CrashHelp and the Role of Multimedia Information in Emergency Response

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Research Aims

- 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?
  - How can mobile technologies assist in getting useful information to the Emergency Room in advance of patient arrival?
  - What information is needed to support patient care for MVC related traumas?

System Prototype

(1) Paramedics/EMT's use a mobile smartphone to securely capture pictures, digital audio recordings, video, patient indicators (stroke, STEMI, trauma) and the most basic patient and incident information
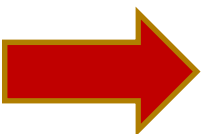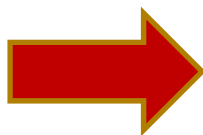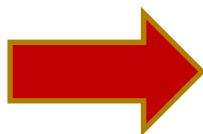
(2) The information collected on scene is sent securely to the ED via an automated phone call, AND/OR a text message, AND/OR an email AND/OR an iPad application. The notification can be sent to any number of predetermined devices.

(3) The information collected on scene can be viewed through a secure web-based interface or via an iPad application for practitioners to view on demand

CrashHelp System Architecture
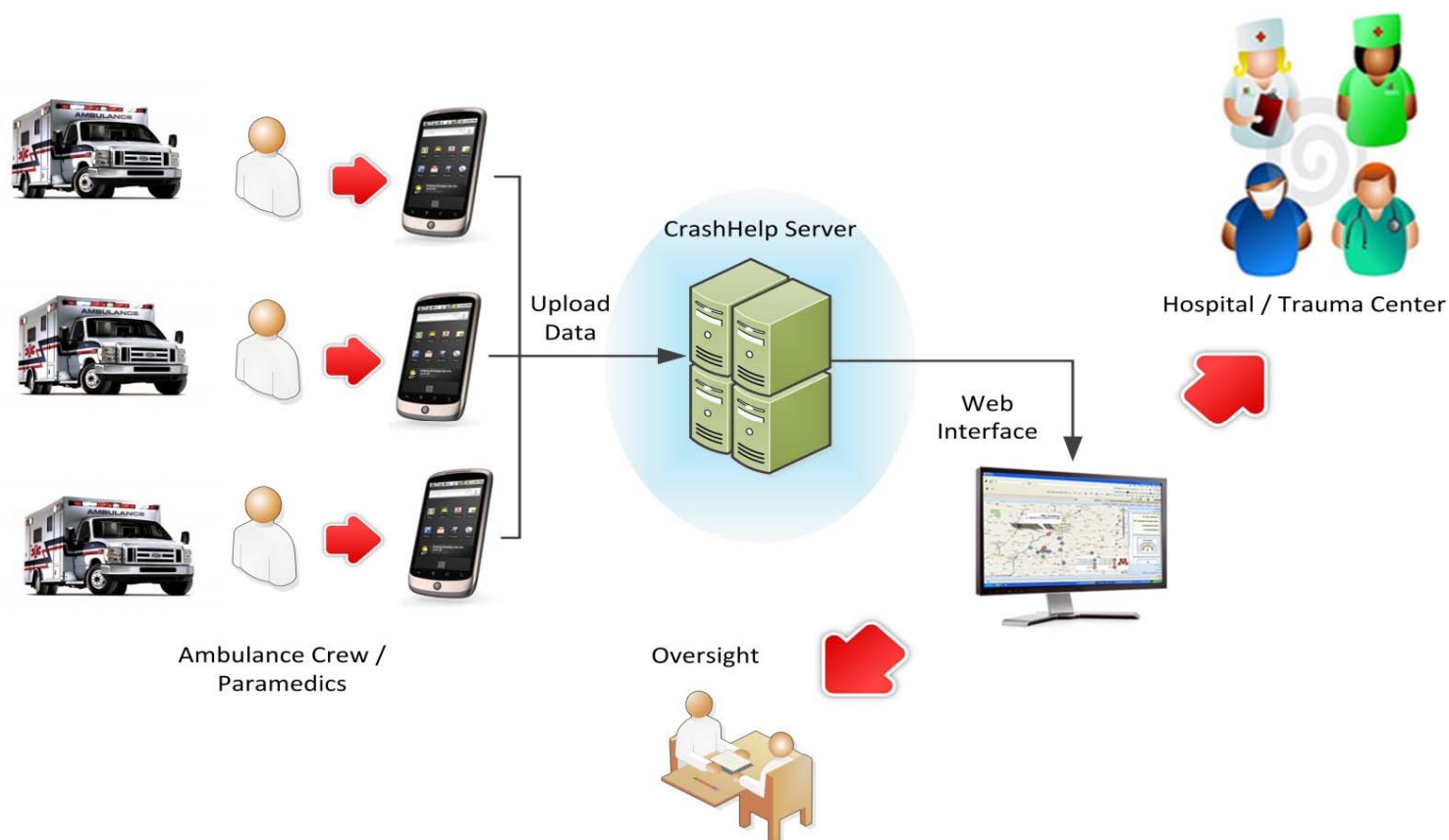
CrashHelp Server

Upload Data

Web Interface

Hospital / Trauma Center

Ambulance Crew / Paramedics

Oversight

Mobile Phone Application

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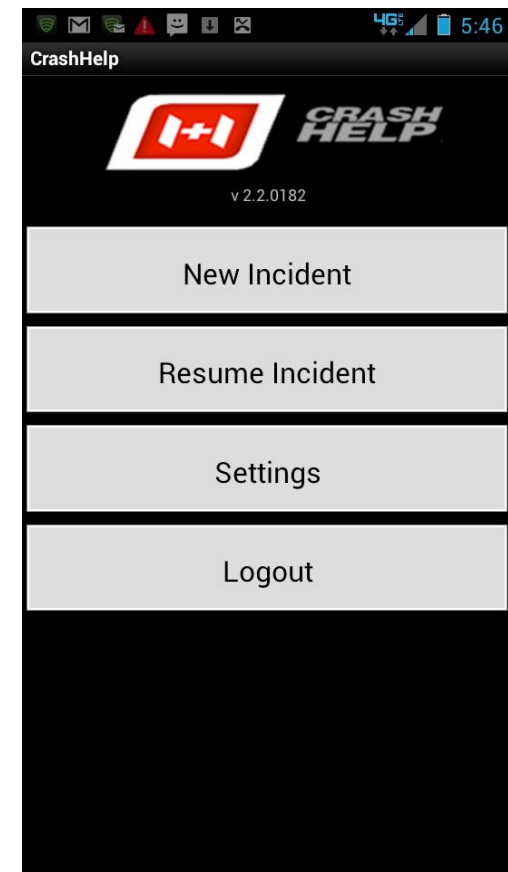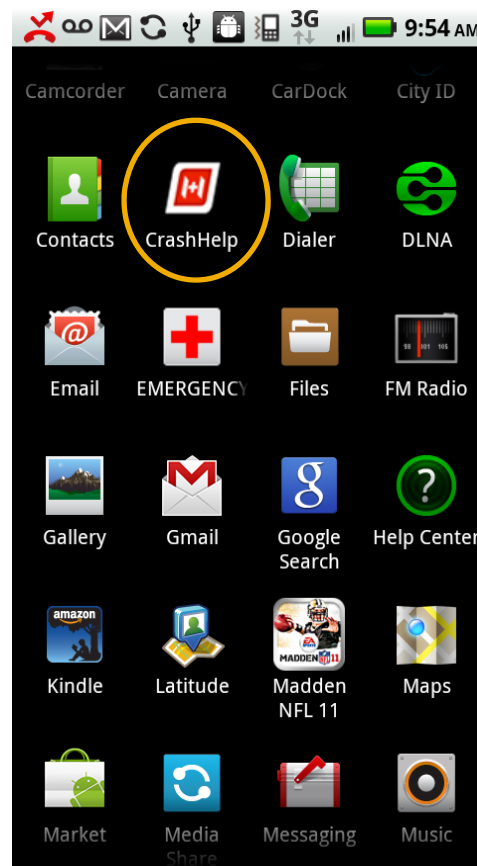
Mobile Phone Application

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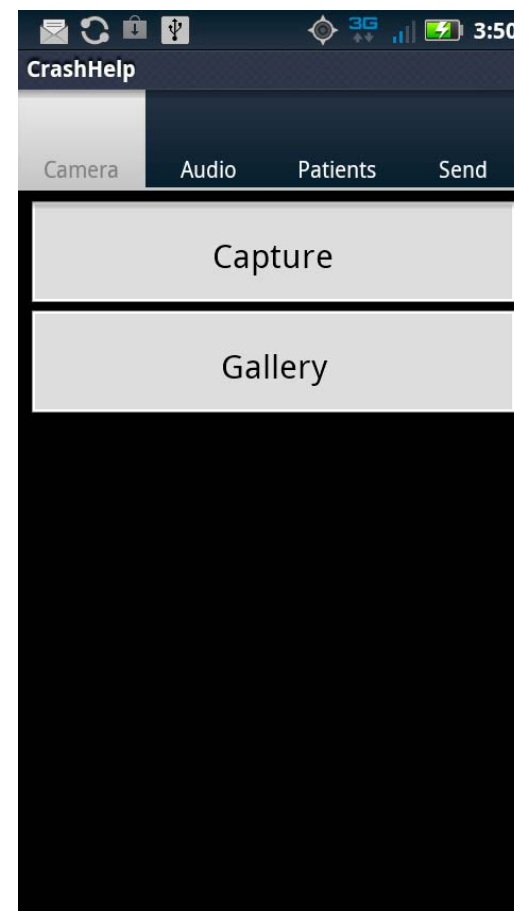 - Treatments given
  - Other: e.g., patient history

Mobile Phone Application

- Take Pictures and Video

Mobile Phone Application

- Review and add *basic* patient data

(gender, age,
And name)

Web Application

Web Application

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

Minnesota Pilot Objectives:

- Enhance the functionality of CrashHelp specific to the needs of rural Minnesota emergency medical practitioners in the CENTRAC region.

- Phase I: Test CrashHelp at Cuyuna Regional Medical Center (CRMC) and its EMS service.

- Phase II: Plan and implement CrashHelp in 2 locations (Cuyuna, Wadena) over a 6 month period.

- Evaluate CrashHelp features for their reported and perceived impact on EMS communications, emergency medical decision making, and medical outcomes.

- Evaluate feasibility to expand CrashHelp throughout region.

Cuyuna Use: Summary Usage Stats

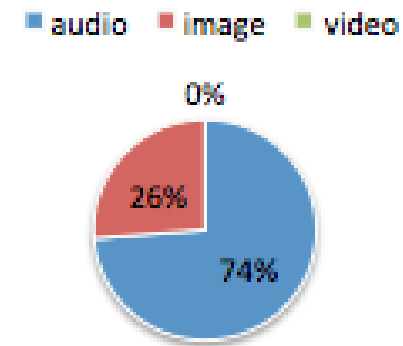- Total Live Reports Sent: 88 (5 month)
- Total Live Reports Acknowledged: 80
- Total Medics Used: 13
- Total Audio Files Sent: 86
- Total Pictures Sent: 41
- Total Videos Sent: 0

Pie chart legend: ■ audio ■ image ■ video
- 0%
- 26%
- 74%

Camera and Audio Use

- ## What pictures have been taken:
  - Vehicles: crash intrusion, damaged windshields, inside vehicle, unused motorcycle helmets, crash site (at a distance, ditch depths, tree sizes, skid marks)
  - Various trauma injuries: immobilized patients, wounds, blood pools
  - Stroke / Brain attack facial images
  - Burns, burn progression
  - EKG's, Paper run reports, insurance cards, medication bottle descriptions
- ## What audio was recorded:
  - The same (or similar) report provided over the radio to the ED including: Primary impression, patient demographics, patient condition, interventions, and ETA

Cuyuna Interview Themes

- **EMS communications: generally easy to use, audio preferred, could be integrated into EMS processes, data entry was time consuming, wireless coverage gaps, short runs problematic**

"I thought that not only was the phone was pretty self explanatory... I think it was pretty simple to use. Straightforward, had enough tools there, but not so polluted ."

"I really think that there would be some really good value in using it more to crash scenes."

"there were times ...we were so close that they, by the time the acknowledgement makes itself back through the cell service ...you're walking in the door and saying oh good, they got it"

Cuyuna Interview Themes

▪ **ED usage: preregistration and patient preparation, mobilizing resources (radiology, labs, unit activation), clinical impact more nebulous**

"It helps us to get people through faster…that was a huge asset to us as getting people registered and being able to order stuff on them, being able to pull meds out for them and stuff like that…"

"The ED physician, on seeing the image [of a deep tissue laceration], actually went ahead and, before the patient even arrived, contacted the surgeon and said, you know, I anticipate we're gonna need your involvement based on what I'm seeing here. And it just kind of expedited getting the surgeon here."

"I preferred to use the desktop rather than listening to the audio through the phone so then we would actually play it through a set of external speakers where the physician could hear it as well."

Wadena: Phase 2

- Implement at Wadena – Tri-County Hospital – through June, 2013

- Continue to refine system and use, including development of Trauma and Stroke use cases, and possible validation in real cases.

- Conduct focus groups, including regional implications (at TZD Meetings).

- Conduct qualitative interviews and quantitative analysis.

Use: Summary Usage Stats (Wadena)

- Total Live Reports Sent: 300 (over 6 months)
- Total Medics Used: 11
- Total Audio Files Sent: 180
- Total Pictures Sent: 54
- Total Videos Sent: 0

Last updated July 10, 2013

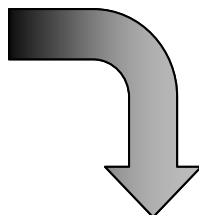# Example Incident

Trauma Reporting Scenario

EMS/Report/Trauma

Please ask for the following information

Encourage early reporting

Respiratory compromise/intubation at scene

Lowest BP
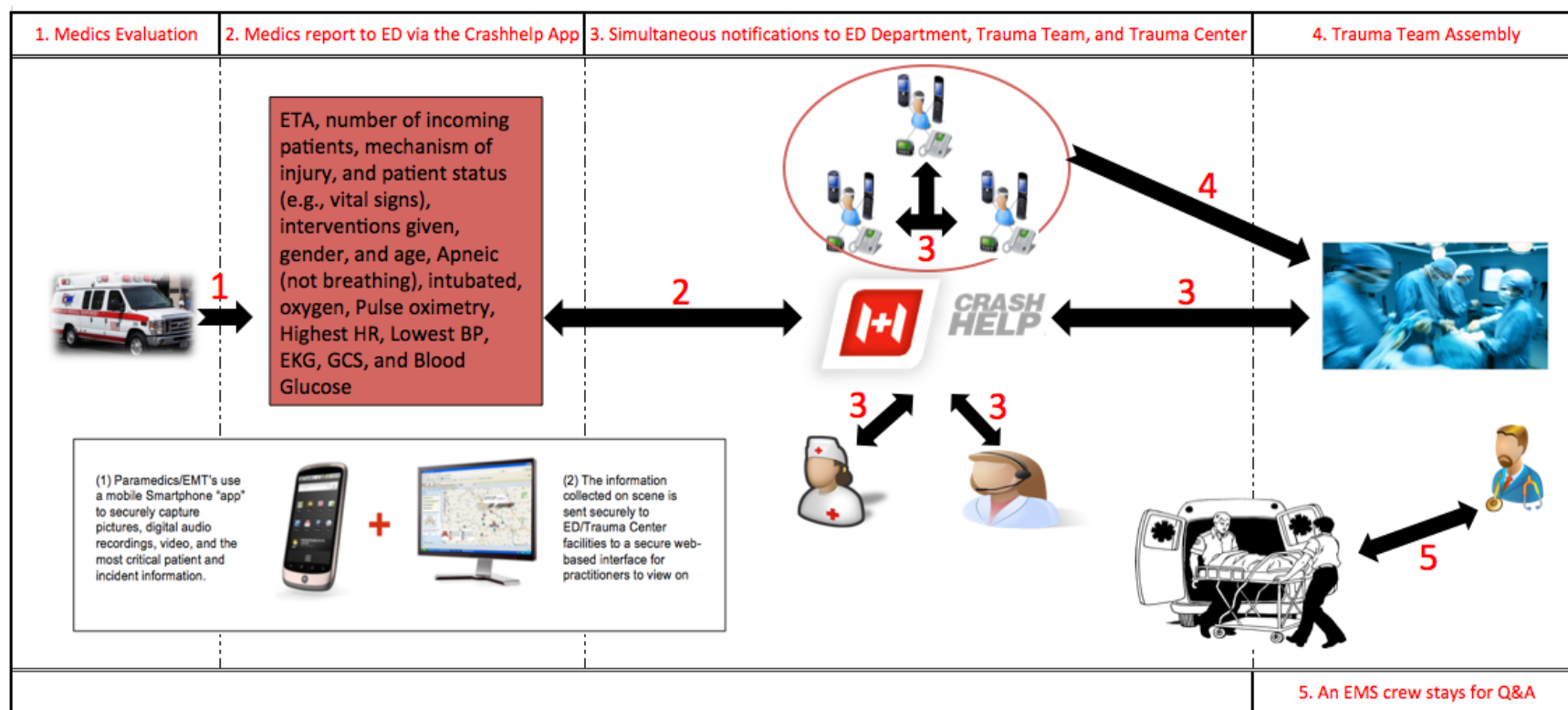
Highest HR

GCS/AVPU

Mechanism of Injury

Age

Criteria	"Must know" Information
Airway/Breathing	Intubated, Apneic (not breathing), oxygen, Pulse oximetry (value ~ 90%)
Circulatory	Lowest BP, Highest Heart Rate, EKG (for chest pain or if found unconscious)
Neurologic	GCS
Other Considerations	Mechanism of Injury, Blood Glucose
Geriatric Patients	Age > 65 -> upgrade trauma level Pregnant Patient -> upgrade trauma level

Trauma Scenario Using CrashHelp Capabilities

Draft: **An Enhanced** Trauma Scenario

| 1. Medics Evaluation | 2. Medics report to ED via the Crashhelp App | 3. Simultaneous notifications to ED Department, Trauma Team, and Trauma Center | 4. Trauma Team Assembly |

ETA, number of incoming patients, mechanism of injury, and patient status (e.g., vital signs), interventions given, gender, and age, Apneic (not breathing), intubated, oxygen, Pulse oximetry, Highest HR, Lowest BP, EKG, GCS, and Blood Glucose

(1) Paramedics/EMT's use a mobile Smartphone "app" to securely capture pictures, digital audio recordings, video, and the most critical patient and incident information.

(2) The information collected on scene is sent securely to ED/Trauma Center facilities to a secure web-based interface for practitioners to view on

5. An EMS crew stays for Q&A

EMS Response: "Red Card" Implementation on CrashHelp

Future Directions…

- Continued innovation in devices (integrated smartphone/radio, wearable devices) including integration with PCR & EHR systems.

- Consider extending Health IT framework ("meaningful use") into EMS-realm, with focus on innovations and metrics to improve clinical quality of care.

- Consider treating "EMS" as a mode in order to provide framework for transportation consideration of performance (and safety) and innovations thereof.

Acknowledgements

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- ## CrashHelp Team:
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  - Yousef Abed, Abdullah Murad