PEDIATRICS CE

Parental Recognition of Postconcussive Symptoms in Children

Penelope K. Stevens, DNP, RN;
Barbara Penprase, PhD, RN, CNOR;
John P. Kepros, MD, MBA;
James Dunneback

ABSTRACT

Evaluation of current emergency department discharge instructions and parental recognition of symptomatology requiring further care for traumatic brain injury (TBI) is not well understood. A convenience sample of 105 parents of children aged 5 to 17 years who were seen and discharged from the pediatric emergency department with TBI was identified. Parents were surveyed by telephone 2 to 5 days after injury and a questionnaire was completed regarding identification of TBI symptoms. This study demonstrated that despite verbal and written discharge instructions, many parents with symptomatic children reported that their children were asymptomatic, and unable to identify postconcussive symptoms in their children.

KEY WORDS

Concussion, Discharge instructions, Parental recognition

The Centers for Disease Control[1] estimates that 1.4 million people sustain a traumatic brain injury (TBI) each year in the United States. Of these, over half are children younger than 18 years, resulting in 3000 deaths, 50 000 hospitalizations, and 650 000 Emergency Department visits.[2] Mild TBI, also called concussion, is defined as a head injury caused by acceleration/deceleration forces, which produces a brief period of unconsciousness, and/or brief retrograde amnesia, with normal computed tomography (CT) findings.[3] Common causes of TBI in children include sports injuries and bicycle-related mishaps, while falls and motor vehicle collisions become more common in adolescents and adults.[4]

Undiagnosed or untreated mild TBI can result in impaired executive functioning, which is the ability to carry out goal-directed behavior.[4] These behavioral changes may not be readily apparent in the acute phase of injury. Up to 75% of patients with TBI do not require hospitalization.[2] Once discharged from the emergency department, these children may have persistent symptoms such as headache, dizziness, cognitive and memory problems, fatigue or insomnia, mood changes, and changes in hearing or vision.[3] These symptoms are not always attributable to the concussion, and therefore the parents may not seek additional treatment for their child.

Parents of children who suffer a concussion are commonly given verbal or written discharge instructions about symptoms that may trigger a return visit to the emergency department.[5] These symptoms would be those most consistent with an acute change or worsening in neurological functioning that would require immediate medical intervention.[6] Parents may not be given additional information educating them on the persistent postconcussive symptoms that their child may develop after the acute phase has subsided. These postconcussive symptoms occur in approximately 40% of TBI patients,[7] and may be predictive of subsequent increased risk for prolonged cognitive deficits.[3] Recognition and treatment of these conditions, specifically when they do not readily resolve, is essential to help the child reach their optimum cognitive potential.[2]

PURPOSE

The purpose of this study was to identify if parents of children who have a mild TBI are able to identify postconcussive symptoms in their child, which are attributable to their child's injury, after discharge from the emergency department. Symptom identification is necessary to provide

Author Affiliations: *Sparrow Health System, Lansing, Michigan (Drs Stevens and Kepros and Mr Dunneback); Department of Surgery, Michigan State University, East Lansing, Michigan (Dr Kepros); and School of Nursing, Oakland University, Rochester, Michigan (Drs Penprase and Stevens).*

Correspondence: *Penelope K. Stevens, DNP, RN, School of Nursing, Oakland University, Sparrow Health System, 1215 E Michigan Ave, Lansing, MI 48909 (penny.stevens@sparrow.org).*

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children the treatment they need to minimize risk of long-term symptomatology.

METHODS

A descriptive design was used for this prospective study. Although prevalence of postconcussive symptoms has been studied, evaluation of parental understanding of emergency department discharge instructions, and recognition of symptomatology requiring further care is not as well understood.

SAMPLE

The subjects in this study were parents of children ages 5 to 17 years who were treated and released from the pediatric emergency department after having been seen for a concussion. Parents whose children were younger than 5 years were excluded, as verbal report of postconcussive signs would likely be inconsistent in this age group. The emergency department used as the setting for data collection is in an American College of Surgeons (ACS) verified Level I Trauma Center in the Midwest. During the time of data collection, this emergency department treated almost 100 000 patients per year, with approximately 30% being children younger than 17 years. Parents of consecutive children who met inclusion criteria during the fall of 2009 were contacted, and 105 agreed to participate in the study.

Inclusion criteria included traumatic mechanism of injury, no evidence of intracranial hemorrhage on CT scan, Glasgow Coma Score (GCS) of 15 upon discharge from the emergency department, ability to speak and understand the English language. Exclusion criteria included inpatient hospital admission, GCS 14 or less upon discharge from the emergency department, positive findings on CT scan, inability to speak or understand English, and patients without a telephone. Children with a GCS of 14 or less were excluded as the target population for this study included only children who were alert and oriented upon discharge from the emergency department. Attempts at contacting the family were abandoned if 3 unsuccessful attempts were made, or if the parent or guardian declined to participate.

INSTRUMENT

The Centers for Disease Control[8] identified 2 categories for screening pediatric athletes for postconcussive symptoms, which include 5 signs and 9 symptoms that the child may experience. The top 9 symptoms that can be experienced by children after concussion are: (1) headache or pressure in head, (2) nausea, (3) balance problems or dizziness, (4) double or fuzzy vision, (5) sensitivity to light, (6) sensitivity to noise, (7) feeling sluggish or slowed down, (8) feeling foggy or groggy, and (9) does not "feel right."[9] There are also 5 signs the parents may identify, which include: (1) appears dazed or stunned, (2) moves clumsily, (3) answers questions slowly, (4) loses consciousness, even briefly, and (5) shows behavior or personality changes.[9] These signs and symptoms were the basis of the questionnaire that was developed for data collected from these parents. Additional data included demographic information, mechanism of injury, and test results. Results for each parameter were analyzed in aggregate to determine frequency of each sign or symptom, and to identify any relationships between gender, age, type of injury, and symptomatology.

Early onset of symptoms have been shown to be an indicator for children at risk for prolonged postconcussive symptomatology,[5] and therefore those in most need of continued monitoring and intervention.[9] Children who were identified during the telephone interview with the primary investigator as having positive self-report of symptoms, or whose parents observed signs of concussion were referred to their primary care provider (PCP) for follow-up care. If they did not have a PCP, they were given referral information for further testing using more specific instruments such as the Immediate Postconcussion Assessment and Cognitive Testing (ImPACT) tool.

DATA COLLECTION

The emergency department electronic medical record, T-System®, was reviewed daily by the primary investigator for discharge diagnosis in pediatric patients. One hundred and five subjects meeting study criteria were identified. Parents of discharged children with a discharge diagnosis of concussion or mild traumatic brain injury, who met inclusion criteria, received a discharge telephone call scripted to include the study information 2 to 5 days postinjury to coincide with the peak of postconcussive symptoms.[9] Three families declined participation. Data was collected using a questionnaire (Appendix A), entered into SPSS version 16.0, and χ^2 was performed for analysis. No patient identifiers were used, and data were reported in aggregate only.

There were no anticipated risks for parents or children involved in the study. Informed consent from the parents was obtained prior to entry into the study. The study was approved by the hospital and university Institutional Research Review Boards prior to implementation of the study.

FINDINGS

Age range of subjects was 5 to 17 years (mean age 10.4 years), and 67.7% were male. Mechanisms of injury included being struck by an object (48.6%), falls (40%), incidents involving off-road vehicles such as all terrain vehicles or dirt bikes (6.7%), and motor vehicle collisions (4.8%). Of those who were struck, 80.3% were sports-related, with football being the most cited sport. Types of

falls included, in descending incidence, falls from standing, down stairs, off-bunk beds, and playground-related falls. A review of the emergency department records indicated that 100% of the 105 parents surveyed had received both verbal and written discharge instructions prior to leaving the emergency department with their child.

Of the 105 children who had concussions, 62.9% developed postconcussive symptoms. Despite this, the majority of parents (69.5%) initially stated that their child did not exhibit any postconcussive signs or symptoms. When asked about each sign or symptom individually, 46.6% of parents who had reported an asymptomatic child identified 1 or more symptoms in their child. In symptomatic children, χ^2 test demonstrated a significant difference between those parents who were able to identify symptoms in their child, and those who did not, ($\chi^2(1, N = 66) = 16.01$, $p < .05$), supporting the hypothesis that parents of postconcussive children were not able to recognize symptoms in their children.

Of those children whose parents reported they were asymptomatic, when asked about each symptom individually, headache was the most commonly observed symptom (37%), followed by nausea (12.7%), feeling slow or sluggish (11%), appearing dazed or stunned (4.1%), answering questions slowly (4.1%), dizziness or balance problems (2.7%), and behavior or personality changes (2.7%).

The remainder of parents (30.5%) reported that their children were symptomatic. The most common symptom in this group was also headache, seen in 81.3% of this group, followed by nausea (28.1%), feeling slow or sluggish (28.1%), not feeling right (21.9%), and balance problems or dizziness in 18.8% of children. Parents reported 2 or more signs or symptoms in 56.3% of the children, and referral for further follow-up was made. Independent samples t-test demonstrated that there was no significant difference between the groups of children whose parents reported symptoms versus those children whose parents reported them to be asymptomatic with respect to age ($t(103) = 1.248$, $P > .05$). χ^2 tests of independence showed no significant relationship between the same groups with respect to gender ($\chi^2(1, N = 105) = 2.717$, $P > .05$), and mechanism of injury ($\chi^2(3, N = 105) = 6.403$, $P > .05$).

CONCLUSIONS

This study demonstrated that despite verbal and written discharge instructions, many parents with symptomatic children reported that their child was asymptomatic, and were therefore unable to identify postconcussive symptoms in their child. As stated, the majority of those children were exhibiting at least 1 symptom, and 21.9% (N = 16) were exhibiting 2 or more symptoms that their parents either did not recognize, or did not attribute to the child's recent concussion.

Symptomatic postconcussive children must receive appropriate treatment to minimize long-term effects. Although there is debate regarding the exact pathogenesis of postconcussive syndrome as CT scans in symptomatic patients are overwhelmingly negative,[10] many studies have demonstrated that postconcussive symptoms are common in both children and adults. The goal remains to recognize and further assess symptoms, which will guide appropriate treatment to return the child to preinjury functioning in school, at home, and in recreational activities[11] In order for this to occur, parents must be educated to recognize and report postconcussive symptoms.

This study demonstrated that current methods of providing discharge instructions to parents of children with concussion are ineffective. Ideally, individualized care planning can be done by the nurse to meet the needs of each family. This requires assessment of parental educational level, past experiences with the health care team, financial resources, cultural beliefs, and developmental stage of the family. For example, a highly educated family that has a strong relationship with their PCP, as well as the financial resources to schedule and keep a follow-up appointment will have different needs than the family who lacks transportation, financial resources, or an understanding of the potentially devastating cognitive effects of an untreated head injury. The nursing plan of care would include different interventions specific to the strengths and challenges of each situation.

For parents to obtain appropriate treatment for their child, they must be able to accurately recognize postconcussive symptoms, and understand their significance. Standard verbal and written emergency department discharge instructions given to parents in this study were not sufficient. Parents who do not attribute the child's symptoms to the head injury may be frustrated or confused by changes in their child's behavior, as well as potential poor performance at school or in extracurricular activities.

There are both economic and functional burdens associated with TBI. In just 1 year in the United States, the cost of caring for patients with TBI is $406 billion.[1] Among injured children and adolescents 5 to 14 years, the total cost for care is over $34 billion.[1] These figures do not include the costs associated with outpatient treatment that may be sought by patients who are treated and released from the emergency department.[12] Neurological sequelae in an injured child can adversely affect the child's current health, and future productivity. Early diagnosis and treatment of conditions amenable to intervention is essential to the child's ability to function to their cognitive potential, as well as to decrease or eliminate the financial burden and functional deficits such an injury may produce.[9] Treatment can include interventions such as medication, occupational, physical, and psychotherapy.[13]

This study provides information about parental ability to recognize postconcussive symptoms, and identifies several areas of further research necessary to develop solutions to this complex issue. It does not provide information about causation of symptoms, nor is it useful in predicting the population most at risk for symptom development. Sample size, as well as use of a single institution for data collection, are both limitations to generalizability of these findings.

Knowledge of parental understanding in caring for the child with a mild TBI is important to nursing practice. Children with undiagnosed postconcussion syndrome following a mild TBI benefit from early intervention.[13] That early intervention is dependent upon those closest to the child, most commonly the parents, to be aware of, recognize, and report changes in the child's behavior.[10] Discharge teaching must be done in such a way that the parents recognize the importance of monitoring, and reporting of postconcussive symptoms. Emergency departments are often overcrowded, busy, and loud. Such environments are not conducive to effective communication. Further information regarding the frequency with which these discharge instructions are heard and understood could increase the number of children receiving early intervention for their postconcussive symptoms. Children who receive early intervention will ultimately be more productive and less financially draining on society as a whole.[1]

The specific factors that differentiate recognition of signs and symptoms are an area for study, as well as identification of factors that influence the reporting of symptoms. Additionally, education provided by the emergency department nurse should be examined to determine the most appropriate method of education to ensure parental understanding and compliance. All of the parents in this study received both written and verbal discharge instructions, yet the majority were unable to recognize postconcussive symptoms in their child. The timing of the education is an additional variable for further research. Follow-up by telephone in the days following injury may prove to be more effective. Parents may be too upset or distracted by the emergency department environment to hear or process information. Conceivably, the potential of long-term sequelae related to the injury may be too upsetting to consider, and therefore, symptoms are not acknowledged or reported. For other parents, the possibility that their child cannot participate in a favorite sport is upsetting, which may lead to denial or minimization of symptomatology. Further understanding of these and other factors would provide additional information to optimize information timing and content of information given to parents, and are areas for further research.

Concussion has potential for both immediate and long-term consequences, with both functional and economic costs to children and their families. Parental recognition of postconcussive symptoms so that the child can receive treatment is essential, yet our current method of providing discharge education was shown not to be effective. Nurses must be able to provide effective written and verbal discharge instructions for parents so that they can report postconcussive symptoms in their child to their health care provider.

This study showed that parents often do not recognize postconcussive symptoms, and therefore, symptomatic children do not receive the care they need. Further, this study would suggest that contacting families by telephone following emergency department discharge can be done with relative ease, and may result in a much higher level of identification of children with postconcussive symptoms who can then be referred for appropriate follow-up care. Further studies investigating the type, timing, and content of optimal discharge instructions are also needed.

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Appendix

Data Collection Form

Date of Injury _____ Date of Telephone Call _____ Postinjury Day _____

Age _____ Gender _____ Mechanism of Injury _____

Signs/Symptoms	Has Child Experienced? Yes	No	Comments
Headache or pressure in head			
Nausea			
Balance problems or dizziness			
Double or fuzzy vision			
Sensitivity to light			
Sensitivity to noise			
Feeling sluggish or slowed down			
Feeling foggy or groggy			
Does not "feel right"			
Appears dazed or stunned			
Moves clumsily			
Answers questions slowly			
Loses consciousness, even briefly			
Shows behavior or personality changes			

Child has PCP? Yes _____ No _____ If no, referred to: _____

ID # _____