

The Clinical Formulation Methodology for Neuropsychological Rehabilitation Intervention: The Comprehensive Model, the Cycle and the Flow Chart for the Rehabilitator's Reference

Fabricia Quintão Loschiavo Alvares¹ and Barbara A. Wilson²

¹ Nexus- Institute for Research, Teaching and Clinic in Neuropsychological Rehabilitation

Received: 15 June 2021 Accepted: 5 July 2021 Published: 15 July 2021

Abstract

Neuropsychological Rehabilitation (NR) is understood as a process of using a wide variety of strategies deliberately centered on one person, which should stimulate his/her development, or the use of available resources to obtain a good occupational performance. Concerning this point, the intervention must be understood broadly, considering people in their contexts, activities and relationships. In order to attend these principles, the key element for success in proposing an NR plan is the active use, by the rehabilitator, of a clinical formulation process (CF). Considering the infinity of possible influences on an individual's overall level of functioning, the formulation of factors is extremely useful to guide all the people involved, from the clinical team to the patient's family, in order to understand the current problems faced by the person, to delineate the intervention and to prospect for future steps.

Index terms— neuropsychological rehabilitation, clinical formulation, model.

1 Introduction europsychological

Rehabilitation (NR) is understood as a process of using a wide variety of strategies deliberately centered on one person, which should stimulate his/her development, or the use of available resources to obtain a good occupational performance. The intervention must be understood broadly, considering people in their contexts, activities and relationships (Prigatano 1999, Wilson 2002). The fundamental goal is the development of a more adaptive and functional behavior set, aimed at improving quality of life, independence and autonomy (Royal et al. 2007).

According to Wilson (2002), NR is characterized by an individualized approach that identifies and pursues relevant goals for individual patients, contexts and families, and best performance in their occupations. It has as a priority the maintenance and / or development of cognitive skills and compensation for disabilities. It also integrates multimodal methods, conducted by a multidisciplinary and interdisciplinary team (health professionals, educators and all those directly and indirectly related to assistance); and interacts with the individual environment, aiming at transferring the rehabilitation program to the patients' daily life (Kasper et al. 2015). Thus, the sine qua non condition is to rehabilitate the person, and not their neuropsychological processes (Loschiavo Alvares 2020 a).

Considering what had just been said, the key element for success in proposing an NR plan is the active use, by the rehabilitator, of a clinical formulation (CF) (Loschiavo Alvares 2020 b). This requires the application of a theory and empirical knowledge to the collected information through evaluation in order to derive hypotheses about the nature, causes and factors that influence a patient's current problems or their presentations and behavioral situations. During the formulation process, the countless possible influences on the functioning and neuropsychological status of an individual are taken into consideration.

2 II. THE COMPREHENSIVE MODEL OF NR FOR PSYCHIATRIC DISORDERS

Hypotheses about the nature, causes and factors that influence the current problems experienced by the patient are used to guide assessment and / or the offering of a rehabilitation plan (Wilson and Betteridge 2019). That being so, the clinical formulation goes beyond the diagnosis, the development of a conceptualization of the current and future clinical picture, of the etiology, mainly covering the management of the patient in the context of his or her multidimensional biopsychosociocultural domains (Loschiavo Alvares 2020 b). Considering the infinity of possible influences on an individual's overall level of functioning, the formulation of factors is extremely useful to guide all the people involved, from the clinical team to the patient's family, in order to understand the current problems faced by the person, to delineate the intervention and to prospect for future steps.

In accordance with Sperry et al. (1992), the formulation is a process of linking a group of data and information to define a coherent pattern, helping to establish the diagnosis and tracing the appropriate intervention, providing explanations, in order to prepare the rehabilitator, the patient and family for therapeutic work and goal setting. The formulation also helps to gather the results of many evaluations carried out by different team members in a single coherent source. Therefore, it requires a description of what happened to the patient and the pathology or diagnosis, covering all the functional consequences. It is also necessary to know the family and social contexts and how the person sees himself or herself before the injury or illness.

From the perspective of the NR, the CF involves the entire process of clinical structuring for intervention, including the establishment of goals, the measurement of efficacy: in short, a comprehensive flowchart, from which there is the identification of the key characteristics of the patient, the definition of the intervention's targets, the specification of the desired results, contextual and occupational significance, the design of the interventions, the implementation and the constant reassessment, based on functional and contextually relevant parameters. Based on what was introduced, the main objective of this study was to present this theory in a more practical way, as well as offer pragmatics tools for the professionals that work on this area, in order to anchor a more precise and effective practice in the NR.

2 II. The Comprehensive Model of nr for Psychiatric Disorders

In 2002, Wilson published a model of cognitive rehabilitation arguing that "Cognitive rehabilitation is a field that needs a broad theoretical base incorporating frameworks, theories, and models from a number of different areas". No one model or group of models is sufficient to address the complex problems facing people with cognitive problems consequent upon brain injury" (Wilson 2002). Models and theories influencing cognitive rehabilitation include those of cognition, assessment, recovery, behaviour, emotion, compensation and learning. Wilson synthesised these individual models and theories into a comprehensive model of cognitive rehabilitation, which has been used to plan rehabilitation programmes specifically for people with acquired brain injury (Wilson et al. 2013) Initially, the patient's clinical history will be required. This will consist of: the age at the beginning of the disorder; number of hospitalizations; family and developmental histories; possible substance use and risk of suicide; the impact on health condition; psychological factors and possible effects on NR (stigma, personality, experiences of failure, low self-esteem, negative beliefs and coping styles, anxiety and mood); the functional status (Loschiavo Alvares, Sediyaama, Rivero et al. 2011) (by using the International Classification of Functionality -ICF and other assessments that are relevant to the case); and the Expected and Observed Cognitive Profile, which considers the neuropsychological profiles expected for each disorder, already well described in the literature and comparing them with the findings of the neuropsychological evaluation to determine cognitive strengths and weaknesses.

Diagnostic considerations would include the Pharmacological Intervention, which aims to understand the impact of pharmacotherapy on mood and cognition; also, the Biological Influences and Global Prognosis, which would include the neuroprogression and allostatic load, which, taken together, will allow the rehabilitator to note their patient's prognosis.

Theoretical concerns, the third section, on the other hand, consists of Complementary Models, the neuropsychological, behavioral, cognitive behavioral, systemic, which should use a broader understanding of the patient's context; the Scientific Approach, from which there is the postulate that NR should always be an evidence-based process, adopting, therefore, the scientific basis in the evaluation and proposition of new interventions; and the Intervention Focus (s), that helps the rehabilitator to consider the specifics of each case to determine the focus of their intervention. This last named can be one or a combination of the following: restoration of function and / or encouragement of neuroanatomical reorganization, use of residual skills more efficiently, or search for alternative paths, environmental changes.

Finally, there are considerations of the patient, family and contexts that involve the determination of instruments to evaluate the effectiveness of the intervention; the process of setting goals with the patient and family, the NR implementation and constant monitoring of its evolution with periodic reviews and updates according to evolutions, and / or new demands and functional goals that need to be established. An extension to the model has been proposed by Loschiavo Alvares, (see Fig 2) which reflects the synergy and intersection of the components of the sections of the above model. This cycle was idealized and outlined as an intermediate tool, in the sense of being the empirical translation of the Loschiavo Alvares & Wilson's (2020) model. Thus, the cycle brings a structured approach regarding the management of rehabilitation, which includes all tasks, from the analysis and identification of problems, demands for the NR, to the measurement of the effectiveness of the intervention, involving the patient, family and contexts on the clinical decision-making.

105 It also brings, in its essence, the dynamic and interactive proposal of all the based components of the
106 Comprehensive Rehabilitation Process: involves the determination of instruments to evaluate the effectiveness
107 of the intervention, the process of setting goals with the patient, family, NR implementation and constant
108 monitoring of its evolution with periodic reviews and updates, according to developments and / or new demands
109 and functional goals. *V i e w*

110 Step 4: Design, implement and coordinate the personalized and functionally oriented intervention plan.

111 Step 1: Identification of the individual's problems and needs, through its key characteristics.

112 Step 5: Measure the efficacy of the intervention. Step 2: Relate problems to personal and contextual factors,
113 identifying the goals of the intervention.

114 **3 NR**

115 Step 3: Specify desired, contextual and occupationally significant results.

116 Step

117 **4 PERSON SPECIFIC CONSIDERATIONS CONDITION** 118 **SPECIFIC CONSIDERATIONS**

119 **5 DIAGNOSIS THEORETICAL CONSIDERATIONS FAM-** 120 **ILY AND WIDER SYSTEMS CONSIDERATIONS**

121 In fact, there is no "cake recipe" to be followed for the conduct of NR, but it is possible to draw coordinates so
122 that we may have guidelines and an initial route to follow, emphasizing that the collateral routes will always be
123 determined by the patient, with his or her own history, individuality and unique characteristics. Finally, when we
124 get there, how can we then utilize the postulates of the Neuropsychological Rehabilitation Model, by Loschiavo
125 Alvares & Wilson (2020)? How do we employ the whole framework built up to this point as a guiding principle?

126 The answer is by using the cycle above as a practical tool, in the sense of being the empirical translation
127 of the NR model. Thus, the cycle brings a structured approach regarding rehabilitation management, which
128 includes all tasks, from the analysis and identification of problems, demands for the NR, to the measurement of
129 the effectiveness of the intervention, involving the patient, family and contexts in the clinical decision making.

130 It also comprises, in its essence, the dynamic, interactive and synergistic proposal of all the basic components,
131 which until then were presented in a fragmented way only as a didactic resource, ranging from the clinical
132 formulation to the intervention in NR. The cycle consists of six steps, that is, its coordinates for the clinical
133 formulation for NR, namely: What about the range of each coordinate? What are the guidelines? For each
134 step, there is a path composed of the components of the Rehabilitation Model and in order to build it in a more
135 tangible way, in order to build the methodology so that the rehabilitator, fully understands it, follow Table ??
136 below: this Table ??emonstrates the intersections between the coordinates, the steps of the rehabilitation cycle,
137 and the guidelines, being the components of the NR Model (Loschiavo Alvares & Wilson 2020). Step 3: Specify
138 desired, contextual and occupationally significant results.?

139 **6 Funcional Status**

140 General Prognosis -Biological Influences / Neuroprogression.

141 -Goal Setting.

142 Step 4: Design, implement and coordinate the personalized and functionally oriented intervention plan.

143 -Complementary Models; Scientific Approach and Intervention Focus. Goal Setting and NR Implementation.

144 Step 5: Measure the efficacy of the intervention.

145 —NR Implementation; Determination of Instruments to Evaluate the Effectiveness of the intervention .

146 Step 6: Monitor the evolution of the patient, in relation to the achievement of goals, with periodic updates,
147 according to new functional demands. And in order to clinically employ the rehabilitator, based on all the
148 theoretical assumptions presented here, the following flowchart (Figure 3) is proposed for the proposition of an
149 NR plan, leaving it as a methodological reference for the translation of the theory into practice in NR intervention,
150 emphasizing that the same can be applied to cases of both acquired brain injuries, as well as neuro developmental
151 and psychiatric disorders.

152 How to Apply the Flow Chart of CF? A Summary of a Clinical Case Considering all presented above and
153 aiming to demonstrate how to gather all this information together, we describe a clinical case. P.G., Woman, 52
154 years old, retired, diagnosed with bipolar disorder type I, since she was 23. Concerning her clinical history, there
155 were in total 21 suicidal attempts, and the last one was in 2010, when a piercing-blunt wound was self-inflicted in
156 the orbitofrontal cortex bilaterally. Subsequently, about 30 days after this event, as the self-aggressive behaviors
157 persisted, a bilateral tonsillectomy was conducted.

158 According to a familiar informant, the patient has shown a slower functioning, difficulties of concentrating, is
159 unable to tackle an activity to the end, is unable to organize and sequence her daily tasks. "She is paralyzed,
160 does not engage in any goal, she wants, she feels, she does, without any planning", her mother said. "My memory
161 is over. I no longer remember anything," P.G. reinforced.

7 FINAL CONSIDERATIONS

162 The analysis of the pattern of adaptive difficulties faced by P.G. does not suggest any substantial qualitative
163 change, when comparing her situation prior to brain injury with the current situation. The differences are more of
164 an intensity. In summary, the results from the neuropsychological assessment have shown dissociation between the
165 functions of circuits related to the prefrontal cortex dorsolateral, which were the prefrontal cortex ventromedial.
166 Considering the tasks related to contextualized cognition, P.G. also presented a characteristic pattern of
167 impairment regarding the lack of monitoring, impulsivity, myopia for the future, difficulties in anticipating
168 the consequences of her own behavior, cognitive-behavioral dissociation, difficulty in making inferences and
169 integrating implicit non-verbal information, and finally, explicit deficits regarding the decision-making process.

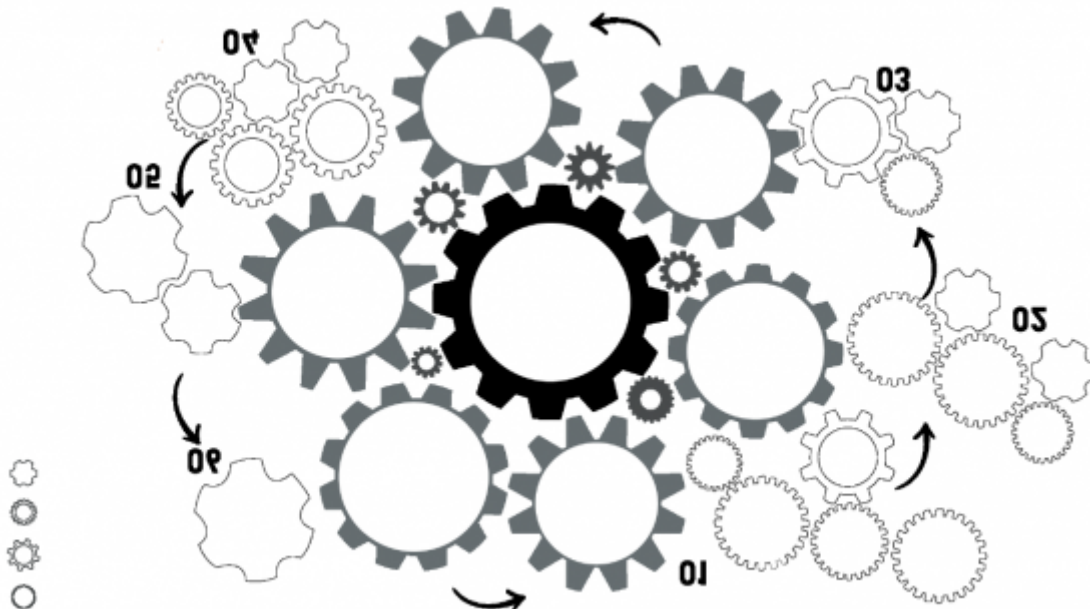
170 Aiming to connect the information from the cognitive deficits up to the strategies of intervention, table ?? III.

171 7 Final Considerations

172 The main pillar for conducting a NR program is the process of clinical formulation as shown in figure 2. It is the
173 master cog that makes all the other components integrate in a synergistic and orchestrated way. It is up to the
174 rehabilitator, that is the one who, regardless of their basic graduation, health, education and professionalism, will
175 perform in NR, the construction and sedimentation of this process so that the intervention is anchored on a solid,
176 scientifically supported and functionally significant basis, indispensable prerequisites for therapeutic success. In
177 this way, the professional /clinician is the best researcher and the converse is also true. Seeing the patient as
178 a research project implies globally analyzing the case and all the variables involved, from the component to
179 the function and vice versa, establishing hypotheses and goals, setting short, medium and long-term objectives,
180 defining the most appropriate intervention with the selection of the most pertinent strategies, and analyzing its
181 impact, using objective methods for evaluating effectiveness. The entire NR process must be parameterized by
182 factors with functional ballast.

183 Considering the evidence-based practice, it is up to the professional to always use the scientific evidence
184 available in the literature to select the most appropriate intervention (Ward, 2003), supporting their clinical
185 reasoning with the single and greatest objective of promoting the functionality of the patient. This process of
186 reflecting, planning, guiding and conducting treatment, requires the therapist to employ a metacognitive analysis,
187 that is, the ability to think and reflect on the clinical decision making process, hence, reasoning, applied to a
188 given situation. In this way, therapeutic actions will always be properly oriented to meet the interests and goals
189 of the patient and the family in the NR process.

190 Aligned to what was presented above, the clinical formulation process as proposed here, is like a compass,
191 through which the rehabilitator will have all the coordinates and guidelines to outline the intervention plan for
192 his/ her patient, at the same time that he will find, from our flowchart, all the parameters to change this plan,
according to the new demands, in a flexible and functionally oriented way.



1

Figure 1: Figure 1 :

193

PERSON SPECIFIC CONSIDERATIONS

Clinical History: characterize the age of onset of the disorder, number of hospitalizations, family and developmental

histories, substance use and risk of suicide.

Impact of Health Condition, Psychological Factors and Possible Effects on NR: stigma, personality, experiences of failure, low self-esteem, negative beliefs and coping styles, anxiety and mood. Functional Status: use of the ICF and its Core Sets, and other

functional assessments that are relevant to the case.

Expected and Observed Cognitive Profile: considering the expected neuropsychological profiles for each disorder, already well described in the literature, conduct a neuropsychological assessment to determine cognitive strengths and weaknesses.

THEORETICAL CONCERNS

Complementary Models: neuropsychological, behavioral, cognitive behavioral, systemic.

Scientific Approach: rehabilitation must always be based on evidence, adopting scientific basis in the evaluation and proposition of new interventions.

CONDITION SPECIFIC FACTORS RELATED TO THE DIAGNOSIS

Pharmacological Intervention: understanding the impact of pharmacotherapy on mood and cognition. Biological Influences and Global Prognosis: consider neuro-progression and allostatic load. In light of biological influences, what is the patient's prognosis?

[Note: Intervention Focus: considering the specifics of each case, they can be one or a combination of these: restoration of function and / or encouragement of neuroanatomical reorganization, use of residual skills more efficiently, search for alternative paths, environmental changes.]

Figure 3:

ST RAT EGIE OF	INT ERV ENT ION	? Self- control strate- gies: self-	instructional routines.	? En- vi- ron- men- tal de- vices:	Calendar with daily sched- ules, learn- ing spe- cific	knowledge er- cues con- trol on task- specific	Environmental Train- ing on task- specific	Outline T in in th se le ti an	
INT ERV ENT ION'S GOALS		Improve her ca- pac- ity of	learning new contents in 75%.				Improve her abil- ity the to hold	75%.	Organ her- self for the in th
OCCUPATIONAL IM- PAIRE MENTS: T A N D FA M I LY 'S MAIN		? She has diffi- cults in learn- ing. She can not	in language and postgraduate subjects.				? She has dif- fi- cul- ties in sus- tain- ing her	? behavi- or am- ple, she has prob- lems in	? maint a ne prop con- e. ver- a su je (she to th er
COGNITIVE DEFICITS		Low re- sis- tance to	distracting stimuli,	attention dif- fi- cul- ties.			? Im- pul- siv- ity in plan- ning	? Dif- fi- cul- ties in plan- ning	- or sequ si
COGNITIVE FUNCTIONS		Attention and	Memory				Execu- tive	Functions	

Figure 4:

194 Rehabilitation: An Empirical Approach. Guilford, New York. 3. Grant I, Adams KM ??2009)
195 [Wilson et al. ()] , B A Wilson , F Ashworth , J Winegardner . 2013.
196 [Wilson and Betteridge ()] *Essentials of Neuropsychological Rehabilitation*, B A Wilson , S Betteridge . 2019.
197 New York: Guilford Press.
198 [Muenchberger H, Kendall E, Wright J] ‘Health and Healing after traumatic brain injury’. *Neuropsychological*
199 *Rehabilitation after* Muenchberger H, Kendall E, Wright J (ed.) Praeger Press. p. . (Traumatic Brain Injury:
200 Two case studies)
201 [Bearden et al. ()] ‘The impact of neurocognitive impairment on occupational recovery of clinically stable
202 patients with bipolar disorder: a prospective study’. C E Bearden , V H Shih , M F Green , M Gitlin ,
203 K N Sokolski , E Levander . *Bipolar Disorder* 2011. 13 p. .
204 [Corrigan et al. ()] ‘The Principles and Practice of Psychiatric The American’. P W Corrigan , K T Mueser , R
205 E Drake , P Solomon . *Journal of Occupational Therapy* 2007. 57 p. .
206 [Wilson ()] ‘Toward a comprehensive model of cognitive rehabilitation’. B A Wilson . *Neuropsychological*
207 *Rehabilitation* 2002. 12 p. .