

Pediatric Mild Traumatic Brain Injury and Population Health

An Introduction for Nursing Care Providers

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KEYWORDS

- Pediatric mild traumatic brain injury • Concussion • Population health
- Health-related quality of life • Health disparities • Pediatric trauma

KEY POINTS

- Prevention of mild traumatic brain injury is essential to improve population health.
- Identification of health disparities in pediatric mild traumatic brain injury is essential to minimize impact of injury.
- Improving health-related quality of life after pediatric mild traumatic brain injury is essential to reduce lifetime economic burden.

TRAUMATIC BRAIN INJURY IN THE UNITED STATES

Injury is the leading cause of mortality in the United States in ages 1 to 44.¹ Traumatic brain injury (TBI), specifically, is a major contributor to population death and disability, accounting for 30% of all traumatic deaths. Caused by a bump, jolt, blow, penetrating, or impulsive trauma to the head, TBI results in disruption of normal neurologic function of the brain, producing symptoms ranging from mild to severe. Rates of TBI have continued to grow over the last several decades, with most recent estimates from the Centers for Disease Control and Prevention reporting approximately 2.5 million cases per year from emergency department (ED) visits, hospitalizations, and deaths. Rising rates of TBI have direct impact on population health and increase the burden on the US economy and health system. The true extent of population health impact as a result of TBI is unknown because of underestimation of incidence; underreporting of

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mild injuries; and the potential for nonreversible, chronic health effects that can continue to occur across the lifespan. Considering these uncertainties, TBI prevention is of national importance and is recognized as one of the most preventable causes of injury, death, and disability.¹

Children are more susceptible than adults to TBI. Differences in pediatric anatomy and physiology, such as a disproportionately large head compared with body size, lack of fusion of skull bones, immature neurologic function, and inability to recognize or avoid injury because of age/developmental stage predisposes children to higher risk of injury.^{1,2} In addition to pathophysiologic and developmental differences, health disparities exist in pediatric trauma care that further increase risk of injury and impact treatment and recovery from TBI. While general access to health care has improved over the last decade, children with Medicaid or Child Health Insurance Program coverage may not obtain care as soon as desired and receive lower quality of care, especially in southern states.³ National efforts to reduce general disparities in minority children and those with lower socioeconomic status have been unsuccessful and remain unchanged.^{3,4}

Disparities specific to pediatric trauma care include limited numbers of pediatric trauma centers, pediatric surgeons, and pediatric specialists to support trauma care, and significant health inequities that exist among African American children.⁵ African American children have a higher prevalence of comorbidities before injury compared with other ethnicities and have longer lengths of hospital stay, functional outcomes that are worse, and higher need for inpatient rehabilitation after all types of trauma care.⁶ Additional disparities have been suggested in health care provider bias and cultural differences in the care of African American children with TBI because they are more likely to be cared for by a resident physician and less likely to be hospitalized or receive follow-up care. Mortality after TBI has also been reported higher among African American children (5.3%) compared with white children (2.2%).^{4,7}

Despite inequities in care, higher risks, and increasing incidence, children with TBI sustain less severe injuries and have higher survival rates compared with adults.^{1,8,9} Children who have a TBI, therefore, carry a higher overall burden on society. Loss of productivity has to be weighed for the parents of the injured child and across the lifespan of the child with TBI, considering that chronic effects may not develop or be recognized until the child ages. Chronic health effects may vary in severity and manifest themselves either as a single entity or exist in combination as an impairment, disruption in functional status, disability, or reduction in health-related quality of life (HRQOL).¹ Efforts to prevent injuries that result in pediatric TBI, improve quality of care and recovery after injury, and reduce associated disparities in pediatric trauma care are paramount to lower future health care costs, improve societal productivity, and enhance population health.

IMPACT OF PEDIATRIC TRAUMATIC BRAIN INJURY ON THE HEALTH SYSTEM

Overall increase in incidence of TBI has been linked to increase in ED visits, as TBI-related hospitalizations have essentially remained stable and TBI-related deaths have decreased slightly. In 2009 to 2010, an average of 11.9 million injury-related ED visits occurred involving children and adolescents ages 0 to 18 years.^{8,9} Publicly funded insurance coverage (41.7%), Medicaid or Child Health Insurance Program, and no insurance coverage (8.6%) comprised expected payor sources in more than half the ED visits. Mechanisms of injuries for all injury-related ED visits were highest for falls and striking against or being struck by an object or persons in males and

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