

# Survey on the Use of Function Assessment and Outcome Measures in Rehabilitation Facilities in Israel (SUFA 2004)

Haim Ring MD<sup>1,4</sup>, Malka Itzkovich MAOT<sup>2,4</sup> and Aida Dynia MA<sup>3</sup>

Departments of <sup>1</sup>Neurological Rehabilitation C and <sup>2</sup>Occupational Therapy, and <sup>3</sup>Fleischman Unit for the Study of Disability, Loewenstein Hospital – Rehabilitation Center; Raanana, Israel

<sup>4</sup>Sackler Faculty of Medicine, Tel Aviv University, Ramat Aviv, Israel

**Key words:** function assessments, outcome measures, rehabilitation scales, impairment, disability, handicap

## Abstract

**Background:** Measurement of function is an essential component of routine rehabilitation work (mainly for quantifying function at different phases in the rehabilitation process), rehabilitation policy (admission and discharge criteria, length of stay in rehabilitation), goal setting, and outcome measurement.

**Objective:** To explore the scope of the scales used for function assessment by the various disciplines of rehabilitation medicine in rehabilitation facilities.

**Method:** A structured questionnaire was sent to 36 rehabilitation facilities. Respondents were asked to specify the scales they use for functional assessment for each of 15 selected pathologies. Also examined were satisfaction with the scales, as well as the existence of a computerized database of routine function assessment in the facility and the willingness to create a national agreed "common data set" of the assessments.

**Results:** The general response rate was 86.1% (31 of 36 questionnaires were returned). For the sake of data presentation, rehabilitation facilities were classified into four categories: general, geriatric, pediatric, and community. Most facilities performed function assessment using a total of 125 scales. Heterogeneity was found between facilities and between pathologies. The highest number of scales was found in the area of neurologic pathologies. For most pathologies, assessment of impairment was used more than assessment of disability. Most facilities in the survey did not have a computerized database of function assessments.

**Conclusions:** A common data set of function assessments in everyday clinical work would ensure standardization without necessarily limiting the use of additional scales and at the same time significantly minimize the current heterogeneity.

*IMAJ 2007;9:102–106*

Measurement of function is an essential component of routine rehabilitation work (mainly for quantification of function at different phases in the rehabilitation process), rehabilitation policy (admission and discharge criteria, length of stay in rehabilitation), goal setting, outcome measurement, etc. A range of assessment scales [1-7] has been developed over the years. Although an indication of ongoing improvement, this large variety can cause difficulties, for example, a heterogeneity that limits the ability to compare departments, units, or institutions.

In Israel there is a lack of data concerning the scales used in rehabilitation institutions. This paper presents the scope of the scales serving the various disciplines of rehabilitation medicine in their clinical work. The survey was performed on behalf of the Function Assessment & Outcomes Measure Committee of

the National Council of Rehabilitation of the Ministry of Health. The specific purposes of the survey were to identify the scales used at various levels of dysfunction (impairment, disability, handicap) according to the ICDH-I [8] and in different clinical rehabilitation facilities (general, geriatric, pediatric, community); and to determine whether a computerized database is being used together with functional assessment measurements during rehabilitation.

## Materials and Methods

Data were collected by means of a structured questionnaire regarding the type of institution, staff, number of patients, care being provided, scales in use (by whom and how often), satisfaction with scales, existence of a computerized database of function assessment, and readiness to help create and use a national common data set. Participants were asked to indicate which of the following 15 pathologies were being treated in their institutions: traumatic brain injury, stroke, spinal cord injury (trauma and disease), post-brain tumor surgery, low back pain, joint replacement, fractures, lower limb amputation, multiple sclerosis, rheumatoid arthritis, neuromuscular disorders, coma, cerebral palsy, retardation, and respiratory disease. For each of the pathologies, participants were asked to specify the scales that were used for functional assessment.

The questionnaire was sent to 36 rehabilitation facilities defined as a facility that provides rehabilitation services; for example, a department in a rehabilitation center or in a general hospital, a day hospital, a rehabilitation institute in the community, or a home-care unit. Questionnaires were sent out by mail on 21 July 2004. By October 2004, 80% of the returned questionnaires (n=31) had been completed, an additional 13% were completed by November-December, and the final 7% by January 2005. In most cases questionnaires were completed by the head of the department or by someone on his/her behalf such as an assistant or a member of staff (e.g., the head nurse). A separate questionnaire was sent to 31 occupational therapists regarding the use of scales in hand rehabilitation [Appendix 1].

## Results

### Response rates

The general response rate was 86.1% (31 of 36 questionnaires were returned). Rehabilitation facilities were classified into

four categories: general, geriatric, pediatric, and community. (A pediatric day hospital was included in the pediatric rehabilitation category.) A questionnaire was sent to 14 general facilities, 10 geriatric, 4 pediatric and 8 community. Response rates were 100%, 60%, 100% and 87.5% respectively.

### Classification of scales

The sample revealed that 125 scales were being used for function assessment by the different professionals in rehabilitation medicine: physicians, physiotherapists, occupational therapists, speech therapists, and nurses. The scales were classified into three categories according to ICDH-1 classification: a) scales for assessing impairment, b) scales for assessing disability, and c) scales for assessing handicap [Appendix 2]. Classification according to ICDH-1 was preferred over ICDH-2 [9] because it is more widespread. Scales that included elements of more than one category were classified into an intermediate category such as impairment-disability or disability-handicap. One scale was classified as belonging to all three categories. The classification was based on the rehabilitation medicine literature [3-7] and the opinion of experts in rehabilitation medicine, occupational therapy, speech therapy and physiotherapy.

### General rehabilitation facilities

Table 1 presents the total number of scales used in the most prevalent pathologies as indicated by the facilities. For each pathology it shows the rate at which scales are being used for the assessment of an impairment or a disability. Pathologies for which the rates of impairment and disability do not add up to 100% included several intermediate categories, as explained above.

The highest number of scales was indicated for the assessment of: stroke patients (n=58), post-brain tumor surgery patients (n=53), and traumatic brain injury patients (n=44). Fewer scales were found to be in use for orthopedic patients, e.g., fractures (n=10), low back pain (n=9), joint replacement (n=8) and lower limb amputation (n=7). Patients with neurologic pathologies were

**Table 1.** Number and type of scales in use by pathology in general rehabilitation facilities

Pathology	No. of scales	Ratio of scales for assessment of	
		Impairment (%)	Disability (%)
Stroke	58	63.8	19.0
Post-brain tumor surgery	53	62.2	18.9
Traumatic brain injury	44	61.4	18.3
Spinal cord injury	22	63.6	36.4
Multiple sclerosis	20	80.0	10.0
Neuromuscular disorders	11	45.4	54.6
Fractures	10	70.0	30.0
Low back pain	9	55.5	44.5
Joint replacement	8	37.5	62.5
Lower limb amputation	7	42.8	57.1
Rheumatoid arthritis	6	66.6	33.4
Coma	5	60.0	40.0
Respiratory	-	-	-

generally assessed more frequently by scales targeted to the impairment level. In some of the orthopedic pathologies (joint replacement and lower limb amputation), the number of scales for assessing disability exceeded that for the assessment of impairment. Participants were asked to indicate their satisfaction with the scales they used. Of 11 participants, 64.0% showed satisfaction with most scales and 36.0% with some of the scales.

In most facilities (61.5%) there was no computerized database of function assessments. In four only part of the assessment data were computerized, and in one there was a computerized database for all function assessments. All participants but one indicated their willingness to take part in the creation of a national common data set of function assessments.

### Geriatric rehabilitation facilities

Table 2 presents the number and type of scales used in the most prevalent pathologies. In general, the number of scales was small. Orthopedic pathologies like joint replacement and lower limb amputation were assessed by one scale at the level of disability. All participants reported satisfaction with most scales, which may be due to the low number of scales in use.

Sixty percent reported that there was no computerized database of function assessments, 20% reported using a computerized database only for some of the function assessments, and the remaining facilities reported using such a database for all function assessments. All indicated their willingness to participate in the creation of a national common data set of function assessments.

### Pediatric rehabilitation facilities

Questionnaires were sent to four pediatric rehabilitation facilities and the response rate was 100.0%. Given the small number of facilities, a relatively large number of scales was used for the assessment of patients with neurologic pathologies like stroke (n=19), traumatic brain injury (n=18), and cerebral palsy (n=18) [Table 3]. Only a few scales were in use for orthopedic pathologies like lower limb amputation (n=4) and fractures (n=3). For most pathologies, the number of scales used for assessing disability was equal to or exceeded that of scales used to assess impairment.

All but one participant indicated satisfaction with most of the scales in use, and one participant indicated satisfaction with some of the scales. None of the facilities reported having a

**Table 2.** Number and type of scales in use by pathology in geriatric rehabilitation facilities

Pathology	No. of scales	Ratio of scales for assessment of	
		Impairment (%)	Disability (%)
Stroke	7	71.4	28.6
Fractures	4	75.0	25.0
Low back pain	2	50.0	50.0
Joint replacement	1	-	100.0
Spinal cord injury	1	-	100.0
Lower limb amputation	1	-	100.0

**Table 3.** Number and type of scales in use by pathology in pediatric rehabilitation facilities

Pathology	No. of scales	Ratio of scales for assessment of	
		Impairment (%)	Disability (%)
Stroke	19	52.6	42.1
Traumatic brain injury	18	50.0	44.5
Cerebral palsy	18	44.4	55.6
Post-brain tumor surgery	17	52.9	41.2
Retardation	16	37.5	62.5
Coma	6	66.6	33.4
Spinal cord injury	5	40.0	60.0
Rheumatoid arthritis	5	40.0	60.0
Lower limb amputation	4	50.0	50.0
Respiratory	4	50.0	50.0
Fractures	3	—	100.0

computerized database of functional assessments, but all showed interest in the creation of a national common data set of these assessments.

#### Community rehabilitation facilities

Two of seven community facilities did not use any scale. The highest number of scales used was in neurologic pathologies, mostly for the assessment of impairment [Table 4]. A small number of scales was used for orthopedic pathologies, mostly for the assessment of disability.

Three participants indicated satisfaction with most scales in use and two with some of the scales. None of the facilities reported having a computerized database of functional assessments but all of them showed interest in the creation of a national common data set of these assessments.

#### Discussion

There is overall agreement that assessment tools are essential during routine work in rehabilitation for monitoring change, setting treatment goals, and preparing patients' discharge from rehabilitation and follow-up. The main objective of the present survey was to investigate the extent to which assessment tools are being used in Israel.

The total response rate was 86.1%. Most facilities used function assessment and 125 scales were registered altogether. Heterogeneity was found among facilities and pathologies. In general rehabilitation facilities, scales are used much more extensively than in geriatric settings. This finding may be the result of the relatively low response rate (60%) among geriatric facilities. The highest number of scales was indicated for neurologic pathologies. For most pathologies scales were used more frequently to assess impairment than disability.

This finding of multitude scales raises the issue of cost-effectiveness in rehabilitation work. Since there is no clear evidence that using a large number of assessment scales results in improved rehabilitation care, a minimal common data set of function assessments could possibly be one way of significantly minimizing the current heterogeneity. Most of the facilities sur-

**Table 4.** Number and type of scales in use by pathology in community rehabilitation facilities

Pathology	No. of scales	Ratio of scales for assessment of	
		Impairment (%)	Disability (%)
Traumatic brain injury	23	56.5	21.7
Stroke	20	60.0	25.0
Post-brain tumor surgery	19	63.2	21.0
Spinal cord injury	6	34.0	66.0
Multiple sclerosis	5	—	100.0
Fractures	4	—	100.0
Joint replacements	4	—	100.0
Low back pain	4	—	75.0
Neuromuscular disorders	3	—	100.0
Lower limb amputation	3	—	100.0
Rheumatoid arthritis	3	—	100.0
Cerebral palsy	3	—	100.0

veyed do not use a computerized database of function assessments. Introducing such a computerized system will enable data handling, monitoring of quality assurance and performing analysis of rehabilitation outcomes.

**Acknowledgment.** The authors express their gratitude to Dr. Nava Ratzon for her contribution to issues concerning the rehabilitation of the hand, and to all participants in the survey.

#### References

1. Ring H. Functional assessment tools in rehabilitation and geriatric medicine: the case of the Functional Independence Measure (FIM). *Gerontology* 2001;28(3-4):35-51.
2. Ring H, Eldar R. The nature of functional assessments and their contribution. *Harefuah* 1992;122(7):441-4 (Hebrew).
3. Barat M, Franchignoni F, eds. Assessment in Physical Medicine and Rehabilitation – Views and Perspectives. Vol. 16. Pavia, Italy: Maugeri Foundation Books, 2004.
4. Chino N, Melvin JL, ed. Functional Evaluation of Stroke Patients. Tokyo: Springer Verlag, 1996.
5. Dittmar SS, Gresham GE. Functional Assessment and Outcome Measures for the Rehabilitation Health Professional. Gaithersburg: Aspen, 1997.
6. Post Stroke Rehabilitation Panel. Post Stroke Rehabilitation Clinical Practice Guideline. no. 16. (AHCPR Publication no. 95-0662). Rockville: Agency for Health Care Policy and Research, 1995.
7. Wade D. Measurement in Neurological Rehabilitation. New York: Oxford University Press, 1992.
8. World Health Organization. International Classification of Impairment, Disability and Handicap ICDH-1. Geneva: WHO, 1980.
9. World Health Organization. International Classification of Functioning, Disability and Health (ICF), ICDH-2, Geneva: WHO, 2001.

**Correspondence:** Dr. H. Ring, Dept. of Neurological Rehabilitation C, Loewenstein Hospital – Rehabilitation Center, 278 Ahuza Street, Raanana 43100, Israel.  
Phone: (972-9) 770-9090  
Fax: (972-9) 770-9193  
email: haimr@clalit.org.il

## Appendix 1. Rehabilitation of the hand

A short questionnaire was sent to 31 occupational therapists (OT) of the Clalit and Maccabi Health Services. The questionnaires were completed by the OT in charge of the facility. Rate response was 41.9% (13 of the 31 questionnaires were returned). OTs reported providing care for the following pathologies: neurologic, traumatic, burns, ligament pathologies, scars, amputations, rheumatoid arthritis, as well as chronic or accumulative diseases

like Carpal tunnel syndrome, trigger finger, De-Quervain disease, tennis elbow, congenital deformities, Dupuytren syndrome, and state post-general and plastic surgery.

Thirty-one scales were indicated as being in use for function assessment: 80.6% were scales for the assessment of impairment, 6.5% for the assessment of disability, and the rest belonged to intermediate categories.

## Appendix 2. Index of scales indicated by rehabilitation facilities categorized as assessing impairment, disability, and handicap

### 2-A. Scales for the assessment of impairment

AIMS – Abnormal Involuntary Movement Scale

AIMS – Alberta Infant Motor Scale

Anderson & Tranel

Ashworth

Ashworth modified

ASIA – American Spinal Injury Association's standards of neurologic classification

BADS – Behavioral Assessment of Dysexecutive Syndrome

BADS (for children)

Balance Master

BEERY VMI – Visual Motor Integration

BIT – Behavioral Inattention Test

Blue Dye Test – modified

Boston Diagnostic Aphasia Examination

Boston Naming Test

Box & Blocks

Clock Completion Test

CMT – Contextual Memory Test

CNCS – Coma Near Coma Scale

COAT – Children's Orientation and Amnesia Test

COGNISTAT – the Neurobehavioral Cognitive Status Examination (NCSE)

Crawford Small Parts Dexterity Test

DOTCA

D2

Depressive Traits List (RTD)

ELAP – Early Learning Accomplishment Profile

EVAL

FDT – Functional Dexterity Test

FEES

FR – Functional Reach

Frenchay Dysarthria Assessment

Fugl – Meyer Motor Assessment

Gardner – Test of Perceptual Skills (non-motor) – Revised (TVPS-R)

GCS – Glasgow Coma Scale

GMFM – Gross Motor Function Measure

Goniometer

ITPA

Jamar Dynamometer

Jebsen Taylor

LCS – Loewenstein Communication Scale

LOTCA – Loewenstein Occupational Therapy Cognitive Assessment

LOTCA-G (Geriatric)

MEAMS – Middle Assex Elderly Assessment of Mental State

MES – Mesulam Cancellation test

MFT – Manual Function Test

Mini Depression Score

MMSE – Mini Mental Status Examination

MMT – Manual Muscle Testing

Moberg Picking Up Test

Motor Activity Log

Motor Function Test

NIHSS – NIH Stroke Scale

Nine Hole Peg

O'Connor Tweezer Dexterity Test

O'Connor Finger Dexterity Test

Peabody Development Motor Scale

Pinch Meter

Purdue Pegboard

Rancho Los Amigos Scale

Raven

REY-AVLT – Auditory Verbal Learning Test

Rivermead Inattention

Schultz Upper Extremity Pain Assessment

Semmes-Weinstein Monofilaments

Sensory Score

Sensory Test for Temperature

SN – Starry Night

SPIM – Spinal Pain Independence Measure

Swallowing Assessment

TCA – Toglia Categorization Assessment

TEA – Test of Everyday Attention

TEACH

TOL – Tower of London

Two Points Discrimination

VAS – Visual Analog Scale

Volumeter

Western Aphasia Battery

Whur Screening Test

Wolf Motor Function Test

## 2-B. Scales for the assessment of disability

Alexander Catz  
 Berg Balance Scale  
 Berg (for children)  
 CELF PRESCHOOL  
 CELF3  
 DASH – Disabilities of the Arm Shoulder and Hand  
 DRS – Disability Rating Scale  
 Fatigue Index  
 FIM – Functional Independence Measure  
 Frenchay Arm Test  
 Get Up & Go  
 Guralnik Test  
 HIQ – Health Independence Questionnaire  
 Kels – Kohlman Evaluation of Living Skills  
 Limits of Stability  
 LMMAS – Loewenstein Modified Motor Assessment Scale  
 Motor Score  
 PEDI – Pediatric Evaluation of Disability Inventory  
 Phonological Awareness Test – Gila Tubul  
 PPME – Physical Performance and Mobility Examination  
 Rina Shtemler Memory and Forgetfulness questionnaire  
 Rossetti  
 SCIM – Spinal Cord Independence Measure  
 Sit to Stand  
 6 Meters Walk Test  
 Symbolic Play Test

Ten Meters Walk  
 Tinetti Balance  
 Tinetti Gait  
 TONI – Test Of Nonverbal Intelligence  
 TOPS  
 WEEFIM – Functional Independence Measure for children

## 2-C. Scales for the assessment of handicap, and intermediate categories

SF-36	Handicap
AHFT – Arthritis Hand Function Test	Impairment + Disability
BAFLA – Friedman Battery for Agramatism	Impairment + Disability
EDSS – Extended Disability Status Scale	Impairment + Disability
FriGvi – Friedman Gvion battery for assessment of phonological working memory	Impairment + Disability
ILAT – Israeli Loewenstein Aphasia Test	Impairment + Disability
MAS – Motor Assessment Scale	Impairment + Disability
Mule	Impairment + Disability
PALPA – Psycho-Linguistic Assessment of Language Processing in Aphasia	Impairment + Disability
RBMT – Rivermead Behavioral Memory Test	Impairment + Disability
TILTAN – Battery For the Diagnosis of Dyslexias	Impairment + Disability
Token Test	Impairment + Disability
COPM – Canadian Occupational Performance Measure	Disability + Handicap
FAM – Functional Assessment Measure	Disability + Handicap
Glasgow Outcome	Impairment + Disability+ Handicap

*He who wishes to secure the good of his others has already secured his own*

Confucius (5th century BCE), Chinese philosopher

*A book is a story for the mind. A song is a story for the soul*

Eric Pio, American poet

## Capsule

### Immune activation by bacterial products in HIV patients

Chronic activation of the immune system is a hallmark of progressive HIV infection and better predicts disease outcome than plasma viral load, yet its etiology remains obscure. Brenchley and collaborators from the NIH show that circulating microbial products, probably derived from the gastrointestinal tract, are a cause of HIV-related systemic immune activation. Circulating lipopolysaccharide, used as an indicator of microbial translocation, was significantly increased in chronically HIV-infected individuals and in simian immunodeficiency virus (SIV)-infected rhesus macaques ( $P = 0.002$ ). The researchers show that increased lipopolysaccharide is bioactive *in vivo*

and correlates with measures of innate and adaptive immune activation. Effective antiretroviral therapy seemed to reduce microbial translocation partially. Furthermore, in non-pathogenic SIV infection of sooty mangabeys, microbial translocation did not seem to occur. These data establish a mechanism for chronic immune activation in the context of a compromised gastrointestinal mucosal surface and provide new directions for therapeutic interventions that modify the consequences of acute HIV infection.

*Nature Med* 2006;12:1365

Eitan Israeli