CASER

Issue 12, December 2015

Child Assessment Service Epidemiology and Research Bulletin

Message from Subspecialty Division

Acquired Cognitive Impairment (ACI) refers to cognitive impairment that result from acquired brain injuries (ABI). "Acquired Brain Injury (ABI) is damage to the brain that occurs after birth from a traumatic or non-traumatic event. ABI is not related to a congenital disorder or a degenerative disease, such as Alzheimer's Disease, Multiple Sclerosis or Parkinson's Disease. Traumatic Brain Injury (TBI) is damage to the brain caused by a traumatic event such as, a blow to the head, a fall, a motor vehicle collision or a sports related injury. Non-Traumatic Brain Injury is damage to the brain caused by illness such as meningitis or encephalitis, oxygen deprivation (anoxia) or stroke".[1]

In the Child Assessment Service (CAS), the ACI Team was set up in 2003 in order to take care of children with ABI. It is an important area within the field of child health and development, including prevention, identification of impairments, comprehensive assessment and rehabilitation. Clinical protocols for the assessment and management of patients with traumatic brain injury (TBI) was first established in 2003. Subsequently, operational protocols for assessment of patients with other types of ABI were also established, including for stroke, malignancies and infections involving central nervous system; and for intractable epilepsy patients who may be candidates of epilepsy surgery.

In this issue, we present the epidemiological data and clinical profile of patients with TBI who were referred to CAS in the past ten years (from 2003 October-2014 July). We also provide a brief report on a survey on the needs of parents of children with moderate to severe TBI studying in mainstream school. Rehabilitation of their speech and language function is discussed. Finally, we include a report on how our team helps these patients to reintegrate into their school after discharge from hospital.

Reference

1. Ontario Brain Injury Association. http://obia.ca/what-is-abi/ (accessed 25 November 2015).

Child Assessment Service Epidemiological Data on Patients with Traumatic Brain Injury 2003-2014

Liu KY Stephenie[1] & Acquired Cognitive Impairment Team

[1] Senior Medical & Health Officer

Introduction

Traumatic Brain Injury (TBI) is one of the leading causes of mortality and morbidity in children and adolescence in the world. "TBI is caused by a bump, blow or jolt to the head or a penetrating head injury that disrupts the normal function of the brain".[1] In Hong Kong, the local epidemiological data is limited. The incidence of TBI was reported to be 1.7/1000 population in 2002 by Leung et al.[2] In United States in 2010, 2.5 million cases of TBI occurred. The rate of emergency department visit due to TBI was 7.15/1000 population and the mortality rate was 0.17/1000.[1]

Clinical protocols for assessment and management of patients with TBI in CAS were developed. Three phases are included: Time 1 Acute phase: the period of post traumatic amnesia from 6 weeks to 6 months; Time 2 Recovery phase: the status at the first assessment at one year post injury; and Time 3 Chronic phase: the status at assessment two years post injury. The patients will be further reviewed in other school and work transitional points.

In this study, we report the epidemiological and longitudinal outcome data for patients with TBI who were referred to CAS in the past ten years (2003 October-2014 July). It aims to summarize our clinical experience and report the neurological, neuropsychological and other functional outcome of these patients, to define their course of recovery on various functional domains and to evaluate the clinical predictive factors for their long term functional outcomes.

We retrospectively reviewed the medical charts of 30 patients with TBI (n=30) who were referred to us by major neurosurgical teams in Hong Kong in the past

ten years. Patients with premorbid neurodegenerative disease, psychiatric disorder, significant cognitive impairment or developmental delay were excluded. Patients with TBI due to shaken baby syndrome were also excluded due to their different and distinct clinical profiles.

Results

Demographic data

In the 30 patients reviewed, male predominance was noted with a male to female ratio of 4:1. Age at injury ranged from 1 year 5 months to 14 years 1 month old. Most patients were injured between age 6-12 (50%), followed by age 13-15 (30%) and age < 6 (20%). Two patients had premorbid ADHD and one has epilepsy. Twenty four school aged patients were assessed by standardized tests at Time 1, while two school aged patients and four preschool children could not be assessed by standardized testing. Sixteen patients were seen at Time 2 and 10 patients at Time 3.

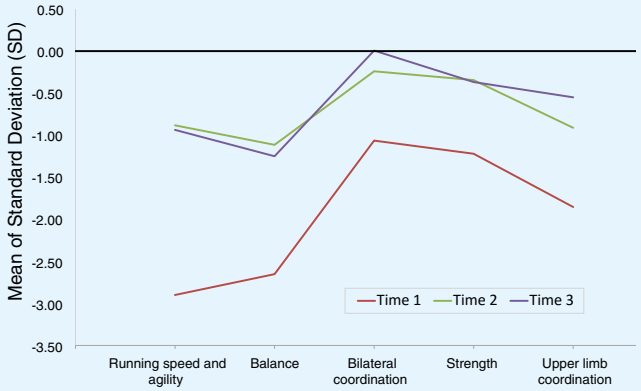
Injury related data

Road traffic accident was the most common cause of injury (74%), followed by fall (20%) and bicycle related accident (6%). 68% of patients of this cohort suffered from severe head injury (Glasgow Coma Scale GCS 3-8 on admission to hospital), 29% moderate head injury (GCS 9-12), and 3% mild head injury (GCS 13-15). The majority of patients suffered from diffuse brain injury (67%) (subdural haemorrhage, subarachnoid haemorrhage, intraventricular haemorrhage, cerebral oedema, diffuse axonal injury), 23% have focal brain injury (focal epidural haemorrhage/brain contusion) and 10% showed normal MRI brain scans.

Functional outcome

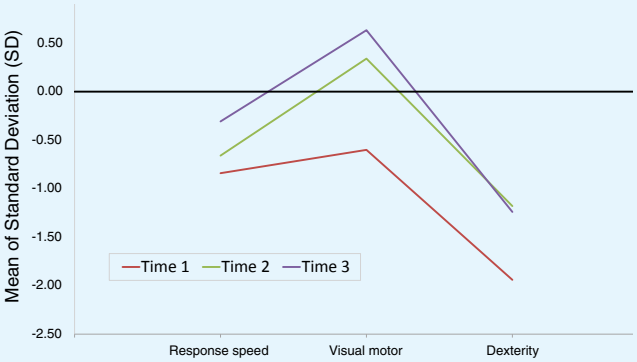
Motor function: The majority of our patients showed good neurological outcome. One third of patients had initial neurological deficit but only 20% showed persistent deficit on follow up. 54% had initial gross motor problem and 37% fine motor problem. Their running speed, agility and balance were most affected, but showed improvement with time (Figure 1). Their fine motor function also improved but dexterity and handwriting speed were persistently impaired (Figure 2). Their visual perceptual function also showed good recovery.

Figure 1. Gross motor function (n=5)



Bruininks Oseretsky Test - Gross Motor Function

Figure 2. Fine motor function (n=10)

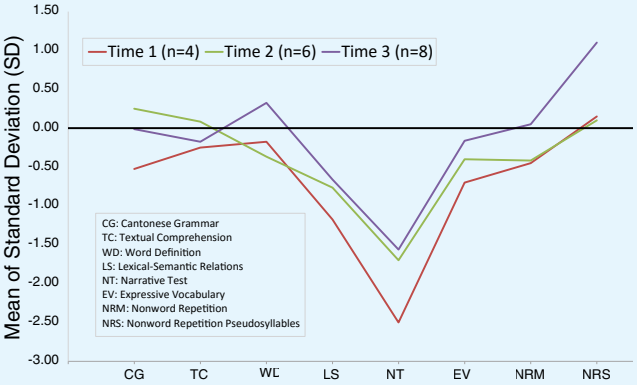


Bruininks Oseretsky Test - Fine Motor Function

Neurocognitive function: The neurocognitive function of our patients recovered less well when compared to their motor function. During initial assessment at Time 1, 33% of patients showed average intelligence, 20% low average intelligence, 20% limited intelligence, 14% intellectual disability and 13% developmental delay. General intelligence was not a good representation of their overall neurocognitive function, although improvement in Performance IQ was noted on follow up (from 80 at Time 1 to almost 100 at Time 3 in 8 patients). Their persistent impairment in verbal and visual memory was the most debilitating impairment in their neurocognitive ability and daily function. Attention problem was common among our patients (40%). All of them required behavioral and educational support in school, and 17% required psychiatric management.

Language function: Language impairment occurred in 73% of our patients which improved with time, but narrative ability was persistently impaired in some patients (Figure 3). Speech disorder was also present in 20% of patients due to oral muscle weakness and incoordination.

Figure 3. Language performance (n=8)



HK Cantonese Oral Language Assessment Scales (HKCOLAS)

Due to the small number of patients reviewed in this study and a majority having suffered from moderate to severe TBI, no correlation can be found between their severity of TBI and long term clinical outcome.

Discussion

Motor function: Overseas studies have reported good motor recovery of these patients,[3] but they may have persistent deficit in balance and gait

speed.[4] Their persistent deficits in strength, agility and coordination also affect participation in sports and other physical activities.[5] Their motor weakness is characterized by a lower incidence and severity, long recovery time, and good motor outcome when compared with cognitive or behavioral problems following TBI.[6] In our patients, their running speed, agility and balance were affected with improvement with time.

Neurocognitive function: In a meta-analysis of literature on neurocognitive outcomes after paediatric TBI,[7] significant impairment in intellectual function, executive skills (including processing speed, attention, fluency, inhibition and problem solving skills), and verbal and visual memory were found in patients with moderate to severe TBI. During the chronic phase, substantial recovery in intellectual functioning, small to moderate recovery in processing speed, working memory and visual perceptual function were observed. In our patients, improvement in Performance IQ was noted on follow up, but there was persistent impairment in verbal, visual memory and daily memory function. Children with moderate TBI showed modest recovery in intellectual functioning and attention but failed to catch up with their peers, whereas children with severe TBI fell farther behind their peers over time. This may be due to injury consequences together with lack of adequate learning opportunities, medical treatment and rehabilitation (the "double hazard" injury model).

Language function: Communication deficits are also common in patients with TBI. They may have difficulty in understanding or producing speech (aphasia), slurred speech consequent to weak muscles (dysarthria) and/or difficulty in programming oral muscles for speech production (apraxia). They may have problem in understanding both written and spoken language. Social communication, such as turn taking in conversation and topic maintenance, is difficult in some patients.[8] Impairment in discourse processing was reported to be common among patients with TBI because of cognitive and linguistic skills deficits.[9,10] In our patients, language impairment was common. Their narrative ability, a measure of discourse processing, was persistently impaired.

Predictive factors: Researchers have identified several factors that can predict outcome following TBI.[11] Injury related factors which predict poor outcome include severe diffuse brain injury, posttraumatic amnesia more than two weeks, secondary brain injury due to raised intracranial pressure, hypoxia/ ischemia, fever and seizure. Demographic predictors of poor outcome include young age at injury, presence of cognitive disability and behavioral problem prior to injury, lower socioeconomic status and poor family functioning. Post injury predictors of good outcome include individualized rehabilitation interventions that are embedded in naturalistic environment of the child; use of basic antecedent management strategies and external structured support to improve cognitive, behavioral and executive function; and training in metacognitive, behavioral and direct instruction strategies to improve memory and executive function. Integrated and multidisciplinary assessment and coordination of care improves parents' understanding, functional outcome and overall quality of life. Specific neuropsychological deficits (executive function, attention, memory) and poor school performance post injury are related to poor long term social functioning, quality of life and employment.[12] Poor family functioning also predicts family stress and child behavioral problems. Due to the small number of patients reviewed in this study and with a majority suffering from moderate to severe TBI, no predictor factors can be drawn.

Conclusion

This study reports the epidemiology and clinical outcome of our patients with moderate to severe TBI. The majority of our patients showed satisfactory neurological outcome, but most of them demonstrated persistent deficits in neurocognitive, psychological, motor and language function. These deficits affect their academic, social and daily functioning and long term quality of life. Methods that can systematically capture these functional outcomes will be highly valuable in our future assessment and follow up protocol. Multidisciplinary team assessment and coordinated care, together with individualized rehabilitation interventions are necessary to improve the long term outcome of this group of patients.

Acknowledgements

I would like to thank our Acquired Cognitive Impairment Team in helping me to collect, compile and analyze the clinical data. Their professional input and guidance contribute tremendously to this project. Special thanks to Donna Chan, Lucia Tsang, Effie Yu, Gillian Tang, Carol Chan, Teresa Wong and Candice Poon.

References

1. Centers for Disease Control and Prevention. Traumatic Brain Injury in the United States: Fact Sheet. http://www.cdc.gov/traumaticbraininjury/get_the_facts.html (accessed 25 November 2015).
2. Leung KM, Fong D. Pattern of head injury among the paediatric population: experience of a local neurosurgical centre. Ann Coll Surg Hong Kong 2002;6(1):4-7. doi: 10.1046/j.1442-2034.2002.00124.x
3. Kuhtz-Buschbeck JP, Hoppe B, Golge M, Dreesmann M, Damm-Stunitz U, Ritz A. Sensorimotor recovery in children after traumatic brain injury: analyses of gait, gross motor, and fine motor skills. Dev Med Child Neurol. 2003;45(12):821-8.
4. Katz-Leurer M, Rotem H, Keren O, Meyer S. Balance abilities and gait characteristics in post-traumatic brain injury, cerebral palsy and typically developed children. Dev Neurorehabil. 2009;12(2):100-5. doi: 10.1080/17518420902800928
5. Rossi C, Sullivan SJ. Motor fitness in children and adolescents with traumatic brain injury. Arch Phys Med Rehabil. 1996;77(10):1062-5.
6. Jang SH. Review of motor recovery in patients with traumatic brain injury. NeuroRehabilitation. 2009;24(4):349-53. doi: 10.3233/NRE-2009-0489
7. Babikian T, Asarnow R. Neurocognitive outcomes and recovery after pediatric TBI: meta-analytic review of the literature. Neuropsychology. 2009;23(3):283-96. doi: 10.1037/a0015268

8. American Speech Language Hearing Association. Traumatic Brain Injury (TBI). What deficits result from TBI? http://www.asha.org/public/speech/disorders/TBI/#deficits (accessed 25 November 2015).
9. Chapman SB. Cognitive-communication abilities in children with closed head injury. Am J Speech-Language Pathology 1997;6(2):50-58. doi:10.1044/1058-0360.0602.50
10. Murdoch BE, Theodoros DG. Traumatic Brain Injury: Associated Speech, Language and Swallowing Disorders. San Diego, CA: Singular Publishing Group; 2001.
11. Johnson AR, DeMatt E, Salorio CF. Predictors of outcome following acquired brain injury in children. Dev Disabil Res Rev. 2009;15(2):124-32. doi: 10.1002/ddrr.63
12. Anderson V, Brown S, Newitt H, Hoile H. Long-term outcome from childhood traumatic brain injury: intellectual ability, personality, and quality of life. Neuropsychology. 2011;25(2):176-84. doi: 10.1037/a0021217

Rehabilitation of Speech and Language in Children with Traumatic Brain Injury

Tang KM Gillian[1]

[1] Speech Therapist

Introduction

In children with traumatic brain injury (TBI), speech and language function may be affected to different extents and severity depending on the location and severity of brain injury. Even injury to the same area of brain may result in different skill deficits in different children.[1] For children with mild head injury, most often they seem to recover well.[2] However for children with moderate to severe head injuries, speech and language functioning are commonly affected. The extent ranges from minor subtle problems to severe impairment in verbal comprehension and expression which may be persistent for a period or become permanent.

Problems in speech and language caused by brain injury include voice quality, articulation problems such as apraxia or dyspraxia, dysarthria and language problems. Receptive and/or expressive language problems are common. Language abilities are closely linked to cognitive functions such as attention, memory, conceptual organization, speech of processing, analysis and synthesis of environmental cues and conversation. Although conversation skills improve with time, social use of language, i.e. pragmatic skills, may continue to be impaired in children with brain injury.[2]

Assessment

During the early stage, orientation to time, place and person for the child with TBI is checked. This can be followed by informal assessment of concepts mastered previously e.g. numbers words and letters. When the child's condition becomes stable, more in-depth, comprehensive assessments in all areas of functioning including education, speech and language, behavior may be evaluated.[2]

For speech and language assessment, one should consider using both formal and informal assessments. The result will help us to understand the deficits of the children and areas that need support or remediation, which helps to set the short and long term goals of rehabilitation. Other general characteristics that need to be observed include attention, stress tolerance, degree of cueing and prompting required, use of compensatory strategies, processing time and fatigue level.

Rehabilitation

Many of the techniques used in intervention for children with TBI are similar to those employed for students with language-learning disorders. It is because the cognitive and communicative patterns in these children are similar in many ways.[3]

Training for discourse production

Jointly-produced discourse (with a familiar communication partner) is found to be more effective than monologue discourse (typically narrative production) in facilitating competent participation in everyday life for patients with TBI.[4] They were able to produce more informational content in their narratives when facilitated by their friends. However the training did not improve the productivity (producing more words) and cohesion of the narratives.

Training for language disorders

The children can be helped to develop vocabulary that is useful and meaningful in their environmental context. We can also help them to develop appropriate pragmatic skills in peer setting e.g. make conversation with peers in a quiet therapy room as a start, then move to more naturalistic environments. We should monitor and evaluate any communication breakdown between them.

Training for pragmatics skills

Therapist can use videotapes to teach pragmatic skills such as gaze and paralinguistic skills by asking these children to observe and rate the behaviors they see in the tape. Structured discourse training sessions can also be held. Routine speech acts such as greetings, introductions, requests for repetition and clarification can be modeled and practiced. Less routine speech acts such as requesting, describing, suggesting, negotiating and expressing feelings in controlled settings can also be taught.[3] Therapy of pragmatic deficits may adopt approaches of individualized communication skills training, group interventions, and building and enhancing social networks that are more acceptant towards these group of patients.[5]

Training for motor speech disorders

Oral motor therapy for strengthening oromotor muscles, phonation exercises (e.g. breath control) and articulation therapy can all be used.

Techniques that can help to reintegrate this group of children in community and school include:

- Plan small-group activities to help in development of interaction skills
- Pause when giving instructions to allow extra

processing time

- Give extra time to respond in view of their slow processing speed
- Arrange a classroom "buddy" to help them to keep on top of instructions and assignments
- Consider use of assistive devices when need e.g. computer, calculator
- Modify assignments by reducing the number of questions and amount of reading materials

Conclusion

Children with TBI are a very diverse population. We have to be flexible in using appropriate assessment tools for assessing children with different type and severity of brain injury. Formal and informal assessment tools together with observation of the whole person should be used in order to formulate a suitable rehabilitation plan for them. Rehabilitation should include training in speech, language, pragmatic and social skills, and integrating these skills in their daily activities and environment.

References

1. Semrud-Clikeman M. Traumatic Brain Injury in Children and Adolescents: Assessment and Intervention. New York, NY: The Guilford Press; 2001.
2. Schoenbrodt L, ed. Children with Traumatic Brain Injury: A Parent's Guide. Bethesda, MD: Woodbine House; 2001.
3. Paul R. Language Disorders from Infancy through Adolescence: Assessment and Intervention. 2nd ed. St. Louis, MO: Mosby, Inc.; 2001.
4. Jorgensen M, Togher L. Narrative after traumatic brain injury: a comparison of monologic and jointly-produced discourse. Brain Inj. 2009;23(9):727-40. doi: 10.1080/02699050903133954
5. Solberg MM, Mateer CA. Cognitive Rehabilitation: An Integrative Neuropsychological Approach. New York, NY: The Guilford Press; 2001.

Brief Report: Survey on the Needs of Parents of Children with Moderate to Severe Traumatic Brain Injury Studying in Mainstream School

Chan YK Donna[1], Chung WH Angela[2]

[1] Occupational Therapist, [2] Clinical Psychologist

Introduction

This survey was conducted in 2010, aiming to explore the service needs of families with children who suffered from moderate to severe traumatic brain injury (TBI) attending mainstream schools.

Brain injury may result in multiple disabilities. However, it was difficult for them to obtain appropriate service based on the parents' needs and the needs of their children.[1] Studies have indicated that in families of children with multiple disabilities, parental perceptions of their needs differ considerably from the views of professionals serving them.[2] The unclear picture of needs may be a factor in parental dissatisfaction with services they are receiving, and with the apparent inability of the services to alleviate stress in many cases.[1] For our team to plan future services that could better meet their needs, it was important to understand and prioritize the service needs from their perspectives.

Method

Participants

25 suitable cases of TBI were seen in CAS from 2003 to 2010. 20 of them returned the completed questionnaires with written consent.

Measures

Service Needs Questionnaire (SNQ), a locally validated questionnaire developed by CAS,[3] was used. This questionnaire consisted of 27 items sub-divided into two parts. The first part consisted of 8 items on personal and family stress. The second part consisted of 19 items on need for various services. Each item was rated on a 5-point Likert scale. Participants were also requested to supply information on basic demographic characteristics.

Data analysis

Descriptive statistics were used to calculate mean scores and standard deviations of different variables. The data collected in this study on traumatic brain injury (TBI group) was compared to three different groups, including Normal, CAS (group of students diagnosed with learning and/or behavioral problems) and VI group (group of students with visual impairment). One-way ANOVA with post hoc analysis was used to determine whether there was any significant difference in their responses to SNQ between different groups.

Results

Among the 20 subjects, 15 were boys and 5 were girls. 18 children studied at subsidized government schools, one at a Direct Subsidy Scheme school and one at a private school.

Descriptive statistics on present age, age of injury, number of months from injury to date of this study, Glasgow Coma Scale (GCS), duration of Post Traumatic Amnesia (PTA), coma days, Verbal Intelligence Quotient (VIQ), Performance Intelligence Quotient (PIQ) and Full Scale Intelligence Quotient (FSIQ), were listed below:

Table 1. Characteristics of subjects

Characteristic	Mean	Standard Deviation	Minimum	Maximum
Present age	15.60	2.58	10.0	19.8
Age of injury	9.11	3.53	1.08	13.42
Month of injury	71.48	44.14	8	206
GCS	7.00	2.66	3	10
Duration of PTA	42.50	58.19	3	180
Coma days	10.33	5.51	5	16
VIQ	92.79	14.87	78	130
PIQ	86.37	12.77	67	115
FSIQ	88.58	14.01	74	125

The top five needs were listed according to each item's total score:

Table 2. Descriptive statistics on total SNQ

Priority	Item	Total score
1	I worry about children's future	92
2	I need more information about children's future education	91
3	School should allocate more resources to support my children's study	87
4	I need to know how to help my children	86
4	I need to know more about aiding children's study	86
4	I need more information about children	86
4	Children need more services in supporting study	86
4	Children need more systematic services	86
5	I need to know more about dealing with children's emotion and behaviour	84
5	School should provide more support to my children	84
5	Few teachers have adequate knowledge about children having specific need	84

Descriptive statistics on total SNQ score of the four groups were listed:

Table 3. Mean of total SNQ by group

Group	Mean	Standard Deviation	Minimum	Maximum
Normal group	53.12	12.99	27	81
CAS group	71.03	8.06	43	81
VI group	63.88	13.60	27	81
TBI group	68.15	11.74	36	81

ANVOA was used to compare the difference among the 4 groups (df=3, F=60.65, p=0.00). Post hoc tests were run to compare the difference among the 4 groups. There was significant difference between Normal Group and TBI group, p=0.00. There was no significant difference between the CAS group and TBI Group, and between the VI Group and TBI group (p=0.80 and p=0.69 respectively).

Conclusion

The findings indicated that parents of TBI group's need of support was equally strong when compared to the CAS and VI group, and parents were most concerned about current and future educational support for their children. Professionals should be aware of any gaps between ongoing support and parents' unmet needs. Liaison among multiple disciplines on children's reintegration to school after hospital discharge was essential to meet parents' top priority needs. Parents should also be actively involved so that they are informed about the resources available to their children. For the above reasons, the ACI team at CAS works with schools and parents to communicate the needs of children with TBI at critical transition points on an individual basis, and initiates conferences with school personnel and parents as indicated. Through this survey, groundwork was laid for the development of a self-help group to support young persons with brain injuries and their families in Hong Kong, followed by its formal establishment in 2012. However, due to the low incidence rate of TBI and their diverse outcome, TBI is still a condition that is not widely understood and recognized within schools. Professionals' continuing, joint and systematic efforts to support and advocate for this group of children is warranted.

References

1. Sloper P, Turner S. Service needs of families of children with severe physical disability. Child Care Health Dev. 1992;18(5):259-82.
2. Blackard MK, Barsch ET. Parents' and professionals' perceptions of the handicapped child's impact on the family. Research and Practice for Persons with Severe Disabilities 1982;7:62-70.
3. Leung C, Lau J, Chan G, Lau B, Chui M. Development and validation of a questionnaire to measure the service needs of families with children with developmental disabilities. Res Dev Disabil. 2010;31(3):664-71. doi: 10.1016/j.ridd.2010.01.005

Children with Traumatic Brain Injury: School Reintegration Program

Tsang YH Lucia[1], Chan YK Donna[2]

[1] Clinical Psychologist, [2] Occupational Therapist

Children and adolescents sustain moderate and severe traumatic brain injuries (TBI) have unique challenges after discharging from hospital back to their home, school and community. The notion that these children will "grow out" of their disabilities with the assumption of increased plasticity of central nervous system remains controversial.[1]

Reintegration into appropriate school is a crucial part after paediatric brain injury. A formal transitional support system from hospital to school for these children seems to be generally lacking at the local context. Medical information is communicated in fragmented manner and interconnection and interrelationship between hospital and school are scarce, and the network is not well established. The concept of dichotomy of medical-educational systems in supporting these children is suggested to be replaced by the interdependence concept, which refers to the interconnection or interrelationship among two or more entities.[2] Medical, family, educational and community entities are responsible to one another as points of contact. The medical team provides the treatment but the treatment is provided with consideration of the eventual return of these children to the school and community. Educational psychologists and school personnel receive the children with an appreciation of the complex and unique medical, sensory and motor, neurocognitive and behavioral aspects that will affect learning and school coping of these children. The interconnection among the entities enables interactive and proactive planning, and guides and modifies the intervention and level of support rendered both at school and upon follow-up at various departments/specialties at the hospital.

Under the International Classification of Functioning, Disability and Health (ICF model) in 2001, rehabilitation planning for these patients should emphasize on their participation and involvement

in different life situations.[3] For this, our team has established a comprehensive School Reintegration Programme to help this group of patients. It plays an important role in enhancing their successful participation in school and the community. This programme involves four phases:

Preparation Phase: Before Discharge from Hospital to Home

Individually tailored assessments are conducted by different professionals. They give us information on the patients' medical stability and physical recovery, their baseline function in sensory, motor, cognitive, language and behavioral areas, and family functioning. It also helps us to identify suitable intervention strategies at home and in school, and in the development of Individualized Education Programmes (IEP) when these patients return to school.[3,4]

Second Phase: Going back to School

Our case manager will organize a multidisciplinary school conference prior to the return of patients to school. It involves our team, the patients, their parents and teachers, school social worker and educational psychologist. The school conference provides a platform for us to explain the patients' current function to the school personnel, share with them the ways to help, and discuss on possible school accommodations and how to involve the peers as assistants.

Ongoing Monitoring Phase

After the initial school conference, these patients will be returned to school. Our case manager will continue to communicate with the school representative on their progress and modify our recommendations accordingly. These include the length of daily attendance at school, school work load, participation in physical education lesson, level of teacher and peer assistance, etc. The patients, their parents and teachers should also participate in the discussion so as to gain better mutual understanding and arrive at a consensus.

Transition Phase

After the injury, these patients will go through different transition phases including transition from one grade level to another, and from primary to secondary school. Beyond that, they will also transit to post-secondary education, employment and community living. Our team may need to reassess the patients at critical points, and give further recommendations on school placement, accommodations, examination allowance and vocational training.

Conclusion

There are four phases to assist children and adolescents to go back to their school and community after the impact of brain injury. They include (1) Preparation phase before discharge from hospital to home, (2) Going back to school phase, (3) Ongoing monitoring phase and (4) Transition phase. Patients with TBI will face different challenges in each phase. A successful school reentry program should adopt a multi-disciplinary approach so as to address the functional impairments and support needs of these patients in various aspects. Our team has established the program which serves to bridge the rehabilitation gap between hospital, school and community. With this effort, it is hoped that the needs of these patients may be better understood, and that more coordinated and efficient rehabilitation intervention can be carried out, ultimately contributing to the successful rehabilitation of these patients.

References

1. Blosser J, DePompei R. Pediatric Traumatic Brain Injury: Proactive Interventions. 2nd ed. Clifton Park, NY: Delmar; 2002. Cited by: Ashley MJ, ed. Traumatic Brain Injury: Rehabilitation, Treatment, and Case Management. 3rd ed. New York, NY: CRC Press; 2010.
2. Shaklai S, Peretz R, Spasser R, Simantov M, Groswasser Z. Long-term functional outcome after moderate-to-severe paediatric traumatic brain injury. Brain Inj. 2014;28(7):915-21. doi: 10.3109/02699052.2013.862739
3. Begali V. Head Injury in Children and Adolescents: A Resource and Review for School and Applied Professionals. 2nd ed. Brandon, VT: Clinical Psychology Publishing Company, Inc.; 1992.
4. Ylvisaker M, Chorazy AJL, Cohen SB, Mastrilli JP, Molitor CB, Nelson J, Szekeres SF, Valko AS, Jaffe KM. Rehabilitative assessment following head injury in children. In: Rosenthal M, Griffith ER, Bond MR, Miller JD, eds. Rehabilitation of the Adult and Child with Traumatic Brain Injury. 2nd ed. Philadelphia, PA: F.A. Davis Company; 1990:558-92.

Recent Publications and Scientific Presentations

Publications

Cheung JP, Liu DS, Lam CC, Cheong AM. Development and validation of a new Chinese reading chart for children. Ophthalmic Physiol Opt. 2015;35(5):514-21. doi: 10.1111/opo.12228

Ng M, Chui M, Lin L, Fong A, Chan D. Performance of the visual-motor integration of preschool children in Hong Kong. Hong Kong Journal of Occupational Therapy 2015;25:7-14.

Wong AMY, Ho CSH, Au TKF, Kidd JC, Ng AKH, Yip LPW, Lam CCC. (Dis)connections between specific language impairment and dyslexia in Chinese. Reading and Writing 2015;28(5):699-719.

Scientific Presentations

Understanding typical and disordered development in speech sound system (phonology) in children. How can teachers identify and support children with speech sound system problems in schools? on 30 November 2015 at Thematic Course on Education of Students with Hearing Impairment and Speech and Language Impairment, The Hong Kong Institute of Education by CHEUNG Sau-ping, Pamela.

How to enhance the oral language skills of school-age children with language impairment on 19 November 2015 at The Hong Kong Institute of Education by CHAN Wai-ki, Amy.

Working with children with physical impairment on 18 November 2015 at Master of Educational and Child Psychology, Hong Kong Polytechnic University by CHEN Yuk-ki.

Understanding the aim, scope, and procedures on screening and assessment of oral language functions in pre-school and school-age children. How can teachers identify children with oral language difficulties in schools? on 18 November 2015 at Department of Special Education and Counselling (SEC), The Hong Kong Institute of Education by CHAN Wai-ki, Amy.

Working with children with visual and hearing impairment on 4 November 2015 at Master of Educational and Child Psychology, Hong Kong Polytechnic University by TSANG Fung-king.

The assessment and diagnosis of the students with special educational needs on 20 October 2015 at Centre for Special Educational Needs and Inclusive Education, The Hong Kong Institute of Education by SHEH Ching-shan, Annie.

Autism spectrum disorders on 13 October 2015 at Child and adolescent psychopathology course, Department of Psychological Studies, The Hong Kong Institute of Education by LAM Ling.

Management of commons paediatric problems encountered at CAC on 16 September 2015 at Department of Family Medicine and Primary Health Care, Kowloon West Cluster by Dr CHOW Chin-pang.

Childhood developmental disorders 2: abnormal development on 3 August 2015, 12 October 2015, 7 December 2015, 15 February 2016 at Department of Paediatrics, The Chinese University of Hong Kong by Dr LEE Mun-yau, Florence.

Experience sharing on 22 July 2015 at Children's Cancer Foundation by TSANG Yee-ha, Lucia and Dr LIU Ka-yee, Stephenie.

Mathematics disorder and difficulties on 16 July 2015 at Child and Adolescent Psychiatric Team, NTEC, Alice Ho Miu Ling Nethersole Hospital by CHAN Mee-yin, Becky.

Early diagnosis and management of pre-school children with hyperactive and inattentive problem on 18 June 2015 at Radio Television Hong Kong by Dr LIU Ka-yee, Stephenie.

Understanding the aim, scope, and procedures on screening and assessment of oral language functions in pre-school and school-age children. How can teachers identify children with oral language difficulties in schools? on 12 June 2015 at The Hong Kong Institute of Education by CHAN Wai-ki, Amy.

Understanding typical and disordered development in speech sound system (phonology) in children. How can teachers identify and support children with speech sound system problems in schools? on 11 June 2015 at Thematic Course on Education of Students with Hearing Impairment and Speech and Language Impairment, The Hong Kong Institute of Education by CHEUNG Sau-ping, Pamela.

How to enhance the oral language skills of school-age children with language impairment on 9 June 2015 at Department of Special Education and Counselling (SEC), The Hong Kong Institute of Education by CHAN Wai-ki, Amy.

Enhancing children's oral language skills on 25 April 2015 at Department of Educational Psychology, The Chinese University of Hong Kong by CHAN Wai-ki, Amy.

Learning to read and write: strengthening children's hand-writing related skills on 9 April 2015 at Department of Educational Psychology, Faculty of Education, CUHK by FONG Kin-han.

Application of visual strategies in intervention and teaching of children with ASD on 9 April 2015 at Diploma in Special Education (Special Learning Needs Education Course in Autism/ Asperger's Syndrome), HKU SPACE by LAM Ling.

Workshop on the Hong Kong Cantonese Oral Language Assessment Scale (HKCOLAS) on 27 March 2015 at The University of Hong Kong:

- **Administering HKCOLAS & Test of Hong Kong Cantonese Grammar** by NG Kwok-hang, Ashley
- **Textual Comprehension Test** by CHAN Yvonne Binva
- **Word Definition Test** by MAN Yuk-han, Yonnie
- **Lexical-Semantic Relations Test & Expressive Nominal Vocabulary Test** by CHAN Wai-ki, Amy
- **Nonword Repetition Test & Hong Kong Cantonese Articulation Test** by CHEUNG Sau-ping, Pamela

Assessment and clinical presentation of dyslexia: from a cognitive perspective on 26 March 2015 at Department of Psychiatry, Alice Ho Miu Ling Nethersole Hospital by CHAN Mee-yin, Becky.

Diagnostic issues on children with ASD on 26 March 2015 at Diploma in Special Education (Special Learning Needs Education Course in Autism/Asperger's Syndrome), HKU SPACE by LAM Ling.

Understanding typical and disordered development in speech sound system (phonology) in children. How can teachers identify and support children with speech sound system problems in schools? on 9 March 2015 at Thematic Course on Education of Students with Hearing Impairment and Speech and Language Impairment, The Hong Kong Institute of Education by CHEUNG Sau-ping, Pamela.

How to enhance the oral language skills of school-age children with language impairment on 5 March 2015 at The Hong Kong Institute of Education by CHAN Wai-ki, Amy.

Understanding the aim, scope, and procedures on screening and assessment of oral language functions in pre-school and school-age children. How can teachers identify children with oral language difficulties in schools? on 3 March 2015 at Department of Special Education and Counselling (SEC), The Hong Kong Institute of Education by CHAN Wai-ki, Amy.

School integration of acquired brain injury on 9 February 2015 at Education Bureau by CHAN Yau-kam, Donna.

How EPs could support students in transition from hospital to school? on 9 February 2015 at Educational Psychological Service, Education Bureau by TSANG Yee-ha, Lucia.

Learning to read and write: strengthening children's hand-writing related skills on 24 January 2015 at Department of Educational Psychology, Faculty of Education, CUHK by CHUI Mun-yee, Mandy.

Overview of child development - normal and abnormal on 16 January 2015 at School of Optometry, The Hong Kong Polytechnic University by Dr LEE Mun-yau, Florence.

Contact

Email : ro_cas@dh.gov.hk
Website : http://www.dhcas.gov.hk
Editorial Board : Epidemiology and Research Committee, Child Assessment Service, Department of Health
Address : 2/F, 147L Argyle Street, Kowloon, Hong Kong