

Cognitive Remediation for Schizophrenia

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The importance of treatment of cognitive impairments of people with schizophrenia has long been established. Among many pharmaceutical and non-pharmaceutical approaches, cognitive remediation offers one of the best promises for the rehabilitation of cognitive impairments of schizophrenia. The purpose of this paper is to introduce one such approach, the Neuropsychological Educational Approach to Remediation (NEAR). NEAR has been utilized as a leading treatment model for cognitive impairments of schizophrenia. Cognitive remediation including NEAR is administered within a framework of psychiatric rehabilitation program. Cognitive remediation is most effectively administered when the rehabilitation goals in the social and domain are clarified. Social functions associated with the cognitive impairments of schizophrenia are discussed in the specific categories of independent living skills, vocational skills and social problem-solving. Highlights of various models of cognitive remediation are presented to illustrate the unique features of NEAR. In the theoretical framework of NEAR, intrinsic motivation, personalization and contextualization are the central concepts, and the patients are regarded as learners aiming for independent living. In order to provide a clinical overview, specific treatment issues, staff training and patient characteristics are discussed. A summary of the NEAR outcome studies with a diverse psychiatric population is presented to demonstrate its effectiveness. Functional measures associated with cognitive impairments are presented to suggest directions for future studies.

Key words: cognitive function; functional outcome; psychiatric rehabilitation; remediation; schizophrenia

Schizophrenia

Schizophrenia is a chronic, severe and debilitating psychiatric illness. Epidemiological data indicate that approximately 1% of population develops schizophrenia during their life time. Impairments in the regulation of affect, perception, cognition and social functioning have been associated with schizophrenia. Due to the chronicity and pervasive function impairments, schizophrenia often requires intensive and long-term treatment. However, since the United States health-care reform

forced the reduction of government funding for the patient care, the trend for shorter hospitalization emerged. It is now widely accepted that psychiatric treatment focuses on stabilization of acute symptoms and discharge into community living. Similarly, the movement toward deinstitutionalization of psychiatric patients is becoming common in Japan. More people with severe psychiatric illnesses such as schizophrenia are expected to live in their communities, rather than to remain institutionalized.

Integration of people with schizophrenia into communities has become possible due to the ef-

Abbreviations: CRS, Cognitive Remediation Specialist; NEAR, Neuropsychological Educational Approach to Remediation

Table 1. Cognitive functions associated with social functions of schizophrenia

Social function	Cognitive function	Study
Independent living skills	Executive functioning	Penades et al., 2003
Vocational function	Attention, verbal memory	Bryson and Bell, 2003
Employment status	Verbal learning and memory, executive functioning, overall intelligence	McGurk et al., 2005
Social problem-solving	Executive functioning	Spaulding et al., 1999
	Overall intelligence, attention, executive functioning	Zanello et al., 2006
Social behavior	Cognitive flexibility	Wykes et al., 1999
General social function	Working memory	Bora et al., 2006

fectiveness of atypical neuroleptics such as clozapine, risperidone and olanzapine. Atypical neuroleptics are primarily known for their effective suppression of positive and negative symptoms with fewer side effects. However, medication alone is not effective in alleviating cognitive impairment, which is the core feature of schizophrenic symptoms (Nakagome et al., 2007). The prevalence of cognitive impairments for schizophrenia is fairly high ranging from 50% to 80%, depending on severity of illness (Goldberg and Gold, 1995). A decline in cognitive function in schizophrenia occurs near the onset of illness, and remains stable for the remainder of the course of the illness (Russell et al., 1997).

Cognitive impairment refers to problems in the areas of cognition such as attention, memory, and problem-solving. Cognitive function is categorized into basic functions and executive functions. Executive functions refer to the higher-order thinking that require complex manipulation of information. Studies have shown that executive functioning is a predictor of prognosis for schizophrenia (Jaeger and Douglas, 1992; Green, 1996; Wykes et al., 1999). In particular, executive functioning has been associated with social functions (McGurk and Mueser, 2004). However, caution is necessary in the interpretation of the association between social and executive functioning, which is not a unidimensional ability. As the executive function entails the ability needed for complex cognitive tasks such as problem-solving, planning and organization, it should be noted that currently

available research findings may not provide sufficient evidence to determine which aspect of executive function is associated with social functions.

Social functions of schizophrenia

Social functions of schizophrenia have been extensively studied (Allen, 1990; Mueser et al., 1995; Penn et al., 1995) and their definitions in studies on schizophrenia have been varied. Social functions examined in relation to cognitive functions of schizophrenia include broad areas such as independent living skills (Delahunty et al., 1993; Harvey et al., 1997; Wykes, 1994), vocational skills or employment status (McGurk et al., 2005) and social problem solving (Yamashita et al., 2005; Zanello et al., 2006). Some studies used measures of social functions that incorporated several of these areas (Penades et al., 2003; Ryu et al., 2006). It stands to reason that cognitive impairments are associated with deficits in the broad range of functions. Although an extensive review has been provided (Green, 1996), more recent findings for the areas of cognitive functioning associated with social functions are summarized in Table 1. As Green (1996) pointed out, it is evident that the improvement of social function is a strong factor in sustaining independent living for people with schizophrenia. Cognitive remediation aims to rehabilitate impaired cognitive functions, which in turn will affect the overall functions of the individual that enable independent living.

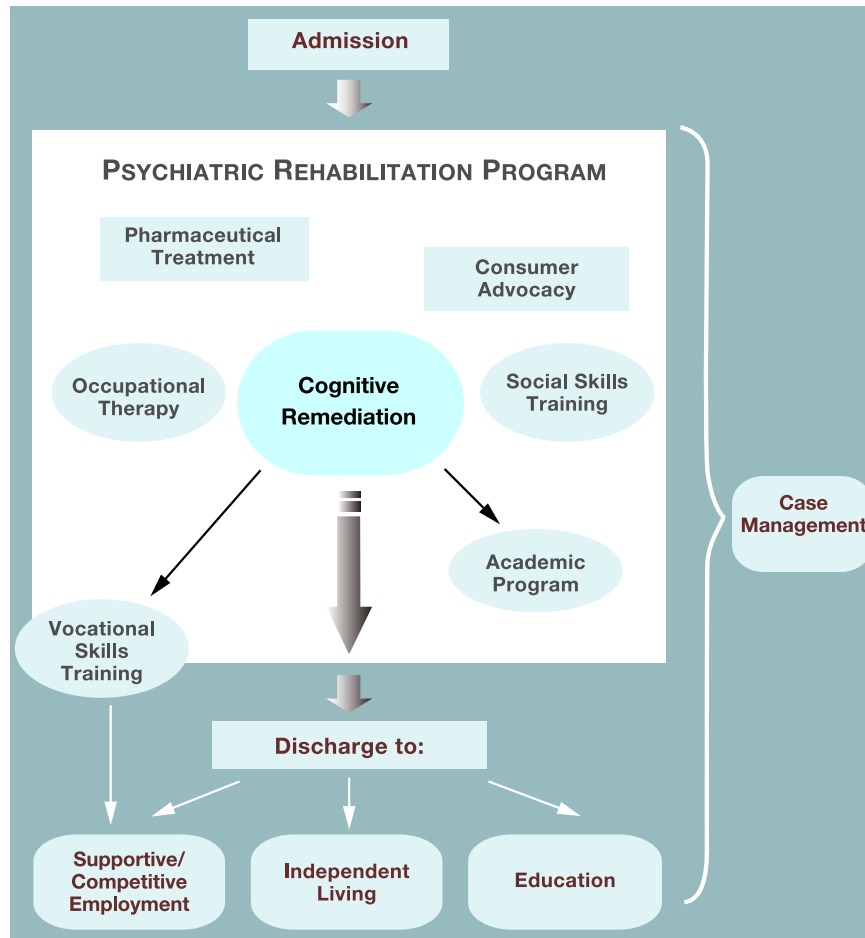


Fig. 1. Cognitive remediation in a psychiatric rehabilitation program.

Models of rehabilitation for people with schizophrenia

Deinstitutionalization of people with schizophrenia necessitates rehabilitation models that enable them to acquire skills for independent living. Rehabilitation programs provide skills training and treatment which encompass the goal of independent living. Rehabilitation programs for people with chronic psychiatric illness include independent living skills training, vocational training, social skills training and cognitive remediation.

Cognitive remediation is often provided in conjunction with vocational programs for its congruency in treatment focus (Bell et al., 2001). Researchers demonstrated that improvement of cognitive functions was related to improvement of vocational functions (McGurk and Mueser, 2004).

Models of rehabilitation for people with chronic psychiatric illness that emphasize community living have been long since established. Representative models include Assertive Community Treatment (Test and Stein, 1976), Choose-Get-Keep model (Danley et al., 1992) and Intensive Psychiatric Rehabilitation Treatment (Lamberti et al., 1998). These rehabilitation programs emphasize a multi-disciplinary approach, skills acquisition, independent living, consumer advocacy and behavioral intervention in combination with pharmaceutical treatment. They often offer cognitive remediation as a part of their services, as the overall goal of the rehabilitation model for independent living is congruent with the rehabilitation philosophy of cognitive remediation. A conceptual model for the placement of cognitive remediation in a psychiatric rehabilitation program is presented in Fig. 1.

Table 2. Models of cognitive remediation

Model (author)	Modality	Frequency	Description
NEAR (Medalia)	Group	2 × wk	Computer-assisted sessions and a verbal group are administered. Acquisition and contextualization of cognitive skills are emphasized.
IPT (Brenner)	Group	3 × wk	Structured sessions are administered to improve cognitive and social skills. The sessions are offered in 5 subgroups of cognitive differentiation, social perception, verbal communication, social skills, and interpersonal problem-solving.
CRT (Delahunty)	Individual	1-h daily × 40 d	Paper-and-pencil sessions are administered to improve executive functioning. The model consists of three modules including cognitive flexibility, working memory, and planning.
CET (Hogarty)	Group		Computer-assisted sessions and group exercises are administered to improve social cognition. The model consists of cognitive and social rehabilitation phases.
TSWP (McGurk)	Group, individual		Computer-assisted sessions and supportive employment program are combined.

CET, Cognitive Enhancement Therapy; CRT, Cognitive Remediation Therapy; d, days; IPT, Integrated Psychological Therapy; NEAR, Neuropsychological Educational Approach to Remediation; TSWP, Thinking Skills for Work Program, The; wk, week. (Table 2 was partially adapted with permission from *Treatment of cognitive dysfunction in psychiatric disorders*, by Medalia and Lim, *Journal of Psychiatric Practice*, volume 10, pages 17–25. Copyright© 2004 by the Lippincott, Williams and Wilkins. All rights reserved.)

Cognitive remediation

Several models of cognitive remediation are available. Representative models of cognitive remediation are summarized in Table 2. The features of the models of cognitive remediation vary, depending on their treatment context and theoretical foundation. While some models emphasize drill practice of isolated cognitive skills (Delahunty et al., 1993), others are offered in conjunction with vocational training (McGurk et al., 2007). However, it is becoming more common for cognitive remediation to be offered with or as a part of vocational rehabilitation program (Bell et al., 2001). The movement toward the inclusion of a vocational approach is consistent with the deinstitutionalization of psychiatry.

Originally developed for the rehabilitation of brain injury, cognitive remediation needed to be tailored to address the unique characteristics of schizophrenia. The central characteristics of schizophrenia associated with the induction of

cognitive remediation included the issue of motivation and social functions. Avolition is a prominent symptom of schizophrenia and interferes with the treatment compliance. Impairments in social function is another characteristic of schizophrenia. Therefore, a model of cognitive remediation that addresses impairments in motivation and social function is expected to best serve the needs of people with schizophrenia. Among existing models of cognitive remediation, one model addresses these features: the Neuropsychological Educational Approach to Remediation (NEAR).

NEAR

Theoretical foundation

NEAR is theoretically based on neuropsychology, educational psychology, learning theory and cognitive psychology. In NEAR, the process of rehabilitation is viewed as the learning process for a person with psychiatric illness. Thus in the framework of NEAR, the patient receiving treat-

ment may be referred to as a learner or a student, with the implication that the participant is engaged in learning. The theoretical foundation of NEAR emphasizes motivation, social aspect of rehabilitation such as personalization, and contextualization.

Intrinsic motivation for treatment

The role of motivation in learning and acquisition of novel skills has been extensively discussed in the field of educational psychology (Kage, 1994; Ryan and Connell, 1989; Vallerland and Bissonette, 1992). The importance of motivation is not limited to educational context, as motivation has been associated with the treatment compliance of psychiatric patients (Pelletier et al., 1997). In NEAR, the role of motivation may be regarded as two-fold since the motivation is related to the treatment compliance specific to NEAR, and to treatment compliance with the overall rehabilitation program. In psychological literature, motivation is categorized into extrinsic motivation and intrinsic motivation (Vallerland and Bissonette, 1992). Although some researchers question the validity of the dichotomized categorization of intrinsic and extrinsic motivation (Kage, 1994; Ryan and Connell, 1989), the category fits well in the theoretical context of NEAR. Extrinsic motivation refers to a behavior that is motivated by external rewards such as monetary gain or praise by an instructor or a therapist. It is expected that the maintenance of learned behavior is difficult with extrinsic motivation because the behavior tends to be discontinued unless the external rewards are continued. Intrinsic motivation is observed in a behavior that is motivated by internal factors such as the sheer pleasure of mastering a task or enjoyment of an activity. In short, intrinsic motivation is observed when an individual participates in the activity due to internal and personal needs from within, independent of external factors. Intrinsic motivation is regarded as more effective in the maintenance of learned behaviors.

In NEAR, the role of intrinsic motivation

is highly valued for effective learning to occur. Therefore, efforts are made to enhance the intrinsic motivation of the patient. The strategies to enhance intrinsic motivation include the clarification of the target cognitive functions, and overall rehabilitation goals. Additionally, the theme of tasks may be tailored to meet the patient's interests. In sum, patient participation is facilitated by their motivation for rehabilitation and learning, and not by the external demand for treatment compliance.

Personalization and contextualization

It is important to personalize and contextualize tasks for effective learning to occur (Bender, 1986; Fishman, 1992), and in this instance, for effective remediation of cognitive functions. Personalization refers to the fact that a task or a learning environment is "customized" for the individual. For example, in NEAR, individual patient folders are prepared so that when a patient arrives for the rehabilitation session, he or she can take the folder and sign-in, just as they might at a work setting. Inside the folder is their log for the session record, in which they keep track of the lesson activities. Moreover, individual lesson plans are prepared prior to the start of the rehabilitation which is analogous to the personalized treatment plan. With the individualized lesson plan, patients work on their unique menu which targets their cognitive impairments.

Contextualization is vital for effective cognitive remediation, and it's one of the most distinguishing features of NEAR. Unlike some of the previous models of cognitive remediation that heavily relied on drill activities disconnected from daily cognitive functions, NEAR utilizes contextualized tasks. Cognitive function is rehabilitated in a context that is as relevant to real life as possible in order to facilitate the process of transfer. Transfer of the task from treatment room to a real life setting is called bridging. In NEAR, bridging also occurs through more deliberate attempts, such as a discussion on how learned skills may be relevant to everyday functions.

Table 3. Neuropsychological Educational Approach to Remediation (NEAR) outcome studies

	Study				
	Choi and Medalia 2005	Medalia et al. 2003	Revheim et al. 2003	Medalia et al. 2001	Medalia et al. 2000
Number of subjects*	48	12	31	54	28
Subject age†	34.9 [-]	48.3 [-]	- [18-55]	P‡ 36.4 [-] M‡ 33.6 [-] C‡ 39.0 [-]	E‡ 33.0 [21-48], C‡ 33.5 [21-45]
Symptom scale			BPRS, SANS	PANSS	DPRS, SCL-90
Work measure	WBI				
Other functional scale			QLS, ILS, SESS	ILS	
Cognitive scale	MCT	CSI	WCST, WMS, CVLT, WAIS	WAIS, WMS	WAIS, TOH
Diagnosis	Schizophrenia spectrum, affective dis- order	Chronic psy- chiatric illness, substance abuse	Schizophrenia, schizoaffective disorder	Schizophrenia, schizoaffective disorder	Schizophrenia, affective dis- order
Treatment facility	Community intensive rehabilitation	Supportive housing	Inpatient	Inpatient	Inpatient
NEAR administration	26 sessions	2 × wk for 1 yr	12 sessions	10 sessions	6 sessions
Outcome					
Cognitive function	+	+	0	+/0	+
Vocational function	+				
Other function			+	+/0	+

“+” indicates significant improvement at post-intervention.
 * Includes control group.
 † Mean [range].
 ‡ P, Problem-solving group; M, Memory group; C, Control group; E, Experimental group.
 BPRS, Brief Psychiatric Rating Scale; CVLT, California Verbal Learning Test; CSI, Cognitive Stability Index; DPRS, Derogatis Psychiatric Rating Scale; ILS, Independent Living Scale; MCT, Minnesota Clerical Test; PANSS, Positive and Negative Symptom Scale; QLS, Quality of Life Scale; SCL-90, Symptom Checklist-90; SANS, Scale for the Assessment of Negative Symptoms; SESS, Self-Efficacy Scale for Schizophrenia; TOH, Tower of Hanoi; WAIS, Wechsler Adult Intelligence Scale; WBI, Work Behavior Inventory; WCST, Wisconsin Card Sorting Test; wk, week; WMS, Wechsler Memory Scale; yr, year.

Treatment

Administration of NEAR consists of an intake interview and evaluation, a treatment phase and a discharge evaluation. A patient is usually referred by a treating physician, to prompt the intake interview. Exclusion criteria for enrollment in NEAR are a reading level lower than 4th grade, pervasive developmental disability and substance abuse not in remission. The intake interview covers areas of information including primary diagnosis, onset of illness, treatment history and educational and vocational history. Factors associated with learn-

ing are examined such as the most and the least favorite subjects, learning styles (e.g., auditory, visual, tactile learner) and the most effective time of day (e.g., day, evening, etc.). Assessment in the areas of cognitive impairment is provided by the patient and the referral source. The information from two sources is helpful in informing the treatment plan.

Evaluation at intake and discharge includes measures of cognitive functions, social functions, and other biomarkers that may be relevant to the treatment outcome of schizophrenia. (Refer to Table 3 for the measures that were previously used in NEAR outcome studies.) Depending on

the context in which NEAR is provided, a mid-term evaluation or a follow-up evaluation may be conducted to observe changes at a given stage of rehabilitation.

Patients are typically enrolled in the treatment for a period of six months, although the treatment phase may be extended. Outcome studies indicated improvements in functioning after the enrollment of five weeks (Medalia et al., 2001) to a year (Medalia et al., 2003). The treatment phase is the core of NEAR where patients attend three 1-hour sessions a week. The sessions are conducted in a group format, with one or two Cognitive Remediation Specialists (CRSs), and two to a dozen patients. Patients work on individualized tasks in a group format. Of the three sessions, two sessions are the core sessions in which learning tasks are assigned using a PC and computer software. Prior to the beginning of the treatment, software is systematically reviewed by the CRS for target cognitive areas, and the level of contextualization. An example of a computerized task is shown in Fig. 2. Computerized learning tasks are selected to address the specific cognitive impairments for each patient. During a 1-hour session, two to three tasks are assigned to a patient based on individualized treatment plan. Patients who complete a 6-month period are usually discharged to more challenging vocational skills training, assisted employment, an academic program, or assisted living of increased independence.

A discussion group is held once a week in order to facilitate contextualization and socialization. In the discussion group, opinions that foster the transference of learning to real life experiences are solicited. For instance, a patient may share an experience of working on a simulated filing task which targets cognitive functions of attention, processing speed and decision-making. A successful bridging or a transfer of the learning experience has transpired if the patient is able to mention a similar incident in real life that requires attention, processing speed and decision-making such as the instance of working as a cashier at a store. A CRS may lead the discussion in order to



Fig. 2. An example of a computerized task.

Note: The figure represents the simulated task of a commercial long-distance truck driver. The patient is required to utilize cognitive functions while executing tasks as the truck driver, such as making a travel plan (planning), remembering to fasten the seat belt (memory), and deciding when to take a break (decision-making). Failure to utilize appropriate cognitive functions will result in a penalty such as an accident due to driving extensive hours without a break.

facilitate conversations. A variant of the discussion group may involve non-threatening exercises that involve simulated daily tasks that require specific cognitive functions. Other suggested activities during a discussion group may include sharing an article from a periodical and identifying the main points as a group.

In addition to the primary objective of proving the transfer of learning, the discussion group provides an opportunity for the patients to interact with each other, who are otherwise engaged in individual tasks during the two computerized sessions. Through sharing opinions, group cohesiveness and the sense of belonging is developed among the members. Learning takes place effectively in a socialized environment (Caspi, 2006). With a sense of membership in a group that purports learning, patients' motivation to learn is further developed. Moreover, participation in a discussion group also provides opportunities to practice social skills.

NEAR outcome studies

NEAR has been conducted with diverse clinical populations. Studies have shown improvements in cognitive functions such as attention (Choi and Medalia, 2005), problem-solving (Medalia et al., 2000) and other areas of functioning related to social functions such as employment readiness (Choi and Medalia, 2005), and independent living skills (Medalia et al., 2001, 2002a). Improvements in psychiatric symptoms associated with NEAR included the changes in Brief Psychiatric Rating Scale, Scale for the Assessment of Negative Symptoms (Revheim et al., 2003), Positive and Negative Symptom Scale (Bark et al., 2003), Symptoms Checklist 90-R and Derogatis Psychiatric Rating Scale (Medalia et al., 2000). Reduction in recidivism is another critical marker of effectiveness of NEAR (Revheim et al., 2001). Attainment of rehabilitation goals such as employment and enrollment in schools have also been reported (Medalia et al., 2003). Details of the outcome studies are summarized in Table 3.

Application of NEAR

NEAR has been effectively applied at psychiatric institutions (Bark et al., 2003), at vocational rehabilitation facilities (Revheim et al., 2001), and at housing settlements (Medalia et al., 2003). The first attempt to disseminate NEAR in Japan is in the early stage of implementation at Tottori University Faculty of Medicine. Specific issues pertaining to the application of NEAR in Japan, consisting of staff training and patient characteristics, are discussed below.

CRS training

Candidates for CRS may hold a range of professional disciplines. Previous CRSs have included psychiatrists, nurses, social workers, psychologists and occupational therapists. Professionals are

required to receive extensive training in NEAR before they start working as a CRS (Medalia et al., 2002b). The training acclimates the professionals to literature on cognitive impairment in schizophrenia, theoretical foundations of NEAR, and logistical aspects of NEAR administration. The training consists of didactic and experiential components. Experiential components offer opportunities for the trainees to try computerized exercises and to practice verbal intervention.

Although NEAR uses computerized exercises, the role of verbal intervention by CRSs is critical in facilitating the process of rehabilitation. Verbal intervention by a CRS aims to provide feedback for patient progress. The primary goal of the feedback is not to provide answers to the tasks, but to help the patient to increase awareness on how their cognitive functioning works. An example of an effective feedback by a CRS is “I see that you are struggling with the task. Which part of it do think you is most challenging?” and not “I see that you are struggling with the task. Let me give you an answer.” Moreover, effective feedback focuses on the process of how their cognition functions, and not on whether they have the right answer or have achieved a certain task level. An example is illustrated in the contrast between effective feedback, “Could you tell me how you solved the task differently this time?” with less effective feedback, “I’m impressed that you solved the task this time.” Effective feedback is immediate, specific, and well-informed. While in the beginning, a CRS’ urge is to provide solutions to the tasks for the patients, it is critical to observe the patients as they work on learning tasks. Through careful observation, CRSs are able to identify the characteristics of their task approach (e.g., haphazard versus orderly), the pattern of errors (e.g., not following instructions, missing details, running out of time) and how they complete one task and start the next one (e.g., abruptly ending a task after being frustrated over a difficult problem). These observations undoubtedly inform the feedback. The points of observation and well-informed feedback are grounded in the theoretical foundation of NEAR.

Treatment issues associated with systematic differences

Systematic differences between Japan and the United States, where NEAR was originally developed, affect the application of NEAR in Japan. One treatment issue relates to the technology literacy rate of the patients. Contrary to Japan, computer use is far more common in the United States where NEAR was developed (Ono and Zavodny, 2005). Regardless of age or socioeconomic status, patients generally have not rejected participation in NEAR due to their apprehension of computer skills in the United States. However, some of lower functioning patients, patients with fewer years of education, and older patients are expected to be reluctant to participate in NEAR due to their perceived apprehension of computer skills in Japan. A few candidates for CRS themselves may feel intimidated that NEAR uses computers. Remedies for the fear of computers involve simple tactics. It is critical that patients are assured that there is no requirement for computer literacy prior to beginning the rehabilitation sessions. For the patients who have never used a computer, small steps may be taken to familiarize them with its basic operation. They may be guided as to how to turn on the computer and using the right- and left-click of the mouse. These small steps may be practiced until the patient feels sufficiently confident about basic computer operation.

The other treatment issue is related to the systematic differences in the training of mental health professionals in the United States and Japan. In Japan, training for treatment in group modality is required for limited disciplines, while group facilitation is a common clinical skill across disciplines in the United States. It is possible that many professionals outside of the field of psychology have never facilitated group treatment prior to their work as a CRS. In NEAR, both computerized sessions and discussion sessions are conducted in a group format. Although a CRS does not need to be an expert in group psy-

chotherapy, competence in basic group facilitation skills is instrumental in effective facilitation of NEAR. Effective group facilitation skills will enhance social aspect of learning. An inclusion of brief training on group facilitation skills in the CRS training workshop may be helpful.

Functional improvements related to cognitive remediation outcomes

Researchers have examined different areas of functions associated with cognitive remediation and cognitive functions (Green, 1996;McGurk and Mueser, 2004). Although social function as an expansive concept has been associated with cognitive functions in the past (Green, 1996), this section further categorizes social functions into independent living skills, vocational skills, social problem-solving, social behavior and general social function. Scales relevant to each area are listed as potential outcome measures for cognitive remediation.

Independent living skills

Enhanced independent living skills have been associated with the increase of cognitive functions (Delahunty et al., 1993; Penades et al., 2002). Measures for independent living skills consist of surveys. Surveys are either self-reported or reported by a third party such as the patient's family and/or treatment staff (e.g., Life Skills Profile, Rosen et al., 1987). Some scales that measure social function as an overarching domain such as the Social Functioning Scale (Birchwood et al., 1990) also include subscales for independent living skills.

Vocational skills

Enhanced vocational skills have been associated with an increase of cognitive functions (Bryson and Bell, 2003; McGurk and Mueser, 2004). Vocational skills have traditionally been measured

by scales (e.g., Social Adjustment Scale, Schooler et al., 1979; Work Behavior Inventory, Lysaker et al., 1993), or more indirectly by vocational goals attainment or vocational status at the completion of cognitive remediation. It should be noted that systematic measures of vocational skills target basic job skills and employment readiness such as punctuality and greetings, and not specific vocational skills such as typing. The attainment of basic job skills such as punctuality and greetings are related to improvement in cognitive functions.

Social problem-solving

It should be noted that impairments in social problem-solving have been viewed as the central features of symptoms of schizophrenia. It has been indicated that enhanced social problem-solving is associated with the increase of cognitive functions (Zanell et al., 2006). Social problem-solving skills are measured by surveys, or by behavior rating. Behavior rating involves analysis of role-play behaviors (Assessment of Interpersonal Problem-Solving Skills, Donahoe et al., 1990; Social Problem-Solving Assessment Battery, Bellack, 1990) and responses to stories involving hypothetical social problems (Means-Ends Problem Solving Procedure, Platt and Spivack, 1975).

The review of functional measures shows ranges of areas that may be examined in assessing the outcome of NEAR. However, it should be noted that the review does not contain the measures that were developed in Japan. Many of the above measures have been translated for Japanese users with variable psychometric properties (e.g., Social Functioning Scale, Means-Ends Problem-Solving Procedure). In selecting an outcome measure, it is imperative to confirm that a measure has been properly back-translated, and appropriate standardization data is available. Selection of an outcome measure for NEAR will also be affected by the type of patient population and the treatment context.

Conclusion: A model of cognitive remediation, NEAR, has been introduced as a new model of rehabilitation for schizophrenia. Although NEAR directly aims for the improvement of cognitive functions, improvements in independent living skills, vocational skills and interpersonal skills are reported. The application of NEAR in Japan requires some modifications in order to address uniqueness of staff and patient characteristics. Future studies on NEAR may examine the effectiveness of NEAR through multi-faceted perspectives, including cognitive, and other functions that capture the individual's ability for independent functioning in the community.

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References

- 1 Allen H. Cognitive processing and its relationship to symptoms and social functioning in schizophrenia. *Br J Psychiatry* 1990;156:201–203.
- 2 Bark N, Revheim N, Huq F, Khalderov V, Watras Ganz Z, Medalia A. The impact of cognitive remediation on psychiatric symptoms of schizophrenia. *Schizophr Res* 2003;63:229–235.
- 3 Bell MD, Bryson G, Greig T, Concoran C, Wexler BE. Neurocognitive enhancement therapy with work therapy. *Arch Gen Psychiatr* 2001;58:763–768.
- 4 Bellack AS, Morrison RL, Mueser KT, Wade JH, Sayers SL. Role play for assessing the social competence of psychiatric patients. *Psychol Ass* 1990;2: 248–255.
- 5 Bender WN. Instrumental grouping and individualization for mainstreamed learning disabled children and adolescents. *Child Study J* 1986;16:207–215.
- 6 Birchwood M, Smith J, Cochrane R, Wetton S, Copestake S. The social functioning scale: the development and validation of a new scale of social adjustment for use in family intervention programmes with schizophrenic patients. *Br J Psychiatry* 1990;157: 853–859.
- 7 Bora E, Eryavuz A, Kayahan B, Sungu G, Veznedaroglu B. Social functioning, theory of mind and neuro-cognition in outpatients with schizophrenia; mental

- state decoding may be a better predictor of social functioning than mental state reasoning. *Psychiatr Res* 2006;145:95–103.
- 8 Brenner HD, Roder V, Hodel B, Kienzle N, Reed D, Liberman RP. Integrated psychological therapy for schizophrenic patients. Toronto: Hogrefe;1994.
 - 9 Bryson G, Bell MD. Initial and final work performance in schizophrenia: cognitive and symptom predictors. *J Nerv Ment Dis* 2003;191:87–92.
 - 10 Caspi A, Chajut E, Saporta K, Beyth-Marom R. The influence of personality on social participation in learning environments. *Learn Individ Differ* 2006; 16:129–144.
 - 11 Choi J, Medalia A. Factors associated with a positive response to cognitive remediation in a community psychiatric sample. *Psychiatr Serv* 2005;56:602–604.
 - 12 Danley KS, Sciarappa K, MacDonald-Wilson K. Choose-get-keep: a psychiatric rehabilitation approach to supported employment. *New Dir Ment Health Serv* 1992;53:87–96.
 - 13 Delahunty A, Morice R, Frost B. Specific cognitive flexibility rehabilitation in schizophrenia. *Psychol Med* 1993;23:221–227.
 - 14 Donahoe CP, Carter MJ, Bloem WD, Hirsch GL, Laasi N, Wallace CJ. Assessment of interpersonal problem-solving skills. *Psychiatry* 1990;53:329–339.
 - 15 Fishman AR. Ethnography and literacy: learning in context. *Topics Lang Disord* 1992;12:67–75.
 - 16 Goldberg E, Gold JM. Neurocognitive functioning in patients with schizophrenia: an overview. In: Bloom FE, Kufner DJ, eds. *Psychopharmacology: the fourth generation of progress*. New York: Raven Press; 1995. p. 1171–1183.
 - 17 Green MF. What are the functional consequences of neurocognitive deficits in schizophrenia? *Am J Psychiatry* 1996;153:321–330.
 - 18 Harvey PD, Sukhodolsky D, Parrella M, White L, Davidson, M. The association between adaptive and cognitive deficits in geriatric chronic schizophrenia patients. *Schizophr Res* 1997;27:211–218.
 - 19 Hogarty GE, Flesher S. Practice principles of cognitive enhancement therapy of Schizophrenia. *Schizophr Bull* 1999;25:693–708.
 - 20 Jaeger J, Douglas E. Neuropsychiatric rehabilitation for persistent mental illness. *Psychiatr Q* 1992;63:71–94.
 - 21 Kage M. A critical review of studies on intrinsic motivation. *Jap J Educ Psychol*, 1994;42:345–359.
 - 22 Lamberti JS, Melburg V, Madi N. Intensive psychiatric rehabilitation treatment (IPRT): an overview of a new program. *Psychiatr Q* 1998;69:211–234.
 - 23 Lysaker PH, Bell MD, Bryson GJ, Zito W. Rater's guide for the Work Behavior Inventory. West Haven: Rehabilitation, Research, and Development Service, Department of Veterans Affairs; 1993.
 - 24 McGurk SR, Mueser KT. Cognitive functioning, symptoms, and work in supported employment: a review and heuristic model. *Schizophr Res* 2004; 70:147–173.
 - 25 McGurk SR, Mueser KT, Pascaris A. Cognitive training and supported employment for persons with severe mental illness: one-year results from a randomized controlled trial. *Schizophr Bull* 2005;31: 898–909.
 - 26 McGurk SR, Mueser KT, Feldman K, Wolfe R, Pascaris A. Cognitive training for supported employment: 2–3 year outcomes of a randomized controlled trial. *Am J Psychiatry* 2007;164:437–441.
 - 27 Medalia A, Dorn H, Watras-Gans S. Treating problem-solving deficits on an acute care psychiatric unit. *Psychiatr Res* 2000;97:79–88.
 - 28 Medalia A, Herlands T, Baginsky C. Cognitive remediation in the supportive housing setting. *Psychiatr Serv* 2003;54:1219–1920.
 - 29 Medalia A, Lim R. Treatment of cognitive dysfunction in psychiatric disorders. *J Psychiatr Pract* 2004;10:17–25.
 - 30 Medalia A, Revheim N, Casey M. Remediation of problem-solving skills in schizophrenia: evidence of a persistent effect. *Schizophr Res* 2002a;57:165–171.
 - 31 Medalia A, Revheim N, Casey M. The remediation of problem-solving skills in schizophrenia. *Schizophr Bull* 2001;27:259–267.
 - 32 Medalia A, Revheim N, Herlands T. Remediation of cognitive deficits in psychiatric patients: a clinician's manual. New York: Montefiore Medical Center Press; 2002b.
 - 33 Mueser KT, Blanchard JJ, Bellack AS. Memory and social skill in schizophrenia: the role of gender. *Psychiatr Res* 1995;57:141–153.
 - 34 Nakagome K, Ikezawa S, Pu SH. Mismatch negativity as a psychophysiological index of cognitive function in schizophrenia. *Yonago Acta Med* 2007;50:23–32.
 - 35 Ono H, Zavodny M. Gender differences in information technology usage: a US-Japan comparison. *Sociol Perspect* 2005;48:105–133.
 - 36 Pelletier LG, Tuson KM, Haddad NK. Client motivation for therapy scale: a measure of intrinsic motivation, extrinsic motivation, and amotivation for therapy. *J Pers Assess* 1997;68:415–435.
 - 37 Penades R, Boget T, Catalan R, Bernardo M, Gasto C, Salamero M. Cognitive mechanisms, psychosocial functioning, and neurocognitive rehabilitation in schizophrenia. *Schizophr Res*, 2003;63:219–227.
 - 38 Penn DL, Mueser KT, Spaulding W, Hope DA, Reed D. Information processing and social competence in chronic schizophrenia. *Schizophr Bull* 1995;21:269–281.
 - 39 Platt JJ, Spivack G. Unidimensionality of the Means-Ends Problem-Solving (MEPS) procedure. *J*

- Clin Psychol 1975;31:15–16.
- 40 Revheim N, Kamnitzer D, Casey M, Medalia A. Implementation of a cognitive rehabilitation program in an IPRT setting. *Psychiatr Rehab Skills* 2001;5:403–425.
- 41 Revheim N, Medalia A, Mouscou P, Javitt DC. Cognitive remediation and sensory processing deficits in schizophrenia. *International Congress on Schizophrenia Research 2003, Program 180*. Colorado Springs, Colorado, United States, 31 March, 2003.
- 42 Rosen A, Parker G, Hadzi-Pavlovic D, Hartley R. Developing evaluation strategies for area mental health services in NSW. Sydney: State Health Publication; 1987.
- 43 Russell AJ, Monro JC, Jones PB, Hemsly DR, Murray RM. Schizophrenia and the myth of intellectual decline. *Am J Psychiatry*, 1997;154:635–639.
- 44 Ryan RM, Connell JP. Perceived locus of causality and internalization: examining reasons for acting in two domains. *J Pers Soc Psychol* 1989;57:749–761.
- 45 Ryu Y, Mizuno M, Sakuma K, Munakata S, Takebayashi T, Murakami M, et al. Deinstitutionalization of long-stay patients with schizophrenia: the 2-year social and clinical outcome of a comprehensive intervention program in Japan. *Aust N Z J Psychiatry* 2006;40:462–470.
- 46 Schooler N, Hogarty G, Weissman M. Social Adjustment Scale II (SAS-II). In: Hargreaves WA, Attkisson CC, Sorenson JE, eds. Resource materials for community mental health program evaluations. Rockville: National Institute of Mental Health, Washington, DC; 1979. p. 290–303.
- 47 Spaulding WD, Fleming SK, Reed D, Sullivan M, Storybach D, Lam M. Cognitive functioning in schizophrenia: implications for psychiatric rehabilitation. *Schizophr Bull* 1999;25:275–289.
- 48 Test MA, Stein LI. Practical guidelines for the community treatment of markedly impaired patients. *Community Ment Health J* 1976;12:72–82.
- 49 Vallerland RJ, Bissonette R. Intrinsic, extrinsic, and amotivational styles as predictors of behaviors: a prospective study. *J Pers* 1992;60:599–620.
- 50 Wykes T. Predicting symptomatic and behavioural outcomes of community care. *Br J Psychiatry* 1994; 165:486–492.
- 51 Wykes T, Reeder CL, Corner J, William SC, Eberitt, B. The effects of neurocognitive remediation on executive processing in patients with schizophrenia. *Schizophr Bull* 1999;25:291–307.
- 52 Yamashita C, Mizuno M, Nemoto T, Kashima H. Social cognitive problem-solving in schizophrenia: associations with fluency and verbal memory. *Psychiatr Res* 2005;134:123–129.
- 53 Zanello A, Perrig L, Huguelet, P. Cognitive functions related to interpersonal problem-solving skills in schizophrenia patients compared with healthy subjects. *Psychiatry Res* 2006;142:67–78.

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