



**CRASH
HELP** A MOBILE & MULTI-MEDIA EMS APPLICATION

CrashHelp and the Role of Multimedia Information in Emergency Response

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Minnesota Medicare Rural Hospital Flexibility Grant



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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?



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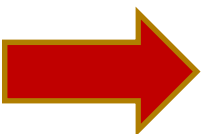
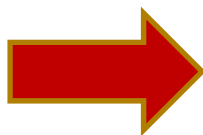
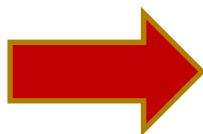


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System Prototype



(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



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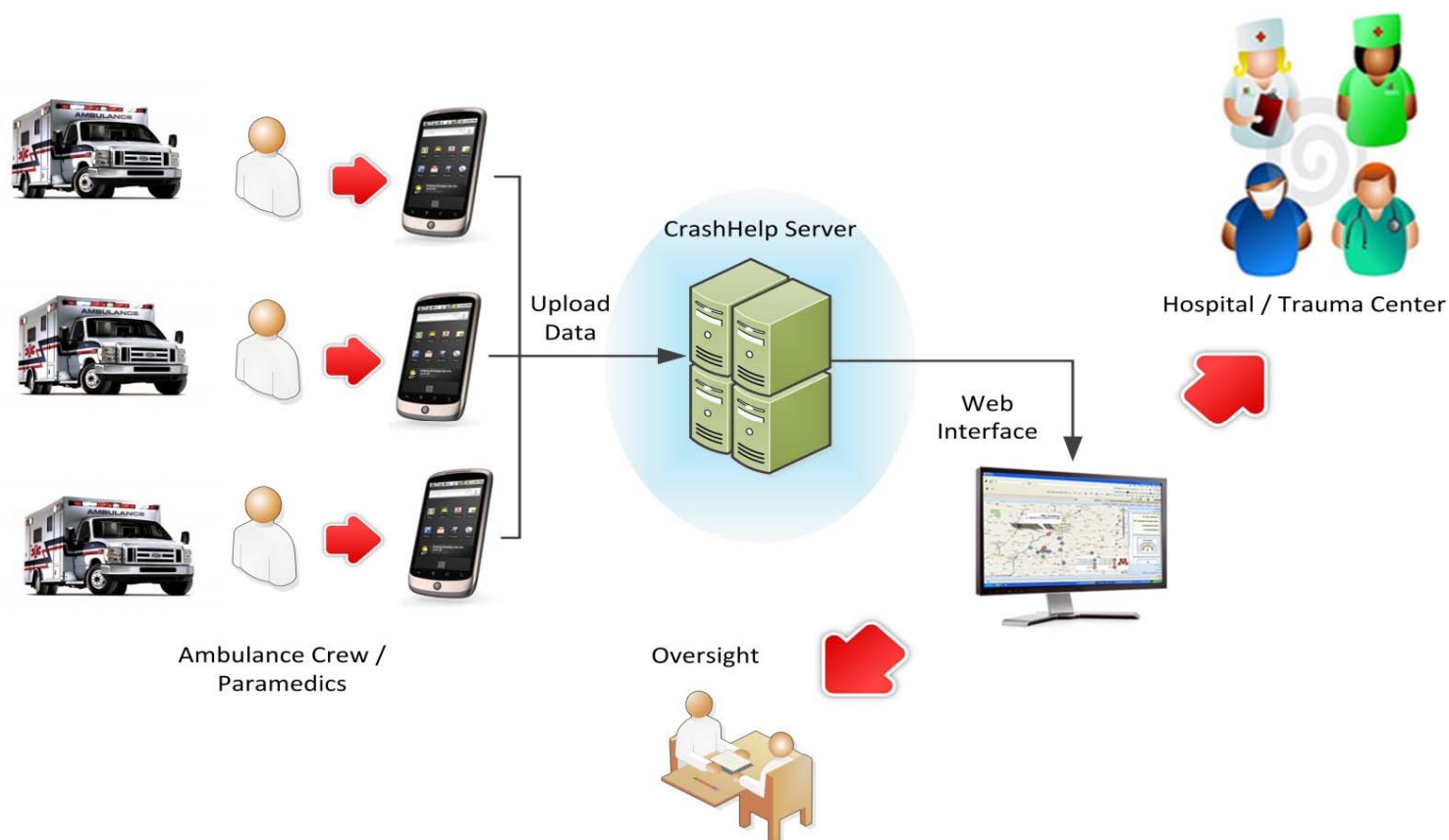


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CrashHelp System Architecture



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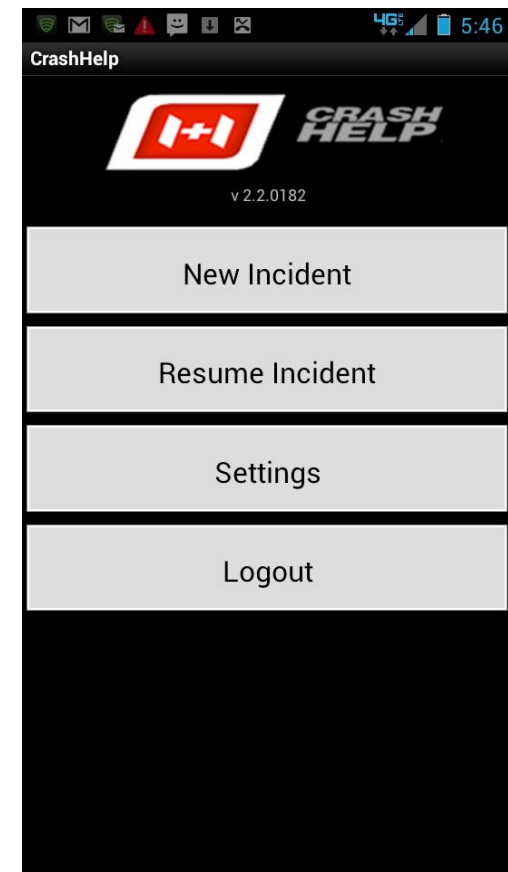
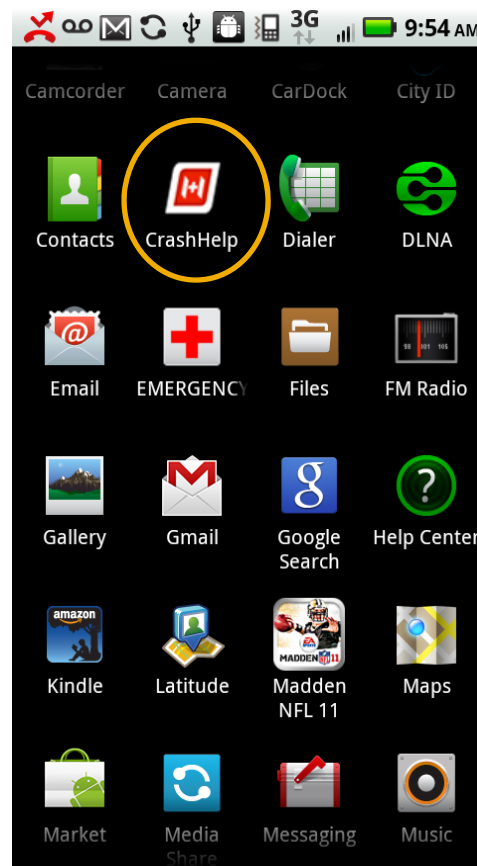
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Mobile Phone Application

- Secure login
- Add new Incident
- Review existing incidents

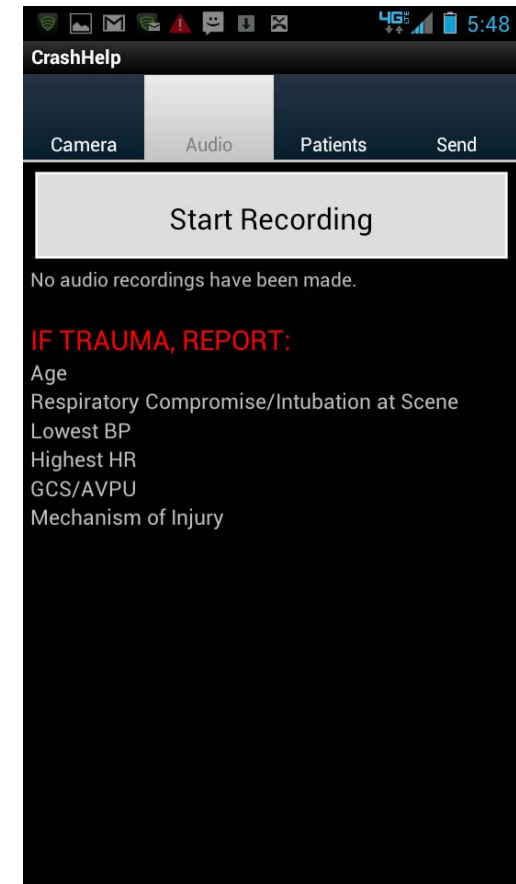




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Mobile Phone Application

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

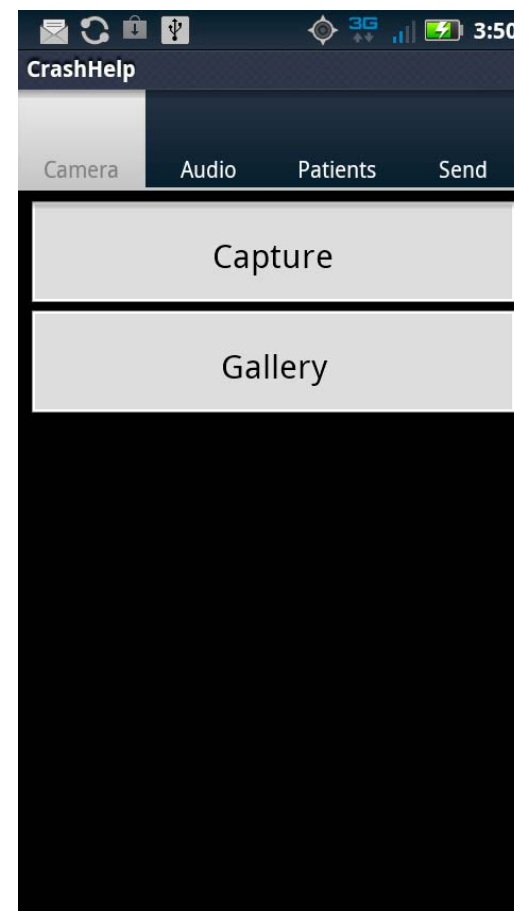




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Mobile Phone Application

- Take Pictures and Video



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Mobile Phone Application

- Review and add *basic* patient data

(gender, age,
And name)

CrashHelp

Camera Audio Patients Send

New Patient

No patients have been entered.

CrashHelp

Gender: Age: ☒ Years ☐ Months

☐ Male ☐ Female

DOB 0 0 YYYY

Name:

Patient Indicators:

- None Selected -

Critical Interventions:

- None Selected -

View Tags

Done



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Web Application



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Web Application

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next update in 4 seconds | [logout](#) |

What's new?
Updated: 07-03-2012

Tri-County Hospital

LIST VIEW

MAP VIEW

<div>INCIDENT</div> <div>26</div> <div>Date: Today Time: 3:26:37 PM Distance: 6 miles ETA: 9 minutes Status: Enroute</div>	<div>PATIENT(S)</div> <div>+ Medic 1</div> <div>Name: Gender: Female Age: 31 Years DOB: 00-00-0000 na Alert</div> <div>30+ minutes elapsed</div>	<div>MEDIA</div> <div>Photos (2) Video (0) Audio (0) Notes (0)</div> <div>Details Send SMS(2)</div>
<div>INCIDENT</div> <div>24</div> <div>Date: Today Time: 11:26:43 AM Status: Arrived</div>	<div>PATIENT(S)</div> <div>+ Medic 1</div> <div>Name: test Gender: Male Age: 50 Years DOB: 5-4-1963 e</div>	<div>MEDIA</div> <div>Photos (0) Video (0) Audio (1) Notes (0)</div> <div>Details Send SMS(1)</div>





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Web Application



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Web Application

INCIDENT


Date: Today
Time: 3:26:37 PM
Distance: 6 miles
ETA: 9 minutes
Status: Enroute

PATIENT(S)


31

MEDIA

30+ minutes elapsed

Photos (2)
Video (0)
Audio (0)

Sent by Julie Jensen

Unit : Medic 1
2186390772

Incident Details

Photo

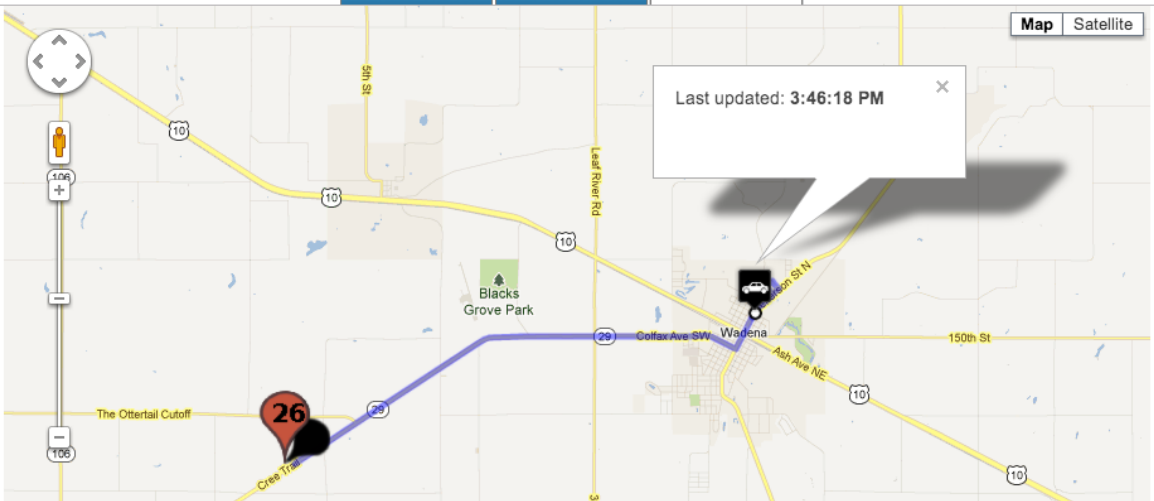
Video & Audio

Map

Map

Satellite

Last updated: 3:46:18 PM





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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



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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.

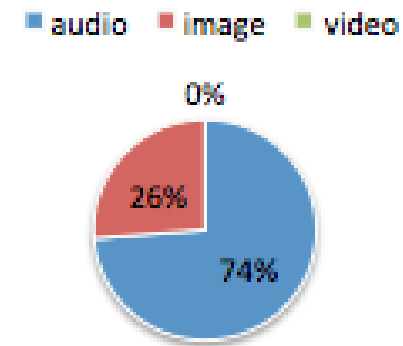




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Cuyuna Use: Summary Usage Stats

- 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



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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





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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”



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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.”



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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.



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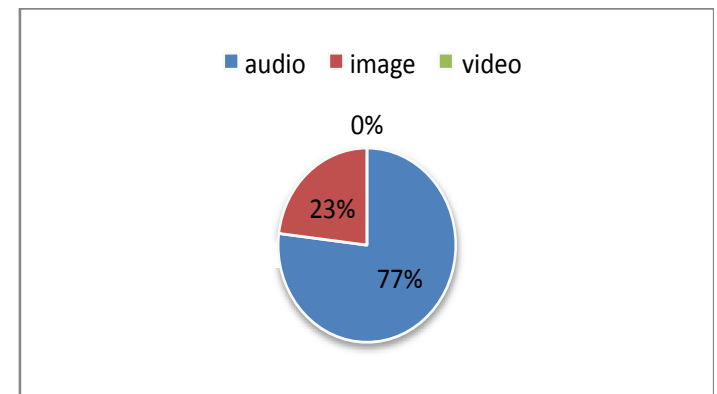
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Use: Summary Usage Stats (Wadena)

- 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



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Example Incident

INCIDENT

35

Date: 04-14-2013
Time: 5:48:48 PM
Distance: 14 miles
ETA: 16 minutes
Status: Enroute

PATIENT(S)



peterson chelsy b
0

30+ minutes elapsed

MEDIA

Photos (1)
Video (0)
Audio (1)

Sent by Thomas Krueger

Unit : Medic 1
2186390772

Incident Details

Photo

Video & Audio

Map

Map Satellite

Last updated: 6:16:32 PM



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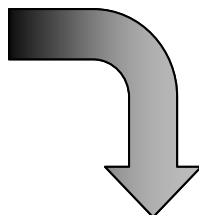
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Trauma Reporting Scenario

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

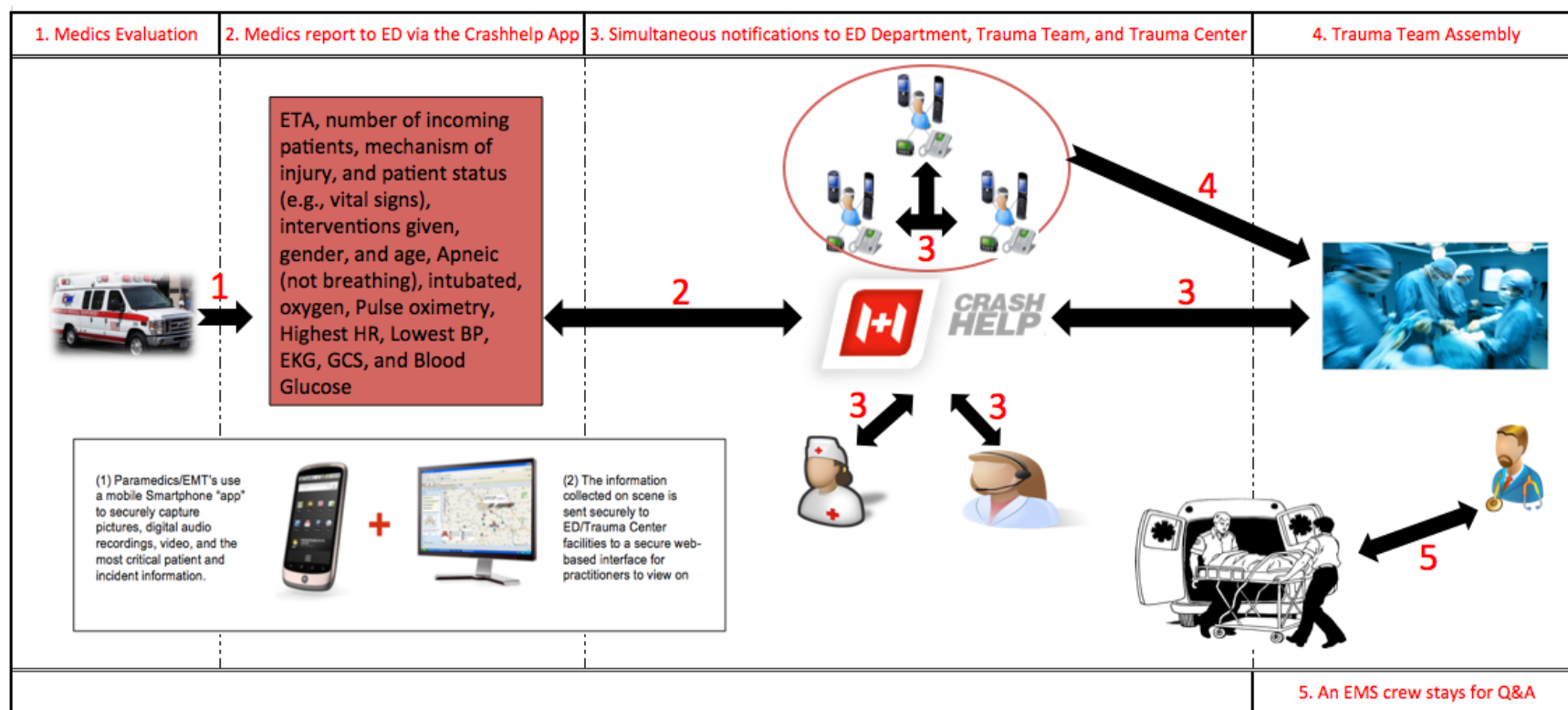


Criteria	"Must know" Information
Airway/Breathing	Intubated , Apneic (not breathing), oxygen, Pulse oximetry (value ~ 90%)
Circulatory	Lowest BP, Highest Heart Rate , EKG (for chest pain or if found unconscious)
Neurologic	GCS
Other Considerations	Mechanism of Injury , Blood Glucose
Geriatric Patients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



Trauma Scenario Using CrashHelp Capabilities

Draft: An Enhanced Trauma Scenario





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EMS Response: "Red Card" Implementation on CrashHelp

EMS Mobile Phone Screen

CrashHelp

Trauma Sheet

GCS

Lowest BP

Highest HR

AVPU

Mechanism of Injury

☐ Respiratory Compromise

☐ Intubation at scene

Notes

Done

ED iPadScreen- General

Carrier 9:20 PM 100%

Log Off Incidents 9:20:03 PM Overview Map

Red Card Button

INCIDENT 39 30+ minutes elapsed Trauma (Red Card) MEDIA

Unit 1
Yousef Abed
(760) 475-4088

Date: Today
Time: 12:59:05 PM
Dist: 0 miles
Status: At the scene

DOB: 1/2/1967

Interventions:

Indicators: Trauma

ACKNOWLEDGE

INCIDENT 38 30+ minutes elapsed Trauma (Red Card) MEDIA

Unit 1
Abdullah Murad
(909) 714-2036

Date: Mar 31, 2013
Time: 08:36:57 PM
Dist: 0 miles
Status: At the scene

Name: Gender: Female
Age: 55 Years
DOB: 2/4/1958

Interventions: Immobilized
Indicators: Lvl1 Trauma, Stroke

ACKNOWLEDGE

INCIDENT 37 30+ minutes elapsed Trauma (Red Card) MEDIA

Unit 1
Abdullah Murad
(909) 714-2036

Date: Mar 31, 2013
Time: 01:14:07 AM
Dist: 0 miles
Status: At the scene

Name: Gender: Unknown
Age: 0 Years
DOB: 0/0/0

Interventions: Lvl1 Trauma, Stroke

ACKNOWLEDGE

INCIDENT 36 30+ minutes elapsed Trauma (Red Card) MEDIA

Unit 1
Abdullah Murad
(909) 714-2036

Date: Mar 30, 2013
Time: 02:32:11 AM
Dist: 0 miles
Status: At the scene

ACKNOWLEDGE

INCIDENT 35 30+ minutes elapsed Trauma (Red Card) MEDIA

Unit 1
Abdullah Murad
(909) 714-2036

Date: Mar 30, 2013
Time: 02:28:55 AM
Dist: 0 miles
Status: At the scene

Name: Abdullah Murad
Gender: Male
Age: 25 Years
DOB: 0/0/1988

Interventions: Immobilized
Indicators: Lvl1 Trauma

ACKNOWLEDGE

INCIDENT 34 30+ minutes elapsed Trauma (Red Card) MEDIA

Unit 1
Abdullah Murad
(909) 714-2036

Date: Mar 28, 2013
Time: 02:12:46 PM
Dist: 0 miles

Name: test
Gender: Male
Age: 25 Years
DOB: 1/3/1988

Interventions: Lvl1 Trauma

ACKNOWLEDGE

ED iPad Screen Details

Carrier 9:20 PM 100%

Log Off Incidents 9:20:03 PM Overview Map

INCIDENT 39 30+ minutes elapsed Trauma (Red Card) MEDIA

Unit 1
Yousef Abed
(760) 475-4088

Date: Today
Time: 12:59:05 PM
Dist: 0 miles
Status: At the scene

Name: test
Gender: Male
Age: 46 Years

Interventions:

Indicators:

ACKNOWLEDGE

Red Card

Pre Hospital Data

Mode of transportation: Air Auto
Ambulance

Time event occurred: Mar 30, 2013 02:28:55 AM

Trauma Report:

respiratory compromise
intubation at scene

GCS: 25 Heart Rate: 344/566
BP: 57 AVPU: response

Mechanism of injury: mvc

Notes:

Details: Patient: Abdullah Murad
25 Years old Male
Indicators: Lvl1 Trauma ,
Interventions: Immobilized

ACKNOWLEDGE

INCIDENT 38 30+ minutes elapsed Trauma (Red Card) MEDIA

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Abdullah Murad
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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.



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