



Pediatric Concussion Management in the Emergency Department: A National Survey of Parents

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Objective To examine parental expectations and beliefs about diagnosis and management of pediatric concussion.

Study design We conducted a cross-sectional web-based survey of a nationally representative panel of US parents in March 2014. Parents of 10- to 17-year-old children responded to questions about their expectations and beliefs about diagnosis and management of pediatric concussion in the emergency department (ED). Weighted percentages for descriptive statistics were calculated, and χ^2 statistics were used for bivariate analysis.

Results Survey participation was 53%, and of 912 parent respondents with a child 10-17 years of age who were presented with a scenario of their child having mild symptoms of concussion, 42% would seek immediate ED care. Parents who would seek immediate ED care for this scenario were more likely than parents who would consult their child's usual provider or wait at home to "definitely expect" imaging (65% vs 21%), definitive diagnosis of concussion (77% vs 61%), a timeline for return to activity (80% vs 60%), and a signed return to play form (55% vs 41%).

Conclusions Many parents who bring children to the ED following a possible concussion are likely to expect comprehensive and definitive care, including imaging, a definitive diagnosis, a timeline for return to activity, and a signed return to play form. To manage these expectations, healthcare providers should continue to educate parents about the evaluation and management of concussion. (*J Pediatr* 2017;181:229-34).

See related article, p 222

In 2011, the Center for Disease Control reported that sports and recreation related traumatic brain injury (TBI) visits to US emergency departments (EDs) increased by 62% between 2001 and 2009, with the highest rates among males aged 10-19 years.¹⁻³ Recognizing the increased public concern, in 2012 the Institute of Medicine convened the Committee on Sports-Related Concussion in Youth.⁴ In their review of the most current literature, imaging of any kind for sports-related concussions in the absence of more serious TBI symptoms is not recommended. In addition, though there is no optimal time period, protecting youth athletes from Second Impact Syndrome and possible long-term sequela requires limiting physical and cognitive activity until symptom free.

In 1991, the Colorado Medical Society Guidelines for the Management of Concussion in Sports issued guidelines based on grade of confusion, amnesia, and loss of consciousness. These guidelines had return to play recommendations, which were based on immediate postinjury concussive symptoms, and timelines which ranged from 20 minutes to 2 weeks.^{5,6} In 1998, Cantu⁶ published guidelines with stricter return to play time periods and cautions regarding total number of concussions in a season. It has since been recognized that concussion symptoms and recovery vary highly between individuals, making definitive diagnosis difficult, and long-term management plans imprecise.⁷ Current guidelines are tailored to the individual and recommend a stepwise gradual return to play after symptoms have resolved.^{7,8} It is unclear whether the key concepts from these earlier guidelines continue to shape the expectations and beliefs of parents. Myths about head injury and concussion may also shape parents expectations, though they are not supported by evidence.

The objective of this study was to examine current parental expectations and beliefs regarding concussion management in the ED and the impact of various activities on postconcussion healing. We surveyed parents to determine parental expectations of concussion management in the ED, parental interpretations of the negative impact that physical and mental activities can have on a child postconcussion, and belief in concussion myths.

CT	Computed tomography
ED	Emergency department
NPCH	National Poll on Children's Health
TBI	Traumatic brain injury

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Methods

In March of 2014, we conducted a cross-sectional web-based study of parents of children 10-17 years old. The University of Michigan Medical School Institutional Review Board approved the study. The survey was conducted in conjunction with the C.S. Mott Children's Hospital National Poll on Children's Health (NPCH), a recurring online survey of parents and nonparents. The NPCH is conducted using the web-enabled KnowledgePanel (GfK Custom Research LLC, New York, New York), a probability-based panel that is representative of the US population.⁹ NPCH KnowledgePanel surveys have explored a variety of health-related issues, as documented in many national peer-reviewed publications.¹⁰⁻¹⁴ The design for KnowledgePanel recruitment begins as an equal probability sample with several enhancements to improve efficiency, such as oversampling in census blocks with high-density minority communities. Since 2009, GfK has recruited KnowledgePanel participants by a random selection based mainly on residential addresses. Persons in selected households are then invited to participate in the web-enabled KnowledgePanel. For those who agree to participate who do not already have Internet access, a laptop and Internet connection is provided at no cost to the participant; those who already have a computer and Internet service use their own equipment. GfK develops demographic profiles for each panel member and sends periodic e-mails inviting them to participate in surveys, using unique login information to access surveys online.

With all NPCH surveys, the introductory e-mail invites participation in a survey about child health, with no greater specification of survey topics. NPCH surveys are targeted to panel members identified in GfK profile data as being a parent of 1 or more children aged 0-17 years; the authors have no direct contact with the sample. To reduce the effects of any nonresponse and noncoverage bias in the overall KnowledgePanel membership, GfK applies a presampling poststratification adjustment based on demographic distributions from the current population survey.

The survey was pilot tested with a separate convenience sample of 81 KnowledgePanel members, and the final survey was fielded in March 2014.

The authors created a series of questions targeted to parents of children 10-17 years of age. The initial scenario was designed to represent the common situation where a child sustains a head injury with mild symptoms suggestive of a concussion: "Imagine the following situation: The school secretary calls, and says your [oldest child in target age range] child fell and hit his head during gym class or sports practice. Your child was not knocked out, but is a bit dizzy and has a headache. The secretary thinks it might be a concussion, but isn't sure."

Parents were asked what they would do immediately after the call (response options: take child to emergency department, usual health provider, or home; call usual health provider; wait for end of school/activities; other). All parents were then asked: "For that same situation, if you take your child to

the emergency room after the fall at school, how much do you expect that the ED doctors would do the following?" (response options: definitely expect, possibly expect, do not expect) The question presented four actions: take a magnetic resonance imaging, computed tomography (CT) scan, or radiograph; tell whether the child did or did not have a concussion; tell them how long the child should stay out of school or other activities; and sign a return to activity form for gym class or sports. Parents were then asked how much (response options: very much, some, not much) different activities would negatively affect their child's recovery during the period where the child is still having symptoms of headache and dizziness.

Additional questions, separate from the scenario, presented a series of statements about concussions in children, none of which have been substantiated by evidence, and asked parents to rate them as definitely true, probably true, probably false, or definitely false. Demographic questions included parents' personal experience with concussion ("Has a person close to you [family or friend] ever had a concussion?") Additional questions about parental concussion education were fielded and presented in a report of the NPCH.¹⁵

Data Analyses

Census-based sampling weights provided by the Knowledge Networks were applied to the data to enable nationally representative inferences. Frequency distributions were calculated on all variables; χ^2 tests were performed to assess the associations between key outcomes (response to the concussion scenario; expectations of ED management; beliefs in concussion myths). Additional χ^2 tests were performed to assess the associations between key outcomes and parent demographic variables included in GfK profile data. All analyses were conducted with Stata v 10 (StataCorp, College Station, Texas). Results are presented as unweighted frequencies and weighted proportions.

Results

The survey participation rate was 53%; 912 respondents had a child 10-17 years and completed the concussion questions. Demographic characteristics of respondents are presented in **Table I**. Over 94% of parents reported their child had a usual healthcare provider. In response to the scenario describing a head injury and possible concussion with mild symptoms that happened at school, 42% of parents reported that they would immediately take their child to the ED, whereas 44% would call or go to the child's usual care provider and 14% would have child wait at school or take them home.

Parental Expectations

Table II demonstrates parents' expectations of care in the ED after a head injury with mild concussion symptoms, regardless of the parents' response as to where they would seek care. Two-thirds of parents would "definitely expect" a definitive diagnosis and timeline for return to activity, whereas nearly one-half would "definitely expect" the ED physician to sign a return to play form.

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