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Bicycle Handlebar-Associated Injuries Call for the Need to Establish Industry Standards, According to Researchers at The Children's Hospital of Philadelphia

Philadelphia --In a study from The Children's Hospital of Philadelphia, researchers have determined that bicycle handlebar- related abdominal or pelvic organ injuries pose a serious health risk to children and result in substantial health care costs. In non-motor vehicle related bicycle crashes, as many as 80 percent of internal organ injuries are associated with handlebar impact. Requirements for safer handlebar designs may reduce the risk of these costly injuries. The study is published in the American Medical Association's September issue of "Archives of Pediatric and Adolescent Medicine."

"In one year, more than 1,100 children in the United States suffered serious internal organ injuries due to bicycle crashes not involving motor vehicles," states Dr. Flaura Winston, M.D., Ph.D., the study's lead author and director of TraumaLink, an interdisciplinary pediatric injury control research center at The Children's Hospital of Philadelphia. "The majority of these injuries, as many as 900, were due to handlebar impact."

Hospital discharge data from 19 states for 1997, as well as Children's Hospital's Trauma Registry for 1996 to 2000, were analyzed by researchers at Children's Hospital, the University of Pennsylvania, the Center for Injury Research and Control at the University of Pittsburgh, and the Pacific Institute for Research and Evaluation. National estimates were determined through extrapolating these data based on U.S. Census information. The financial impact of these injuries was estimated based on accepted health economic procedures.

Injuries to children, such as abdominal or pelvic organ injury, result in lengthy hospital stays ranging from three to 47 days. Parents and caregivers lose work to care for a child recovering from serious injury. In extreme cases, children who are permanently disabled have reduced work capacity as adults. All these are considered when determining societal healthcare costs.

Researchers took into account immediate and lifetime medical costs, lifetime productivity losses, and the monetary impact of long-term disability (monetized Quality-Adjusted Life Years). Estimated 1997 costs from bicycle handlebar-related injuries included \$9.6 million in hospital charges, \$10.0 million in lifetime medical costs, \$11.5 million in lifetime productivity losses and \$503.9 million in long-term disability costs.

Children's Hospital researchers previously identified the circumstances and mechanism of injury from bicycle handlebars. In that study, published in "Pediatrics" in 1998, all study participants were riding at low speed when something occurred to make them lose control of their bicycle and fall. The front wheel rotated into a plane perpendicular to the child's body. The child landed on the end of the handlebar, resulting in serious abdominal or pelvic organ injuries. Common

injuries in the Pediatrics study were splenic, kidney, liver and pancreatic lacerations and contusions.

A retractable handlebar that absorbs the energy of the handlebar impact may be the solution to this injury mechanism. Biomechanical engineers at Children's Hospital describe this novel handlebar design in a paper published in November 2001 in "Accident Analysis and Prevention." "With this prototype, we proved that it is feasible to create an energy-absorbing handlebar which will likely prevent serious handlebar injuries," states Dr. Winston. "It's time to incorporate safer handlebars into the design of the bicycle."

"For too many years, trauma care providers have had to treat the damage caused by handlebar-related injuries," states Michael L. Nance, M.D., study co-author as well as associate director of Trauma and a surgeon at Children's Hospital. "Prevention is clearly the best solution." Drs. Winston and Nance offer the following recommendations:

- Voluntary or mandatory standards should be adopted to ensure appropriate product modifications, offering potential for the reductions in both frequency and severity of handlebar-related injuries.
- Clinicians should educate parents about choosing and maintaining their child's bicycle to help minimize the risk of bicycle-related injuries.
- Parents and diagnosing physicians need to learn as much as possible about the circumstances of a child's fall from a bicycle in order to determine if internal organ damage may have occurred due to a handlebar impact.

Founded in 1855 as the nation's first pediatric hospital, The Children's Hospital of Philadelphia is ranked today as the best pediatric hospital in the nation by a comprehensive "Child" magazine survey. Its pediatric research program is among the largest in the country, ranking second in National Institutes of Health funding. For more information visit us at <http://www.chop.edu>.