powering readiness through partnerships

Disaster Planning for California Hospitals
The only statewide conference developed by and for California hospitals

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Pediatric Emergency Transport in Disasters

Patricia Frost, RN, MS, PNP
Contra Costa Health Services

Kelly Coleman, EMT-P
Alameda Emergency Medical Services

Susan Aitkens
Emergency Medical Services Authority
Pediatric Emergency Transportation
What to do With the Kids?

Patricia Frost, RN, MS, PNP
Emergency Medical Services Director
Contra Costa Health Services
Vice Chair National Pediatric Disaster Coalition

Actual Rollover Crash Footage
It is inevitable that all hospitals in a large-scale disaster involving pediatric patients will be overwhelmed.

Both events
- Involve Triage and Resource Allocation
- Situational and Dynamic
- Involve patient distribution decisions
  - Protocols, Judgement, Experience, Situational Awareness and Practice

Disaster ... NOT normal standards of care
- Maximum of Maximums
- Greatest good for greatest number of people

Mass Casualty part of the EMS System normal workflow
- All the rules are on
- Saving as many patients as possible
- May expand to disaster levels but typically does not
ARE EMS PROVIDERS PEDIATRIC DISASTER READY?

- 1,150 EMTs and Paramedics
- 50 States
- 27% Fire Departments
- 12% Hospital-based
- 19% Local Governments
- 20% Private Ambulance
- 2% Public Utility Service
- 1% Active Military
- 1.5% Industrial
- 6.5% Other: Law, Campus, Search and Rescue

MUTUAL AID CAPABILITIES

93% of managers report their EMS agency has Mutual Aid Agreements in place, 7% don’t.

<table>
<thead>
<tr>
<th>Mutual Aid Capabilities</th>
<th>Less than 24 hrs</th>
<th>24-48 hrs</th>
<th>48-72 hrs</th>
<th>72 hrs+</th>
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<tbody>
<tr>
<td>Neighboring jurisdiction</td>
<td>85%</td>
<td>8%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Regional jurisdiction</td>
<td>58%</td>
<td>31%</td>
<td>3%</td>
<td>8%</td>
</tr>
<tr>
<td>In-state</td>
<td>42%</td>
<td>39%</td>
<td>8%</td>
<td>11%</td>
</tr>
<tr>
<td>Intra-state</td>
<td>27%</td>
<td>37%</td>
<td>15%</td>
<td>21%</td>
</tr>
</tbody>
</table>
AMBULANCE STRIKE TEAM READY

Does your agency have the ability to support an ambulance strike team (5+ ambulances) for out-of-jurisdiction response?

- 68% NO
- 32% YES

Is your service part of a local or regional healthcare coalition?

- 60% YES
- 40% NO

REAL WORLD EXPERIENCE

More than one in three EMS practitioners reported having responded to a disaster situation at some point during their career.

- 36% RESPONDED TO A DISASTER
- 64% HAD NOT
REAL WORLD EXPERIENCE (CONT.)

Among managers, about half had served as a manager during a disaster response.

- 49% MANAGED A DISASTER
- 51% HAD NOT

EMS PROVIDER HOUSEHOLD PREPAREDNESS

Most (63%) of respondents report having a household preparedness plan in place, but 37% didn’t.

Three in four (75%) report maintaining at least a three-day supply of food, water and prescription medications for all individuals and pets in their household. 25% don’t.
CHILDREN, HOSPITALS & EMS
COMPETENCY BEGINS WITH OPPORTUNITY
LOW VOLUME, HIGH RISK … REALLY “SICK” KIDS RARE

<table>
<thead>
<tr>
<th>U.S. Hospitals &amp; EMS</th>
<th>Pediatric Contact</th>
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</thead>
<tbody>
<tr>
<td>Non-children’s hospitals ED</td>
<td>See 89% of all children in EDs</td>
</tr>
<tr>
<td>75% Hospital see</td>
<td>&lt; 20 children/day</td>
</tr>
<tr>
<td>50% Hospitals see</td>
<td>&lt; 10 children/day</td>
</tr>
<tr>
<td>Remote Hospitals see</td>
<td>&lt; 2 children/day</td>
</tr>
<tr>
<td>Percent of total ED volume</td>
<td>18-27%</td>
</tr>
<tr>
<td>Pedi ED volume admitted</td>
<td>&lt;10% (90% treat and release)</td>
</tr>
<tr>
<td>Average Length of Stay</td>
<td>3.5 days (children’s hospital)</td>
</tr>
<tr>
<td>911 Calls and Transports</td>
<td>&lt; 5-10% of all calls</td>
</tr>
<tr>
<td>EMS Pediatric MCI Plan</td>
<td>13% report plan</td>
</tr>
</tbody>
</table>

CALIFORNIA AMBULANCE INDUSTRY
BY THE NUMBERS

- 715 public & private ambulance services
- 170 private sector ambulance services
- 3,600 licensed ambulances
- 74% ambulances operated by private providers
- 60,000 EMTs & 20,000 paramedics
- 20,000 people are employed by private ambulance services
- 220 out of the 337 emergency ambulance services areas (zones) are served by private contractors

Many private ambulance providers serve both EMS and Hospitals Intra-facility needs

KATRINA RECOMMENDATION
ESTABLISH A DATABASE OF COALITION PEDIATRIC CAPABILITIES
AMBULANCE MUTUAL AID MAY TAKE OVER 24 TO 72 HOURS TO GET TO YOU
“BE PREPARED TO BE ON YOUR OWN”

2016 CALIFORNIA AIR MEDICAL ASSETS

- Services
  - 22 in state
  - 1 out of state
  - 302 in U.S.

- Rotor
  - 71 bases
  - 98 aircraft
  - 879 in U.S.

- Fixed Wing
  - 13 bases
  - 121 aircraft
  - 360 in U.S.
PEDIATRIC CENTERS ARE REGIONAL ASSETS WITH DEDICATED TRANSPORT ASSETS PRIVATELY CONTRACTED

Every U.S. Hospital Pediatric Ready

Infrastructure Largely NOT Pediatric Ready or Easily Coordinated

OPTIMAL PEDIATRIC TRANSPORT SYSTEM DAY-TO-DAY & DISASTER(?)

Air & Ground Ambulances
Fixed Wing, Helicopter
Surface Ambulance

Flexible & Coordinated Internal & External Operational and Clinical Communications
Regional in Scope

Medically controlled Pediatric MD Specialist with Personnel experienced in Critical Pediatrics
(EMS, Nurses, Respiratory Therapists, Physicians)

Mode of Transport determined by patient's clinical condition, carrier and personnel availability, region's geography, weather & traffic

AAP Guidelines for Air and Ground Transportation for Pediatric Patients Pediatrics Nov 1986
What We Know About Large Scale Pediatric Medical Transportation

LESSONS LEARNED THEMES
PLANNED VS. UNPLANNED TIME VS. NO TIME

- Time
- Distance
- Workforce
- Training
- Coordination
- Patient Tracking
- Communication
- Planning
**FIRST KNOWN DESCRIPTION**
**CHILDREN’S HOSPITAL COLORADO**
**PEDIATRIC-SPECIFIC PATIENT MOVEMENT PLAN**

- Transferred 111 patients 8.5 miles in 11.6 hours.
- 64 patients (32 infants), 24 vents, 3 inhaled nitric oxide, 30 continuous infusions, 4 external ventricular drain
- 5 ALS ambulance crews, 4 SUVs, 1 Hospital Van
- 13 critical care teams: 1 pediatric and 8 neonatal and 2 general care critical care transport team
- 1 ventilator failure and 1 cyanotic event requiring suctioning and bagging

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**How to move a hospital**

Children's Memorial will move to a new 23-story hospital in the Streeterville neighborhood on June 9. The new building will allow for expansion of hospital resources and a better connection with the hospital's academic partner, Northwestern University's Feinberg School of Medicine.

**MOVING DAY: JUNE 9**

Starting at 6 a.m., **160 to 200 critically ill or injured children** will be moved via ambulance. One family member or guardian is allowed to ride along.

**ROAD CLOSURES**

- Fullerton Avenue will be closed from Lincoln Avenue to Lake Shore Drive.
- Public traffic is allowed north and south on Clark Street, and Stockton and Cannon drives, but will be controlled by traffic aides and police.
- Chicago Avenue will remain open, but no parking will be allowed from the new hospital to Lake Shore Drive.

**20-25 Ambulances will be used as transportation**

In between transporting patients, each ambulance will return to a staging ground on Orchard Street, between Lincoln and Fullerton, to be cleaned and refreshed with supplies.

While in transport, vehicles will have lights on, and Chicago police officers and traffic control aides will be set up at posts along the 3.5-mile stretch of city streets to manage traffic.

**10-18 hours**

The amount of time officials estimate it will take to move all patients. A 10-hour contingency plan has been created in case of emergency. Some patients will take no longer than 60 minutes to transport. Others could take more than four hours from door to door.
**KATRINA: HOSPITALS AS VICTIMS OF DISASTER**

“WIDESPREAD CHAOS, DESPERATION & INEFFICIENCY”

- Transport across 7 states within 3 days coordinated by ad hoc and private networks
- Few pediatric air and ground assets available; critical PICU/NICU patients transported by paddle boat, cars and flat bed trucks
- 5 pediatric transport teams mobilized from 5 different children’s centers moved 40 med/surgical patients and 12 PICU during the hurricane
- 170 cancer treatment interrupted; chronic & specialty care disrupted

**KATRINA KEY RECOMMENDATION**

EDUCATE AND INFORM COALITION MEMBERS OF SPECIAL NEEDS OF PEDIATRIC/NEONATAL PATIENTS DURING EVACUATION

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**EXISTING PLANS DURING KATRINA CLEARLY INADEQUATE FOR CHILDREN**

- Large numbers of children w/ chronic issues managed without formal governmental relationships
- Regional Collaboration Infrastructure Solutions Required
NICU EVACUATION
TWICE THE NUMBER OF PEDIATRIC BEDS IN CALIFORNIA
WITH LIMITED TRANSPORTATION ASSETS

THE FALLBACK PLAN …
MOVEMENT IN THE ARMS

- Extra blankets, chemical mattress warmers and keeping infants in the arms of mothers and staff may be necessary
- New York Superstorm Sandy: 5 staff for each infant to navigate flights of stairs

Source: Dr. Romansky Unique Vulnerabilities
Pediatric Resiliency Presentation May 2016
WHEN ALL ELSE FAILS?

HANDING EMS A CONTAINER INFANTS
WE CAN DO BETTER …

FIGURE 2 Newborns arriving in bassinets
Spedale, S. B. Pediatrics 2006;117:S389-S395
### REGIONAL Centers

<table>
<thead>
<tr>
<th>Hospital</th>
<th>City</th>
<th>Neonatal</th>
<th>ECMO</th>
<th>High Risk</th>
<th>Maternity</th>
<th>Last Update</th>
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<tr>
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<td>San Francisco</td>
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<td>open</td>
<td>6/9/2017 3:00:51 AM</td>
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<tr>
<td>Lucile Packard Children's Stanford</td>
<td>Palo Alto</td>
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<td>open</td>
<td>open</td>
<td>open</td>
<td>6/9/2017 9:20:06 AM</td>
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<td>n/a</td>
<td>n/a</td>
<td>6/9/2017 5:26:06 AM</td>
</tr>
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</table>

**NorCal Regional Centers**
- 8 NorCal Regional Centers
- 22 NorCal Community Centers
- 7 NorCal Intermediate Centers

**SoCal Regional Centers**
- 14 SoCal Regional Centers
- 38 SoCal Community Centers
- 7 SoCal Intermediate Centers

**Kaiser Hospitals**
- 2 Regional Kaiser Hospitals
- 2 Regional Kaiser Hospitals
- 13 Kaiser Community Centers
- 4 Kaiser Intermediate Centers

### TRAIN
Move patients to resources - Move resources to patients

**Surge - Evacuation**

<table>
<thead>
<tr>
<th>Triage by Resource Allocation for IN-patients (TRAIN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Life Support</td>
</tr>
<tr>
<td>Mobility</td>
</tr>
<tr>
<td>Nutrition</td>
</tr>
<tr>
<td>Pharmacy</td>
</tr>
</tbody>
</table>

**We adopt Innovations**
- Children's Stanford NICU, Peds PICU, Perinatal & coming soon Adult
Priorities to Move Patients are Situational
Assumes transportation is at the ready
Regional models to scale are in place

**Acuity 1**
- Minimal Care
- Feeders growers

**Acuity 2**
- Moderate Care
- Nasal cannula, BCPAP

**Acuity 3**
- Intensive Care
- Ventilators, drips and chest tubes

Immediate Evacuation Order Given
- Acuity 1 then 2
- Acuity 3
- Evacuate to area of refuge or receiving facility

Planned Controlled Evacuation Order Given
- Acuity 3
- Acuity 2 then 1
- Evacuate to receiving facility

Source: Evelyn Lyons Illinois EMSC DPH June 2016
Integrated Healthcare System Preparedness Summit

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**California Association of Neonatologists**

**CPQCC NICU Disaster Preparedness Tool Kit**
Douglas Carbine, MD
Vice President, California Association of Neonatologists
CAN Disaster Preparedness Task Force

**Emergency Preparedness in the NICU**
Children’s Hospitals and Preparedness Webinar
Friday, May 12, 2017, at 1:30pm ET/12:30pm CT


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We Build Consensus
We Educate
BEST PRACTICE EVACUATION GUIDELINES
DON’T REINVENT … IMPLEMENT

- Illinois
- New York
- California

DAY-TO-DAY PEDIATRIC PATIENT MOVEMENT
EMS FOR CHILDREN (EMSC) TOOLKIT

- Evidence shows best outcomes for critically ill children are achieved when treated at facilities most prepared to address their needs and are on the same page

- Inter-facility Transfer and Regional agreements key to success

- https://emscimprovement.center/resources/toolboxes/interfacility-transfer-toolbox/
Local EMS Systems Positioned To Scale
Learn How that Happens in Your Operational Area
Coalition Patient Movement Exercises

A Multi-Sectoral Rescue Chain

Yes There Are Many Gaps to Fill
Coalitions can Help EMS Ambulance Providers To Fill Those Gaps
Engage the EMS Community In Every Drill

- IOM Report
  - Emergency Care for Children: Growing Pains
- Only 6% have supplies to manage pediatrics
  - Only half have transfer agreements
  - Continuing pediatric training lacking
  - Protocols vary widely
  - Shortage of equip in rural areas
  - Disaster plans overlook the needs of peds
Pediatric Patient Movement
Are you Training with Local EMS?

EMS NICU Evacuation Tabletop Strike Team Scenario

40 NICU Patients in Next 3 hours
Patient Transport Flow Rate
(X ambulances)
(Y patient/ambulance)
(60 minutes/hr) divided by
(Z minutes/round trip)

AMERICAN ACADEMY OF PEDIATRICS

“WINGING IT” IS NOT AN EMERGENCY PLAN
Make a disaster plan with your kids.
PEDIATRIC EMERGENCY TRANSPORTATION

Case Studies From A Regional Perspective

Kelly Coleman
Regional Disaster Medical Health Specialist
Region II

Case Study #1 – SFO Asiana Flight 214 Crash 2013
**Actual Footage of the Crash**

**Asiana Crash Info**

- 307 people on board
- 181 TOTAL Transports
- Approximately 40 Pediatrics on board (under 14)
Pediatric Trauma Hospital Distribution

- Stanford Hospital/Lucille Packard Children’s Hospital: 20+ Pediatrics received
- San Francisco General Hospital: 12+ Pediatrics received
- NOT all were critical trauma patients, but pediatrics were some of the most severely injured

Successes

- Early focus on getting critical kids off scene in the first 50 minutes
- START triage works well for large numbers of patients because it is based on patient CONDITION, not age
- Stanford and SFG (both Comprehensive Level I Trauma) received all the critical Pedi traumas
- NO under-triage was done
Lessons Learned

- Patient Tracking is very difficult in the chaos of an MCI. Triage tag number with Hospital Destination might be the only clue you have to follow-up.
- In large MCI events, there is not time or resources to designate Pediatrics to specialty centers. Seldom will responders know exact patient age. In the BEST CASE, Pediatrics will end up at a Comprehensive Trauma Center and then receive follow-up transport and care if needed to a Pediatric specialty hospital.
- Keeping families together (Children, Siblings, Parents, Guardians) is challenging, especially with the 1st wave critical patients. Expect that there might be some family separation issues to work out.

Case Study #2 – UCSF Mission Bay Hospital Move

- Planned Transfer of 131 pediatric patients from UCSF Parnassus and UCSF Zion Campuses to new UCSF Mission Bay Campus
- 41 ambulances, 110 ambulance personnel
- Several critical ECMO patients
- Several women in eminent labor
- Total Time: 8 ½ hours
- NOT COVERING THE HOSPITAL SIDE OF THIS INCIDENT, JUST EMS
• Plenty of resources available to make the move.
• NO patients died in the moving process.
• Extensive pre-planning by UCSF, City of San Francisco, and AMR led to a successful move.
Lessons Learned

• Moves of this size eat up a lot of resources. An emergent hospital evacuation might not be as fast or successful.

• Heavy need for CCT-RN units and Isolet-capable ambulances. These are scarce resources in California.

• Efficiencies of moving ECMO babies and neonates are resource heavy and very time consuming. This is problematic in emergent circumstances.

Thanks!

Kelly Coleman, BA, EMT-P  
Regional Disaster Medical Health Specialist, Region II  
Alameda EMS Agency  
Kelly.coleman@acgov.org  
Phone: 510-421-9340
California Patient Movement Plan

Susan Aitkens
Emerge Technologies
Consultant to EMSA, CDPH and Cal OES

California Patient Movement Plan

• Developed by EMSA in collaboration with CDPH; Cal OES; and local, regional, state and federal stakeholders

• 26-person workgroup met over 18 months

• TTX in January 2017 (approx. 60 participants)

• Review and comment period underway
Plan is Activated When …

• “Local EMS systems require regional, state or federal assistance to manage the patient movement needs created by the incident …”

• “… including triage, treatment, stabilization and transportation of patients to definitive care, in addition to the evacuation of existing healthcare facilities as needed.”

Who is the Audience?

• YOU! (hospitals, skilled nursing facilities, state institutions with patient populations, congregate care facilities, etc.)

• MHOAC and RDMHC Programs

• State agencies including EMSA, CDPH, Cal OES, California National Guard, etc.

• Federal agencies including HHS, FEMA, DoD and current federal contractor AMR
5 Essential Functions of Patient Movement

1) Patient Evacuation
2) Regulation (Coordination of Transport Resources and Destinations)
3) En-Route Medical Care
4) Patient Tracking (always a challenge!)
5) Return of Patient to Originating Location

Standard (Medical) Patient Movement Resources

- EMSA-affiliated Ambulance Strike Teams (ASTs)
- Unaffiliated ASTs and Single Resources
- Air Ambulances
- California National Guard (Aeromedical Evacuation)
Federal Patient Movement Resources

- National EMS Contract (currently, AMR)
- National Disaster Medical System (NDMS)

National EMS Contract

- 300 ground ambulances (max. 70% ALS and 30% BLS)
- 25 air assets (fixed and rotary wing)
- Sufficient paratransit vehicles to transport 3,500 people (not 3,500 vehicles); max. 25% wheelchair capable
- Non-ambulance EMS personnel (max. 150 fixed location EMTs and Paramedics)
National EMS Contract
Pediatric Capabilities

• As of July 2017, 5-10 CCT ground ambulances included in the contract
• Neonatal-specific ground transport is not mentioned in the contract
• Neonatal air ambulances are part of contract

National Disaster Medical System

• MOU between HHS, DoD, VA, FEMA
• NDMS includes:
  1) Medical Response
  2) Patient Evacuation (primarily DoD)
  3) Definitive Care
DoD Contraindications to AE (no fly)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any medical condition not stabilized</td>
<td>Untreated pneumothorax</td>
</tr>
<tr>
<td>Pregnancy &gt; 34 weeks</td>
<td>Seizure within last 2 weeks</td>
</tr>
<tr>
<td>Hemorrhaging (Hgb &lt; 8.5)</td>
<td>New onset cardiac dysrhythmia</td>
</tr>
<tr>
<td>Post-op &lt; 72 hours</td>
<td>Unbivalved orthopedic cast</td>
</tr>
<tr>
<td>Acute Coronary Syndrome</td>
<td>Communicable disease</td>
</tr>
<tr>
<td>&lt; 7 Days: Open Heart Surgery</td>
<td>Respiratory isolation inc. possible TB</td>
</tr>
<tr>
<td>&lt; 7 Days: Craniotomy</td>
<td>Psychologically unstable</td>
</tr>
<tr>
<td>&lt; 7 Days: Spinal Surgery</td>
<td>Decompression sickness</td>
</tr>
<tr>
<td>Pneumocephalus</td>
<td>Agitation or other distracting behavior</td>
</tr>
<tr>
<td>Neonates/young pediatric patients</td>
<td></td>
</tr>
</tbody>
</table>

Patient Tracking

“Patient tracking is very difficult in the chaos of an MCI. Triage tag # with hospital destination might be the only clue you have to follow up.”

– Kelly Coleman, RDMHS
Patient Tracking (cont.)

• In California, jurisdictions use different tracking methods, including proprietary electronic methods or paper-based

• The different methods are not interoperable

• Using current technologies, sometimes patients are temporarily difficult to locate

• How do we track patients in a catastrophic event much larger than an MCI?

Patient Tracking (cont.)

• California needs a simple, non-technology-based tracking system that can be readily adopted

• Must anticipate the need to relocate patients to far-away locations, potentially out-of-state via NDMS

• What are the minimum data points necessary and (relatively) easily obtainable?

• County of origin, gender, last 4 digits of triage tag # or SSN
Future Focus

• Operational elements of plan must be implemented and tested
• Assessment and inventory of regional and state pediatric and neonatal transportation assets
• The evacuation of large pediatric specialty hospitals will require coordination among multi-state pediatric coalitions and hospital networks; plans and procedures must be developed
• Allocation of scarce resources remains a continuing challenge

Thank you!

For further information on plan status, please contact
Jody Durden, EMSA
jody.durden@emsa.ca.gov

Susan Aitkens
Questions?

Don’t forget to complete your evaluation!

If you do not have access to the app, please see CHA staff for a printed evaluation.

CE certificates will be emailed within two weeks of the conference.

Thank you!

**Patricia Frost, RN, MS, PNP**
Contra Costa Health Services
Patricia.Frost@hsd.cccounty.us

**Kelly Coleman, EMT-P**
Alameda Emergency Medical Services
kelly.coleman@acgov.org

**Susan Aitkens**
Consultant, Emergency Medical Services Authority