Impact of a State Law on Physician Practice in Sports-Related Concussions

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Objective To determine physician-reported adherence to and support of the 2010 Massachusetts youth concussion law, as well as barriers to care and clinical practice in the context of legislation.

Study design Primary care physicians (n = 272) in a large pediatric network were eligible for a cross-sectional survey in 2014. Survey questions addressed key policy and practice provisions: concussion knowledge, state regulations and training, practice patterns, referrals, patient characteristics, and barriers to care. Analyses explored relationships between practice and policy, adjusting for physician demographic and practice characteristics.

Results The survey response rate was 64% among all responders (173 of 272). A total of 146 respondents who had evaluated, treated, or referred patients with a suspected sports-related concussion in the previous year were eligible for analysis. The vast majority (90%) of providers agreed that the current Massachusetts laws regarding sports concussions are necessary and support the major provisions. Three-quarters (74%) had taken a required clinician training course on concussions. Those who took training courses were significantly more likely to develop individualized treatment plans (OR, 3.6; 95% CI, 1.1-11.0). Physician training did not improve screening of youth with concussion for depression or substance use. Most physicians (77%) advised patients to refrain from computer, telephone, or television for various time periods. Physicians reported limited communication with schools.

Conclusions Primary care physicians report being comfortable with the diagnosis and management of concussions, and support statewide regulations; however, adherence to mandated training and specific legal requirements varied. Broader and more frequent training may be necessary to align current best evidence with clinical care and state-mandated practice. *(J Pediatr 2016;178:268-74).*

Concussion is a form of mild traumatic brain injury that can result in prolonged emotional, cognitive, and physical symptoms. Pediatricians and family medicine physicians are often the first practioners to evaluate and treat children with suspected concussion.[1,2] Various protocols and recommendations to guide clinical management have been published that rely on current best evidence.[3-6] In addition, all 50 states have enacted some form of concussion legislation to address youth sports concussions.[7]

The role of primary care physicians (PCPs) in concussion legislation varies by state. Generally, physicians are mandated to have some involvement in authorizing the return of a student to play sports, sometimes with little or no training.[7] At best, laws encourage providers to coordinate and communicate with parents, schools, and coaches. Rarely is the extra time to manage these cases funded by the state as part of the mandate. In 2010, the Massachusetts state legislature passed its first law standardizing procedures for persons involved in the prevention, training, management, and return to activity decisions of students who incur head injuries during extracurricular activities. This law, passed in June 2011, mandates the Department of Public Health to develop standard procedures around concussion in children (Massachusetts General Laws Chapter 111, Section 222 and 105 CMR 201.000). In particular, the regulations require (1) students showing signs of concussion symptoms to be removed from play; (2) specific graduated reentry plans and clearance forms for all public middle and high school students diagnosed with sports-related concussion; (3) placement of the responsibility of medical clearance on physicians in coordination with other health care providers and school staff; and (4) required training in concussion treatment for medical providers, as well as annual training for parents, athletes, and school staff.

In 2014, 3 years after implementation of the Massachusetts law, we conducted a survey of practicing pediatric PCPs to investigate the reality of clinical practice in this environment. In particular, we examined physician-reported (1) adherence to the law, including mandatory training, communication with schools, and

CDC	Centers for Disease Control and Prevention
MDPH	Massachusetts Department of Public Health
PCP	Primary care physician

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The authors declare no conflicts of interest.

http://dx.doi.org10.1016/j.jpeds.2016.08.025

development of individualized treatment plans; (2) clinical management patterns; (3) barriers to providing optimal care; and (4) perceptions of patient and parent knowledge.

Methods

We conducted a cross-sectional, self-administered survey of 272 PCPs within the Partners Community Healthcare Inc network in December 2014. Partners Community Healthcare Inc is a large multidisciplinary practice network of more than 5500 physicians across Massachusetts. The study was approved by our Institutional Review Board.

Survey Development and Study Protocol

The survey instrument was developed by a team of survey research, policy, and clinical experts to measure physician knowledge, attitudes, and clinical practice mapped to the provisions of the Massachusetts law and established clinical guidelines.

The instrument was pretested for length and clarity by 10 PCPs and modified accordingly. The survey included 8 sections with multiple-choice, Likert-scale, and free-text questions. Key outcomes were knowledge and attitudes about the Massachusetts policy, concussion treatment and management, and physician-perceived barriers to providing optimal care. Key control variables included physician demographics and practice characteristics, including PCP age, parent of school-age children, adherence to mandatory concussion training, and number of patients evaluated with concussions.

The survey was administered using LimeSurvey (Hamburg, Germany), an online survey software tool. All physicians received an initial e-mail invitation from study investigators, along with an individual link to the survey instrument package. Participants received 3 e-mail reminders. To enhance the response rate, we mailed a self-administered paper version by first-class US mail, with a $5 incentive gift card enclosed; online respondents received the incentive after survey completion.

Statistical Analyses

Data from the LimeSurvey database were downloaded into SAS version 9.4 (SAS Institute, Cary, North Carolina). Descriptive statistics were computed using 2-sided *t* tests for continuous variables and the Pearson χ^2 test or Fisher exact test for categorical variables, with $P < .05$ considered statistically significant. Cross-tabulation was used to create contingency tables for comparisons across respondent characteristics. Logistic regression was used to assess associations with physician demographics and training experiences.

Results

The response rate was 64% among the 272 PCPs contacted.[8] Of the 173 respondents, 27 were excluded from our final analysis because they reported not practicing primary care or not having evaluated, treated, or referred any patients in grades 6-12 who had a suspected sports-related concussion over the past year. A total of 146 surveys were included in our analyses.

Personal and Professional Physician Characteristics

The physician respondents had a median age of 48.2 years, and a reported average of 18.1 years experience in medical practice. Among the respondents, 56% were female, and 53% reported having children aged 10 or older. (The Massachusetts law is aimed at middle and high school students, age approximately 10-18 years.) On average, PCPs reported seeing 19.5 patients with suspected sports concussion in the past year.

Adherence to the Law

The vast majority of surveyed physicians reported that the Massachusetts regulations are necessary (92% agree or strongly agree), and that the regulations improve clinical care (87% agree or strongly agree) (**Figure 1**). In bivariate analyses, PCPs with a higher caseload of patients with concussions, of older age, and with their own children aged 10 and older were more likely to agree that the regulations improve clinical care.

Most respondents (74%) had taken a training course on sports concussions, with 74% of trained care providers having completed an online course provided by the Centers for Disease Control and Prevention (CDC) and 35% having completed an online presentation on the Massachusetts concussion regulations provided by the Massachusetts Department of Public Health (MDPH) (**Table I**).

Approximately one-third (37%) of respondents reported always or often communicating with the school nurse or school staff regarding patients' return to school or sports, and 32% reported someone in their office communicating with the school. PCPs who completed a training course were not more likely to have some communication with the schools compared with those who did not complete training (OR, 1.3; 95% CI, 0.56-2.82).

Table I presents data on physician-reported adherence to individualized treatment requirements. PCPs who answered "yes" to completing a sports concussion training course were more likely to develop individualized plans for return to academic activities (OR, 3.5; 95% CI, 1.34-9.30) and sports (OR, 3.6; 95% CI, 1.15-11.0).

Clinical Management Patterns

Table II presents data on variations in clinical practice. Notably, most PCPs (77%) advised patients to not use a computer, telephone, or television for various time periods, including until the patient was symptom-free (33%), until the patient felt ready (20%), or until they signed off on social involvement (20%). Many PCPs (80%) answered "yes" to always, often, or sometimes requesting school accommodations for varying reasons. Important reasons were that the child had decreased ability to engage in academic activities (49%), the provider felt it important to have the student return to school as soon as possible (18%), and the child needed help in not pushing himself or herself too hard (17%). When asked about the balance of cognitive rest and cognitive exertion in patients with concussions, 51% of respondents thought that increased cognitive rest was associated with better outcomes, and only 13% thought that too much cognitive rest could have negative consequences.