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TOOLS FOR EFFICACY'S ASSESSMENT OF NEUROPSYCHOLOGICAL REHABILITATION PROGRAMS: A SYSTEMATIC REVIEW

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Abstract

Objective: There is a consensus in the field of neuropsychological rehabilitation (NR) that to measure effectiveness of a particular treatment program, one should look at the results of neuropsychological tests before and after the rehabilitation program, as well as the result of neuroimaging techniques and questionnaires of daily living and/or other behavioral and functional measures. The focus of NR is the reduction of disability, the impact of cognitive disabilities to the level of activities performed by patients and are therefore of fundamental importance the use of tools of efficacy assessment focusing on aspects of functional and environmental performance. This study aims to address the question of which tools are most commonly used to measure neuropsychological rehabilitation efficacy.

Method: A systematic literature review was designed using the MEDLINE database and the following keywords in association: "neuropsychological rehabilitation", "cognitive rehabilitation", "efficacy" and "evidence-based". The publication date was used as search limit. All articles were classified according to a degree methodological efficacy (Class I, II and III). Besides that, the articles were classified according to their congruence between the rehabilitation goal and the assessment method used to insure the outcome (successes or the failure in the goal) of the rehabilitation program (A, B and C, being categories A the most congruent with the general proposal of NR and C the less one).

Results: A total of 32 articles were selected and allocated in three different classes, being that Class I articles were comprised of randomized controlled trials (n = 12), Class II clinical series with well-designed controls that permitted subject comparisons of treatment and conditions " quasi-randomized "studies (n = 14) and Class III studies that results from one or more single cases appropriate with the use of single-subject methods (n = 6). In reference to the goal congruence analysis, 66% were classified in Category A, 12% in Category B and 22% in Category C.

Conclusions: These results show that until now there is a misleading use of assessments tools, causing misconceptions of the discussion and the interpretation at the time the results. The use of formal neuropsychological tests to evaluate treatment outcomes such as patient quality of life, independence and autonomy, remain in practice e in the art of clinical cognitive rehabilitation, however the real predictive power of this practice still needs to be evaluated more systematically. Moreover the isolated application of these tests proves to be inconsistent with the objectives neuropsychological rehabilitation program, since the rehabilitation objectives are grounded in functional goals, which generally aim to reduce the impact of cognitive deficits in individuals daily life and not to increase the performance in specific tests.

Key Words: neuropsychological rehabilitation, treatment efficacy, evidence-based, disability, impairment, assessment

Declaration of interest: none

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Background

Neuropsychological Rehabilitation (NR) is the proposition of efforts to improve the functionality and quality of life of patients with neurological and psychiatric disorders through the use of psychological, cognitive and behavioral techniques (Wilson 2004). Therefore, the rehabilitation aims to maximize the

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cognitive functions through the psychological well-being, enhancing skills necessaries for activities of daily living (ADLs) and social relationship. According to Ben-Yishay (2008), the objective is to recover or minimize the effects of cognitive impairment, so that patients find alternative and appropriate means to achieve specific functional goals, as well as the improvement in performance and behavioral skills aiding to understanding and monitoring of emotional reactions. Therefore, the major objective of NR is to reintegrate patients to their environments of schooling, social and professional.

In according to Cicerone (2000), the best measure to evaluate treatment efficacy are randomized controlled trials, such as the Brain Injury–Interdisciplinary Special Interest Group, that divide treatment efficacy studies as highly constrained studies that typically evaluated time-limited interventions of selected, homogenous samples, primarily for research purposes. This seems to be a statement in this area, that for specific populations, one must use specific techniques, (Slomine and Locascio 2009, Tsaousides and Gordon 2009), it means that there is no support in the literature for global stimulation programs that has an useful gain for all types of patients. For example, the use of spaced retrieval training for patients with Alzheimer's disease (Lee et al. 2009) and behavioral training in leftward visual scanning, eye-patching, encouraging movement of the left limbs, an interventions designed to increase general alertness for patients with unilateral neglect (Manly 2002). However few studies addresses the efficacy of neuropsychological assessment's in rehabilitation programs in general, being this the main objective in present study.

However, one of the most important tasks in any rehabilitation program is the identification of everyday life problems. Since 1990 it is possible to observe an increasing emphasis on the development and use of outcome measures in cognitive rehabilitation as tools for estimating effectiveness (McMillan and Sparkes 1999), giving birth a philosophy change (i.e. stop using neuropsychological test to insure real life outcomes) that still today it is not fully understood and implemented. Information from standardized tests and questionnaires that contribute to build up a profile of strengths and weaknesses need to be complemented by information from functional or behavioral assessments to build up a picture of how these problems affects everyday life (Wilson 2002). According with Solhberg and Mateer (2001), the use of goals assessment in the context of cognitive rehabilitation covers the development of an accurate profile of individual's functioning including the evaluation of cognitive, emotional and interpersonal factors. Furthermore the most important suggestion is dedicated to the comprehension of strategies that facilitate learning and cognitive dynamic functioning.

Thus, in an attempt to obtain an ecological neuropsychological evaluation and functionality assessment in its wide spectrum, the World Health Organization's International Classiûcation of Impairments, Disabilities and Handicaps (ICIDH) distinguishes three levels of functional deûcit: impairment, disability and handicap (Arthanat et al. 2004). Is important to note that these three levels do not relate to different aspects, but rather different categories of impact of a same specific health problem, in case of the subject referred to NR, deficits in cognitive functions. "Impairment" occurs at a physical, structural, organ, or system level and involves a missing or malfunctioning body part or system (for example, a person with lesion of the hippocampus and as a consequence, a memory impairment). "Disability" occurs at the activity level, as a result of impairments. It involves disturbed function in performance of usual age appropriate activities, such as Impairments in activities of daily living (ADL) and instrumental activities of daily living (IADL), for example: difficulty remembering to take medication, pay bills or finish their chores. "Handicap" occurs at the social level (job loss, family's dependency or loss of the ability to take care for himself). It involves disturbed function in the performance of social roles, such as employment. In this perspective, the overall focus of neuropsychological rehabilitation programs is to reduce the disability and handicaps. Within this perspective becomes viable the employment of different assessments that measure objectively the functionality / performance of the individual in their daily tasks, since an intervention can only be implemented based on the level of individual function, the extension of activity performance (Arthanat et al. 2004). To take an advance in the effort to systematize the knowledge about the three stages functional deficits of patients who are in the neuropsychological rehabilitation processes it is important to have tools that provide an estimation of the degree of the impact of the injury and what kind of difficulties in daily life and social losses this patient should exhibit. In this way, the goal of this study is to perform a systematic review of the current literature, which investigating which instruments were used to assess efficacy in rehabilitation programs evaluating the congruence between these instruments and the goal of the neuropsychological rehabilitation programs they aim to evaluate.

Method

A research was conducted through MEDLINE using the follow keywords in association: "neuropsychological rehabilitation", "cognitive rehabilitation", "efficacy" and "evidence-based".

In the first selection, 157 articles were assigned to the study sample. They underwent to a second step for the selection of relevant papers that the content fulfills the designed criteria, i.e. papers that aims at neuropsychological rehabilitation programs and it effectiveness, and should have been published from January 2000 through March 2011. After this, two experts in neuropsychological rehabilitation identiûed and analyzed the abstracts or complete articles according to the following exclusion criteria: (1) review papers; (2) non-English language paper; (3) theoretical articles; (4) pharmacologic interventions; (5) medical rehabilitation without an specification concerning neuropsychological rehabilitation program used; (6) book chapters; (7) non-human population (8) articles with only measures of assessment based on neuroimaging studies.

Through this process, the specialists selected 32 articles and classified these in three classes based on Cicerone (2000). In accordance with this classification, the Class I covered studies that were defined as randomized controlled trials, Class II clinical trials with well-designed controls that permitted between subject comparisons of treatment conditions and "quasi-randomized" studies. Finally class III studies were defined by results from one or more single cases that used appropriate single-subject methods, such as multiple baselines cross-interventions with adequate quantification and analysis of results.

For the purpose to verify the congruence of the selected articles in the neuropsychological intervention and the clinical assessment, they were categorized in three categories with respect to the congruence between the objective of the intervention and the assessment tool employed to measure the intervention´s outcome. About the objectives of the intervention, the articles were evaluated for the proposition of goals focused on reducing disability and handicap, and focus on reducing only impairments. The category A, included interventions that had the aim to reduce the disability and / or handicap and used environmental assessments, like functional scales, performance in activity daily living, social functioning, coping and self-efficacy scales (supposedly the most congruent), category B, articles aimed to reduce disability and / or handicaps but did not use environmental assessments, only psychometric tests, and category C, whose goals were focused only on the reduction of impairments and used psychometric tests (supposedly less congruent).

Results

The total population studied was 157 articles of which we found 32 who fulfilled the inclusion criteria. **Table 1** shows the article selection and exclusion number for each search proceeded in MEDLINE.

Following the proposal of this review, 32 studies were found, and they were classified according to the criterion of methodological efficacy, with the following description: 12 Class I studies, 14 Class II and 6 Class III, as detailed in **tables 2, 3** and **4**. The description of these studies is presented on **table 2, 3** and **4**. For each **table** detailed descriptions of the selected articles are provided; the total sample, the methods employed for efficacy assessment, and the classification about the NR goal/assessment congruence using the categories described above (A, B, C).

In terms of clinical populations that were exposed to rehabilitation procedures, 38% had a stroke or traumatic brain injury, 23% had a diagnosis of Alzheimer's disease or mild cognitive impairment (MCI), 15% had multiple sclerosis, 13% had substance use disorder, 2% cancer related brain injury, 1%, attention deficit of hyperactive disorder (ADHD) and 1% language impairments. In the graphic below it is possible to see the frequency distribution of three levels of congruence of the studies, concerning the clinical relation between the measurement of the impairment or disability and the neuropsychological rehabilitation goals outcome. From the analysis of the results on the congruence of the studies it was observed that most (66%) had focus on the reduction of NR disability / handicap with the use of functional assessments, consistent with the proposed objectives and more consistent with the proposal of the NR. Were used parameters the actual task of rehabilitation as target for pre and post intervention, assessments of performance in activities of daily living (ADL), measures of greater ecological validity for measuring the difficulties related to memory and executive function in daily activities, self-efficacy scales and quality of life, coping, social functioning. However, 12% had goals in the

Table 1. *Selected and Excluded Articles*

Keywords	Population	Number of articles excluded	Selected
"neuropsychological rehabilitation" AND "efficacy"	39	27	12
"neuropsychological rehabilitation" AND "evidence-based"	7	6	1
"cognitive rehabilitation" AND "efficacy"	83	65	18
"cognitive rehabilitation" AND "evidence-based"	28	27	1

Table 2. *Description of Class I Studies*

CLASS I STUDIES			
Studies	**Sample**	**Methods used for efficacy's assessment**	**Classification about the goal congruence and assessments used**
Geusgens et al. (2006)	N = 113 (stroke)	Four standardized tasks, namely: 1 (washing face and upper extremity), 2 (dressing shirt) 3 (preparing and eating a sandwich) 4 (preparing a hot chocolate).Scores were assigned according to independence, initiative, execution and control. ADL Observations, Barthel ADL Index, Apraxia Test, Action Research Arm Test (ARA), SAN Test.	A
Svendsen and Teasdale (2006)	N = 50 (stroke and traumatic brain injury)	European Brain Injury Questionnaire (EBIQ); Patient Competency Rating Scale (PCRS); Generalized Self-efficacy scale (GSEC); Locus of Control (LoC); Hospital anxiety and depression scale (HADS); WHO-Qol Bref	A
Wolwer et al. (2005)	N = 77 (schizophrenia)	PFA test: pictures of facial affect. D2, Trail Making Test A and B, AVLT, Digit span, Wais, Fluency non-verbal Test, range of positive and negative symptoms.	B
Bier et al. (2008)	N = 30 (Alzheimer's disease)	Face-name association - Performance Parameters adapted for the own task used in the rehabilitation program. Digit span and letter-number sequencing tests – WAIS III; Visuo-spatial block tapping test – WMS-III; French version of the Selective and Cued Reminding Test (SCRT) Recognition Memory Test; Verbal ûuency – French version; Association match task from the Birmingham Object Recognition Battery (BORB); Benton's Face Discrimination Test; The Stroop Test; The Trail Making Test A and B, The Process Dissociation Procedure (PDP).	A
Derwinger et al. (2005)	N = 81 (elderly without cognitive impairments)	Remember numbers with and without learning strategies - Performance parameters adapted for the own task used in the rehabilitation program	A
Troyer et al. (2008)	N = 54 (mild cognitive impairment)	Performance Parameters in own Task Used in Rehabilitation, The Impact Rating Scale, Strategy subscale of the Multifactorial Metamemory Questionnaire, Elaborated Memory tests to be administered (by projecting stimuli onto a screen and requiring written responses), Hopkins Verbal Learning Test (HVLT), Wechsler Memory Scale–Revised Verbal Paired Associates, Brief Visuospatial Memory Test (BVMT) and Rey-Osterreith Complex Figure Recall.	A
Winocur et al. (2007)	N = 49(elderly without cognitive impairments)	Geriatric Depression Scale (GDS), Locus of Control Scale (LOC), Quality of Life (QOL), Self-Efficacy Scale (SE), Memorial University of Newfoundland Scale of Happiness (MUNSH), Life Orientation Test (LOT), Everyday Activity Questionnaire (EA), Ways of Coping Questionnaire (WOC), DEX.	A
Cicerone et al. (2008)	N = 68 (traumatic brain injury)	Community Integration Questionnarie (CIQ), Cognitive Energy Scale, Perceived Quality of Life Scale (PQOL) Community Integration Questionnaire (CIQ), TMT-A; California Verbal Memory Learning Test -II,Rey Figure Oral Word Association Test e Booklet Category Test. Community-based employment - Scale.	A

Table 2. *(Continued)*

Buiza et al. (2008)	N = 238 (elderly without cognitive impairments)	Hachinski Scale Hachinski, Barthel ADL Index , Instrumental activities of daily living Lawton Temporal, spatial and personal orientation Information and orientation of WMS-R, Attention Direct and inverse digits of WMS-R, Working memory, Immediate execution memory Logic memory of WMS-R, Logic memory Recent word list memory Auditory Verbal Learning Test (AVLT), Short term memory Learning potential, -Designation language -Boston vocabulary test Repetition language Boston Diagnostic Aphasia Examination (BDAE), Audit compression, Written compression, Written language, Reading language, Visuo-constructive ability WAIS-III, Planning Clock drawing (order and copy) , Bimanual coordination Motor sequences of Luria, Pre-motor function, Visomanual coordination speed Trail Making Test, part A, Army Individual Test Battery, Visomanual coordination execution, Phonetic ûuency FAS Benton and Hamsher, Semantic ûuency, Abstraction Proverbs, Categorization Similarities of WAIS-III, ICPR Motor Sequences of Luria.	C
Fals-Stewart and Lam (2010)	N = 160(Substances Abuse Use Disorder)	Working Alliance Inventory–Short Form (WAI-S); Staff Rating Scale (SRS); Client Assessment Summary (CAS); Client Satisfaction Questionnaire (CSQ-8); Timeline Followback Interview (TLFB); Addiction Severity Index (ASI); SureStep urine drug screen card; Neuropsychological Assessment Battery-Screening Module (NAB-SM).	A
Man et al. (2006)	N = 103 (traumatic brain injury)	Specific tests developed for performance evaluation. Category Test for Adults (Subtest I-VII); Lawton Instrumental Activities of Daily Living Scale (LIADL); Test of Non-verbal Intelligence – Version 3 (TONI-3);Letter cancellation; Test of The Rivermead Perceptual Assessment Battery (RPAB)	A
Flavia et al. (2009)	N = 150(multiple sclerosis)	Paced auditory serial addition test (PASAT); Winsconsin Card Sort Test (WCST); controlled oral word association test with phonemic and semantic cues (COWA/P, COWA/S) for cognitive ûexibility and word ûuency; divided attention of Test of Everyday Attention (TEA) — median for auditory stimulus (am), for visual stimulus (vm), total omitted stimuli (to) and total errors (te) and two questionnaires: the Montgomery–Asberg Depression Rating Scale (MADRS) and the self-reported Multiple Sclerosis Quality of Life (MSQoL).	B

intervention focused on reducing disability and/or handicaps but did not use functional assessments to measure the level of impact on activities and social level, they just used psychometric tests, showing therefore an incongruence in the evaluation of the efficacy of intervention plan. The other studies, 22%, had only focused intervention aimed at reducing the impairment and used psychometric tests, this finding is inconsistent with the proposal of NR, which considers impairment but should be focused on its impact on the individual level of activity (disability) and as in their level of social participation (handicap).

Discussion

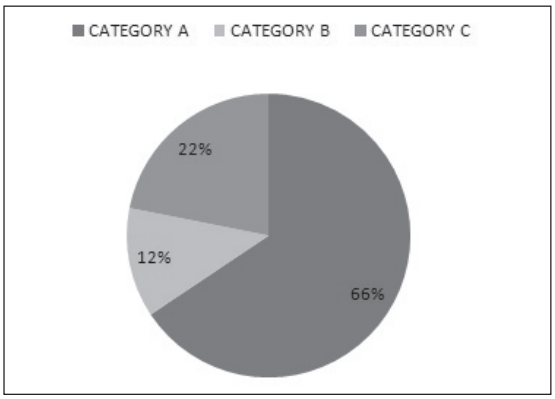
In the articles compiled in this review was possible to see common features in the evaluation procedures for the proposed rehabilitation programs, even with different populations, different functional impairment and different intervention strategies. Most of the articles (61%) are related to neuropsychological rehabilitation with stroke, traumatic brain injury and dementia. Also it was possible to found, in a lower frequency, programs of neuropsychological rehabilitation in neurodevelopmental psychiatric disorders (2%), in this case

Table 3. *Description of Class II Studies*

CLASS II STUDIES			
Studies	**Sample**	**Methods used for efficacy's assessment**	**Classification about the goal congruence and assessments used**
Brennan et al. (2009)	N = 44 (dementia)	Naturalistic Action Test (NAT)	A
Culley and Evans (2010)	N =11 (acquired brain injury)	SMS text messaging - Performance Parameters in own Task Used in Rehabilitation	A
Savorani et al. (2004)	N = 34 (mild cognitive impairment)	Mini mental state examination (MMSE), memory impairment screen (MIS), Alzheimer's disease assessment scale (ADAS), ADAS-Cog 10-word, semantic verbal fluency, digit span forward and backward and geriatric depression scale (GDS)	B
Farinamd et al. (2006)	N = 32 (Alzheimer's disease)	Mini Mental State Examination (MMSE), Rivermead Behavioural Memory Test (RBMY), Attentional Matrices, Verbal fluency for Letters and Categories, Rey figure copy and recall, Functional Living Skills Assessment (FLSA), Activities of daily living (ADL), Nurses' Observation Scale for Geriatric Patients (NOSGER), Neuropsychiatric Inventory (NPI), Revised Memory and Behaviour Problems Checklist (RMBPC), Geriatric Depression Scale (GDS), Clinical Insight Rating scale (CIR), Caregiver Burden Inventory (CBI) and Beck Depression Scale (BDI).	A
Powell et al. (2008)	N = 32 (acquired brainInjury)	Raven's Coloured Progressive Matrices, Labelling of Facial Expression, Position Discrimination Test from the Visual Object and Space Perception Battery, Unusual Views , Letter Cancellation, Similarities sub-test from the Wechsler Adult Intelligence Scale–Revised, Oldûeld Naming Test, Controlled Oral Word Association Test (COWAT), Story Recall (immediate), Digit Span – total forwards and backwards, Recognition Memory Test – Words, Picture Recognition, Cognitive Estimates, Famous Faces Test ,Test of Facial Recognition, Face Matching Test, Warrington Recognition Memory Test – Faces, Face Recognition test from the Rivermead Behavioural, Memory Test and Face Learning Test.	B
Kinsella et al. (2007)	N = 32 (Alzheimer's disease)	Text-Reading Task, Hopkins Verbal Learning Test – Revised (HVLT-R), recognition discrimination index (HVLT-R DI), The Trail Making Test part A and B and Wechsler Digit Span.	A
Talassi et al. (2007)	N = 66 (Mild cognitive impairment and mild dementia)	Mini Mental State Examination (MMSE), forward and backward digit span, phonemic and semantic verbal fluency, sub-test for episodic memory of Rivermead behavioral memory test, visual search, digit symbol test, rey complex figure copy and recall, clock drawing test, geriatric depression scale (GDS), state-trait anxiety inventory, neuropsychiatric inventory (NPI), physical performace test (PPT), basic ADL (BADL), instrumental (IADL) and caregiver burden inventory (CBI)	A
Galante et al. (2007)	N = 11 (Alzheimer's Disease and mild cognitive decline)	Mini Mental State Examination (MMSE), Milan Overall Dementia Assessment (MODA), Bisyllabic Word Repetition Test, Prose memory, Corsi's block tapping test, Digit cancellation test, Raven's Coloured Progressive Matrices, Semantic and	C

Table 3. *(Continued)*

		phonemic verbal fluency, Denomination, Constructional apraxia and Ideomotor apraxia for superior limbs, Neuropsychiatric Inventory, Geriatric Depression Scale, Basic Activities of Daily Living and Instrumental Activities of Daily Living.	
Shevil and Finlayson (2009)	N = 41 (multiple sclerosis)	Program evaluation questionnaire and qualitative analysis	A
Kesler et al. (2011)	N = 25 (cancer)	Wechsler Intelligence Scale for Children 4th Edition (WISC-IV) or Wechsler Adult Intelligence Scale 3rd Edition (WAIS-III); Wide Range Assessment of Learning and Memory 2nd Edition (WRAML2) List Memory and Picture Memory NEPSY II Animal Sort or Delis Kaplin Executive System (DKEFS); Sorting Test; Woodcock-Johnson 3rd Edition (WJ-III); Cancellation Test Motor Free Test of Visual Perception 3rd Edition (MVPT-3) and Functional MRI (fMRI)	C
McDonald et al. (2009)	N = 22 (traumaticbrain injury)	Wechsler Test of Adult Reading (WTAR) Face Recognition Test; Digit Symbol Coding, Symbol Search; Matrix Reasoning and Digit Span Subtests of the Wechsler Adult Intelligence Scale (WAIS-III); Controlled Oral Word Association Test (COWAT); phonemic naming: F, A, S; category naming: animals; Trail Making Test parts A and B; Haylings test of inhibition from the Hayling-Brixton tests; LogicalMemory I and II from theWechslerMemory Scal (WMS-III); facial expression naming stimuli from the Ekman and Friesen series.	C
Boman et al. (2004)	N = 10 (acquired brain injury)	Attention Process Training test; Digit Span Test from the WAIS; Claeson-Dahl test, CD-test Rivermead Behavioural Memory test (RBMT), Assessment of Motor and Process Skills; European Brain Injury Questionnaire (EBIQ); Quality of life (QoL).	A
Cicerone et al. (2004)	N =56 (Traumatic Brain Injury)	Community Integration Questionnaire (CIQ); and Quality of Community Integration Questionnaire (QCIQ); Trail-Making Test parts A and B; California Verbal Learning Test (CVLT);Rey Complex Figure; Controlled Oral Word Association Test30 (COWAT) and Category Test.	A
O'Connell et al. (2006)	N= 15 (attention-deûcit hyperactivity disorder)	Modified version of the Sustained Attention to Response Test (SART)	C



Graphic 1. *Distribution of studies according to the categories of level of impairment or disabilities with respect to the congruence between the objective of the intervention and the assessment tool employed to measure the intervention's outcome*

Table 4. *Description of Class III Studies*

CLASS III STUDIES			
Studies	**Sample**	**Methods used for efficacy's assessment**	**Classification about the goal congruence and assessments used**
Fillingham et al. (2006)	N = 11 (language impairments)	Picture naming tests were used to measure the degree of anomia: Boston Naming Test without standard systematic cueing, Graded Naming Test and Picture Naming PALPA 53. Single-word reading and repetition were used to assess the integrity of phonological representations (reading words, PALPA 31; and non-words, PALPA 8; repeating words (PALPA 9) and non-words (PALPA 8). Word and picture versions of the Pyramids and Palm Trees, a 100-item spoken word–picture matching test in both spoken (SWPM) and written formats (WWPM). Psychometrically-graded tests of comprehension, again run twice for auditory and written presentations, British Picture Vocabulary Scale (BPVS), Concrete and Abstract Synonyms. Assessments of episodic memory for verbal and nonverbal materials including recognition for faces, pictures, words and landscapes, Rey Complex Figure Test; Camden Memory Test) working memory (Digit Span); PALPA Auditory , Digit Matching Span, nonverbal problem-solving and reasoning (Wisconsin Card Sorting Test.	B
Schweizer et al. (2008)	N = 1 (acquired brain injury)	Sustained Attention to Response Task; Delis Kaplan Executive Function System Tower Test (D-KEFS); Revised-Strategy Application Test (R-SAT); Hotel Task; Dysexecutive Questionnaire (DEX); Cognitive Failures Questionnaire (CFQ).	A
Tam et al. (2003)	N = 3 (Traumatic brain injury)	Software packages for on-line cognitive skills training and Rivermead Behavioural Memory Test (RBMT)	A
Davalos et al. (2002)	N = 5 (schizophrenia)	Action Programs Test and the Modified six elements of the Behavioural Assessment of Dysexecutive Syndrome Scale (BADS); Trail Making part B; Dysfunction of the Executive Syndrome Scale (DEX).	C
Parish and Oddy (2007)	N = 4 (traumatic brain injury)	Evaluated the percentage of independence in performing the task target.	A
Levaux et al. (2009)	N = 1 (schizophrenia)	Digit span (forward and backward), letter number frequency, logical memory, face recognition, of Manuel de l'Echelle Clinique de Mémoire (MEM III); Alpha span; Brown-Peterson; working memory, divided attention, vigilance, go/no-go, flexibility of Test of Attentional Performace (TAP); Selective Reminding Test; Mirror Tracing; Verbal ûuency: Phonological/Semantic; Continuous Performance Test (CPT); Trail Making Test part A and B; Rule Shift Cards; Six Elements Test; Action Programme (BADS); Symbol Copy (WAIS-III); Memory Self-Assessment (QAM); Attention Self-Assessment (QAA); Working Memory Self-Assessment (QAMT); Subjective Scale to Investigate Cognition in Schizophrenia (SSTICS) and Self-esteem Inventory (SEI)	A

schizophrenia and ADHD. It is important to note that there are few articles concerning the rehabilitation of neuropsychiatry and developmental disorders and a lot of researches showing that cognitive deficits are common findings in this population related to impairment in the performance of productive skills, social and daily living (Corrigan et al. 2007, Malloy-Diniz et al. 2007, Moreira et al. 2010, Bowie et al. 2010, Pigache 2010, Rocca et al. 2010, Binz and Brüne 2010). In this way, future studies are needed to assess the efficacy of clinical neuropsychological rehabilitation in this field.

Neuropsychological assessment was used in different designs and in most studies, followed by scales and questionnaires. In some ways, this finding is convergent with Wilson (2002), which emphasizes the application of standardized tests for establishment of the cognitive weaknesses and strengths of individuals. However, as pointed out by Solhberg and Mateer (2001), psychometric assessment generally addresses the level of impairment which is relevant, but it is not enough to enable professionals to completely understand the full impact of an impairment at a subject´s activity of daily living, making it difficult to formulate an appropriate and executable intervention plan.

From this perspective, it was observed eleven studies, including those with higher methodological rigor (Classes I and II), that has established as a parameter for evaluating the effectiveness of rehabilitation intervention the measurement of the performance in the task itself the target of treatment in situations ecological, according to the demands of patient rehabilitation (Cicerone et al. 2004, Derwinger et al. 2005, Farinamd et al. 2006, Geusgens et al. 2006, Man et al. 2006, Kinsella et al. 2007, Bier et al. 2008, Powell et al. 2008, Brennam et al. 2009, Culley and Evans 2010).The parameters used were numbers or percentage of correct answers in self-care tasks, questionnaries and instruments to measure activities of daily living (established as the rehabilitation program) and contextualized, effective employment of mnemonic strategies in tasks of face recognition. On the ecological situation was evident the use of rehabilitation strategies developed for remembering names, phone numbers and passwords, using available technologies to patients, as features of cellular phone and internet (Culley and Evans 2010). Importantly, these parameters and ADL's Scales were used in studies with elderly and people that have had an acquired brain injury (Geusgens et al. 2006, Man et al. 2006, Talassi et al. 2007, Buiza et al. 2008). One possible explanation for this result would be based on the historical perspective of neuropsychological rehabilitation, since most of the initial studies were directed to the investigation of brain injury populations (Prigatano 1999), and in the elderly population, have had been increasingly need for proposals of non-pharmacological treatments. From the distribution analysis of these articles according to its category of level of impairment and disabilities, the data show that there is still an incongruence usage of techniques and assessments, certainly causing misconceptions during the discussion and interpretation of results. The use of formal neuropsychological tests to evaluate treatment success, quality of life, independence and autonomy, remains a practice still used in clinics and departments abroad, and need to be evaluated more systematically in order to fully understand the true extent of its predictive power for therapeutic success. For instance, the study of Galante et al. (2007), which used psychometric tests to measure the effectiveness of cognitive training software, showed a quite unspecific pattern, which prevents any type of generalization to the performance of functional skills, ecological activities and quality of life.

As pointed out by Wilson (2009) when planning a cognitive rehabilitation programs there are many questions that need to be answered. And many of these cannot be answered by psychometrics tests, some examples are: How are the memory difficulties manifested in everyday life? Which memory problem cause most concern to the family and the patient? What do we know about the cultural background and level of support available? What coping strategies are used? Are the problems exacerbated by depression or anxiety? Is this person likely to be able to return to work (or school)? Can this person live independently? What kind of compensatory aids did this person use premorbidly? What kind of memory compensation strategies are being used now? What is the best way for this person to learn new information?

These questions and concerns are the real important ones, when the major focus of the treatment is the impairment impacts in everyday life (handicap).The main objective in the NR is the development of a set of more adaptative and functional behaviors, life quality, independence and autonomy, and it is difficult to visualize how we can perceive such developments using formal neuropsychological tests. The evaluation of the neuropsychological profile of impaired and preserved processes is a necessary condition but should always be combined with a measuring of the impact of cognitive impairments and handicaps in daily individual life (Royal et al. 2007). Some authors, such as Prigatano (1999) and Wilson (2002), propose that NR interventions must be understood in a broader way, considering the persons in their context and their relationships.

In a way to cope with this question, a different approach is required, using diverse forms of behavioral, functional, observational and self-report measures, such as ecological tests, for example Rivermead Behavioural Memory Test – RBMT (Wilson et al. 1985), every day cognitive problems questionnaires (Crawford et al. 2006) and other scales, (also involving family members and caregivers) and interviews (Wilson 2009). Thus it is possible to elect constructs intervention, an individualized and effective practice that helps to set parameters for evaluating the effectiveness of an intervention impact after an acquired brain injury: self in relation to self; self in the world; emotions; motivation; uncertainly; basic skills; social relating; copying; outlook; activity; all important concepts that are important to capture the pre and post identity of a patient (Psaila et al. 2006).

Conclusion

Assessment is the first step in establishing a neuropsychological rehabilitation plan, as well as the

basis for determining its effectiveness. In this sense it is a dangerous pitfall the use of neuropsychological tests as outcome measure, since the aim of neuropsychological rehabilitation is not the isolated improvement of cognitive functions, but rather the use of different techniques to enable people with disabilities to function the most adequately as possible in their appropriate environment. It seems rational that changes on scores of standardized tests will not give us the information we require. Therefore, still nowadays the responsibility falls to the rehabilitation professionals to give attention to the relevance and greater need to establish efficacy parameters grounded in functional performance referred by cognitive life constructs, and related to ecological tasks.

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