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Healthcare Providers' Self-Reported Pediatric Mild Traumatic Brain Injury Diagnosis, Prognosis, and Management Practices: Findings from the 2019 DocStyles Survey

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Abstract

Objective: To assess adherence to five key recommendations in the Centers for Disease Control and Prevention (CDC) evidence-based guideline on pediatric mild traumatic brain injury, this paper presents results from the 2019 DocStyles survey.

Study Design: Cross-sectional, web-based survey of 653 healthcare providers.

Results: Most healthcare providers reported adhering to the recommendations regarding use of computerized tomography (CT) imaging and providing education and reassurance to patients and their families. However, less than half reported routinely examining their patients with mTBI using age-appropriate, validated symptom scales, assessing for risk factors for prolonged recovery, and advising patients to return to noncontact, light aerobic activities within 2 to 3 days. Self-reported mTBI diagnosis, prognosis, and management practices varied by specialty. Only 3.8% of healthcare providers answered all seven questions in a way that is most consistent with the five recommendations examined from the CDC Pediatric mTBI Guideline.

Conclusion: This study highlights several important information gaps regarding pediatric mTBI diagnosis and management. Further efforts to improve adoption of guideline recommendations may be beneficial to ensure optimal outcomes for children following an mTBI.

Keywords

guideline; concussion; mTBI; TBI

Introduction

The Centers for Disease Control and Prevention (CDC) estimates that there were more than 800,000 emergency department visits among youth (age 17 and under) for a traumatic brain injury (TBI) in the United States in 2014.[1] Approximately, 75% to 85% of patients with a

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TBI will be classified by healthcare providers as having a mild TBI (mTBI).[2] Most children with a suspected mTBI who seek care are seen in an outpatient setting.[3] Caused by an external force or direct blow to the head or body, an mTBI is associated with a complex pathophysiological cascade involving ionic and neurometabolic changes and microstructural axonal dysfunction.[4–6] The results of this cascade may manifest in the experience of a range of symptoms that can evolve over the course of the injury and may differ for each person. In general, mTBI symptoms fall into four categories: physical or somatic, cognitive, behavioral, and sleep-related symptoms.[7,8] Most pediatric patients with mTBI will be asymptomatic within two weeks; however, it is estimated that approximately 14% will still be symptomatic 3 months after injury.[8,9] The length of recovery may vary based on factors such as age,[9] gender,[10] more severe initial presentation of mTBI, including intracranial hemorrhage,[8,11] and the presence of pre-existing comorbid conditions (e.g., mood and learning disorders, attention-deficit disorders, migraine headaches).[12–14]

Due to concerns about the increased susceptibility to chemical and metabolic changes that may occur in the brain when an mTBI occurs, healthcare providers have been advised to take a more conservative approach to mTBI diagnosis and management for pediatric patients as compared to adults.[4,9] Further, there are concerns that the effects of sustaining an mTBI as a child will persist into adulthood, such as impeded development of self-regulation and social participation.[15–18] Still, as described by Mayer and colleagues, there are several differing, and sometimes conflicting, criteria created by medical organizations, and presented in the published literature, regarding the definition and diagnostic criteria for mTBI.[19] Practice variation and inconsistent use of evidence-based practices, as well as factors such as insurance status and access to quality pre-hospital care, may affect a pediatric patient's health outcomes following a TBI.[20] Previous studies on healthcare provider's self-reported mTBI diagnosis and management practices find that published recommendations are not always translated into practice and guideline usage varies by healthcare provider specialty.[21] Surveys of pediatric emergency department physicians and neurologists have found that between 65% to 91% report using evidence-based clinical guidelines.[21–24] However, other studies suggest that there are stark differences in self-reported usage of a published set of criteria or guidelines (e.g., concussion in sport return to play protocols and consensus statements) for concussion in sport management between healthcare providers of different specialties.[25,26] As such, there have been calls for more focused dissemination and implementation strategies for clinical guidelines on mTBI and concussion to ensure widespread uptake and more standardized care.[27]

In September 2018, CDC published an evidence-based guideline[28] that made clinical recommendations for healthcare providers related to the diagnosis, prognosis, and management/treatment of pediatric mTBI. While the guideline contains 19 sets of recommendations, five key practice-changing recommendations include: 1) do not routinely image patients to diagnose mTBI; 2) use validated, age-appropriate symptom scales to diagnose mTBI; 3) assess evidence-based risk factors for prolonged recovery; 4) provide patients with instructions on return to activity customized to their symptoms; and 5) counsel patients to return gradually to non-sports activities after no more than 2–3 days of rest.[29–31]

To disseminate the guideline, CDC employed a multi-pronged approach, using best practices in health communications, that included the creation of educational tools to promote uptake and understanding of the key clinical recommendations in the Guideline.[32] CDC engaged with professional medical organizations to promote the guideline to their members, conducted social media outreach, integrated the key recommendations into mobile apps and websites commonly used by healthcare providers, created educational handouts, and launched an online training with a no-cost continuing medical education (CME) opportunity.[32] Since its publication, CDC has had over 110,000 views of their CDC Pediatric mTBI Guideline webpage and approximately 60,000 webpage views of the online training (developed in partnership with the American Academy of Pediatrics).

To evaluate current practice strategies and to determine to what degree healthcare providers are adhering to the key recommendations in the CDC Pediatrics mTBI Guideline, CDC utilized the annual DocStyles survey to ask a diverse group of pediatric healthcare providers about their mTBI care practices. The findings from this study can help inform future guideline implementation and dissemination efforts aimed at improving use of evidence-based mTBI guideline recommendations.

Methods

From October 3, 2019 to November 4, 2019 Porter Novelli Public Services commissioned the 2019 DocStyles, a Web-based survey with a main sample of primary care physicians and additional samples of other specialties. Quotas were set to reach 1,000 primary care physicians, 250 obstetrician/gynecologists (OB/GYNs), 250 pediatricians, and 250 nurse practitioners/physician assistants (NP/PA). OB/GYNs were not included in our study. Of the 1,500 non-OB/GYN providers, 67.2% (1,008) indicated that they ever see pediatric patients. Our analysis was further confined to the 64.7% (n=653) of family practitioners, internists, pediatricians, and NP/PAs who indicated that they cared for a pediatric patient with mTBI within the past year. Respondents were paid an honorarium of $40-$85 for completing the survey based on the number of questions they were asked to complete. The survey was conducted by SERMO. SERMO's Global Medical panelists are verified using a double opt-in sign up process with telephone confirmation at place of work. SERMO sampled its currently active panel members based on their activity level so that high responders (answer >75% of survey they are sent) are invited first, followed by Medium (answer 25–75%) and Low (answer < 25%) responders. Panelists who did not participate in the previous year's DocStyles survey were prioritized above previous respondents. All invitations included a link to the Web-based survey. Respondents were screened to include only those who practice in the United States, actively see patients, work in an individual, group, or hospital practice, and who have been practicing for at least three years. Respondents were not required to participate and could exit the survey at any time. Respondents who did not complete the survey did not receive the honorarium. To protect respondent confidentiality, no individual identifiers were included in the database. CDC licensed the results of the survey from Porter Novelli after data were collected. CDC's analyses were exempt from institutional review board approval because personal identifiers were not included in the data file.

Instrument

The 2019 DocStyles survey instrument was developed by Porter Novelli with technical guidance provided by federal public health agencies and other non-profit and for-profit clients. DocStyles contained 158 questions, some with multiple subparts, which were designed to provide insight into health care providers' attitudes and counseling behaviors regarding a variety of health issues and to assess their use and trust of available health information sources. Primary care providers are asked all of the questions in the 2019 DocStyles survey while subgroups, such as pediatricians, were only asked the questions that pertain to their specialty. As such, the median time for completion of the survey varied by specialty: 33 minutes for primary care physicians, 6 minutes for pediatricians, and 31 minutes for nurse practitioners/physician assistants (NP/PA).

In addition to providing demographic (sex, age, region) and practice-related information (specialty, work setting, years in practice), respondents were asked eight questions related to mTBI in the 2019 DocStyles survey. First, respondents were asked: "Over the last 12 months, have you cared for a pediatric patient age 18 and under with a mild traumatic brain injury (mTBI) or concussion?" If the respondent answered affirmatively to this first question (n = 653), they were directed to answer seven additional questions that assessed their self-reported diagnosis, prognosis, and management practices related to five key recommendations in the CDC Pediatric mTBI Guideline (Table 2). Respondents were given one question each on their head imaging practices and use of validated, age appropriate symptom scale. There were two questions regarding the CDC Pediatric mTBI Guideline recommendation on rest and one question examined respondent's prognostic indicators. Finally, two questions assessed respondent's use of discharge instructions.

Analysis

All data were analyzed using SAS 9.4 (SAS Institute Inc., Cary, North Carolina, USA) and SPSS 25. Frequency distributions were calculated for each question. In order to determine whether practice specialty was associated with following the mTBI guideline recommendations, χ^2 tests were conducted. For χ^2 tests that indicated significant differences for specialty ($p \leq 0.05$), differences in proportions (i.e., risks differences) were run for pairwise comparisons.

Results

A little over half (56.7%) of the respondents were male (Table 1). About a quarter (26.8%) were between the ages of 26–40 years, 33.7% were between the ages of 41–50 years, 24.0% were between the ages of 51–60 years, and a smaller proportion (15.5%) were age 61 years or older. The respondents were spread out across the four regions of the United States. Approximately one-third (34.8%) of providers work in the South while 23.7% work in the Northeast, 21.3% work in the Midwest, and 20.2% work in the West. About 38.2% identified as family practitioners, 14.4% as internists, 34.5% as pediatricians, and the remaining (12.9%) as NP/PAs. Most healthcare provider respondents (76.9%) worked in a group outpatient practice, and they reported a varying number of years in medical practice.

Table 2 displays the results of the mTBI-related practice questions. Questions that were answered in adherence to key recommendations in the CDC Pediatric mTBI guideline ranged from a low of 26.8% (for the item on return to noncontact, light aerobic activity after mTBI) to a high of 70.3% (for the item on providing information to patients about returning to activity).

In order to determine if there were differences in survey responses by healthcare provider specialty, we stratified the responses by family practitioners, internist, pediatrician, and nurse practitioner/physician assistant (Table 3). Generally, family practitioners and pediatricians were more likely to answer the mTBI questions in a way that aligned with current recommendations than either internists or NPs/PAs. For example, a significantly higher proportion of family practitioners (74.8%) and pediatricians (79.6%) than internists (34.0%) and NPs/PAs (60.7%) answered the question, “How often do you use or refer your pediatric patients for neuroimaging (such as CT scan) for diagnostic purposes in children with mTBI or concussion?” with the response consistent with the CDC recommendation (p’s < 0.05). However, there were no significant differences by specialty for the questions: “How often do you use a validated, age-appropriate symptom scale as a component of the diagnostic evaluation?”, “How many days of rest do you recommend for pediatric patients with an mTBI or concussion before they return to school?”, and “How many days of rest do you recommend for pediatric patients with an mTBI or concussion before they return to noncontact, light aerobic activities?” Only 3.8% of healthcare providers answered all seven questions in a way that is most consistent with the five recommendations examined from the CDC Pediatric mTBI Guideline. When broken-down by specialty, 4% of family practitioners, 1.0% of internists, 4.0% of pediatricians, and 5.9% of NP/PAs answered all seven questions in the survey in the way that is most consistent with the recommendations examined from the CDC Pediatric mTBI Guideline; however, these differences were not statistically significant.

Discussion

Findings suggest that a large percentage of healthcare providers in this study do not consistently implement all five key recommendations contained in the CDC Pediatric mTBI Guideline. Further, self-reported mTBI diagnosis, prognosis, and management practices vary by specialty. Most healthcare providers reported adhering to the CDC Pediatric mTBI Guideline recommendations regarding use of CT imaging and providing education and reassurance to patients and their families. However, less than half of healthcare providers reported routinely examining their young patients with mTBI using age-appropriate, validated symptom scales, assessing for risk factors for prolonged recovery, and advising patients to return to noncontact, light aerobic activities within 2 to 3 days. This highlights several potential barriers related to healthcare provider behaviors, including important information gaps.

Based on the available evidence on neuroimaging and pediatric mTBI, the CDC Pediatric mTBI Guideline states that healthcare providers, “should not routinely image a pediatric patient with suspected mTBI for diagnostic purposes.”[28] This includes the use of CT scans. A systematic review by Lumba-Brown and colleagues stated that among pediatric patients

presenting with a suspected mTBI and who underwent a head CT, approximately 7.5%, were found to have intracranial injury. About 1.9% were intracranial injuries that were associated with clinically important outcomes and 0.8% were intracranial injuries required neurosurgical intervention.[13] To avoid unnecessary exposure to radiation from a head CT, while balancing the importance of identifying children at risk for intracranial injury, the CDC Pediatric mTBI Guideline recommends the use of validated decision rules, such as the Pediatric Emergency Care Applied Research Network (PECARN) decision rules.[33] The PECARN decision rules evaluate for a variety of factors that, when assessed together, may indicate increased risk for more serious injury. These rules have good performance accuracy in identifying children with clinically significant head injuries.[33,34] Previous studies suggest that a CT rate of <15% is achievable if the PECARN decisions rules are used to evaluate children presenting with minor head injury, including mTBI.[35–37] Thus, it is reasonable to conclude that the response most consistent with the CDC Pediatric mTBI Guideline recommendation should be “less than 25%.” Two-thirds of healthcare providers chose this response in the survey. The most recent estimate for CT usage for pediatric patients with mTBI at about 35%,[33] which indicates that neuroimaging is being used slightly more than is indicated. These findings point to the need for continued efforts to reduce the use of head CT for pediatric mTBI patients. Educational interventions (e.g., targeted dissemination of educational handouts)[38] and promotion of prolonged clinical observation of patients in the emergency department, have been shown to lower CT usage rates.[39] Moreover, there is growing research on the use of fast MRI in children as an alternative to CT scans.[40] In contrast to traditional MRI, fast MRI can be performed quickly, in approximately 6 minutes, thus a child generally does not need anesthesia or to be sedated. In addition, fast MRI eliminates concerns about exposing children to ionizing radiation and the potential health risks associated with CT scans.[40]

Current evidence supports the use of age-appropriate, validated symptom rating scales for diagnostic and prognostic purposes.[28] There are several symptom-based tools available to healthcare providers;[41,42,43,44] yet, less than half of the healthcare providers in this study reported using these tools routinely (“more than 75% of the time”). Zuckerbraun and colleagues found that implementing a symptom-based screening form in a pediatric emergency department was feasible;[45] however, theses scales do have some limitations that may affect wide-spread usage.[14,28,46,47] For example, many symptom rating scales are not validated for use with young children (such as those under the age of 10)[9,46] and some symptoms commonly reported by young children (e.g., changes in appetite, refusal to engage in typical activities, increased dependence on parents) are not directly represented in current symptom rating scales.[48,49] There are currently efforts to expand the use of validated, symptom rating scales by integrating short screening questions into electronic health record-based (EHR) systems for adults with mTBI.[50] Adult patients who screen positive for a potential mTBI based on the screening are then evaluated for mTBI using a symptom rating scale.[50] A systematic review and meta-analysis found that use of EHR systems, when properly implemented, is associated with improvements in guideline adherence.[51] Further studies can explore opportunities to standardize mTBI screening and the use of evidence-based recommendations through EHR-based tools with electronic reminder prompts for healthcare providers treating pediatric patients, as well as other

promising interventions to improve healthcare provider knowledge and attitudes (e.g., trainings or presentations from recognized experts, personalized audit and feedback for individual providers).[3,50,52]

When a mTBI is diagnosed, the CDC Pediatric mTBI Guideline recommends that a pediatric patient return to non-sports activities, such as school, within 2–3 days after the injury, so long as it does not exacerbate their symptoms.[28] This recommendation aligns with a shift in practice recommendations regarding mTBI management and is meant to deter healthcare providers from prescribing "strict rest" following a concussion. Prescribing "strict rest" may have included advising the child to stay in a dark room with little to no stimulation, prohibiting the use of screens (e.g., phone, computer), and limiting social activities (e.g., time with friends). Thomas et al. (2015) conducted a randomized control trial and found that pediatric patients who were recommended "strict rest" after a concussion reported more symptoms and had poorer school attendance than respondents who were not.[53] Importantly, they also found that strict rest may lead to an increase in emotional symptoms.[53] About half of healthcare providers in this study responded that pediatric mTBI patients should return to school 2 to 3 days following the injury. This is consistent with a recent study by Chrisman et al. that found that 50% of youth athletes returned to school within three days of their concussion.[54] However, most healthcare providers answered that children should refrain from noncontact, light aerobic activities for 4 days or longer. A scoping review by Fischer and colleagues found that lack of awareness and familiarity with a guideline is a main barrier to implementation of recommendations.[52] As such, inclusion of best practices regarding concussion care into medical school curriculum and greater outreach by medical societies to promote awareness of clinical guidance (e.g., continuing medical educational opportunities, presentations at meetings, emails to members, dissemination of guideline implementation tools) on rest following mTBI may be beneficial.[52]

A critical part of mTBI management involves helping pediatric patients return safely to their regular activities, such as school. However, there are several potential obstacles that may lead to communication gaps between healthcare providers and school professionals—both of whom play important roles in the recovery of children with mTBI.[15,55,56] The provision of discharge instructions and a letter to schools from a patient's healthcare provider, customized with their symptom presentation and suggested accommodations, may help to bridge this communication gap and increase the use of school accommodations.[45] To improve patient recall and uptake of the information, discharge instructions should be given in both a verbal and written format.[57,58] Providing relevant, concise, and personalized information that is easily accessible, is most effective.[57,58] The CDC Pediatric mTBI Guideline also recommends providing education and reassurance to pediatric patients and their families that include warning signs of more serious injury; description of expected course of symptoms and recovery; instructions on how to monitor postconcussive symptoms; methods for preventing further injury; best practices for management of cognitive and physical activity/rest; instructions regarding return to play/recreation and school; and clear instructions regarding patient follow-up.[28] About two-thirds of healthcare providers reported providing pediatric patients with mTBI with information on return to school and sports and physical activity "more than 75% of the time." However, the actual number of patients who receive discharge instructions may be substantially lower.[50,59]

Upchurch and colleagues found that of the pediatric patients diagnosed with a sports-related concussion seen in an emergency department, only 66% received appropriate discharge education.[60] Similarly, a study by DeMaio and colleagues found that only 62% of pediatric patients seen in an emergency department for concussion received concussion-specific discharge instructions.[59] Computer-generated discharge instructions, such as those integrated into EHR systems, are preferred by healthcare providers and patients.[57] Arbogast and colleagues found that implementation of a concussion-specific EHR-based decision support tool in a pediatric hospital, along with training for healthcare providers on concussion, substantially increased documentation of healthcare provider-patient discussions about recovery (e.g., return to school and sports).[61]

Limitations

This study is subject to at least five limitations. First, the survey did not ask about specific guidelines and tools. Future research efforts exploring specific attributes of mTBI guidelines and supporting tools and resources could inform targeted dissemination and implementation efforts. Second, the DocStyles sample is weighted to match the American Medical Association Masterfile proportions for age, sex and region, but healthcare providers are not randomly selected and thus results may not be generalizable. Third, there are no data about the volume of TBI patients each healthcare provider diagnosed and/or managed. Fourth, healthcare providers self-reported diagnosis and management practices and the survey did not verify self-reports to confirm they reflect actual experiences with patients. Finally, as it was unlikely that healthcare providers could indicate an exact percentage to represent their behaviors, the survey responses provided a range of compliance (i.e. less than 25% of the time; between 25% and 75% of the time; more than 75% of the time). Thus, it is not clear what percentage of healthcare providers are in 100% of compliance as compared to those who were never in compliance with the recommendations. Further, while the ranges were designed to primarily capture the low and high implementers, they do not allow for finer analysis of the data, especially among those who indicated the response “between 25% and 75% of the time.” This information could affect the observed differences between specialties and among the key recommendations.

Conclusion

The CDC Pediatric mTBI Guideline was published in 2018 with a dissemination plan that offered outreach and education to multiple healthcare provider specialties. This survey is the first to provide insight into current diagnosis, prognosis, and management practices consistent with the CDC Pediatric mTBI Guideline recommendations. Findings indicate there is variation in adherence to recommendations in the areas of using age-appropriate, validated symptom scales, assessing for risk factors for prolonged recovery, and advising patients to return to noncontact, light aerobic activities within 2 to 3 days. Use of continuing education opportunities for healthcare providers, trainings or presentations from recognized experts, personalized audit and feedback for individual healthcare providers, and implementation of EHR-based tools with reminder prompts)[52] show promise in improving standardization of practices and adherence to guideline recommendations.

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Abbreviations

CDC	Centers for Disease Control and Prevention
CME	continuing medical education
CT	computerized tomography
EHR	electronic health record
MRI	magnetic resonance imaging
mTBI	mild traumatic brain injury
PECARN	Pediatric Emergency Care Applied Research Network
TBI	traumatic brain injury

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Table 1:

Characteristics of respondents in 2019 DocStyles Sample[1]

Characteristic	Frequency	Percent
Sex		
Male	370	56.7
Female	283	43.3
Total	653	100.0
Age		
26–40	175	26.8
41–50	220	33.7
51–60	157	24.0
61 or over	101	15.5
Total	653	100.0
U.S. Region		
Northeast	155	23.7
Midwest	139	21.3
South	227	34.8
West	132	20.2
Total	653	100.0
Specialty		
Family practitioner	250	38.2
Internist	9	14.4
Pediatrician	225	34.5
NP/PA	84	12.9
Total	653	100.0
Work Setting		
Individual outpatient practice	109	16.7
Group outpatient practice	502	76.9
Inpatient practice	42	6.43
Total	653	100.0
Years in Medical Practice		
0–10	174	26.7
11–18	183	28.0
19–25	154	23.6
26 or more	142	21.8
Total	653	100.0

[1]Sample includes those respondents who indicate that they see pediatric patients (those age 17 or younger) and who are family practitioners, internists, pediatricians, nurse practitioners, or physician assistants who indicated that they cared for a pediatric patient with mild traumatic brain injury within the past year.

Table 2:

Frequency and percentage of respondents in 2019 DocStyles Sample[1] whose response was most consistent with the key CDC pediatric mild traumatic brain injury guideline recommendations

	Frequency	Percent
How often do you use or refer your pediatric patients for neuroimaging (such as CT scan) for diagnostic purposes in children with mTBI or concussion?		
More than 75% of the time	73	11.2
Between 75% and 25% of the time	131	20.1
Less than 25% of the time	449	68.8
How often do you use a validated, age-appropriate symptom scale as a component of the diagnostic evaluation?		
More than 75% of the time	277	42.4
Between 75% and 25% of the time	181	27.7
Less than 25% of the time	134	20.5
Never	61	9.3
How many days of rest do you recommend for pediatric patients with an mTBI or concussion before they return to school?		
1 day or less	58	8.9
2 to 3 days	312	47.8
4 to 7 days	205	31.4
More than 7 days	78	11.9
How many days of rest do you recommend for pediatric patients with an mTBI or concussion before they return to noncontact, light aerobic activities?		
1 day or less	42	6.4
2 to 3 days	175	26.8
4 to 7 days	250	38.3
More than 7 days	186	28.5
How often do you screen pediatric patients seen for mTBI or concussion for known risk factors for persistent symptoms?		
More than 75% of the time	302	46.3
Between 75% and 25% of the time	207	31.7
Less than 25% of the time	113	17.3
Never	31	4.8
How often do you provide pediatric patients with mTBI or concussion with education and reassurance that includes information on how to return to school following this injury?		
More than 75% of the time	442	67.7
Between 75% and 25% of the time	146	22.4
Less than 25% of the time	54	8.3
Never	11	1.7
How often do you provide pediatric patients with mTBI or concussion with education and reassurance that includes information on how to return to sports and physical activity following this injury?		
More than 75% of the time	459	70.3
Between 75% and 25% of the time	130	19.9
Less than 25% of the time	51	7.8

	Frequency	Percent
Never	13	2.0

[1] Sample includes those respondents who indicate that they see pediatric patients (those age 17 or younger) and who are family practitioners, internists, pediatricians, nurse practitioners, or physician assistants who indicated that they cared for a pediatric patient with mild traumatic brain injury within the past year.

Table 3:

Frequency and percentage of respondents in 2019 DocStyles Sample[1] whose response was most consistent with the key CDC pediatric mild traumatic brain injury guideline recommendations, by select medical practice variables[1]

	SPECIALTY											
	TOTAL		Family Practitioner		Internist		Pediatrician		NP/PA			
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	χ^2	p-value
How often do you use or refer your pediatric patients for neuroimaging (such as CT scan) for diagnostic purposes in children with mTBI or concussion?											71.7	<0.0001
Correct response (Less than 25% of the time)	449	68.8	187	74.8[2,3]	32	34.0	179	79.6[2,3]	51	60.7[2]		
Incorrect response	204	31.2	63	25.2	62	66.0	46	20.4	33	39.3		
How often do you use a validated, age-appropriate symptom scale as a component of the diagnostic evaluation?											5.7	0.13
Correct response (More than 75% of the time)	277	42.4	101	40.4	35	37.2	96	42.7	45	53.6		
Incorrect response	376	57.6	149	59.6	59	62.8	129	57.3	39	46.4		
How many days of rest do you recommend for pediatric patients with an mTBI or concussion before they return to school?											0.94	0.81
Correct response (2 to 3 days)	312	47.8	121	48.4	46	48.9	109	48.4	36	42.9		
Incorrect response	341	52.2	129	51.6	48	51.1	116	51.6	48	57.1		
How many days of rest do you recommend for pediatric patients with an mTBI or concussion before they return to noncontact, light aerobic activities?											6.4	0.09
Correct response (2 to 3 days)	175	26.8	54	21.6	29	30.9	70	31.1	22	26.2		
Incorrect response	478	73.2	196	78.4	65	69.2	155	68.9	62	73.8		
How often do you screen pediatric patients seen for mTBI or concussion for known risk factors for persistent symptoms?											8.7	0.03
Correct response (More than 75% of the time)	302	46.3	101	40.4	47	50.0	119	52.9[4]	35	41.7		
Incorrect response	351	53.8	149	59.6	47	50.0	106	47.1	49	58.3		

	SPECIALTY											
	TOTAL		Family Practitioner		Internist		Pediatrician		NP/PA			
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	χ^2	p-value
How often do you provide pediatric patients with mTBI or concussion with education and reassurance that includes information on how to return to school following this injury?											14.3	0.0025
Correct response (More than 75% of the time)	442	67.7	159	63.6	53	56.4	165	73.3[2,4]	65	77.4[2,4]		
Incorrect response	211	32.3	91	36.4	41	43.6	60	26.7	19	22.6		
How often do you provide pediatric patients with mTBI or concussion with education and reassurance that includes information on how to return to sports and physical activity following this injury?											13.9	0.0031
Correct response (More than 75% of the time)	459	70.3	172	68.8[2]	53	56.4	173	76.7[2,4]	61	72.6[2]		
Incorrect response	194	29.7	78	12.0	41	43.6	52	23.1	23	27.4		
All seven questions answered correctly	25	3.8	10	4.0	1	1.0	9	4.0	5	5.9	3.0	0.39

[1]Sample includes those respondents who indicate that they see pediatric patients (those age 17 or younger) and who are family practitioners, internists, pediatricians, nurse practitioners, or physician assistants who indicated that they cared for a pediatric patient with mTBI within the past year.

[2]Significantly higher than internist

[3]Significantly higher than NP/PA

[4]Significantly higher than family practitioner