

Capability Statement
for the
Center for Injury Research and Prevention
at
The Children’s Hospital of Philadelphia

The Center for Injury Research and Prevention at the Children’s Hospital of Philadelphia (“Injury Center”) is a comprehensive research center dedicated to advancing the safety of children, youth, and young adults through research. The primary focus of the Injury Center’s activities for more than a decade is traffic injury prevention and treatment. Recently, we expanded our focus to include one new thrust area, violence prevention, and one emerging thrust area, sports injury prevention. Using a multidisciplinary approach, the Injury Center draws on a team of scientists from a broad range of fields including but not limited to medicine (emergency, pediatric, critical care, and adolescent), nursing (emergency, pediatric, critical care, and adolescent), health services research (utilizing the electronic medical record and other state-of-the-art medical science), surgery (general, pediatric, orthopedic), psychology (developmental, pediatric, clinical, social, neuropsychology, and trauma), epidemiology, biostatistics, and demography, engineering (biomechanical, mechanical, automotive, computational, field investigation), public health (knowledge transfer, education, communication, community- based participatory research), social sciences (anthropology, qualitative studies, focus group conduct, interviewing, survey design and analysis, sociology), outreach (continuing education, web-based education, technical outreach, scientific outreach, media relations, scientific, lay, script, and technical writing, web development, video production, community mobilization, and marketing/social marketing). Many of the scientists are faculty at the University of Pennsylvania (Penn) and the Injury Center draws on the vast experience at Penn as necessary for research studies beyond our core capabilities, particularly involving adult medicine and surgery. The Center is composed of four Core groups: Engineering, Behavioral Sciences, Epidemiology and Biostatistics, and Outreach.

The **Epidemiology and Biostatistics Core** members are recognized experts in pediatric injury science whose work focuses on defining the nature and magnitude of the injury burden on populations. The Core applies rigorous epidemiologic principals in studying the causes and consequences of injury, and in identifying temporal and geographic clusters of injury problems that should be targeted for more in-depth study. Core faculty have particular expertise in:

- The creation, implementation, and analysis of injury surveillance systems
- The creation of multi-modal data collection instruments
- Multi-centered longitudinal studies and effectiveness trials.
- Weighted data analysis, spatial analysis using GIS technology, and multivariable analyses

Key accomplishments:

- Created and maintain the world’s largest surveillance system focused on children in motor vehicle crashes – Partners for Child Passenger Safety,

results of which have informed federal and state laws, supported new regulation and product development, and led to extensive educational opportunities.

- Conducted a nationally representative survey of over 5000 high school students about their attitudes, behaviors, and experiences with driving.
- Conducted a wide range of analyses, using novel and existing data sources, to determine the effectiveness of vehicle safety technologies and the unique risks children in crashes experience.
- Participated in landmark multi-center studies, including:
 - The Crash Injury Research and Engineering Network (CIREN), operated by the National Highway Traffic Safety Administration.
 - The Children's Health after Trauma study which advanced understanding of the broad impact of injury on children's health functioning.
 - The Children's Health after Brain Injury study, which aims to determine the prevalence and nature of disability following traumatic brain injury in children.

The **Engineering Core** includes recognized experts in pediatric implications for safety engineering design, analysis, and testing, with areas of focus in traffic safety, musculoskeletal injury and disease, and sports medicine injury prevention. They have specific expertise in three main research focuses: field investigation, injury biomechanics and computational engineering.

- *Field investigation* collects and interprets data from on-scene crash investigations, with primary interview data from witnesses, crash victims and physicians, as well as hospital, police, and emergency medical service records. The Injury Center is a member of the National Highway Traffic Injury Administration's (NHTSA) Crash Injury Research and Engineering Network (CIREN) – a network of eight Level 1 trauma centers dedicated to collecting and integrating crash and medical data from injured motor vehicle occupants. The Injury Center's CIREN site is the only center in the network primarily focused on child occupants.
- *Injury biomechanics* collects and interprets data on the pediatric biomechanical response and tolerance to the forces experienced during trauma and in certain musculoskeletal disease states biomechanical input in order to define constitutive relationships and properties, develop and improve anthropomorphic dummies, develop and improve test procedures, and develop and improve computational models for children. In addition, through a collaboration with Rowan University, Injury Center researchers study sub-injurious pediatric human motion through the use of three-dimensional motion capture of human volunteers and through novel methods translate those findings to biomechanical knowledge in injurious situations.
- *Computational modeling* creates advanced computer simulation models – of the vehicle, the restraint/child restraint systems, and the child - and utilizes them to improve the understanding of crash dynamics, occupant kinematics, and crash injury mechanisms.

Some key accomplishments include:

- In collaboration with University of Virginia and Ford Motor Company, developed a new abdominal insert for the 6 year old crash test dummy that has appropriate human-like dimensions and response and measures the risk of abdominal injury seen in field investigation cases of child occupants.
- Developed novel analytical methods to extract thoracic biomechanics data from resuscitation events involving pediatric hospital patients receiving chest compressions during CPR.
- Using sled tests and computer models, quantified the effect of misusing a new attachments system for child restraints (LATCH) on the likelihood of injury to child occupants in frontal and side impact crashes

The **Behavioral Science Core** includes recognized experts in a wide range of disciplines focused on social, family, and human factors that influence injury – from the cause of the injury to the consequences. Core investigators conduct basic science research to understand behavioral aspects of injury risk and injury sequelae, and design and evaluate interventions aimed at preventing injury or the negative consequences of injury. Methods include qualitative, quantitative, and mixed methods research, as well as community participatory-based research.

Research focus areas include:

- Parent, child, and family factors in child safety, from child passenger safety to sports injury to violence prevention
- Teen driving - learning processes, risk and protective factors, parent roles, interventions to promote optimal learning and reduce risk, simulation research
- Prevention of youth violence - building collaborative relationships and community participation to foster mutual learning between researchers and the community, and to implement effective, sustainable prevention programs
- Traumatic stress and other psychological sequelae of pediatric injury - etiology, risk and protective factors, parent roles, secondary preventive interventions
- Design and evaluation of practical and valid assessment methods and measures

Some key accomplishments:

- Identified key factors in parents' use of age-appropriate safety restraints (car seats, booster seats, seat belts) for children in vehicles, and translated these into effective interventions to help parents.
- Conducted one of the largest prospective studies to date of injured children and their parents - assessing risk and protective factors for traumatic stress.
- Developed innovative risk screening tools for traumatic stress that can be embedded in pediatric trauma care.
- Developed AfterTheInjury.org, a multi-media interactive website for parents to help them promote child emotional recovery after injury.

The **Outreach Core** translates our scientific findings into evidence-based, life-saving messages for various audiences. This dissemination of the scientific results into actionable recommendations and information to the media, parents and communities, industry members, policymakers, and practitioners has helped to dramatically improve child passenger safety and teen driver safety. The Outreach Core includes recognized experts and operates as a full-service public relations agency within CIRP research teams,

providing traditional and social media relations, public health education, web development, marketing, public relations, and government relations services. Outreach accesses CHOP Public Relations and Marketing and Government Relations support when needed. Key accomplishments:

- Through the development of legislative education tools and key alliances with strong grass roots organizations, our research has been used to pass booster seat laws in most states and the District of Columbia.
- Through US Senate testimony, regular presentation of new research to NHTSA, and active participation in expert panels, conference workshops and coalitions, CIRP scientific findings and recommendations are shared to improve federal safety standards and testing procedures for motor vehicles and restraints, as well as to support legislation that builds awareness of safe driving practices among novice drivers.
- CIRP research on child passenger safety alone has tracked more than 11,500 placements in print, broadcast, and web-based mediums. Highlights of this coverage include features on “Dateline,” and in all of the major newspapers, including the *Wall Street Journal*, the *New York Times*, and *USA Today*. The audience reach is conservatively estimated at more than \$1 billion, with an “ad value” well above \$10 million.
- CIRP facilitates collaboration with industry members who are positioned to translate our research into biomedical research priorities and innovative new technologies via its Industry/ University Collaborative Research initiative called Center for Child Injury Prevention Studies as well as an annual Manufacturers Briefing Conference in Detroit.
- In order to share our research and recommendations with as many child injury prevention stakeholders and parents as possible, CIRP has developed a family of evidenced-based Web sites that offer users a plethora of information and resources. The websites log more than 10,000 visits each month. From January 2007 to June 2008 alone, 220,897 people visited the sites, an average of 12,9993 each month.
 - www.chop.edu/injury is the Center’s main site for researchers and practitioners. Dozens of downloadable tools, links to research abstracts, dynamic news about our research are popular features. This well-respected resource also offers access to *Research in Action*, CIRP’s bimonthly newsletter that has doubled its readership in 2008 and in 2009.
 - www.chop.edu/carseat is designed for parents and practitioners looking for evidenced-based recommendations for choosing and installing child restraints. From this site users can access a full library of educational materials: legislative education fact sheets, parent handouts, illustrations and charts that can be dropped into practitioner developed materials, and research reports. Short how-to installation videos, available in English and Spanish, can be viewed on line (or by CD for use by practitioners). Thousands of the CD have been ordered by practitioners
 - www.chop.edu/youngdrivers is designed for parents and practitioners looking for evidence-based information on teen driver safety and features research and recommendations from Young Driver Research Initiative, a research and outreach alliance of CIRP and State Farm. Popular features

include parent handouts and a driving lesson timeline. In 2008, CIRP reached out to teen driver safety stakeholders via webinars, conferences, and group e-mails, as well as helped develop a school-based peer-to-peer initiative called “Ride Like A Friend/Drive Like You Care” to promote safe teen passenger behavior. This web-based initiative (www.ntdsw2009.org) provides a program planner interface for users, a Facebook application, and other materials and is currently under evaluation.

- Aftertheinjury.org is an award winning Web site that provides parents and healthcare providers with a program to help children avoid long term traumatic stress following an injury. Evidence-based content provides information utilizing video, as well as interactive tools to help parents develop a customized plan that works.