

## DISABILITY ASSESSMENT BY A SINGLE RATER OR A TEAM: A COMPARATIVE STUDY WITH THE CATZ-ITZKOVICH SPINAL CORD INDEPENDENCE MEASURE

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**The Catz-Itzkovich Spinal Cord Independence Measure was found to be reliable and more sensitive than the FIM to functional changes, when used by a multidisciplinary team. This study was performed to find out whether assessment may be similar when done by a single rater. Twenty-eight patients with spinal cord lesions participated in the study, in which examinations performed within a week by a single nurse or a team were compared for correlation, differences and agreement. The team members scored their relevant fields. A significant correlation was found between the nurse's scoring and that of physiotherapists and occupational therapists ( $r = 0.82\text{--}0.94$ ;  $p < 0.0001$ ), and the differences between the mean scores were small. The agreement between raters was modest, however (total agreement 38–90%, Kappa 0.17–0.73). It was concluded that although disability assessment performed by a single nurse may not be as accurate as by a multidisciplinary team, it could be reliable and valid.**

**Key words:** Catz-Itzkovich SCIM, spinal cord, functional assessment, multidisciplinary team.

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### INTRODUCTION

The “Catz-Itzkovich SCIM” (Appendix A) is a revised version of the Spinal Cord Independence Measure (SCIM) which is a new disability scale designed specifically for patients with spinal cord lesions (SCL) (1, 2). These were developed because most of the previously existing disability scales, such as the Modified Barthel Index (MBI) and the Functional Independence Measure (FIM), were designed for various disorders, and are not sensitive enough to assess the specific functional problems of patients with SCL (3–5). The new scale measures the capacity of patients with SCL to perform daily tasks independently, with minimum discomfort, medical risks or economic burden. It covers three areas of function: self-care (score range 0–20), respiration and sphincter management (0–40), and mobility (0–40). Mobility is

scored in the room and toilet and indoors and outdoors. The total score ranges between 0 and 100.

The main changes introduced into the revised version were separation of the self-care tasks “bathing” and “dressing” for the lower and for the upper body and addition of criteria to the areas of sphincter management and mobility. Both versions were found to be reliable, more sensitive than the FIM to functional changes of patients with SCL, and their scores correlate with those of the FIM (1, 2). They rate functional achievements according to their importance for these specific patients; they include ADL functions relevant to them, and define the scoring criteria on the evaluation sheet.

In spite of their advantages, SCIM versions were tested only when used by a multidisciplinary team (1, 2). Team scoring, however, may be burdensome and expensive, and disability assessment by a single rater may be independent of specific professionals and much more convenient for routine work. It is desirable, therefore, that like the FIM, which is intended for use by any trained personnel, the Catz-Itzkovich SCIM would be suitable for scoring by a single staff member (6).

To examine the implications of assessing disability of patients with SCL by a single person, we compared the Catz-Itzkovich SCIM scorings of a nurse to those of a multidisciplinary team.

### METHODS

Twenty-eight patients (18 males, 10 females; age range: 20–79, mean 46, SD 17) admitted to the Department of Spinal Rehabilitation of Loewenstein Rehabilitation Hospital were included in the study. Patients with concomitant medical problems that might have influenced everyday function, such as malignancy, brain injury or mental disease, were excluded. Six patients had tetraplegia and 22 had paraplegia. In 7 patients the lesions were complete or almost complete on admission (Frankel grade A or B), and in 21 they were incomplete. Eleven of the spinal lesions were traumatic; the remainder suffered from lesions caused by myelitis, meningioma, arteriovenous malformation, tuberculosis of the spine, neurofibromatosis or spinal stenosis.

A single nurse and a team scored all areas of function. The team included one of two occupational therapists, another nurse and of one of two physiotherapists, who scored their relevant fields: self-care, respiration and sphincter management and mobility in the room and toilet, and mobility indoors and outdoors, respectively. Each of the examiners scored the patients independently and was blind to the other examiners' results.

The comparisons of the nurse's scoring with the whole multidisciplinary team and the other staff members included (a) linear regression and Pearson correlation coefficient; (b) paired *t*-test; (c) percentage of examinations in which the scoring of the nurse and the

Table I. Relationship between scores of a single nurse and other raters

Area of function	Rater	n	Mean score	SD	t	p'	A/a	B/b	r	p'
Self-care	Nurse	69	13.52	3.84						
	OT 1		14.16	4.29	2.74	0.008	0.69/2.19	1.00/0.80	0.893	0.0001
	Nurse	65	13.48	3.87						
	OT 2		14.14	4.48	2.51	0.015	0.40/2.73	1.02/0.76	0.880	0.0001
Mobility indoors and outdoors	Nurse	53	7.11	4.92						
	PT 1		6.64	6.72	1.09	0.280	-2.09/2.74	1.23/0.66	0.899	0.0001
	Nurse	48	7.42	4.86						
	PT 2		6.67	6.61	1.32	0.193	-1.88/3.50	1.15/0.59	0.823	0.0001
Total score	Nurse	45	49.76	18.90						
	Team		48.87	22.10	0.76	0.449	-5.79/10.51	1.10/0.80	0.939	0.0001

n = number of tests included in the analysis; OT = occupational therapist; PT = physiotherapist; team = a second nurse + OT + PT; t = the statistic for comparison of means; p' = significance of t-test; A = intercept of the regression line predicting raters' scoring by the nurse's scores and the vertical axis; a = intercept of the regression line predicting nurse's scoring by the scores of other raters and the vertical axis; B = slope of the regression line predicting raters' scoring by the nurse's scores; b = slope of the regression line predicting nurse's scoring by the scores of other raters; r = Pearson correlation coefficient; p' = significance of r.

physiotherapists or occupational therapists was identical (total agreement); (d) chance-corrected measure of agreement (Kappa) (7, 8). The analysis included only examinations performed by the compared raters within a single week.

Data were analyzed with the SPSS.

## RESULTS

The scores obtained by the single nurse were significantly correlated with those of a multidisciplinary team and with those of occupational and physiotherapists for their respective fields. The correlation coefficients ranged between 0.82 and 0.94 ( $p < 0.0001$ ) (Table I), and we were able to compute linear regressions by which the nurse's scorings would predict those of the other raters. A comparison of the mean values revealed no significant differences between the total scores of the nurse and a multidisciplinary team (Table I). The absolute differences between the mean scores of the nurse and each of the other

raters were small, (less than 0.75 points on a 0–100 points scale). The nurse's scores were also close to those of the physiotherapists ( $p > 0.05$ ).

However, the slope values of the regression lines were not consistently close to 1, they did not consistently cross the axes close to zero, and the nurse's scores were significantly lower than those of the occupational therapists ( $p < 0.02$ ) (Table I, Figs 1–2). In accordance with these, the total agreement found between a single nurse and raters of other professions was modest. It ranged between 38% and 94% on the various individual tasks, with a Kappa coefficient of 0.17–0.73 (Table II).

## DISCUSSION

The skills and the training needed for assessing and scoring patients' abilities on a disability scale have frequently been

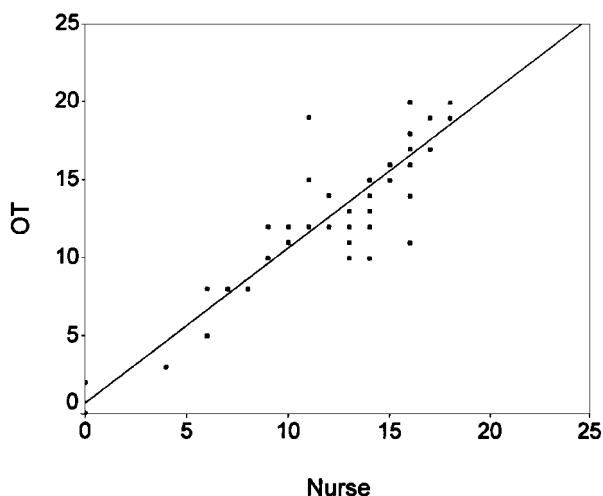


Fig. 1. Correlation between scores of a nurse and an occupational therapist.

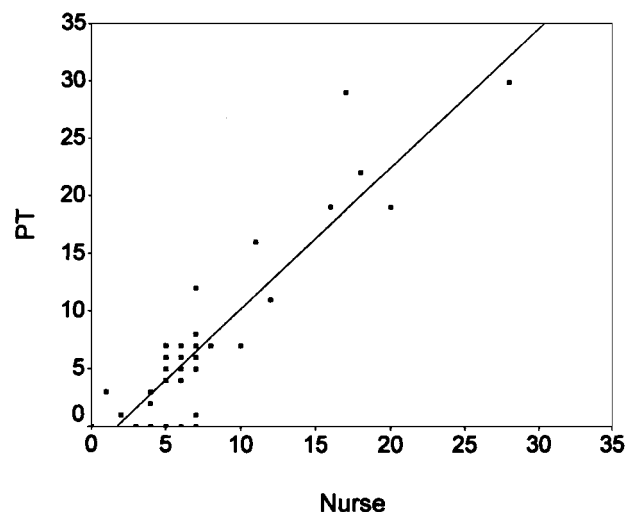


Fig. 2. Correlation between scores of a nurse and a physiotherapist.

Table II. Agreement between a nurse and other raters OT1, OT2, PT1 and PT2 on individual tasks

Task	n	Total agreement (%)	Kappa coefficient	n	Total agreement (%)	Kappa coefficient
<i>Self-care</i>		<i>OT 1</i>		<i>OT 2</i>		
Feeding	70	90.0	0.683	67	89.6	0.636
Bathing—upper body	70	70.0	0.343	67	64.2	0.325
Bathing—lower body	70	51.0	0.240	67	56.7	0.282
Dressing—upper body	70	38.0	0.172	67	41.8	0.219
Dressing—lower body	70	75.7	0.641	67	75.8	0.636
Grooming	69	91.3	0.618	66	93.9	0.728
<i>Mobility indoors and outdoors</i>		<i>PT 1</i>		<i>PT 2</i>		
Mobility indoors	61	72.1	0.508	51	54.9	0.323
Mobility—moderate distances	61	70.5	0.531	51	60.8	0.423
Mobility outdoors	60	60.0	0.454	51	49.0	0.291
Stair management	58	86.2	0.542	50	84.0	0.570
Transfers: wheelchair—car	56	67.9	0.497	49	63.3	0.438

n = number of tests included in the analysis; OT = occupational therapist; PT = physiotherapist.

ignored. Previous publications regarding the usefulness of various disability scales either did not indicate the profession of those who scored patients' abilities (9–12), or did not detail the accurate procedure for detecting reliability (5). Only a few articles indicate the profession of the team members who scored the subjects, or refer to qualifications required for scoring (4, 13).

It stands to reason that professionals specializing in treatment of a specific area of function may assess disability in that area more accurately than those of other professions. We suspected, therefore, that assessment of all areas of function by one person (a nurse) would be less accurate than assessment by a multidisciplinary team. This raised questions about the applicability of reliability and validity of a scale tested when scored by a team, to scoring by a single person.

The results demonstrated correlations and similarities, as well as significant differences (although small on average), between the scores of the nurse and those of the team members. This implies that although assessment by a single nurse is not as accurate as by a multidisciplinary team, it may prove reliable and valid as the discrepancies between a team's and a nurse's scoring are small and may be predicted and corrected.

The relatively low agreement between the nurse and the occupational therapists may be attributed to the patients' tendency to ask nurses for more assistance in self-care tasks, or to relative ambiguities of self-care criteria on the SCIM form. Rephrasing of these criteria on the next SCIM version is expected to improve the accuracy of any rater's assessment.

#### ACKNOWLEDGEMENT

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**Appendix A**



שרותי בריאות  
כ ל י ת

**Patient Name:** \_\_\_\_\_ **ID:** \_\_\_\_\_  
**Examiner Name:** \_\_\_\_\_  
**Department IV**  
**Medical Director:** Dr. Amiram Catz

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(The score for each function should be placed in the adjacent square, below the date)

**SCIM-SPINAL CORD INDEPENDENCE MEASURE Version II**

**Self-Care**

DATE

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**1. Feeding** (cutting, opening containers, bringing food to mouth, holding cup with fluid)

- 0. Needs parenteral, gastrostomy or fully assisted oral feeding
  - 1. Eats cut food using several adaptive devices for hand and dishes; unable to hold cup
  - 2. Eats cut food using only one adaptive device for hand; holds an adapted cup
  - 3. Eats cut food without devices; holds a regular cup; needs assistance to open containers
  - 4. Independent in all tasks without any adaptive device

**2. Bathing** (soaping, manipulating water tap, washing). **A-upper body; B-lower body**

- A. 0. Requires total assistance
  - 1. Requires partial assistance
  - 2. Washes independently with adaptive devices or in a specific setting
  - 3. Washes independently; does not require adaptive devices or a specific setting
- B. 0. Requires total assistance
  - 1. Requires partial assistance
  - 2. Washes independently with adaptive devices or in a specific setting
  - 3. Washes independently; does not require adaptive devices or a specific setting

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**3. Dressing** (preparing clothes, dressing, undressing). **A-upper body; B-lower body**

- A. 0. Requires total assistance
  - 1. Requires partial assistance
  - 2. Dresses independently with adaptive devices or in a specific setting
  - 3. Dresses independently; does not require adaptive devices or a specific setting
- B. 0. Requires total assistance
  - 1. Requires partial assistance
  - 2. Dresses independently with adaptive devices or in a specific setting
  - 3. Dresses independently; does not require adaptive devices or a specific setting

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**4. Grooming** (washing hands and face, brushing teeth, combing hair, shaving, applying makeup)

- 0. Requires total assistance
  - 1. Performs only one task (e.g., washing hands and face)
  - 2. Performs some tasks using adaptive devices; needs help to put on/take off devices
  - 3. Independent with adaptive devices
  - 4. Independent without adaptive devices

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**SUBTOTAL (0-20)**

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**Respiration and Sphincter Management**

**5. Respiration**

- 0. Requires assisted ventilation
- 2. Requires a tracheal tube and partially assisted ventilation
- 4. Breathes independently but requires much assistance in tracheal tube management
- 6. Breathes independently and requires little assistance in tracheal tube management
- 8. Breathes without a tracheal tube, but sometimes requires mechanical assistance for breathing
- 10. Breathes independently without any device

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**6. Sphincter Management - Bladder**

- 0. Indwelling catheter
- 4. Residual urine volume > 100cc; no catheterization or assisted intermittent catheterization
- 8. Residual urine volume < 100cc; needs assistance for applying drainage instrument
- 12. Intermittent self-catheterization
- 15. Residual urine volume <100cc; no catheterization or assistance in urine drainage required

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**7. Sphincter Management - Bowel**

- 0. Improper or irregular timing or very low frequency (less than once in 3 days) of bowel movements
- 5. Proper and regular timing, but requires assistance (e.g., for applying suppository); rare accidents (less than once a month)
- 10. Regular bowel movements, with proper timing, without assistance; rare accidents (less than once a month)

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**8. Use of Toilet** (perineal hygiene, clothes adjustment before/after, use of napkins or diapers)

- 0. Requires total assistance
  - 1. Partially undresses lower body, needs assistance in all remaining tasks
  - 2. Partially undresses lower body and partially cleans self (after); needs assistance in adjusting clothes and/or diapers
  - 3. Undresses and cleans self (after); needs assistance in adjusting clothes and/or diapers
  - 4. Independent in all tasks but needs adaptive devices or special setting (e.g., bars)
  - 5. Independent without adaptive devices or special setting

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**SUBTOTAL (0-40)**

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**Mobility (room and toilet)**

DATE

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**9. Mobility in Bed and Action to Prevent Pressure Sores**

- 0. Requires total assistance
- 1. Turns in bed to one side only
- 2. Turns in bed to both sides but does not fully release pressure
- 3. Releases pressure when lying only
- 4. Turns in bed and sits up without assistance
- 5. Independent in bed mobility; performs push-ups in sitting position without full body elevation
- 6. Independent in bed mobility; performs push-ups in sitting position with full body elevation

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**10. Transfers: bed-wheelchair** (locking wheelchair, lifting footrests, removing and adjusting arm rests, transferring, lifting feet)

- 0. Requires total assistance
- 1. Needs partial assistance and/or supervision
- 2. Independent

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**11. Transfers: wheelchair-toilet-tub** (if uses toilet wheelchair - transfers to and from; if uses regular wheelchair - locking wheelchair, lifting footrests, removing and adjusting armrests, transferring, lifting feet)

- 0. Requires total assistance
- 1. Needs partial assistance and/or supervision, or adaptive device (e.g., grab-bars)
- 2. Independent

**Mobility (indoors and outdoors)**

**12. Mobility Indoors**

- 0. Requires total assistance
- 1. Needs electric wheelchair or partial assistance to operate manual wheelchair
- 2. Moves independently in manual wheelchair
- 3. Requires supervision while walking (with or without devices)
- 4. Walks with a walking frame or crutches (swing)
- 5. Walks with crutches or two canes (reciprocal walking)
- 6. Walks with one cane
- 7. Needs leg orthosis only
- 8. Walks without aids

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**13. Mobility for Moderate Distances (10 - 100 meters)**

- 0. Requires total assistance
- 1. Needs electric wheelchair or partial assistance to operate manual wheelchair
- 2. Moves independently in manual wheelchair
- 3. Requires supervision while walking (with or without devices)
- 4. Walks with a walking frame or crutches (swing)
- 5. Walks with crutches or two canes (reciprocal walking)
- 6. Walks with one cane
- 7. Needs leg orthosis only
- 8. Walks without aids

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**14. Mobility Outdoors (more than 100 meters)**

- 0. Requires total assistance
- 1. Needs electric wheelchair or partial assistance to operate manual wheelchair
- 2. Moves independently in manual wheelchair
- 3. Requires supervision while walking (with or without devices)
- 4. Walks with a walking frame or crutches (swing)
- 5. Walks with crutches or two canes (reciprocal walking)
- 6. Walks with one cane
- 7. Needs leg orthosis only
- 8. Walks without aids

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**15. Stair Management**

- 0. Unable to climb or descend stairs
- 1. Climbs and descends at least 3 steps with support or supervision of another person
- 2. Climbs and descends at least 3 steps with support of handrail and/or crutch or cane
- 3. Climbs and descends at least 3 steps without any support or supervision

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**16. Transfers: wheelchair-car** (approaching car, locking wheelchair, removing arm- and footrests, transferring to and from car, bringing wheelchair into and out of car)

- 0. Requires total assistance
- 1. Needs partial assistance and/or supervision
- 2. Independent with adaptive devices
- 3. Independent without adaptive devices

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SUBTOTAL (9-16)

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**TOTAL SCIM SCORE (0-100)**

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