



RESTORATIVE TECHNIQUES IN COGNITIVE REHABILITATION: PROGRAM DESIGN AND CLINICAL BENEFITS

In the treatment of traumatic brain injury, cognitive rehabilitation is an intervention that seeks to improve cognitive abilities and day to day functioning. Cognitive rehabilitation programs may involve training in the use of assistive memory devices, instruction in the use of strategies to aid learning and memory, and the direct re-training of impaired abilities. The efficacy of cognitive rehabilitation techniques has been the subject of numerous articles but practical and theoretical issues related to program design have not received much attention as yet, despite the widespread use of re-training methods.

The techniques of cognitive rehabilitation are primarily compensatory or restorative. Compensatory techniques are designed to circumvent deficits through the use of external memory aids, such as appointment books and electronic devices; restorative techniques are designed to remediate impaired abilities through regular exposure to material in the area of deficit. The use of compensatory techniques appears to have gained acceptance without further scrutiny, whereas restorative techniques have been viewed with scepticism. Progress in the area of program design has been seriously hindered by the prevailing distrust of cognitive restoration efforts, but recent publications on the topic suggest that much of the criticism of restorative methods has been too simplistic. Ironically, program design issues are pivotal to the efficacy debate.

The present article discusses issues related to the design of cognitive restoration programs for people with brain injury. Aspects of program design, such as selecting a therapeutic starting point and measuring progress, are briefly reviewed. The role of repetition or “practice” within the context of a re-training program is reviewed and comments are made on the psychosocial and emotional benefits that may result from participation in a well-designed program. The article also suggests guidelines for choosing and evaluating cognitive rehabilitation programs.

PROGRAM DESIGN ISSUES: WHERE TO START

In devising cognitive rehabilitation programs there is no pre-ordained series of steps to follow and several factors should be evaluated in determining the intervention sequence. Decisions about the starting point for cognitive rehabilitation should ideally depend on the severity of identified impairments, psychosocial and emotional variables, and functional goals. The information gleaned from a neuropsychological assessment clearly helps in the formulation of a treatment plan by identifying cognitive strengths and weaknesses.

A person plagued by difficulties in daily function may never reach the point where they are able to regularly attend a restorative program. With this consideration in mind many clinicians prefer to teach the use of compensatory techniques before introducing a restorative program, but it should be pointed out that this therapeutic sequence may have drawbacks and is not always indicated. It is commonly assumed by clinicians that compensatory training will succeed in making positive changes in the client's daily function within a relatively short period of time, but compensatory training may be a lengthy and labour-intensive process. In cases of moderate to severe deficit some form of restorative training may be required before compensatory training becomes feasible. Furthermore, the most practical and economical solutions to functional difficulties are not always obvious and are often discerned only after working with the client on a daily basis, within the context of a restorative program.

Restorative program design requires the selection of a cognitive domain in which to begin cognitive exercises. The domain selected may be the area where the greatest deficit was observed, but depending on the personality characteristics and emotional state of the individual, one might begin with tasks which tap an area of less severe or even minimal impairment. The level of difficulty should be set appropriately so as to present challenge without undue frustration. As tasks are mastered the level of difficulty is gradually increased, but there is no general protocol to follow for this aspect of program design, nor are there set criteria for deciding what constitutes mastery or improvement in a given domain. Given the lack of accepted guidelines in this area, it is important to establish that the clinician offering cognitive rehabilitation has their own reasonable criteria for starting and ending this service based on current models of learning and memory.

MEASURING PROGRESS

Progress measures should be taken at regular intervals, and these should assume one of two basic formats. The first format is purely psychometric and measures the effect of task performance on identical or related cognitive tasks. This type of progress measure relies heavily upon the availability of equivalent test forms, but although two equivalent versions of several memory tests have been developed, there are simply not enough alternate test forms available for most of the neuropsychological tests used in a standard assessment. Tests that are theoretically resistant to the effects of practice may be useful for repeat administrations. Rarely are progress measures built into commercially available cognitive re-training programs.

The second format examines the transfer or generalization of skills from psychometric tasks to everyday activities. Generalization refers to the ability to apply a strategy learned in therapy to a novel situation, and one reason typically cited for not offering cognitive restoration programs is the difficulty in achieving generalization of specific cognitive skills to real life situations. Generalization may be measured by questionnaires which ask about daily memory function or activities of daily living, or by behavioural observations of function within a clinical setting. Transfer of learning refers to the use of specific learned skills that are relevant in a certain job or activity of daily living. Transfer of learning is measured simply by pre- and post-rehabilitation task success.

It is important to note that in many rehabilitation settings, several services such as counselling, physiotherapy, and cognitive rehabilitation, may be offered simultaneously. Monitoring of emotional state may reveal associated changes in mood and cognition, rendering the value of cognitive therapy difficult to assess. While a cognitive program offered in isolation is the best way of measuring the efficacy of cognitive training, multi-disciplinary programs are often the most effective form of rehabilitation for a patient. Regardless of how the service is delivered, the specific changes brought about by a cognitive program should always be viewed within the broader context of social and emotional function.

INDEPENDENT VERSUS GROUP INTERVENTIONS

Although close supervision of a patient might be expected to produce the most successful outcomes, there are some advantages to a group format for cognitive training. These are mostly of a psychosocial nature, reducing the client's sense of alienation by allowing him/her to feel part of a cohesive group of individuals engaged in a meaningful project. A group format also allows the service to be offered to more individuals and creates a forum for educational sessions and the exchange of ideas regarding coping strategies and compensatory techniques. It should be emphasized, however, that cognitive programs must be individually designed, and monitoring of progress at each session is a necessity. A patient should never be left to work independently for a countless number of sessions, and this applies not only to paper and pencil exercises but also to cognitive programs delivered through the use of computers or audio tapes.

THE ROLE OF REPETITION OR PRACTICE IN COGNITIVE REHABILITATION

Practice forms the cornerstone of a diverse number of cognitive re-training programs, many of which have reported promising results. Most studies that have failed to show benefits from the use of practice techniques are those in which repetitive drill of word lists and other trivial material failed to improve broader aspects of memory, and those studies which have relied on a general stimulation technique without basing their interventions on current models of neuro-cognition.

While practice is recognized and accepted as a necessary component of compensatory training, various arguments have been used to discredit cognitive restoration efforts which encompass a practice component. One argument that is commonly advanced by clinicians who reject the use of cognitive re-training efforts is that chemical or morphological changes in the brain cannot result from the mere practice of cognitive exercises. While this argument may be true of those brain areas where there is extensive tissue destruction, a number of learning or repetition-based molecular changes might occur in undamaged or partially damaged areas. The human brain is known to have potential for re-organization (termed plasticity) which is not well understood at the cellular level, but which may hypothetically involve repetition-based changes in cell connectivity, excitability, or chemical transmission. Abilities which are thought to be diffusely organized, such as attention may be especially prone to repetition-based remediation. The argument that repetition of cognitive exercises cannot lead to changes in brain function is thus based on inferences and misconceptions regarding mechanisms of recovery after brain injury. A second argument that has been levelled against repetition of cognitive exercises is that such training results in specific practice effects with no relevance to general brain function (i.e. structural changes may occur, but they are trivial in that they relate only to the performance of a specific task). While it is true that transfer of skills between related tasks is more easily demonstrated than is skill generalization, there is also data to suggest that cognitive abilities may show significant change as the result of practice.

Despite controversy regarding the rationale for inclusion of practice in cognitive re-training, it is not always clear what is meant by “practice” or “repetition” because various forms of repetition exist. For example, simple repetition, repetition with immediate feedback, and repetition with response shaping might all be expected to produce different results. Information that would allow for a comparison of these methods is not presently available.

THE CLINICAL VALUE OF A COGNITIVE RESTORATION PROGRAM

While the ultimate goal of cognitive restoration techniques is to bring about an improvement in cognitive skills, there are additional benefits of a cognitive program. The program may help to re-acquaint an individual with their own memory capacity (a term called meta-memory) and may help re-establish the limits of their ability. When patients discover that with a little extra effort they are still capable of learning new information it may serve to renew a sense of confidence. When offered in combination with supportive counselling, cognitive rehabilitation may compliment the process of acceptance and adjustment to losses. When there is pain and anxiety experienced during the performance of cognitive tasks, a cognitive program combined with relaxation techniques may help to alleviate the problem. Finally, even in cases where there is no improvement in pure ability level or memory capacity, the use of mnemonic techniques and special rehearsal strategies may facilitate the acquisition of a limited body of information that needs to be mastered in efforts at educational upgrading or vocational re-integration.

Many clinicians worry that participation in cognitive rehabilitation programs will lead to false hopes on the part of the patient, which in turn may lead to frustration and depression if these goals are never realized. This problem is inherent in all rehabilitation services be they physical, psychological, or cognitive, but may be avoided when the service in question is offered by skilled individuals who reflect realistic goals, and who are able to carefully monitor cognitive and emotional changes in the patient’s daily presentation.

SUGGESTED GUIDELINES FOR EVALUATION OF COGNITIVE REHABILITATION SERVICES

It appears that much of the controversy surrounding the efficacy of cognitive restoration techniques will continue pending the collection of further data, but it is critical to ensure that the service offered reflects recent advances in the field and can be justified based upon empirical evidence and sound theoretical considerations. The following are suggested guidelines which might be useful in the evaluation of a cognitive rehabilitation service:

1. Has the client been adequately trained in the use of compensatory strategies? Have all reasonable interventions been attempted? Have these been practiced according to conventional learning protocols so as to ensure mastery?
2. Has the client been adequately trained in the use of mnemonics?
3. Did the client understand the nature of all interventions? Were the reasons for each intervention provided to the client in writing?
4. Were restorative exercises based on current theory and empirical data? Were the techniques used based on published studies with promising results?
5. Were adequate measures of progress taken?
6. Was the patient given a sufficient amount of one-to-one time?
7. Was the service offered or supervised by a trained individual or team of multi-disciplinary professionals?

8. Were client functional and vocational goals kept in mind?
9. Were the clinicians offering this service able to recognize and monitor problems requiring additional intervention, such as depression?
10. Was supportive counselling offered in conjunction with cognitive rehabilitation?

SUMMARY

In the treatment of mild traumatic brain injury, cognitive rehabilitation is an intervention with great potential for benefits, not only in the cognitive realm but in the psychosocial realm as well. It is recommended that cognitive rehabilitation based on sound knowledge of neurocognitive principles be offered to patients whose daily functioning is being disrupted by cognitive problems which may range from mild to severe. This is advised not only for the purpose of restorative and compensatory training, but for re-acquainting clients with their own cognitive limitations, facilitating adjustment to impairment, and preparing clients for vocational reintegration or new educational endeavours.

Cognitive rehabilitation may be offered in group format as long as programs are individually designed and evaluation of the client occurs at each cognitive session. The client should never be left to work independently for a countless number of sessions.

As yet treatment outcome measures are not readily available, and those that are available have not been perfected. There is a shortage of equivalent test forms for repeat testing, and even where these are available it is not always clear how to measure the practical value of progress made within the artificial constraints of a cognitive rehabilitation program. The challenge for people working in this field is to continue to overcome some of these difficulties with the development of new test materials.

Finally, practice forms the cornerstone of a diverse number of cognitive re-training programs, many of which have reported promising results. One argument that is commonly advanced by clinicians who reject the use of cognitive re-training efforts is that chemical or morphological changes in the brain cannot result from the mere practice of cognitive exercises. While this argument may be true of those brain areas where there is extensive tissue damage, a number of learning or repetition-based cellular changes might occur in undamaged or partially damaged areas. This popular argument is thus based on inferences and misconceptions regarding mechanisms of recovery after brain injury.

Author: Ricki Ladowsky-Brooks, Ph.D., (C.Psych.)