels of the same disease. The SF-36 has also demonstrated sensitivity to significant treatment effects in a variety of patient populations [1].

The questions are designed to be easy to understand and relevant to most people's lives. The form only takes 5 to 10 minutes to complete. The 36 questions have been carefully chosen to measure all the aspects of health and wellbeing that, together, we call "quality of life". It can be self-administered by persons 14 years of age and older or be administered by a trained interviewer in person or by phone.

The SF-36 consists of eight scaled scores, which are the sums of the questions in their section. Each scale is directly transformed into a 0-100 scale on the assumption that each question carries equal weight.

The questionnaire was constructed to satisfy minimum psychometric standards necessary for group

comparisons. The eight health concepts represent the most frequently measured concepts in widely-used health surveys and those most affected by disease and treatment [5].

The eight sections are:

- vitality;
- physical functioning;
- bodily pain;
- general health perceptions;
- physical role functioning;
- emotional role functioning;
- social role functioning;
- mental health [4].

Uses:

- Evaluating individual patients;
- Researching the cost-effectiveness of a treatment;
- Monitoring and comparing disease burden.

Limitations:

- The survey does not take into consideration a sleep variable;
- The survey has a low response rate in the >65 population.

2 Materials and methods

We studied 345 people from a non-clinical general population that answered the questions of the SF-36 and their choices were analysed.

RAND Corporation (Research ANd Development) recommends the following straightforward approach to scoring the RAND 36-Item Health Survey.

Question number	Original response	Recorded value
1,2,20,22,34,36	1	100
	2	75
	3	50
	4	25
	5	0
3,4,5,6,7,8,9,10,11,12	1	0
	2	50
	3	100
13,14,15,16,17,18,19	1	0
	2	100
21,23,26,27,30	1	100
	2	80
	3	60
	4	40
	5	20
	6	0
24,25,28,29,31	1	0
	2	20
	3	40
	4	60
	5	80
	6	100
32,33,35	1	0
	2	25
	3	50
	4	75
	5	100

Table 1 Scoring Questions

All questions are scored on a scale from 0 to 100, with 100 representing the highest level of functioning possible. Aggregate scores are compiled as a percentage of the total points possible, using the RAND scoring table (Table 1).

The scores from those questions that address each specific area of functional health status (Table 2) are then averaged together, for a final score within each of the 8 dimensions measured (eg pain, physical functioning etc.) [3].

Scale	Number of items	After recording as per Table1, average the following items
Physical functioning	10	3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Role limitations due to physical health	4	13, 14, 15, 16
Role limitations due to emotional problems	3	17, 18, 19
Energie/ fatigue	4	23, 27, 29, 31
Emotional well being	5	24, 25, 26, 28, 30
Social functioning	2	20, 32
Pain	2	21, 22
General heath	5	1, 33, 34, 35, 36

Table 2 Averaging Items To Form 8 Scales

2.1 SF-36 Measurement Model

Table 3 illustrates the taxonomy of items and concepts underlying the construction of the SF-36 scales and summary measures.

The taxonomy has three levels: (1) items; (2) eight scales that aggregate 2-10 items each; and, (3) two summary measures that aggregate scales. All but one of the 36 items (self-reported health transition) are used to score the eight SF-36 scales. Each item is used in scoring only one scale.

The eight scales are hypothesized to form two distinct higher-ordered clusters due to the physical and mental health variance that they have in common.

Three scales (PF, RP, BP) correlate most highly with the physical component and contribute most to the scoring of the Physical Component Summary (PCS) measure [2]. The mental component correlates most highly with the MH, RE, and SF scales, which also contribute most to the scoring of the Mental Component Summary (MCS) measure. Three of the scales (VT, GH, and SF) have noteworthy correlations with both components.

Specifically, scales that load highest on the physical component are most responsive to treatments that change physical morbidity, whereas scales loading highest on the mental component respond most to drugs and therapies that target mental health.

Items	Scales	Summary Measures		
3a. Vigorous Activities	Physical Functioning (PF)	Physical Health		
3b. Moderate Activities				
3c. Lift, Carry Groceries				
3d. Climb Several Flights				
3e. Climb One Flight				
3f. Bend, Kneel				
3g. Walk Mile				
3h. Walk Several Blocks				
3i. Walk One Block				
3j. Bathe, Dress				
4a. Cut Down Time	Role-Physical (RP)	Physical Health		
4b. Accomplished Less				
4c. Limited in Kind				
4d. Had Difficulty				
7. Pain-Magnitude	Bodily Pain (BP)		Physical Health	
8. Pain-Interfere				
1. EVGFP Rating	General Health (GH)*			Physical Health
11a. Sick Easier				
11b. As Healthy				
11c. Healthy to Get Worse				
11d. Health Excellent				
9a. Pep/Life	Vitality (VT)*	Mental Health		
9e. Energy				
9g. Work Out				
9i. Tired				
5. Social-Extent	Social Functioning (SF)*		Mental Health	
10. Social Time				
5a. Cut Down Time	Role-Emotional (RE)			Mental Health
5b. Accomplished Less				
5c. Not Carreful				
9b. Nervous	Mental Health (MH)			
9c. Down in Dumps				
9d. Peaceful				
9f. Blue/Sad				
9h. Happy				

* Significant correlation with other summary measure

Table 3 Measurement Model

2.2 Scoring and interpreting the SF-36 using standard hardware and software

Merlin™ Outcome Measurement Software runs on any standard personal computer.

This software allows easy entry of SF-36 data. For instance, it only takes 30 seconds to enter an SF-36 questionnaire into Merlin™. Once data is entered, analysis is simply a matter of clicking on buttons. It can compare patients scores in multiple ways: compare pre- and post-scores on the same graph to see improvement over time; compare individual scores to national norms based upon gender, age group, and diagnosis; and compare individual scores to user-defined variables such as "treatment" or "therapist".

Merlin™ also has the ability to create user-defined statements on form printouts if patient scores fall below pre-determined levels [6].

3 Results

Median age of the analysis sample was 31 years, the range spanned 21 to 78 years and almost two-thirds were females.

Within the Vitality (VT) scale, items that measured energy or well-being (VT1 and VT2) had lower means than items measuring fatigue or disability (VT3 and VT4) as hypothesized.

Within the Physical Functioning (PF) scale, the most difficult item (PF1: vigorous exercise) had the lowest mean and the easiest item (PF10: bathing and dressing) had the highest mean. Item means decreased across clusters of PF items as hypothesized; for example respondents reported more limitations (lower mean score) in climbing several stairs (PF4) than one flight of stairs (PF5).

Within the Mental Health (MH) scale, items measuring positive affect (MH3 and MH5) had lower means than items measuring negative affect (MH1, MH2 and MH4).

The two role functioning items that asked if the respondent "accomplished less" (RP2 and RE2) were hypothesized to have the lowest mean within its scale. This was observed for RE2 within the Role-Emotional scale, but RP2 did not have the lowest mean in the Role-Physical scale.

As hypothesized, the scales measuring both positive and negative aspects of well-being (GH, VT and MH) produced lower mean scores than the scales measuring disability (PF, RP, BP, SF and RE) (Table 4).

As expected for a sample primarily composed of healthy respondents, response distributions tended to be skewed in the direction of positive health.

Scale	Mean
PF	77.3
RP	82.2
BP	75.6
GH	65.1
VT	62.2
SF	78.2
RE	80.4
MH	66.1

Table 4 The mean for the eight scales

All SF-36 scores were higher in persons without the disabling health condition than in persons with the condition.

Higher coefficients were found between scales which represent similar constructs (eg MH and VT) than those with competing constructs (eg PF and RE).

The correlations between scales generally were less than the within-scale correlations (reliability coefficient). This was indication that the SF-36 scales generally could discriminate between the different concepts being measured, excepting the concepts of vitality and mental health. Although both the VT and MH items individually had higher correlations with their hypothesized scales than with other scales, the

VT scale was found to correlate higher with the MH scale than with itself.

4 Conclusions

1. Merlin™ Software has been use for data processing and for obtaining the final scores.

2. Using this software we gain time by shorting data process from several minutes to a few seconds.

3. To patients's scores that fall below pre-determined levels Merlin™ Software has the ability to create user-defined statements on form printouts.

4. The SF-36 questionnaire is easy to apply (from home, hospital, by phone etc) and it doesn't require a

lot of time to answer the questions and process the data.

5. Reliability and validity were established for use of the SF-36 in the general population.

6. Almost all results are positive because the respondents are from a non-clinical general population.

7. The SF-36 discriminates well between generally healthy persons who differ in health states. Persons who had depression, arthritis, impaired vision or difficulty eating scored significantly lower on several of the SF-36 scales.

8. The data will be useful for assessing the health status of the general population and the effect of interventions on health-related quality of life.

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