

## **Assistive Technology for People with Cognitive Disabilities**

### **A 5 year follow-up on an interdisciplinary cognitive rehabilitation clinic focusing on its development, evolution, and expansion**

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#### **ABSTRACT**

The ICRP program published an article in 2015 that discussed the theoretical frameworks and practical substrates of delivering cognitive rehabilitation interventions within an inter-disciplinary approach [1]. The 2015 article highlighted the clinical model, discussed the theory behind the approach, and identified specific treatment approaches. The purpose of this current review is to discuss the evolution and programmatic changes of this unique multidisciplinary cognitive rehabilitation program over time. The current review will also highlight a case example to demonstrate the current clinic model and highlight the use of technology within an integrative cognitive rehabilitation for individuals with mild to moderate cognitive impairment. The overarching goal of this submission is to shed light on the overwhelming benefits of collaborative practice of cognitive rehabilitation, emphasize implications for future research, inform public policy on practice, and demonstrate clinical program development in an existing outpatient clinic.

#### **INTRODUCTION**

Beginning in 2011, a clinical need emerged to better manage the cognitive and functional deficits of adult populations with acquired neurologic illness/disease. The Integrative Cognitive Rehabilitation Program (ICRP) was developed to focus on the assessment and cognitive rehabilitation treatment of adults with mild to moderate cognitive deficits and associated functional challenges within an outpatient medical setting.

The program highlighted integrative care from Occupational Therapy, Speech Pathology, and Neuropsychology and promoted an interdisciplinary approach to cognitive rehab, including initial comprehensive individual evaluation, collaborative goal setting, and patient-driven rehabilitation treatment [1]. The program focused on the shared partnership of these professions to assist individuals with mild to moderate cognitive impairments by identifying functional goals and then developing and implementing cognitive compensatory strategies, including support from assistive and everyday technologies, to maximize functioning for an adult population (ages 18+).

Current models of cognitive rehabilitation suggest the efficacy of inter-professional approaches in the assessment and treatment of individuals with mild to moderate cognitive impairments [2]. Since its inception, the ICRP program has evolved to maintain efficiency and address individual specific needs while maintaining the theoretical tenets of the Self Determination Theory (SDT), along with the Matching Person and Technology model and the Distributed Cognition model [2, 3].

Assistive technology (AT) has been widely used to support individuals with new onset cognitive impairment. A significant body of research supports the use of external aids/AT approaches to support recovery from brain injury and for patients living with general cognitive impairments [4]. Within the ICRP program, cognitive aids are used to promote independence and improvement in everyday functioning. The program features both low tech and high tech approaches to AT and promotes Scherer's MPT model of tailoring tools for specific users based on both purpose and environment [3].

The ICRP program begins with a one-stop-shop approach with an initial comprehensive evaluation by each discipline (occupational therapy, speech-language pathology, and neuropsychology). This assessment allows the providers to identify a specific profile for each individual's cognitive and functional needs. Discipline-specific objective measures are utilized during each evaluation to measure goodness of fit for the program, establish individual goals, and identify individual cognitive strengths and weaknesses through formal assessment. Each discipline also completes a formal interview process to assist with clinical decision making.

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multidisciplinary cognitive rehabilitation program over time. The current review will also highlight a case example to demonstrate the current clinic model and highlight the use of technology within an integrative cognitive rehabilitation for individuals with mild to moderate cognitive impairment. The overarching goal of this submission is to shed light on the overwhelming benefits of collaborative practice of cognitive rehabilitation, emphasize implications for future research, inform public policy on practice, and demonstrate clinical program development in an existing outpatient clinic.

## **METHODS**

### **Program Development**

This is a program review of the current integrative cognitive rehabilitation program at the University of Rochester Medical Center to determine changes and modifications that were required for program improvement and individual care. Review of current literature was considered as a part of the changes made within the clinic model as well as aspects of the program that has maintained over time. Future development will discuss research involvement to measure outcomes and consider future technology to incorporate in cognitive rehab treatment. Notable program changes from inception to current clinic function are cited below with related discussion.

#### Population

Clinical parameters of the ICRP program have been modified since the original articles publication in 2015 in order to meet the need of the serving population. The 2015 article discusses inclusion criteria for the program such as: “1) individuals ages 12 and over; 2) mild to moderate levels of cognitive impairment, with no specifications related to diagnoses or duration post injury; 3) the presence of intact insight and awareness into their cognitive deficits or the capacity to develop this insight and awareness with education; and 4) the ability to learn compensatory strategies for cognitive skills [1].

The current program continues to reflect inclusion criteria such as: the presence of intact awareness and insight, mild to moderate levels of cognitive impairment and the ability to learn compensatory strategies. However, the current program has shifted the inclusion criteria to include an adult population (18+), as the theoretical models framed by this program is best suited for an adult population.

Another change highlighted within the ICRP program regarded the specificity of the population served in the program. Over time, it became evident that this integrative cognitive rehabilitation program best benefited individuals with diagnosed acute neurological injuries or illness versus individuals with more remote injuries or neurological presentations. Rationale for this approach reflects the program’s compensatory approach, which appears better suited for acute changes in function.

#### Initial ICRP evaluation protocol

The initial multidisciplinary evaluation session has been shown to be an invaluable part of the program’s success in addressing individual functional complaints related to cognitive decline. Since the original article’s publication, the ICRP program has utilized a series of formal measures and questionnaires to address individual and caregiver concerns [1]. The focus of the initial evaluation is to provide a subjective report of cognitive and communication complaints, along with identification on impact of activities daily function. Further, the evaluation serves to highlight psychosocial concerns and other stressors that might be impacting the clinical presentation of the individual.

Over time, the program has identified that the important role of both qualitative and quantitative information to inform treatment. Further, it has balanced the need for this person’s information with the needs of the individual and their ability to tolerate lengthy written questionnaires or rating scale completion. In addition, the idea of discipline specific coverage was discussed to avoid over-burdening the individual with similar questions during the evaluation process.

#### Program coverage/program education

The main goal of the ICRP program has been to provide cognitive rehabilitation to address function based concerns. Over time, a clear need emerged to provide basic education on cognitive rehabilitation and general education related to the individuals’ specific diagnosis. In an effort to improve individual understanding, all individuals are now provided with a comprehensive handbook at the beginning of their initial interdisciplinary evaluation. This handbook provides information on the specific approach to cognitive rehab (compensatory approach). At the end of the initial evaluation, individuals’ are also provided a summary sheet of the team’s to take with them. These tools are both new additions added to increase individual education and frame expectations for the cognitive rehabilitation experience.

#### Integration of technology

As the program has advanced, a need to define an individual's willingness to utilize technology has become a relevant need in the climate of advancing technology. In this vein, the program aims to provide interventions to aid towards criteria of the MPT model. The MPT measure [1] allows for individuals to be classified as either high tech or low tech users. This classification enables ICRP providers to utilize compensatory strategies surrounding the available low tech or high tech options. Following the MPT model, clinicians within ICRP utilize the Device Match Assessment within the Assistive Technology Device Predisposition Assessment to assist with determining appropriateness of assistive technology for individuals, and how well the device(s) targets preferred outcomes of the individual [7, 8, 9].

Over time, the program has built a library of high tech cognitive strategies and applications for use that aid individuals with improving cognitive performance during functional activities. These strategies and applications range in variety, and include reminder applications, calendar applications, smartwatches, and smart home devices. These devices and applications provide opportunities for individuals to offload information to assist with regulating cognitive overload during a task, attend to specific tasks that need to be completed during an activity, recall information necessary for the task, and engage in communication with other individuals also involved in the task or activity. The advancements and usability of the artificial intelligence within these applications and devices afford individuals strategies to efficiently organize, store, and retrieve information personally relevant to a daily task, and help the individual better participate in and complete the desired task.

#### Program enrollment/scheduling

If individuals are deemed appropriate candidates for cognitive rehabilitation, they are scheduled for the subsequent treatment sessions with the occupational and speech therapists. This was not highlighted in the original article and was implemented within the past few years. The program has also objectively tracked whether individuals were deferred program participation or if program participants declined at the end of the assessment. Many factors could lead to deferral or decline such as severity of individual needs that require a higher level of care, other health issues being the primary concern, mental health, lack of identified functional goals by the individual, among others. Providers within the program will often refer to auxiliary service to meet the needs of individuals who are deferred or decline participation for instance individual service (OT/SLP), mental health treatment, physical therapy, or a structured day program.

#### Duration of treatment

Frequency and duration of treatment has evolved over time, as the recognition of a compensatory strategy approach to cognitive rehabilitation was best suited with a short term treatment tactic. Once compensatory strategies have been successfully taught and/or a successful match of technology and education has been made, individuals are discharged from the program. This short term approach has shaped a person's expectations of cognitive rehabilitation and stressed the importance of using assistive devices to aid in everyday life activities.

#### Formalized follow up

The previous 2015 article discusses informal follow up's with treating providers (OT and SLP) on an as need basis [1]. At that time, there was no formal conclusion or discharge form the ICRP program and individuals were individually discharged from their respective treating providers. The Integrative Cognitive Rehabilitation Program has since added a formal follow up with the Neuropsychologist as a part of person's discharge from the ICRP program. This follow up has been added to provide a formal wrap up meeting and also identify any clinical concerns or additional referrals that might need to be implemented for the individual.

### **DISCUSSION**

As this integrative cognitive rehabilitation program continues to develop over time, future directions regarding program development should be considered. For instance, mental health has been identified as a barrier to cognitive rehabilitation for some individuals who engage in cognitive rehabilitation. The current model does not provide mental health in the associated treatment sessions. Although, mental health needs are assessed at the time of the initial evaluation, patients are typically referred to external providers for psychological support. The need for embedded mental health providers in conjunction with the delivery of cognitive rehabilitation treatment is viewed as both optimal and necessary for future care.

From a research perspective, this program is exploring pre and post functional focused objective outcome measures to measure utility and success in this type of cognitive rehabilitation program. The need for future collaboration to objectively measure outcome and benefit of short term compensatory cognitive rehabilitation is a necessary area of continued development.

With regard to public policy, there are a variety of assistive and everyday technologies that can be useful supportive tools. The availability of these products is not typically a problem; rather, it is the lack of trained providers and personnel who can provide specific recommendation, advise on set-up, and promote active use. Further, insurance reimbursement for cognitive rehabilitation services has historically been problematic. The delivery of cognitive rehab through tele-rehab has been limited by varying state laws and discipline specific regulations. Increased awareness of these obstacles needs to be made known to policymakers and legislators.

## CONCLUSIONS

In sum, programmatic development within this integrative cognitive rehabilitation program has evolved over time. Future exploration should consider how to implement advanced technology and research to improve the efficacy of outpatient cognitive rehabilitation programs.

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