

Case Series

Cognitive rehabilitation using occupational therapy models for adults with cognitive impairment: a case series

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ABSTRACT

Occupational Therapy is one of the primary professions with knowledge and skills to address the consequences of cognitive decline. Cognitive decline is caused by traumatic brain injury, non-traumatic neurological diseases, Ageing, Chronic psychiatry diseases. Recent thinking on cognitive rehabilitation places various approaches to a continuum, from restorative/ remedial approaches to cognitive compensatory approaches with four models within OT, and functional environmental approach with three models of intervention. Before using any of the above models, it is necessary to assess the needs of the patient, the demands of the environment and his cognitive ability. The issues faced by persons with cognitive dysfunctions demand interdisciplinary work to link the brain, behaviour and performance in everyday life. A 36-year-old male, 4years post-traumatic brain injury with anosognosia, disorientation and anomia was treated using a dynamic interactional model of cognitive retraining and showed dramatic recovery after 8 weeks' therapy. A 65-year-old female diagnosed as Alzheimer's Dementia since two years with memory problems, neglect of ADL and visual hallucinations, disinhibited behaviour was treated for 8 weeks using Cognitive Disabilities model of 2011 and showed moderate recovery. A 73-year-old male diagnosed as Alzheimer's Dementia with forgetfulness, difficulty in money handling, disorientation and dependent in ADL was treated using Cognitive Disability Reconsidered model showed slight recovery. Each individual with cognitive problems due to disease, trauma and ageing behaves separately. Occupational therapy aims at maintaining independence in ADL and achieving the maximum level of performance in work and leisure.

Keywords: Cognitive impairment, Cognitive rehabilitation, Models of occupational therapy

INTRODUCTION

Occupational Therapy is one of the primary professions with knowledge and skills to address the consequences of cognitive decline. Cognitive decline can occur secondary to Traumatic Brain Injury, Non-traumatic neurological diseases, Ageing, Chronic psychiatry diseases. In the past cognitive rehabilitation was divided into two major approaches:

- Restorative / Remedial: or process-oriented approach. It consists of direct retraining or restoration of impaired core areas for cognitive skills.

This method targets the underlying mechanism of memory, attention and executive function.

- Adaptive/ Functional: or compensatory substitution approach. It targets the tasks and functions a person needs or wants to perform. It directly teaches and trains a person to accomplish tasks despite the cognitive disability with the strategy being an adaptation of the environment.

Recent thinking on cognitive rehabilitation places various approaches on a continuum. From neuro-anatomical-based intervention and restorative/ remedial approaches to cognitive compensatory approaches with four models

within OT, and functional environmental approach with three models of intervention.

Before using any of the above models, it is necessary to assess the needs of the patient, the demands of the environment and his cognitive ability. You need to know the client as well as his or her goals and history. The assessment provides insight into this information and can identify capabilities and limitations and enablers and barriers that the occupational therapist can use to frame a client-centred intervention plan.

The issues faced by persons with cognitive dysfunctions demand interdisciplinary work to link the brain, behaviour and performance in everyday life. An occupational therapist can lead the process with their knowledge in cognition and its impact on occupational performance in real life and ecological context.¹

CASE SERIES

Case 1

Patient information

It was a case of 36 years old male patient, married for seven years, a case of Road Traffic Accident 4 years ago. The patient was riding a two-wheeler and waiting at the signal and a bus banged from behind causing a head injury. He was not wearing protective headgear.

CT brain

Right Temporo-parietal extradural haematoma. During surgery performed on 28th February 2011, right temporo parietal craniotomy and evacuation of EDH was done. The patient was with altered sensorium for 35 days and then discharged on 7th April 2011. The patient slowly regained all motor abilities with nil motor deficit but had cognitive problems of complete loss of memory about the accident. Loss of memory of marriage, could not recognise person, disoriented in time and place, complete anomia- cannot name object or person.

The patient was taken to a native place and was given rest. He was brought to Neurosurgery exactly after 4 years of the accident in Feb 2015 and was referred for cognitive rehabilitation. He attended initially daily and then thrice a week session of almost 2 hours daily for 8 weeks in the Occupational Therapy Department.

Dynamic interactional model

- Personal context - an important step in assessment is gaining an understanding of the personal context of the client including clients premorbid personality characteristics, believes, valued occupations and previous lifestyle. In patient number 1 above information was provided by the patient's wife that the client was educated till 12th grade and then did a

diploma in graphic designing. He had his own business of taking orders to print visiting cards and banners using the knowledge of graphic designing.

- Occupational performance - gaining an understanding of the daily occupations and environment that the client previously functioned in as well as current functional abilities.

In the case of patient number 1, the daily occupations were highly affected. The patient was to be told about his timings for basic ADLs. He was disoriented in time, place and person so could not resume back as a graphic designer. He did not recognize his wife, neither could he name her, so his role as a husband was affected.

The most commonly used method of self-awareness measurement is measuring the discrepancy between the client's ratings and the relative ratings of ability.

Investigating self-awareness before the task- drawing, writing numbers 1- 10, alphabets from A-Z.

Facilitating changes in performance patient have difficulty, Occupational therapist facilitates by giving cues, teaching strategies or reducing demands of the activity.

Investigating self-perceptions of performance during or after the task- clients perception of his performance including the ability to recognize errors can occur during the activity or after.

The assessments were done using the following scales

- Montreal Cognitive Assessment (MOCA): It is a brief cognitive instrument for the measurement of Dementia.²
- Addenbrookes Cognitive Examination (ACE): It provides information on a range of cognitive domains and differentiates well between those with and without cognitive domain.³

Linking assessment to treatment

In patient number 1, the dynamic assessment indicated that the patient had poor self-awareness and showed little to no response to cues or guided assistance from another person. So the performance was best facilitated by changing the activity or environment are training specific functional skills without expectation for generalization.

The multi-context treatment approach was used

- Personal context - treatment activities include a combination of simulated activities that have relevance or meaning to the client's lifestyle and activities practised in the different context that they occur.
- Enhancing self-monitoring and self-awareness- the client can be moved from a cued to uncued condition

once he has internalized the ability to self-monitor and regulate the performance

One major obstacle to community integration after ABI is impaired self-awareness which limits a person’s ability to set realistic goals and participate actively in rehabilitation and recognise the need for strategies to compensate for cognitive impairments.¹

Neuro-psychological remedial treatment method referred to as Frontal Executive Treatment- developed by Delahunty and colleagues includes three models.¹

- Cognitive shift- flexibility.
- Working memory (A and B), and planning (A and B) consisting of mostly paper and pencil tasks with some construction items. Each module is graded in difficulty and clients are directed to work in that order, providing them with the ability to practice until they can do an easier task before moving on to more difficult one.

Reviews of evidence-based intervention of executive functions, behavioural and emotional self - regulatory and metacognitive processes were reviewed by Ciceron et al.

Summary of key concepts to be considered in planning cognitive intervention which includes following cognitive rehabilitation is supported by research evidence, cognitive assessment is required for treatment planning, diverse interventions exist that must be tailored to the client, an intervention can be effective regardless of the length of time since injury and severity and cognitive rehabilitation leads to improvement in cognition and psychosocial functioning.

The patient was completely unaware of his condition - Anosognosia. He was started with tabletop activities, he was given free drawing, asked to write alphabets from A-Z and numbers from 1 to 10. He was also asked to draw a man, house and tree.

Occupational therapy intervention

On the table, he was given letter cancellation, graded activities with playing cards- to sort out cards first by colour (black and red) and then by suits. Then each suit in ascending order, descending order and so on. Each time increasing the complexity of the task. Along with this a task of different coloured beads stringing into a pattern which becomes more and more complex and arranging checkers different colour disk into a pattern which is shown in the picture. Throughout the session, he was addressed by his name. He was accompanied by his wife so she was also addressed by her name.

Activities to improve attention and concentration were also given. As he showed improvement in sessions, the task with ADL was given like enumerate steps of dressing upper body, eating lunch, taking bath. Then after

he was asked to enumerate steps into his occupation. He worked as a graphic designer, then he was given actual working on computers simulated to his occupation. At the end of eight weeks, the patient was oriented in time, place and person. He could name the objects and persons. He could go back to his occupation as a graphic designer. His drawings and writing can depict how he improved gradually as the treatment progressed (Table 1) and (Figure 1).

Table 1: Case 1, Scores of scales.

Scales used	Pre-intervention (Day 1)	Post- intervention (After 8 weeks)
Score on MOCA	5/30	26/30 (Increase in score indicates improvement)
Score on ACE	23/100	88/100 (Increase in score indicates improvement)



Figure 1: Improvement in cognitive ability.

Case 2

The patient was 65-year-old female, resident of Kurla, diagnosed case of Alzheimer’s dementia for 2 years. She was admitted in Ward 19 with acute exacerbation of symptoms in terms of memory problems, disinterested in household work, neglect of ADL and also visual hallucinations in the form of talking to small children, disinhibited behaviour- removing clothes in front of family members, decreased appetite and sleep and was referred to occupational therapy department for cognitive rehabilitation.

The assessment was done using MOCA and ACE Scales.

Occupational therapy intervention

The overall focus of occupational therapy intervention is to facilitate engagement in as many desired occupations as possible throughout the disease. The therapist provides individuals with a repertoire that reflects a balance of personal care, productive, leisure, physical, social and spiritual activities. The intent is to improve the quality of

life and wellbeing of the person with dementia and also of their caregivers.

Based on Allen cognitive level, CPT/ L (cognitive performance test level is the cognitive performance test. The patient at baseline was at level 3.0 moderate to severe functional decline from object-centred thought process increase the cues needed during the task one to one assistance for all ADLs was needed.

Occupational therapy intervention is guided by the combined results of the occupational profile and the analysis of occupational performance

From the Cognitive Disabilities model in 2011 the concept of “CAN DO”, “WILL DO” and “MAY DO” was selected. What a person “CAN DO” determines the realistic performance expectations, what is psychologically relevant has a strong influence on what a person “WILL DO”. Factors within these are social context and environment, affect what is possible or what individuals “MAY DO”.¹

The intervention process included

- Modifying occupations and environments: usually done in collaboration with a caregiver. In patient number two, she was staying with her son and her sister was visiting to take care of her. The demands of the activity may be reduced by the caregiver by providing the specific type of cues, such as the list of steps or indicating the location of items. The initial approach of family members was doing all the ADLs on patient’s behalf with almost 90% assistance. Slowly patient was given clues to accomplish her ADL.
- Establishing and restoring patterns of performance and performance skills: The CDM assumes that individuals are capable of learning (establishing) or resuming (restoring) performance skills. The simple cooking task was performed in the Department and transfer of learning was thought at home under the supervision of her sister. The patient was pre morbidly fond of cooking.
- Establishing and restoring client factors: The CDM acknowledges that promoting or optimal occupational for performance by maximizing fit between what an individual CAN DO, WILL DO, and MAY DO with the demands of valued activities provides the optimal conditions for changes that may occur in cognitive capacities due to neuroplasticity, healing, medication effectiveness or other conditions. Tasks like washing dishes and washing clothes were started. The patient was trained in the Department by analyzing each activity by its components and making patient realize how it is possible to perform the task by following the steps of CAN DO, WILL DO and MAY DO. For these patients, motivation and caregivers minimum assistance and cueing were boosted.

- Prevention: prevention or minimization of risk and hazards that pose a threat to the safety of self or others, is a central preventive intervention focus in the CDM. Safety recommendations for example in fall prevention, that is based on the lowest level of functional cognition they have observed. While performing all the activities in the initial phase the caregivers were trained on how to be supportive in terms of causing minimum hazards during activity, by demonstration during therapist sessions. Overprotection was discouraged. The same learning was transferred to the home environment (Table 2).

Table 2: Case 2, Scores of scales.

Scales used	Pre-intervention (Day 1)	Post- intervention (After 8 weeks)
Score on MOCA	7/30	20/30 (Increase in score indicates improvement)
Score on ACE	35/100	75/100 (Increase in score indicates improvement)

Case 3

A 73-year-old male patient, resident of Sion who was the owner of a bookstall and was diagnosed with a case of Alzheimer’s dementia since 2014 with a history of forgetfulness and difficulty in money handling so he was referred to neuro medicine Department at LTMMC and GH in October 2014. His MRI showed multiple lacunar ischaemic foci in bilateral cerebral hemispheres and cerebral atrophy.

The patient was showing no improvement and so he wanted to get a disability certificate for bank procedures as he had difficulty travelling to the bank. So he was referred to Occupational therapy Department in 2017.

In the Department, he was assessed using IDEAS scale and was given a moderate disability of 40. The patient had complaints of forgetfulness, speaking difficulty, disorientation in time, place and person and was dependent on all family members in all the ADL, also had balance issues so he was referred to Occupational therapy department for therapy.

Chief complaints

- Performance Area: ADL-Dependent on basic ADL.
 - Performance Components: Motor: poor endurance and posture.
- Performance Area: Work: difficulty in money management.
 - Performance Components: Cognitive: Disoriented in time, place and person, poor attention span, memory affected, problem-solving affected.

The assessment was done using the following scales pre and post-intervention

- Mini-Mental Status Examination (MMSE): MMSE is the most widely used measure of cognition and is a screening test with relatively moderate sensitivity.⁴
- Addenbrookes Cognitive Examination (ACE): It provides information on the range of cognitive domains and differentiates well between those with and without the cognitive domain.
- Bristol Activities of Daily Living (Bristol ADL): It assesses the performance of patients in basic and instrumental ADL activities.⁵

Occupational therapy intervention

The cognitive disabilities reconsidered model was used this model provides a theoretical scaffolding for cognitive level scale and provides a means of more specifically delineating the complex relationships between neurocognitive deficits and functional capacities.

It provides a framework for more accurate assessment of the impact of cognitive impairment on occupational performance as well as intervention guidelines that can more reliably be generalized to functional performance capabilities of people with dementia. This model viewed following as components of information processing system consider at each level of hierarchical cognitive levels

Attention (input) - sensory-motor associations (throughput)-behavioural responses. In the reformulated model, key dimensions of short-term working memory are considered at each of the cognitive levels. According to the cognitive levels used in cognitive disabilities reconsidered model patient was in level 2.5 that is a severe functional decline from object-centred movement/sensory processes. Poor use of familiar objects, total assist with ADL, maybe resistance with Cares, little speech.

Initially, a remedial approach was used for the patient to optimize function and minimized deterioration and health complications. Although procedural memory is impaired at this level, attention is directed towards using hands to explore the objects and goal of the action is limited to tactile exploration and simple touch so activities such as sorting cards, stacking pegs and coins, ADL boards were given which were also done to use visual, kinesthetic and proprioceptive recognition cues for relatively passive participation of the patient (Figure 2).

Then compensatory strategy was used as the patient required total care. It included education and training for family caregivers i.e., ensuring the safety in home and environment. Freedom to move about was needed to be allowed. Thus it was needed to eliminate the clutter and environmental hazards. Caregivers were told to eliminate

the cluttered floors, loose rugs, uneven surfaces and steps and furniture on which he might stumble.

To teach him to carry out the basic ADL, the environment was made simple and safe and it included constant supervision of the caregiver in which he was made to learn basic techniques for moving, bathing, dressing hygiene and feeding. They were told to keep the communication simple, give the one-step command and step-by-step verbal cues (Figure 2).



Figure 2: Photographs taken during ADL training.

As the patient was having difficulty in balancing while walking, he was given positioning and movement programs to decrease the risk of falls sensory activities were used such as music dancing movements and simple exercises so that the person may hum or sing tunes as he had very little speech. Caregivers were told to use pictures for orientation such as signage for wardrobe, bathrooms and toilets. The patient was also given an ID card.

Since the human brain processes visual information more quickly, the patient was given memory aids such as daily planner box for daily medicine tracking.

Based on the tracked performance for all scales above, the score as listed in Table 3.

Table 3: Case 3, Scores of scales.

Scales used	Pre-intervention (Day 1)	Post- intervention (After 8 weeks)
Score on MMSE	11	12 (Increase in score indicates improvement)
Score on ACE	32	45 (Increase in score indicates improvement)
Score on Bristol ADL	29	22 (Decrease in score indicates improvement)

DISCUSSION

Dynamic Interactional Model was effective in improving the self-awareness and performance across different areas of functioning including self-care, orientation and work-related performance.

Dynamic assessment involves guided assistance and task alterations to determine the degree of cognitive modifiability. Thus using the dynamic interactional model in case 1, the therapist could achieve complete self-awareness, good orientation and independence in ADL and work activities.

Using cognitive disability model in case 2, the therapist considered what is cognitively realistic (CAN DO), psychologically relevant (WILL DO) and contextually and environmentally possible (MAY DO) and used it in intervention and outcome process. The use of probing and grading was made to identify person's best ability to function and how to use an estimate of a person's cognitive capacities concerning her interest and context to formulate intervention in case 2, it was successfully used to make the patient independent in her ADL activities and achieve occupational performances like a cooking meal for the family.

Using cognitive disabilities reconsidered model which is considered a reliable best practice model in dementia in case 3, an attempt was made to help the individual live with the disease and continue to participate in everyday ADL for as long as possible. Although the patient did not show major improvement in terms of the score on the scales, there was a marginal improvement in his ADL performance with the help of compensatory strategies. Thus it can be due to cognitive training and use of adaptive aids or compensatory strategies which is supported by the study on therapeutic interventions for people with dementia that combining memory aids with memory training exercises (such as cueing) and environmental modifications contributed to the improved outcomes in the independence for people with Dementia.⁶

CONCLUSION

Each individual with cognitive problems secondary to the disease, trauma and ageing behaves separately. In Occupational Therapy practice, the therapist can use a combination of restorative/remedial approach along with some techniques from compensatory/adaptive approach. Thus, the key to successful cognitive retraining is individualised occupational therapy assessment leading to a specific or unique Occupational Therapy intervention for an individual patient using either restorative/remedial OR adaptive/compensatory OR a combination of restorative/remedial and adaptive/compensatory approach. Training and participation of caregivers are utmost important.

Thus, a thorough occupational therapy evaluation will lead to a reliable and most practical model of intervention. Occupational therapy here aims at maintaining independence in ADL and achieving a maximum level of performance in work and leisure.

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