Hospital First Receiver Operations for Fire Departments and HazMat Responders

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Kevin W. Heym, HazMat Specialist
Hazardous Materials Team
Chester County, PA

May 31, 2014
Goals and Objectives

- Introduction and Background
- Importance of Community Preparedness
- Case Scenario Review
- Standards and Regulations Overview
- Behind the Scenes Look at Hospital Capabilities and Limitations
- Planning, Training, Exercises
- Resource Information
Introduction and Background
Introduction and Background
Chester County, Pennsylvania
# Chester County, Pennsylvania

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td>Population</td>
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</tr>
<tr>
<td>Square Miles</td>
<td>762</td>
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<tr>
<td>Municipalities</td>
<td>72</td>
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<tr>
<td>- City</td>
<td>1</td>
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<tr>
<td>- Townships</td>
<td>56</td>
</tr>
<tr>
<td>- Boroughs</td>
<td>15</td>
</tr>
<tr>
<td>Hospitals</td>
<td>5</td>
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<tr>
<td>- Trauma Center</td>
<td>1</td>
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<tr>
<td>HazMat:</td>
<td></td>
</tr>
<tr>
<td>- Full-Time Chief / HazMat Coordinator</td>
<td></td>
</tr>
<tr>
<td>- 30 Part-Time Paid-On-Call Employees</td>
<td></td>
</tr>
<tr>
<td>Fire</td>
<td></td>
</tr>
<tr>
<td>- 41 Fire Departments @ 53 Stations</td>
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<tr>
<td>EMS</td>
<td></td>
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<tr>
<td>- 23 EMS Agencies @ 28 Stations</td>
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</tr>
<tr>
<td>- ALS</td>
<td>9</td>
</tr>
<tr>
<td>- BLS</td>
<td>14</td>
</tr>
<tr>
<td>Pipeline Operator Name</td>
<td>Contact Address</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>BUCKEYE PARTNERS, LP</td>
<td>Five TEK Park 9999 Hamilton Blvd., Breinigsville, PA 18031</td>
</tr>
<tr>
<td>COLONIAL PIPELINE CO</td>
<td>1185 Sanctuary Parkway Suite 100, Alpharetta, GA 30009</td>
</tr>
<tr>
<td>COLUMBIA GAS TRANSMISSION, LLC</td>
<td>1700 MacCorkle Ave., S.E., Charleston, WV 25071</td>
</tr>
<tr>
<td>EASTERN SHORE NATURAL GAS CO</td>
<td>1110 Forrest Ave, Suite 201, Dover, DE 19901</td>
</tr>
<tr>
<td>ENTERPRISE PRODUCTS OPERATING LLC</td>
<td>1100 Louisiana, Houston, TX 77009</td>
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<td>PECO ENERGY CO</td>
<td>300 Front St Building 3, West Conshohocken, PA 19428</td>
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<tr>
<td>PPL INTERSTATE ENERGY CO</td>
<td>214 Shoemaker Road, Pottstown, PA 19464</td>
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<td>SUNOCO PIPELINE L.P.</td>
<td>525 Fritztown Road, Sinking Spring, PA 19608</td>
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<td>TEXAS EASTERN TRANSMISSION LP (SPECTRA ENERGY CORP)</td>
<td>5400 Westheimer Ct, Houston, TX 77056</td>
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<td>TRANSCONTINENTAL GAS PIPELINE COMPANY</td>
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Chester County, PA – Public-Use Airports

Map showing locations of public-use airports in Chester County, PA.
Why Important?

• Community Preparedness
• Training Opportunities
• Develop Connections
• Advanced Awareness of Capabilities
  • Triage
  • Decon Plans, Set-ups & Equipment
  • Incident Command Systems
• Resource Information for Scene Management
  • Direct connection to Medical Command
  • Emergency specialty response
    • Ex. - Surgical response teams
• Specialty Capabilities
  • Burn Centers
  • Trauma Centers
    • Levels
    • Adult & Pediatric
  • Nuclear Power Plant Readiness
What?

• Basic introduction to current practices
  • City Hospitals
  • Suburban Hospitals
  • Rural Hospitals

• Real-time Technical Resource information
What can my FD or HMAT Team offer?

• Knowledge & Experience

• Rapid response 24/7 365

• Resources
  • Equipment
  • Supplies
  • Manpower
But...

- Will your department be committed on-scene and unable to respond to support the hospital ED

- Consider developing plan to use mutual aid companies
  - Are they trained?
  - Are they prepared?
Franisella Tularensis
(University of Alabama School of Medicine)

Mustard Blisters
(University of Alabama School of Medicine)

Severe Acute Respiratory Syndrome (SARS)
(National Institute for Occupational Safety and Health)

Anthrax Lesion
(University of Alabama School of Medicine)

Phosgene
(University of Alabama School of Medicine)

Cholera
(University of Alabama School of Medicine)

Tuberculosis
(Center for Disease Control)

Are We Prepared?

Smallpox
(University of Alabama School of Medicine)

Ricin
(University of Alabama School of Medicine)
Today it’s

**ALL HAZARDS APPROACH**

- Internal Disasters
- External Disasters – Natural or man-made
- Terrorism and Weapons of Mass Destruction (WMD’s)
- CBRNE applies to hospitals also:
  - Chemical
  - Biological
  - Radiation / Nuclear
  - Explosives
  - + ...
- And what’s next....
Explosives – with unknown agents
DECONTAMINATION RESPONSE
“CBNR” Priorities to remember:

**Chemical**
- **DECON** patient(s) **before** they enter the ED

**Biological**
- Patients may already have been admitted to the hospital when we learn that they were exposed to a biological agent.
- **DECON** patient(s) **before** they enter the ED if they arrive directly from a known biological event, or report they were exposed to powders / aerosols.

**Nuclear / Radiation**
- Lifesaving care should not be delayed
- If time permits patients should be deconned prior to entry in ED
Let’s look closer @ an Incident Case Review
Case Review of Contaminated Patients

- Next 4 slides are summary highlights of a Sarin attack which occurred in Tokyo, Japan.

- This case reviews the actual release of a chemical weapon in a populated city.

- St. Luke’s Hospital was the closest hospital in proximity to the event – in particular, take note of:
  - Volume of patients
  - Times of arrival of patients to the E.D.
  - Volume of healthcare workers who suffered secondary exposure
  - Time until the material was identified
Sarin Case Review

- Review of St. Luke’s response to the disaster
- Major receiving hospital for subway sarin incident (520 bed)
- Had a disaster plan – drills regularly for earthquakes
- 1 prior nerve gas incident in Japan year before
- Incident 3/20/95 07:55 AM – 5 subway cars effected; 15 stations

_Academic Emergency Medicine, 5(6), 618 - 624._
Sarin Case Review

- 12 fatalities; 5500 sickened
- 3km away from stations effected
- 640 treated @ St. Lukes; 1410 in week following treated

<table>
<thead>
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<th>Time</th>
<th>Event</th>
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<td>08:16 AM</td>
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<td>08:28 AM</td>
<td>1st patient – walk-in – eye pain / “visual darkness”</td>
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<tr>
<td>08:43 AM</td>
<td>1st Ambulance arrived</td>
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<tr>
<td>09:16 AM</td>
<td>500 pts. &amp; 3 codes had arrived in 1st hour</td>
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</table>

Academic Emergency Medicine, 5(6), 618 - 624.

Sarin Case Review

- 472 workers suffered secondary exposure
- Sx’s included eye problems, headaches, throat pain, dyspnea, nausea, dizziness

<table>
<thead>
<tr>
<th>Role</th>
<th>Percentage</th>
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<tr>
<td>Nurses</td>
<td>39%</td>
</tr>
<tr>
<td>Nurse Asst.’s</td>
<td>26.5%</td>
</tr>
<tr>
<td>Volunteers</td>
<td>25.5%</td>
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<tr>
<td>Doctors</td>
<td>22%</td>
</tr>
<tr>
<td>Clerks</td>
<td>18%</td>
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</tbody>
</table>

Academic Emergency Medicine, 5(6), 618 - 624.
Hydrofluoric Acid - Refinery

- Warm sunny day in May
- Large Petroleum Refinery in an urban environment
- Large quantities of flammable liquids and corrosives...
- Contractors conducting a turnaround and a problem was encountered
- Refiner workers exposed to hydrogen fluoride (HF)
Hydrofluoric Acid - Refinery

• Hospital gets a Haste Message – “Release of HF from a refinery operation, you will be receiving 7 patients.....”

• How do you or the hospital prepare?
Hydrofluoric Acid

- What if FD or EMS are exposed at the scene from a release during the response

- 7 Patients need to be transported to hospital

- 6 FD personnel exposed

- Initial PPE is bunker gear due to rapid rescue attempt... contamination occurred...Hazmat involved...decon?

- Treatment at the scene?

- Inhalation or skin exposure?

- Treatment? Enough supplies?
Hydrofluoric Acid
Federal Regulations mandate specific training requirements for personnel who utilize Personal Protective Equipment (PPE):

- OSHA 1910.120
- EPA 40 CFR 311

National Fire Protection Association:

- NFPA 99 Standard for Health Care Facilities
  - Assess, Mitigate, Prepare, Respond
- NFPA 1600 Standard on Disaster / Emergency Management and Business
• Awareness & Operations Levels application to emergency healthcare providers

(For ex. – A patient(s) arriving @ the E.D. contaminated with some type of hazardous substance who has not been decontaminated prior to arrival, or who may have only received partial decontamination).

• Focus:
  - Safety of personnel / safe practices
  - Recognition and identification of hazardous materials / risks / potential outcomes
  - Familiarization with use of the North American Emergency Response Guidebook
  - Recognize when to request additional resources
  - Releases / Potential releases
  - Protection of people / property, or the environment
  - Personal Protective Equipment (PPE) selection and use
  - Basic control, containment, confinement
  - Basic Decontamination procedures
EPA 40 CFR 311

- Is a “mirror standard” to OSHA 1910.120
- Federal Regulation to ensure compliance with the law
- Applicable to states not adopting OSHA requirements
FIRST RESPONDERS’ ENVIRONMENTAL LIABILITY DUE TO MASS DECONTAMINATION RUNOFF

The Environmental Protection Agency (EPA) is issuing this alert as part of its ongoing effort to provide information on environmental issues related to biological, chemical, and nuclear terrorist incidents. EPA publishes alerts to increase awareness of possible hazards and environmental...
OSHA = Occupational Safety and Health Administration - Best Practices for Hospital Based 1st Receivers…

AHJ = Authority Having Jurisdiction
- DOH
- Local = Township

TJC = The Joint Commission (historically known as JCAHO) standards:
- Requires emergency management plans
  - Preparedness and response
  - Chemical / Biological / Radioactive decontamination
  - Incident Command

AIA = American Institute of Architects (now Facilities Guidelines Institute (FGI))
- Guidelines for Hospital Construction
- UL = Underwriters Laboratories
Hospital Readiness

- History
- Grant funding
- Equipment & PPE
- Communications (radios, phones.....)
- Training & drills
- Pharmaceuticals (SNS, CHEMPACK)
- Decontamination (Internal, External, Tent...)
- Handling decon water (EPA reference)
- Job Action Sheets
- Rehab, heat stress
- Environment and weather
- Scene Safety and Control (crowds, VIP)
- Inspections (Secret Service, TJC, DOH......)
- HVA
- Risk Assessments
Hospital Readiness

- Hazard Vulnerability Assessments
- Risk Assessments

### External Events Table

<table>
<thead>
<tr>
<th>Hazard Type</th>
<th>Likelihood</th>
<th>Generates Casualties</th>
<th>Decon Required</th>
<th>Service Disruption</th>
<th>Access Disruption</th>
<th>Supply Disruption</th>
<th>Occupancy Disruption</th>
<th>Vulnerability Summary</th>
<th>Planning Priority</th>
<th>Response Level</th>
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</thead>
<tbody>
<tr>
<td>Winter Storm / Blizzard</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Multiple / Mass Casualty Incident</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pandemic / Epidemic</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Injured Police/Firefighter/VIP in ED</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>3</td>
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<td>Ice Storm*</td>
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<td>Low</td>
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<tr>
<td>Transportation Disaster</td>
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<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>3</td>
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<tr>
<td>Flood / Flash Flood</td>
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<td>Medium</td>
<td>Medium</td>
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<td>Medium</td>
<td>Medium</td>
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<td>Severe Thunderstorm</td>
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<td>Low</td>
<td>Medium</td>
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<td>Low</td>
<td>Low</td>
<td>Medium</td>
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<td>Temperature Extreme</td>
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<td>Haz-Mat Incident</td>
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<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Multiple Alarm Fire in City Region</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
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<td>Low</td>
<td>Low</td>
<td>Medium</td>
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<tr>
<td>Train Derailment*</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>3</td>
<td>3</td>
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</tbody>
</table>
Hospital Readiness Monitoring & Detection

- All hazards – Chem, Bio, Rad...

- Equipment and Capabilities
  - Corrosivity? pH
  - VOCs Multi-gas Detection
  - RAD (portal monitors and friskers)

- Decon effectiveness?
Equipment
Respiratory Protection

**Powered Air-Purifying Respirator (PAPR)**

- Filters ambient air through high-efficiency filters
- Butyl rubber hood providing protection from a variety of chemicals / agents
- Covers head, face, and shoulder
- Clear face shield
- Weighs approximately 8 lbs.

*3M Breathe Easy Turbo PAPR Assembly*
Respiratory Protection - Other Types

For Hospital Personnel
Hospital Readiness – Decon Ensemble

- Inner Garment (work uniform)
- Outer Protective Suit
  - Respiratory equipment (Butyl PAPR)
  - Hand Protection (Nitrile, Silvershield, butyl)
  - Foot Protection (PVC boots)
  - Head/Eye protection (PAPR Hood)
  - Taped Seams (Yellow Chemical tape)
What one issue fails the most during emergencies, drills and exercises?

Communications
Communications - Operations

- Hospital Notification Systems
  - Medial Command & Notification Systems - Ex. – HASTE, FRED, Knowledge Center
- Interoperability
  - Two-Way - scene to hospital, State 800 mghz systems – PA, DE
- Situational Awareness
  - Ex. Knowledge Center, WebEOC
- Amateur Radio - ARES/RACES
- Mass Notification Systems
  - Ex. – Everbridge, Amcom
- Direct Communications
  - Cell phone, Text, Landline
- Decon Operations
  - Ex. – Portable radios, Intercoms, Throat Microphones
- Internal phone systems
  - Ex. – Volt, Vocera
- Social Media
  - Ex. – Facebook, Twitter
Communications – Public Information

- Hospital Public Information Officer?
- FD PIO?
- Regional information vs. Hospital Doctor vs. Both
- Proper packaging of info via Medical Expert / Regional PIO
- Department of Health
- Community Awareness
- Paulsboro, NJ – Vinyl Chloride Train Derailment
- Boston Marathon
Philadelphia Fire Department
Emergency Medical Systems

How is the Hospital notified of external disasters?

- “HASTE”
  - Hospital Alert System – Tone Encoded
  - PFD 911 Center transmits messages to hospital ED’s via radio
  - One way only communication alerting system
  - Example of every day use:

  “Attention Hahnemann University Hospital, Medic 15 is enroute with a 42 year old trauma patient, struck by a car, unconscious, vital signs unstable, ETA 3 minutes, request Trauma Alert”
Philadelphia Regional Emergency Medical Disaster Operations Plan (PREMDOP) Alerting System

- Message received via the “Haste” System
- For alerting hospitals of potential or declared Mass Casualty Incidents (MCI)

- Three Levels:
  - “PREMDOP YELLOW”
    - Incident occurred – possibility of mass casualties to arrive
  - “PREMDOP RED”
    - Confirmed MCI – alerted hospitals will receive patients
  - “PREMDOP WHITE”
    - Disaster diminished – hospitals resume normal operations
Disaster Protocol

- Emergency Operations Plan
- Job Action Sheets
Disaster Levels – Sample Hospital Protocol

• **Level 1**
  – *Potential* to receive mass casualties
  – Distant train accident or 9/11

• **Level 2**
  – * Likely to receive mass casualties
  – Accident or explosion; unknown if children are involved

• **Level 3**
  – *Expected* to receive mass casualties
  – Local accident or explosion

• Future: create tiered-response for Level 3
Isolate - Control Zones

Limiting Access

- HOT Zone
- Warm Zone
- Cold Zone
Not to Scale

HUP EMERGENCY DEPARTMENT 1ST RECEIVERSHIP AND DECON MAP

Truma

ED Waiting Room Entrance

Security Operations Center

Security Barriers

Contaminated Individuals

6 Feet

Mixing Valve

CLOSET #1 [Personal Belongings & Decon]
(100) Personal Care Kits
(20) Emergency blankets
(4) Buckets/Sponges/Brushes
(2) Litter Conveyor System
(4) Conveyor back boards
(1) Spare air pump
(2) Spill absorbent
(6) Folding chairs

Additional Wall Showers

CLOSET #2 [Scene Control & Decon]
(3) Security barriers
(3) Rolls -Barrier tape (R/Y/G)
(1) Tent
(1) Water hoses
(2) Electrical Cords
(1) Air pump
(2) Heater for tent
(1) Soap for decon

Decon Tent

Propane Tank

Ambulance Entrance
Hospital Interaction & Transfer of Patients

- Physical receiving area
- Transferring patients (bariatric?)
- Litters, backboards, stretchers, conveyors
- Environment - Internal vs. external; cold/hot
- Special Needs – Hearing impaired, physical disability, behavioral health/psych
Hospital Interaction - Receiving

Staff photo by Tom Kelly IV
Photo used by permission of Daily Local News
Signs and Symptoms - Triage

• What does EMS use in your coverage area?

• What does your region use?

• Standardized system?
Triage Algorithm

If you are unable to obtain a capillary refill check the radial pulse. If absent then control the bleeding and prioritize the patient PRIORITY 1.
Registration and Triage

- Maintain patient flow?
- Additional triage staff needed?
- Hot zone vs. Cold zone triage
- Tablet registration
ED Patient Tracking

### Immediate Bedding (55)

<table>
<thead>
<tr>
<th>R</th>
<th>Pt</th>
<th>Age</th>
<th>Cplnt</th>
<th>C</th>
<th>LoS</th>
<th>OEL</th>
<th>R</th>
<th>BP</th>
<th>Te</th>
<th>Pul</th>
<th>O2</th>
<th>Re</th>
<th>Intake</th>
<th>Triage</th>
<th>Reg</th>
<th>Status</th>
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<tbody>
<tr>
<td>R</td>
<td>TEST, FEMALE</td>
<td>35 F</td>
<td>Bite, Cat</td>
<td>458...</td>
<td>10/10</td>
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<td>10</td>
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<tr>
<td>R</td>
<td>TEST, FEMALE</td>
<td>35 F</td>
<td>Bite, Cat</td>
<td>458...</td>
<td>10/10</td>
<td>98.0</td>
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<tr>
<td>R</td>
<td>TEST, ALEX</td>
<td>133...</td>
<td>Bite, Cat</td>
<td>179...</td>
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<td>R</td>
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### Triage Needed (2)

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<th>M</th>
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<th>C</th>
<th>LoS</th>
<th>OEL</th>
<th>R</th>
<th>BP</th>
<th>Te</th>
<th>Pul</th>
<th>O2</th>
<th>Re</th>
<th>Intake</th>
<th>Triage</th>
<th>Reg</th>
<th>Status</th>
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<tbody>
<tr>
<td>M</td>
<td>MC, EIGHTYTW0</td>
<td>131...</td>
<td>M-CASUALTY</td>
<td>530h02</td>
<td>10.00</td>
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<tr>
<td>M</td>
<td>MC, EIGHTYSEVEN</td>
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</tbody>
</table>
HICS - Emergency Department

HUP ED ICS Organization

Operations
Chief

ED Attending

Trauma Attending

ED Charge Nurse

ED Triage

ED Treatment

ED Logistics

ED Transport

ED Triage Leader
High Side Attending
- Designated RN

ED Treatment Leader
Middle Attending or
Chief Resident

ED Logistics Leader
Designated
ED Technician

ED Transport Leader
Designated
ED Technician

Treatment Supervisor

Treatment Supervisor

Treatment Supervisor

Treatment Supervisor
Hospital Incident Command

California Emergency Medical Services Authority
Planning, Training, & Exercises
TEAM TRAINING
JUST-IN-TIME TRAINING

EX. - DISASTER TEAM LEADERS – TWO-WAY RADIO
Motorola Radius GP 300

Controls

1. Volume Control – (on top of radio) to turn radio on or off and to adjust volume.

2. Channel Selection (on top of radio)

3. Push to Talk and Release to Listen (on side of radio)
JUST-IN-TIME TRAINING
Communications - Using Personal Protective Equipment

Points to Remember

• RADIOS WILL NOT WORK IF THEY GET WET!
• Communications will be hampered by PPE & PAPR use
  – Speaking
    • Hold radio in close proximity to PAPR face mask
    • Speak clearly into radio
  – Listening
    • Hold radio in close proximity to ear
Planning, Training, & Exercises

• Regional Planning and Support?
  • Local, State, Federal
  • SE PA Zones (Center City, Chester County…)
  • Regional Task Force
  • Hospital Association of Pennsylvania (HAP)
  • Mutual Aid
Regional Resources Available?
Hospital Decon Response

Basic 2 Line Decon Tent Set-Up

Decon - POV Arrival

Hospital Decon Preparations

Hospital Incident Command
Resources (see handout...)

NLM – REMM

Visual Dx or Uptodate

WISER

NLM - HSDB
Thank You

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