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Assessment of functional status and rehabilitative strategies in occupational therapy: role of the Groningen Activity Restriction Questionnaire

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ABSTRACT. Background and Purpose. ***The Groningen Activity Restriction Scale (GARS) is a self-reported non-disease-specific instrument for measuring patients' disability in Activity of Daily Living (ADL) and Instrumental Activity of Daily Living (IADL). In literature, several studies have demonstrated high psychometric properties of GARS for disability assessment. The aim of this study was to evaluate the use of GARS administered and scored by the occupational therapists, rather than self-reported by the patient, as a tool for measuring disability in adult patients treated with occupational therapy.*** **Methods.** ***A inter-operator reliability and correlation study was conducted among 31 people (mean age 70.6±13.1 years), admitted to inpatient Occupational Therapy rehabilitation service of ICS Maugeri, Pavia, from May through September 2018. ADL and IADL dependency indices were measured with GARS, which was assessed by three independent occupational therapists during admission of patients to occupational therapy rehabilitation service. Other measures included demographic characteristics and healthcare resource utilization. Therefore, a single occupational therapist performed a second evaluation of patient's performance using GARS at the discharge from treatment, in order to identify any changes in patient's functional abilities after rehabilitation treatment; the results obtained were compared with those detected by the functional independence measures (FIM). Statistical analysis was conducted by*** **Cohen's k coefficient and Pearson's p correlation coefficient.** **Results.** ***The statistical analysis showed a discrete reliability and responsiveness of GARS (*****Coen's k = *****0.531), due to a moderate correlation between GARS and FIM instruments (*****Pearson's p = *****0.359) for evaluating the effectiveness of occupational therapy interventions.*** **Conclusions.** ***Even if conducted by occupational therapists, GARS is a useful tool for measuring disability in ADL and IADL, which can help clinicians to develop a customized plan of care in occupational therapy, improving patient's management and clinical outcome.***

Key words: *Occupational therapy, GARS, disability, rehabilitation medicine.*

RIASSUNTO. Valutazione dello stato funzionale e delle strategie riabilitative in terapia occupazionale: il ruolo della Groningen Activity Restriction Questionnaire. ***Background and scopo della ricerca.*** **La Groningen Activity Restriction Scale (GARS) è una scala non specifica per malattia, compilata in auto somministrazione dal paziente, che consente di misurare la disabilità nell'esecuzione delle Attività di Vita Quotidiana (AVQ - ADL) e nelle Attività Strumentali della Vita Quotidiana (ASVQ - IADL). In letteratura, diversi studi hanno dimostrato le elevate proprietà psicometriche**

Background

Occupational therapy is a branch of rehabilitation medicine which promotes health and well-being through "occupations", that are the multiple activities of daily life.

"To do something" is a primary goal of the occupational therapist, in order to develop strategies for physical, psychological or social adaptation, improving overall quality of life of patients, even in disability (1).

The term "occupations" refers to the set of meaningful activities that characterize the self, consonant with age, capacities, and cultural patterns; they are carried out by each individual in order to provide for himself, experience joy in living and contribute to economic life and social community (2).

In this sense, occupational therapy plays a fundamental role in rehabilitative medicine and related treatments; "occupation" is both the goal and the instrument through which occupational therapists assist and contribute to promoting recovering and maintaining of bodily functions (self-care, education, household, work and community life (3). Multiple techniques are involved into rehabilitative exercise, using functional activities which fit better for each patient, in his uniqueness (4).

Patients are actively involved in a therapeutic process, that typically includes assessment, intervention and identification of patient-led outcomes, measured in terms of participation or satisfaction derived from engaging in occupations (5). To this aim, the Individual Rehabilitation Project (PRI) should include a personalized training program for Activity of Daily Living (ADL) and Instrumental Activity of Daily Living (IAD), with a specific focus on the most relevant activities for each patient (6).

Alongside the "personalization" of rehabilitation therapy, it still remains the need to quantify outcomes, establishing criteria that allow a standardized and repeatable assessment of results, in order to elicit qualitative and quantitative judgement on what has been done.

The most common evaluation scales used in occupational therapy are those investigating personal independence, as well as tools concerning appropriateness of technical aids and assistive devices (7).

della GARS nel definire la disabilità. Lo scopo di questo lavoro è stato quello di valutare l'uso della GARS somministrata e compilata dal terapista occupazionale, piuttosto che auto somministrata dal paziente, come uno strumento per misurare la disabilità dei pazienti adulti in terapia occupazionale.
Metodi. **È stato effettuato uno studio di ripetibilità inter-operatore e di correlazione su un campione di 31 pazienti (età media 70,6±13.1 anni), trattati presso il servizio di Terapia Occupazionale ed Ergonomia dell'ICS Maugeri, Pavia, nel periodo compreso tra Maggio e Settembre 2018. Il grado di dipendenza nelle ADL e IADL è stato misurato attraverso la scala GARS, compilata indipendentemente da tre terapisti occupazionali durante l'ammissione dei pazienti al servizio di riabilitazione di terapia occupazionale. Sono stati inoltre raccolti i seguenti parametri: dati demografici e utilizzo delle risorse sanitarie. Successivamente, un singolo terapista occupazionale ha effettuato una seconda valutazione della performance dei pazienti, utilizzando la GARS alla dimissione dal trattamento, al fine di identificare qualsiasi cambiamento nelle capacità funzionali dei pazienti a seguito del trattamento riabilitativo; i risultati così ottenuti sono stati confrontati con quelli determinati dalla Functional Independence Measure (FIM). L'analisi statistica è stata effettuata attraverso la valutazione del coefficiente *k di Cohen* e il coefficiente di correlazione *p di Pearson*.**
Risultati. **L'analisi statistica ha mostrato una discreta riproducibilità e sensibilità della scala GARS (*k di Cohen* = 0.531), deducibile dalla presenza di una moderata correlazione tra le scale GARS e FIM (*p di Pearson* = 0.359) per valutare l'efficacia degli interventi della terapia occupazionale.**
Conclusioni. **La scala GARS rappresenta un valido strumento nella di valutazione della disabilità nelle ADL e IADL, anche se compilato dal terapista occupazionale, e può essere utile nella stesura di un progetto riabilitativo personalizzato di terapia occupazionale, migliorando la presa in carico del paziente e l'esito clinico.**

Parole chiave: Terapia occupazionale, GARS, disabilità, medicina riabilitativa.

Generally, it is recalled that the value of any scale depends on its clinical usefulness and scientific integrity, in terms of psychometric properties:

- "Validity", which considers whether the scale measures what is intended to be measured;
- "Reliability", which addresses the reproducibility of the score (intra- inter-rater reliability);
- "Responsiveness", which assesses the ability of the scale to detect meaningful changes over time.

From the perspective of the occupational therapist and, primarily, from the patient's one, the distinction between ADL and IADL, in terms of evaluation of disablement and assessment of the need, remains theoretical. The Groningen Activity Restriction Scale (GARS) (8,9) is a self-reported non-disease-specific instrument for measuring patients' disability in both ADL and IADL. The GARS was developed according to the Nagi's conceptual framework of disability, considered as a limitation in performing socially defined roles and tasks expected of an individual within a sociocultural and physical environment – a product of the interaction of the individual with the environment (10, 11).

Partly on the basis of existing instruments, such as Katz's et al. ADL (12), Lawton and Brody's IADL (13), Kempen and Suurmeijer developed a scale of 18 items and five response categories, that has been applied in several studies, with satisfying psychometric properties demonstrated (14). The total score rages from 18 to 90, with higher scores indicating a higher level of ADL and IADL dependency. However, we have found some practical limitations to the previous reported studies: first of all, all of them were performed with an evaluation questionnaire completed independently by the patient, leading to biases and heterogeneity of a subjective evaluation process; secondly, studies were limited by the lack of precise physiatric evaluation of patients' disability, or the use of independent objective-based techniques, which can result in a not accurate measurement of the real biological features of the disability.

The aim of this study was to evaluate the effectiveness of GARS as an assessment tool in occupational therapy, even if administered and scored by the occupational therapists, to improve examination of rehabilitation therapy results in a significant improvement in physical and psychosocial functioning.

Methods

Sampling procedures

An inter-operator reliability and correlation study longitudinal study was conducted among 31 people (mean age 70.6±13.1 years) admitted to inpatient occupational therapy rehabilitation service of ICS Maugeri, Pavia, from May through September 2018.

Exclusion criteria were as follows: a) age less than 18 years b) physical impairment related to hip / knee replacement surgery c) concurrent acute clinical condition, aside from the admission pathology, from which a change in patient's clinical and functional status should be expected (i.e. concomitant acute infection).

Evaluation's Methods

As suggested by the authors, the GARS's items refer to what the responders say they are able to do, rather than considering their actual performance. For the purpose of our study, the GARS scale was not compiled by patients, but it was filled by occupational therapists: this choice is justifiable taking into the account the great heterogeneity of patients both in socio-cultural and demographic aspects. Thus, as is usual in clinical practice, it often happens that patients ask the therapist for help with filling self-reported questionnaire. Herewith, our aim was to evaluate the inter-operator sensitivity of the scale despite the risk of subjective variability in scoring patient's performance. To the best of our knowledge, we are the first to report the use of GARS administered and scored by the occupational therapists, rather than self-reported by the patient, as a tool for measuring disability in adult patients treated with occupational therapy.

Evaluations were performed in a blinded fashion by independent occupational therapists. Thus, all data were matched and collected in a single database with Excel soft-

ware (Microsoft Corporation Redmond, WA, USA) by an occupational therapy trainee, involved in this study as part as his final research work. Finally, statistical data analysis was performed in double-blind by a medical doctor, 4th year resident in physical and rehabilitation medicine with 2-years experience in occupational therapy.

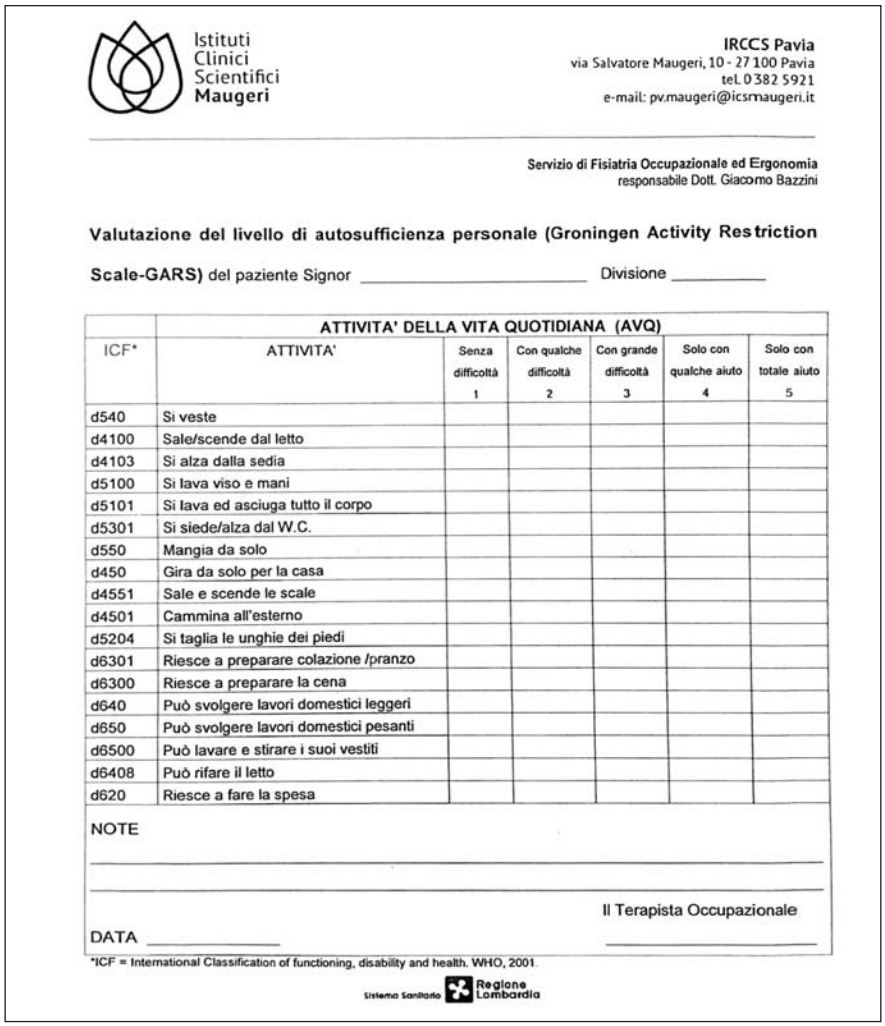
Patients enrolled in the study were asked to accomplish the ADL and IADL tasks included in the GARS, under the supervision of an occupational therapist, who was responsible for scoring the GARS according to patients' difficulties in performing the assignments (Figure 1). The scale did not include any specification about the use of aids, which did not have any influence in scoring method: nonetheless, occupational therapists were asked to report whether partial or complete help was needed, as well as the use of aids, which is, according to our experience, a valuable information with a view to setting customized rehabilitation programs (15).

In order to evaluate the inter-operator reliability, three examiners used the GARS scale to assess patients' disability in ADL e IADL before the rehabilitation treatment had been started (T0) (Figure 2).

Subsequently, at the end of occupational therapy treatment (T1), one of the three observers completed a second evaluation of patients' performance, in order to test the responsiveness in detecting clinical changes in disability (Figure 3).

Other measures taken by occupational therapists included patients' demographic characteristics and healthcare resource utilization.

Lastly, GARS scores were compared to those obtained by functional independence measure (FIM) instrument on admission and discharge planning, in order to evaluate concordance between observers rating, and assess the sensitivity of GARS in recording changes in rehabilitative outcomes of patients undergoing occupational therapy treatment.



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Valutazione del livello di autosufficienza personale (Groningen Activity Restriction Scale-GARS) del paziente Signor _____ Divisione _____

ICF*	ATTIVITA' DELLA VITA QUOTIDIANA (AVQ) ATTIVITA'	Senza difficoltà 1	Con qualche difficoltà 2	Con grande difficoltà 3	Solo con qualche aiuto 4	Solo con totale aiuto 5
d540	Si veste					
d4100	Sale/scende dal letto					
d4103	Si alza dalla sedia					
d5100	Si lava viso e mani					
d5101	Si lava ed asciuga tutto il corpo					
d5301	Si siede/alza dal W.C.					
d550	Mangia da solo					
d450	Gira da solo per la casa					
d4551	Sale e scende le scale					
d4501	Cammina all'esterno					
d5204	Si taglia le unghie dei piedi					
d6301	Riesce a preparare colazione /pranzo					
d6300	Riesce a preparare la cena					
d640	Può svolgere lavori domestici leggeri					
d650	Può svolgere lavori domestici pesanti					
d6500	Può lavare e stirare i suoi vestiti					
d6408	Può rifare il letto					
d620	Riesce a fare la spesa					

NOTE

Il Terapista Occupazionale

DATA _____

*ICF = International Classification of functioning, disability and health. WHO, 2001.

Sistema Sanitario Regione Lombardia

Figure 1. *GARS form*

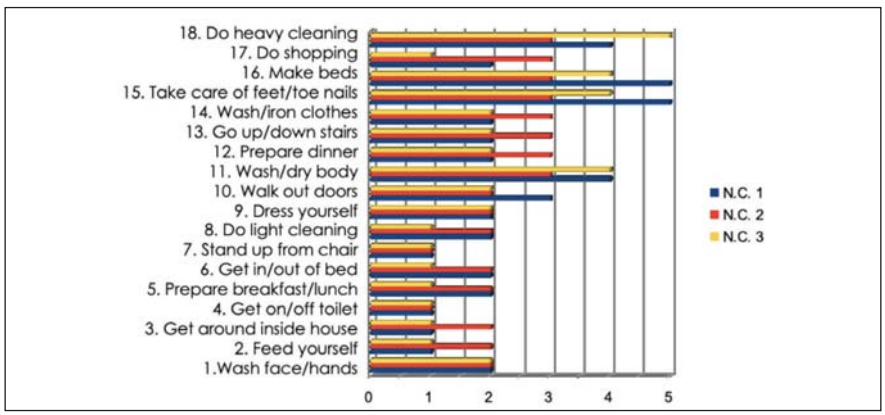

Figure 2. *I.E Inter-operator comparison of the GARS based evaluation of N.C., 64 years old, affected of ictus cerebri.*

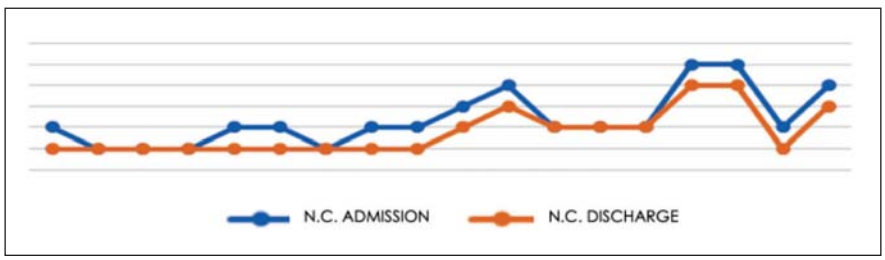

Figure 3. *I.E. Comparison between patient N.C. 's GARS score from admission to discharge.*

Results and Comments

Statistical analysis was conducted by ©MedCalc Statistical Software version 16.4.3 (MedCalc Software bvba, Ostend, Belgium; https://www.medcalc.org; 2016).

In order to verify the inter-operator repeatability of the GARS scale, the *Cohen's Kappa* (*Cohen's k*) concordance coefficient was tested, while the *Pearson's p* correlation coefficient was used to verify the agreement between the assessments obtained with GARS and those measured by FIM instrument. The statistical analysis showed a discrete reliability (*Coen's k* = 0.531) of the GARS scale, even if it administered by an observer (Figure 4, 5, 6, 7), and a moderate correlation with the FIM instrument (Pearson's p = 0.359) in detecting clinical changes in patients' independence (Figure 8).

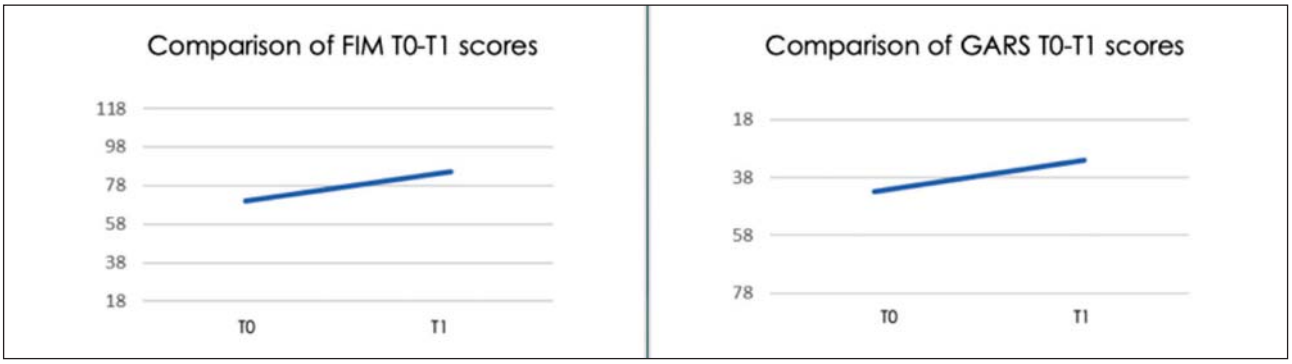

Figure 4. ***I.E. Trend of FIM and GARS score among the rehabilitation treatment of N.C.***

Inter-rater agreement (kappa)

Observer A	op1
Observer B	op2

	op1					
op2	1	2	3	4	5	
1	49	20	2	3	1	75 (13,4%)
2	14	25	17	9	5	70 (12,5%)
3	2	19	12	18	8	59 (10,6%)
4	2	8	13	44	22	89 (15,9%)
5	0	0	3	16	246	265 (47,5%)
	67 (12,0%)	72 (12,9%)	47 (8,4%)	90 (16,1%)	282 (50,5%)	558

Kappa	0,52937
Standard error	0,025111
95% CI	0,48015 to 0,57858

Figure 5. ***Inter-operator reliability***

Inter-rater agreement (kappa)

Observer A	op2
Observer B	op3

	op2					
op3	1	2	3	4	5	
1	44	10	4	4	2	64 (11,5%)
2	23	35	16	14	2	90 (16,1%)
3	7	6	13	10	3	39 (7,0%)
4	1	14	14	39	21	89 (15,9%)
5	0	5	12	22	237	276 (49,5%)
	75 (13,4%)	70 (12,5%)	59 (10,6%)	89 (15,9%)	265 (47,5%)	558

Kappa	0,51121
Standard error	0,025565
95% CI	0,46110 to 0,56131

Figure 6. ***Inter-operator reliability***

Inter-rater agreement (kappa)

Observer A	op1					
Observer B	op3					
	op1					
op3	1	2	3	4	5	
1	44	12	3	4	1	64 (11,5%)
2	18	40	15	14	3	90 (16,1%)
3	2	14	15	8	0	39 (7,0%)
4	3	2	11	42	31	89 (15,9%)
5	0	4	3	22	247	276 (49,5%)
	67 (12,0%)	72 (12,9%)	47 (8,4%)	90 (16,1%)	282 (50,5%)	558

Kappa	0,55448
Standard error	0,025769
95% CI	0,50398 to 0,60499

Figure 7. *Inter-operator reliability*

Correlation

Variable Y	FIM
Variable X	GARS
Sample size	31
Correlation coefficient r	0,3591
Significance level	P=0,0472
95% Confidence interval for r	0,005468 to 0,6329

Figure 8. *FIM and GARS correlation*

The first GARS's items investigated ADL activities of simpler execution, both in terms of motor skills and cognitive engagement; therefore, it was reasonably expected to find lower scores (which means lower disability) in independent patients. On the contrary, the latest activities investigated required higher motor performances to be performed, as well as a specific training of motor control and strategies, and a greater cognitive involvement, being more sensitive in highlighting severe disability or complete absence of disability.

Analyzing the graphs obtained by comparing the GARS score trends for each patient (Figure 3), it is possible to observe how, in some cases, the evaluations had not underlined a significant difference between the beginning and the end of the rehabilitation treatment. However, it seems to be necessary to notice that some of the patients enrolled in this study were affected by motor impairment deriving from chronic or degenerative pathologies, for which they were periodically rehospitalized, to undergo follow-up examinations and rehabilitation treatments. For this reason, these latter could unlikely result in substantial improvements of the overall clinical and functional condition in chronic disease patients.

However, when GARS scale is assessed by the therapist, there could be the risk of poor inter-operator reliability, because of the influence of personal experience and background on scoring process. By way of example, the same patient, observed while taking care of personal hygiene and dressing activities, could receive two different score of 2 or 3 points by different operators, depending on the timing and quality of execution of the task performed.

The GARS assessment based on an observer-rating method seems to imply a strict training of therapists, in particular about the distinction between actual disability and intrinsic disability (10): as indicated by the authors, the GARS measures actual disability, which refers to difficulty in performing activities including personal or equipment assistance, whereas intrinsic disability refers to inability in performing tasks without personal or equipment assistance. Therefore, explicit information, whether subjects need to use specific aids or equipment assistance to carry out activities by themselves, is not measured with the GARS. For example, if the observer is not qualified to use the GARS, a patient who is able to walk outdoors with a walker without any difficulty could receive a judgment of disability because of the needs of aid. Furthermore, this risk seems to be more considerable in occupational therapy, where the use of aid has a relevant role both in clinical evaluation and in assessment of rehabilitation program.

Conclusions

Our analysis showed that GARS scale could be a useful instrument for measuring disability in ADL and IADL, even if it is filled by the therapists, and it could represent a useful tool to develop a customized plan of care in occupational therapy.

Thus, it could be advisable to implement the GARS with a free space questionnaire, that could be filled by the therapist with information about which aids or orthoses could ease patient's performance (i.e. devices which improve walking, buttonhook, adapted cutlery) (Figure 9), as well as advises about environmental control system

Figure 9. ***Examples of dining and dressing aids***

and household adaptation, in order to improve accessibility and facilitate return to home after discharge: with these relevant clarifications, according to our results, the GARS could be a useful tool also when assessed by an observer.

Further studies with larger population size are needed to assess current outcome indicators of GARS in occupational therapy.

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