High School Principals' Resources, Knowledge, and Practices regarding the Returning Student with Concussion

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Objective To determine high school principals' self-reported resources, knowledge, and practices regarding the management of students returning to school following concussion.

Study design A cross-sectional survey of public high school principals in the state of Ohio assessed respondent and school demographics, respondent concussion training, school resources, and monitoring and accommodation practices for students with concussion.

Results Of the 695 eligible high school principals, 465 (66.9%) completed the survey. Over one-third of principals (37.2%) had some form of concussion training in the past year. Those with training were more likely to promote training of other school faculty (57.4% vs 30.6%, $P < .001$). Principals were asked to identify school personnel who are designated as case managers for students with concussion. Schools without a designated case manager were less likely to have an athletic trainer ($P < .001$) and had fewer students (median 424.5 vs 599) than schools with a case manager. Principals could list at least 1 faculty designee who communicates with health professionals more often for student-athletes than for nonathletes ($P < .001$). Most principals were willing to provide students with short-term academic accommodations, but 30.1% required a health professional's note prior to making any academic changes. Only 32% of principals reported providing families with a written academic plan following concussion.

Conclusions Schools differ in their resources and management strategies for students returning to school after concussion. Understanding these differences can help health professionals to overcome potential barriers in managing their school-aged patients with concussion. *(J Pediatr 2015;166:594-9)*.

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Concussion is a complex pathophysiological process induced by direct or indirect biomechanical forces to the head, affecting brain function, and causing the rapid-onset of neurologic signs and symptoms that resolve spontaneously.[1] Concussions result in more than 100 000 emergency department (ED) visits each year for school-aged children and adolescents in the US.[2] The number of concussed youth who are evaluated in physician offices without being seen in the ED, or who do not seek any medical treatment, is not known.[3]

The duration of postconcussion symptoms is highly variable. The majority of concussions resolve within 7-10 days, although the normal recovery period may be longer in children and adolescents.[1,4,5] Brown et al found that the mean duration of postconcussion symptoms among junior high and high school-aged patients was 43 ± 55 days,[6] and those with the highest levels of cognitive activity after injury had the longest times to symptom recovery. Cognitive over-exertion can exacerbate existing symptoms and cause the reemergence of symptoms that had previously resolved.[7] Excessive physical activity can also adversely affect cognitive recovery.[8] The 2012 Zurich Consensus Statement on Concussion promotes cognitive and physical rest as "the cornerstone of concussion management,"[1] and all current guidelines recommend cognitive and physical rest during the initial stages following concussive injury.[9-12] Thus, the return to school or "return-to-learn" process poses complex challenges for students with persistent postconcussion symptoms.[13,14]

Although return-to-play guidelines for the student-athlete have received considerable attention, few data exist to determine best practices for the student with concussion returning to school. Arguably, athletic and other extra-curricular activities should not be attempted until the student can tolerate the full school day. As of February 2014, all 50 states have passed laws that address concussion education and practices in youth sports.[15] In contrast, the implementation of educational protocols that optimize student learning and return to school after concussion are only beginning to gain momentum.[7]

Understanding how schools approach concussion can help health professionals overcome potential barriers in concussion management, specifically those barriers related to the return-to-learn process.[7] Knowledge transfer (the synthesis,

ED	Emergency department
RTI	Response-to-intervention

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exchange, and application of knowledge aimed at strengthening the healthcare system) has been highlighted as a mainstay in enhancing concussion awareness and education.[1,16] Understanding gaps in concussion knowledge among school personnel can help to optimize knowledge transfer initiatives.

The goal of the current study was to determine high school principals' knowledge, resources, and policies as they relate to monitoring and accommodating the academic needs of students when they return to school following concussion.

Methods

We conducted a cross-sectional survey of public high school principals in Ohio from October 2013 to January 2014. The study was approved by the Institutional Review Board at Nationwide Children's Hospital. Schools were eligible if they were listed on the website www.education.ohio.gov.[17] Private schools and nontraditional high schools (charter schools, on-line schools, and technical schools) were excluded, leaving 695 eligible high schools. We assessed high school size (number of students) and financial resources (school-district dollars spent per student) from finalized data listed on the website for the year 2011. Each high school principal was sent an introductory e-mail that included a unique survey link. The 18 survey questions addressed respondent and school demographic information, respondent self-rating of concussion knowledge, faculty concussion training, school resources, school designees who monitor students' academic progress and communicate with parents and health-care providers after concussion, available classroom adjustments and school accommodations for the student with persistent postconcussion symptoms, and whether or not the school provides the family with a written concussion plan (**Appendix**; available at www.jpeds.com). Academic adjustments refer to nonformalized classroom changes lasting 1-3 weeks that do not alter the curriculum or affect standardized testing; academic accommodations refer to school and classroom changes that may exceed 3 weeks and include special arrangements for standardized testing or changes in class schedule but remain in the context of regular education.[13]

Up to 3 e-mail reminders were sent at 2- to 4-week intervals. Attempts at telephone contact were made if no e-mail response was received within 2 weeks after the introductory e-mail. There was no incentive provided for participation.

Statistical Analyses

Descriptive statistics were calculated. Categorical variables were compared using the Pearson χ^2 test. Comparisons of continuous variables were made using the Student t test or a corresponding nonparametric test. One-way ANOVA was used to compare student numbers per school, school district spending per student, and school resources (percentage of schools with a part-time or full-time school nurse, athletic trainer, social worker, and psychologist) among schools designated as urban, suburban, and rural. This was followed by post hoc comparisons using the Bonferroni correction. Statistical significance was set at 5%. All statistics were performed using SPSS v 21 (SPSS Inc, Chicago, Illinois).

Results

Of the 695 eligible high school principals, 465 completed the survey for a response rate of 66.9%. The respondents represented schools located in 85 (96.6%) of the 88 counties in the state of Ohio. Internet responses account for 82.8% (n = 385) of the total response rate.

School Characteristics and Resources

The number of students per school ranged from 36-2840 (mean 710.3; median 555), and school district spending per student ranged from $5060-$21 464 (mean $10 208; median $9665). Respondents designated their school as urban (14.6%), suburban (28.8%), or rural (56.6%). The **Table** compares mean student numbers, mean school district spending per student, and the percentages of schools with a full-time or part-time school nurse, athletic trainer, social worker, or school psychologist, all as a function of their urban, suburban, or rural designation. Post hoc testing demonstrated that rural schools had fewer students ($P < .001$) and lower spending per student ($P < .001$) than urban and suburban schools; suburban schools had more students than urban schools ($P = .002$) but lower spending per student ($P < .001$). The part-time or full-time presence of school nurses, athletic trainers, and social workers differed based on urban, suburban, and rural school designations ($P < .001$ for each); the presence of a school psychologist did not differ ($P = .08$).

School Principal and Faculty Concussion Training

Over 73% of the respondents reported ≥10 years of work experience as a teacher or principal; over 37% reported ≥20 years of work experience. The mean score for principals self-rated concussion knowledge on a scale from 1-10 was 7.4 (median 8). Just over one-third of the principals (37.2%) had participated in some form of concussion training over the past year. The most common types of

Table. School size, spending, and resources as a function of urban, suburban, and rural designations

	Urban (n = 68)	Suburban (n = 134)	Rural (n = 263)	F	*P* value
Mean student number per school	910	1122	449	130	<.001
Mean school district spending per student	$12 343	$10 619	$9445	72.5	<.001
Part-time or full-time: school nurse	95.6%	98.5%	87.5%	10.8	<.001*
Athletic trainer	77.9%	96.3%	81.4%	9.8	<.001*
Social worker	55.9%	44.0%	31.9%	7.7	<.001*
Psychologist	98.5%	96.3%	88.2%	2.6	.08

*Post hoc testing demonstrated several significant differences: suburban > rural school nurses ($P < .001$); suburban > urban ($P < .01$) and suburban > rural ($P < .001$) athletic trainers; and urban > rural ($P < .001$) social workers.