Many people assume that it is the emotional and psychotic symptoms that make it difficult for a person with schizophrenia to function in everyday life. In fact, research indicates that cognitive impairment is a major reason why functional outcome is so poor.¹

Impairments in attention, memory, processing speed, and problem-solving ability are commonly seen in patients with schizophrenia, depression, bipolar disorder, and alcohol and substance abuse disorders.² While the severity and profile of these deficits vary depending on factors such as diagnosis, course of illness, and socioenvironmental variables, patients with schizophrenia spectrum disorders typically score below 85% of the general population on cognitive tests. These cognitive deficits are persistent and are not simply related to an episode of illness. Therefore, even when the person is psychiatrically stable, cognitive impairment remains evident.

Cognition and daily functioning
Cognitive deficits make it difficult to work, study, live independently, socialize, and manage one’s illness. These daily living tasks all require an ability to attend and remember, to identify goals and the steps to reach them, to prioritize and organize activities, and to integrate feedback to monitor performance. Take the example of illness management. Many patients do not take medications as prescribed because they have difficulty organizing their pills or forget their dosing schedule or whether they already took their medication.³ Some patients may be referred to psychiatric skills training programs, but it is difficult for them to process and remember the information given in groups if they have cognitive problems. In the arena of independent living, patients with cognitive deficits struggle to remember appointments and where they put their keys and other personal items. People with problem-solving deficits have trouble organizing their living space so that they can find things and may have difficulty in maintaining a budget or negotiating public transportation. Sometimes patients are labeled as unmotivated and uncooperative when, in fact, they want to remember but simply are not able to.
Patients with cognitive impairment require specific therapeutic interventions so they can achieve a good functional outcome. Careful attention should be paid to the potential cognitive toxicity of pharmacotherapeutic regimens. Psychoeducation about cognitive symptoms should be provided for the patient and his or her family so that they understand the basis of the forgetful, inattentive behaviors and can strategize ways to support improved cognitive functioning. There are no FDA-approved medications to improve neurocognitive functions in patients with schizophrenia and affective disorders, but patients may benefit from participation in a cognitive remediation (CR) program. These programs can strengthen impaired cognitive skills that interfere with daily functioning and teach strategies that can be used to compensate for deficits (Table).

**Behavioral treatment for cognitive impairments**

CR is a behavioral treatment that engages the patient in exercises intended to improve the neuropsychological skills that underlie thinking. It differs from cognitive-behavioral therapy (CBT) in both focus and methodology. The focus of CR is on the neuro-psychological processes that underpin thinking, while the focus of CBT is on the form and content of thought. For example, while CBT might focus on a patient’s reasoning and attributional style of jumping to conclusions or being quick to self-blame, CR focuses on improving working memory capacity and ability to sustain attention. CBT might focus on a patient's belief that there is a plot to harm him, whereas CR focuses on improving attention, executive functioning, and verbal memory.

While the immediate goal of CR is to improve cognition, the ultimate goal is to improve functioning in daily tasks—including school, work, social interactions, and independent living. CR might be used to help someone become more attentive so that he can better focus on schoolwork, household tasks, or job responsibilities. CR has been most studied as a treatment for people with schizophrenia and schizoaffective disorder, but it is increasingly being applied to other populations as well. Clinical trials are under way to evaluate the effectiveness of CR therapy for patients who have cognitive impairment associated with major depression, anorexia nervosa, ADD, Alzheimer disease, and substance abuse disorders.

**The need for cognitive remediation**

Patients should be referred to CR therapy when it is apparent that cognitive deficits are interfering with functional outcome. Formal cognitive assessment will help determine whether there are
cognitive deficits, but if this is not available, then observation of behavior, a thorough patient history, and inquiries about perceived cognitive symptoms will also identify the need for CR. Unfortunately, because about half of the people with schizophrenia have significant cognitive impairments but are not aware of them, it is not advisable to rely only on a patient’s self-report. A careful interview designed to uncover problems following schedules, sustaining attention, or following instructions can also be useful. When formal cognitive testing is available, brief, 45-minute assessments, such as the Brief Assessment of Cognition in Schizophrenia (BACS) or the MATRICS Consensus Cognitive Battery (MCCB), would identify whether CR is indicated and what aspects of cognition should be targeted.

Because significant cognitive impairments are evident at the first episode of schizophrenia, all patients, regardless of age and disease chronicity, should be considered candidates for CR. In people with other psychotic disorders, a good guideline for determining treatment appropriateness is whether cognitive impairment is affecting the ability to achieve functional goals.

**CASE VIGNETTE**

Henry had a first psychotic episode while he was a junior in engineering school, and after 2 hospitalizations, schizophrenia was diagnosed. His symptoms were stabilized with risperidone and benztrapine. Henry now lives with his girlfriend and works part-time at a computer store. His family reports that he is not functioning anywhere near the level he displayed before the onset of symptoms. He forgets to meet friends, loses personal items, and has less problem-solving capacity. Once a proficient cook, he now burns food and uses the wrong proportions of ingredients. He wants to work full-time but has trouble focusing, and he is starting to get discouraged about his future options.

The treatment plan for Henry consists of optimizing cognitive benefits from pharmacotherapy, psychoeducation for Henry and his family about the cognitive symptoms of schizophrenia, and referrals to CR and to supportive employment and educational services.

**A context for cognitive remediation**

CR is best done within the context of a rehabilitation-oriented program so it is possible to integrate the goals of CR with overall rehabilitation goals. This integration of therapeutic modalities appreciates the complex interaction of cognitive, emotional, and environmental variables in the recovery process and identifies cognitive deficits not only as a manifestation of brain dysfunction but more specifically as social-cognitive dysfunction.

Rehabilitation programs focus on skills development and seek to give patients the tools to function adaptively and independently in society. Patients can more readily understand the need for CR if they link the benefits of improved cognition with attainment of their recovery goals. For example, CR has been successfully linked with supportive employment. Participants who attend both rehabilitation and CR programs have better vocational outcomes.

**Effectiveness of cognitive remediation**

Numerous randomized controlled trials of a variety of CR techniques have been performed in both laboratory and clinical settings around the world. Most of these studies have been of people who have cognitive deficits secondary to psychotic disorders, such as schizophrenia. These studies have been reviewed in several meta-analyses that, while differing in focus, have generally showed moderate to large effect sizes.

As can be seen in the Figure, the effect sizes vary in accordance with the goals of treatment. When the studies had a highly proximal goal of improvement on a training task, the effect size was large. When the goals of training became more distal and were affected by a multiplicity of variables, the effect sizes diminished. Still, moderate-range effect sizes were found both for CR studies that used neuropsychological test results as an outcome measure and for the studies with the most distal goal of improving daily functioning. Taken together, this literature informs us that remediation effects persist up to 6 months after CR stops and that the cognitive gains generalize to improvements in social behaviors, real-world problem-solving ability, and occupational outcome. Patient populations amenable to remediation programs include those in acute care and institutionalized settings, those in supportive housing and intensive day treatment programs, and higher-functioning people in outpatient treatment.

Findings from randomized controlled trials indicate that integration of CR with other psychiatric rehabilitation interventions, such as supported employment and social skills training, is more effective than individual approaches in achieving overall psychiatric rehabilitation. Patients in work therapy programs that incorporated CR maintained greater vocational benefits (were more likely to work, worked longer, and earned more), even at 3-year follow-up, than did those who received work therapy alone.
An overview of cognitive remediation strategies

While all CR programs focus on cognition, there is considerable diversity in specific approaches. One basic distinction is whether they use a restorative or a compensatory approach, or both. A restorative approach to CR attempts to directly repair impaired cognitive skills by using drill and practice exercises. Compensatory remediation techniques do not attempt to restore the impaired cognitive skill but rather to compensate for, or circumvent, the deficit with reliance on intact cognitive skills. Environmental manipulation is one compensatory technique that refers to changes in the environment that are made to facilitate optimal cognitive functioning. The use of a key hook by the door is an example of environmental manipulation.

Most CR programs use computers, although some programs exclusively use paper and pencil tasks and verbal discussions. While the majority of computer-based CR programs use one designated software package that targets either one or multiple cognitive skills, a few programs employ a range of software packages to target multiple areas of cognitive functioning. The Neuropsychological Educational Approach to Remediation (NEAR) is a CR program that developed a rubric for evaluating software exercises. The NEAR rubric takes into account not only the cognitive skill being targeted but also how the exercise works. For example, it considers whether the exercise is likely to be engaging and motivating in addition to whether it targets attention or working memory.

CR programs vary, depending on whether they are for individuals or groups. When a group approach is used, there are differences in whether the group does the same activity all together or whether participants work independently on an individualized program of exercises. The sessions are usually held 2 or 3 times a week (range, 1 to 10 hours). Active treatment typically lasts 3 to 6 months but can range from several weeks to 2 years, depending on the treatment setting, goals, and/or severity of deficits.

Another distinction between programs is whether they exclusively focus on neuroscience-based drill and practice exercises assumed to reactivate and restore specific brain regions or whether they additionally provide compensatory and bridging activities to translate neuropsychological gains into real-world change. Bridging is a technique that promotes generalization by making explicit connections between the cognitive skills acquired during sessions and the application of these skills in everyday life. Group discussions promote bridging by encouraging patients to talk about the ways in which the skills they are using to complete the software exercises are relevant to daily life. This may be supplemented by in vivo work with a coach, who accompanies the patient into the community to observe and guide the application of cognitive skills to everyday tasks.

Conclusion

CR is an evidenced-based treatment for the neurocognitive deficits seen in schizophrenia and psychotic disorders, and it is increasingly being investigated for use in additional psychiatric disorders. Narrowly defined, CR is a set of cognitive drills or compensatory interventions designed to enhance cognitive functioning. However, from the vantage point of the psychiatric rehabilitation field, CR engages the patient in a learning activity to enhance the neurocognitive skills relevant to overall recovery goals. CR programs vary in the extent to which they reflect these narrow or broader perspectives, and there is ongoing research to identify the active ingredients that result in a positive response to treatment.

Questions remain about adequate dosing, whether booster sessions are necessary, who is best
suited to provide the treatment, and the relative merits of specific instructional techniques. Multisite trials indicate the ease and efficacy of dissemination, yet CR programs are still largely unavailable to patients. It is hoped that as more information about CR becomes available, this situation will improve.

**Drugs Mentioned in This Article**

Benztropine mesylate oral (Cogentin) Risperidone (Risperdal)

**References:**


Evidence-Based References

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