

Return to Drive Counseling After Sports-Related Concussion: A Quality Improvement Project

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Abstract

Introduction: Concussion is a common injury in adolescent athletes, many of whom also drive. Counseling athletes and their families about driving risks post concussion is a potentially significant intervention. The aim of this quality improvement project was to increase driving recommendations for concussed athletes in a pediatric sports medicine clinic. **Methods:** Patients in this quality improvement project were seen in the sports medicine concussion clinic between February 2014 and August 2015. We determined how often driving recommendations were documented through a retrospective chart review. Once the “return to drive” project was introduced to the sports medicine staff, multiple interventions were completed including handing out flyers to remind families about driving and creating changes to the electronic medical record. **Results:** At baseline, 9.3% of visits had driving recommendations documented. After an intervention requiring clinical documentation in the electronic medical record, 97% of patients received driving recommendations. **Conclusions:** The quality improvement effort was successful at increasing the frequency of delivery of appropriate driving recommendations provided to concussed athletes.

A concussion is a traumatically induced, complex disturbance of brain function that commonly occurs during sporting activities.^{1–3} Each year, approximately 30 million children and teenagers participate in sports. It is estimated that 1.6 to 3.8 million sports-related concussions of all ages occur annually⁴; this may be an underestimate as at least 30% of athletes have had undiagnosed concussions in the past.^{5,6} Despite the lack of definitive evidence supporting specific interventions for concussion treatment,⁷ the mainstay for concussion management is the physical and cognitive rest, followed by a gradual return to school and play.^{8–13} However, there are other important aspects of young athletes’ lives that may also be affected after a concussion. One of these areas is driving.¹⁴

Young athletes who suffer concussions are often of the age when they are learning to drive. Moreover, for many adolescents, driving is an instrumental activity of daily living, used by the individual to get to school, after-school activities, and work.¹⁵ Driving can be a potentially dangerous activity, especially for new, inexperienced teenagers.^{16,17} With inexperience can also come distractibility that puts them at an increased risk of motor vehicle accidents. Motor vehicle collisions are, for instance, the leading cause of sudden death in collegiate athletes.¹⁸ Concussions can affect many cognitive processes that are required for driving and may result in impaired driving.^{14,19,20} After a concussion, reaction time may be slowed; vision may be impaired; concentration may be affected; and the patient may experience headaches and dizziness.^{1,11,21,22} In addition, complex cognitive tasks, which include driving, may worsen concussion symptoms.²³

Athletes should be counseled regarding the hazards of driving after a concussion. Expert consensus endorses caution in determining fitness to drive after minor traumatic brain injury,²⁴ yet many clinicians, patients, and families are not aware that driving could be a potentially dangerous activity after a concussion.²⁵ In an exploratory survey conducted at the authors’ sports medicine specialty clinic, less than 10% of patients aged 16 and over (n = 495) were provided recommendations regarding driving after a concussion.

The aim of this quality improvement (QI) project was to increase driving recommendations to more than 90%

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of age appropriate concussion patients over the course of 1 year. Because of the importance of this issue and the potential for further substantial harm to adolescent drivers after a concussion, as suggested in the literature, we implemented a project to improve recommendations for driving after concussion. Recognizing that there is not yet a standard of care approach to this circumstance, we allowed clinicians to counsel and document based on their clinical judgment. However, we felt that some documentation of teaching was requisite, given the risk of serious injury if an individual is impaired after a concussion.

METHODS

Project Design

This multifaceted QI project was performed at Nationwide Children's Hospital (NCH), an urban academic center in Columbus, Ohio. The division of Sports Medicine at NCH has 8 different locations throughout the city and surrounding suburbs. There were over 2,900 concussion visits to the sports medicine clinic in 2014.

A team of sports medicine physicians, athletic trainers, and a parent and patient developed and implemented the changes made in the project.

Inclusion criteria included the following: patients must have been aged 16 and older when seen at new or follow-up visits at the NCH pediatric sports medicine concussion clinic between February 2014 and August 2015 and must have had a diagnosis of concussion made by 1 of the 9 fellowship-trained sports medicine physicians working in this clinic. Age 16 was the minimum age chosen for study inclusion because the rules in place for Ohio's graduated driver licensing program. Adolescents must be 16 to obtain a probationary driver's license, which permits unsupervised driving during the day and limits the number of passengers in the car.

Interventions

The manual, retrospective chart review, completed by the authors, assessed physician documentation regarding the patient's ability to drive. The physician could document driving recommendations in the patient's plan or in the instructions that were sent home with the patient. In September 2014, the "return to drive" QI project was introduced to the sports medicine division. Physicians were directly instructed to document driving recommendations in the plan or in the instructions at every visit. The importance of the project was stressed at the division meeting at the beginning of the fall sport season; all physicians were present at this meeting. Throughout the project, the team sent email reminders and gave presentations on the project.

To encourage patient awareness of the issue, a flyer was distributed by the front desk staff to all patients at the beginning of each concussion clinic in 1 location in January 2015. This flyer was a reminder for the patient or the parent to ask the physician during the visit about whether

or not the patient was allowed to drive. The following month, this flyer was distributed at all locations where patients were seen for concussion. The flyer was handed out for the following 2 months.

Frequent physician feedback was solicited from the QI team. Physicians recognized that they were having a difficult time remembering to ask about driving and also to document driving recommendations in the chart. Therefore, at the end of March 2015, a change was made within the electronic medical record (EMR). A specific "driving recommendation" section was added to the patient instructions used by all the providers for concussion patients. Physicians had to complete the section or delete it entirely before the patient could receive the discharge paperwork before leaving. The physician chose from a drop down list of options the most appropriate recommendation. Because of physician feedback, this section was edited 3 months later to include a "patient is cleared to drive" option (Fig. 1). In addition, the certified athletic trainer who roomed the patients asked at intake whether or not the patients drive. This information was documented in the EMR before the physician saw the patient.

Data Collection and Statistical Analysis

We searched the institutional database to identify eligible patients with the diagnosis of concussion seen in a sports medicine clinic who were aged 16 and older. Seven months of data were reviewed before initiation of the project. Both initial and follow-up visits were included in the evaluation of the data. Each month, all charts were reviewed for documentation regarding driving recommendations. We determined the percentage of patients aged 16 and older who were provided driving recommendations each month. We analyzed the data and plotted results on a p-chart. Control limits were set at 3 SD from the mean. Data were examined for trends and shifts.

Outcome and Balancing Measures

The primary outcome measure was the documentation of driving recommendations. The goal was to provide driving recommendations to over 90% of patients aged 16 and older seen in a sports medicine concussion clinic. To determine if our change would disrupt clinic flow, we also asked physicians to estimate the time required to discuss and document driving recommendations. We asked the providers to give estimates once at a provider meeting a few months into the project. This time outcome variable was the balancing measure.

RESULTS

Over the 7-month baseline period, there were 495 visits to the concussion clinic by patients aged 16 and older. Only 9.3% of these visits had documentation regarding driving recommendations. The data showed wide variability in individual physician practice, however, with monthly data ranging from 0% to 100% of patients

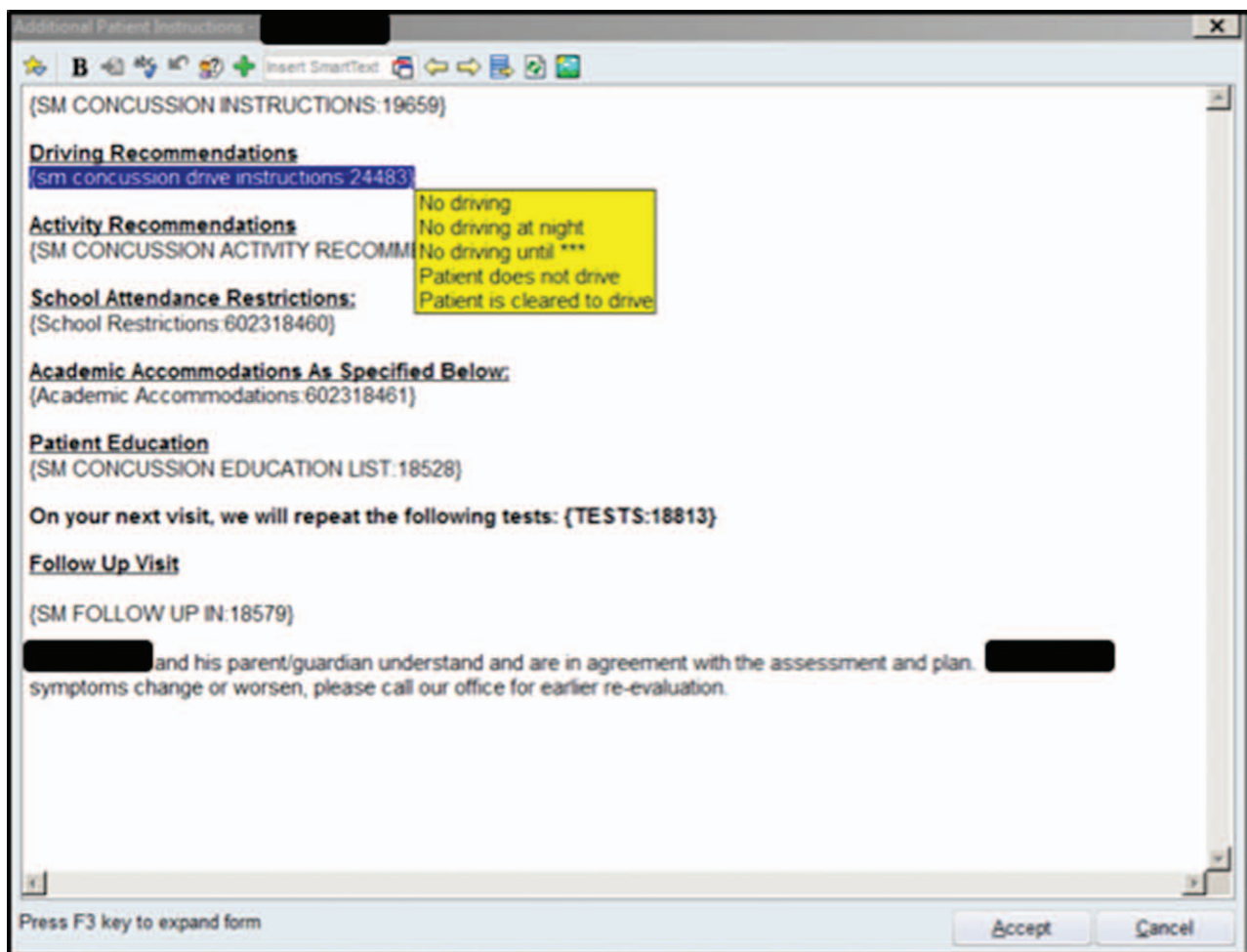


Fig. 1. Return to drive patient instructions.

Percentage of patients provided instructions from each physician (N)

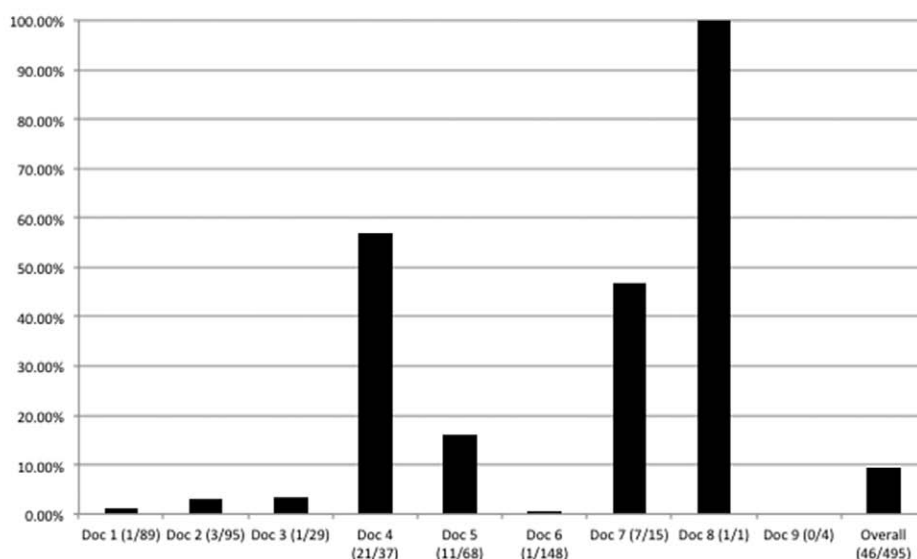


Fig. 2. Baseline data: percentage of patients provided return to drive instructions from each physician.

having documentation regarding driving depending on the physician (Fig. 2).

The initial intervention (physician meeting) encouraging all physicians to document driving recommendations led to 20% (20/97) of patients receiving written instructions (Fig. 3). After the second intervention (flyers) was instituted, just over 30% of all patients were receiving driving instructions. This was only a modest improvement as the project's stated goal was over 90%. The final intervention (EMR requirement that physician document driving recommendations) resulted in 97.6% of patients (244/250) receiving written instructions regarding driving at their concussion visits after this intervention had been in place 5 months. In the final month of data analysis, 100% of patients (n = 59) received instructions.

In addition to documenting driving recommendations, physicians were asked to estimate the time they spent counseling and documenting these new recommendations. On average, physicians estimated that they spent less than 30 seconds per patient on counseling and documentation. This suggests that the interventions did not adversely impact clinic flow; however, we were not able to directly observe or calculate the amount of time spent counseling and documenting driving recommendations.

DISCUSSION

We successfully implemented a multidimensional QI project that increased driving recommendations for patients aged 16 and older who suffered a concussion. With multiple interventions including discussions, flyers, emails, and changes to the EMR, the preset goal of 90% or greater compliance with making driving recommendations was reached within 1 year and sustained for 5 months.

Previous studies have shown that active interventions such as workshops are more successful than passive interventions.^{26,27} Our study similarly demonstrated that simply presenting QI information in a meeting and using email reminders did not have significant impact on changing physician behaviors.

Conversely, multifaceted interventions have been shown to be most effective in changing physician behaviors.²⁶ In this study, physician education, email reminders, patient handouts, and changes to the EMR all contributed to our successful outcomes, with the EMR change being the most effective. This is consistent with previous studies revealing that provider treatment choices could be influenced by grouping menu options in an EMR order set or by using techniques such as gamification (the use of game elements in nongaming contexts).^{28,29} However, as pointed out in a commentary by Burgess et al,³⁰ it remains to be seen if these strategies' effects are long lasting if not matched with parallel alterations in clinician knowledge, attitudes, and behaviors.

Despite our success, this QI intervention had limitations. Our target population was athletes aged 16 and over. We did not account for some of our younger patients who drive before age 16, such as those who drive all-terrain vehicles, tractors, or those who may get their driver's permit at age 15. In addition, we only reviewed charts for patients in the NCH sports medicine concussion clinic. Patients diagnosed with a concussion in the same hospital's urgent care, emergency room, or primary care clinics were excluded from this study. We also only analyzed written patient instructions. Our study was not designed to capture possible physician-patient conversations regarding driving or patient's and family's understanding of the recommendation. Therefore, we did not know what, if any,

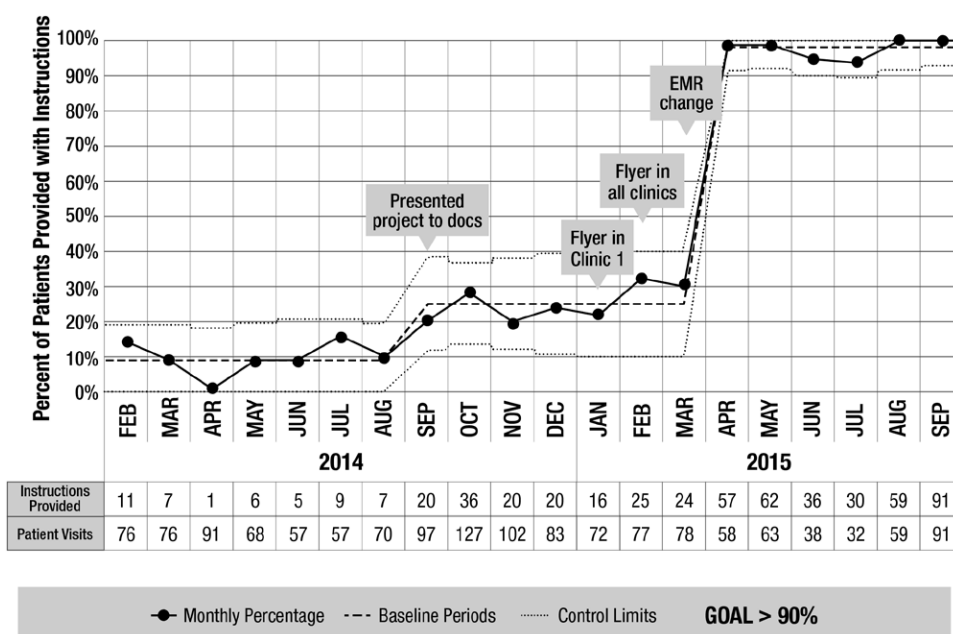


Fig. 3. p-chart with timing of interventions for the return to drive project.

verbal driving instructions were given and only what was documented. Further evaluation of these discussions is needed. This may be done through patient exit surveys or follow-up phone calls, which may provide more meaningful data about these patient–physician conversations. Furthermore, it may be worthwhile to include an option in the EMR that driving recommendations were not discussed.

Finally, one of the challenges that physicians noted was how to determine if a concussed patient is fit to drive or not, aside from using clinical judgment. There is no single test that determines if a patient is healed from his or her concussion.¹ Similarly, there is no single test, time frame, or published guideline for healthcare providers to follow regarding driving after a concussion. Although various tests have predicted driving performance in adult patients with moderate and severe traumatic brain injuries, no assessments have been able to predict safe-driving ability in patients with mild traumatic brain injuries such as concussions.^{31,32} In the authors' current institution, multiple tests are performed to evaluate a concussed patient. This comprehensive evaluation includes a patient-reported symptom score, Balance Error Scoring System test, Cogstate neurocognitive testing (Wausau, Wis.), visual acuity testing, and Sideline Assessment of Concussion test.³ The results of these tests, combined with the patient's history and neurological examination, would be integrated by physicians when providing driving recommendations. Determining which, if any of these or other tests, may provide data by which a clinician may make an objective determination of driving fitness should be the goal of future research.

CONCLUDING SUMMARY

Through the implementation of a QI project, we were able to increase driving recommendations from less than 10% to over 90% of concussed athletes aged 16 and older at all new and follow-up visits in the sports medicine clinics within a year of starting our project. Our success has been maintained for 5 months. Although our project was effective, continued efforts in the field of concussion and driving are crucial to keep our athletes and adolescents safe.

For adolescents who have sustained a concussion, driving before fully recovered represents an activity that potentially puts the patient at significant risk.

Clinicians caring for adolescents recovering from a concussion should ask about their patient's driving habits when managing recovery from this injury. Appropriate recommendations should be prescribed by the clinician using clinical judgment.

To ensure that issues involved with driving after concussion are addressed, clinicians should institute required documentation processes, preferably using EMRs.

DISCLOSURE:

The authors have no financial interest to declare in relation to the content of this article.

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