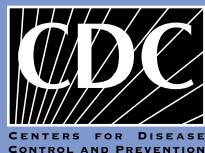


HEADS+UP

CONCUSSION IN HIGH SCHOOL SPORTS

Follow-up evaluation of a concussion tool kit for high school coaches

Final Report



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

KEY SUCCESSES:

- **More than 20,000 tool kits were distributed nationwide within the first three months of the national launch.**
 - **The national media tour garnered over 6 million media impressions during the launch through newspaper, magazine, radio, and television exposure of the *Heads Up* tool kit.**
 - **CDC developed partnerships with over 14 leading medical, sports, national, and state organizations.**
 - **Over 19,000 hits tracked at CDC's *Heads Up* Website within the first three months of the national launch.**
-
- **Evaluation of the tool kit demonstrated positive changes in high school coaches' knowledge, attitudes, behavior and skills related to concussion prevention and management.**
 - **50% of coaches reported viewing concussions more seriously after using the tool kit.**
 - **68% of coaches reported using the tool kit to educate others about concussions, including athletes, athlete's parents, and other coaches.**
 - **34% of coaches reported that the tool kit increased their knowledge about how to prevent and manage concussions.**
 - **38% of coaches reported making changes in how they dealt with concussions, including placing more emphasis on training techniques and safety equipment that minimize the risk of concussion.**

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SPORTS

Follow-up evaluation of a
concussion tool kit for high school coaches

Final Report

ATLANTA, GEORGIA
AUGUST 2007

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
NATIONAL CENTER FOR INJURY PREVENTION AND CONTROL
DIVISION OF INJURY RESPONSE

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BACKGROUND

A traumatic brain injury (TBI) is caused by a bump or blow to the head or a penetrating head injury that disrupts the normal function of the brain. The severity of a TBI may range from “mild” (i.e., a brief change in mental status or consciousness) to “severe” (i.e., an extended period of unconsciousness or amnesia after the injury). Many who sustain a mild to moderate TBI are released from medical care without hospitalization or never receive medical care at all. An unknown proportion of those who are not hospitalized may experience long-term disability such as persistent headache, confusion, pain, cognitive and/or memory problems, fatigue, difficulties with sleep patterns, mood changes, or vision or hearing problems. Teenagers ages 15 to 19 are one of the highest risk groups for TBIs.¹

Of those who sustain a TBI each year, an estimated:

- o 50,000 die;
- o 235,000 are hospitalized; and
- o 1.1 million are treated and released from an emergency department.

~ Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations, and Deaths, CDC¹

The majority of TBIs that occur each year are concussions or other forms of mild TBI. An estimated 1.6 to 3.8 million sports- and recreation-related concussions occur in the U.S. each year, many of which are not seen in a hospital or emergency room.² Concussions among high school varsity athletes account for more than 20% of the annual sports-related concussions and more than 10% of the annual incidence of all head injuries.³ The proportion of these concussions that are repeat injuries is unknown; however, there is an increased risk for subsequent concussions among persons who have had at least one previously.^{4,5} Repeated concussions occurring over an extended period (i.e., months or years) can result in cumulative neurologic and cognitive deficits,^{6,7} and repeated concussions occurring within a short period (i.e., hours, days, or weeks) can be catastrophic or fatal.^{8,9,10}

History of Product Development and Distribution

Product development. Because of the complexity of brain injuries, the danger of repeat concussions, and the wide range of constituencies involved, there is an immediate and ongoing need for accurate and appropriate information and resource materials on this topic. In response, CDC implemented a national TBI education and awareness initiative to address sports-related concussion in teens. The initiative involved development of the multi-media educational tool kit directed toward high school athletic coaches. The distribution of this tool kit had the following three aims:

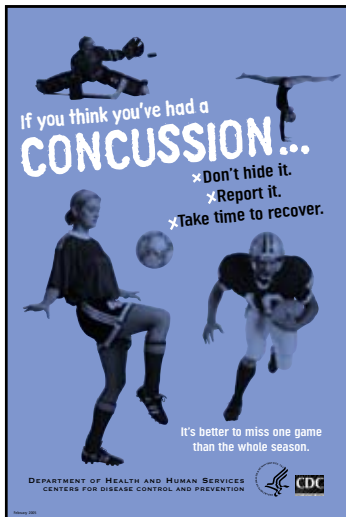
- Aim 1: Raise awareness and educate coaches about concussion (Knowledge)
- Aim 2: Help coaches educate others about concussion (Behavior)
- Aim 3: Provide information to coaches in order to improve their ability to prevent and manage concussions among their athletes (Skill-Building)

The tool kit includes the following information to address these aims:

- Definitions of concussion, incidence, and risk factors
- Explanation of who is at risk
- Signs and symptoms of concussion

- Advice on management of concussion, regardless of degree of perceived seriousness
- Information about effective prevention strategies
- Suggestions for coaches' role in concussion education, prevention, and communication with athletes, their families, and other school officials

The materials that have been developed for the tool kit include:



- Introductory letter from CDC
- Concussion guide for coaches (brochure)
- Coach's wallet card on concussion for quick reference
- Coach's clipboard sticker, with concussion facts and space for emergency contacts
- Fact sheets for athletes and parents in English and Spanish
- Training room posters
- Educational video/DVD featuring a segment produced by PBS's News Hour
- CD-ROM with downloadable kit materials, relevant resource materials, and journal articles

Pilot study. In preparation for the national roll-out, a pilot version of the tool kit was tested with a telephone survey among 497 high school coaches in five states. The pilot study assessed coaches' appraisal, perceptions, intentions to use, and actual use of the tool kit materials. Many coaches provided positive assessments of the overall look and the visual appeal of the tool kit, and 97% of coaches indicated that they would recommend the tool kit to others. Some coaches who offered ideas for enhancements indicated that the wallet card should be reduced in size to fit into a typical wallet, that both a video and DVD should be offered, and that the tool kit should be made available to coaches earlier in the sports season. These enhancements were incorporated into the materials of the tool kit for the follow-up to the pilot, the national roll-out.

National roll-out. In September 2005, the tool kit was rolled-out nationally to coincide with the beginning of the school year and the high school sports season. In preparation, CDC invited the U.S. Surgeon General, Vice Admiral Richard H. Carmona, MD, MPH, FACS, to serve as one of the key spokespersons during promotion efforts. CDC also developed a press kit and other promotional materials tailored for partners and the general public. Promotional materials were posted on CDC's Website (www.cdc.gov/injury) for downloading and ordering. National outreach also involved intensive, targeted media pitches consisting of emails being sent to hundreds of media outlets, followed by telephone calls. More than 100 pitch calls were made to long- and short-lead national, regional, and local media outlets. Media efforts focused on targeting editors and reporters affiliated with general and specialty magazines (e.g., Coach and Athletic Director Magazine), and the health and sports editors and reporters of national and regional newspapers (e.g., top 25 news markets in the U.S.). Radio interviews about the tool kit with the Surgeon General and the Director of CDC's Injury Center, Dr. Ileana Arias, were broadcast nationwide, reaching an audience of more than three million listeners. The combined promotional efforts of CDC staff, partners, and expert panel members, resulted in the nationwide distribution of more than 20,000 tool kits within three months of its launch. Information and articles about the tool kit have appeared in magazines, television programs, national and regional newspapers, as well as on nationally- and internationally-based Websites.

Purpose of the Evaluation Study

In 2005, Constella Health Sciences was contracted to evaluate the tool kit as part of the national roll-out. The purpose of the evaluation study was to determine the tool kit's use, impact, and sustainability as an important TBI resource. More specifically, the evaluation provided information on the following topics:

- ENVIRONMENT - What barriers and resources affect how coaches respond to concussions?
- MATERIALS - How have coaches used the tool kit materials?
- KNOWLEDGE - What did coaches learn from the tool kit?
- ATTITUDES - How has the tool kit changed coaches' attitudes toward the severity of concussions?
- BEHAVIOR - How did coaches use the tool kit to educate others?
- SKILLS - How did the tool kit change the ways in which coaches prevented or managed concussions?

METHODS

Study participants. All individuals who had received a tool kit from September 2005-July 2006 (N=13,199) through CDC's Website were eligible for participation in the evaluation study. This population was narrowed to the evaluation's target audience of U.S.-based coaches of high school athletes (n = 1,009).

Study overview. A two-pronged mixed-method evaluation was employed to assess the research questions above. First, surveys were conducted to collect mostly quantitative information on coaches' use of the tool kit materials as well as their knowledge, attitudes, and behaviors towards concussion. Second, focus groups were conducted with a sample of the coaches who responded to the survey in order to gain a broader understanding of the quantitative findings. The methods for the survey and focus groups are described separately below.

Survey

Instrument. The main data collection instrument utilized in this project was the survey aimed at coaches who had received the tool kit during the previous year. Questions included multiple choice, Likert scale, and open-ended formats.

Sampling. In the sample of surveys used for analysis, all respondents were based in the U.S. and self-identified as coaches of high school-aged athletes who reported receiving the *Heads Up: Concussion in High School Sports* tool kit.

Method. Dillman's method, a scientifically proven format for conducting mail surveys, was used to contact all prospective survey respondents and encourage participation. This technique includes a series of contacts and is characterized with the following elements:

1. Five mailings, including:
 - (a) A pre-notification letter sent a few days before the survey mailing
 - (b) Initial survey mailing that included a cover letter, instruction sheet, survey, and a return envelope
 - (c) A thank-you or reminder postcard

- (d) Replacement survey mailing and cover letter
- (e) Final survey mailing with cover letter, using special delivery
- 2. Return envelopes with first-class stamps as opposed to pre-franked envelopes
- 3. Inclusion of a small, project-related token (in this case, a whistle or notepad with the *Heads Up* logo)

Data entry and analysis. Survey responses were manually entered into the study database, using rigorous quality control procedures, including double data entry and adjudication of a percentage of the surveys by a senior-level data manager.

Quantitative data from the surveys was analyzed by use of SAS. The analysis included descriptive statistics for each question to characterize the population as well as additional variables, such as impact level of the sport and school demographics. Where appropriate, responses to the survey questions are presented for the entire sample, as well as cross-tabulated by key variables.

Focus groups

Instrument. A semi-structured moderator’s guide with open-ended questions was used to lead the focus group discussions. Discussion topics included:

- Ways in which coaches prevent, recognize, and manage concussions
- Coaches’ experiences with sports-related concussions
- Coaches’ use of the tool kit materials to educate others
- Ways in which the tool kit influenced how coaches prevent and/or manage concussions
- Ideas for improving or expanding the tool kit materials and/or distribution

Method. Six focus groups were conducted with a sample of survey respondents who identified that they coached athletes in high- or low-impact sports (see Table 1). Sports were classified as either high- or low-impact, based on published surveillance data for this age group.^{3,11-14}

High-Impact	Low-Impact
Boys’ Ice Hockey	Boys’ Baseball
Boys’/ Girls’ Lacrosse	Boys’ Basketball
Boys’ Rugby	Boys’/ Girls’ Cheerleading
Boys’/ Girls’ Soccer	Field Hockey
Boys’ Wrestling	Girls’ Ice Hockey
Football	Girls’ Volleyball
Girls’ Basketball	Softball

Table 1: High- and Low-Impact Sports

Because a higher proportion of coaches of high-impact sports compared to low-impact sports responded to the survey (74% and 26%, respectively), four focus groups were conducted with coaches of high-impact sports and two with coaches of low-impact sports. Many coaches work with multiple sports, so the following definitions were based on survey responses.

- **Coaches of high-impact sports:** Coaches who identified coaching at least one high-impact sport
- **Coaches of low-impact sports:** Coaches who identified coaching at least one low-impact sport but no high-impact sports

It was hypothesized that coaches of even one high-impact sport would have more experience managing concussions and, thus, a different point of view compared to coaches of low-impact sports in which concussions are considered to be less common.

Focus group participants were recruited in the following manner.

1. Survey respondents who identified themselves as coaches of high- or low-impact sports were mailed postcard invitations to participate in the focus groups.
2. An online service (<http://www.w3data.com/>) and an Internet search of high school Websites were used to identify coaches' publicly listed telephone numbers and email addresses.
3. Coaches were called and/or emailed and invited to participate in the focus groups.
4. Coaches who indicated an interest in participation were given a call-in time, date, and toll-free number to access the focus group discussion.
5. Focus groups took place in April-May 2007, and participants were mailed a gift card to thank them for their time. Coaches of high-impact sports were given a \$75 gift card. Coaches of low-impact sports were given a \$100 gift card. The incentive was increased for coaches of low-impact sports because this group proved to be more difficult to recruit.

Before each focus group, participants were read a verbal consent form to ensure that they understood the parameters of the focus group format. Participants were made aware that the focus group discussion would be audio-recorded, and no participants objected.

Focus groups contained an average of four coaches per discussion (N=23). Participants were self-selected and represented diverse sports (e.g., baseball, boys'/girls' basketball, boys' ice hockey, boys' gymnastics, boys' lacrosse, boys' rugby, boys'/girls' soccer, boys'/girls' tennis, fencing, football, girls' volleyball, softball, track and field) and geographical locations (e.g., Colorado, Georgia, Illinois, Kansas, Massachusetts, Minnesota, Missouri, New Jersey, New York, Pennsylvania, Virginia, Wisconsin).

Data analysis. Focus group data were analyzed by use of a heuristic approach, including immersion in the audio recordings and notes from the focus groups; documenting meaning through the coding of common themes and unique ideas; and summarizing opinions and experiences expressed by focus group participants. Findings were reviewed with members of the Constella research team who participated in the focus groups to reach consensus on interpretation of the data.

RESULTS

Quantitative findings are derived from coaches' responses to the survey. Qualitative findings come from open-ended questions on the survey and focus group discussions. Wherever possible, quantitative and qualitative findings were triangulated to provide greater depth and understanding of coaches' responses and will be presented together under the topic of each evaluation question.

Response Rate

Of the 1,009 coaches who were sent a survey, 451 (or 45%) completed and returned a survey. Of the 451 coaches who responded to the survey, 118 indicated that they were not coaches of high school athletes or had not received the *Heads Up* tool kit materials and so were not eligible for this evaluation. These individuals were dropped from subsequent analyses, for a total of 333 eligible respondents.

Demographics

Most of the coaches who responded to the survey:

- Were male (78%)
- Had 10 or more years of experience in coaching (53%) (see Table 2)
- Coached athletes with middle-income parents (62%) (see Table 3)
- Were situated in suburban (43%) or rural settings (38%) (see Table 4)
- Worked at a public school (78%) with fewer than 1,000 students (50%) (see Table 5)

Table 2: How many years have you coached high school-aged athletes?

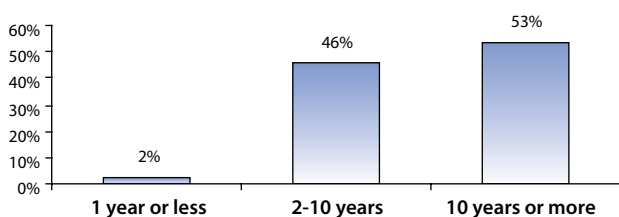


Table 3: Which best describes the income level of your athlete's parents?

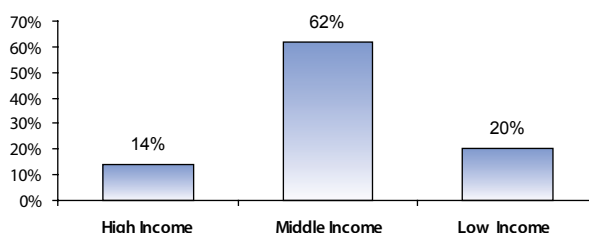


Table 4: What is the setting of your school or sports club?

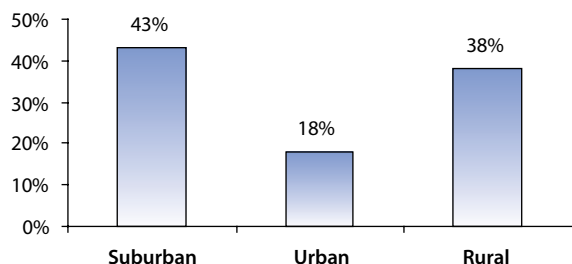
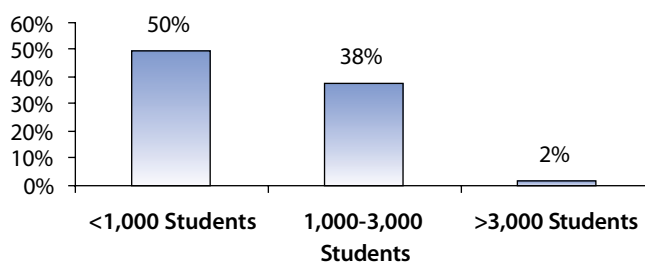
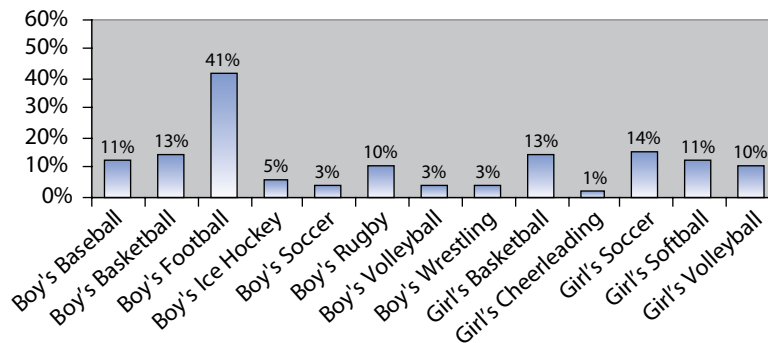


Table 5: How many students attend the school?



Survey respondents coached a wide variety of high- and low-impact sports (see Table 6). Boy's football was the most popular (41%), with boy's basketball (13%) and girl's soccer (11%) following.

Table 6: Which high school-aged sports do you coach?



Environment: What barriers and resources affect how coaches respond to concussions?

In order to better contextualize the findings from the evaluation study, the environmental factors present in coaches' attempts to prevent and manage concussions are reported below. Of note, concussions were reported to be highly prevalent, since 63% of coaches reported that they were aware of a sports-related concussion among their athletes in the 2005-2006 playing season.

Concussion policies. As demonstrated in Tables 7 and 8, the majority of coaches were aware of their school or club's policy on sports-related concussion (60%), and most thought the information provided in the tool kit was more comprehensive than their current policy (79%). Furthermore, the results indicated that coaches of high-impact sports were more likely to be aware of school or club concussion policies (61%) than coaches of low-impact sports (55%).

Table 7: Are you aware of your school/club policy for addressing sports-related concussions?

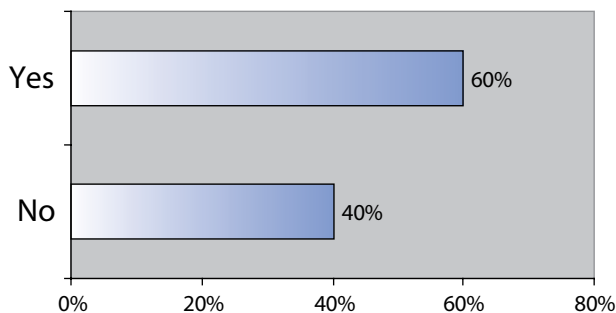
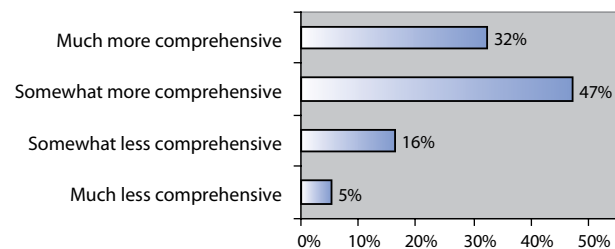


Table 8: How does the information in the tool kit compare with your school/club's policy for addressing sports-related concussions?



Although the majority of survey respondents indicated an awareness of their school, district, or club policy addressing sports-related concussion, follow-up discussions with focus groups indicated that most school or club athletic teams did not have policies specific to the topic of concussions. This disparity can be explained because focus group participants noted that general injury policies encompassed the management of concussions. Coaches in focus groups agreed that their general injury policies did not conflict with recommendations from the *Heads Up* tool kit and usually incorporated the following duties in the case of any sports-related injury:

- The coach must fill out an accident report
- An athlete's parents must be notified of the injury
- An athlete must have a note from a doctor to approve return to play

Focus group participants attested that in the case of a concussion resulting in a loss of consciousness, an athlete would immediately be sent to the hospital, usually via ambulance. But when a concussion with less clear-cut symptoms is suspected, the coach often plays an active role in deciding how to manage the injury. Athletic trainers and/or parents may also contribute to this decision, but in many cases, especially for club sports, trainers and parents have little or no involvement. As one coach noted, "Educating the coach is vital because you're not always going to have a certified medical professional on your sideline."

Formative interviews with coaches indicated that coaches generally do not have the power to influence injury policies, which are legislated at the district or management level. Nevertheless, focus group participants articulated that coaches have a strong role to play in establishing a safe environment for their athletes. This idea is reinforced by the survey findings, in which a vast majority (89%) of respondents agreed that their roles as coaches included educating athletes about sports-related concussions. In addition to educating athletes, coaches in focus groups felt that they were obligated to educate themselves about concussions, to ensure the correct use of safety equipment, to implement training techniques that minimize exposure to potential concussion risks, and, in the event of a concussion, to act as a gatekeeper in gauging the safety of returning an athlete to play.

"The coach has to be the adult – certainly with the players and sometimes with the other parents."

"Just because the doctor signs them off that they're ready to go again doesn't mean I'm throwing them in the next day into our toughest game of the season... We [coaches] have to be the one that looks at the overall situation."

Athletes' and their parents' views of concussions. Even as a coach may be convinced of the seriousness of a possible concussion, athletes and athletes' parents may attempt to derail proper concussion management. In the survey, only 37% of coaches reported that their athletes took concussions seriously or very seriously, and 64% of coaches reported that athletes' parents took concussions seriously or very seriously. Furthermore, coaches of high-impact sports (see Table 1) were more likely to report that their athletes did not take concussions seriously than coaches of low-impact sports.

"Some of the parents think, 'My kid is too tough. He couldn't have a concussion.'"

Barriers to managing concussions can include parents' or athletes' competitiveness, viewing injuries as a weakness, underestimating the potential risks of concussions, and lack of health insurance.

"Physician will say, 'One month [off]' and mom will say, 'He's fine. It's two weeks and he wants to play and his buddies need him.' And youth athletics being as competitive as they are right now, at least in our area where I come from, the parents are more likely to ignore any long-term elimination from play."

"It's getting harder and harder to get a parent to take a kid to the doctor unless something is broke or bleeding profusely."

Materials: How have coaches used the tool kit materials?

Most coaches (67%) had received the tool kit at least 6 months prior to receiving the survey, presumably giving them ample time to implement the materials (see Table 9). Overall, 90% of coaches who responded to the survey had implemented at least one of the tool kit materials. When asked which materials they had used from the tool kit, the most popular materials were the booklet (79%), wallet card (60%), video (59%) and athlete's fact sheets (57%) (see Table 10). An overwhelming majority of coaches (94% or more) identified the tool kit materials as useful (see Table 11). Coaches in focus groups were enthusiastic about the ways in which they had used materials.

Table 9: How long have you had the tool kit?

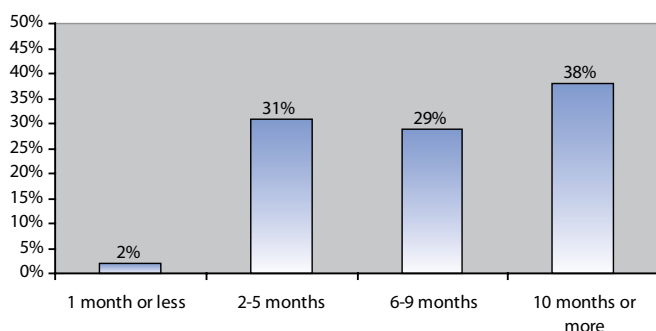


Table 10: Which of the following materials have you used from the tool kit?

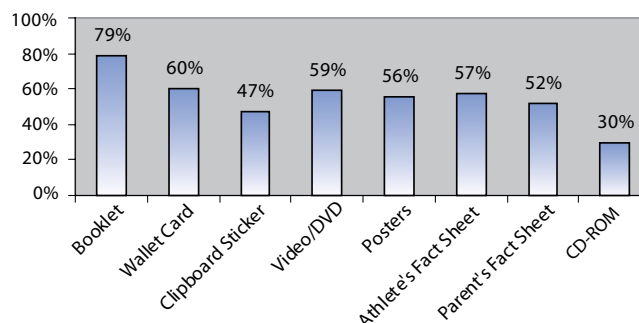
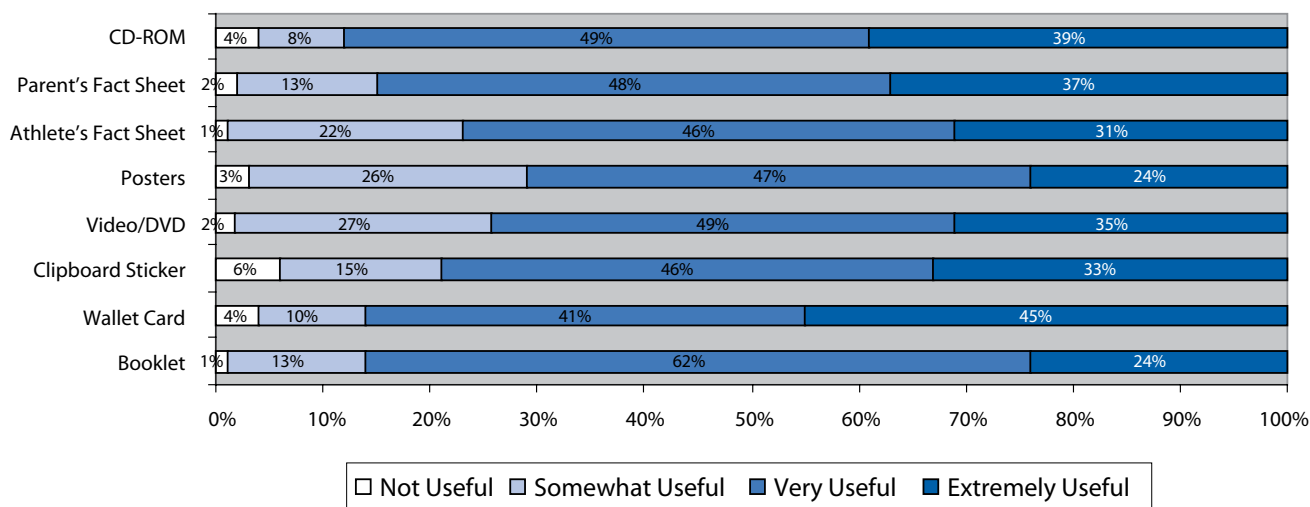


Table 11: How useful were the following materials?



FEEDBACK FROM COACHES:

"If I've had a kid experience something that you would consider or I would consider a bell ringer, I actually use the fact sheet for parents and hand it to them and say, 'You know what? This is what happened at practice. He seems ok, but when you get him home in an hour he may not seem ok. These are the things you're going to look for. You know, if you have any doubts at all, he really should be seen by a physician.'"

"We had a meeting with our in-town, local youth program... We viewed the DVD, made everything available, printed out the [fact sheets] and everything... Made them aware that it was an easy way to educate people. I mean, everything was right there, so it really came in handy."

"The thing we found the most useful was the quick snapshot signs and symptoms [wallet] card and we had that photocopied and put into everybody's med kit of all the coaches, every sport, every level."

One focus group participant who worked in a community with a large Hispanic population was especially pleased that the tool kit materials came in Spanish as well as in English.

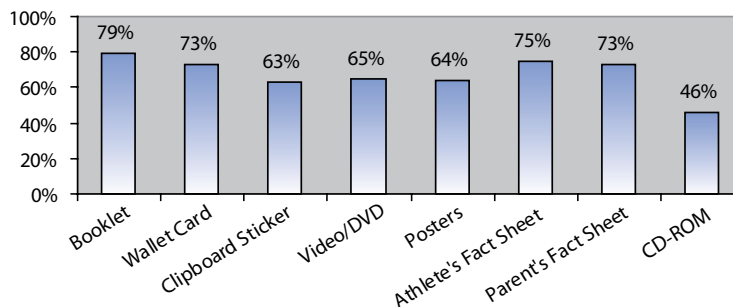
"I loved it because I didn't have to go over necessarily the long list of things over the phone or translate it into Spanish for my parents because it was right there in front of them."

Overall, focus group participants reported that the materials were appropriate for target audiences and proved to be an extremely useful tool for coaches.

"I thought the [tool kit] was brilliant because it spoke to the parents and the students on an even playing field where they could understand what exactly was going on."

In addition to having used the tool kit materials in the past, the majority of coaches planned to keep using the materials in the future, indicating continued sustainability and relevance for the tool kit (see Table 12). Coaches' top choices for continued use are the booklet (79%), athlete's fact sheet (75%), parent's fact sheet (73%), and wallet card (73%).

Table 12: Which materials do you plan on using in the future?



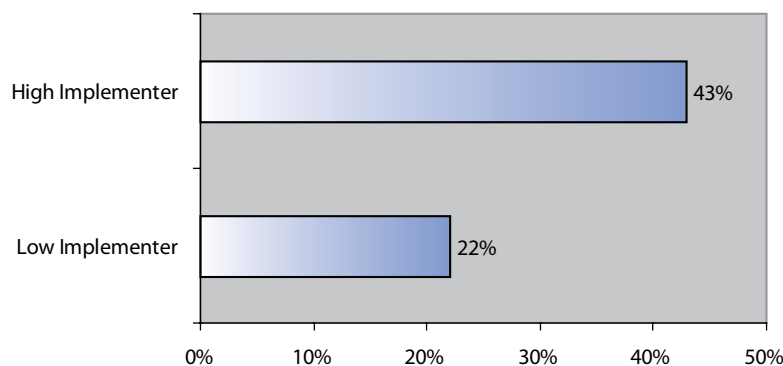
Knowledge: What did coaches learn from the tool kit?

The survey results indicated that over a third of coaches (34%) reported that they learned something new about concussions from the tool kit. This finding is particularly significant, given that the majority of coaches who responded to the survey had been coaching for 10 or more years.

"[I learned] what kinds of things to look for to determine if an athlete has a concussion and when to allow them back into a game/practice."

Of those coaches who learned something new, high implementers of the tool kit (i.e., individuals who reported using four or more of the tool kit materials) were almost twice as likely to have learned something new than low implementers (i.e., individuals who reported using 3 or fewer of the tool kit materials).

Table 13: Which coaches reported that they learned something new from the tool kit?



On the survey and in the focus groups, coaches indicated that the tool kit helped them to identify the signs and symptoms of concussions, provided helpful information about the possible length of recovery, and made them aware of second impact syndrome and the need to have a suspected concussion checked by a medical professional.

"I thought symptoms would be more severe and the athlete would not be able to continue, but I was surprised that many times coaches and athletes would continue having the injured play."

"If a second concussion is received close to the first one death can result."

"[I learned] how serious a concussion is and to not let an athlete play until okayed by a doctor."

Many focus group participants explained that while in most cases the tool kit did not supply them with much new information, its value lay in its succinct and convenient presentation of the facts.

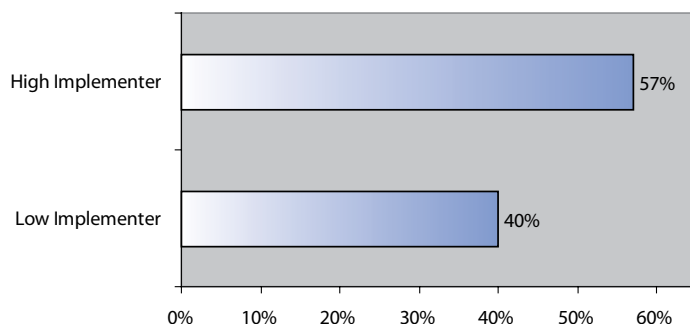
"For me, it presented all the information in one spot better than I'd seen it before, so that was a big help."

"It's just a good thing to have and it was a great reminder that we do have to be aware of [concussions]."

Attitudes: How has the tool kit changed coaches' attitudes toward the severity of concussions?

Half of survey respondents reported that the tool kit changed their views on the seriousness of concussions. Of those coaches who noted a change, all reported that they now regard concussions more seriously. Furthermore, coaches who reported high use of tool kit materials (i.e., high implementers) were more likely to register this change than coaches who reported a relatively lower use of tool kit materials (i.e., low implementers).

Table 14: Which coaches reported that they changed their views on the seriousness of concussions?



Coaches in the focus groups agreed that using the tool kit made them more cautious in their assessment of potential concussions.

"Any head injury has the potential to be harmful."

"[Concussions are] more serious and more prevalent than I ever thought."

"[I learned] not to take unnecessary chances. Better safe than sorry."

"What I wouldn't have considered as a 'serious' head injury before, I now do."

IMPACT ON COACHES' VIEW ON CONCUSSION:

"[Before the tool kit] I was guilty of thinking, 'Oh, he got his bell rung.' That type of thing. Thinking that some of that stuff was just part of the competition and not taking it quite as seriously as I should have."

Some focus group participants noted that CDC's authorship of the *Heads Up* tool kit made them trust the validity of the information.

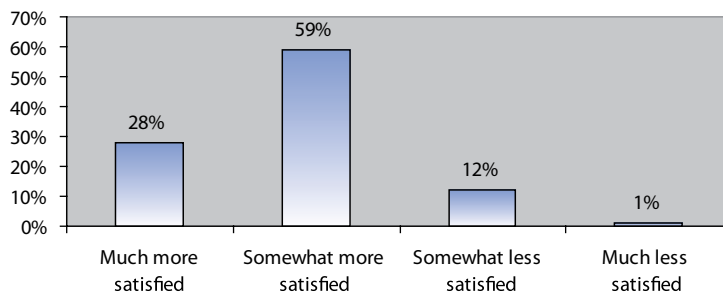
"We get a lot of information from the helmet manufacturers and I sometimes wonder about the bias because of course they're trying to make their helmet look the best."

"One thing I think is good is that [the tool kit] came out of the CDC because it lends legitimacy to everything and it gets people's attention."

Behavior: Did coaches use the tool kit to educate others?

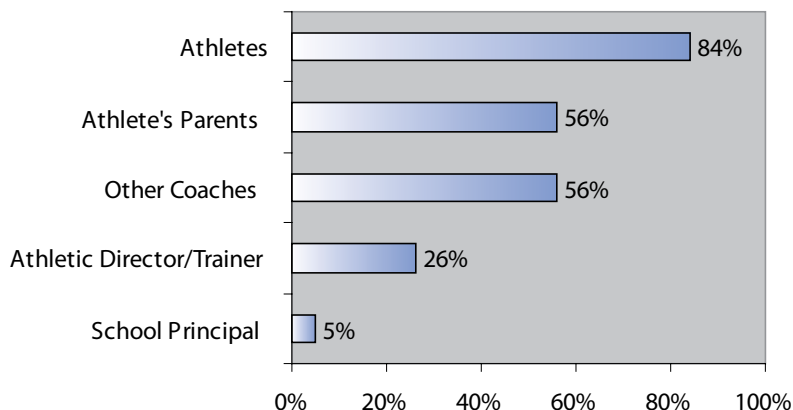
Half of the coaches reported that they currently had access to materials, other than the tool kit, about preventing and managing concussions. Of those with access to additional materials, 87% reported that they were more satisfied with the tool kit materials in comparison to the other materials (see Table 15).

Table 15: How satisfied were coaches with the tool kit materials as opposed to any other materials that were available on concussions?



In many cases, the tool kit provided the means and the impetus for coaches to educate others about preventing and managing concussions. In fact, 68% of coaches had reported that they had educated others about preventing or managing concussions. Of those who reported educating others, 84% noted that they had educated athletes about preventing and managing concussions (see Table 16).

Table 16: Whom did coaches educate about concussions?



Coaches in the focus groups discussed using the tool kit materials to initiate conversations about concussions.

IMPACT ON COACHES' BEHAVIOR:

"In managing concussions, it is much easier when I can hand the parent the fact sheet. They seem to take things more seriously. The trainer loves that I do this."

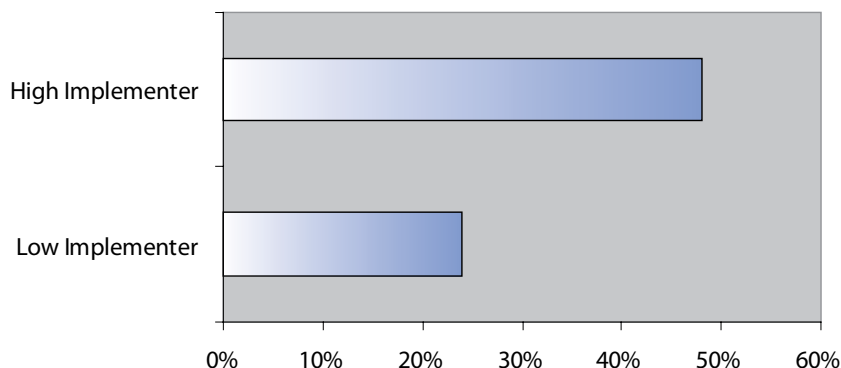
"The more people that are educated about [concussions], the better off everybody is to understand the seriousness of the problem when it does occur, even if it doesn't occur all the time."

"What's happened is that we've at least elevated [concussions] to an upfront discussion. And it enables us to get through the season with everybody understanding that if [a concussion] happens, this is what we're going to do... They understand that there is a protocol or they're not going to be able to play."

Skills: How did the tool kit change the ways in which coaches prevented or managed concussions?

Over a third of survey respondents (38%) reported making changes in how they prevented or managed concussions after using the tool kit. Once again, coaches who reported a high use of tool kit materials (i.e., high implementers) were more likely than coaches who reported a lower use of tool kit materials (i.e., low implementers) to have made changes in how they prevent or manage concussions (see Table 17).

Table 17: Which coaches have made changes in how they prevent and manage concussions since receiving the tool kit?



IMPACT ON COACHES' CONCUSSION MANAGEMENT:

"[Before the tool kit] if an athlete got hurt in the game and the next day they were feeling fine, I was probably guilty of not worrying about them. And I think now after going through the material and watching the video, I'm monitoring them for a longer period probably than I had in the past."

In addition to changes in how concussions were managed, the tool kit compelled many coaches to place more emphasis on training techniques and safety equipment that prevent or minimize the risk of concussion.

"I spend more time on the correct ways to head the ball in soccer."

"I teach Heads Up hockey! When you check an opponent or if you are checked, you need to hit the boards with anything but your head!"

"We are more cautious when hitting and placing tags on players."

"I spend more time talking about proper tackling and take down techniques and talk about proper fitted equipment, helmet and head gear."

RECOMMENDATIONS

Ideas for improvements to the materials were few, but they included laminating the wallet card, so that it would be sturdier and could be used in the rain, and including multiple copies of the wallet card and fact sheets so that they could easily be passed out as needed. Some coaches noted that the only addition to the existing materials should be any updates warranted by additional research.

Focus group participants had many ideas for additional audiences for the tool kit, including:

- Youth league coaches
- Club coaches
- Summer recreation coaches
- Parochial school coaches
- Health teachers
- School nurses
- Physical education teachers
- Athletic trainers
- Athletic directors
- Elementary school playground monitors



CONCLUSIONS

Many coaches face environmental barriers to preventing and addressing concussions, including athletes and athletes' parents who discount the potential severity of concussions and a lack of concussion-specific injury policies. Despite these hurdles, most of the coaches in this survey felt responsible for educating themselves and others about how to recognize and deal with sports-related concussions. While about half of coaches noted that they had access to other concussion resources, the vast majority noted that they were more satisfied with the tool kit materials.

This survey was completed at a time in which most coaches had actively used the tool kit and the vast majority found the materials to be useful and relevant for their situations. Despite the fact that most of the coaches who responded to the survey had more than 10 years of experience coaching, over a third of coaches reported that they learned something new about concussions from the tool kit, and half of coaches noted that the tool kit made them view concussions more seriously. Coaches who reported using more materials from the tool kit were more likely than coaches who used fewer materials to convey that they had learned something new or viewed concussions more seriously. Therefore, use of the tool kit is associated with increased knowledge of concussions and a change in attitude of viewing concussions with increased severity.

In addition to influencing positive changes in knowledge and attitudes, the tool kit proved to be a vehicle for behavioral change in the prevention of concussions. The vast majority of coaches indicated that they had used the tool kit to educate others about concussions, including athletes, athletes' parents, and other coaches. In addition, many coaches cited use of the tool kit in their decisions to place more emphasis on training techniques and safety equipment that prevent or minimize the risk of concussion. Coaches who reported using more materials from the tool kit were more likely than coaches who used fewer materials to acknowledge that they had made changes in the ways they prevent or manage concussions since using the tool kit.



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CONCUSSION IN HIGH SCHOOL SPORTS

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