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FOCUS on EXCEPTIONAL children

Students with Traumatic Brain Injury: Making the Transition from Hospital to School

Mary P. Mira and Janet Siantz Tyler

THE NATURE OF TRAUMATIC BRAIN INJURY

Barbara's Accident: How It All Began

Sixteen-year-old Barbara lost control of her car on a rural road and slid into a moving delivery truck. Although she was restrained by a lap belt, she slammed sideways on impact, hitting her head against the side of the car. The driver surmised that Barbara was seriously injured and summoned an ambulance on the truck's radio.

Because they were not far from town, the paramedics arrived quickly. They noted her unconscious state and that she was moving her extremities and trunk in a writhing manner. Recognizing that this indicated a head injury, they phoned ahead to the regional medical helicopter service, which met them at the local hospital. After she was stabilized at the emergency room, Barbara was evacuated to the nearby university medical center. Less than an hour after the accident, she was in the neurosurgical operating room.

The Demographics of Head Injury

Barbara's case exemplifies several typical features of traumatic brain injury (TBI). First, she was an adolescent; head injuries occur most often in the 15–24-year age range (Kalsbeek, McLaurin, Harris, & Miller, 1980). Because TBI is almost as frequent in children under age 15 (Kalsbeek et al., 1980), the peak incidence occurs among children of school age. Second, Barbara was injured in a vehicular accident. Motor vehicle accidents, either pedestrian or passenger/vehicle accidents, are the most common cause of head injuries in adolescents (Kalsbeek et al., 1980). Other causes of TBI in children include falls (the most frequent cause in young children), bicycle accidents, and other recreational activities. Among the adolescent group, sports injuries and, in some regions, assaults also result in head injuries. As a female, Barbara is not representative, the male-to-female ratio in adolescent motor vehicle injuries in about 2:1 (Kraus, Fife, Cox, Ramstein, & Conroy, 1986).

Dr. Mira is Associate Professor, Pediatrics and Dr. Tyler is Training Coordinator, Head Injury Project, Children's Rehabilitation Unit, University of Kansas Medical Center.

TBI is regarded as a low-incidence problem, with many school administrators reporting no occurrence in their schools (Tyler & Mira, 1989). Nevertheless, one in 500 school-age children will be hospitalized each year because of a head injury, and by age 15, 3% of the student body will have sustained a head injury (Kalsbeek et al., 1980). An average metropolitan district can expect 90 to 100 children a year to suffer head injuries that will have educational impact. In a small rural community three or four children may be injured annually. Thus, TBI is a significant problem within the schools.

Another feature of TBI, illustrated by Barbara's case, is that even in rural areas trauma care is often excellent, allowing those who are seriously injured to receive emergency care immediately. Children who once would not have survived severe injuries are getting prompt care, recovering, and returning to school. Thus, we can anticipate that the number of TBI children returning to school will increase as medical services become more sophisticated.

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The Nature of Barbara's Injuries

Shortly after admission to the neurosurgical service, a computerized tomography (CT) scan was performed on Barbara. This radiological procedure allowed the physicians to visualize various layers of the brain and determine the extent of the structural damage. The CT scan revealed several areas of damage. One area was deep within the brain in the region where many major blood vessels join. Another area of contusion (brain tissue damage) was on the left side, extending from the middle portion of the temporal lobe to the posterior portion of the frontal lobe (from above the ear toward the forehead). Still another region of contusion was on the right side near the back of the frontal lobe. The CT scan also indicated areas of swelling throughout the brain. Barbara's condition was critical, and she required ventilation assistance to breathe. She remained in a coma for 6 weeks.

Neuropathology for the Educator

Educators who understand what happens in a TBI are in a better position to appreciate cognitive outcomes in children returning to school following a TBI. Barbara's injuries illustrate what often happens in a closed head injury. When the head is slammed against a stationary object (in this case, the inside of the car), the brain slams against the inside of the skull at the point of impact. The brain keeps moving back and forth within the skull after the impact, slamming against the inside of the skull at the opposite side from the point of impact, tearing apart the brain substance. Because the inner surface of the skull contains a number of sharp, bony protrusions, bleeding and further contusion will occur as the brain rubs against these.

In addition to contusions from slamming, the forces within the skull following an impact pull, stretch, and rotate the brain along various planes and surfaces. This not only further disrupts tissue and blood vessels but also affects individual brain cells as fibers are stretched and often torn. The significant feature of such rotational and stretching forces is that these occur widely throughout the brain, affecting the brain diffusely and far removed from the original site of impact.

Thus, in a TBI widespread damage may be done beyond the point of impact. The stretching and tearing result in diffuse changes, which are not often visualized by procedures such as CT scans. The implication is that the effects of TBI

are generalized; they affect more than one area of the brain and, therefore, affect more than one or two skills. Rotional shearing effects, which are permanent, occur even in mild head injuries. This *primary* damage represents permanent effects of the trauma on the brain; the damaged cells will not regenerate.

Secondary effects of the trauma to the brain further influence the individual's condition after injury. Bleeding and accumulation of blood may be present within the brain. Build-up of fluids in the tissue will result in swelling. This swelling causes increased pressure within the brain, which may further restrict blood flow through smaller vessels, leading to more cell damage. These secondary effects of trauma will subside when treated; as they do, the patient's condition will improve. This early, relatively rapid improvement is often erroneously interpreted as an indication that subsequent recovery will be as rapid and complete.

Barbara's injuries exemplify several of the neurological features discussed. A significant area of her brain, most likely at the point of impact, sustained tissue damage. A region of contusion also was found opposite this point, probably as a result of the brain's rebounding against the opposite wall. Other tissue, deeper within the brain, also was damaged. The extent of primary tissue damage suggested diffuse damage to brain fibers that were not visible on the CT scan. In addition, secondary damage occurred as a result of the brain swelling. Thus, we could anticipate that Barbara would show some marked and specific deficits, at least in the early phase of recovery. And, because of the diffuse and generalized damage, she would continue to show long-lasting, if subtle, residuals.

Barbara's head injury was classified as serious because she was not fully conscious and alert for 6 weeks. The length of coma is a major criteria for classifying severity of head injuries. Although no uniform system exists for classifying TBI severity, a frequently cited system follows:

Minor: Common bumps on the head with no evidence of concussion; generally, these cases are not seen by a physician.

Mild: Only brief loss of consciousness, if any, with accompanying symptoms of concussion such as vomiting, lethargy, or lack of recall of the injury.

Moderate: Evidence of concussion; loss of consciousness, less than 5 minutes.

Severe: Concussion or skull fracture; loss of consciousness 5–30 minutes.

Serious: Loss of consciousness more than 30 minutes; concussion or skull fracture and notable neurological sequelae (Klonoff, Low, & Clark, 1977).

RECOVERY FROM TRAUMATIC BRAIN INJURY

Barbara's Hospital Course

Barbara was hospitalized for 10 weeks. During that time her neurological status gradually improved. Her coma intensity gradually diminished over the first 6 weeks, and she became more and more responsive to lighter stimuli. By the end of the sixth week, she opened her eyes on command, made motor responses to commands, and indicated when she needed to be helped to the toilet.

Soon after admission, a tracheostomy tube was inserted through an opening in her neck to maintain an airway and help her breathe. Initially she was fed intravenously with nutrients delivered directly into her bloodstream. At the end of the fourth week, this was changed to a nasogastric tube, which delivered nutrients directly into her stomach, a physiologically more normal type of feeding. At the end of the sixth week, she pulled out the tracheostomy tube and began breathing on her own. She also began feeding by mouth at that time. At the beginning of the seventh week, she was alert, walking with assistance, answering simple questions, and responding socially, with smiles and two- to three-word comments.

Patterns of Recovery Following Head Injury

Each child with a TBI progresses through the recovery process in a unique way. Recovery is influenced by the site and extent of the injuries to the brain, age, and other injuries or complications. Nevertheless, Barbara's recovery exemplifies the general recovery course.

Motor functions are among the first to improve, and gains in this area are often greater than initially expected (Brink, Garrett, Hale, Woo-Sam, & Nickel, 1970). In Barbara's case, walking to the bathroom with assistance was one of her first accomplishments. In most cases, communication skills improve rapidly (Marquardt, Stoll, & Sussman, 1988). The child may move rapidly from using short utterances to complex sentences. At discharge, children may appear to converse easily; however, more complex language skills, such as word finding, comprehending complex instructions, and formulating coherent and sequenced outputs, may continue to be problematic (Ylvisaker, 1986).

Measures of intelligence, particularly verbal IQ, may recover to near pretrauma level within several months (Rutter, 1981). IQ scores within the normal range following a TBI indicate only what the child retains of previously learned information; this does not necessarily indicate normal ability to process new information, to learn easily and organize inputs efficiently.

Recovery occurs more slowly and to a lesser degree in higher level cognitive activities (Rourke, Fisk, & Strang, 1986) and attention and memory (Levin & Eisenberg, 1979). After even a mild head injury, problems in these areas may persist for many months (Boll, 1983).

Recovery, particularly following moderate to severe head injury, is characterized by relatively rapid progress during the first few months, with continued observable changes over the first year (Chadwick, Rutter, Brown, Shaffer, & Traub, 1981). Improvement in cognitive, motor, and language functioning may continue through the second year at a slower rate, and in some cases, there will be evidence of improvement for several years after the injury (Klonoff et al., 1977).

Barbara's Rehabilitation and Education

Barbara began occupational and physical therapy within the first week of hospitalization. The therapists worked with her several times daily, using passive exercise to maintain and improve motor function. Daily speech and language therapy was begun during the fifth week, and in the seventh week Barbara began attending the hospital school daily. Included within the total rehabilitation program was a team consisting of a psychologist and two special educators devoted to the transition of children with TBI back into the school. By the sixth week this team began working with Barbara to assess her cognitive and behavioral status. The team also met with family members daily to provide information about TBI and the services Barbara might require upon school reentry. The reentry team also initiated collaboration between the rehabilitation team and her school.

Barbara was discharged from the hospital 10 weeks after the accident. Because it was near the end of the school year and because of her physical and endurance limitations, she did not return to school but instead continued her rehabilitation program as an outpatient for an additional 10 weeks during the summer. The program included homebound instruction provided by her school, which focused on her regaining previous academic skills, physical, occupational, and speech therapy, plus an academically based cognitive rehabilitation program.

This last program, developed and presented by the special educator from the hospital reentry team, used educational materials rather than isolated cognitive tasks to address her specific cognitive deficits in comprehension, memory, judgment, problem solving, organization, and sequencing. For example, to improve her reading and listening comprehension, activities were developed from the daily newspaper, in which she was to identify main ideas and locate sentences containing specific information. For memory practice the educator used exercises involving following directions, providing rapid retrieval, and reading for detail. Computer exercises provided practice in all areas. For example, one program asked Barbara to state whether a sentence was fact or opinion, a task that called upon her use of judgment.

Acute Rehabilitation Program

Children who have mild to moderate head injuries may be admitted to a general pediatric unit of the hospital. Those with more severe injuries, who require continuous monitoring of brain function, intubation, and other assistive devices, or those who have had brain surgery, will be under the care of neurosurgeons, often within an intensive care unit.

Once the child is medically stable, if residual motor or speech impairments are present, the child should be transferred to an acute rehabilitation program within the hospital. Here the child can receive a medically directed program of evaluation and treatment. He or she is evaluated for seizures, metabolic problems related to the brain damage, and orthopedic, feeding, and nutritional problems. The rehabilitation team, directed by a physician who specializes in rehabilitation medicine, develops a treatment program to maximize the extent and rate of the child's recovery. Physical, occupational, and speech therapists treat the child up to several times daily. Cognitive retraining, in the hospital classroom and in individual therapy, encourages recovery of residual cognitive skills. Other services that may be avail-

able in a comprehensive rehabilitation program include neuropsychologists who assess current brain functioning and plan cognitive retraining programs, psychologists who work with child and family, providing counseling and behavioral management services, and special educators who guide the relearning of academic material and prepare the child for reentry into school.

All of these specialists work with the child during the initial recovery period when the child is most responsive to interventions. Many children who could benefit from intense acute care rehabilitation do not receive these services because of the lack of availability in a community, or because a child without obvious deficits is erroneously assumed to be fully recovered.

Children may remain in a hospital-based acute rehabilitation program for several weeks or months. They then may continue rehabilitation therapies on an outpatient basis. Other children may require long-term treatment from a team of experts in pediatric head injury; these children may enter one of the residential programs at centers around the country that offer such specialized treatment.

SEQUELAE OF TRAUMATIC BRAIN INJURY

Effects of TBI on Barbara's Functioning

At the end of the summer, following the outpatient rehabilitation program, Barbara displayed a number of residual problems that had to be considered in developing her educational program. Physically her stamina was reduced; she required frequent rest breaks and was very tired by afternoon. She could endure only an hour and a half of sustained academic work. Her balance was poor, and her gait was clumsy, necessitating extra time to get from one place to another. She had reduced strength and dexterity of both arms, with marked incoordination of the right arm. Although she did not have seizures, she was placed on an anticonvulsant as a preventive measure for one year. She was restrieted from all contact sports for one year, because her motor problems rendered her prone to further injury.

Barbara's language comprehension had returned to pretrauma levels, but her expressive skills were impaired. She spoke slowly, with diminished oral movement, and imprecise articulation reduced her intelligibility.

Throughout her rehabilitation Barbara was always cooperative, cheerful, polite, and willing to work in her therapies. She presented no problems of compliance or difficulty with impulse control. She occasionally was silly but could control this when cued.

Her measured IQ was approaching a documented pretrauma level within the average range. Her performance on neuropsychological evaluations was characterized by reduced efficiency on complex psychomotor tasks, normal sensory perceptual functioning, reduced mental processing speed, and impaired efficiency in problem solving in novel situations. She demonstrated good recovery of higher level cognitive skills such as generating hypotheses, concept formation, and effective use of feedback. Memory problems persisted, however. Although Barbara approached normal levels on short-term memory tasks, her recall of more complex units of information depended on her familiarity with the material. Delayed recall continued to be moderately impaired.

She made steady recovery of previously learned academic material. At the end of summer, on an individual achievement measure her scores in reading and math were within the average range, and written language and knowledge were slightly below average.

Those scores, however, did not reflect her difficulty with instructional material on a day-to-day basis. Barbara read and comprehended independently at the ninth grade level but comprehended only 60% of material at the tenth–eleventh grade level. In math, although computational skills were recovering, she continued to have difficulty with word problems and defining math concepts. Before the TBI she had some difficulty with written language, and she continued to have considerable difficulty in this area. She could not generate well formulated written products or detect her errors in grammar, style, or spelling. Although she could perform several tasks at her grade level, her speed of information processing was well below what was expected for her grade.

Educationally Significant Effects of Head Injury

Long-term sequelae often are associated with moderate to severe TBI. Many times these problems occur following mild injuries as well. A number of medical problems also may be present at the time of school reentry. Approximately 5% of the children have seizures following a TBI, with the incidence increasing to 40% among children who have sus-

tained severe injuries (Hauser, 1983). In some cases the seizures occur soon after the injury; in others the onset may be delayed for as long as a year (Brink, Imbus, & Woo-Sam, 1980; Hauser, 1983). For this reason many neurologists routinely place a child on prophylactic anticonvulsant medication for the first year.

Persistent headaches are reported in up to 20% of children following a TBI (Klonoff & Paris, 1974), as are reduced stamina and fatigue (Lezak, 1978). Another characteristic, which teachers may interpret as boredom, is frequent yawning, reflecting the effects of injury rather than lack of interest or insolence.

Whereas obvious motor problems may resolve relatively quickly, problems with the execution of refined and complex psychomotor movements, particularly when speed is involved, may persist (Bawden, Knights, & Winogron, 1985). These deficits have implications for the child in the classroom because they influence the degree to which the child can keep up with class procedures such as copying, organizing material, and producing significant amounts of work.

Continuing language problems may influence how the child functions in the classroom. Although deficits such as lack of speech, restricted expressive output, and problems of breath control, which may have been present right after the trauma, may subside rapidly, more subtle and long-standing difficulties with language comprehension and expression may be present. These include problems of word finding, organization of sequenced utterances, and comprehension breakdown as instructional complexity increases (Ylvisaker, 1986).

The cognitive and psychosocial sequelae of TBI are the most important for the child's success in school. Children who have been comatose for 24 hours or more generally demonstrate some residual cognitive effects (Levin & Eisenberg, 1979). The degree of cognitive deficit is related to the amount of damage to the brain (Chadwick et al., 1981; Levin & Eisenberg, 1979). Although measured IQ may return to premorbid levels, as it did in Barbara's case, certain cognitive functions may take several years to recover and may never do so completely. Other cognitive problems that may persist include difficulties with concept formation, organization of sensory inputs, dealing with complex instructions, organizing coherent verbal or written products, and flexibility in thinking (Rourke et al., 1986). These deficits are less obvious on cursory examination but have major effects on how the child functions in school and community (Haarbauer-Krupa, Moser, Smith, Sullivan & Szekeres, 1985).

Behavioral Sequelae of Head Injury

In the period immediately following a TBI, children may exhibit a number of behavioral reactions that interfere with treatment and distress family and friends. These include agitation and confusion, impulsiveness, noncompliance with treatment, impaired judgment, and lack of sustained interest and attention (Black, Blumer, Wellner, & Walker, 1971; Klonoff & Paris, 1974). The origins of these problems stem from several sources: abnormal brain activity, demands of therapy, and restrictions on activity. Further, the irritability withdrawal, and impaired judgment may lead to adverse reactions from others, creating a maladaptive cycle that goes beyond the actual injury effects (Rutter, 1981). As schools take on greater responsibility for children recovering from TBI, many of these children will become the school's responsibility while exhibiting these early recovery behavioral patterns.

TRANSITION TO SCHOOL

The School as a Vehicle for Rehabilitation

The child's return to school is not the end point of rehabilitation. Rather, school is an extension of the rehabilitation program begun in the hospital. Because recovery from TBI continues for many months and even years, the child will be back in school while recovery is still taking place. And because the skills that are recovering are sensitive to the kinds of training that is going on, what schools provide will influence how the child recovers. Also, by its nature the educational program offers many of the features that contribute positively to recovery: a regular schedule, commitment to training, and systematic building on previous skills. The availability within school of specialists trained to provide motor, language, and educational therapies is another positive feature.

The school plays another major role in the recovery of the child with TBI. Prigatano's (1987) formulations about the role of the workplace in the adults' recovery apply to children in school. Because school is the setting for new learning, it is the place where the child faces the limits on performance imposed by the TBI and begins to develop a more realistic view of his or her new self. As the child and school together are involved in this changing perception, the school's role is significant. For this reason alone, educators must have the knowledge and sensitivity to carry this out intelligently.

The school also is important to families of the child with TBI. Families find that the support network they established during the acute phase of recovery no longer exists when the child returns to school. (Slater & Rubenstein, 1987). Thus, educators must be sensitive to changes in the family's functioning and provide support whenever possible. Families of the returning TBI child also will have to be taught that they are expected to be involved in all stages of planning the child's educational program.

Steps in Planning Barbara's Transition to School

Planning for reentry began while Barbara was still hospitalized. Throughout her rehabilitation there was collaboration between the hospital and her school. Even before her discharge from the hospital, the rehabilitation team and the reentry team, the staff from her school, and the family met together. The purpose of that meeting was to acquaint the school with her progress and needs and to discuss the kinds of services that would be available through the school.

At the end of Barbara's 10-week outpatient rehabilitation/educational program, she received a comprehensive evaluation, conducted collaboratively by hospital and school staff. The psychologists from her school and from the reentry team jointly conducted the assessment of cognitive and neuropsychological functioning. The homebound teacher from the school and the reentry team special educator jointly conducted assessment of her academic status and needs.

Just before the start of the school year, a reentry planning meeting took place at Barbara's school. Attending were the 15 school administrators and staff members who would have contact with her, a member of the reentry team, Barbara, and her parents. Taking into account the information provided by the hospital and her recent evaluation, the group developed an individualized education plan based on her physical, cognitive, and academic status. The plan provided the following educational modifications:

1. *Reduced course load:* Barbara enrolled in a limited number of academic courses with the understanding that others could be added.
2. *Special scheduling:* Barbara took her most taxing courses early in the day, when she was most alert.
3. *Resource room:* Barbara would begin and end the day in the resource room with an aide present to provide assistance.
4. *Rest breaks:* Barbara was allowed to rest in the nurse's office when she became fatigued.
5. *Adaptive physical education:* Barbara would receive adaptive PE with an aide present to assist her at all times, because of the danger of her falling.
6. *Student aide:* One of her friends would assist her in moving from one class to the next.
7. *Extra set of books:* Barbara was given an extra set of books to keep at home, to avoid having to carry them back and forth.
8. *Lunch room provisions:* Because Barbara was still physically unsteady, someone would carry her lunch tray and have her seated before the lunchroom crowds arrived.
9. *Counseling:* Meetings were scheduled with the school counselor, and she was given the option for other meetings as needed.
10. *Other modifications:* Barbara would be allowed to have someone take notes for her in her class and tape her lectures, and she would be able to take her exams in a setting other than the regular classroom, with extra time allowed. She also would have use of a computer to complete assignments.

At the initial IEP meeting the need to closely monitor Barbara's progress was noted. Thus, a schedule was established that provided for monthly IEP reviews for the first semester and every few months thereafter.

A Transition Model

All too often the child with TBI is discharged from the hospital directly to home and school, with minimal planning for the transition. The family has little information about the child's residual problems and how they will affect learning in school. Family members are thus poorly prepared to advocate for their child. The school may not receive any information about the student's recovery course until he or she is back in school. Without prior reentry planning there is a potential for educational disruptions as the student's special needs are gradually identified and accommodations made.

In Barbara's case, her transition to school was guided by a comprehensive reentry program. Although hospital-based, it

was financially supported by her state's Department of Education. The program included several components that are critical for a successful transition.

First, a designated person or team was to be responsible for the interchange of information between hospital and school. This allowed the rehabilitation staff to learn about Barbara's pretrauma functioning and about the services her school could offer. Also, the reentry team was responsible for communicating to Barbara's school staff information about her injury and recovery course; and it arranged the predischarge conferences attended by hospital and school personnel.

A second component of a comprehensive reentry model is the education of families about TBI. Families need information about ways in which their child's injury will affect learning, and about school resources to meet special needs. Education of families does not automatically occur throughout the course of rehabilitation. Members of the rehabilitation team may not know how schools function and what kinds of educational modifications the child's residual deficits may dictate.

A third important component of a comprehensive reentry program is the preparation of school personnel for the reentering child. School personnel have not been trained in the characteristics, needs, and programming requirements of children with TBI (Mira, Meck, & Tyler, 1988; Savage & Carter, 1984). Also, educators often do not receive the necessary information to plan an appropriate program for the returning child (Tyler & Mira, 1989). A comprehensive reentry program addresses this issue; it provides inservice training to educators and bridges the information gap between the medical and educational worlds.

The Reentry Process

Criteria for School Reentry

The timing of reentry to school should not be determined by the school calendar but instead by carefully determining the degree to which the student is able to participate in the school setting. Before returning to school, the child with a TBI should display the ability to carry out the following: (a) sustain attention to a task; (b) work for 30 minutes without a break; (c) tolerate the multiple stimuli in a normal classroom; (d) respond to instruction; (e) interact with the environment (Mira, Tyler, & Tucker, 1988).

Evaluation of the Student

An early step in the transition from the acute rehabilitation program to school is a comprehensive evaluation of the student's physical, educational, and social needs. Comprehensive assessment of a student with TBI is usually beyond the combined competence of the public school staff. A range of specialists, such as those from neurology, neuropsychology, physical and occupational therapy, audiology, and ophthalmology should be included (Martin, 1988). Often these evaluations are conducted within the rehabilitation program, perhaps prior to discharge.

As much as possible, members of the school's diagnostic team should participate in the comprehensive assessment of the child. For example, the intelligence testing can be completed by the school psychologist and used in combination with the neuropsychological assessment to provide information on cognitive, linguistic, mnemonic, sensory, and perceptual motor skills (Fay & Janesheski, 1986). The information from this comprehensive evaluation constitutes important data for the school to consider when preparing the child's individualized education plan.

Staff Training

Before the student with TBI returns to school, all personnel who are likely to interact with the student will need information about TBI and how the injury has affected this specific student. Those who knew the student before the injury must be informed about how the child will be different. Those who worked with the child before often have difficulty understanding that the child may now have a different learning style, pattern of reacting, and physical status.

Although staff training may occur during the initial IEP meeting, inservice training programs should be in place to inform the staff about TBI and its ramifications (Savage & Carter, 1984). Increased understanding of the effects of TBI may lead to more appropriate evaluations and better planning for the child, which may prevent a negative cycle of failure from beginning (Boll, 1983). During the inservice training the staff should receive general information about TBI, characteristics of children so injured, outcomes, and educational programming strategies. In addition, the staff should receive comprehensive information about the student's educational history, the nature of the accident and resulting injuries, rehabilitation course, and residual deficits. The staff also must understand that children with TBI often change rapidly and that educational programs have to be constantly reviewed and changed to meet the student's current needs.

Training educators about TBI has become a part of many reentry programs (Jacobs, 1989). A number of written resources are available for educators (Begali, 1987; Mira, Tyler, & Tucker, 1988; National Head Injury Foundation, 1988; Rosen & Gerring, 1986), as well as training modules for those who educate teachers (Tyler, 1990).

The IEP Meeting

Because of physical and cognitive impairments, students who have sustained a TBI qualify for special education services and an individualized education program (IEP) under PL 94–142. To avoid educational disruptions, the student's IEP should be developed prior to school reentry. Unlike other children, for whom school observations and evaluations can provide most of the information for educational planning, much of the relevant data about needs of the student with TBI is provided by professionals outside of the school. Because team collaboration between rehabilitation and educational specialists is needed for the student with TBI to best continue recovery (Savage, 1987), input from hospital and school personnel should be considered jointly when planning for the student. Furthermore, because most school personnel at this point have limited knowledge about programming for students with TBI (Mira, Meck, & Tyler, 1988), they must consult with specialists from outside the team when developing the student's program.

Any student needing special services poses a challenge to a school district, but the child with TBI poses a unique challenge (Martin, 1988). A common problem relates to labeling the student for special education services. Until recently TBI was not a category by itself, so many of these students were given labels of other handicapping conditions. Because students who have sustained a TBI have rapidly changing needs, however, these other categories often are inappropriate for children with TBI. Furthermore, the child with a TBI may respond differently to intervention programs designed for other groups (Ewing-Cobbs, Fletcher, & Levin, 1985).

Now P.L. 101-476, the Individuals with Disabilities Education Act (1990), adds TBI to the definition of children with disabilities. However, until the future time when these mandated changes are translated into practice, schools will have to continue to rely on existing services.

Therefore, rather than trying to fit the child with a TBI into a specific category, the goal of the IEP meeting should be to identify the student's unique educational needs and to determine which available school resources can be integrated to provide the program to best meet those needs.

The initial IEP meeting is only the first step in providing for the child with a TBI. Because goals, strategies, priorities, and services have to be adjusted according to the specific, yet changing, needs of the individual student (Begali, 1987), the child's progress must be continually monitored. After an IEP is developed, the school staff must maintain a network to promote ongoing communication about the student's performance and changing needs (DePompei & Blosser, 1987). At the initial IEP meeting, review dates should be set up and the staff and family encouraged to meet more frequently if changes are necessary.

Placement and Program Modifications

Problems of stamina often preclude the child with a head injury from physically returning to school, even though the child is ready to begin some educational activities. Thus, following a TBI, children commonly reenter the school system via homebound instruction. Homebound instruction cannot consist of merely delivering class assignments to the student. The homebound teacher must be knowledgeable about the needs of students with TBI and be able to modify materials for the child's unique learning characteristics (Martin, 1988). The student also must have continuity in the necessary therapies as he or she makes the transition from rehabilitation program to school.

The student may return to school with a reduced schedule or modified course load, with classes and activities to be added as attention and stamina increase. It is important for the child to return to the world of school, even on a limited basis, as soon as possible, because school is the ideal place for the student's continued cognitive and social rehabilitation (Savage & Carter, 1984).

Returning to school following a head injury can be a difficult transition. The child will be leaving an environment where others have similar difficulties and entering a setting where the injuries will clearly set him or her apart from peers (Rosen & Gerring, 1986). Some suggested activities to help ease the transition include making visits to school prior to reentry, preparing the child to tell classmates about the accident and treatment regime, and playing a videotape of the child's rehabilitation.

Once back in school, the educational program of the child with a TBI may require modifications. The child may have to be placed differently from the pre-injury placement. As many as half of the students sustaining severe to serious TBI require special education placements (Mira, 1989; Walker, Luckhard, Owen, Easley-Bowman, & Scott, 1987). Children returning to a regular educational setting will more than likely require programming modifications. Barbara's case exemplifies some typical educational modifications. Compensations for lack of speed (e.g., extra time for exams) and physical restrictions (providing rest breaks and assistance in moving between classes) allowed Barbara to participate in regular education courses. Modifications such as these minimize the student's deficits and allow him or her to remain in a less restrictive school environment.

EDUCATIONAL OUTCOMES OF TBI

Barbara's Educational Course

Following Barbara's reentry to school, the school and the reentry team monitored her progress via the scheduled review meetings. These meetings proved to be vital for recognizing and planning for problems that arose in several areas. First, Barbara's continued difficulties with short-term memory and ability to work independently required modification of classroom strategies. Another issue related to problems in administering and delivering her program. These included overlooking the inservice of new teachers who were not aware of Barbara's head injury and special needs, and disruptions of communication between family and school.

The value of the review meeting was recognized when difficulties arose after a major schedule change was made without a planning meeting. Adding two new courses to Barbara's schedule and dropping time in the resource room led to problems in her keeping up with her work, and lower grades.

When Barbara returned to school, she was relatively free of emotional or behavioral problems. During her first year back in school, however, she sometimes resisted the resource room services. This could have reflected a typical adolescent response to being different from her peers by needing special help. Her major psychosocial problem occurred at the end of her junior year, as she began realizing the extent of her disabilities. This, coupled with the fact that her friends were not as supportive as they were right after her injury, led to feelings of isolation and depression. A counseling program outside of the school aided her in dealing with these problems and moving out of the depression.

With careful monitoring and program revisions as needed, and continued use of resource services, Barbara completed her junior and senior years with passing grades in all subjects. With the help of summer school courses, she accumulated the needed credits to graduate with her class. Her plans included college the next fall at a small university near home that offered special assistance for students with handicapping conditions.

School Progress

After a severe or serious TBI, approximately half of the children will require special education (Mira, 1989), and those who return to the regular class require some form of modification (Walker et al., 1987). Without specialized planning and programming, many children with TBI experience disruptions in school progress. For example, Klonoff, Low, and Clark (1977) found that of the children who returned to the mainstream after a TBI (including those with mild injuries), 20% failed or withdrew from school after successive failures. Difficulties in academic areas and behavior problems may lead to these failures.

After a TBI, progress in specific academic areas is frequently disrupted. Scott (1984) found that following a TBI, students experienced a significant decline in all academic areas (reading comprehension, language/vocabulary, spelling, and arithmetic), with reading comprehension most greatly impaired. Similarly, Shaffer, Bijur, and Rutter (1980) reported that 1 to 2 year delays in reading comprehension are common in students with TBI.

Math is another academic area that often is affected by a TBI (Levin & Benton, 1986). In TBI students he studied, Adams (1990) found that mathematic application was the academic achievement area most negatively affected. Problems with math may be attributable to computational deficiencies, focusing difficulties, and attention problems, as well as organizational difficulties. Long-term language difficulties may affect all areas of academic functioning. Expressive and written language disorders often interfere with the child's overall school performance (Ylvisaker, 1986).

Behavior problems also may interfere with school progress. Up to half of children with a severe TBI demonstrate behavioral problems (Brown, Chadwick, Shaffer, Rutter, & Traub, 1981). Although behavior problems can occur in children who were free of problems prior to their injury, those with behavior problems before their accident almost always show post-injury behavior difficulties (Rutter, 1981). Behavior problems may include emotional difficulties and socially inappropriate behaviors (Brown et al., 1981), as well as depression and withdrawal (Barin, Hanchett, Jacobs, & Scott, 1985). Even though it is

important for school personnel to help the child deal with behavioral problems, parents have reported that school personnel often fail to recognize or provide for the student's social-interactional needs after a TBI (Walker et al., 1987).

Long-term academic and behavioral problems following TBI require school personnel to plan programs that address the child's needs in these areas.

CONCLUSION

The transition from hospital to school may be a difficult process for children following a traumatic brain injury. In the case presented here, a student made a successful transition following a serious head injury. Barbara's case was typical in many respects (type of accident, age at type of accident, recovery patterns), but several factors contributed to her successful reentry into school.

One factor was that her hospital had a reentry program supported by the State Department of Education. The staff was trained in head injury and could devote time to planning an effective transition.

Second, Barbara's school district had a strong commitment to provide a program to meet her needs and regularly monitor her progress. Successful reentry requires school personnel to acknowledge that the child with the TBI is unique and will require specialized programming (Blosser & DePompei, 1989).

Third, Barbara's family was a positive feature in her recovery and reentry. The family's premorbid stability, response to the original trauma, and positive view of her rehabilitation program were assets in her adjustment to her post-injury impairments. Their ability to learn about Barbara's needs and the school resources enabled them to advocate effectively for her with the school.

Finally, Barbara did not have a prior history of any behavioral, learning, or attentional deficits that can complicate post-injury adjustment (Jaffe & Hays, 1986). She also remained free of significant behavior problems following the TBI, which encouraged all to maintain the intense transition program.

Although most of these factors are not within the school district's control, they all contribute to the successful school reentry of children following TBI, and therefore must be considered. If a formal reentry program is not in place, educators must take the initiative in establishing communication with rehabilitation programs and in obtaining the needed information from hospital personnel.

Educators can make the necessary commitment to provide the best possible program for the child by being knowledgeable about TBI and realizing that the child will require specialized programming. Furthermore, because the family plays such an important role in the child's recovery, school personnel can work with the student's family to further understanding of their child's post-injury impairments and implications for the child's learning. Finally, by recognizing that behavioral and academic problems are common following a TBI, educators can establish programs that will best meet the needs of the individual student.

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