An International View of Traumatic Brain Injury

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An International View of Traumatic
Brain Injury

BY
Erin Wesley

THESIS
SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
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I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
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DATE
An International View of Traumatic Brain Injury

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Abstract

Traumatic brain injury (TBI) is the leading cause of disability in the world. This was a descriptive study implemented through a survey which gathered information on epidemiology, demographics, service delivery, and the role of the SLP in countries outside the United States. Contact persons were notified and asked to distribute surveys to health care professionals who work with TBI. The survey was completed by 14 individuals in 5 different countries. Countries included Brazil, Israel, Italy, South Africa, and United States.

Compilation of this information revealed that there was a large variety of answers both within and between countries. There was no common definition given for TBI across countries, and few countries had access to national epidemiological information. Etiologies of sports related injuries resulting in TBI varied across countries. Demographic data across countries showed that males aged 14-24 were at the highest risk for obtaining a TBI. Additional factors associated with TBI in the various countries were identified. Results on service delivery for TBI revealed that various measurements and categorizations for TBI were used across countries. Team members involved in patient care also varied. The speech-language pathologist's role was also different among countries.
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CHAPTER 1

Introduction

Traumatic brain injury (TBI) is the leading cause of disability worldwide (Brain Injury Association, 1997a). TBI is an insult to the brain that may result in impaired cognitive abilities or physical functioning. The impact of TBI on individuals varies in the degree of severity and associated characteristics. In the United States (US), there is one TBI every 15 seconds (Brain Injury Association, 1997b). The primary causes of TBI in the US are motor vehicle accidents, falls, assaults, firearm injuries, and sporting injuries.

In the US, findings indicate that young adult males are at the highest risk for TBI. Males are also twice as likely to sustain a TBI as females. A person who sustains a brain injury is usually unmarried, living independently, and is employed or in school (Gordon, Mann, & Willer, 1993). Additional factors that have been associated with an increased risk for TBI in the US include substance abuse, preexisting learning disorders, pre-traumatic individual or family dysfunction or psychiatric illness, and prior brain injury (Brain Injury Association, 1997b). Other contributing factors to TBI include not wearing a seat belt, not wearing a helmet, and being intoxicated at the time (Gordon et al.).

TBI can be described in many ways. In the US, TBI is classified as either a penetrating brain injury or a closed head injury. Measurements used in describing behaviors associated with TBI include the Glasgow Coma Scale, Children's Coma Scale and Rancho Los Amigos' Levels of Cognitive Functioning. TBI is measured in
terms of mild, moderate, or severe depending on the characteristics observed.

Interventions in the US, specifically in the acute care unit, combined with efficient teamwork help to minimize secondary injuries and to maximize functional outcomes (Mackay, Chapman, & Morgan, 1997). Ragnarsson, Thomas, and Zasler (1993) made recommendations for service delivery associated with TBI based on information gathered from medical treatment of TBI. Recommendations included having the following rehabilitation professionals work with TBI patients: rehabilitation nurses, physical and occupational therapists, speech-language pathologists, neuropsychologists, social workers, vocational counselors, recreational therapists, nutritionists, and pharmacists. Ragnarsson et al. also suggest that all TBI patients admitted to an acute care facility should undergo complete neurological and medical evaluations to identify factors that may compromise neurological functioning. Evaluations should include a case history, physical exam, and functional measurement.

Speech language pathologists (SLPs) in the US assess and treat a greater number of communication disorders than ever before. Among those with acquired disorders are patients with TBI. ASHA (1991) has published documents related to cognitive communication after TBI.

Many articles about the different practices of SLPs in various countries have been published. However, no articles have addressed the role of SLPs in working with TBI in other countries. Since TBI is the leading cause of disability in the world, information gathered would be useful for SLPs to develop an understanding about TBI as an international health problem and the role the SLP has in each country.
The purpose of this study was to provide additional information on the epidemiology, demographics, and service delivery of TBI in countries other than the US. The role of the SLP in serving patients with TBI was also investigated. The following research questions were asked:

1. What is the epidemiology of traumatic brain injury in countries outside the United States?
2. What are the demographics of those who sustain traumatic brain injuries outside the United States?
3. What is the service delivery pertaining to traumatic brain injury in countries outside the United States?
4. What is the role of the speech-language pathologist in serving patients with traumatic brain injury outside the United States?
CHAPTER II
LITERATURE REVIEW
Defining Traumatic Brain Injury

Traumatic brain injury (TBI) is the leading cause of disability in the United States (US) (Brain Injury Association, 1997a). TBI is defined by the Brain Injury Association as "an insult to the brain, not of congenital nature, but caused by an external physical force that may produce a diminished or altered state of consciousness, which results in an impairment of cognitive abilities or physical functioning" (1997b, p.1).

Traumatic Brain Injury in the School System

In 1992, TBI was included as a special education disability category in the US (Federal Register, 1992). In the school system, TBI is defined as acquired brain damage caused by an external physical force which is not caused by congenital birth defects or birth trauma. TBI may include open or closed brain injuries which impair language, speech, memory, and other factors which negatively impact on academic performance (Federal Register). With the addition of this disability category and the higher number of children with head injuries returning to the schools, proper identification of those children with TBI is important so that they may receive the necessary support services. (Blosser & DePompei, 1994).

Epidemiology of Traumatic Brain Injury in the United States

Hensyl (1990) defines epidemiology as "the study of the relationships between
the various factors that determine the frequency and distribution of diseases in human and other animal populations” (p.522). In the US, epidemiological data on TBI have been collected by organizations such as the Brain Injury Association, Traumatic Coma Data Bank, National Center for Health Statistics, and independent researchers (Frankowski, Annegers & Whitman, 1985; Harrison & Dijkers, 1992; Willer, Abosh, & Dahmer, 1990).

**Incidence of Traumatic Brain Injury**

The number of actual occurrences of TBI in the US is difficult to ascertain because incidence rates vary from study to study, and according to differences in TBI definitions and reporting procedures (Hartley, 1995). In the United States, approximately two million cases of TBI occur each year (Brain Injury Association, 1997b). About 500,000 of those with TBI are hospitalized each year. Of these, 99,000 individuals sustain moderate to severe brain injuries that result in life-long disabling conditions. Many of these individuals will not be able to return to a normal life (Brain Injury Association, 1997b). More than 20,000 children each year will have permanent disabilities resulting from TBI (Blosser, & DePompe, 1994). TBI impacts the US economically, costing approximately 48.3 billion dollars annually (Brain Injury Association, 1997b).

**Etiology**

The primary causes of TBI in the United States are well established and include motor vehicle accidents (MVA), falls, assaults, firearm injuries and injuries occurring in recreational and sport activities (WHO Collaboration Centers for
Consequences of TBI may vary according to age, severity of injury, geographic location, and various sources of data (Blosser & DePompei, 1994). According to the Brain Injury Association (1997d), vehicle crashes are the leading cause of TBI, accounting for fifty percent of all cases. Falls are the second leading cause, accounting for more than twenty percent of all TBIs. Trends in TBI show that infants, toddlers, preschoolers, elementary-age students, and adolescents will sustain injuries in various ways (Blosser & DePompei).

**Infants and Young Children**

According to the 1997 National Pediatric Trauma Registry (as cited in Brain Injury Association, 1997c), about one third of all pediatric injury cases in the United States result in brain injury. The leading cause of serious brain injury among infants is physical abuse. Approximately 64% of children under one year of age who are abused physically sustain brain injury. Data indicate abuse is a growing contribution to TBI. Infants will also sustain brain injuries from mishandling by caregivers such as accidental dropping and rolling off from a changing table (Blosser & DePompei, 1994). Falls account for fifty percent of the brain injuries among children under five years of age. Toddlers and preschoolers may sustain injuries from falls, MVA, and physical abuse (Blosser & DePompei). Pedestrian-MVA and bicycle crashes are most prevalent among school-age children (Blosser & DePompei).

**Older Adults**

In the elderly population, falls account for the majority of TBI (Hartley, 1995). Gordon et al. (1993) noted that most falls (76%) occurred in those 56 years of age and
older. In a Gordon et al. study which included 20 individuals between the ages 56-65 years who had sustained a TBI, 70% were intoxicated at the time of the injury.

**Children and Young Adults**

Children and adolescents show trends in sustaining TBIs with MVA, all terrain vehicle accidents (ATV), motorcycle accidents, pedestrian accidents, bicycle accidents, injuries during play, sports injuries, risk taking behaviors, and assaults (Blosser & DePompei, 1994). MVAs and falls account for approximately 80% of all childhood injuries. In children, violence is also a leading cause of injury, especially when guns are involved (Brain Injury Association, 1997a).

**Sports and Brain Injury**

According to the Brain Injury Association (1997b), each year more than 750,000 Americans report injuries that occurred during recreational sports. Approximately 82,000 of these involve brain injuries. Males are twice as likely to be involved in a sports-related injury than females. However, when contact sports are disregarded, the rate of injury for males and females is similar (Brain Injury Association, 1997b).

In the US, contact sports such as football and soccer have a higher rate than non-contact sports such as track and field, horseback riding and ice skating. In a given football season, 10% of all college players and 20% of all high school players are estimated to sustain brain injuries (Brain Injury Association, 1997b). Football players with brain injuries are six times as likely to sustain another brain injury (Brain Injury Association, 1997b). Approximately five percent of soccer players receive a brain
injury which may result from head to head contact, falls, or being struck by a ball on the head. Of all injuries sustained in winter sports (skiing, sledding, ice skating and ice hockey), 46% include TBI. Of all horseback riding injuries, 17% include TBI. Brain injury is estimated to occur to approximately 87% of professional boxers (Brain Injury Association, 1997b).

Demographics of Traumatic Brain Injury

Hensyl (1990) defines demographics as "the study of groups of people, their environment, their geographic distribution and other characteristics" (p. 411). Studies have identified factors associated with sustaining a brain injury (Frankowski et al., 1985; Gordon et al., 1993; Harrison & Dijkers, 1992).

Gordon et al. (1993) presented research using demographic data gathered from 325 individuals with TBI who were included in the TBI model system database. This study examined several factors associated with TBI including demographic and social characteristics, etiology of TBI, and factors contributing to injury. Findings indicated that in the US males aged 14 to 24 years are at the highest risk for TBI, followed by infants, then the elderly. In the 14 to 24 year age group, males are twice as likely as females to sustain TBI. This increased risk is believed to be due to the differences in exposure and life style of males in the US. The Gordon et al. study suggested that African Americans make up thirty-four percent of brain injuries. According to the 1990 National Census data, African Americans represent only 16% of the population in the US, suggesting an over representation of minorities with TBI in the US.

Additional factors have been associated with increased risk for TBI: substance
abuse, preexisting learning disorders, pre-traumatic individual or family dysfunction or psychiatric illness, and prior brain injury (Brain Injury Association, 1997d). A higher incidence of TBI has been associated with low socioeconomic status and/or residence in high density urban areas (Hartley, 1995). Other contributing factors to TBI include not wearing a seat belt (MVAs) and not wearing a helmet (bicycle and motorcycle accidents). When TBIs occur as a result of MVAs, alcohol is involved in more than fifty percent of cases in the US (Brain Injury Association, 1997b; Gordon et al., 1993).

Describing Traumatic Brain Injury

In every TBI case, the unique status of each individual who acquires TBI and the variety of mechanisms that contribute to the brain injury location and severity should be considered. In the US, the type of traumatic brain injury is classified in two ways; 1) as a penetrating brain injury and 2) as a closed head injury (CHI) (Beukelman & Yorkston 1991).

Types of Damage After Traumatic Brain Injury

Penetrating Brain Injury

Penetrating brain injury, also known as open head injury, usually results from a gunshot or stab wound. Persons sustaining this type of injury usually sustain focal brain lesions and, therefore, present a clear case for the clinician. The damage is usually localized and the TBI will result in specific deficits related to that area. For example, there may be no problem with graphic skills but difficulties with forming speech may be evident (National Head Injury Foundation, 1989).
Closed Head Injury

Deficits which occur after CHI are a result of both primary and secondary damage. Primary damage occurs immediately following or as a result of impact, such as, diffuse anoxal injury, hematoma, and cerebral contusion (Freund, Hayter, MacDonald, Neary, & Wiseman-Hakes, 1994). Secondary damage is not present at the initial time of the injury but is due to the body's response to the primary damage, for example, swelling of the brain (Hartley, 1995). CHI may result in physical, emotional, intellectual, social and/or vocational problems (National Head Injury Foundation, 1989).

The Nature of Traumatic Brain Injury

Acceleration/deceleration during a traumatic injury can result in deformations of the brain that cause damage. These deformations may be caused by force that pushes the brain tissue together or pulls it apart. Parallel force may cause sheering of brain tissue. These brain tissue deformities are directly responsible for some of the major TBI pathologies, diffuse anoxal injury (DAI) and focal contusions (FC) (Katz, 1992).

**Diffuse brain injury.**

DAI is the major type of diffuse pathology after CHI. In diffuse anoxal injury, axons are pushed together and pulled apart by the force of acceleration/deceleration. Axonal stretching may cause temporary or irreversible damage (Katz, 1992).

Subdural and epidural hematomas are other important consequences of TBI. Subdural and epidural hematomas are hemorrhages that occur in areas surrounding the
brain. These can lead to secondary brain damage as a result of the shifting of brain structures (Katz, 1992).

Focal brain injury.

Focal contusions are also a consequence of TBI. Focal contusions may appear in any area of the brain but are usually located at the anterior and inferior surfaces of the temporal and frontal lobes after TBI. Focal contusion involves edema, hemorrhage and tissue distortion which later creates an area of retraction and scarring (Katz, 1992).

Measurements Used in Assessing Persons with Traumatic Brain Injury

Various measurements are used in assessing behavior after TBI. The Glasgow Coma Scale (GCS) (Teasdale & Jennett, 1974), Children's Coma Scale (CCS) (as cited in Begali, 1992) and the Rancho Los Amigos' Levels of Cognitive Functioning (Ranchos) (Hagen, 1984; Hagen & Malkmus, 1979) are widely used in the US.

Glasgow Coma Scale

The GCS (Teasdale & Jennett, 1974) is used in acute care facilities. The GCS provides a standardized method of observing neurologic function by evaluating eye openings, motor responses, and verbal responses. The patient is given a score for each of the parameters and the scores are totaled to give the final GCS score (Beukelman & Yorkston, 1991; Mackay, Chapman, & Morgan, 1997).

Children's Coma Scale

The CCS (as cited in Begali, 1992) is used to assess consciousness in infants and children under the age of three. The CCS uses a scale to rate the presence or
absence of physiological indicators. The verbal portion of the CCS is better suited for the preverbal child (cries, etc). The CCS uses different scoring procedures than that of the GCS. Therefore, scores cannot be compared and the CCS score cannot be applied to the GCS to obtain a severity rating (Begali, 1992).

**Ranchos Los Amigos Scale**

The Ranchos (Hagen, 1984; Hagen & Malkmus, 1979) is a hierarchical description of behaviors that change as a person emerges from the coma. General behaviors are described that can be expected during each stage of recovery. Early stages of recovery include no response, generalized response and localized response. Middle stages of recovery include confused-agitated, confused, inappropriate, nonagitated and confused-appropriate. Late stages of recovery include automatic-appropriate and purposeful and appropriate. A patient may be in more than one stage at a time. A patient may also plateau and remain in a stage for an extended period of time or move rapidly through the stages. The Ranchos is used for ages 14 years and older. The scale has been adapted for children by the Ranchos staff at Ranchos Los Amigos Hospital, but it is not as widely accepted as the adult version (Blosser & DePompei, 1994).

**Severity of Traumatic Brain Injury**

In the US, TBI is categorized into severe, moderate, and mild injury. Severity levels of TBI are usually defined by an overall definition of characteristics displayed.
Mild Traumatic Brain Injury

Mild TBI is characterized by very brief or no loss of consciousness present at the time of injury. A brief loss of consciousness is defined as no longer than 30 minutes. The patient with mild TBI demonstrates a GCS score between 13 and 15 and a loss of memory for day to day events not more than 24 hours. Focal signs of brain injury may be present and signs of a concussion may include headache, nausea, dizziness, vomiting, lethargy, difficulty concentrating, and irritability. Symptoms resolve in 90% of the mild brain injuries within days to a few weeks. Computerized tomography (CT), magnetic resonance imaging (MRI), electroencephalogram (EEG), or routine neurological evaluations may be normal. Only ten percent of those with mild TBI have residual deficits that last for a lifetime (Alexander, 1995; Beukelman & Yorkston, 1991; Blosser & DePompeo, 1994; Mild Traumatic Brain Injury Committee, 1993).

Moderate Traumatic Brain Injury

Moderate TBI is characterized by loss of consciousness for up to 24 hours with a GCS score of 9-12. Neurological signs of trauma to the brain may include hemorrhage, skull fracture, contusions (bruises), or focal damage identified by neuroimaging. Rimel (as cited in Wilson, 1998) found that persistent headaches, memory problems, and impairments in activities of daily living continued for as long as three months post-injury in patients with moderate TBI.
Severe Traumatic Brain Injury

Severe TBI is characterized by coma duration longer than 24 hours and a GCS score between 3-8 (Beukelman & Yorkston, 1991). Patients with severe TBI are likely to require immediate, intricate, and systematic medical treatments such as mechanical ventilation, intravenous therapy, and/or neurosurgery. Various cognitive, physical, social, emotional, behavioral, and cognitive-communicative impairments are likely to be included in the disability that results from a severe TBI (Beukelman & Yorkston; Blosser & DePompeoi, 1994; Mild Traumatic Brain Injury Committee, 1993).

Consequences of TBI

Various consequences may result from TBI. These may include cognitive impairments, physical impairments, and psychosocial/behavioral/emotional problems. Cognitive impairments may include difficulties with concentration, judgment, communication, planning, short and long term memory loss, and spatial judgment. Physical impairments may include seizures, muscle spasticity, vision, hearing, smell and taste loss, speech impairment, headaches, and reduced endurance. Psychosocial/behavioral/emotional problems may include anxiety and depression, mood swings, denial, sexual difficulties, emotional liability, ego-centricitism, impulsivity and disinhibition, agitation, and isolation (Brain Injury Association, 1997d). The sequelae of TBI may vary according to severity of injury, age, geographic location of the patient, and pre-injury abilities (Beukelman & Yorkston, 1991; Blosser & DePompeoi,
Service Delivery Model Systems of Care in the United States

Interventions, specifically in the acute care unit, along with interdisciplinary teamwork minimize secondary injuries and maximize functional outcomes in the patient with TBI. Although rehabilitation teams are formed according to the severity of injury and the availability of staff, certain members are essential. Core members of the TBI team in the US may include the family and professionals in respiratory therapy, social work, dietetics, physical therapy, occupational therapy, speech/language pathology, insurance representation/case management, discharge planning, nursing, and medicine (Mackay, Chapman & Morgan, 1997).

Medical Treatment for Traumatic Brain Injury in the United States

Ragnarsson, Thomas, and Zasler (1993) reported a model system of care in five medical facilities (Mount Sinai Medical Center, Wayne State University, Medical College of Virginia, The Institute for Rehabilitation and Research, and Santa Clara Valley Medical Center) in the US for patients with TBI. The study was funded by the National Institute on Disability and Rehabilitation Research. The purpose of this study was to demonstrate system of care effectiveness and the benefits derived from innovative rehabilitative interventions. These model systems provided recommendations for care from the onset of the injury and during acute care, inpatient, outpatient, and rehabilitation services.

The objectives of the model TBI system were to: (a) evaluate cost-benefit and service delivery outcomes of persons with TBI; (b) establish a research program to
develop a new database and conduct innovative analyses of TBI information; (c) demonstrate and evaluate the development and application of improved and innovative methods essential to the care and rehabilitation of individuals with TBI; and (d) participate in national studies of the TBI model system concept by contributing to a national TBI database as prescribed by the Secretary of Education (Ragnarsson et al., 1993).

Ragnarsson et al. (1993) made recommendations based on information gathered in the study of TBI model systems. Recommendations included specifying the rehabilitation professionals who should work with TBI patients. Those included were rehabilitation nurses, physical and occupational therapists, speech-language pathologist, neuropsychologists, social workers, vocational counselors, recreational therapists, nutritionists, and pharmacists. Ragnarsson et al. suggested that all TBI patients admitted to an acute care facility should undergo complete neurological and medical evaluations to identify factors that may compromise neurological functioning. Evaluations were recommended to include a case history, physical exam, and goals for a functional recovery.

Guidelines for model systems of care are recommended because complete care of individuals with severe TBI can rarely be provided by one institution. Consequently, care is often fragmented and limited to services offered in the neighboring towns. Without a protocol of care, acute care management may be mostly handled by the attending surgeon. Rehabilitation therapy may not occur for a few weeks after TBI. Timely and appropriate intervention can have a great impact on
the outcomes associated with TBI.

The Role of the Speech Language Pathologist in Serving Traumatic Brain Injury

Currently, speech-language pathologists (SLPs) in the US treat and assess a greater number of communication disorders than ever before (ASHA, 1991). Individuals with acquired disorders include children, adolescents, and adults with TBI. In the past ten years, the degree of impact that a cognitive impairment may have after TBI on all aspects of functioning has been documented. The role of the SLP in providing services to those with TBI has been addressed by the American Speech-Language Hearing Association (1987).

There is a growing interest by American SLPs in the services that are provided by SLP’s in other countries. The American Journal of Speech Language Pathology has published articles about the different practices of SLPs in various countries. Articles about SLP services internationally have included the Dominican Republic (Meline, Penalo, & Oreste, 1996), South Africa (Tuomi, 1994) and the Gaza Strip (Silverman & Moulton, 1997). Other journals have published information about rehabilitation of TBI in countries outside the US. No articles have addressed the role of SLPs in working with TBI in other countries. Since TBI is the leading cause of disability in the world, additional information about TBI as an international health problem and the role the SLP has in each country would be useful.

The Purpose of This Study

The purpose of this study was to gather additional information on the
epidemiology, demographics, medical service delivery and the speech-language pathologist's role in service delivery for TBI in countries outside the US. The following research questions were asked:

1. What is the epidemiology of traumatic brain injury in countries outside the United States?

2. What are the demographics of those who sustain traumatic brain injuries outside the United States?

3. What is the service delivery pertaining to traumatic brain injury in countries outside the United States?

4. What is the role of the speech-language pathologist in serving patients with traumatic brain injury outside the United States?
CHAPTER III

Method

Participants

Contact persons in countries outside the United States (US) were health care professionals and identified through professional contacts, conferences and through sources provided in ASHA in the World-A publication of the International Affairs Association. Participants completing the survey in this study were health care professionals. A list of potential participants who were contacted by mail is provided in Appendix A. A letter (Appendix B) was sent out to all potential participants to determine their interest in taking part in this study. Participants were asked to provide survey information regarding traumatic brain injury (TBI) in their country. Contact persons were asked to return the surveys in self-addressed, stamped envelopes, or through e-mail within thirty days.

A total of 13 countries were contacted and included Turkey, Jordan, Israel, Italy, Germany, China, Canada, Spain, South Africa, Brazil, and Norway. Potential participants were sent letters to determine if they were interested in participating in this study. A total of five countries participated. Participating countries included Brazil, Israel, Italy, South Africa and the United States. A contact person from each country was asked to distribute surveys to health care professionals who work with traumatic brain injury (TBI). Brazil returned two surveys, Israel returned five surveys, Italy returned one survey, South Africa returned three surveys and the United States returned four surveys. Responses from each country were based on the answers of the
majority of survey respondents from that country if multiple surveys were returned. Respondents included speech language pathologists and one physician.

Survey

A preliminary survey was sent to contact persons in Brazil, Canada, Israel, Italy, and South Africa to review for readability by speakers of English as a second language prior to distribution. The survey (Appendix C) addressed 4 specific areas: (a) background information, (b) epidemiological information, (c) demographic information, and (d) service delivery. The initial section of the survey addressed background information about the health care professional and the country in which professional resides. Questions included personal information about the health care professional filling out the survey. The background section included items such as name, country, occupation, population, and education. The second section requested epidemiological information. Questions included terms used to define TBI, incidence, and number of hospitalizations for TBI. The third section gathered demographics for persons who have sustained a TBI. Demographic information gained from the survey addressed primary causes of TBI, age at injury, sex, and risk factors relating to TBI. The fourth section requests information relating to aspects of service delivery for TBI. Information includes measurements used in assessing TBI, classification of TBI, treatment planning for TBI and the role of the speech language pathologist in providing services to the TBI patient was obtained.
CHAPTER IV

Results

Participating countries included Brazil, Israel, Italy, South Africa, and United States. A contact person from each country was asked to distribute surveys to health care professionals who work with traumatic brain injury (TBI). Responses from each country were based on the answers of the majority of survey respondents from that country if multiple surveys were returned. The following results were obtained.

**Definition of Traumatic Brain Injury**

Preliminary questions asked which of the following (words) were included in the definition of TBI in your country. The terms included post-traumatic amnesia, acquired, coma, disability, focal damage, cognitive deficit, congenital, loss of consciousness, anoxia and other. Table 1 displays which terms were reported to be used in the definitions of TBI in participating countries. **Acquired** and **loss of consciousness** were the terms reported by the majority.

**Location of Services**

The fourth question asked about the location of services for TBI in each country. Options for locations included public school, private school, hospital, private practice, health department, rehab center, and other. Table 2 displays locations where services are reportedly offered. In all countries, services are available in hospitals, private practice, and rehab centers. The United States and South Africa were the only countries to report services in the public schools. Brazil is the only country to offer services through a health department.
Table 1

Terms Used in the Definition of Traumatic Brain Injury

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<thead>
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<td>focal damage</td>
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<td>cognitive deficit</td>
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<td>X</td>
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Table 2

Locations Where Traumatic Brain Injury Services are Available

<table>
<thead>
<tr>
<th>public school</th>
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<td>private school hospital</td>
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<td>private practice</td>
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<td></td>
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<td>X</td>
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</table>
Research Question #1

The first research question examined the epidemiology of TBI. The epidemiology reported in this study included incidence, primary causes, age acquired, and sports and brain injury.

Incidence Figures

Italy and the United States were the only countries to report incidence figures. Responses from Italy estimated 2-4 brain injuries per 1,000 persons. In the United States, approximately 1.5 TBIs occur per 1,000 persons (WHO, 1995). Brazil, Israel, and South Africa did not report incidence figures and the respondents were not aware of which, if any, agencies collected this information.

For survey question numbers 9, 11, 13, and 16 survey participants were asked to rate responses on a 5 point Likert type scale. Items were rated on a scale of 1-5, where 1 is rarely occurring, 3 occurs sometimes and 5 is frequently occurring. A ranking of 0 was equivalent to unknown. Figure 1 shows the primary causes of TBI in Brazil, Canada, Israel, Italy, South Africa, and the United States. In all countries, automobile accidents were ranked 5. Ratings for motorcycle and vehicle accident rankings were similar. Ratings for falls, sport accidents, assaults and gun shots varied among countries.

Sports and Brain Injury

Information concerning sports and brain injury was also gathered. The sports information reported included American football, soccer, polo, rugby, horseback riding, playground, and other. Etiologies of TBI varied across countries. In Brazil,
horseback riding, soccer, and playground activities were reported as the leading causes of TBI among sports activities. The sport activity that is the leading cause of TBI in Israel is horseback riding. In Italy, the sport activities that are the leading causes of TBI are soccer and skiing. The sport activity that is the leading cause of TBI in South Africa is rugby. In the United States, sport activities that are the leading causes of TBI are American football and horseback riding.

**Figure 1.** This figure displays mean ratings for the primary causes of traumatic brain injury across countries. Each cause was ranked between 1 and 5, where 1 is rarely occurring, 3 occurs sometimes and 5 is frequently occurring. Auto = automobile accident; motorcycle = motorcycle accident; vehicle = vehicle accident (bicycle, etc); recreational = recreational sporting activity; abuse = physical abuse/assaults.

Research Question # 2

The second research question examined the demographics of TBI. Question numbers 11, 12 and 13 gathered demographic information in this study which included age, gender and additional factors associated with TBI.
All of the countries participating reported that primarily males ages 14-24 were at highest risk for acquiring a brain injury. Figure 2 displays additional factors that were reported to be associated with TBI including low socioeconomic status, substance/drug abuse, psychiatric illness, alcohol use, densely populated areas, family dysfunction, and prior brain injury.

Figure 2. This figure displays factors associated with traumatic brain injury. Each cause was rated between 1-5, where 1 is rarely occurring, 3 occurs sometimes, and 5 is frequently occurring. LSS = low socioeconomic status; drugs = substance abuse/drug abuser; psyc illness = psychiatric illness; alcohol = alcohol use; dense pop = densely populated areas; fam dysf = family dysfunction; prior BI = prior brain injury.

Research Question #3
The third research question asked, "What is the service delivery pertaining to TBI in various countries?" The aspects of service delivery reported in this study included measurements used in assessing TBI, methods of categorizing TBI into mild/moderate/severe, components of a TBI team, and members involved in treatment of TBI. Question numbers 14, 15, 16, and 17 gathered the information.
Measurements Used in Assessing Traumatic Brain Injury

Information was gathered to identify what measurements were used in assessing TBI. Table 3 shows the measurements used to diagnose TBI. The English or translated version of the GCS was used in all countries. The CCS was reported to be used in Brazil. The Ranchos Los Amigos Scales of Cognitive Functioning was reported to be used only in the United States. Italy reported to use the Functional Independence Measurement, Disability Rating Score, and Neurobehavioral Rating Scale.

Table 3
Measurements Used to Diagnose Traumatic Brain Injury

<table>
<thead>
<tr>
<th></th>
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<th>Israel</th>
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<td>T</td>
<td>X</td>
<td>E, T</td>
<td>E, T</td>
<td>E</td>
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<tr>
<td>CCS</td>
<td>T</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rancho</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
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</table>

Note. GCS = Glasgow Coma Scale; CCS = Children’s Coma Scale; Rancho = Rancho’s Los Amigos Scale of Cognitive Functioning; E = English version; T = translated version; X = not specified English or translated; S. Africa = South Africa; US = United States.

Categorization of Traumatic Brain Injury

Information was also obtained on how TBI is categorized according to severity (mild, moderate and severe). Table 4 displays information about reported criteria are
used to distinguish between mild, moderate, and severe TBI.

Table 4
Categorization of Mild, Moderate, and Severe Traumatic Brain Injury

<table>
<thead>
<tr>
<th>Category</th>
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<th>United States</th>
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<tr>
<td>Brief/no loss of consciousness</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Loss of memory no more than 24 hrs</td>
<td>M</td>
<td>M</td>
<td>S</td>
<td>MD</td>
<td>M</td>
</tr>
<tr>
<td>Loss of consciousness for up to 24 hrs.</td>
<td>MD, S</td>
<td>MD</td>
<td>MD</td>
<td>MD</td>
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</tr>
<tr>
<td>Life long disability</td>
<td>MD, S</td>
<td>S</td>
<td>S</td>
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<td>S</td>
</tr>
<tr>
<td>MRI/CT/EEG normal</td>
<td>M, MD</td>
<td>M</td>
<td>M</td>
<td>M, MD, S</td>
<td>M, MD, S</td>
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<tr>
<td>Neuro signs of trauma</td>
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<td>MD</td>
<td>M, MD, S</td>
<td>M, MD, S</td>
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<tr>
<td>Impairments up to 3m post injury</td>
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<td>S</td>
<td>M</td>
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<tr>
<td>Coma duration longer 24 hrs</td>
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<td>MD</td>
<td>S</td>
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<tr>
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<td>M, MD</td>
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</table>

GCS

M, MD, S

Note. M = mild; MD = moderate; S = Severe; GCS = Glasgow Coma Score.

Team Members Included in Treatment of Traumatic Brain Injury

The survey requested information concerning individuals who may be involved in the treatment of TBI. Treatment team member options included mother, father, other family members, dietican, occupational therapist, social worker, physical therapist, wife, speech-language pathologist, insurance representative, respiratory therapist, physician, husband, discharge planner, and nurse.
Team members involved in the treatment of TBI were ranked on a scale of 1-5, where 1 is rarely involved, 3 is sometimes involved and 5 is often involved. A rank of 0 was equivalent to unknown. The physical therapist and physician were the only members listed by all countries to be often involved. Mothers were reported to play an important role in therapy by four out of five countries. Three out of the five countries also considered the father, wife, husband, and SLP to be involved in the service delivery of TBI. The occupational therapist, respiratory therapist, social worker, insurance representative, and discharge planner were less likely to be involved in the treatment of TBI across countries.

Research Question #4

The fourth research question examined the speech-language pathologist’s (SLP) role in serving patients with TBI. Question number 17 gathered this information. Table 5 displays the information gained about the role the SLP may have with TBI patients.

Reading and writing was the only therapy activity provided by SLPs in all countries participating in this survey. Cognition, oral-motor, swallowing and memory were within the scope of SLP’s who treated TBI patients in four out of the five countries.
Table 5

Role of the Speech-Language Pathologist in Serving Patients with TBI

<table>
<thead>
<tr>
<th></th>
<th>Brazil</th>
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<td>oral-motor</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>bathing</td>
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</tr>
<tr>
<td>sensory stim</td>
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Note. S.Africa = South Africa; US= United States.
CHAPTER V
Discussion
Cross Cultural Perspective of Traumatic Brain Injury

This study compared information and identified trends and discrepancies in the terminology, service delivery, role of speech-language pathology and cultural issues pertaining to traumatic brain injury (TBI) in five countries. Countries participating in this study included Brazil, Italy, Israel, South Africa, and the United States. The following trends were evident after reviewing surveys from these countries.

Describing Traumatic Brain Injury

The definition of TBI, from a service provider's point of view, varied among and within countries. There were no definitions agreed upon by each country. The majority of the survey respondents did use the terms acquired and loss of consciousness in their definition of TBI. This indicates that a universal definition is not used. The use of a common definition of TBI has many implications for data collection and research. The lack of uniform terms in defining TBI makes renders discussion of information pertaining to TBI across countries impossible without first considering the definition used.

Severity Levels of Traumatic Brain Injury

Respondents provided a wide range of answers when categorizing TBI according to mild, moderate, and severe brain injuries. The only aspect of classification that was unanimously agreed upon was that mild TBI has a brief or no
loss of consciousness. Terms used to categorize mild TBI were more consistent than those used in describing severe TBI. Severity levels are important in distinguishing between different classifications of TBI. Severity levels are used to help predict how debilitating the TBI will be. If the literature on TBI is to be shared internationally, it is important to have uniform criteria for describing the severity of injury.

**Associated Factors**

In all participating countries, males aged 14-24 years were reported at the highest risk for traumatic brain injury. Other factors associated with TBI varied across countries. This data identifies important information to be used when developing prevention programs. Collection of this type of data to show who is at the highest risk and to educate that population in attempt to prevent TBIs from occurring is important.

**Incidence Figures**

According to international health professionals who are familiar with TBI, information was not readily accessible on incidence figures for TBI. This information can be important for funding at state and national levels, and may also lead to the development of prevention programs. Epidemiology information is imperative in establishing funding for service and prevention programs. Clinicians also did not have economic impact figures available. Availability of incidence figures, such as epidemiology and economic information, will play an important role in the funding for services of TBI.
Service Delivery

Measurements

All respondents reported use of the Glasgow Coma Scale (GCS). With all of the countries using this scale, it could serve as a common instrument in comparing mild, moderate, and severe injuries. The United States was the only country to use the Ranchos Los Amigos Scale of Cognitive Functioning (Ranchos). The Ranchos is a morbidity scale, which is used for predicting the recovery pattern after TBI. Predicting the expected recovery pattern provides good information to family and staff for rehabilitation planning.

Service Delivery Team

The survey results indicate that the physical therapist and physician were the only members to be consistently involved in the treatment of individuals with TBI across countries. TBI teams are extremely important in the development of treatment goals. Family members and medical staff would best serve a patient with TBI by identifying goals that are important and functional to the individual. If family members are not involved in the goal setting, service providers may be focusing on goals that are not critical to the TBI patient’s return to a normalized role.

Outpatient rehabilitation should focus on activities involved with daily living. According to Hartley (1995), problems in functional communication have been found to be significant factors in failure to return to work and maintain employment. For this reason, the SLP would be an important member. A multidisciplinary team approach will best serve the individual’s needs.
Cross Cultural Perspective of TBI

An important aspect to consider in the treatment of TBI is cultural perspective. Across countries, the survey results indicated that people from some cultures/religions may not take full advantage of therapy and services when offered because of cultural or religious beliefs. Sensitivity to cultural differences is extremely important in order to provide the most efficient and effective services. An awareness of cultural differences prior to therapy planning will help to prevent misunderstandings that could limit client’s therapy outcome. Findings from this study suggest that it is important to provide cultural and language data on clients involved in any research or epidemiologic study. Not doing so may result in findings being generalized to cultural groups which are not represented.

Another factor to consider in the treatment of TBI is the language barrier. Language barriers resulting from the SLP not speaking the same language as the patient can make therapy difficult, if not impossible. Each country reported problems with ineffective services due to language barriers. With various dialects/languages throughout countries, family members should be considered as a resource when seeking a bilingual speaker. If a bilingual person can be identified, the benefit for the client is immeasurable. If a bilingual speaker is not available to assist with therapy, accommodations such as hiring a translator might be considered to enable service providers to continue to be effective when a language barrier is present.

The availability of professionals trained in TBI can also affect the service delivery. If professionals are not trained about the functional aspects of TBI, they will
not be able to provide quality services. TBI can be a very complicated issue; and many aspects, such as behaviors exhibited after a TBI, need to be identified. A person with TBI may look “normal” to the untrained observer but the underlying deficits can have a large impact on a person’s life. Only 62% of survey applicants reported any coursework in TBI. Since TBI is the leading cause of disability in the world and presents many unique problems, professionals working with this population need education in this area.

**Role of the Speech Language Pathologist**

The availability of rehabilitative services can also impact the service delivery after TBI. All countries reported that some patients do not have funding for or transportation to services. A lack of rehabilitative facilities can also affect the quality of services. An interesting point made by an SLP from the United States was that with an increasing number of individuals sustaining TBIs, there is a decrease in the amount of money available for lifetime care. More outside funding sources such as grants and private funds need to be identified and used as fewer individuals will have the financial means for adequate rehabilitation after TBI.

The role of the SLP in TBI rehabilitation varied across countries. With regard to therapy goals addressed by SLPs, **reading and writing** was the only aspect that was identified by respondents in each country. Current research findings and therapy techniques should be shared among therapists across countries to provide the most comprehensive services in the most effective and efficacious way. Sharing new ideas would not only benefit clients, but also service providers.
Implications/Conclusions

Results of this study have several important implications for TBI as an international health problem. An universal definition for mild, moderate, and severe brain injuries is needed. This study revealed that within countries there was not consistent agreement on these definitions. The diagnosis of TBI and a severity level is important in predicting the expected outcome of the damage. Common terminology would facilitate a comparison of TBI across countries. The use of consistent terminology may be accomplished/implemented through international organizations such as the World Health Organization, International Brain Injury Association and ASHA in the World.

This study not only identified members who are included in the treatment of TBI, but also the role of the SLP. Including the family in the treatment of TBI is extremely important in the functional recovery of a person after TBI. Functional goals and outcomes are difficult to identify without input from significant others or family members who interact with the patient on a daily basis. Functional goals can be extremely important in how well a person will function in society. The importance of communication skills in returning to work and maintaining employment would suggest that the SLP should be an important TBI rehabilitation team member.

The expectation that TBI teams should be multidisciplinary could be facilitated by more publications which include the roles of team members in journals with international circulation. The International Brain Injury Association sponsors an
annual conference on TBI in a different country each year. Presentations at these conferences which focus on outcomes resulting from a multidisciplinary team approach will help promote an understanding of the importance of an expanded TBI team.

Outside funding is becoming more and more important in serving TBI. It is a critical issue in establishing continuing education and effective service delivery. International research funding programs could be established to help identify TBI rehabilitation needs of individual countries.

Many cultural considerations, such as language barriers, cultural differences toward disability and the availability of rehabilitative services and trained professionals, were identified through this study. A primary comment of respondents pertained to language barriers. When service providers and clients do not speak the same language, the effectiveness of therapy is compromised. By having a diverse staff and incorporating family members into therapy, services can be provided to a wider range of populations. Encouraging the involvement of family members would facilitate a reduction in the language barrier.

Limitations

There were several limitations to this study. The first limitation was the small sample of countries used in this study. A larger sample would give a more representative view of TBI as a disability worldwide. The second limitation was that one physician and 12 SLPs completed the survey. Results may have been skewed due to an overrepresentation of SLPs filling out the survey. A more representative sample would consist of various professionals who interact with persons with TBI. Another
limitation to this study was that the survey did not request information on the setting in which the survey participant worked. Results may have been different if the study only focused on a particular health care setting.

This survey has provided preliminary data on TBI across countries. Since TBI is an international health problem, further research which carefully consider terminology, definitions, etiologies of TBI and cultural aspects of service delivery across countries is important.
References


impairments. Austin, TX: Pro-ed.


Appendix A

Participants

<table>
<thead>
<tr>
<th>Contact Person</th>
<th>Country</th>
</tr>
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<tbody>
<tr>
<td>1. Ofer Amir</td>
<td>Israel</td>
</tr>
<tr>
<td>4 Sirkin St.</td>
<td></td>
</tr>
<tr>
<td>Givatayim 53294</td>
<td></td>
</tr>
<tr>
<td>Israel</td>
<td></td>
</tr>
<tr>
<td>Phone: 972-3-7320930</td>
<td></td>
</tr>
</tbody>
</table>

| 2. Stefano F. Cappa, M.D. | Italy |
| Neuropsychology Lab | |
| University of Brescia Medical School | |
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| South Africa | |
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| Brazil | |
| email: asennyey@netpoint.com.br | |
December 15, 1998

Dear Health Care Professional:

Hello, my name is Erin Wesley. I am a graduate student in Communication Disorders and Sciences at Eastern Illinois University in Charleston, IL. I am doing my thesis on traumatic brain injury (TBI) as a disability worldwide. My goal is to collect data from different countries regarding TBI patients. Do you have contact with patients who have TBI, or do you know of someone who does? I will be sending out a survey to be completed by a health care professional who works with TBI patients in late January. The survey will take about 30 minutes to complete. Your help would be very much appreciated.

Thank you so much for your time. Please contact me as soon as possible if you or someone you know is willing to complete a survey for my study.

Sincerely,

Erin Wesley, B.S.
Graduate Student

Brenda Wilson, Ph.D./CCC-SLP
Assistant Professor
March 5, 1999

Dear Survey Participant,

Traumatic brain injury (TBI) is now the leading cause of disability worldwide. In America, much is written about TBI in journals, articles, magazines, etc. It would be interesting to learn more about TBI in other countries. The attached survey is intended to gather information in various areas about TBI in countries outside the United States.

It is important that the attached survey be completed by a person in health care who is familiar with TBI and the resulting problems. We would like to have as many surveys completed as possible. Please give copies of the survey to as many people as you know who work with patients with TBI, and ask them to fill out. We would like to have the completed survey by April 15, 1999.

Thank you for taking the time to fill out the attached survey. If you would like a summary of the findings, please indicate below and send this letter back with the survey. Again, thank you for your time.

Sincerely,

Erin S. Wesley
Graduate Student

Brenda Wilson, Ph.D., CCC/SLP
Assistant Professor

Enclosure
Appendix D
An International View of Traumatic Brain Injury (TBI)

Answer all of the following questions specific to practices in your country. Report information for which data is available. Leave blank if no data is available.

1. Is there a common definition of TBI in your country?  ___ yes  ___ no

2. If yes, check the following that would be included. (check all that apply)
   ___ post-traumatic amnesia  ___ cognitive deficit
   ___ acquired  ___ congenital
   ___ coma  ___ loss of consciousness
   ___ disability  ___ anoxia
   ___ focal damage
   other

3. Are therapy services available for persons with TBI in your country?  ___ yes  ___ no

4. If yes, in your country where are the therapy services for TBI offered? (check all that apply)
   ___ public school  ___ private practice
   ___ private school  ___ health department
   ___ hospital  ___ rehabilitation center
   ___ (other)

5. Are data available on the incidence of TBI in your country?  ___ yes  ___ no

6. If yes, what is the incidence per 1,000?  _____________
   source of data _____________ year _____________

7. Are data available on how many people with TBI are hospitalized each year in your country?  ___ yes  ___ no

8. If yes, what is the incidence per 1,000?  _____________
   source of data _____________ year _____________
9. Different types of accidents may cause TBI. In your country, what are the primary causes of TBI? (Rank on a scale of 1-5, where 1 is rarely occurring, 3 occurs sometimes and 5 is frequently occurring, 0= unknown).

- automobile accident
- fall
- motorcycle accident
- vehicle accident (bicycle, etc)
- recreational sporting activity
- physical abuse/assaults
- gun shot
- (other)

10. TBI is often acquired during recreational sporting activities. What sports are leading causes of TBI? (check all that apply)

- American football
- soccer
- polo
- rugby
- horseback riding
- playground
- (other)

11. Some age groups are injured with TBI more often than others. In your country which of the following age groups have TBI more often? (Rank on a scale of 1-5, where 1 is rarely occurring, 3 sometimes occurs and 5 occurs most frequently, 0=unknown.)

- 0-12 months
- 1-13 years
- 14-25 years
- 26-54 years
- 55+ years

12. In your country, how is gender represented in TBI? (check one)

- mostly males
- mostly females
- equally affected

13. There are some risk factors associated with TBI. Which of the following risk factors are associated with TBI in your country? (Rank on a scale of 1-5, where 1 is rarely associated, 3 sometimes associated and 5 if frequently associated, 0=unknown)

- low socioeconomic status
- substance abuse/drug abuser
- psychiatric illness
- alcohol use
- densely populated areas
- family dysfunction
- prior brain injury
- other

14. When diagnosing and treating TBI, various measures are used. Which of the following measurements are used in your country? (check all that apply)

- Glasgow Coma Scale (English version or translated)
- Children’s Coma Scale (English version or translated)
- Rancho Los Amigo’s Levels of Cognitive Functioning (English version or translated)
- (other)
15. Professionals categorize TBI according to a severity. Which of the following would be used to describe mild, moderate and severe TBI? (check all that apply)

- brief/no loss of consciousness
- loss of memory no more than 24 hours
- loss of consciousness for up to 24 hours
- coma duration longer than 24 hours
- MRI/CT/EEG normal
- neurological signs of trauma
- impairments may last up to 3 months post injury
- life-long disability
- likely to require immediate medical interventions
- other

16. Certain members may be involved in the treatment of TBI. Which of the following are typically involved in the treatment planning for patients with TBI in your country? (Rank on a scale of 1-5 where 1 is rarely involved, 3 is sometimes involved and 5 is often involved, 0=unknown)

- mother
- father
- other family members
- dietician
- occupational therapist
- discharge planner
- physical therapist
- speech language pathologist/logopedia
- insurance representative
- respiratory therapist
- nurse
- social worker

17. Speech-language pathologists may have a variety of roles when working with TBI patients. What is the speech-language pathologist’s role in working with a patient with TBI in your country? (check all that apply)

- cognition
- sensory stimulation
- swallowing
- oral motor
- orientation
- memory
- reading/writing
- counseling
- prescribing medicine
- bathing
- identifying funding for rehabilitation services
- (other)

18. Are you aware of the estimated economic impact of TBI (in dollars) in your country? _____ yes _____ no

19. If so, what is the cost of TBI in your country each year (in dollars)? ______

Source ______ Year ______

20. Do agencies in your country collect data on TBI? _____ yes _____ no
21. If so, what agencies in your country collect data on TBI? (check all that apply)
   _____ National Registry—describe __________________________
   _____ Traumatic Brain Injury Association    _____ hospitals
   _____ professional associations    _____ other __________________

22. In your country, which of the following may limit the rehabilitation of person with TBI?
   _____ religious beliefs    _____ cultural view on disability
   _____ availability of medical facility    _____ availability of rehabilitation funding
   _____ transportation    _____ distance from treatment
   _____ availability of trained health professional who work with TBI patients
   _____ language
   _______ (other) ______________________________

23. Culture may influence the treatment of TBI.

   a. In your country, describe how culture or religion may affect the treatment of TBI.

   ________________________________
   ________________________________
   ________________________________

   b. In your country, describe how language may affect the treatment of TBI.

   ________________________________
   ________________________________
   ________________________________

   c. In your country, describe how the availability of trained professionals may affect the treatment of TBI.

   ________________________________
   ________________________________
   ________________________________

   d. In your country, describe how the availability of services may affect the treatment of TBI?

   ________________________________
   ________________________________
   ________________________________
Title of professional degree: ____________________________

Number of years in your professional training program? ________________

Did your program of education include course work on TBI? ______ yes ______ no

Number of years you been serving patients with traumatic brain injury? (check one)

____ less than 2 years ______ 2-5 years ______ 5+years

Number of patients with TBI you professionally interact with a year? (check one)

____ less than 5 ______ 5-10 ______ 10+

Number of patients with TBI you socially interact with a year? (check one)

____ less than 5 ______ 5-10 ______ 10+

Name of person completing the survey (optional):

_______________________________________________

Where does the person completing this survey live? ________________

Age: ________________

Gender: _____Male _____Female

Please return completed survey to:

Erin Wesley
2400 Cambridge #1010
Charleston, IL 61920
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