CrashHelp: An Innovation to Improve Traffic Crash Emergency Medical Response

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Our research goal is to develop and test models and tools to improve technology enabled EMS systems.

Our focus:

- How can we more effectively collect, share, and visualize information?
- What existing and emerging technologies could be applied?
- What are the best practices and how can we improve upon them?
Research Activities

Conceptual Model – 2004-2006
- Development of Time-Critical Information Services Model for EMS that emphasizes end-to-end performance

Case Study Research – 2005-2009
- Two case studies to validate the model and explore best practices: San Mateo County, Mayo Clinic Trauma System

Prototype Development and Testing – 2009-present
- Review of Comparative Cases
- Design and Testing of prototype: CrashHelp
Background: ITS and EMS

The four “E’s” of transportation safety (USDOT, 2006)
- Education, Engineering, Enforcement, Emergency medical services (EMS)

“EMS is the Safety-Net of Transportation, it needs to be there when the other three E’s fail”
- Idaho EMS Director

ITS is needed to:
- Support the end-to-end emergency response process
- Provide information that can be used at the point of care, as well as to guide traffic safety analysis and improvements.
Background: MVC’s and EMS

- Almost 35,000 traffic related fatalities per year
- Approximately 60% are on rural roads, 70% in Minnesota
- Medical and emergency service costs are roughly 15 percent of the cost of MVC’s (NHTSA, 2008)
- According to FHWA, in 2005 dollars, the average cost of a fatality was $3,246,192 and the average cost of an injury was $68,170

Timely and effective emergency medical response to MVC’s can significantly reduce the likelihood of death, disability, and economic consequences.
Background: EMS

An essential medical care safety net in the U.S.

- Over 240 million 9-1-1 calls every year (2009, FCC)
- Over 6,000 9-1-1 call centers
- Over 16 million medical transports to hospitals (IOM, 2006)
- Over 4,800 emergency departments (GAO, 2006)

80% of fire service calls are now EMS related
Many existing and emerging technologies
Research Findings

- Major Gaps Information exchange from *pre-hospital* to *hospital*
CrashHelp High Level Design Principles

- Solution must facilitate information hand-off at or before patient hand-off to ED
- Solution must facilitate coordination across EMS organizations
- Solution must interfere in least possible way with medical care processes and practices
- Solution must provide value added context to decision makers at ED/Trauma Center
- Users must be protected from themselves (security & privacy)
- Users must want to use it, be able to use it, like to use it
- Leverage growth of mobile computing (smartphones)
- Leverage expansion of cell phone network
- Leverage the web
CrashHelp System Prototype

For: EMT's / Paramedics in the field
Google Android Compatible Phone
Android Application

For: Emergency Department /
Trauma Center
Web based interface
CrashHelp System Architecture
Mobile Phone Application

- Secure login
- Add new Incident
- Review existing incidents
Mobile Phone Application

- Take Pictures and Video
Mobile Phone Application

- Review, delete, encrypt, pictures, video
Mobile Phone Application

- Record audio messages, Paramedic/EMT verbal snapshot:
  - Vitals
  - Origin of incident
  - Mechanism of Injury
  - Treatments given
  - Other: e.g., patient history
Mobile Phone Application

- Review and add *basic* patient data

  (gender, age, And name)
Mobile Phone Application

- Choose destination
- Get location
- Send phone number
- Send EMS personnel info
- Send data
- Data encrypted and stored securely on device and is “purged” after sending
- Data sends only when phone has a connection
- Text message sent to ED staff member
Web Application
Web Application
Web Application
Web Application

![Web Application Image](image-url)
Web Application
Web Application
Pilot Test & Evaluation

- Improved information collection by on-scene EMS personnel

- Improved communication between pre-hospital transport and hospital organizations (ED / Trauma)

- Improved care decision making by hospital personnel (for some incidents)

- Improved resource utilization by hospital personnel
Questions?
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Publications

Phase III

Phase II

Phase I