INCOG Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury: Methods and Overview

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INCOG Recommendations for Management of Cognition Following Traumatic Brain Injury, Part IV: Cognitive Communication

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Introduction: Cognitive-communication disorders are common in individuals with traumatic brain injury (TBI) and can have a major impact on long-term outcome. Guidelines for evidence-informed rehabilitation are needed, thus an international group of researchers and clinicians (known as INCOG) convened to develop recommendations for assessment and intervention. **Methods:** An expert panel met to select appropriate recommendations for assessment and treatment of cognitive-communication disorders based on available literature. To promote implementation, the team developed decision algorithms incorporating the recommendations, based on inclusion and exclusion criteria of published trials, and then prioritized recommendations for implementation and developed audit criteria to evaluate adherence to best practice recommendations. **Results:** Rehabilitation of individuals with cognitive-communication disorders should consider premorbid communication status; be individualized to the person's needs, goals, and skills; provide training in use of assistive technology where appropriate; include training of communication partners; and occur in context to minimize the need for generalization. Evidence supports treatment of social communication problems in a group format. **Conclusion:** There is strong evidence for person-centered treatment of cognitive-communication disorders and use of instructional strategies such as errorless learning, metacognitive strategy training, and group treatment. Future studies should include tests of alternative service delivery models and development of participation-level outcome measures. **Key words:** *cognitive communication*, *cognitive rehabilitation*, *guidelines*, *rehabilitation*, *traumatic brain injury*

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THE TERM *COGNITIVE-COMMUNICATION DISORDER* was adopted by the American Speech-Language-Hearing Association and the College of Audiologists and Speech-Language Pathologists of Ontario (CASLPO) to differentiate communication disorders resulting from primary cognitive impairments, as in acquired brain injury, from those resulting from primary language impairments, as in aphasia after stroke. As defined by CASLPO,[1] cognitive-communication

disorders are "communication impairments resulting from underlying cognitive deficits due to neurological impairment. These are difficulties in communicative competence (listening, speaking, reading, writing, conversation, and social interaction) that result from underlying cognitive impairments (attention, memory, organization, information processing, problem solving and executive functions)."[1(p3)] This definition is based on the premise that basic language functions such as syntax and semantics are intact, by contrast to disorders such as aphasia and developmental language impairments, in which impairments in basic language functions are the defining characteristic.[2] Cognitive-communication disorders have unique features, comorbidities, trajectories of change over time, and long-term outcomes, necessitating different approaches to assessment and treatment. While aphasia can result from TBI, particularly in the presence of focal lesions to left hemisphere and subcortical structures important for language form and content,[3] primary language impairments are relatively rare. Thus, our recommendations focus on cognitive-communication disorders as defined by CASLPO.

While TBI is a complex and multifocal disorder, there are some common patterns in brain pathology and related cognitive and communication impairments. Traumatic brain injury typically affects the ventrolateral and anterior surfaces of the frontal and temporal lobes and also causes diffuse white matter injury.[4,5] These injury patterns generally result in slowed information processing; impaired working memory and attention; executive function problems including inertia, rigidity, poor conceptualization and planning; and poor self-control of cognition and behavior.[6] Communication disturbances reflect these various underlying cognitive problems. Thus, adults with TBI have been described as overtalkative,[7,8] inefficient,[9] tangential[10] or drifting from topic to topic,[11] or lacking in language output.[9,12] Communication of adults with TBI has been described as slow, with incomplete responses, numerous pauses, and a reliance on set expressions.[13] People with TBI may also demonstrate confused, inaccurate, and confabulatory verbal behavior, with frequent interruptions, inappropriate disinhibited responses, swearing, tangential topic changes or perseveration on topics, or some combination of these features.[14] Likewise, in adolescents and adults with TBI, there may be reduced conversational fluency, difficulties with interpretation of abstract language, and an inability to juggle the multiple demands of conversation.[15] Indeed, changes in pragmatic communication, with resulting impairments in overall social competency, are a hallmark of TBI.

It became clear to researchers in the late 1980s and early 1990s that traditional language tests, such as the Western Aphasia Battery,[16] were not sensitive to cognitive-communication impairments.[2] Research investigating the assessment and treatment of cognitive-communication disorders is, therefore, relatively more recent than investigation of TBI sequelae such as basic neuropsychological deficits. Research on cognitive-communication disorders has been informed not only by historical studies of pragmatic communication in children but also by recent development of theories of social communication after TBI, resulting in new methods of standardized and nonstandardized assessment.[17,18] These new theories in turn have spawned new treatment approaches, which specifically target the unique communication difficulties that arise following TBI. As a result, the body of literature on assessment and treatment of cognitive-communication disorders is still evolving, and guidelines presented here will be refined and expanded in the future.

METHODS

The Guidelines Adaptation and Development (ADAPTE) process was used to develop the INCOG guidelines.[19,20] An international expert panel was formed through invitations of authors of previously published cognitive rehabilitation guidelines and contacts of the team. In preparation, a detailed Internet and Medline search was conducted to identify published TBI and cognitive rehabilitation evidence-based guidelines.[21] The quality of the development process for each eligible clinical practice guideline (CPG) was evaluated using the Appraisal of Guidelines for Research and Evaluation (II) instrument.[22,23] The ADAPTE process involves extracting recommendations from these CPGs to allow easy comparison, for example, all recommendations about executive function were tabulated together. The Evidence Based review of Acquired Brain Injury (ERABI: http://www.abiebr.com/) synopses of evidence for each topic area were also distributed to the panel.[24] The initial expert panel meeting was scheduled for convenience just prior to the World Congress of Neurorehabilitation in Melbourne, Australia, in May of 2012. Some members attended via Web conferencing from the United States and Canada. This panel examined the recommendations matrix and selected suitable recommendations from existing guidelines or articulated novel recommendations on the basis of the evidence available. This yielded an initial draft set of recommendations; however, to ensure that the recommendations were updated according to the most current evidence, the research team prepared synopses of large systematic reviews of the Global Evidence Mapping Initiative[25] based in Australia (www.evidencemap.org), the Acquired Brain Injury Evidence-Based Review[24] and PsycBITE (http://www.psycbite.com).[26] Furthermore, the reference sections of all eligible cognitive rehabilitation CPGs were

also extracted. All relevant references were consolidated into a reference library that was made available to the author teams as they drafted the manuscripts and finalized the recommendations accordingly. By the end, the team completed the evidence review of more than 600 references found in this search process. This task has resulted in a comprehensive mapping of evidence to all previously and newly developed recommendations. The tables will be made available on online content on the Web site of the *Journal of Head Trauma Rehabilitation*. With the updated literature search in mind, the experts graded the evidence. As various systems for determining the level of evidence were used across the CPGs, the INCOG team standardized this by using the grading system outlined later (see Table 1), which was based upon that used in previous guideline development projects.[27] These final recommendations were then presented to the entire team for approval and then the expert panel used Modified Delphi Voting Technique to prioritize the recommendations from the INCOG guideline for audit. Each of the experts was asked in this exercise to vote for his or her top 15 recommendations considering both the importance to practice and the feasibility of auditing the recommendations. For each cognitive rehabilitation domain of posttraumatic amnesia, attention, memory, executive function, and cognitive communication, a clinical algorithm was developed to help clinicians decide to whom the recommendations applied. To finalize the algorithm, evidence tables were reviewed to find the inclusion and exclusion criteria for the study populations that were used. By understanding the subpopulations of patients with TBI to whom the evidence applies, it is possible to understand what treatments are appropriate for each patient. In contrast to other guidelines, the INCOG team has identified recommendations that could be audited from clinical charts to determine adherence to the best practice guidelines in each section. This is known as the INCOG audit tool. More detailed version of the "Methods" section is available in the third article of the series.[28]

Limitations of use and disclaimer

These recommendations are informed by evidence for TBI cognitive rehabilitation interventions that was current at the time of publication. Relevant evidence published after the INCOG guideline could influence the recommendations contained herein. Clinicians *must* also consider their own clinical judgment, patient preferences, and contextual factors such as resource availability in their decision-making processes about implementation of these recommendations.

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Recommendations and literature review

The INCOG guidelines include 7 recommendations regarding best practice for the assessment and management of cognitive-communication disorders following TBI (see Table 2). Two recommendations (Cognitive Communication #2 and #3) encompass principles of practice embodied in current international practice standards for the speech-language pathology profession, and consensus expert opinion, and, therefore, represent level C evidence; 2 recommendations (Cognitive Communication #1 and #6) are based on level B evidence and 3 recommendations (Cognitive Communication #4, #5, and #7) are based on level A evidence. Each of the cognitive-communication recommendations is discussed with reference to the supporting evidence.

Cognitive Communication #1. Rehabilitation staff should recognize that levels of communication competence and communication characteristics may vary as a function of communication partner, environment, communication demands, communication priorities, fatigue and other personal factors. (Adapted from ABIKUS, G51[29(p24)]; Royal College of Physicians, G70[30(p33)])

Communicative competence during everyday activities requires an awareness of sociolinguistic factors such as the person's culture, sex and gender, and languages spoken, as well as an understanding of the person's premorbid and current interpersonal skills, which may vary according to the communication partner.[31] Rehabilitation staff should also recognize the strong influence of the environment on communication performance, whether it be a hospital in-[32] or outpatient therapy room, a busy reception area, the client's workplace, his

TABLE 1 *INCOG level of evidence grading system*

A: Recommendation supported by at least 1 meta-analysis, systematic review, or randomized controlled trial of appropriate size with relevant control group.
B: Recommendation supported by cohort studies that at minimum have a comparison group, well-designed single subject experimental designs, or small sample size randomized controlled trials.
C: Recommendation supported primarily by expert opinion on the basis of their experience although uncontrolled case series without comparison groups that support the recommendations are also classified here.

TABLE 2 *INCOG guideline recommendations: cognitive communication*

	Guideline recommendation Interventions to improve cognitive communication	Grade	Reviews	RCTs	Other
Cognitive Communication #1	Rehabilitation staff should recognize that levels of communication competence and communication characteristics may vary as a function of: • Communication partner: patients may communicate at a higher level with family and friends who know them well than with professional staff Environment • Communication demands (e.g., time pressure, need to follow multiple speakers) • Communication priorities Fatigue • Other personal factors. Adapted from ABIKUS G51 p. 24 (2007)[29]/RCP G70 p. 33 (2003)[30]	B		Togher et al [35]	Togher et al[34] Douglas[15] Wiseman-Hakes et al[38] Valitchka and Turkstra[32] Larkins et al[36]
Cognitive Communication #2	A person with traumatic brain injury who has a cognitive communication disorder should be offered an appropriate treatment program by a speech language pathologist. Adapted from ABIKUS G47 p. 23 (2007)[29]	C			American Speech-Language-Hearing Association[41] College of Audiologists and Speech-Language Pathologists of Ontario[1]
Cognitive Communication #3	A cognitive communication rehabilitation program should take into account the person's premorbid: • Native language • Literacy and language proficiency • Cognitive abilities, and • Communication style, including communication standards and expectations in that individual's culture. Adapted from NZGG, 6.1.5, p. 97 (2006)/DeRuyter (1988)[46]	C	MacDonald and Wiseman-Hakes[48]		Larkins et al[36]

(*continues*)

TABLE 2 *INCOG guideline recommendations: cognitive communication* (Continued)

	Guideline recommendation Interventions to improve cognitive communication	Grade	Reviews	RCTs	Other
Cognitive Communication #4	A cognitive communication rehabilitation program should provide the opportunity to rehearse communication skills in situations appropriate to the context in which the individual will live, work, study, and socialize. Adapted from ABIKUS G49 p. 24 (2007)[29]	A	MacDonald and Wiseman-Hakes[48]	Dahlberg et al[59] McDonald et al[60] Togher et al[57] Behn et al[58]	
Cognitive Communication #5	A cognitive communication rehabilitation program should provide education and training of communication partners. ABIKUS G48 p. 23 (2007)[29]	A	MacDonald and Wiseman-Hakes[48]	Togher et al[35] Togher et al[57] Behn et al[58]	
Cognitive Communication #6	Individuals with severe communication disability should be assessed for, provided with and trained in the use of appropriate alternative and augmentative communication aids by suitably accredited clinicians: speech language pathologists (for communication) and occupational therapists (for access to devices, writing aids, seating etc.) From ABIKUS G46 p. 23 and G50 p.24 (2007)[29]/RCP CPG (2003)[30] / Deruyter (1991)[62]	B	Wilson[66]	Powell et al[70]	Campbell et al[63] Doyle et al[65]
Cognitive Communication #7	Interventions to address patient-identified goals for social communication deficits are recommended after TBI, with outcomes measured at the level of participation in everyday social life. These interventions can be provided in either group or individual settings; however, published evidence is strongest for group-based interventions. Adapted from Cicerone p. 522 (2011)[55]	A	MacDonald and Wiseman-Hakes[48]	Helffenstein and Wechsler[76] Behn et al[58] Togher et al[35] Togher et al[57] McDonald et al[60] McDonald et al[80] Struchen et al[81]	Coelho et al[17] Parente and Stapleton[75] Ylvisaker et al[54]

Abbreviations: RCT, randomized controlled trial; TBI, traumatic brain injury.

or her conversation with a family member or friend,[33] or a shopping encounter.[34] The communication partner's level of experience in interacting with people with TBI can affect the nature of the interaction, and conversational skills training for the partner can improve the interaction of the person with TBI.[35] Togher and colleagues[35] compared trained versus untrained police officers in a randomized controlled trial (RCT) of partner training, in which the training group received 6 weeks of communication instruction aimed at improving their interactions with people with TBI. After police officers received training, their communication partners with TBI made fewer inappropriate and unrelated comments, although the individuals with TBI had not received training. Results indicated that everyday communication partners–including service providers–can have a significant positive influence on communication of people with TBI. The study also highlighted the value of measuring communication during everyday interactions.

People with TBI, their families, healthcare providers, and payers likely differ in what they consider to be important communication interactions, and views of these stakeholders should be considered individually. Larkins et al[36] asked different stakeholders about the relative importance of functional communication assessments for people with TBI. Stakeholders included people with TBI, health professionals, case managers, family members, and employers. Stakeholders differed in their priorities for communication assessment. For example, the top priority for health professionals was that individuals with TBI could use communication to "get basic help," whereas persons with TBI and their families listed assessment of "listening and concentrating" as the highest priority. People with TBI also listed skills required for interviewing and communicating in the workplace, making appointments, having social conversations in groups, writing their thoughts, speaking slowly and clearly, asking questions, and using the telephone. Evaluation of communication competence needs to consider stakeholder opinions when determining communication priorities.

Communication performance also varies in response to changing communication demands. For example, a person with TBI may show significantly poorer communication skills in situations in which time pressure is applied or in which he or she is required to attend to multiple speakers or deal with noisy environments.[37] An important and frequently forgotten factor, which can significantly affect communication performance, is the effect of sleepiness and fatigue associated with sleep disorders following TBI,[38] as well as fatigue occurring independently of sleep disorders. Performance can also be influenced by personal factors such as those outlined in recommendation 6 of the INCOG guideline (e.g., preinjury variables such as prior history of substance abuse, level of education, employment history, and postinjury variables such as concomitant psychiatric conditions, vision or hearing deficits, and other medical conditions such as seizures). Therefore, clinicians should thoroughly investigate these variables and take results into account when determining the person's communication competence and needs for intervention.

Cognitive Communication #2. A person with TBI who has a cognitive-communication disorder should be offered an appropriate treatment program by a speech-language pathologist (SLP). (Adapted from ABIKUS, G47[29(p23)])

Managing cognitive-communication disorders arising from TBI is integral to a speech-language pathologist's (SLP's) scope of practice, as SLPs are uniquely trained to manage communication disorders and have essential clinical knowledge regarding the interaction between cognition and communication.[39] Basic assumptions underlying the management of cognitive communication disorders were described within an initial committee report to the Academy of Neurological Communication Disorders and Sciences in 2002.[40] These included the assumption that managing cognitive-communication disorders requires interdisciplinary support from all relevant professions, particularly neuropsychology; cognitive-communication intervention methods are specific to these disorders (i.e., differ from treatments for aphasia); approaches to management of cognitive-communication disorders include compensatory and restorative methods (e.g., metacognitive strategy training vs. attention training); and multimodal approaches. It is also agreed by consensus that numerous service delivery models exist that improvements in impairments may not facilitate a change in a person's activity or participation or vice versa, and finally, that the ultimate goal of cognitive-communication intervention is to help the individual achieve the highest level of participation in everyday communication life.

International SLP professional associations also acknowledge the central role of the SLP in the management of cognitive-communication disorders. American Speech-Language-Hearing Association added management of cognitive-communication disorders to the scope of SLP practice in 1988 and formally acknowledged the role of SLPs in the identification, diagnosis, and treatment of individuals with cognitive-communication disorders in 2004.[41] College of Audiologists and Speech-Language Pathologists of Ontario acknowledged the importance of SLP management of individuals with cognitive-communication disorders in 2002.[1] The Acquired Brain Injury Knowledge to Uptake Strategy (ABIKUS)[29] recommendations for the rehabilitation of moderate to severe TBI were the first international practice guidelines to explicitly recommend

that an SLP should offer treatment to people with TBI with a communication disorder. Recognition of the central role of SLPs is, therefore, relatively recent, which has contributed to the paucity of research in the area. Nonetheless, there have been significant and important advances in the assessment and management of individuals with cognitive communication disorders, with practice guidelines published over the past decade providing guidance to SLPs in best practice.[42–44]

Cognitive Communication #3. A cognitive-communication rehabilitation program should take into account the person's premorbid native language, literacy, and language proficiency; cognitive abilities; and communication style, including communication standards and expectations in that individual's culture. (Adapted from New Zealand Guideline Group, 6.1.5[45(p97)]; DeRuyter and Becker[46])

People with TBI are a diverse group in regard to age, socioeconomic status, cultural background, native language, educational background, literacy, premorbid intelligence, vocational background, and sociocultural networks. Therefore, it is imperative that personal sociodemographic factors be taken into account when assessing and treating an individual with a cognitive-communication disorder. The New Zealand Guidelines Group Guidelines for Traumatic Brain Injury explicitly recommend that a communication rehabilitation program should take into account the person's premorbid communication style and current cognitive deficits.[45]

Cultural and religious background can influence the communication activities in which a person engages, and when these are disrupted after TBI, the clinician needs to determine which of these activities could form functional goals.[36] For example, cultural background may contribute to whether the person with TBI wishes to focus on being able to communicate in large community gatherings or engage in religious ceremonies. Perspectives of the person with TBI are critical for identifying which communication activities are a priority,[47] as reliance on other stakeholders, such as funding agencies or employers, may lead to goals that are perceived to be less important by the person with TBI. For example, a group of New Zealand Maori TBI participants rated communication activities such as "participating in a specific cultural protocol," "self-expression through art and craft," and "communicating in a sports team" as important, whereas employers were more concerned with the ability to "answer questions." It is also critical for clinicians to take the cultural appropriateness of standardized tests into consideration when interpreting results. Cultural differences may influence test performance, such that errors may not be indicative of a deficit in functioning. In addition, there is a need for normative data from minority populations and the development of new standardized norm referenced instruments designed for the evaluation of individuals with cognitive communication disorders and with proven reliability and validity.[43,48]

A growing number of studies have recognized the importance of client- and patient-centered goal setting in healthcare.[49] Individuals with TBI often lack awareness of deficits, however, particularly in the acute stage after TBI,[50] and patients' unrealistic thinking could pose a challenge for identifying goals. A qualitative study[51] showed no difference over time in overall types of goals, as the frequency of goals such as returning to work and relationships with family and friends did not differ between patients in postacute rehabilitation and individuals who were several years postinjury. Thus, reduced awareness may change the methods by which goals are achieved but does not obviate the need for client-centered goal setting.

Cognitive Communication #4. A cognitive-communication rehabilitation program should provide the opportunity to rehearse communication skills in situations appropriate to the context in which the individual will live, work, study, and socialize. (Adapted from ABIKUS, G49[29(p24)])

Communication is a complex activity that occurs naturally in our everyday lives and can be disrupted after a TBI. Therefore, to assess and treat cognitive communication disorders, it is necessary to focus on situations in which communication may break down and in which intervention can have the greatest impact, which is typically during everyday conversations with families,[52] work colleagues,[53] and friends.[33] Clinicians should be cautious when using standardized tests to assess communication in individuals with TBI, as these tests do not take into account the individual's context-dependent pragmatic communication behaviors, the range of skills among the typical population, and the many variables that contribute to judgments of "appropriateness" in a given social, ethnic, or cultural group.[44] Furthermore, persons with TBI often have difficulties with transfer and generalization of skills from one environment to another. Thus, an important principle of rehabilitation for persons with TBI is the need for activities that promote generalization and maintenance of skills in the target communication context. Training of communication skills within natural contexts will also ensure that these skills will have social validity (i.e., will contribute to the individual's social, vocational, educational, and independent living success) and thus are more likely to generalize into real-life situations.[54] The ABIKUS[29] evidence-based recommendations for moderate to severe TBI, therefore, suggest that a communication rehabilitation program should provide opportunities for the person to rehearse his or her communication skills in situations appropriate to the context in which that person will live, work, study, and socialize.

Developing a rehabilitation program that addresses personally relevant contexts requires a focus on everyday communication skills, including pragmatic conversational skills. A recently published practice standard recommended intervention for pragmatic conversational skills in adults with TBI.[55] Communication practice should occur in contexts in which the person with TBI typically interacts, such as the individual's place of employment, school, leisure activities, and interactions with families, friends, and other social networks.[56] These interactions may be in person or via telehealth.[56]

Rehabilitation efficacy has been shown to be better when individuals with TBI have practiced conversations daily with their family members, at home and during social events, than when participants did not practice at home.[57] In an RCT,[58] people paid carers who received training in conversational interaction had more interesting, rewarding, and appropriate conversations with residents with TBI than carer group that did not receive training. Improvements were maintained at 6 months postintervention. Social communication skills have been the focus of 2 RCTs in which home practice was an essential element of the training programs.[59,60] Participants in 1 study[59] were given copies of a social skills workbook and asked to share them with a family member. In both the RCTs evaluating the effectiveness of a social skills program,[59,60] participants were given weekly homework tasks that required the participant to practice particular social skills, such as topic maintenance, with a family member. In both studies, partner-directed behavior improved in the training group and home practice helped participants generalize newly learned skills to novel communication partners. These findings support a recommendation to embed rehabilitation processes in activities of everyday life, including the opportunity to practice conversational skills during everyday life activities.

Cognitive Communication #5. A cognitive-communication rehabilitation program should provide education and training of communication partners. (Adapted from ABIKUS, G48[29(p23)])

Cognitive-communication disorders following TBI can lead to profound impairments in communication interactions, which can be challenging and embarrassing for communication partners during everyday conversations. Because of changes in social behavior after TBI, some individuals interact primarily with their family members, a few close friends, and healthcare professionals, including paid carers and nursing staff. After discharge from the inpatient setting, a person with TBI may also have contact with people in the community, including shop assistants, community service providers, people who work with government agencies that serve individuals with disabilities, and in some cases, law and justice personnel. It is recommended that everyday communication partners of people with TBI receive skills training to facilitate everyday communication with persons with TBI. This recommendation is based on 2 RCTs[35,58] and 1 waitlist-control, single-blind, multicenter clinical trial.[57] The first RCT was by Togher and colleagues,[35] who developed and evaluated a program to train police officers how to manage service encounters with people with TBI. Individuals with TBI telephoned police officers to ask advice about regaining a driving license, before and after police officers had been trained in communication strategies. Training resulted in more efficient, focused communication interactions and confirmed that training communication partners improved the communication performance of people with TBI.

Building on findings of police-officer training, the researchers conducted a 3-arm waitlist-control single-blind clinical trial to ask whether conversational skills training for family members could lead to improved communication by the person with TBI.[61] Casual conversations were significantly better when training included communication partners than either training the person with TBI alone or no treatment.[57] Positive findings were maintained at a 6-month follow-up assessment. The training program, TBI Express,[53] comprised 10 weeks in which each person with TBI and his or her communication partner attended a 2.5-hour group session, with 3 to 4 other pairs and a weekly 1-hour individual session. Communication partners were taught to ask questions in a positive, nondemanding manner; encourage discussion of opinions in conversations; and work through difficult communication situations collaboratively.

TBI Express was adapted for a second RCT that examined the effectiveness of communication training with paid attendant carers who were employed in a long-term care facility for people with acquired brain injury.[58] Training comprised a 17-hour program delivered across 8 weeks, with structured, casual conversational interactions between paid carers and people with TBI. Conversations were videotaped pretraining, posttraining, and 6 months after training. Results showed that training led to improved, purposeful conversations between carers and people with severe TBI, compared with a matched control group. Trained paid carers were better able to acknowledge and reveal the communication competence of people with TBI. Conversations were perceived as more appropriate, interesting, and rewarding than that in the control group. Improvements were confined to the structured conversation and were maintained for 6 months.

Cognitive Communication #6. Individuals with severe communication disability should be assessed for, provided with and trained in the use of appropriate alternative and augmentative communication aids by suitably accredited clinicians:

speech language pathologists (for communication) and occupational therapists (for access to devices, writing aids, seating etc.). (Adapted from ABIKUS, G46,50[29(pp23–24)]; Royal College of Physicians[30]; De Ruyter and Kennedy[62])

This recommendation was originally reported in the ABIKUS[29] guidelines on the basis of level C evidence. The individual's stage of recovery and specific communication needs are important determinants of the most appropriate alternative and augmentative communication (AAC) systems[63] and methods of training AAC system use.[44,64] During the early stages of recovery, individuals with TBI may use simple yes/no or 2-choice response methods, while those who have emerged from posttraumatic amnesia may use a range of simple communication systems, including gesture, word and symbol boards, alphabet boards, and simple output devices. At the later stages of recovery, when the rate of cognitive recovery has slowed, long-term systems may be considered.[65] In these situations, the goal of rehabilitation is to compensate for impaired cognitive-communication functioning and reduce the extent to which impaired communication prevents successful return to everyday activities.[66] Wilson[66] offers a compensatory framework wherein consequences of the compensatory behavior should result in functional and adaptive performance, thus reducing the mismatch between environmental demands and skills of the person with TBI. Detailed assessment is needed regarding the patient's cognitive-linguistic abilities, his or her potential for speech production, clinical observation of communication skills, physical impairments, seating and positioning requirements, the best method of device access, and visuoperceptual and visual acuity skills.[62] Assessment and prescription of AAC devices require an interdisciplinary approach by trained SLPs, occupational therapists, and physical therapists. For example, seating and positioning requirements are often evaluated by occupational and physical therapists, while the best method of device access may be established by the physical therapists. Clinicians may require additional education and training in AAC and TBI.[67,68] Long-term follow-up of adults with TBI who have been assessed and prescribed AAC devices shows high levels of initial acceptance (>90%) and relatively high levels of continued use where necessary (>80%).[69]

While few studies have addressed AAC use by individuals with TBI, clinical practice in AAC may be informed by research on assistive technology for cognition (ACT). For example, one RCT compared 2 instructional approaches for ACT training.[70] Twenty-nine participants with moderate to severe acquired brain injury (with 80% TBI in both groups) were randomly allocated to either trial-and-error learning (conventional instruction) or systematic instruction conditions. Both groups received twelve 45-minute individual training sessions that targeted selected use of a Palm personal digital assistant. While there were no significant differences between the groups at immediate posttest with regard to accuracy and fluency, participants who received systematic instruction retained and generalized gains more than those in the trial-and-error learning group. There are published practice guidelines for instructional methods for individuals with TBI,[71] and these apply to AAC as well as ACT.

Integrated systems of technological supports for a range of communication and cognitive disorders (e.g., memory, planning, and organization) are well suited to the needs of people with TBI. Such systems are likely to become increasingly available. However, there is a pressing need for research not only to evaluate the effectiveness of such systems in promoting participation but also to evaluate interventions designed to develop the skills underpinning the use these systems.[72]

Cognitive Communication #7. Interventions to address patient-identified goals for social communication deficits are recommended after TBI, with outcomes measured at the level of participation in everyday social life. These interventions can be provided in either group or individual settings, however published evidence is strongest for group-based interventions. (Adapted from Cicerone et al[55])

Loss of friends and social life is a common problem for adults with severe TBI, up to 30% of whom report no social contacts outside their families.[73] Social communication impairments play a key role in negative social outcomes for adults with TBI,[74] and SLPs play a central role in supporting effective social communication for their patients and clients. Improvements in discrete social communication skills are not enough: social communication outcomes should be measured in real-world environments during meaningful activities.[17,48,75] Helffenstein and Wechsler[76] published the first RCT to evaluate the effectiveness of communication training for people with TBI. The primary outcome measure was the participant's score on a communication rating scale, completed by staff during evening recreation activities in a rehabilitation facility. Two independent raters also evaluated a 15-minute videotaped interaction between each person with TBI and an unfamiliar communication partner. This was the first published RCT to incorporate outcomes beyond the therapy session in adults with TBI who received social communication training. A number of studies followed the original work by Hellfenstein and Wechsler,[76] including direct social skills training studies such as the RCT by Dahlberg and colleagues[59]; direct social skills training combined with partner training[57,60]; and training of partners only.[35] Communication goals were also among goals selected by participants in an RCT on telehealth intervention for everyday memory problems in adults with TBI[77] and were successfully trained using systematic instruction. An

evidence review by Cicerone and colleagues[55] concluded that social communication intervention for individuals with TBI should be considered a practice standard. Studies with positive results have common elements: individualized goals that are important to participants, instructional methods that match participants' learning ability, activities for planned generalization, inclusion of important communication partners, and measurement of outcomes beyond the therapy room. Participants in all studies to date also had enough awareness to want to participate in therapy.

Summary of participant characteristics and treatments studied

This article seeks to describe the current evidence base for the assessment and management of cognitive communication disorders following traumatic brain injury. To interpret whether this evidence applies to a particular person with TBI or a clinician's current caseload, it is necessary to examine the characteristics of the participants who were involved in these studies and the nature of the treatments studied. This information is critically important for clinicians to enable them to make a considered judgment as to whether the findings of existing studies are relevant to their current caseload. Therefore, we have created an algorithm diagram (see Figure 1) to summarize these characteristics and assist with translation of the current research evidence into clinical practice. We describe the features of the algorithm here.

Social communication training for people with TBI has been shown to be effective for individuals with chronic injuries, which has been quantified variously as more than 6 months postinjury,[78] at least 9 months postinjury,[57] more than 12 months postinjury,[60,79] or within 2 years of injury.[76] Participants in all studies had severe TBI, indicated by posttraumatic amnesia for more than 24 hours and/or loss of consciousness for more than 6 hours. Most participants lived in the community[35,57,60,78,80] or in long-term care facilities.[58] Participants were included if others considered them to have pragmatic communication problems, which included inappropriate behaviors,[57,60,80] below-average facial affect recognition,[79] chronic social difficulty or social isolation, apparent disregard or lack of awareness of social cues or inappropriate social responding, or to have scored at least 2 standard deviations (SDs) below the norms on any emotion perception measures used at pre- and postassessment.[78] Participants were excluded from treatment if they had severe visual or hearing impairments,[76,79] visual neglect,[79] severe

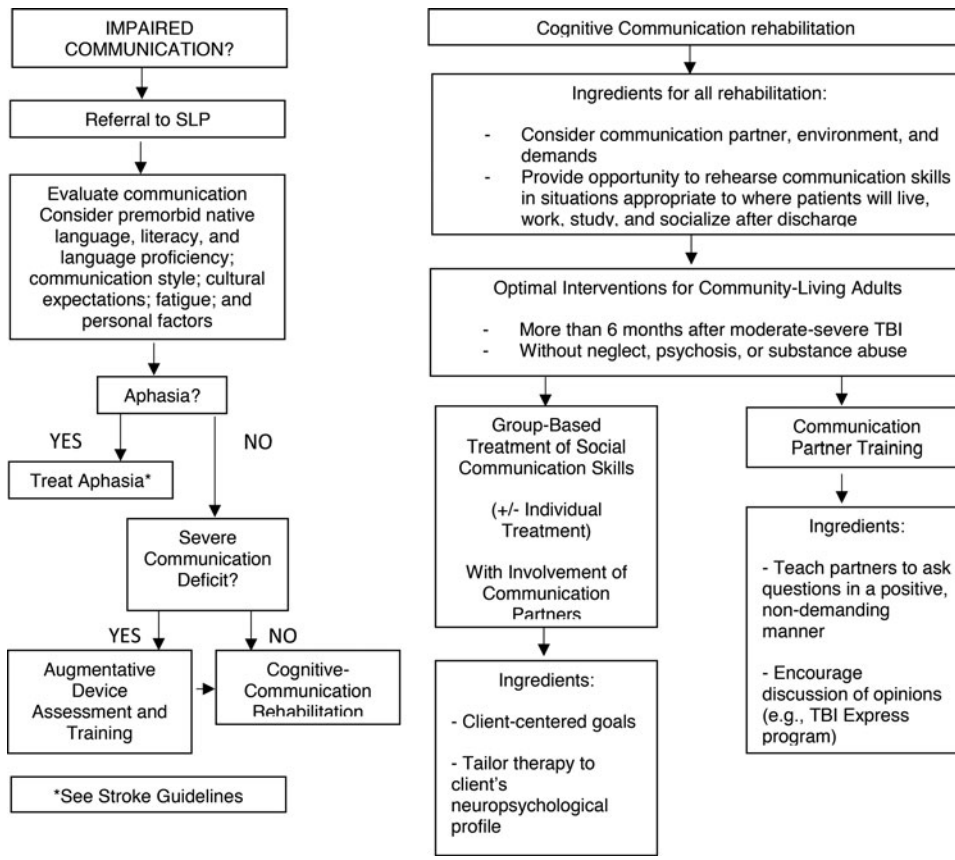

Figure 1. Algorithm diagram describing the characteristics of the participants and the treatment approaches underlying the INCOG cognitive communication guidelines. TBI indicates traumatic brain injury.

aphasia,[57,60,76,79] severe dysarthria,[57] severe cognitive impairments that would preclude participation in training activities,[60] drug and alcohol addiction,[57,58,79] active psychosis,[60] non–English-speaking background, insufficient English to be able to follow instructions and converse with group members,[60] severe amnesia,[57] previous brain injury,[57] or previous or recent psychiatric history.[78–80] These exclusion criteria characterize many of our clients and patients and which should be kept in mind when using any of the recommended social communication training methods.

Treatment approaches for social communication deficits following TBI have predominantly used group formats,[59] although some reported increased benefit by combining individual and group treatment sessions.[57,60] Treatment dose varied across studies: 2 to 3 weeks,[79] three 2-hour sessions,[80] 1 hour per day for 4 weeks,[76] and 3 months of active peer mentoring.[81] Social communication group treatments have been delivered in sessions of 8,[78] 10,[57] and 12 weeks.[60]

Group-based treatments have employed 2 approaches: standardized social skills training and conversational skills training. Standardized social skills training has been least effective, as there is evidence that trained skills do not automatically generalize to untreated skills and contexts,[44,64] at least for individuals with impaired declarative memory and executive functions. Training that incorporates everyday communication partners has been more successful, both immediately and after several months without treatment, perhaps because partners were able to recall the training and continue to practice their skills beyond the period of the training.

Research on autism spectrum disorders has introduced the concept of *social cognition* to the study of pragmatic communication. Social cognition includes processes such as emotion recognition from facial affect and voice and Theory of Mind, the belief that others have thoughts separate from one's own and that these thoughts influence others' behaviors.[82] There is a large body of research on social cognition in individuals with TBI,[83,84] and treatment research is beginning to emerge. At the time of publication of these guidelines, there were 3 published RCTs focusing on emotion recognition and recognition of social inference.[78–80] Results showed benefits of training, and in one case, affect recognition training generalized to improvements in social interactions beyond the study. Research in this area is likely to increase in the future, as understanding of social cognition in TBI advances.

Audit items arising from the cognitive communication recommendations

Recent advances in the field of implementation science suggest that simply making recommendations and developing clinical guidelines is not sufficient to modify clinical practice. The use of audit and feedback is a commonly employed strategy to enhance health professionals' uptake of guideline recommendations and measure their adherence to suggested practice standards.[85] As indicated by the Appraisal of Guidelines for Research and Evaluation II instrument, audit criteria can include process or behavioral elements and/or clinical and health outcomes. The INCOG team has agreed upon the following 4 items from the guideline deemed most significant to clinical practice and auditable (see Table 3): (i) evidence that speech and language pathology treatment programs have been provided to individuals with TBI with indicators of the use of objective individual measures of outcomes, including measurement of activity and participation; (ii) evidence that in addition to the individual with TBI, relevant communication partners have received education and training; (iii) evidence that individuals with severe communication impairments receive assessment for and training in the use of alternative and/or augmentative communication, and (iv) evidence that assessment and prescription of augmentative and alternative communication devices is provided by suitable accredited clinicians, that is, SLPs and occupational therapists.

These items reflect the central importance of specialist speech language pathology services for people with severe TBI. It is critical that SLPs provide assessment and treatment throughout the rehabilitation journey of the person with TBI. In addition to managing the cognitive communication sequelae of TBI, the SLP is also responsible for ensuring that the person has access and training to appropriate augmentative and alternative communication if this is needed, that everyday communication partners receive specialist conversational skills training, and that the outcome measures that are reported are designed to reflect improvements in the person's everyday social life.

It is expected that evidence of all 4 auditable items would be found in the person with TBI's medical record. Referral to an SLP should occur at admission to the acute hospital, and ongoing SLP involvement should occur into the chronic stages of rehabilitation, which may be years after the injury.

Current state of practice

Speech-language pathologists working in the field of TBI rehabilitation are posed with a number of challenges in delivering evidence-based practice services to their patients. Insurers may deny coverage for cognitive rehabilitation or limit the number of sessions, and institutional constraints often limit the extent to which clinicians can implement treatment in everyday settings. We are pleased to report that there is a rapidly

TABLE 3 *Audit guidelines for priority recommendations: cognitive communication*

Intervention (guideline recommendation)	Specific activities, devices, or tools	Assessment of need and effectiveness	Patient characteristics	Discipline
Cognitive communication treatment A person with traumatic brain injury who has cognitive communication difficulties should be offered an appropriate treatment program by a speech-language pathologist.		• Speech pathology treatment program documented	• Cognitive communication impairment	• OT • PT • SLP • MD • Neuro • Other
Education and training of communication partners A cognitive communication rehabilitation program should provide education and training of communication partners.		• Assessment for need conducted • Training provided	• Cognitive communication impairment	• OT • PT • SLP • MD • Neuro • Other
Prescription of augmentative and alternative communication devices Patients with severe communication disability should be assessed for, provided with and trained in the use of appropriate alternative and augmentative communication aids by suitably accredited clinicians: speech language pathologists (for communication) and occupational therapists (for access to devices, writing aids, seating etc).		• Assessment for need conducted • Training provided	• Severe communication impairment (i.e., unintelligible speech or lack of production of speech)	• OT • PT • SLP • MD • Neuro • Other
Participation in everyday social life should be measured Interventions to address patient-identified goals for social communication deficits are recommended after TBI, with outcomes measured at the level of participation in everyday social life. These interventions can be provided in either group or individual settings; however, published evidence is strongest for group-based interventions.		• Results of assessment of participation in social life reported • Patient identified goals measured and reported group training • Individual training	• Cognitive communication impairment	• OT • PT • SLP • MD • Neuro • Other

Abbreviation: TBI, traumatic brain injury.

expanding evidence base to support best practices in assessing and managing cognitive communication disorders for people with TBI. This evidence includes support for ecologically valid assessments such as the Functional Assessment of Verbal Reasoning and Executive Skills,[86] and intervention approaches such as communication partner training, which includes families and friends in training; context-sensitive interventions that are embedded in the communication environments of the person's everyday life; metacognitive strategy training; and employment of instructional techniques such as errorless learning. New evidence also reinforces the importance of measuring outcomes that are meaningful for the person at a social participation level. These advances are situated within a broader rehabilitation focus on life participation for the person with TBI and a multidisciplinary approach to treatment. We recognize that a person's cognitive-communication ability should not be evaluated and treated as an isolated skill but should be viewed within the broader context of the person's every day communication needs. Treatment should be individualized, with person-centered goals and treatment techniques that take into account the person's neuropsychological and psychosocial status.

DISCUSSION

The study of cognitive communication disorders following TBI is an emerging field; however, over the past three decades, considerable progress has been made which provides us with sufficient evidence to produce the INCOG recommendations for clinical practice. It should be noted however that some of the recommendations are at the consensus level. The emphasis in this guideline statement rests on the involvement of a specialist SLP who can provide assessment and intervention focusing on the person's social communication skills in the context of their everyday life activities. Communication partners should be involved in this training process and be provided with specific conversational skills training. People with TBI who have a severe communication disability should be provided augmentative and alternative communication, by the speech pathologist in consultation with other specialist clinicians such as occupational therapists. Finally, outcome measurement should incorporate an evaluation of the person during every day social activities.

Future research should be considered to investigate alternative service delivery models, such as those offered by telehealth or e-health models, particularly to facilitate access to specialist SLP services for those in rural and remote health regions, or for those who cannot travel to rehabilitation centers.[87] In addition, further research is required to evaluate communication partner training across a range of contexts and to determine the optimal dose of treatment required. With advances in technology, it is anticipated that use of devices such smart phones and tablets will be increasingly incorporated into treatment for people with cognitive communication disorders. However, treatment should remain focused on everyday social participation activities, rather than decontextualized games that have little relevance or generalization to the person's everyday communication experiences.

Outcome measurement of cognitive communication disorders also requires further development and research.[17] Developing an international set of common outcome measures is an approach being undertaken by the NHMRC Centre of Research Excellence in Brain Recovery in Australia to remedy the gap in this area. In the field of social cognition, there are emerging treatment approaches that appear promising; however, outcomes are measured using standardized measures, which do not reflect real-world performance. Clearly, this is an area for further development. Research is also needed in the areas of comprehension and information processing, written expression, and academic and vocational communication.[48]

The cognitive communication algorithm highlights the relevant populations from which the evidence underpinning these guidelines has been drawn. This can assist clinicians in operationalizing the guideline recommendations at the point of care of the person with severe TBI who has a communication disability. The audit items provide a mechanism to establish how documented practice aligns with high-priority recommendations and are designed to be used as part of an overall audit tool covering all high-priority recommendations within the INCOG guideline. Our goal is to ensure that all people with severe TBI receive best practice that has been informed by the highest available level of current evidence. Utilizing this guideline and particularly using the audit items within clinical practice will assist in meeting this goal.

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