

Pediatricians' Knowledge, Attitudes, and Behaviors to Screening Children After Complicated Mild TBI: A Survey

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Objective: To understand pediatricians' attitudes, knowledge, and behaviors about the care of children with complicated mild traumatic brain injury (TBI). **Participants:** A total of 3500 pediatricians randomly selected from the American Medical Association Master File. **Design:** It was a cross-sectional survey. **Main Measures:** A survey developed to assess pediatricians' attitudes toward following children with complicated mild TBI for cognitive and behavioral sequelae; their knowledge of TBI sequelae; and their usual evaluation and management of children after TBI. **Results:** There were 576 (16.5%) completed responses. Most pediatricians (51%) see 1 or 2 patients with complicated mild TBI annually. Most do not think that pediatricians are the correct clinician group to be primarily responsible for following children with complicated mild TBI for cognitive (74%) or behavioral sequelae (54%). Pediatricians report difficulty referring children for cognitive (56%) and behavioral (48%) specialty services. Pediatricians have good knowledge of short-term complications of complicated mild TBI. **Conclusion:** Pediatricians do not think they are the clinicians that should primarily care for children after hospitalization for complicated mild TBI; however, other clinicians are frequently not accessible. Pediatricians need educational and referral support to provide surveillance for injury sequelae in this group of children. **Key words:** attitude, beliefs, knowledge, model, pediatrics, traumatic brain injury

TRAUMATIC BRAIN INJURY (TBI) occurs in approximately 300 per 100 000 children younger than 17 years annually.¹ Mild TBI is more frequent than severe injury among children, and although it has less morbidity than severe TBI, it constitutes a larger population burden of disease. Mild TBI is defined by any period of transient confusion, disorientation, or impaired consciousness; any period of amnesia that lasts less than 24 hours; loss of consciousness for less than 30 minutes; or signs of other neurologic or other neuropsychologi-

cal dysfunction and a Glasgow Coma Scale score of 13 to 15 as a result of an injury to the head.^{2,3} Some children with mild TBI have an intracranial abnormality such as an intracranial hemorrhage or contusion, and recommended care includes observation or surgical care in the hospital.^{3,4} Those with mild TBI and intracranial pathology are often subclassified as "complicated mild TBI" and have greater risk for worse longer-term health-related quality of life and more persistent behavioral and cognitive problems than children with mild injury without an intracranial hemorrhage.⁵⁻⁹

Although children with complicated mild TBI are at risk for TBI-related physical, cognitive, and behavioral issues, they are frequently discharged from hospital without a plan for routine surveillance for development of TBI-related sequelae. In a retrospective study of insured children hospitalized because of an intracranial injury, approximately half of those 7 years and older did not have a pediatric visit in the year after hospital discharge or subspecialty care.¹⁰ Slomine and colleagues studied medical needs posthospitalization for TBI among children 5 to 15 years of age. They found that in comparison to children with moderate or severe TBI, children hospitalized with mild injury (defined as a head Abbreviated Injury Score [AIS] of 2) had greater unmet and unrecognized cognitive, behavioral, and physical healthcare needs.^{11,12} The AIS classifies severity of injury according to its associated threat to life on an ordinal scale

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This project was supported by a grant from the Eunice Kennedy Shriver National Institute of Child Health and Human Development under award number K24HD072984.

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. The funder had no involvement in the study design, collection, analysis or interpretation of the data, or the decision to submit the article for publication.

Supplemental digital contents are available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.headtraumabab.com).

No author has a conflict of interest to declare.

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DOI: 10.1097/HTR.0000000000000265

of 1 (minor) to 6 (unsurvivable) for 6 body regions.¹³ Generally, head injury refers to any injury to the head region; this may or may not include a brain injury. The head AIS refers to injury to the cranium and the brain (not the scalp or other soft tissue injury). The AIS uses anatomically based descriptors of injury to the intracranial arteries, the nerves, the brain and the cranial bones. A child with a head AIS 2 injury could have a closed skull fracture and fewer than 15 minutes' loss of consciousness, whereas a child with a head AIS of 4 might have an epidural or subdural hematoma. Over half of the children with a head AIS 2 injury received no health-care services related to the injury in the first 3 months after injury, and nearly 60 percent did not have any physician visits. This lack of health services is especially concerning, as one third of all children in the study who were hospitalized after TBI had unmet or unrecognized physical, cognitive, or socioemotional medical needs assessed 1 year after injury. Medical needs were more prevalent among those children with less severe injury.¹² Together, these studies suggest that a system for routine surveillance of children after hospitalization for the sequelae of complicated mild TBI would improve the medical care of this group of children.

Pediatricians are well placed to care for children who have been hospitalized with a TBI, but who do are not prescribed inpatient or outpatient rehabilitation services on discharge from hospital. Pediatricians are accessible and frequently know the child and family as well as available medical, school, and community resources if children require referral. However, it is not known whether pediatricians have the desire or the knowledge to care for this patient group. We designed and deployed a survey of pediatricians using a knowledge, attitudes, and behaviors framework. Our goals were to determine who pediatricians thought should primarily care for children with complicated mild TBI; to assess their knowledge of short- and longer-term outcomes of complicated mild TBI; and to understand their usual practice behaviors in caring for this group of children. Information from primary care pediatricians is important to guide the medical community in building a system of care for children with TBI after discharge to home from hospital.

METHODS

This research was approved by the University of Utah Institutional Review Board.

Sampling frame

Using the American Medical Association (AMA) Master File, we recruited a national sample of general pediatricians from November 2013 to January 2014. The AMA Master File is considered to be the most in-

clusive list of practicing physicians in the country, as it is neither limited to members of the AMA nor to board-certified physicians. We requested a random sample of 3500 general pediatricians between the ages of 30 and 65 years who had a listed e-mail address and who were listed as currently in practice.

We used a mixed-mode survey design including postal mail and electronic mail using methods developed by Dillman et al.¹⁴ Pediatricians received a presurvey letter, and then a paper survey with a \$2 incentive and a prepaid return envelope. A post card reminder and a second survey were sent to nonrespondents who were offered the opportunity to respond to the survey via the web by electronic mail 3 weeks and 6 weeks after the original mailing.

Estimating the number of surveys we would need to send to achieve a 4-point margin of error using the assumptions of a 20% response rate and 15% ineligible rate, we determined that we would need to mail 3500 surveys to achieve a sample size of 594 respondents.

Survey development

The survey was developed to understand pediatricians' attitudes toward who should care for this group of patients, knowledge about the short- and longer-term consequence of complicated mild TBI, and usual practice in caring for this group of children. Survey development was a multistage process that included development of knowledge questions that encompassed a review of the literature about complicated mild TBI; cognitive interviews with experts; focus groups with local pediatricians; interviews with national pediatricians to understand their nomenclature, usual practice, and to review the survey; and piloting of the survey to check length and wording.¹⁵ To develop the knowledge questions, we performed 7 cognitive interviews with experts from neuropsychology ($n = 2$), pediatric physical medicine and rehabilitation (PM&R) ($n = 3$), and pediatric neurology ($n = 2$). During the interviews, we asked interviewees to elaborate on the information provided by thinking out loud about the topic and posing additional questions or probes about the basis of their response.¹⁶ Experts were recruited via snowball sampling starting with local experts and extending to national experts. Conversations were recorded and then transcribed. Experts were asked to address the following questions in regard to caring for children after a complicated mild TBI: (1) what should pediatricians know about the consequences of complicated TBI in the short and longer terms; (2) what should pediatricians screen for early after injury and late after injury. Two authors reviewed the transcriptions and grouped the responses by frequency of occurrence among the experts.

We then performed both a focus group (6 participants) and interviews with pediatricians ($n = 8$) to ask about their general experience in caring for this group of patients using a facilitator guide to ensure the survey content had face validity for pediatricians.¹⁷ Specifically, pediatricians were asked about their usual practice including how commonly they see children after hospitalization for TBI, how they find out their patient has been hospitalized, how soon and frequently they see children after injury, and the types of formal and informal screens they use to assess children after TBI. Pediatricians were asked to whom they refer children with TBI sequelae and barriers to referrals. At the end of the focus group, pediatricians were asked to comment on the survey in terms of content and clarity. The adapted survey was then tested for length and comprehensibility by a small, separate group of pediatricians ($n = 5$).

Survey content

Demographics

The survey requested information about physician and practice demographics including years in practice, board certification, region (inner city urban, urban, suburban, and rural), type of practice, and percentage of practice panel of publicly insured and non-English-speaking children patterned after a survey by Lewis.¹⁸ To be eligible for the study, pediatricians needed to practicing at least 50% time and to care for general pediatric patients.

Attitudes

Pediatricians' attitudes toward caring for children with complicated mild TBI were assessed by asking which clinicians or school personnel should primarily be responsible for follow-up care of this group after discharge from the hospital with specific questions about follow-up care for learning or behavioral problems. Pediatricians were then asked about their usual referral patterns for children for whom there was concern about learning or behavioral problems.

Knowledge

Pediatricians' knowledge of complicated mild TBI sequelae was assessed by asking question about 3 scenarios that differed primarily by time from injury. Abbreviated scenario stems are shown in the Figure 1. Possible sequelae were chosen from those most frequently suggested by the experts as important for pediatricians to know and included motor, learning, behavioral, emotional, and growth sequelae. Examples of possible sequelae at 3 months postinjury included items such as headaches, clumsiness at sports, tiring quickly, and sleep problems. Examples of possible sequelae 1 and 3 years postinjury included items such as depressive symptoms, inattention to details, overreacting to small things, and inability to concentrate at school. Pediatricians responded using a Likert-type scale: strongly agree, agree, unsure, disagree, or strongly disagree that symptoms might be related to the child's complicated mild TBI. Two potential sequelae not suggested by any expert (appetite and heat

Scenario 1: A previously health 11 year old boy fell off his skateboard and struck his head. He had loss of consciousness, vomiting, and headache. He was diagnosed with an epidural hematoma and skull fracture with underlying brain contusion. He was hospitalized for one night in the intensive care unit and two additional nights in the hospital. He comes for a well child-care visit three months after injury. Please state how strongly you agree or disagree that these problems are likely related to the head injury 3 months ago?

Scenario 2: The 11 year old boy from scenario one comes for well child-care one year later. Please state how strongly you agree or disagree that these problems are likely related to the head injury 15 months ago?

Scenario 3: A previously healthy 13 year old girl was struck by a car while riding her bike. She had a subdural hematoma that was evacuated in the operating room. She was observed in the intensive care unit for two nights and the regular ward for three nights. She had trouble in school for the first six months after injury but then completed her school year with good grades. She had some decline in her grades the following year. She now presents with the following problems. Please state how strongly you agree or disagree that these problems are likely related to the head injury 3 years ago?

Figure 1. Three scenarios abbreviated from the survey used to assess pediatricians' knowledge of post-TBI sequelae.

intolerance) were listed to ensure true negative responses for survey validity.

Behaviors

Pediatricians were asked about their usual anticipatory guidance for a child who is discharged to home without rehabilitation from an overnight stay or longer in hospital after a TBI. Anticipatory guidance in pediatrics involves counseling and educating children and parents about potential future concerns. Pediatricians were asked whether they always, usually, about half the time, occasionally, or never provided types of anticipatory guidance for children who were symptomatic 2 to 3 days after discharge from the hospital for a TBI. (See Full survey in the Supplemental Digital Content, available at: <http://links.lww.com/JHTR/A192>).

Statistical analysis

Descriptive statistics were used to examine demographic variables. Chi-squared analysis was used to compare categorical variables, and Student's *t* test was used to compare means of continuous variables. Responses to the knowledge questions were grouped into positive (strongly agreed and agreed) or negative (unsure, disagree, and strongly disagree). Responses to the anticipatory guidance questions were grouped into always and usually versus half the time, occasionally, or never.

RESULTS

There were 3500 surveys mailed and 765 responses (21.8%) received of which 167 (4.7%) were ineligible and 22 incomplete. This left 576 (16.5%) completed surveys for analysis. Pediatricians were geographically diverse, represented a variety of practice locations, and were primarily in private practice. Pediatricians' practice panels were primarily English speaking and approximately 30% publicly insured (see Table 1). Pediatricians infrequently encountered children who had been hospitalized after a TBI. Most physicians (51%) estimated that they treated children with an overnight stay in the hospital or longer who did not receive inpatient rehabilitation services and were discharged home to follow-up with their general pediatrician after TBI in their practice every 6 months to a year; a smaller number estimated once a month (5%) or every few years to never (44%). Many pediatricians had received no formal training in caring for children with TBI (43%) or had received only a few didactic lectures (50%) about caring for children with TBI.

Attitudes

Pediatricians were asked what group of clinicians should primarily follow children for the development of learning and behavioral problems after a TBI. For

TABLE 1 *Physician and practice characteristics of 576 respondents*

Physician demographics	N (%)
Years in practice, median (IQR)	17.0 (10–25)
Board certified in pediatrics	552 (95.8)
Practice region	
Northeast	149 (25.9)
Southeast	118 (20.5)
Midwest	117 (20.3)
Southwest	75 (13.0)
West	111 (19.3)
Missing	6 (1.0)
Practice location	
Urban, inner city	68 (11.8)
Urban, noninner city	127 (22.1)
Suburban	299 (51.9)
Rural	74 (12.8)
Missing	8 (1.4)
Practice type	
Private	425 (73.8)
Health maintenance organization	31 (5.4)
University-affiliated practice	20 (3.5)
Community clinic	29 (5.0)
Hospital clinic	50 (8.7)
Other	20 (3.5)
Missing	1 (0.2)
Practice patient characteristics, %, median (IQR)	
Publicly insurance	30 (10–60)
Non-English speaking	5 (1–15)

Abbreviation: IQR, interquartile range.

learning problems, respondents replied general pediatricians (36.6%), followed by neuropsychology (21.5%), and pediatric neurology (15.6%). Small percentages of pediatricians felt that this responsibility belonged to the school (5.2%), behavioral medicine (4.5%), developmental pediatrics (3.8%), or PM&R (2.1%). When asked to whom they preferred to refer children who appeared to have a learning problem, most pediatricians selected neuropsychology (50.2%) followed by developmental pediatrics (14.6%), behavioral medicine (12.7%), or neurology (12.3%). For the 56% of pediatricians who stated that they were not able to refer to their preferred subspecialist, the most frequently identified barriers were too long a wait (27.4%), the subspecialist was not available (19.6%), and that insurance did not cover the service (15.1%).

When asked about who should monitor children for behavioral problems that might arise after a TBI, the respondents replied general pediatrics (46.5%), followed by behavioral medicine (26.6%), and neuropsychology (12.7%). Only 1.6% of pediatricians thought that PM&R should follow children for this potential complication. When asked to whom they would prefer to refer children with behavioral issues, pediatricians primarily endorsed behavioral medicine (60.1%), neuropsychology (20.7%),

neurology (7.1%), and PM&R (0.7%). Half of the pediatricians (51.7%) were able to refer children to their preferred provider. For the remainder, the most frequently cited reasons for not referring to their preferred provider were too long a wait for an appointment (25.5%), the provider was not available in their area (13.9%), or insurance would not cover the service (13.9%).

Knowledge

Pediatricians were knowledgeable about short-term consequences of complicated mild TBI, recognizing that

headache, sleep disturbances, problems with fine and large motor control, learning and behavior problems, and fatigue were all possible symptoms a child might experience 3 months after TBI. Over one third of the pediatricians (35.1%) were unsure about whether attention problems might result from the brain injury. Most pediatricians correctly disagreed that heat intolerance was a likely consequence of TBI (see Table 2).

Many pediatricians were unaware of the longer-term consequences of TBI that required an overnight hospital stay (see Table 2). At 15 months postinjury, approximately 40% to 50% of the pediatricians did not agree

TABLE 2 Pediatricians' knowledge of possible TBI sequelae at 3 months, 15 months, and 3 years after injury

	Strongly agree, agree N (%)	Strongly disagree, disagree, unsure N (%)	Missing N (%)
Scenario 1: How strongly do you agree or disagree that the following issues are likely to be related to his head injury at 3 mo postinjury?			
Headaches	559 (97.1)	14 (2.4)	3 (0.5)
Difficulty falling asleep	492 (85.4)	78 (13.5)	6 (1.0)
Difficulty writing with a pen or pencil at school	506 (87.6)	66 (11.5)	4 (0.7)
Difficulty learning new information at school	536 (93.1)	36 (6.2)	4 (0.7)
Intolerant of heat	126 (21.9)	444 (77.1)	6 (1.0)
Clumsy at sports	481 (83.5)	93 (16.1)	2 (0.4)
Tires quickly at school	442 (76.7)	131 (22.7)	3 (0.3)
Interrupting or speaking out of turn in conversations	371 (64.4)	202 (35.1)	3 (0.5)
More arguments with siblings	424 (73.6)	149 (25.9)	3 (0.5)
Scenario 2: How strongly do you agree or disagree that the following issues are likely to be related to his head injury at 15 mo postinjury?			
Gets more upset than he used to about little things, but gets over it quickly	327 (56.8)	242 (42.0)	7 (1.2)
Seizures	431 (74.8)	142 (24.7)	3 (0.5)
Poor appetite	110 (19.1)	459 (76.7)	7 (1.2)
Teachers say he does not stay on task well	417 (72.4)	155 (26.9)	4 (0.7)
Dropped out of team sports	332 (57.6)	238 (41.3)	6 (1.0)
Height below expected on his growth chart	48 (8.3)	520 (90.3)	8 (1.4)
Grades not as good as last year	419 (72.7)	153 (26.6)	4 (0.7)
Fewer friends than last year	271 (47.1)	299 (51.9)	6 (1.0)
Needs lots of reminders to complete his homework	424 (73.6)	148 (25.7)	4 (0.7)
Intolerant of heat	75 (13.0)	499 (86.6)	2 (0.3)
Less energy, seems sad, less interested in activities	357 (62.0)	217 (37.7)	2 (0.3)
Scenario 3: How strongly do you agree or disagree that the following issues are likely to be related to his head injury at 3 y postinjury?			
Gets more upset than he used to about little things, but gets over it quickly	306 (53.1)	264 (45.8)	6 (1.0)
Seizures	422 (73.3)	151 (26.2)	3 (0.5)
Poor appetite	121 (21.0)	449 (78.0)	6 (1.0)
Teachers say he does not stay on task well	398 (69.1)	174 (30.2)	4 (0.7)
Dropped out of team sports	278 (48.3)	292 (50.7)	6 (1.0)
Height below expected on his growth chart	72 (12.5)	495 (85.9)	9 (1.6)
Grades not as good as last year	345 (59.9)	227 (39.4)	4 (0.7)
Fewer friends than last year	248 (43.0)	323 (56.1)	5 (0.9)
Needs lots of reminders to complete his homework	386 (67.0)	187 (32.5)	3 (0.5)
Seems more anxious	329 (57.1)	244 (42.4)	3 (0.5)

that emotional lability, depression, and social problems (fewer friends and less participation in team sports) could be consequences of complicated mild TBI. Most recognized that children could have problems with attention and seizures. Very few pediatricians recognized that at 15 months or 3 years postinjury (8.3% and 12.5%, respectively), pituitary dysfunction leading to decreased growth velocity could be a rare consequence of complicated mild TBI.¹⁹ Many pediatricians were not aware that, at 3 years postinjury, decreased learning velocity (grades not as good as last year), emotional problems (lability or anxiety), or social problems (fewer friends and less participation in team sports) could be attributed to the TBI.

Behaviors

Reflecting their knowledge of early TBI behavioral consequences, most pediatricians advised parents of a child who was symptomatic after discharge from hospital after a complicated mild TBI to tell the school about the child's injury and advised gradual return to school with no physical education (PE) and no contact sports. Most pediatricians reported counseling parents about potential learning and behavioral problems. About 80% of pediatricians stated that they scheduled a follow-up visit in 1 month as opposed to telling parents to return only if the child remained symptomatic (see Table 3).

DISCUSSION

Children with complicated mild TBI are at risk for unmet and unrecognized physical, behavioral, and cognitive healthcare needs, yet they do not routinely receive medical care after discharge from hospital.^{10,12} We wanted to understand pediatricians' attitudes, knowledge, and behaviors in caring for children with complicated mild TBI to decide whether efforts to improve detection and treatment of post-TBI sequelae should be concentrated on referring children back to their pediatri-

cian after their hospital stay or whether children should be referred to an alternate clinician type or program.

We found that less than half of the pediatricians feel that they should be primarily responsible for following children who have a complicated mild TBI to detect learning and behavioral problems. These findings concur with a Pennsylvania state survey examining pediatric practice²⁰ that showed that most pediatricians (89%) identify themselves as the correct physician group to provide follow-up for children with mild TBI and no loss of consciousness; however, fewer pediatricians (61%) felt that they were the correct group to care for children who had sustained a loss of consciousness with the mild TBI.

Pediatricians' knowledge about complicated mild TBI differed according to whether they were asked about early or late effects of complicated mild TBI. Respondents tended to recognize the consequences of complicated mild TBI that overlap with concussion symptoms. Pediatricians' knowledge of these complicated mild TBI sequelae may reflect the success of the concussion educational campaigns by the Centers for Disease Control and the American Academy of Pediatrics.^{21,22} In further support of this contention, pediatricians report following these guidelines in counseling families and children about avoiding sport and physical education early after a complicated mild TBI, following recommendations for cognitive rest and gradual return to sports, and are proactive about follow-up of symptomatic children.

Pediatricians were less well-informed about the potential longer-term learning and behavioral consequences of complicated mild TBI. Specifically, pediatricians may not recognize that as the expectations for higher-level problem-solving, behavior regulation, and self-monitoring increase with age, children with complicated mild TBI may experience more challenges in school. Knowledge of social, behavioral, emotional, and learning problems that may not be recognized until 1 or 2 years after injury is important because they may go

TABLE 3 *Pediatricians' usual practice during a follow-up visit 2 to 3 days after discharge from hospital for TBI*

	Usually or always N (%)	Halftime, occasionally, never N (%)	Missing N (%)
Tell school that child had a head injury	553 (96.0)	18 (3.1)	5 (0.9)
Advise gradual return to school	534 (92.7)	37 (6.4)	5 (0.9)
Advise no physical education	559 (97.1)	13 (2.3)	4 (0.7)
Advise no contact sports	569 (98.8)	4 (0.7)	3 (0.5)
Advise the family about potential learning problems	436 (75.7)	136 (23.6)	4 (0.7)
Advise the family about potential behavioral problems	399 (69.3)	171 (29.7)	6 (1.0)
Schedule a follow-up visit in 1 mo	462 (80.2)	108 (18.8)	6 (1.0)
Schedule a follow-up visit in 1 m only if child still symptomatic	190 (33.0)	375 (65.1)	11 (1.9)

unrecognized by parents. Parents may assume that children's social or school problems are transient developmental issues and not consider the possibility that they are injury sequelae that need to be addressed.

When pediatricians do recognize learning and behavioral problems as a consequence of complicated mild TBI, they have difficulty in referring children for evaluation and treatment because of clinician unavailability and/or lack of insurance coverage. These are barriers that have been previously recognized as impeding the management of other pediatric psychosocial problems.²³ Interestingly, only 1% to 2% of pediatricians recognized pediatric PM&R physicians as a resource in caring for children with complicated mild TBI, perhaps because pediatric PM&R is a recent subspecialty, and there are large regional variations in the availability of pediatric PM&R physicians,^{24,25} especially those who specialize in caring for children with TBI.

Who then should care for this group of children when they return to the community? We suggest that in many areas of the country pediatricians are the only viable clinical option. Many families cannot return to a tertiary care center due to distance, and other clinicians such as pediatric neuropsychologists and psychologists are frequently unavailable in the community or not covered through insurance plans. Schools frequently do not have the resources to recognize and treat even children with severe TBI, making it less likely that children with complicated mild TBI will receive services.²⁶

Although in this survey, many pediatricians reported that following children with complicated mild TBI for the development of behavioral and cognitive problems was not within their scope of practice, general pediatricians do screen uninjured children for both learning and behavioral health problems.²⁷ In a recent survey, approximately 75% of pediatricians who exclusively practice general pediatrics reported managing or comanaging children for attention-deficit hyperactivity disorder, depression, anxiety, and behavioral problems.²⁸ However, pediatricians need support to care for children with complicated mild TBI as a child with complicated mild TBI is a low-frequency event for any single pediatrician.

We suggest a multipronged approach to ensure surveillance of children discharged from the hospital after a complicated mild TBI. This approach could be delivered through the trauma system and would need to include both education of parents and pediatricians. Parents need education about possible complicated mild TBI sequelae and provision of an appointment to their pediatrician or primary care physician at the time of discharge. A recent study of parent ability to recognize concussion symptoms after receiving verbal and writ-

ten instructions in the emergency department showed that most parents were unable to identify concussion symptoms in their children.²⁹ This suggests that more robust discharge education is necessary. Prior work has shown that making an appointment for parents at the time of discharge increases family attendance at follow-up visits.³⁰ Pediatricians need to be supported in their care of this group of children with "just in time" education tailored to the individual needs of the clinician in a timely manner that could be delivered via links to evidenced-based medicine through the electronic medical record or in the child's hospital discharge packet.³¹ Finally, pediatricians need to be able to refer children who are having cognitive or behavioral sequelae. Telehealth has been shown to improve access to needed psychological resources in other settings, and is a possible way of making behavioral treatment available.^{32,33} If pediatricians and parents are able to recognize later symptoms of complicated mild TBI, they may be able to better advocate for services for children within the school system.

These findings should be viewed in light of certain limitations. Similar to many surveys of physicians, the response rate was low although we implemented most suggested methods of increasing response rates.³⁴ This low response rate limits generalizability. If physicians interested in TBI were more likely to respond than those who were not interested, then we likely overestimate pediatricians' knowledge. Our group of respondent pediatricians was more likely to be suburban, private practice physicians with a lower percentage of publicly insured patients compared with the 2014 AAP Periodic Survey of Fellows.³⁵ This comparison would suggest that the respondent group may have more access than some others to resources for their patients. Finally, pediatricians self-reported their practice patterns. It is possible that pediatricians systematically reported desirable behavior as opposed to actual behavior; however, as this survey was anonymous there was no incentive to do so.

CONCLUSION

Pediatricians do not believe that they are the appropriate physician group to provide surveillance of children with complicated mild TBI for the development of potential learning and behavioral sequelae. However, there is a paucity of other clinician types such as PM&R, behavioral health, and neuropsychology in the community to provide surveillance. Trauma systems should develop supports for pediatricians and families to ensure that children with complicated TBI receive surveillance for TBI-related cognitive and behavioral sequelae of injury.

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