Traumatic Brain Injury: A Public Health Problem

A traumatic brain injury (TBI) is caused by a bump, blow, or jolt to the head or a penetrating injury that disrupts the normal function of the brain. TBIs can occur as a result of falls, motor vehicle crashes, violence, and sports and recreation activities, among many other causes. Effects of TBI can include impaired thinking or memory, movement, sensation (e.g., vision or hearing), or emotional functioning (e.g., personality changes, depression). These issues not only affect individuals but can have lasting effects on families and communities.

- A concussion is a type of TBI. Concussions can also occur from a fall or a blow to the body that causes the head and brain to move quickly back and forth. Health care professionals may describe a concussion as a “mild” brain injury because concussions are usually not life-threatening. Even so, their effects can be serious.
- In 2010, at least 2.5 million TBIs occurred in the U.S. either as isolated injuries or in combination with other injuries. This includes 2.2 million ED visits, 280,000 hospitalizations, and 50,000 deaths.
  - Equal to more than 30 TBI-related hospitalizations per hour.
  - Equal to the entire state of New Mexico being treated and discharged from the ED in one year alone.
- The estimated economic cost of TBI in 2010, including direct and indirect medical and work loss costs, is approximately $141 billion.

CDC’s Unique Role and Strategies that Work

For more than 20 years, the National Center for Injury Prevention and Control at the Centers for Disease Control and Prevention (CDC’s Injury Center) has been the nation’s leading public health authority on violence and injury prevention. The CDC’s Injury Center research and programs work to prevent TBI and help people better recognize, respond to, and recover from a TBI if it occurs. CDC’s Injury Center works to address and prevent TBIs is aligned with four interdependent strategic pillars to help prioritize work in the field:

1) **Public Health Surveillance.** CDC’s Injury Center is working to improve the understanding of the public health burden of TBI. Better data is needed to more accurately describe the full public health burden of TBI and to better identify the burden among population subgroups.
2) **Primary Prevention.** Data collection efforts to date have allowed us to identify the leading causes of TBI, enabling the prioritization of research, programs, and collaborations. Much is known about the primary prevention of the leading causes of TBI (i.e. falls, motor vehicle injuries, and violence), but much remains to be done to promote widespread adoption of the prevention strategies.
3) **Recognizing and effectively managing mild TBIs.** Public health has an important role to play in the identification, evaluation, and dissemination of best practices for improving the recognition and management of mild TBIs. Such efforts can reduce the harm caused by these injuries and prevent future, and potentially more severe, TBIs and functional limitations.
4) **Promoting healthy lifestyles and improving health outcomes of persons living with TBI.** CDC’s Injury Center is also working to improve the health and safety of those living with TBI. These efforts include having a better understanding of the economic and social conditions that impact TBI outcomes.
Traumatic Brain Injury Prevention in Action

Pillar 1: Public Health Surveillance

• In response to the Institute of Medicine (IOM) report on sports-related concussions, CDC’s Injury Center has completed an environmental scan of available data and has begun to examine specific data sources that will best address the IOM’s recommendation for CDC’s Injury Center to develop a sports concussion surveillance system.

• In 2012, the Minnesota Core Violence and Injury Prevention Program (Core VIPP) designed, refined, and implemented a high school sports concussion surveillance system to address TBI. Launched in 42 high schools across the Twin Cities metropolitan area, the surveillance effort was streamlined to improve functionality and ease of participation with state high school athletic trainers. Using the data collected through their surveillance system, Minnesota continues to determine how many concussions occur by sport and level of sport, and to identify (and resolve) return-to-learn barriers.

Pillar 2: Primary Prevention

• As a step toward preventing TBIs from occurring, the Injury Center will conduct a needs assessment among state-based Injury Prevention Programs, including programs funded by Core VIPP. This assessment will help to better understand how various prevention activities contribute to reductions in TBI burden and identify prevention strategies that will have the greatest impact toward reducing TBI. This information will be used to tailor technical assistance to states with respect to TBI primary prevention activities.

Pillar 3: Recognize and Manage Mild TBIs

• Over the last 10 years, CDC’s Injury Center’s Heads Up Initiative has played a key role in the public health response to concussions. CDC’s Injury Center is working to evaluate the impact of the Heads Up materials, with an emphasis on ensuring the materials improve use of prevention strategies and help translate knowledge and awareness into positive social norms and behavior change. The Heads Up materials aim to increase the rate of concussion reporting and use of prevention strategies; improve health care providers’ adherence to return-to-school and -play protocols; increase patient follow-up and adherence to emergency department discharge recommendations; and involve a greater number of supports and accommodations provided in schools. Heads Up successes to date include having more than:
  - 215 million media impressions through print media and TV public service announcements;
  - 6 million print materials distributed;
  - 3 million coaches complete online trainings;
  - 50 Heads Up products developed;
  - 22,000 Facebook fans, and growing;
  - 85 organizations signed on as participating organizations; and
  - 40 million social media impressions.

• In FY 2015, Heads Up is expanding outreach to parents, as parents often know best when their child may be experiencing concussion symptoms and can help ensure they receive medical attention as needed. CDC’s Injury Center will promote the updated Heads Up app and website, which provide parents with important concussion information—whether their kids are at home, school, or play.

• CDC’s Injury Center is currently working on a study designed to evaluate the implementation and impact of state youth sports concussion legislation – Return-to-Play laws – among a national youth soccer organization. The main objective of this study is to evaluate the implementation and impact of these laws in improving the knowledge, attitudes, and behaviors of various youth sports stakeholders.
- Appropriate diagnosis and management of children and teens with mild TBI can help safeguard the health of young Americans. The CDC Injury Center’s Board of Scientific Counselors (BSC) established the **Pediatric Mild Traumatic Brain Injury** Guideline Workgroup specifically to address this issue. Comprised of over 40 experts in the field, the goal of this federal advisory committee workgroup is to develop an evidence-based guideline to better inform the diagnosis and management of acute mild TBI among children and adolescents. Following the release in late 2015, CDC’s Injury Center will work with partners to encourage the widespread dissemination and uptake of the new pediatric mild TBI guidelines.

**Pillar 4: Promote Healthy Lifestyles and Improve Health Outcomes of Persons Living with TBI**

- The Traumatic Brain Injury Model Systems (TBIMS) Program Collaboration is working to improve care and outcomes for individuals with TBI. The collaboration with TBIMS has been focused on examining the health outcomes among those affected by moderate to severe TBI. The findings from these studies will help to improve the quality of life for individuals with TBI.
- CDC’s Injury Center is currently engaged in three separate projects examining the natural history of TBI in children. These research projects examine children’s outcomes across the range of TBI severity and examine a broad range of factors after TBI, including educational achievement, family functioning, and attainment of developmental milestones. This information will inform efforts to improve recovery.

**Future Goals**

CDC’s Injury Center is committed to reducing the burden of TBI by enhancing primary prevention and improving the health and quality of life for those who experience a TBI. To continue to strengthen TBI prevention efforts, future goals include:

- Developing a strategy to improve TBI surveillance, including sports-related concussions, to address the IOM recommendations. The goal is to ultimately develop a surveillance system to capture information about all TBIs.
- Evaluating the efficacy of Return-to-Play laws and how they can help reduce the impact of TBIs among youth engaged in sports through their focus on: education, proper identification of TBI, and ensuring injured athletes receive proper care after experiencing a TBI prior to returning to play.
- Releasing the Pediatric Mild TBI Guideline Workgroup clinical guidance to health care providers. The goal of this work is to achieve widespread uptake to better inform clinical practice and to ultimately reduce the impact of TBIs.
- Expanding the Heads Up campaign to include TBI prevention strategies for children and teens, including efforts to change the culture of sports to recognize concussion as a serious sports injury.