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Pediatric education efforts: Enhancing pediatric concussion recovery with a step-wise information sheet.

Kendra Jorgensen-Wagers[1,2*], Stephanie Maxfield-Panker[3], George Smolinski[4]

[1]Defense and Veterans Brain Injury Center, Landstuhl Regional Medical Center, Germany
[2]General Dynamics Information Technology, Falls Church, VA
[3]Regional Health Command Europe, Sembach Germany
[4]United States Army Europe Headquarters, Wiesbaden, Germany

Abstract

This paper outlines an initiative to improve pediatric concussion care within United States Army military treatment facilities throughout Europe. The first step of this initiative was composing a pediatric concussion working group which then created an easy-to-use return to school/play information sheet based on current concussion literature. The second step of this initiative was a performance improvement project focused on the education effort by members of our pediatric concussion working group and training efforts to educate military medical providers, coaches, parents, and teachers regarding sports concussion and return to school/ return to play activities for children who experience concussion. The third step of this initiative was conducting a retrospective case analysis of emergency room admissions on 96 pediatric patients which demonstrated how pediatric concussion evaluation and screening was impacted by this training effort. The fourth step of this initiative was surveying healthcare providers to gauge the usefulness and efficacy of our education/training and our return to school/play information sheet. Our results indicate that pediatric concussion education can be effective and is perceived as being useful in accurate identification of concussion and identifying potential barriers that may impact compliance with clinical practice guidelines for concussion. Education efforts should focus on patient and parent expectations, gender differences, the significance of early identification, continued management through symptom resolution, and the importance of medical clearance for resumption of school/recreation activities.

Keywords: Pediatric concussion, Mild traumatic brain injury, Concussion education.

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Introduction

Pediatric concussion is a substantial public health concern not only because of the high incidence rate but also because concussions are often missed as they are unreported by patients and providers alike [1,2]. Some research indicates provider under-reporting occurs in as many as 50- 70% of all concussive injuries [1]. This is further complicated by the fact that despite many children meeting diagnostic criteria for concussion, they are discharged with either a missing or confusing concussion diagnosis or they are discharged having received only substandard concussion education [3-5]. Children may also have a longer period of recovery than adults [6-10]. Additionally, research demonstrates that children with persistent post-concussive symptoms have lower health related quality of life (HRQoL) compared with those who have recovered from concussion, yet deficits in HRQoL are pervasive across all domains and may persist for months even in children whose symptoms have resolved [11]. Therefore, training and educating primary care providers on the most current clinical practice guidelines are a vital part of optimizing concussion recovery in children.

In Europe, Regional Health Command Europe within the United States Army Medical Command addressed these issues by launching an aggressive pediatric education effort to identify processes to not only encourage reporting but to encourage continued engagement with medical providers by parents after a child's concussion. The U.S. Army Medical Command is organized into four Regional Health Commands. Regional Health Command Europe is responsible for the direct healthcare management of Soldiers and their beneficiaries in Germany, Italy, and Belgium. The American military community living overseas can be viewed as a "closed system" pertaining to medical care. Most children receive medical care at military treatment facilities and go to school on military bases in close proximity to those medical facilities. This helps enable educators' appreciation of the incidence of pediatric concussion and assists with initiation of education efforts to address reporting and follow up care.

Regional Health Command Europe convened a pediatric work group as part of a pediatric concussion care initiative. This workgroup developed an information sheet for providers, parents and nurses alike based on current pediatric concussion care literature. The intent of the information sheet was to provide guidance on returning to school and returning to play that was easily utilized by busy primary care providers and also understood by lay persons. The workgroup then conducted education sessions with healthcare providers, parents, and coaches to distribute this information sheet and educate them on its use. Next, we conducted a survey of the providers who had received the education sessions querying them on the usefulness of the information sheet. At the same time we reviewed medical records and epidemiological data on pediatric concussion at military treatment facilities in Europe to ascertain the rates of concussion in our population and identify if pediatric patients had post-concussion follow up by their primary care providers.

Methodology

We composed a pediatric working group of TBI experts across Regional Health Command Europe who had an identified interest in pediatric concussion care. In order to ensure equitable representation in our working group, we specifically sought to include not only physicians but allied health providers and researchers as well. In the end, our working group was composed of a PM&R physician, three physical therapists, one athletic trainer, one PhD researcher, and a nurse educator.

The workgroup then compiled salient research in the field on pediatric concussion recommendations and developed an educational product (an information sheet) that outlined a stepwise guide for return to school and return to play. We coupled this information sheet with core informational bullets gleaned from current research so that parents, nurses and healthcare providers alike had a product that referenced the current best practices and was easy to use and understandable.

In order to deliver education/training to RHCE medical providers, the workgroup's nurse educator combined pediatric concussion information with required concussion training. The U.S. Army requires that all medical providers receive education on concussion identification and management. During these required training sessions for medical providers, the nurse educator also reviewed pediatric concussion management from the point of injury at school or on the sidelines, to communication with coaches, parents, and teachers; and how to guide patients through the return to learn/ return to play guidelines (Tables 1 and 2).

Table 1. *Gradual return to school plan.*

Stages	Description	Activity Level	Criteria to Move to Next Stage
1	No Return, at Home	Day 1: Maintain in low-level cognitive and physical activity. No prolonged concentration Day 1: Maintain in low-level cognitive and physical activity. No prolonged concentration	To move to stage 1: (1) Student can sustain concentration for before significant symptom exacerbation 20 min (2) Symptoms reduce or disappear with cognitive and rest breaks allowing return to activity
2	Return to School, Partial Day	Attend 1-3 classes, with interspersed rest breaks. Minimal expectations for productivity. 0 tests or home work	Student symptom status improving, able to tolerate 4-5 hours of activity with 2-3 cognitive rest breaks built into school day.
3	Full Day, Maximal Supports (maximal supports required throughout day)	Attend most classes, with 2-3 rest breaks (20-30 min), no tests. Minimal HW (S60 min). Minimal moderate expectations for productivity.	To Move to Stage 3: Number and severity of symptoms improving needs only 1-2 cognitive rest breaks built into school days
4	Return to Full Day, Moderate supports (moderate supports in response to symptoms during day)	Attend all classes with 1-2 rest breaks (20-30min); begin quizzes: Moderate HW 6-90 m(n) Moderate expectations for productivity. Design schedule for make-up work.	To Move To Stage 4: Continued symptoms improvement needs no more than 1 cognitive rest break per day
5	Return to Full Day, Minimal Supports (Monitoring final recovery)	Attend all classes with 0-1 rest breaks (20-30 min); begin modified tests (breaks, extra time). HW (90+ min) moderate-maximum expectations for productivity.	To Move to Stage 5: No active symptoms, no exertional effects across the full school day.
6	Full Return, No Supports	Schedule, no rest breaks. Max. Full class expectations for productivity. Begin to address make up work	N/A
* Cognitive rest break: a period during which the student refrains from academic or other cognitively demanding activities, including schoolwork, reading, TV/games, conversation. May involve a short nap or relaxation with eyes closed in a quiet setting.			
Once child has returned to full class schedule with no symptoms, then start the Return To Play Plan			

Table 2. *Gradual return to play plan.*

S. No	Stages
1	No physical activity
2	Low Levels of physical activity with Limited head rotation and no activities in crowded areas. This includes walking, Light jogging, Light stationary biking, and Light weightlifting (Lower weight, higher reps, no bench, no squat).
3	Moderate Levels of physical activity with body/head movement. This includes moderate jogging, brief running, moderate intensity stationary biking, moderate-intensity weightlifting (reduced time and/or reduced weight from your typical routine). Can walk on uneven terrain and in crowds and moderate head rotation.
4	Heavy non-contact physical activity. This includes sprinting/running, high-intensity stationary biking, regular weightlifting planes. Need medical clearance by licensed healthcare provider to progress to step 5.
5	Full contact in controlled practice including rapid head movements.
6	Full contact in game play or physical education classes.
7	Progression to next stage can only occur if your child has NO symptoms at their current stage.
8	Allow at least one day for each stage of Return to School and Return to Play Plans.
9	If your child has symptoms that persist longer than 10 days since his/her concussion, contact your PCM for an appointment the following day.

Our medical records review and medical provider survey efforts indicated that 17 families out of 96 surveyed had exposure to pediatric concussion education as a part of the Department of Defense Schools policy requirement for sports orientation for student athletes. We found that participation in this sports orientation contributed to greater follow up with primary care physician for return to play. Of the over 150 providers who received pediatric education, 78% of providers indicated that the education on pediatric concussion was helpful to assist them in talking with parents about concussion rehabilitation care. There was a 28% percent response rate to the survey which asked these providers three targeted questions:

1. Have you received pediatric education/training? If so, how many times have you participated in pediatric concussion education/training in the past year?
2. Did you find pediatric concussion education/training beneficial to your identification and assessment of pediatric concussion?
3. Was pediatric concussion education/ training beneficial in helping you manage return to school and return to play?

Results

Based on the information sheet, our performance improvement project (survey), and our medical records data, we then formulated the following key messages suitable for parents and healthcare providers:

Importance of concussion recognition and consistent follow up

- Parental education on the signs and symptoms of concussion can strongly influence appropriate diagnosis of concussion and follow up during recovery.
- When parents appreciate an active and engaged plan of return to learn and return to play, their children can receive the necessary support from the school to provide temporary accommodation for coursework or school engagement.
- Schools require a diagnosis of concussion to support the need for accommodation and use of a progressive return to learn program.

Ways to enhance concussion recognition and follow up

- Take your child promptly to a physician for an evaluation following a potentially concussive event.
- Be prepared to advocate for the supports needed to ensure that your child's return to learn is addressed by your child's physician.
- Discuss the obstacles that your child may face in openly and honestly addressing an "invisible" injury with school personnel.
- Understand that the expectation is your child will fully recover from concussion, but this can be a gradual process over time.
- Support your child's recovery by encouraging active engagement while limiting activities that exacerbate symptoms.
- Provide feedback and progress on recovery to your clinician and school staff to promote shared decision making and active treatment options for symptoms that may not be resolving quickly.

Additional ways to encourage graduated return to learn and return to play

- Appreciate the importance of ensuring a successful reintegration and return to learn process prior to returning to play as it will support the overall recovery and minimize risk of a second injury during recovery.
- Talk with teachers and coaches to evaluate readiness and capacity for increased activity prior to advancing to the next stage.
- Return to your physician for medical clearance for your child prior to the final stage of return to play.

Discussion

There are several significant limitations to this performance improvement project which impacts the level to which the results can be generalized. First, the curriculum on pediatric concussion was initially embedded with training on progressive return to activity for active duty adult personnel. Therefore the training event itself was not specialized solely for pediatric concussion assessment and evaluation, and therefore some learners may not have been able to assimilate the material as effectively as if it had been focused only on pediatric concussion issues. Second, the methodology of the project used survey data that was not specifically identified to correspond to each individual participant so there was no way to measure specific benefits to specific providers. To address these issues, a more specific pre- and post- survey that recorded individual matched pre-post survey scoring has been developed together with a standardized training program on pediatric guidelines for use in future training. A second generation of the performance improvement project is planned and will utilize this updated survey in order to more definitively appreciate how the pediatric education and concussion training influences the specific concussion knowledge of the individual pediatric provider. The final stage of this project will be examining the recovery patterns and return to school/ return to play timelines for our pediatric concussion patient population and assessing if our educational efforts improve the recovery time for these patients [12-17].

Conclusion

Pediatric concussion is a substantial public health concern due to not only the sheer number of concussions that occur in children, but also due to the unique challenges with pediatric patient recovery. Many patients may appear unimpaired and are discharged from the acute care setting only to realize the extent of their symptoms once they attempt to return to normal functioning. Our efforts to address gaps in pediatric concussion education/training and awareness demonstrated that participation in pediatric concussion training sessions that were part of the required sports orientation contributed to greater follow up with primary care physician for return to play. Future projects will provide more standardized provider training and will look for patterns linking awareness and education with rates of recovery.

Disclaimer Pertaining to the Results

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Author's note

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Correspondence to:

Kendra Jorgensen-Wagers
Defense and Veterans Brain Injury Center,
Landstuhl Regional Medical Center, Germany
Tel: (314) 590-5601
E-mail: Kendra.l.jorgensen-wagers.ctr@mail.mil