# Ford Inova Fairfax Hospital CIREN Center

## *CIREN Program Report*

The Inova Regional Trauma Center (IRTC) is one of the busiest trauma centers in the Washington, DC, metropolitan area. In 2000, the trauma center treated more than 2,300 severely injured patients with the majority of patients injured in motor vehicle crashes. Our attending staff of four full-time trauma surgeons receives assistance from a group of community-based general surgeons.

The IRTC is committed to decreasing trauma-related death and disability through education, outreach, prevention, and research to improve the quality of life for everyone in the community. Seventy-eight percent of the patients treated at the IRTC are from Fairfax County, which is an affluent community with a high percentage of new vehicles in the population resulting in a higher probability of encountering new vehicle safety technology. Some of our recent highlights include:

- The IRTC experienced very substantial growth in patient volume over the past decade. We witnessed an increase of 14% in the year 2000, consistent with a nearly three-fold increase in patient volume since the late 1980's.
- Over the past 18 months, we acquired over $1.5 million in grants and charitable gifts to support our core missions of patient care, education/outreach, injury prevention and research.
- Since 1999, we have published 23 articles in peer reviewed medical journals and 16 book chapters. During the same time interval, our group had 21 national research presentations.
- We received a $180,000 grant from the motor vehicle administrations of Maryland, Virginia and the District of Columbia for research on aggressive driving in the Washington metropolitan area, as part of the Smooth Operator Campaign.
- Our Reality Check program, established in 1999 to support young driver safety and education, continued with funding from the DMV in Virginia. This program targets the 10,000 students who enroll in driver's education in Fairfax County each year in an effort to reduce teenagers driving under the influence (DUI). It is a collaborative effort with the Fairfax County schools and incorporates an attitude survey to measure program outcomes. This program also receives support from the Bank of America Foundation and private donors.
- We received funding from CDC for our patient support program, REBUILD. REBUILD is a program that focuses on the psychosocial concerns of the trauma patient. The program also receives funds from the Bank of America Foundation as well as private donors.
- We initiated the "Kids Can't Fly" program to educate parents and caregivers about the risks of children falling from open windows.
- We were selected by the Brain Trauma Foundation (BTF) to be a regional center of excellence. The IRTC received grant support to implement the BTF Guidelines for the Pre Hospital Management of Traumatic Brain Injury and to educate EMS agencies through a "train the trainer" program in partnership with the Fairfax County Fire and Rescue Department.
- We partnered with the Fairfax County Police in sponsoring a Mountain Bike Competition for law enforcement officers from police agencies across the Mid-Eastern region of the US. The proceeds will support prevention efforts in traumatic head injury in children.
- We concluded the first year of implementation of the Substance Abuse Focused Education (S.A.F.E.) program in partnership with the Fairfax County Juvenile Court system and the county's Alcohol Safety Action Program (ASAP). This is a court-mandated program offered to juveniles charged with an alcohol or substance abuse offense. As part of the program, the teenager, accompanied by a counselor, visits patients on different hospital units at the IRTC, attends a Medical Examiner lecture, and composes an essay on the experience. To date over 300 youths have participated in this program.

- We received the "Best Practice" award at the 5th annual conference of Bishop + Associates for the Northern Virginia Injury Prevention Center's website and prevention efforts. Bishop + Associates are a national consulting firm specializing in trauma care.
- We continued our very successful trauma externship program. This program enabled pre-professional students from throughout the country, who have an interest in a career related to trauma, to shadow caregivers across the continuum of care and observe the components of the trauma system.

In May 2000, Ford Motor Company awarded a $1 million grant to the IRTC to establish the 9th Crash Injury Research & Engineering Network Center. The trauma center's unique relationship with the Fairfax County Fire and Rescue Department as well as the Fairfax County Police Accident Reconstruction Unit played a vital role in establishing the CIREN Team at the IRTC. To complete the team, the IRTC has contracted engineering consulting services from the Automobile Safety Laboratory in the Department of Mechanical and Aerospace Engineering at the University of Virginia.

The CIREN Center at the IRTC has the unique opportunity to capture crash events and information because of our long standing integration with the Fairfax County Fire and Rescue Department and the on-scene real-time availability of the Fairfax County Police Accident Reconstruction Unit for most of our cases. The Fairfax County Fire and Rescue Department provide all-professional staffing for vehicle crash victims backed up by the Inova Fairfax Hospital Helicopter service (Inova Medical AirCare). The Fairfax County Fire and Rescue Department have an average response time to crashes of 4–5 minutes. The helicopters are less than 10 minutes from any point in the county. The Fairfax County Police Department has a specialized Accident Reconstruction Unit (ARU) available on call 24 hours per day, 7 days a week in response to fatal and other severe crashes (including potential CIREN cases). This provides real time, accurate reconstruction of crashes and more reliable data.

All parties actively participate in the monthly case reviews. Pre-hospital personnel responding to the scene and attending physicians are invited to share their observations and expertise during the case reviews providing additional insight into the cases discussed.

## Fairfax County Fire and Rescue

Pre-hospital providers are an important part of the trauma system. Without properly trained personnel, skilled extrication, rapid assessment of the patient, and rapid transport to an appropriate facility would not be possible. For these reasons, the Fairfax County Fire & Rescue Department has also become an integral part of our CIREN team. Information from the first unit at the scene is vital to paint a complete picture of the crash scene. In-services were held for pre-hospital providers and digital cameras were distributed to each station captain to enable the responding units to take photos at the scene and extrication process where possible. In turn, Fairfax County Fire & Rescue has held an in-service for the other members of the CIREN team to teach researchers how to differentiate impact crash damage from extrication related vehicle alterations and to better comprehend the roles, responsibilities, and capabilities of heavy rescue companies. Once a patient has agreed to participate in the CIREN program, Captain Christine Woodard, our Fire and Rescue Liaison is contacted to interview pre-hospital personnel that first arrived at the scene. The information gathered includes measures taken during extrication, extrication equipment used, alterations made to the vehicle during the extrication, and in what position and condition the patient was found. Pre-hospital providers are invited and encouraged to participate in the monthly case reviews and feedback is provided to personnel that were unable to attend. Fairfax County Fire & Rescue has been active in participating in the Quarterly CIREN Meetings held by NHTSA and in giving presentations related to their role in the field. In the coming months the CIREN program has planned to further integrate pre-hospital providers by scheduling Grand Rounds at Fire Stations. The goal is to

educate pre-hospital providers of characteristic injury patterns that occur in crashes.

## Fairfax County Police – Accident Reconstruction Unit

The Fairfax County Police Department's Accident Reconstruction Unit (ARU) is an important participant in the CIREN program. The Ford Inova Fairfax Hospital CIREN Center obtained the support of the Fairfax County Board of Supervisors to utilize the expertise of the ARU for this project. The team itself is a leader in accident reconstruction, having been one of the first units of its kind, and is recognized internationally for its accomplishments. The

ARU conducts real time scene investigation for all fatal crashes and crashes in which the occupant is perceived to have suffered life threatening injuries in Fairfax County. They respond to the scene before the vehicles are moved and are able to obtain photographs of the vehicles and evidence at final rest; obtain and record measurements of evidence; and establish the speed, Delta V, maximum crush, and relevant contact points that help determine injury sources. Training conducted by the ARU for local, state and federal agencies explains the CIREN program and involvement by the police. The members of the team attend numerous civic meetings throughout Fairfax County where the CIREN program is discussed. The Ford Inova Fairfax Hospital CIREN Center is currently the only CIREN Center that utilizes law enforcement personnel as the crash investigators. This allows for a greater involvement of the police, fire and rescue and the local community, and broadens the reach of the CIREN Center into the community. The ARU team includes:

- Detective James D. Bean, Fairfax County Police Accident Reconstruction Unit
- Detective James J. Banachoski, Fairfax County Police Accident Reconstruction Unit
- Detective Elizabeth Dohm, Fairfax County Police Accident Reconstruction Unit

## Inova Regional Trauma Center

As an ACS Level I verified trauma center, the IRTC is committed to providing excellence and quality in care to all patients. CIREN allows clinicians, crash reconstruction experts and engineers to collaborate in the in-depth analysis of vehicle crashes and patient injuries with the ultimate

goal of improving auto safety and decreasing death and disability. The information CIREN offers is being utilized to increase the diagnostic sensitivity and specificity of the trauma examination by the identification of patterns of contact in particular types of motor vehicle crashes that are predictive of specific injuries. Although Inova Fairfax Hospital has just recently joined CIREN, the already existing relationship with the Fairfax County Fire & Rescue Department and the Fairfax County Police Department, has allowed this CIREN Center to "go live" in a very short time. The close relationship between the Fire & Rescue Department and Police Department facilitates excellent communication and cooperation. The IRTC has worked closely with the Fairfax County Fire and Rescue Department and the Fairfax County Police Department on many research and injury prevention projects.

## Ford Inova Fairfax Hospital CIREN Team

- Samir M. Fakhry, MD, FACS, principal investigator
- Dorraine D. Watts, PhD, RN, principal investigator
- Christine Burke, study coordinator
- Colleen Gilmore, research associate
- Eileen Caulfield, research analyst
- Sharon Plater, research associate

The Ford Inova Fairfax Hospital CIREN Center went "live" in November 2000. As of August 31, 2001 the CIREN team has screened 1,248 patients and has enrolled forty-six patients into the CIREN study. Detailed case analysis including pre-hospital, scene, hospital data and engineering are presented and discussed at monthly multi-disciplinary case reviews, which are also attended by representatives from the Ford Motor Company via video conferencing.

***Dr. Fakhry demonstrates MAST pants during a case review.***

### Below are 7 selected CIREN related presentations and outreach

May 2000 – the Ford Inova Fairfax Hospital CIREN Center held an opening ceremony that was attended by community leaders and the Secretary of Transportation Rodney Slater. The Fairfax County Fire and Rescue Department presented a crash victim extrication demonstration.

September 2000 – the CIREN team (principal investigators, study coordinator, research associate and a representative from the ARU) traveled to Boston to attend a four-day training session related to CIREN and NASS database management, quality control, NASS coding and report writing.

October 2000 – the Ford Inova Fairfax Hospital CIREN Team and the IRTC sponsored a Child Safety and Booster Seat event as part of Child Health Month. The event brought together child seat technicians from the Fairfax County Police Department, Fairfax County Fire & Rescue and Fairfax Safe Kids Coalition to help install and ensure the proper use of child safety seats, as well as set up educational booths and display boards for the community.

November 2000 – Ford Motor Company was an invited speaker at the IRTC's Annual Trauma Symposium. Ford Motor Company presented **Innovation in Automotive Occupant Safety**.

Samir M. Fakhry, MD, FACS, chief, trauma services and principal investigator, Ford Inova Fairfax Hospital CIREN Center held an educational presentation at the Surgery Grand Rounds and Residents Meeting.

June 2001- Dorraine Watts, PhD, principal investigator and Detective James Banachoski attended and completed the NASS training held by the Transportation Safety Institute.

Samir M. Fakhry, MD, FACS, chief, trauma services, principal investigator, CIREN and Dorraine D. Watts, PhD, RN, trauma research manager, principal investigator, CIREN have held educational presentation at individual Fairfax County Fire & Rescue Stations. Educational topics included liver injuries associated with shoulder belt only use and the CIREN program.

### Below are 7 selected recent motor vehicle-related articles


Watts, D., Fakhry, S., Pasquale, M., Kurek, S., Malhotra, A., Fabian, T., & Boulanger, B. (2002). Motor Vehicle Crash (MVC) And Abdominal Seatbelt Mark As Risk Factors For Perforating Small Bowel Injury (SBI): Results From A Large Multi-Institutional Study. *Proceedings of the Eastern Association for the Surgery of Trauma Fifteenth Scientific Assembly, January 2002, Orlando, FL.*

Watts, D., Hauda, W., & Anderson, J. (2001). The Role of Airbags in Eye Injures: Protective or Injury Producing? *Proceedings of the American College of Emergency Physicians 2001 Research Forum, October 2001, Chicago, IL.*

Watts, D. (2001). Management of Patients with Neurologic Trauma. S. Smeltzer, & B. Bare (editors), *Medical Surgical Nursing* (10th ed., Vol. (in press) Chapter 58). Philadelphia: Lippincott.

Rivera, L., Peitzman, A. B., ....., Fakhry, S., & et.al. (2001). Contributions of Age and Gender to Outcomes of Blunt Splenic Injury in Adults: Multicenter Study of the Eastern Association for the Surgery of Trauma. in *Proceedings of the Fourteenth Annual Scientific Assembly of the Eastern Association for the Surgery of Trauma* (p. page 46).

Peitzman, A. B., Harbrecht, B. G., ....., Fakhry, S., & et.al. (2001). EAST Study of Failure of Observation of Blunt Splenic Injury in Adults. *Journal of Trauma.*

Hanfling, D., Watts, D., Mayer, T., Trask, A., & Fakhry, S. (2001). Forming the Initial Link: Educating Providers in the Guidelines for Pre-hospital Management of Traumatic Brain Injury. *Proceedings of the American College of Emergency Physicians 2001 Research Forum, October 2001, Chicago, IL.*

Fakhry, S., & Salaita, K. (2001). Aggressive Driving: Preliminary Analysis of a Serious Threat to Motorists in a Large Metropolitan Area. in *Proceedings of the Fourteenth Annual Scientific Assembly of the Eastern Association for the Surgery of Trauma* (page 122).

## Engineering by the University of Virginia

The Automobile Safety Laboratory is an interdisciplinary program of the School of Engineering and Applied Science and the School of Medicine, through the Center for Prevention of Disease and Injury of the University of Virginia (UVA). This facility is one of a limited number of laboratories conducting impact biomechanics research with both dummies and cadavers. The laboratory is a 10,000 sq. ft. facility equipped with a wide range of biomechanical test equipment, a machine shop, dummy laboratory, and surrogate storage.

In its role with CIREN, the UVA Automobile Safety Laboratory forms the link between the vehicle dynamics (crash reconstructionists) and the occupant injury information (doctors, nurses, EMTs) to determine injury causation.

**Occupant kinematics** – Personnel at the ASL have years of experience in conducting sled tests with both cadavers and dummies to understand how crash dynamics relate to occupant kinematics. Ultimately injuries occur when the body interacts with the vehicle interior, and understanding occupant kinematics is crucial to this interaction.

**Injury mechanics** – The ASL conducts sled tests with whole cadavers to produce and study injuries. Whole cadavers have also been used in isolated out-of-position airbag tests to study the injuries caused in these situations. Component tests of specific body segments (e.g., lower extremities) have been performed for injury criteria development.

**Modeling** – Advanced computer models (both multi-body and finite element) have been used to study both occupant kinematics and injury mechanics. Multi-body models allow parametric studies to explore the effects of occupant position, size, etc. on occupant kinematics. Finite element models representing bones, ligaments, tendons can explore how external loads cause high stresses and injuries on specific body components.

**Personnel** – Individuals at the ASL not only have experience in current ASL biomechanical research activities, but come from other organizations in the automotive safety world, bringing valuable experience in crash reconstruction, vehicle testing, etc.

**Education** – Prior to the official CIREN case reviews, the ASL has its own internal case review meetings discussing each case in detail. These reviews are attended by professors, research staff, graduate students, doctors, and other auto safety engineers. This collaboration of people with expertise in multiple areas is crucial to determining the most logical explanations for injury causation. These meetings are an especially excellent method for teaching students how injuries occur in the real world crash environment. Knowledge gained from the work in CIREN will also be incorporated into a School of Engineering & Applied Science graduate course on Injury Biomechanics.

**Effect on research and testing** – Our experience and knowledge on injury causation are always being improved with more cases and more data. The detailed data from CIREN cases allows us to see patterns of injuries that may lead to new research ideas and provide information on how to realistically design testing environments. Even when testing with cadavers (as opposed to dummies) there are injuries that cannot be reproduced due to post-mortem physiological changes. The CIREN data allows us to study in-depth information on injuries, which can be incorporated into our future research.