# The Pediatric Black Swan Event
## *What is it and How to Prepare …*

Patricia Frost RN,MS, PNP

EMS Director, Contra Costa Health Services
Vice Chair, National Pediatric Disaster Coalition

CALIFORNIA HOSPITAL ASSOCIATION

# Objectives

1. Describe the lessons learned in real world disasters and their impact on children and families.

2. Identify key preparedness activities to improve resiliency in Black Swan events.

3. Discuss why California may be particularly at high risk for pediatric black swan events.

# What is a Black Swan Event?

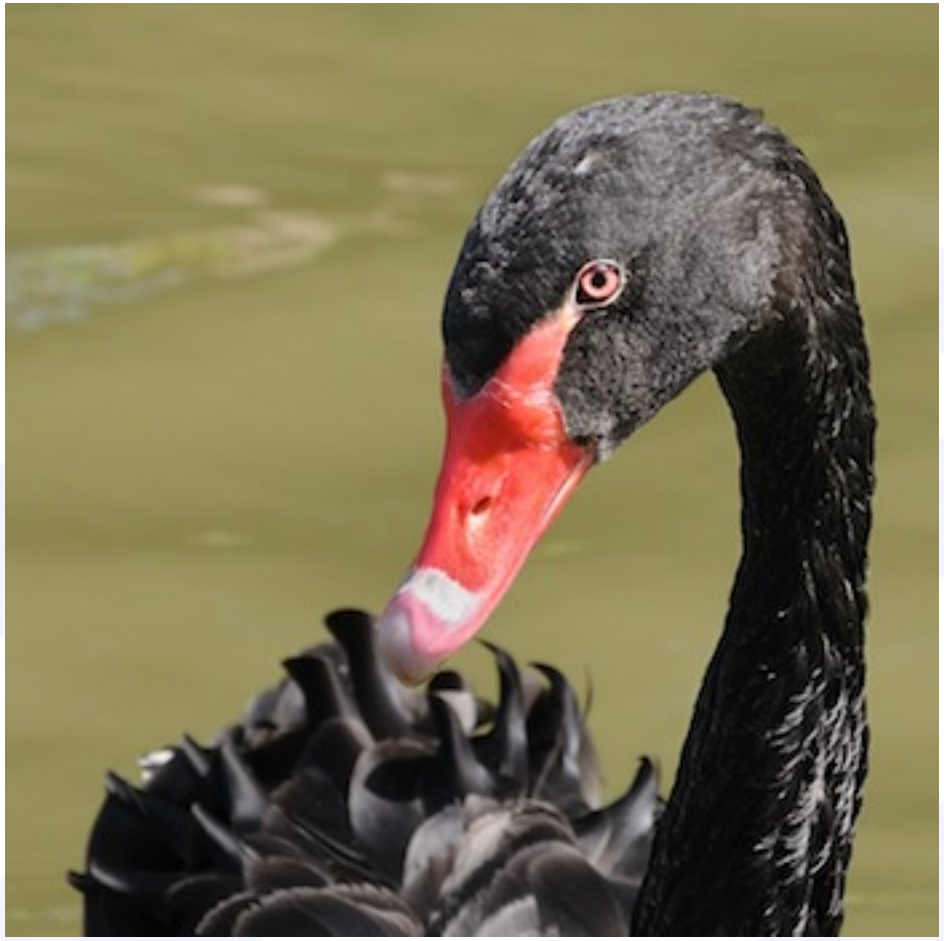
# Three Main Types of Black Swan Events


***Nobody knew and the event was not predicted***

***You don't know but someone else knew and didn't tell you***

***Yeah, we know but events are unlikely to EVER occur… so just ignore it***

# What is a Pediatric “Black Swan” Event?

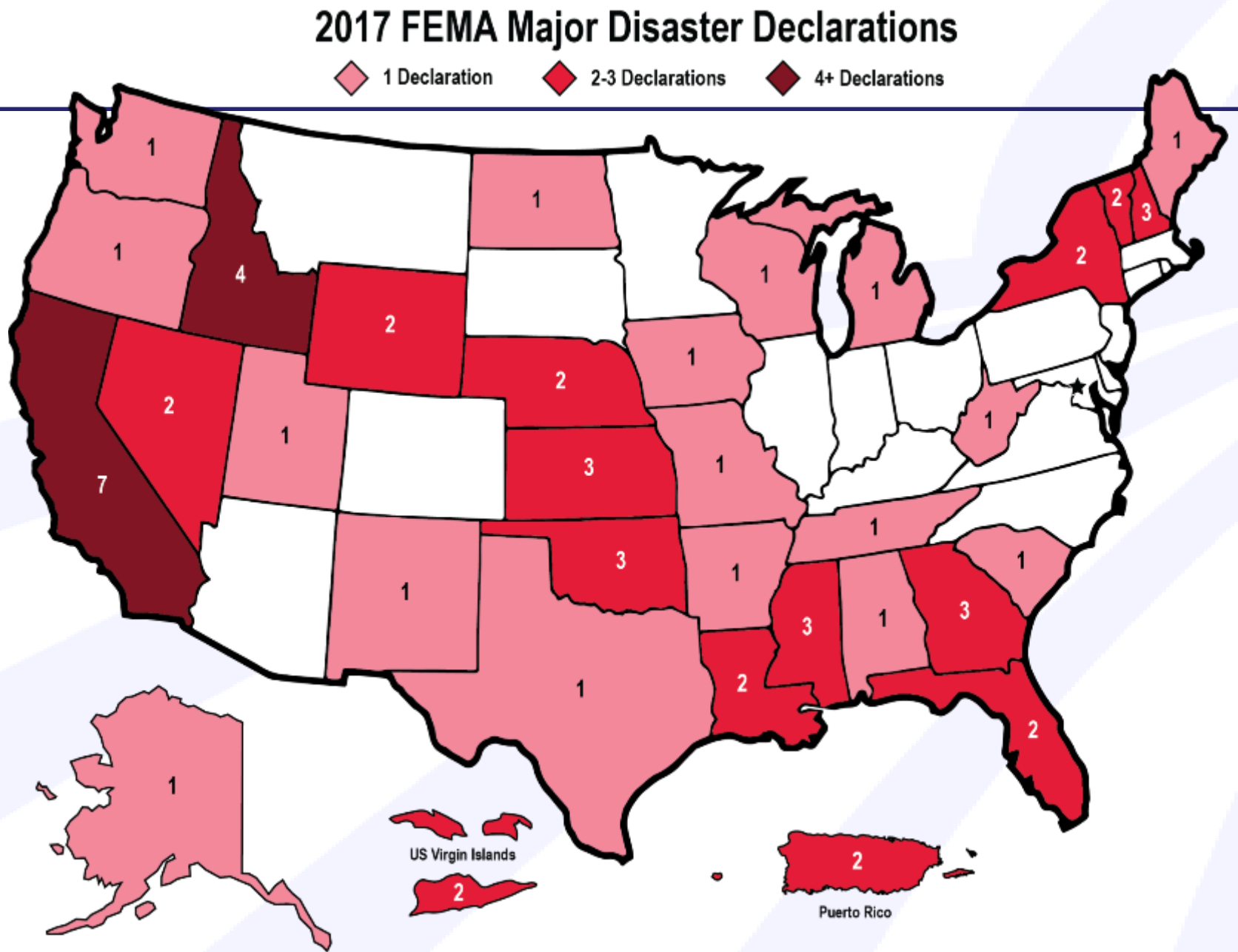


# The Perfect Storm: Compounding Events

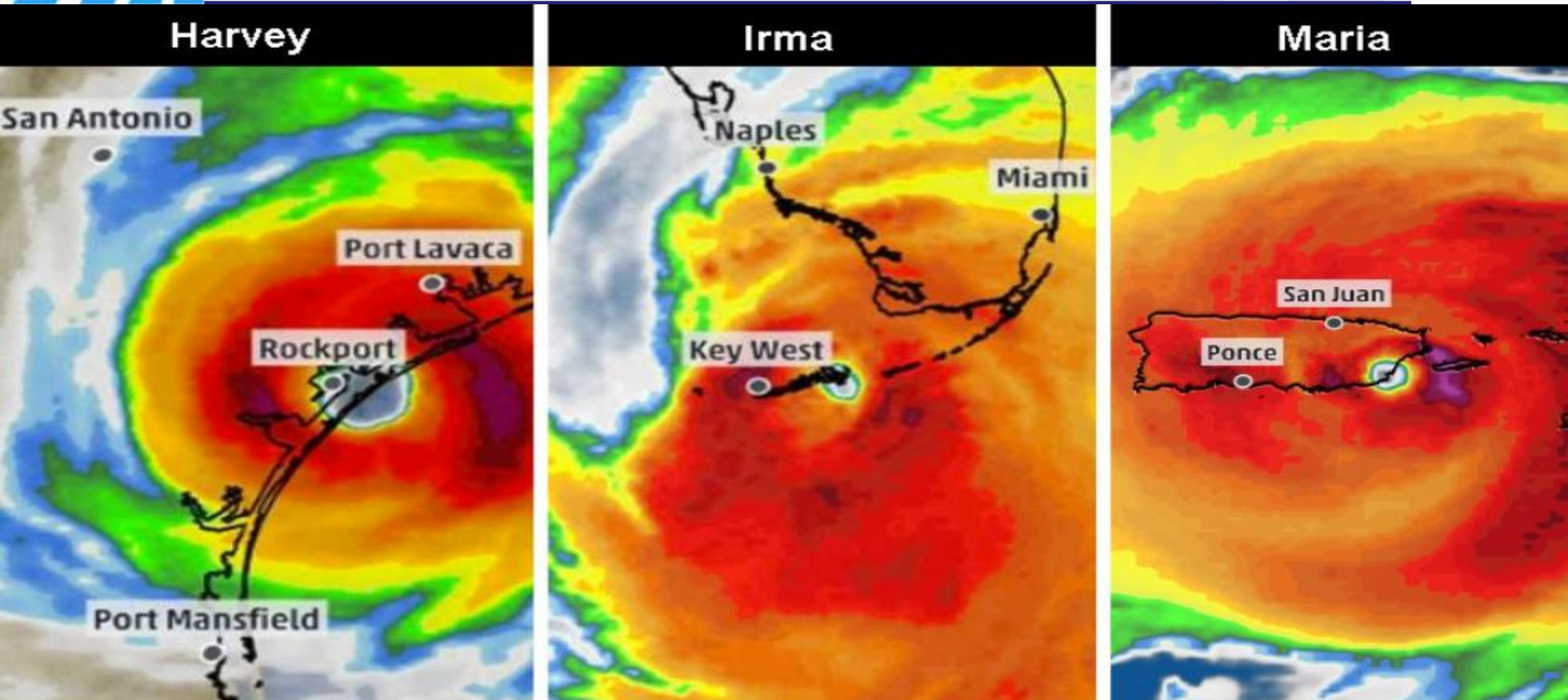
- Any man-made or natural event leading to …
- Pediatric Regional System Exhaustion and Collapse

# Black Swan No Notice & Catastrophic
# Japan 2011 Earthquake/Tsunami/Reactor Melt Down

# 59 Major Disaster Declarations



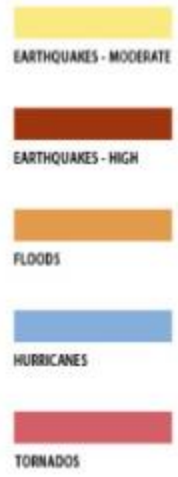
# Over 1.7 Million Children Affected

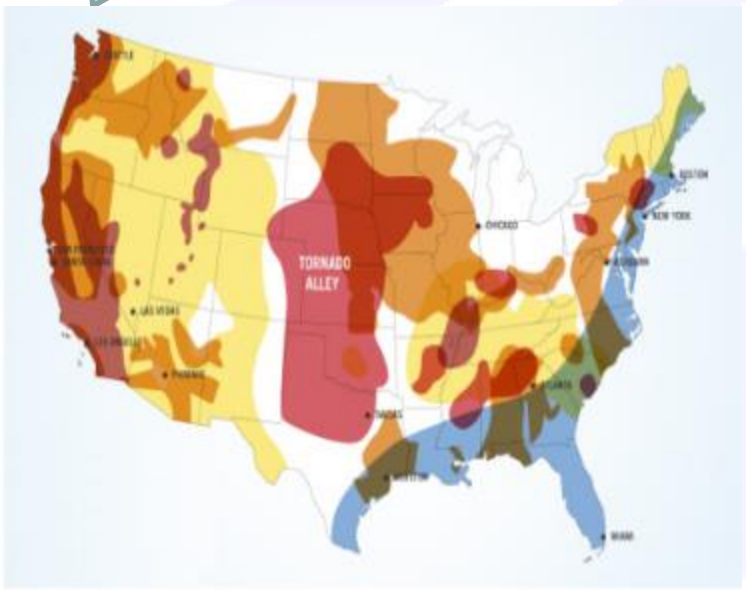


# The Nation's Children's Hospitals & US Risk of Natural Disaster

Vulnerable Regional Infrastructure

Every US Hospital Pediatric Ready



# Pediatric Centers Are “Regional” with Dedicated Transport Privately Contracted Assets

**EMS Medical Transportation Predominately NOT Pediatric or Neonatal Ready**

**Pediatric Readiness (EMSC) Every ED/Hospital Pediatric Ready <34% ED Ready**

# Day to Day Conditions
## Children, Hospitals & EMS

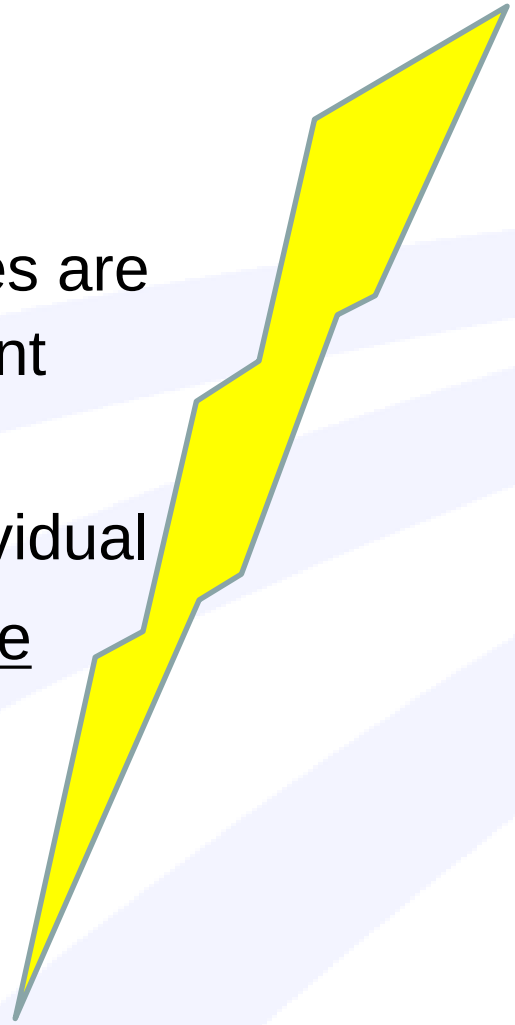
| US Hospitals & EMS | Pediatric Contact |
|---|---|
| Non-children's hospitals ED | See 89% of all children in ED's |
| 75% Hospital see | < 20 children/day |
| 50% Hospitals see | < 10 children/day |
| Remote Hospitals see | < 2 children/day |
| Percent of total ED volume | 18-27% |
| Pedi ED volume admitted | <10% (90% treat and release) |
| Average Length of Stay | 3.5 days (children's hospital) |
| **911 Calls and Transports** | **< 5-10% of all calls** |
| **EMS Pediatric MCI Plan** | **13% report plan** |

Low volume, high risk…Really "sick" kids are rare

# Pediatric Disaster Capability: Living in a World of Narrow Margins

## Daily Triage

- When abundant resources are available relative to patient demand
- Do the best for each individual
- Normal Standards of Care



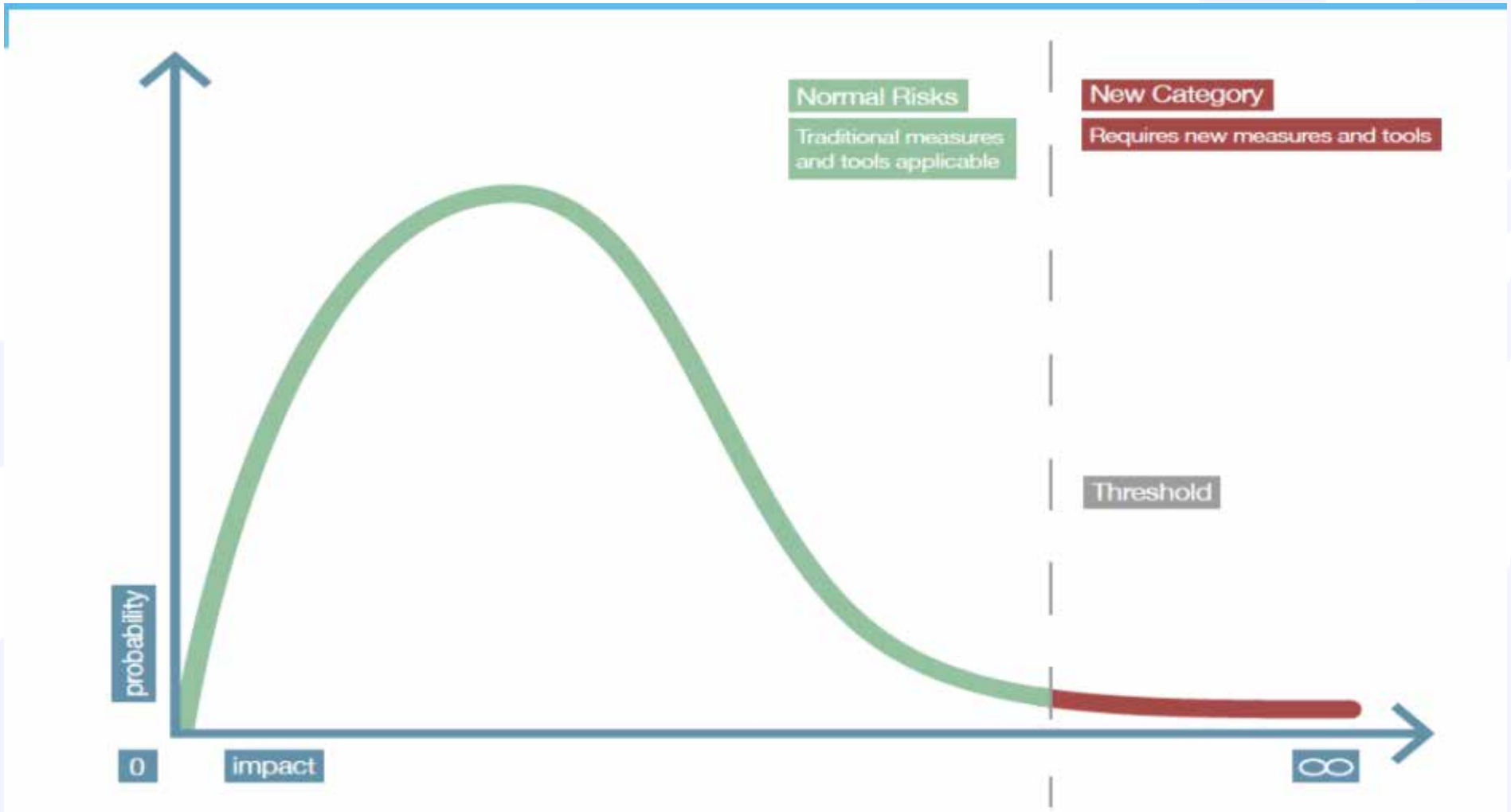
## Disaster Triage

- When the patient needs outstrip resources
- Greatest good for greatest number of people
- Altered Care Standards
- Recognizes resuscitation attempts may be futile

# How Long Can Your Staff Hold Out? … With Children, Pets and Families???

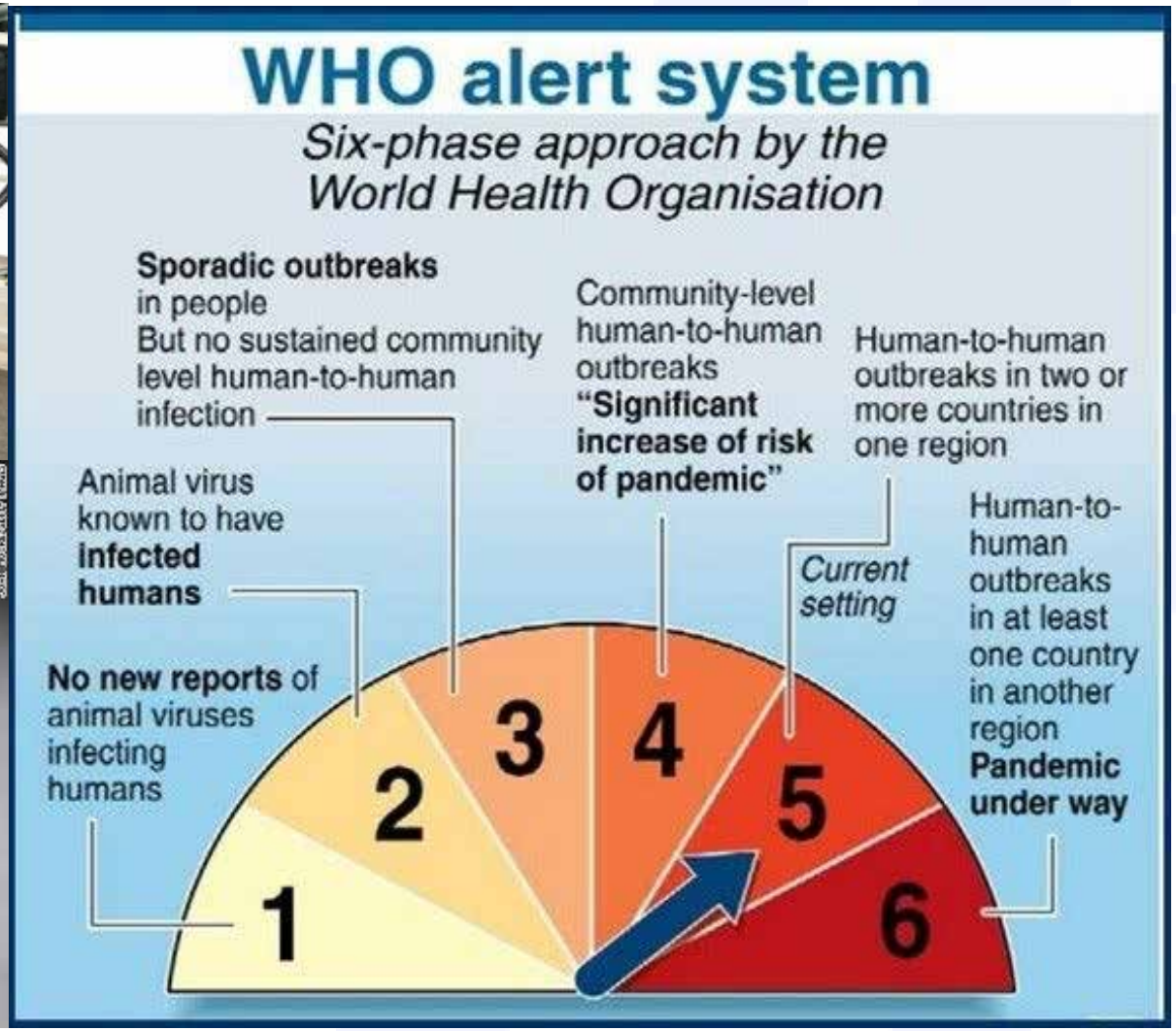

| Industry | Recommendations till Re-supply | Real World |
|---|---|---|
| Hospitals | 96 hours<br>Joint Commission | Weeks |
| EMS | 72-96 hours<br>(Ambulance Strike Team)<br>FEMA | Months |
| Families | 3 days<br>(ideal 2 weeks)<br>FEMA | Years |

# Black Swan Events: Requires Non-Traditional Measures and Tools



# Pediatric Black Swan Scenario #1
# Novel Virus Pandemic

# NOVEL Highly Infectious Disease … AND Human to Human Transmission



# A Black Swan Near Miss … H1N1 2009

**Inpatient Capacity at Children's Hospitals during Pandemic (H1N1) 2009 Outbreak, United States**

Marion R. Sills, Matthew Hall, Evan S. Fieldston, Paul D. Hain, Harold K. Simon, Thomas V. Brogan, Daniel B. Fagbuyi, Michael B. Mundorff, and Samir S. Shah

Less than one additional admission per ten inpatient beds would have caused ALL Children's hospitals to reach 100% capacity.

**M. Sills et.al., Emerging Infections Diseases , Sept 2011**
**CDC MMWR Sept 16,2011**

# Pediatric Black Swan Scenario #2
# Multi-Pediatric Mass Casualty Events

# At-Risk AND Soft Targets

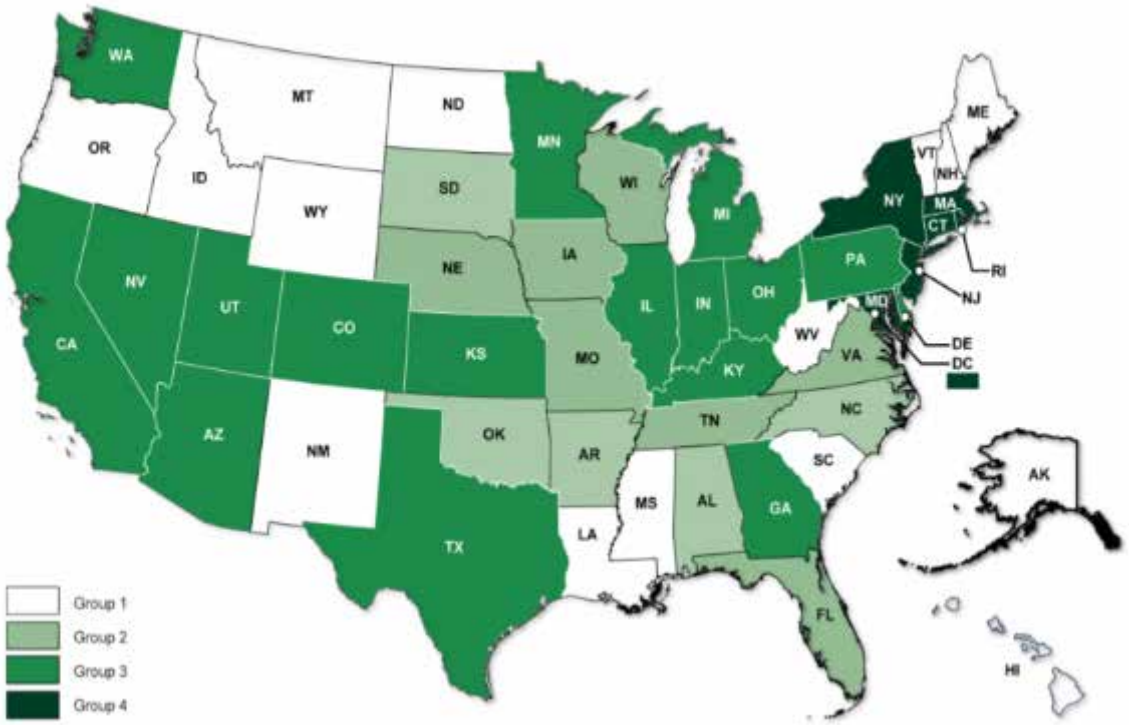
When Lee Malvo asked why he planned to attack children in schools and on buses, convicted sniper John Mohammed allegedly replied:

***"For the sheer terror of it – the worst thing you can do to people is aim at their children."***

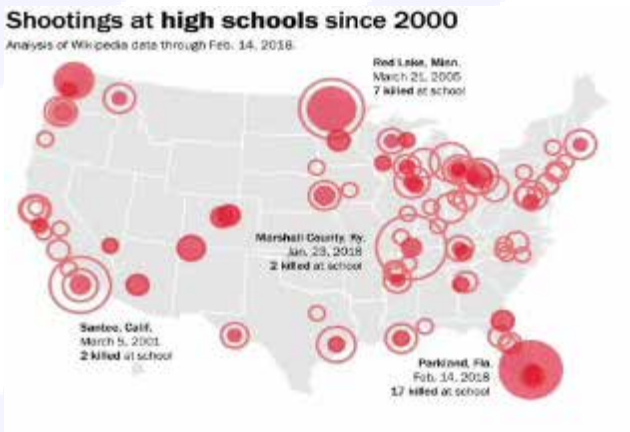
(From AP story 5/30/06)

# Only 57% of Children in US Live Within 30 Miles of a Pediatric Trauma Center

## *How do we get them there?*






Trauma News April 28, 2017http://trauma-news.com/2017/04/15-states-children-farthest-top-level-pediatric-trauma-center/

# Pediatric First Medical Response ... Chaotic First Responders Profoundly Affected

# Pediatric Mass Casualty



- Responders seldom know child's age
- Family separation common
- No time to designate children to specialty centers
- Triage tag may be only identifier

# Mass Casualty Pediatric Surge Identification and Reunification

- Whose child is this?
  - Separated family members
    - Transport/Injured
- No history
- No one to help care for the child
- No one to consent
- No home to send them to

# Hartford Consensus: Integrated Response Fire/Rescue/EMS and Law Enforcement

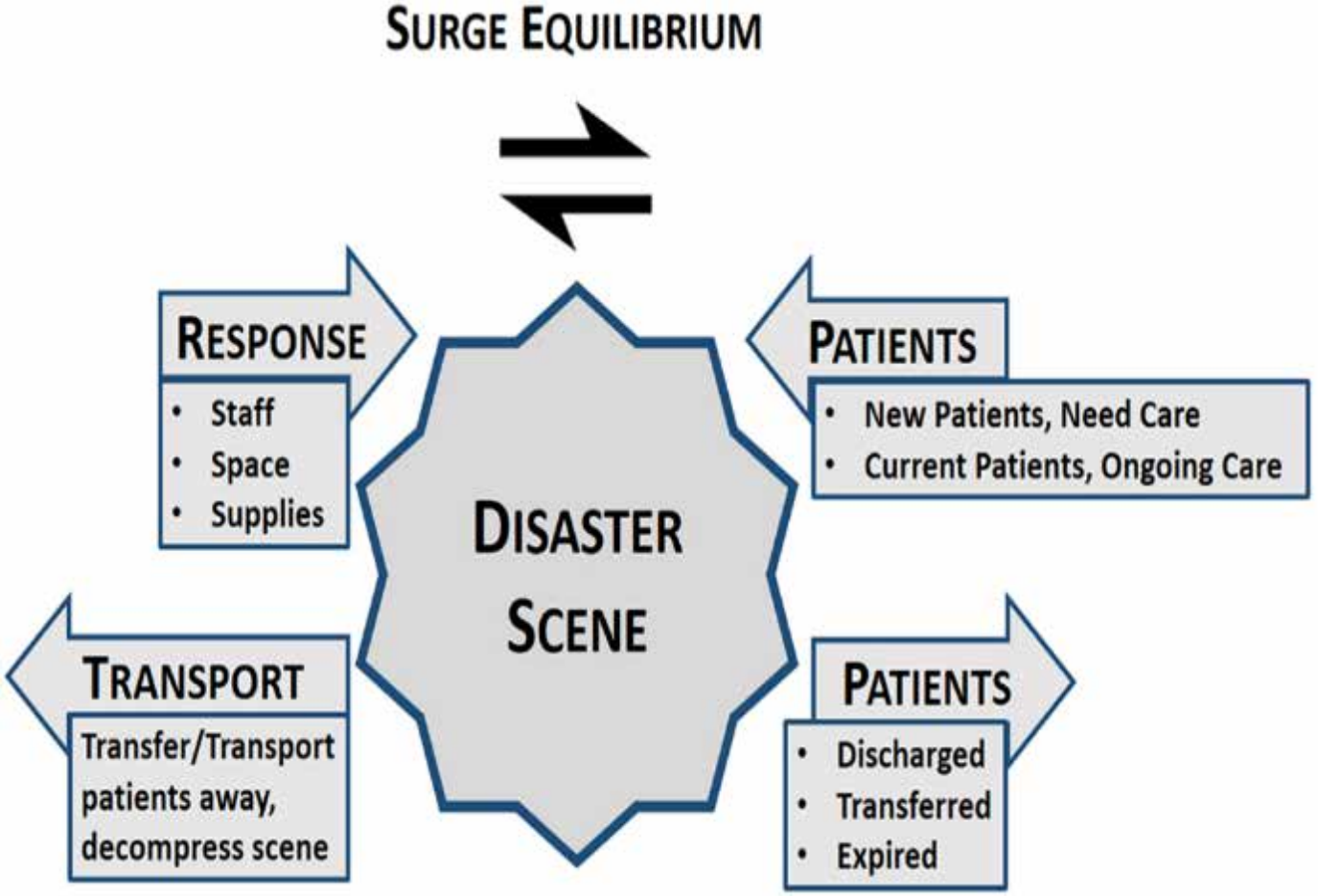
**T =** Threat suppression
**H =** Hemorrhage control
**RE =** Rapid Extrication to safety
**A =** Assessment by medical providers
**T =** Transport to definitive care

# 50-90% of Acute Casualties Go to Closest Facility Less Than 20% Transported by EMS


- **1st wave (0-30 minutes) :** Less injured, May arrive before the most seriously injured, self or bystander transport
- **2nd wave (30-60 minutes):** Most severely injured
- **10-20% Pediatrics**

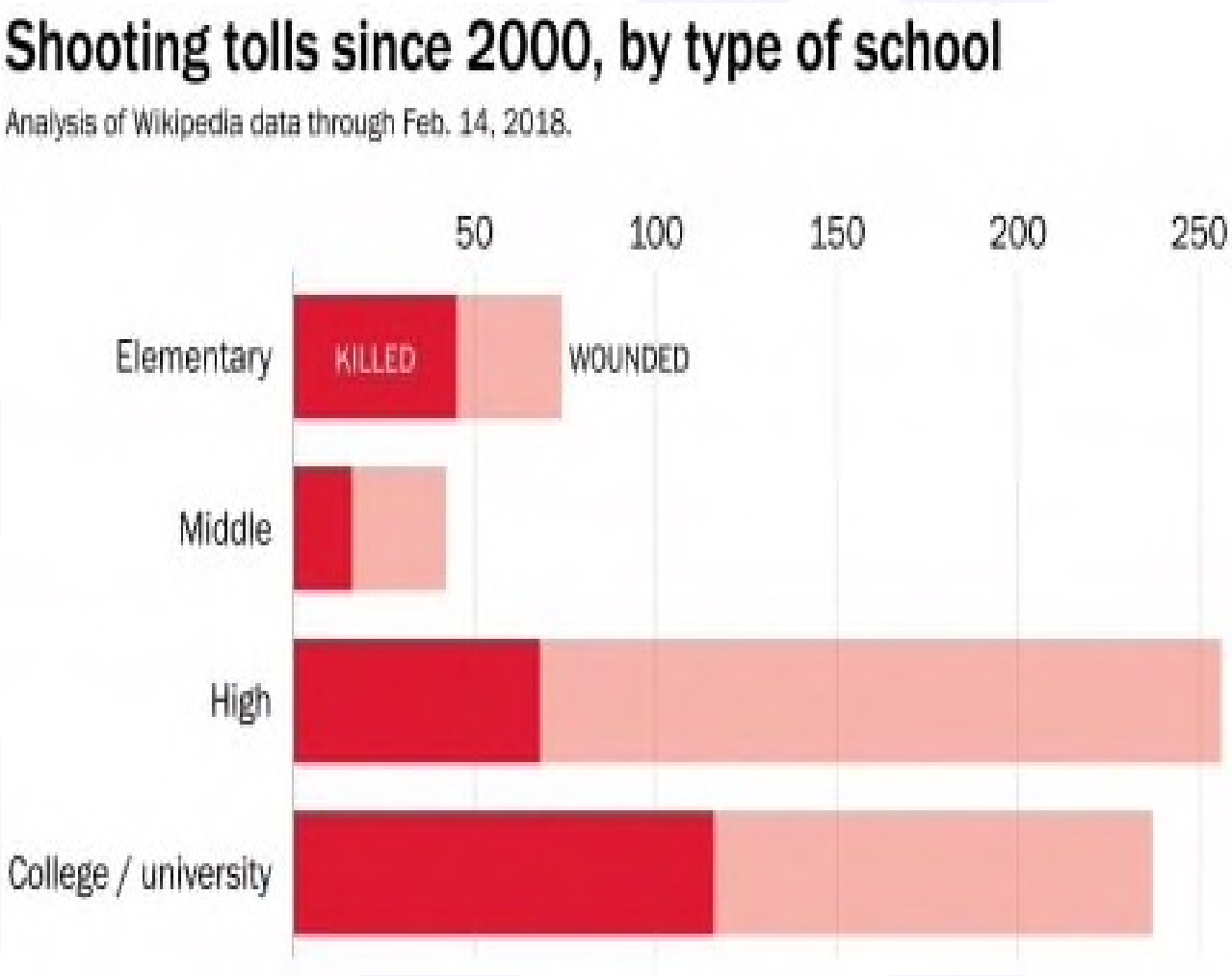
# Pediatric Mass Casualty Bottlenecks

- Surgery/Anesthesia
  - ü Bring patient to the specialist
  - ü Bring specialist to the patient
- Radiology
  - ü Not all imaging is “kid friendly”
- Labs
  - ü Micro-sampling
- Respiratory Therapists (NICU)
  - ü Specialized Staff
- Medical Transportation



# Real World Experience: Many Children Die

***Sandy Hook***

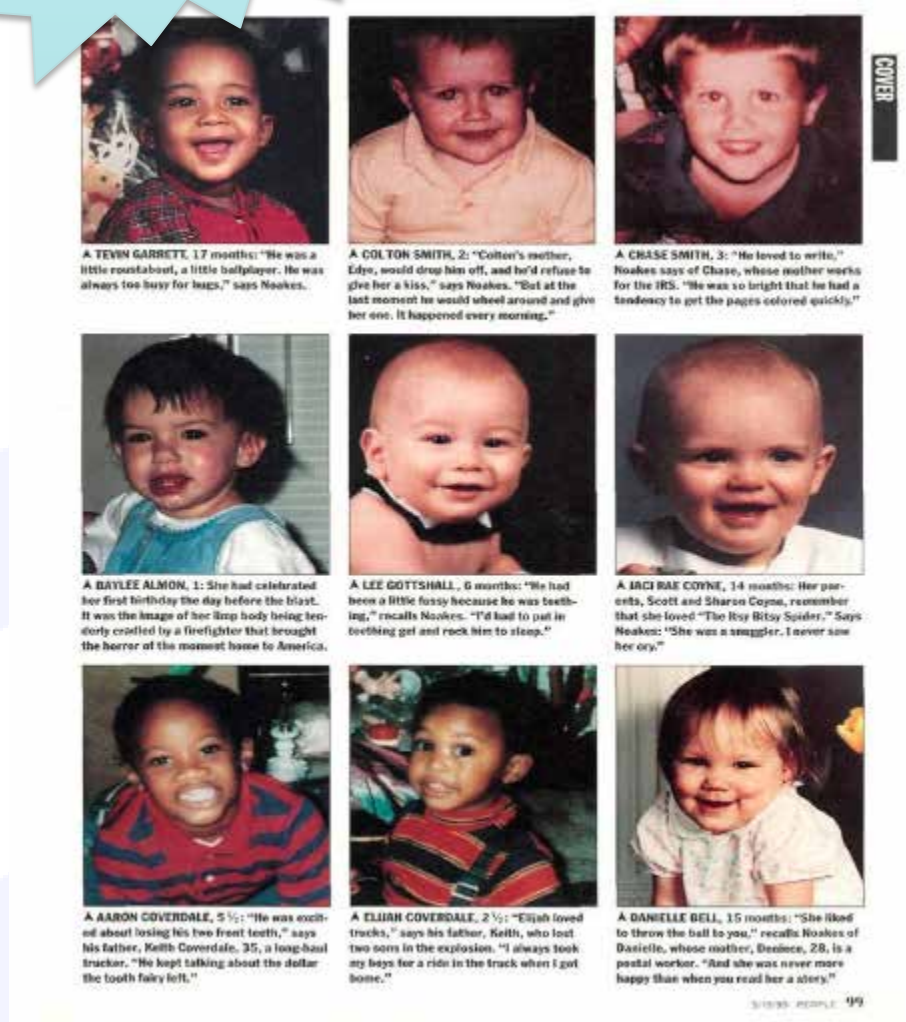



# Black Swan Lessons
# Look to Wartime Pediatric Care

- **Highest risk: < 8 years old**
  - Injuries more severe and higher mortality
    - 20% mortality rate due to burns and penetrating head injury
    - 10-20% require surgical or critical care support
- **Conditions**
  - 76% traumatic (gunshot/explosive)
  - 25% of all conditions non traumatic
  - Longer hospital and ICU stays
- **Poor transfer options**

# Real World Black Swan Lesson Plan for Pediatric Fatality Management

Oklahoma City Bombing



A TEVIN GARRETT, 17 months: "He was a little roustabout, a little ballplayer. He was always too busy for hugs," says Noakes.

A COLTON SMITH, 2: "Colton's mother, Edye, would drop him off, and he'd refuse to give her a kiss," says Noakes. "But at the last moment he would wheel around and give her one. It happened every morning."

A CHASE SMITH, 3: "He loved to write," Noakes says of Chase, whose mother works for the IRS. "He was so bright that he had a tendency to get the pages colored quickly."

COVER

A BAYLEE ALMON, 1: She had celebrated her first birthday the day before the blast. It was the image of her limp body being tenderly cradled by a firefighter that brought the horror of the moment home to America.

A LEE GOTTSHALL, 6 months: "He had been a little fussy because he was teething," recalls Noakes. "I'd had to put in teething gel and rock him to sleep."

A IACI RAE COYNE, 14 months: Her parents, Scott and Sharon Coyne, remember that she loved "The Itsy Bitsy Spider." Says Noakes: "She was a snuggler. I never saw her cry."

A AARON COVERDALE, 5 ½: "He was excited about losing his two front teeth," says his father, Keith Coverdale, 35, a long-haul trucker. "He kept talking about the dollar the tooth fairy left."

A ELIJAH COVERDALE, 2 ½: "Elijah loved trucks," says his father, Keith, who lost two sons in the explosion. "I always took my boys for a ride in the truck when I got home."

A DANIELLE BELL, 15 months: "She liked to throw the ball to you," recalls Noakes of Danielle, whose mother, Denlece, 28, is a postal worker. "And she was never more happy than when you read her a story."

99

- Increase morgue space
- Separate family space away from treatment area
- **Process:** identification of the unknown
- **Comfort:** clothes, food, chargers
- Mental health support
- **Staff assigned:** high risk PTSD

# Black Swan Mass Casualty
# Every Community Hospital Needed

- Treat what you can and shelter patients in place
- Triage and delay non-life threats until the next day
- Stabilize and transfer patients you cannot treat
- STOP BLEEDING
- CONTROL CONTAMINATION
- Restock and resupply in real time
- Create new capacity in the event of multiple surges

# Real World Black Swan Staffing – All Hands on Deck

Respiratory therapists

Pharmacists

Volunteers

Parents

Anesthesiologists

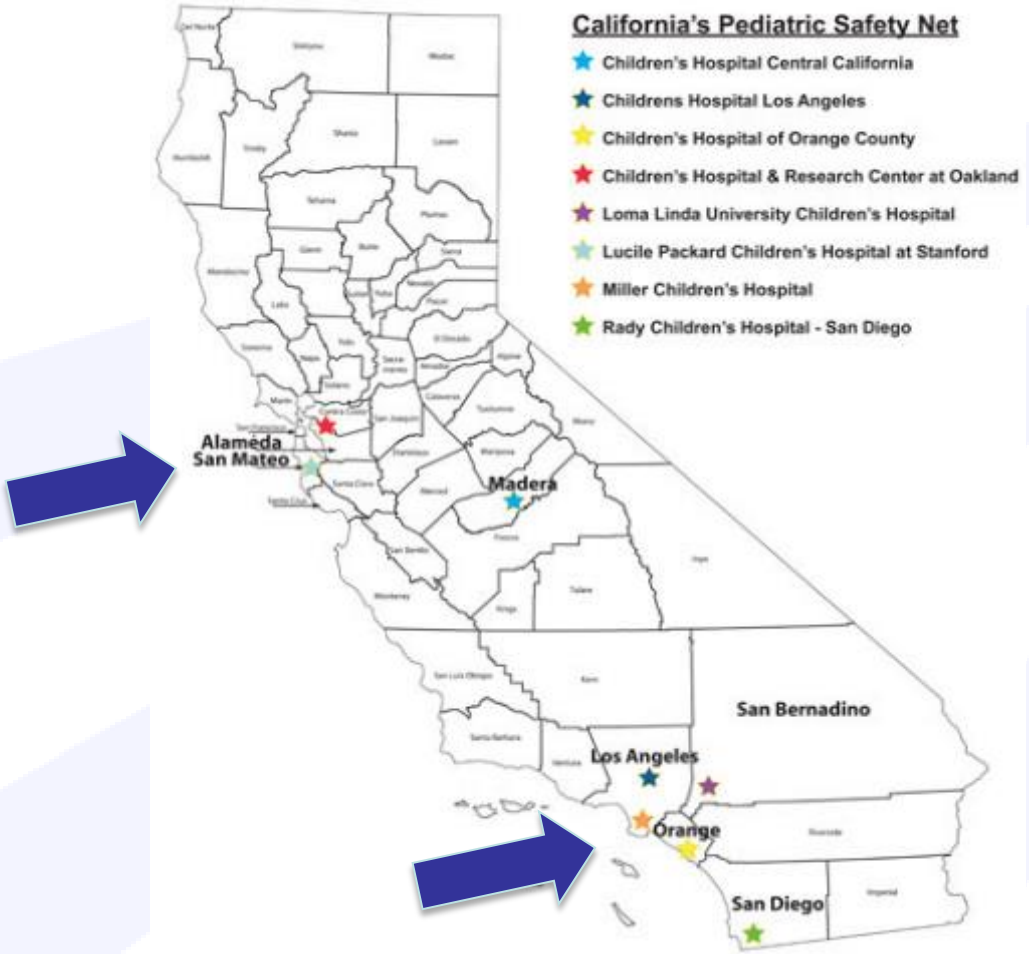
EMT/Paramedics

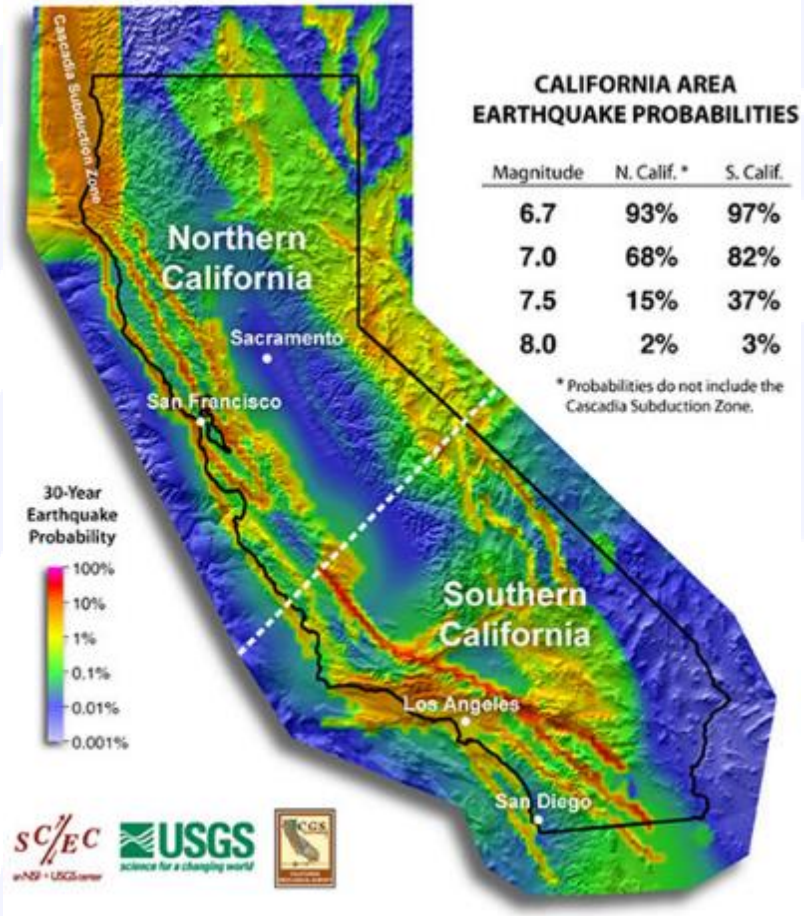
Students/Residents

# Pediatric Black Swan Scenario #3
# No Notice Pediatric Regional Center Evacuation

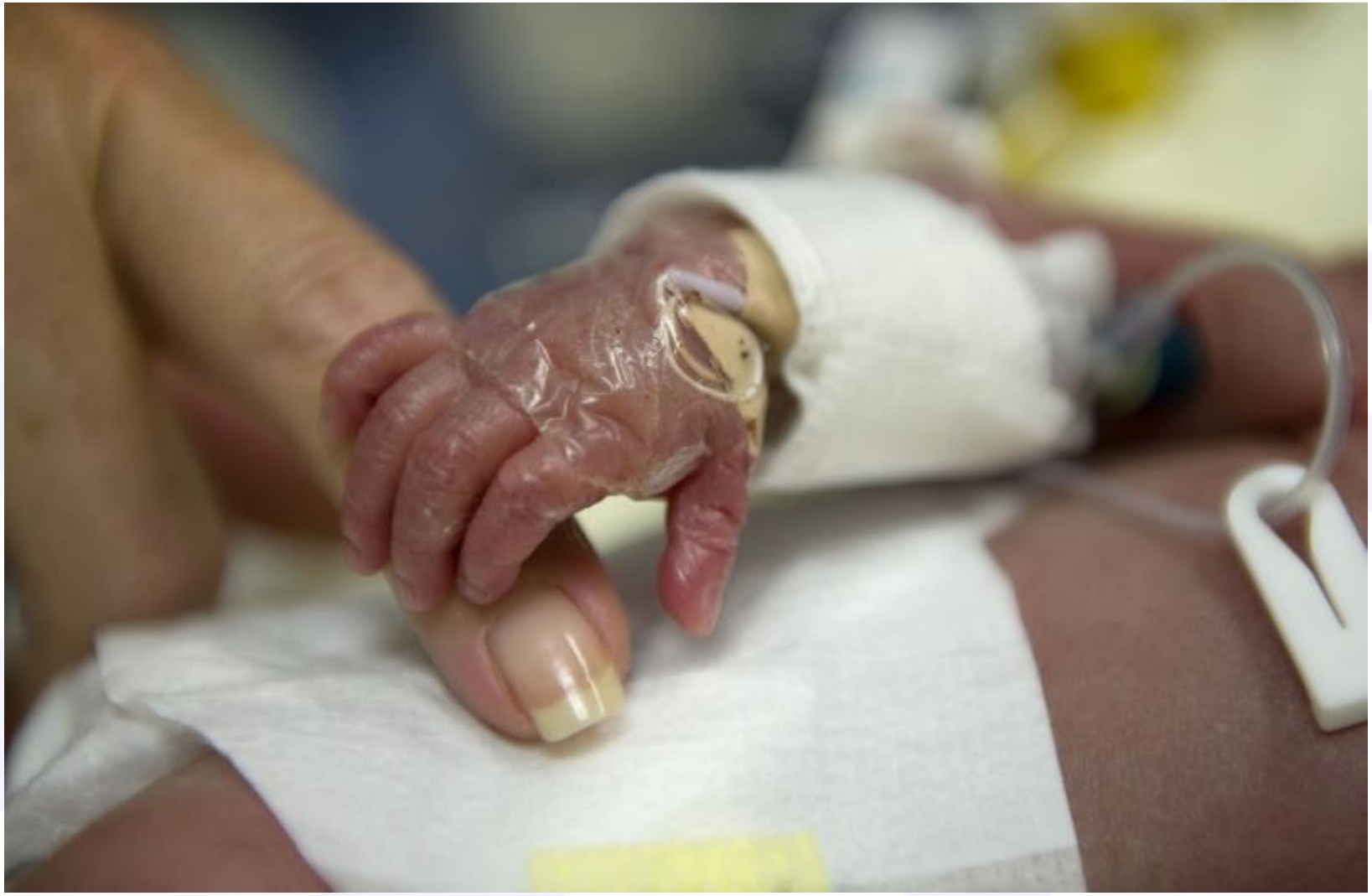
# California's Pediatric Regional Centers and Earthquake Risk

## California's Black Swan Event



# Black Swan Real World Challenge: Premature Infants



*Regional and Multi-State Already Required*
*To Meet Day-to-Day Need*

Tap into Day to Day Workflows

# California Perinatal Transport System

Add New Hospital | Remove Hospital | Update Bed Availability

| REGIONAL Centers | | Beds Available | | | |
|---|---|---|---|---|---|
| Hospital | City | Neonatal | ECMO | High Risk Maternity | Last Update |
| California Pacific Medical Center | San Francisco | 1 | n/a | open | 6/6/2017 12:15:55 AM |
| Children's Hospital Oakland | Oakland | 5 or more | open | n/a | 6/6/2017 3:00:51 AM |
| Lucile Packard Childrens Stanford | Palo Alto | 4 | open | open | 6/6/2017 6:20:06 AM |
| Santa Clara Valley Medical Center | San Jose | 5 or more | n/a | open | 6/6/2017 1:18:16 AM |
| Sutter Med Center, Sacramento | Sacramento | 2 | open | open | 6/6/2017 2:29:35 AM |
| UC Davis Medical Center | Sacramento | 5 or more | open | open | 6/6/2017 7:26:09 AM |
| UCSF Medical Center-Benioff Children's Hospital | San Francisco | 2 | open | open | 6/6/2017 4:45:35 AM |
| Valley Children's Hospital | Madera | 2 | n/a | n/a | 6/6/2017 5:26:05 AM |

# California's Fragile NICU Bed Capacity

| Children's Hospital | Region | NICU beds | Total |
|---|---|---|---|
| UCSF Benioff Oakland | NorCal | 44 | **NorCal 203 NICU beds** |
| UCSF Mission Bay | NorCal | 50 | |
| Stanford Children's | NorCal | 60 | |
| UC Davis | NorCal | 49 | |
| Valley Children's | Central | 88 | **Central: 88 NICU beds** |
| Rady's Children's | SoCal | 60 | **SoCal 274 NICU beds** |
| Children's Orange County (CHOC) | SoCal | 72 | |
| Children's LA | SoCal | 58 | |
| Loma Linda Children's | SoCal | 84 | |

# The ***MOST*** Problem Prone Scenarios … Sudden Shifts from Normal to Austere

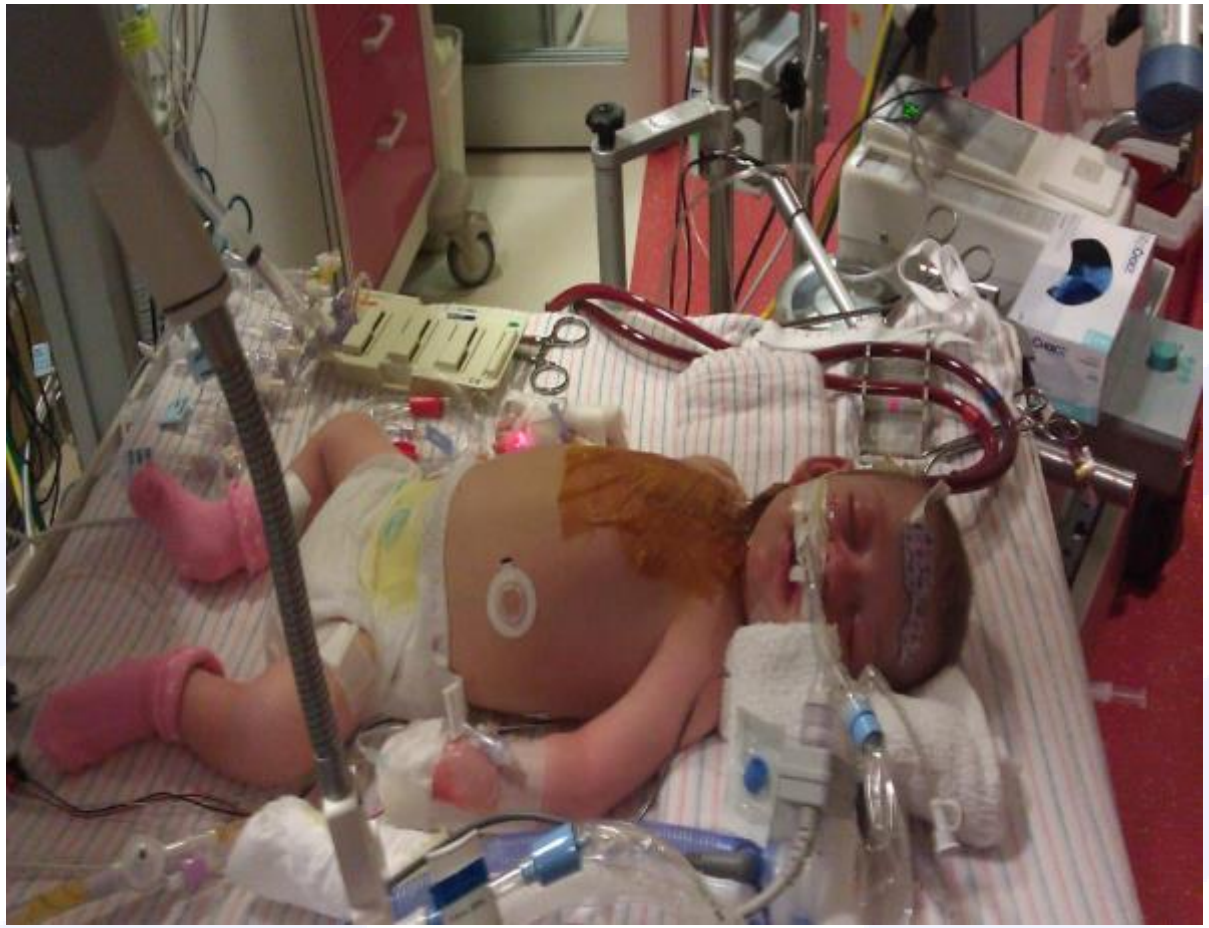
# Crisis Standards of Care: The Pediatric Black Swan Must Have Conversation

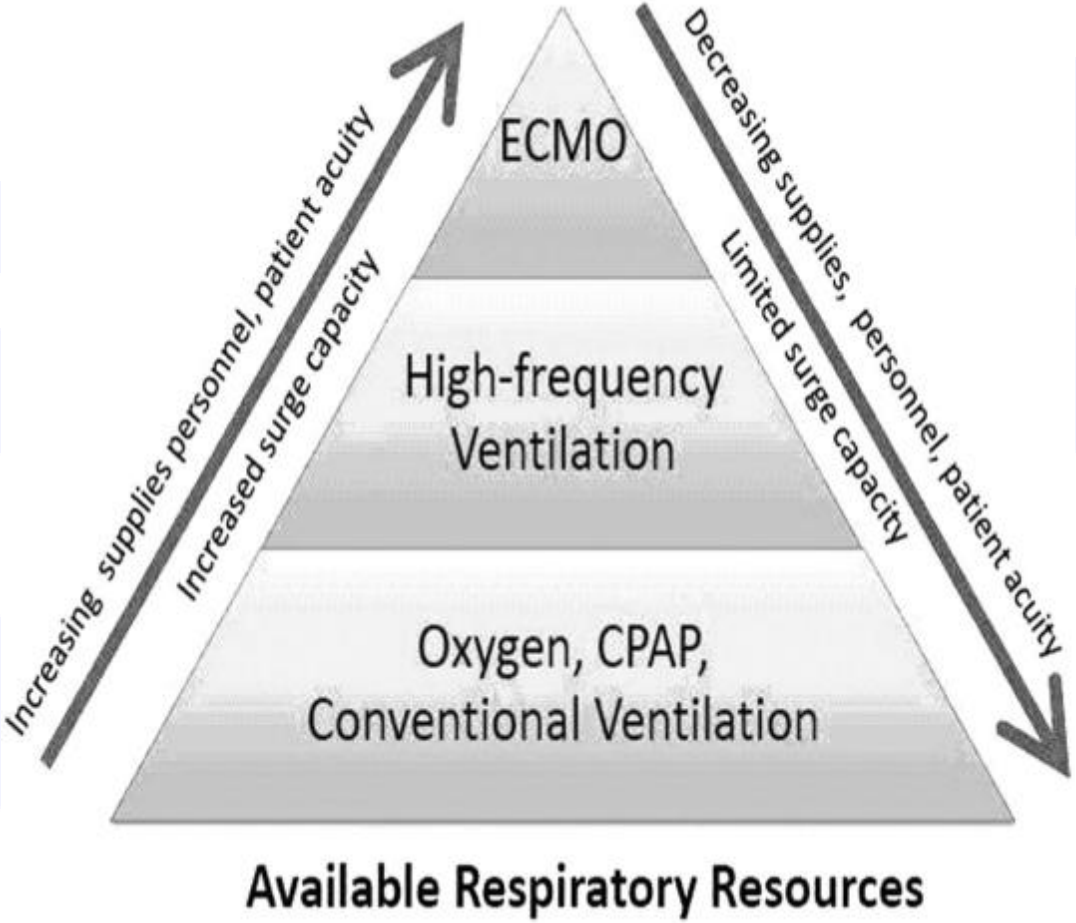




**Risk of disruption, limited staff, space, stuff and system: HIGH PROBABILITY**

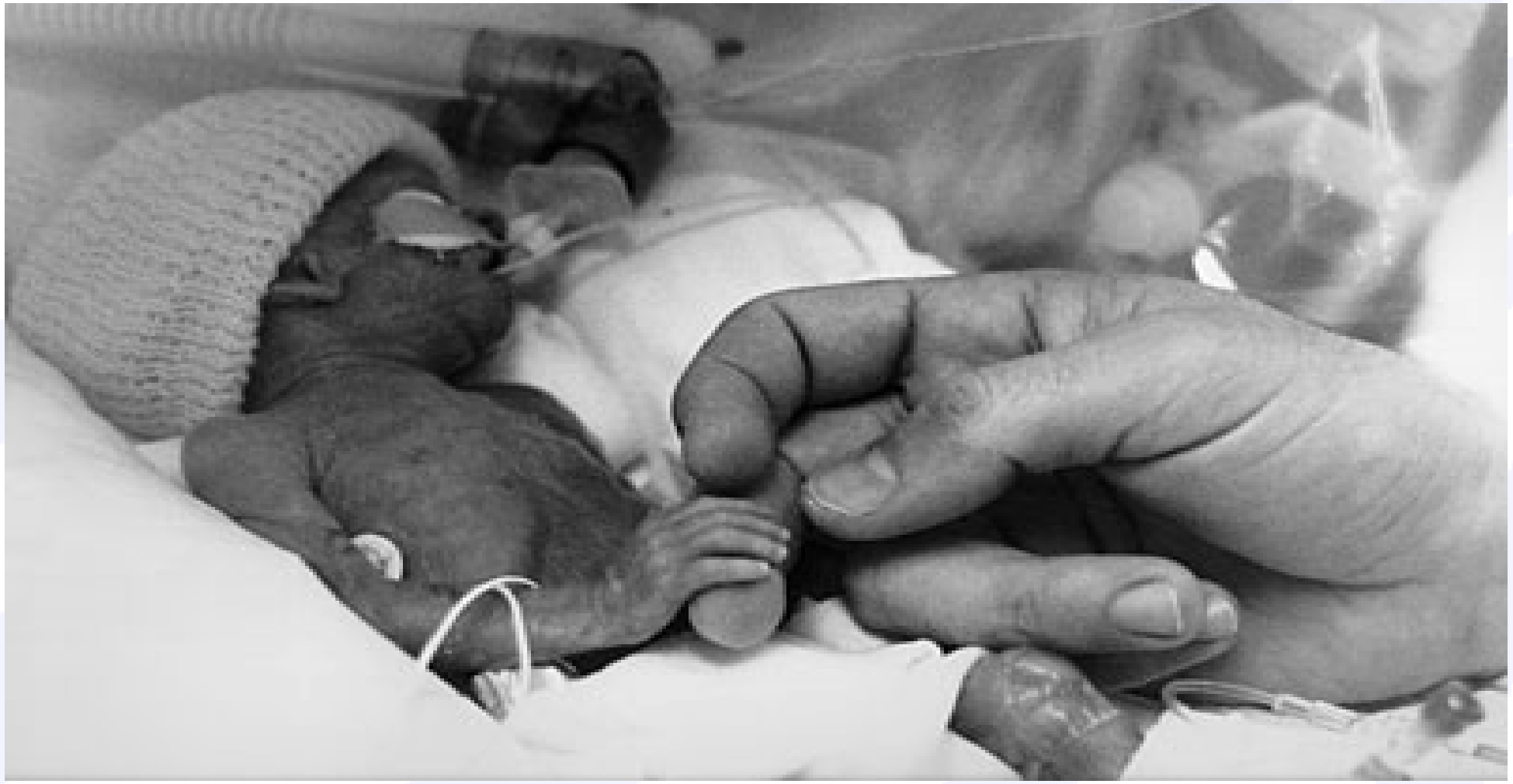
# ECMO and Jet Ventilation Infants Limited Options Other Than Shelter in Place



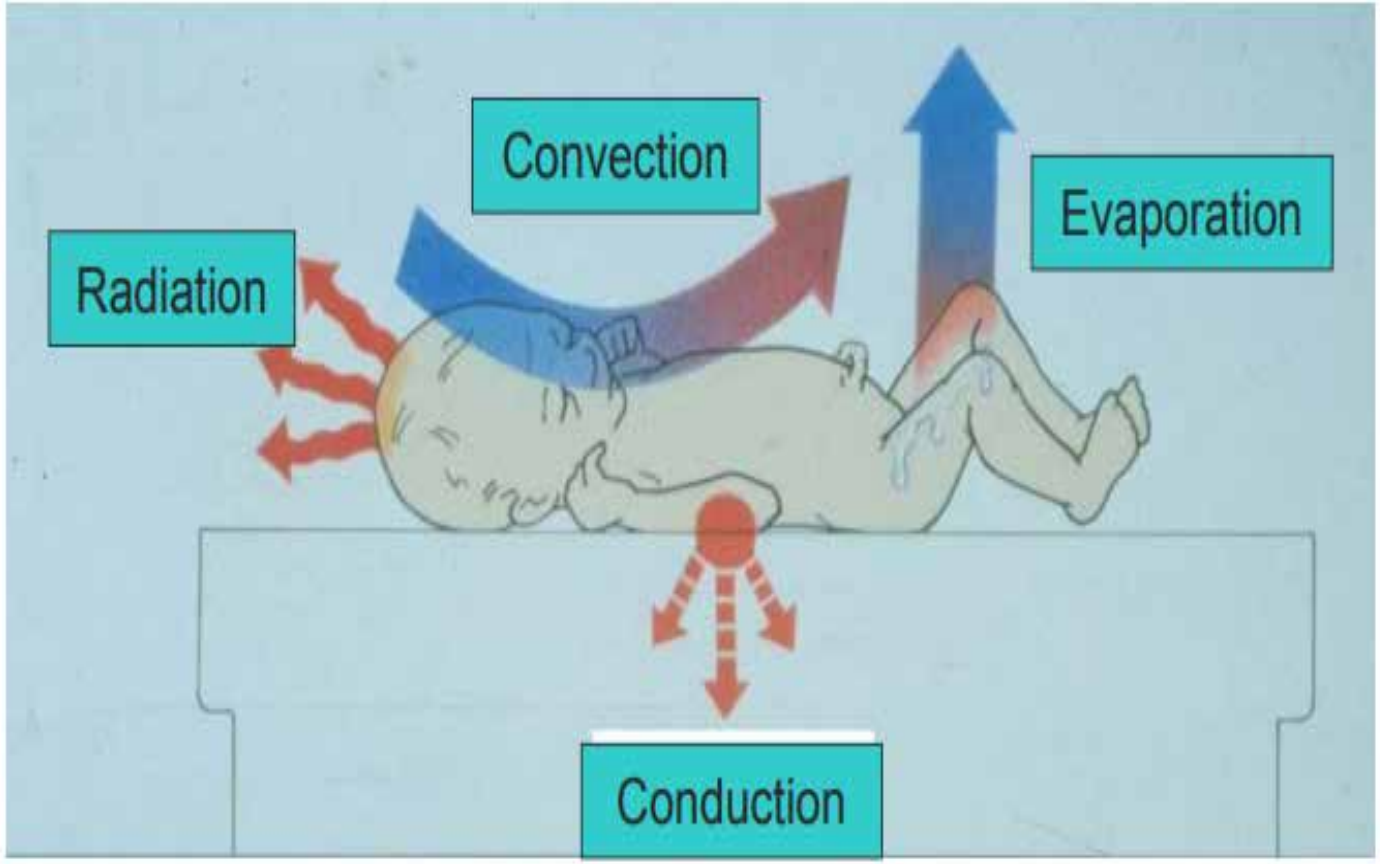


# Neonatal Black Swan Bed Expansion
## Doubling and Tripling Up … *Who, When and How*

# Low Birth Weight Premature Infants And Austere Conditions



# Premature Infants Black Swan Challenge Day-to-Day and Disaster: #1 Hypothermia




Four ways a newborn may lose heat to the environment

**Maintain “ Warm Chain”**

- WHO: one million preventable neonatal deaths per year
- Mortality rate twice in hypothermic babies
- Anticipate risk in transport

# Black Swan Warm Chain Options: Kangaroo Care (Skin-to-Skin) When Technology Runs Out

# Black Swan Warm Chain
# Limited Incubator Options

**Baby Pod**

# EMBRACE: Low Resource Setting Solution India, Africa, Latin America, UNICEF

# Black Swan Low Tech Option: Up to Eight Hour Thermoregulation

## How the warmer works

It is a simple device that provides a constant temperature and does not require continuous power supply

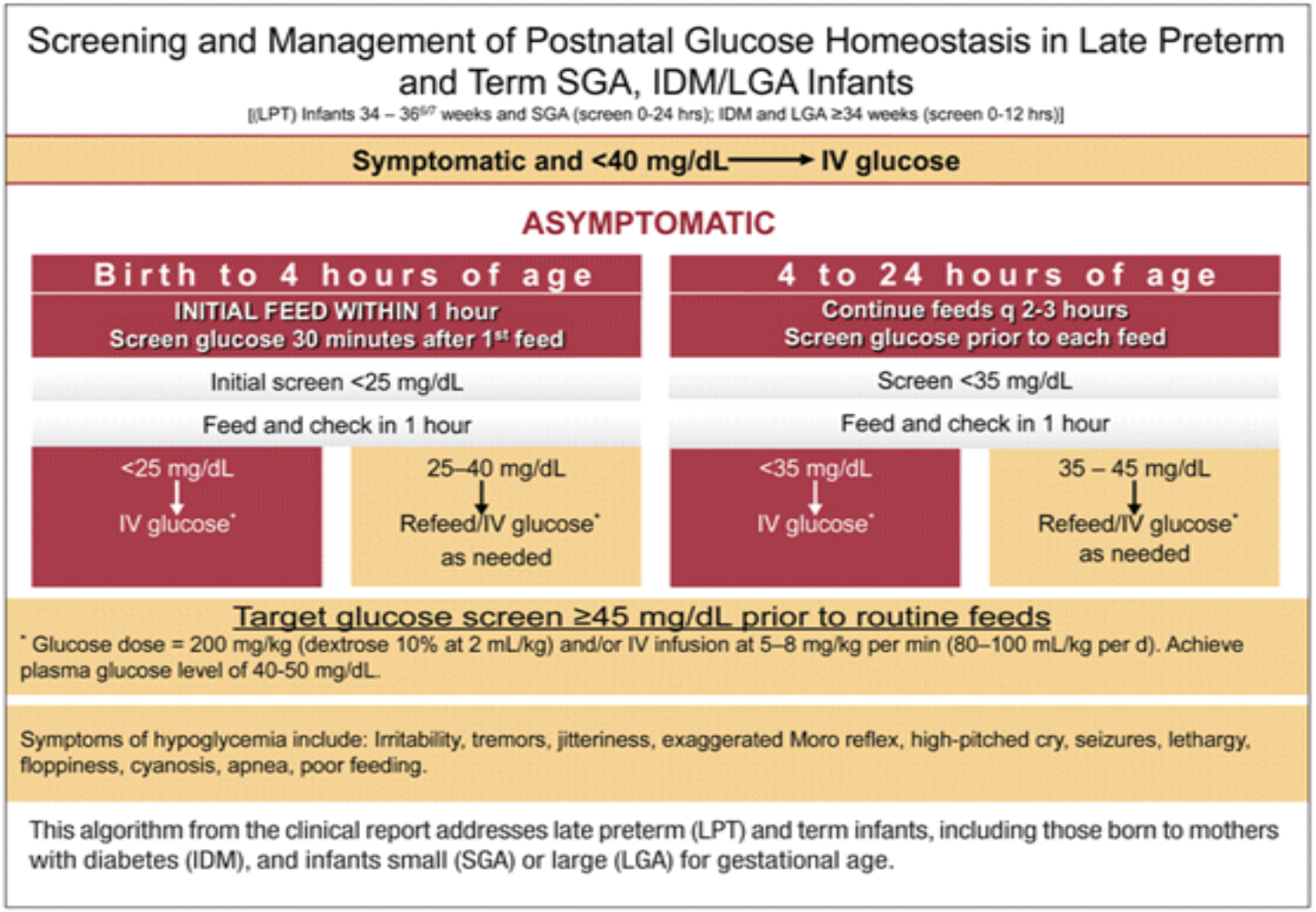
**Heater**
The device takes around half an hour to heat the warm pack to 37° C

**Baby wrap**
The warm pack is kept inside a pocket at the back of the sleeping bag. The infant is then wrapped with it

**Warm pack**
It is made of a phase-changing material that can keep the baby wrap warm for six hours

# Black Swan Option:
# Portable Inflatable Incubators

# Premature Infant Black Swan Challenge Day-to-Day and Disaster: #2 Hypoglycemia



Screening and Management of Postnatal Glucose Homeostasis in Late Preterm and Term SGA, IDM/LGA Infants

[(LPT) Infants 34 – 36$^{6/7}$ weeks and SGA (screen 0-24 hrs); IDM and LGA ≥34 weeks (screen 0-12 hrs)]

**Symptomatic and <40 mg/dL ⟶ IV glucose**

**ASYMPTOMATIC**

| Birth to 4 hours of age | | 4 to 24 hours of age | |
|---|---|---|---|
| INITIAL FEED WITHIN 1 hour<br>Screen glucose 30 minutes after 1st feed | | Continue feeds q 2-3 hours<br>Screen glucose prior to each feed | |
| Initial screen <25 mg/dL | | Screen <35 mg/dL | |
| Feed and check in 1 hour | | Feed and check in 1 hour | |
| <25 mg/dL ↓ IV glucose* | 25–40 mg/dL ↓ Refeed/IV glucose* as needed | <35 mg/dL ↓ IV glucose* | 35 – 45 mg/dL ↓ Refeed/IV glucose* as needed |

Target glucose screen ≥45 mg/dL prior to routine feeds

* Glucose dose = 200 mg/kg (dextrose 10% at 2 mL/kg) and/or IV infusion at 5–8 mg/kg per min (80–100 mL/kg per d). Achieve plasma glucose level of 40-50 mg/dL.

Symptoms of hypoglycemia include: Irritability, tremors, jitteriness, exaggerated Moro reflex, high-pitched cry, seizures, lethargy, floppiness, cyanosis, apnea, poor feeding.

This algorithm from the clinical report addresses late preterm (LPT) and term infants, including those born to mothers with diabetes (IDM), and infants small (SGA) or large (LGA) for gestational age.

- Consequences
  - Seizures
  - Permanent Brain Injury

American Academy of Pediatrics Committee on Fetus and Newborn Pediatric 2011;127: 575-579

# Growers … Formula, Breast Milk, Feeding Frequency, Suck and Swallow Intact?

# Black Swan: Austere Feeding a Spoon, a Syringe, a Med Cup at a Time …

# Pediatric Black Swan #4
# Pediatric Large Scale Patient Movement

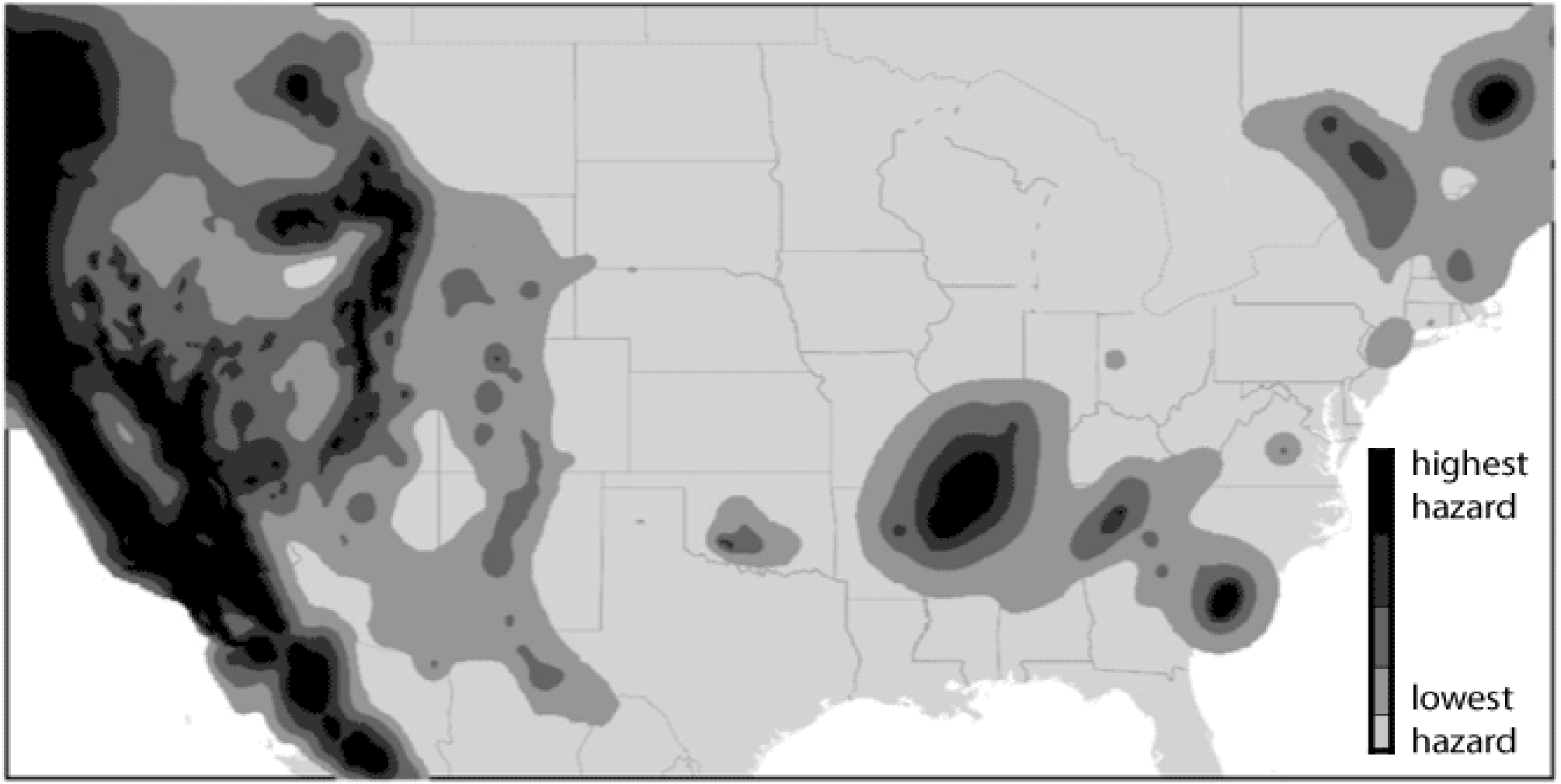
# Pediatric Disaster and Mass Casualty Medical Transportation To and From the Hospital


- 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 apply
  - Saving as many patients as possible
  - May expand but typically does not

# NHTSA Public Meeting August 2010:
## Recommendations for Safe Transport of Children

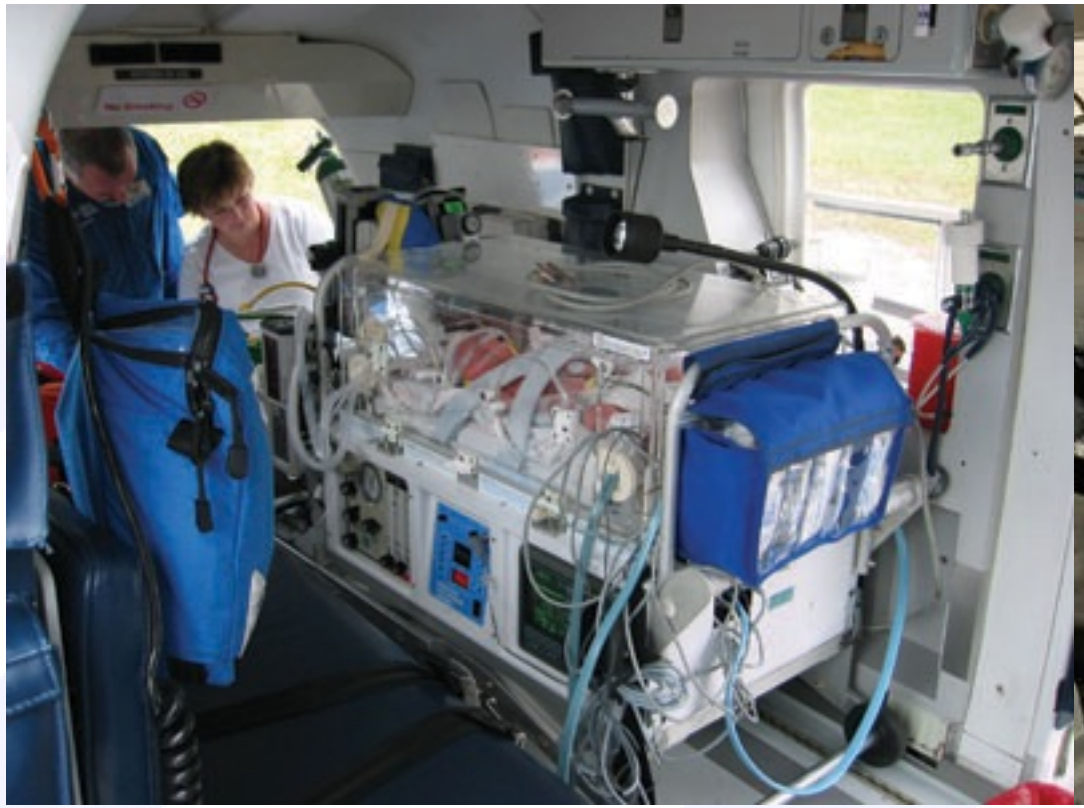
*"There are more safety standards for moving cattle than for moving (pediatric) patients"*

# Transportation Infrastructure and Earthquake Evacuation Routes and Resources



# Black Swan Real World Patient Movement Challenge

Who to move? How many? How to do it? Where to go?



# California Ambulance Industry

## Private Ambulance Providers Serve Both EMS and Hospitals

- 715 public & private ambulance services
- 170 private sector ambulance services
- 3,600 licensed ambulances
- 74% ambulances private operators
- 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

**KATRINA RECOMMENDATION**

**ESTABLISH A DATABASE OF COALITION PEDIATRIC CAPABILITIES**

**Source: California Ambulance Association Website www.the-caa.org**

# 2016 California “Private” Air Medical Assets

**Services**

- 22 in State
- 1 Out of state
- 302 in US

**Rotor**

- 71 bases
- 98 aircraft
- 879 in US

**Fixed Wing**

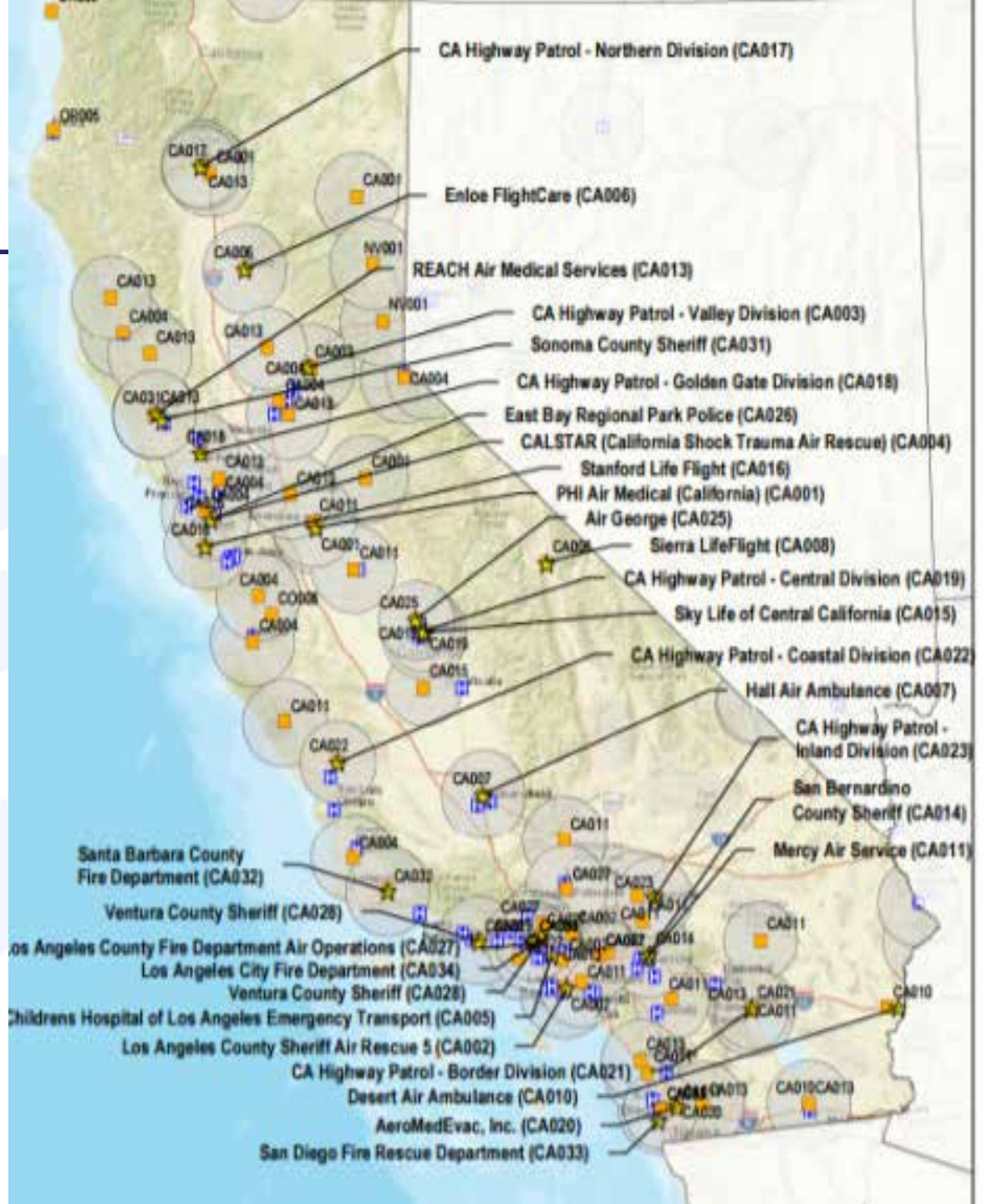
- 13 bases
- 121 aircraft
- 360 in US

AASM: Association of Air Medical Services www.airmed.org

# California's Regional Air Medical Capabilities

219 Air Assets Statewide

10 minute Fly Circle Reasonable Day-to-Day Coverage



# Ambulance Mutual Aid

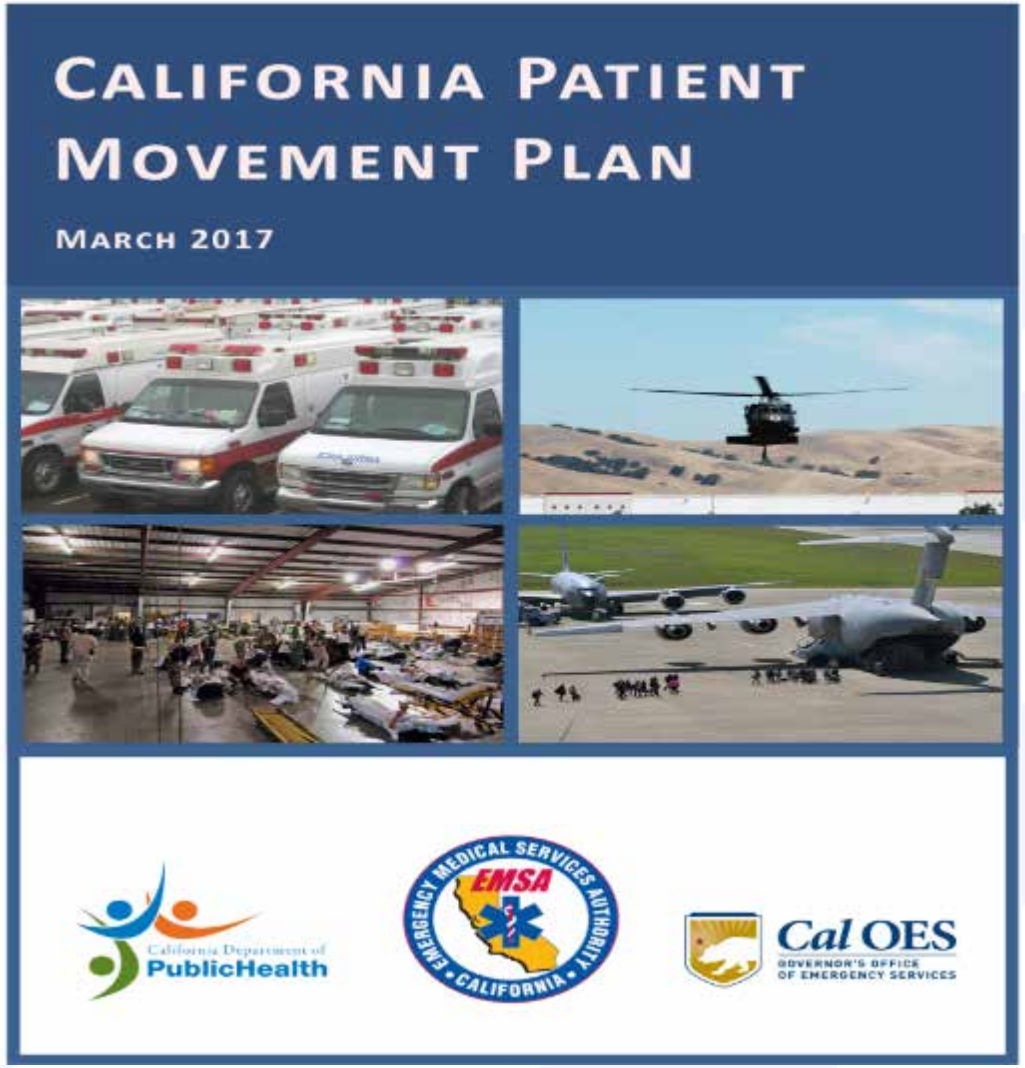
May take from 24 to 75 hours to get to you if the roads are clear.

"*Be prepared to use non-traditional transport*"

# Black Swan Immediate Need …

## The ONLY Cavalry Are the Locals YOU Exercised With

# California Patient Movement Plan




A framework for patient movement, when a disaster creates the need for patient movement ***BEYOND*** the capabilities of California's local EMS systems

# Federal Patient Movement Capabilities Extremely Limited for Pediatrics

Federal Support of Patient Movement

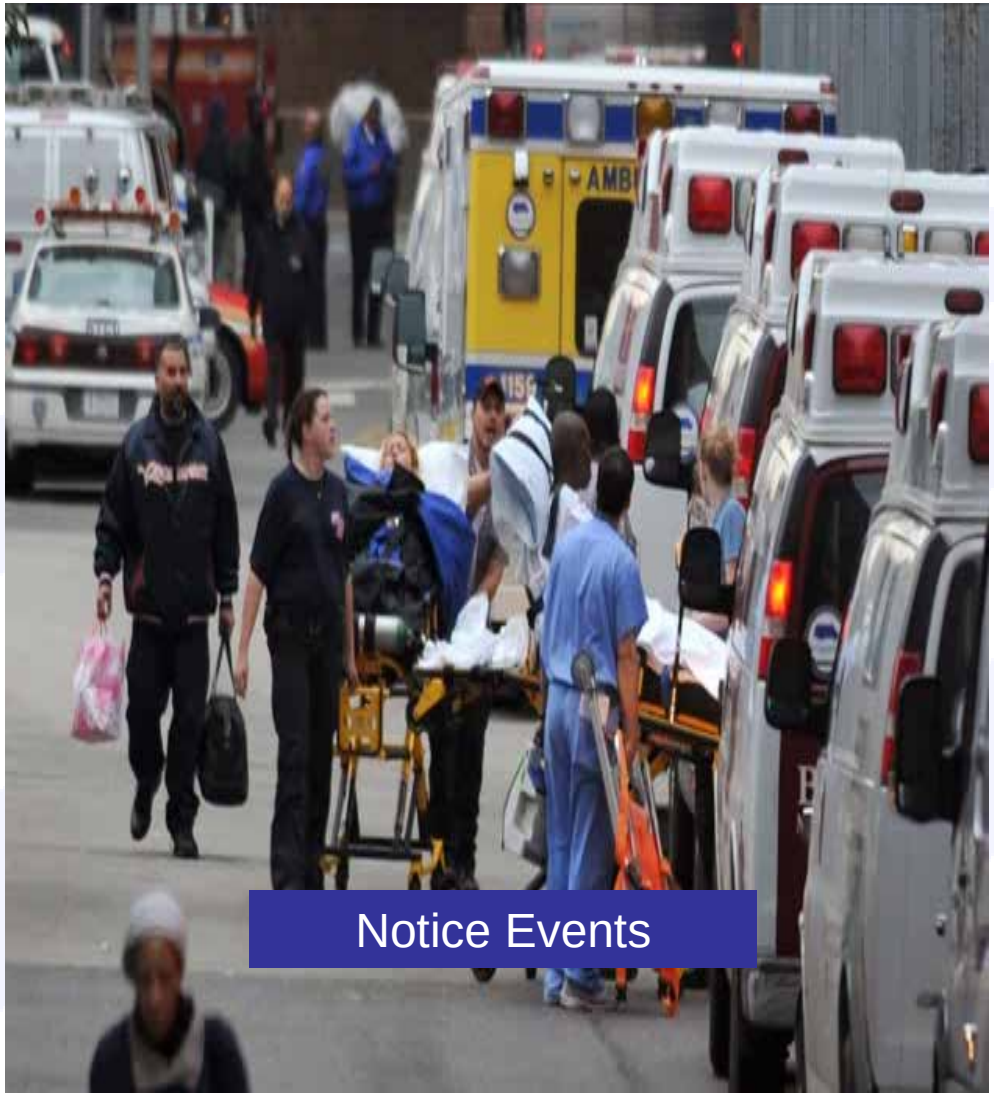
1. National EMS Contract*
2. National Disaster Medical System (NDMS)
3. Defense Support of Civil Authorities (DSCA)

* Most likely available

# Department of Defense Contraindications Air Medical Evacuation

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

# What We Know About Large Scale Pediatric Patient Movement?





# First Known Description Children's Hospital Colorado

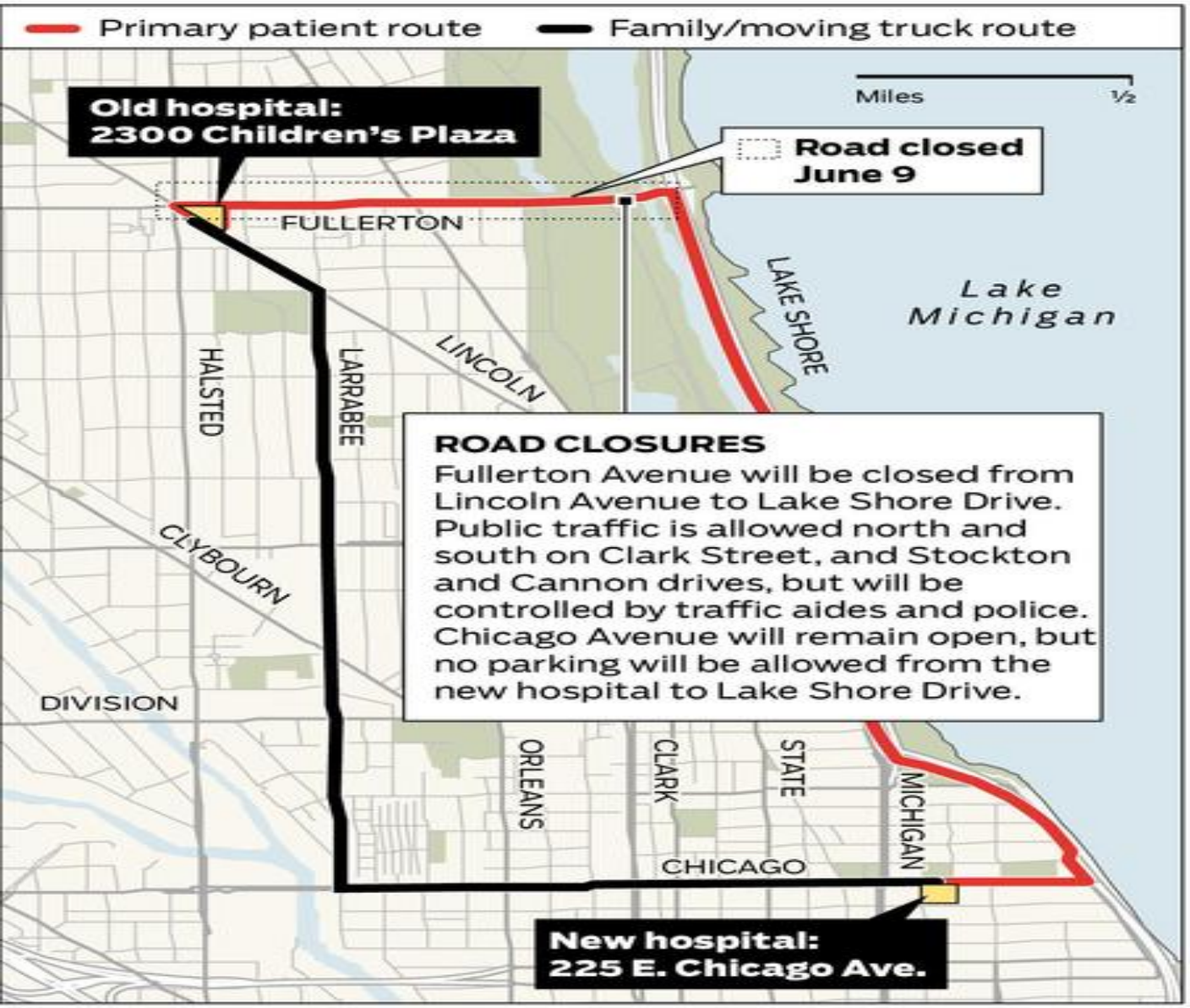
## Pediatric-Specific Patient Movement Plan (Planned Hospital Move)

- Moved **111** children **8.5** miles in **< 12 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

"Mass Transfer of Pediatric Tertiary Care Hospital Inpatients to a New Location in Under 12 hours: Lessons Learned and Implications" *Fuzak, J.K. et al., Journal of Pediatrics, July 2010*

# 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.




SOURCES: Children's Memorial Hospital, ESRI

**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.


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 48-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.

TRIBUNE

# UCSF Benioff Mission Bay
# 2014 Maternal Child Hospital Move

- Move of 131 Pediatric patients from UCSF Parnassus and UCSF Zion Campuses to new UCSF Mission Bay Campus.
- 41 Ambulances, 100 Ambulance personnel and 300 hospital staff
- Several critical ECMO patients
- Total Time - 8 ½ hours, 7.8 miles round trip 45 minutes

# Over a Year in Pre-Planning: Assets Staged Planned, Exercised and Executed

# HURRICANE KATRINA

## AUGUST 23–31 2005

Costliest hurricane in the U.S.

Nearly **106 billion** U.S. dollars.

Damage caused by Superstorm Sandy, which struck in 2012, was approximately 71 billion U.S. dollars

**62** tornadoes in 8 states spawned from the storm

maximum storm surge in Mississippi


lives lost **1,200**

Mississippi

Alabama

Aug. 29, 8:00 PM EDT
tropical storm, 60-mph winds

Louisiana

Florida

Aug. 29, 8:00 AM EDT
category 3, 125-mph winds

Aug. 28, 8:00 PM EDT
category 5, 160-mph winds

*Gulf of Mexico*

Aug. 27, 8:00 PM EDT
category 3, 115-mph winds

Aug. 25, 8:00 PM EDT
category 1, 80-mph winds

Aug. 26, 8:00 PM EDT
category 2, 105-mph winds

Aug. 24, 8:00 PM EDT
tropical storm, 50-mph winds

Aug. 24, 8:00 AM EDT
tropical storm, 40-mph winds

Aug. 23, 2:00 PM EDT
tropical depression forms

CUBA

Hurricane

Tropical storm

# Large Disaster Event: Katrina 2005

*"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 Hospital Patient Evacuation Battlefield Conditions …

| Priority | Criteria (Evac Decision Making) |
|---|---|
| 1 | Fairly good health<br>Can sit up or walk<br>NICU babies and pregnant mothers |
| 2 | Sicker<br>Need more assistance |
| 3 | Very ill<br>With DNR orders<br>Last to go… |

- Nearby violence
- No fresh water
- 200 people trapped
- Five days without power before everyone rescued
- Helipads: passing patients thru 3x3 hatch
- Hundreds sent to International Airport for evacuation staging handed off to understaffed FEMA teams

# HHC and *Hurricane Sandy* By the Numbers

**9** Hospitals in full operation through the hurricane and post hurricane period

**4** Nursing homes in full operation

**7000** Patients in HHC hospitals and nursing homes during the storm

**3** HHC mobile medical vans serving hard hit communities

**900** Patients safely evacuated

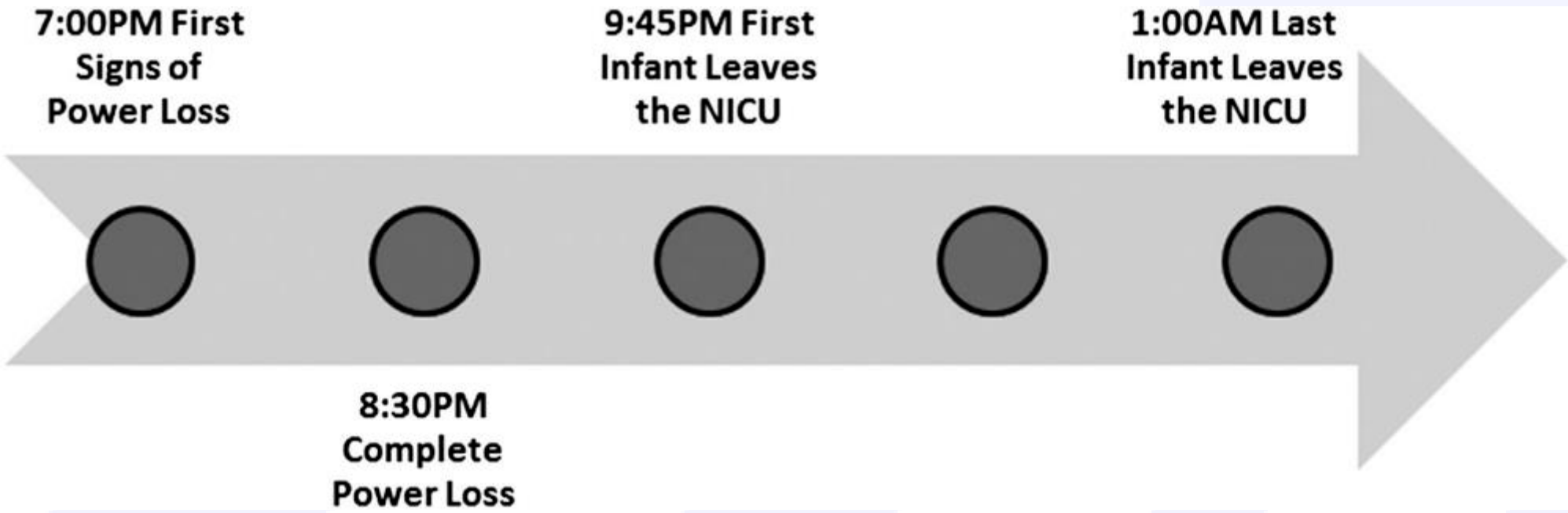
**8** Special Medical Needs Shelters staffed by HHC clinicians

**2** Data Centers where electronic medical records are backed up

**$300 Million** Emergency Repair Funds for public hospitals made available by Mayor and City Council

# Large Disaster: Hurricane Sandy 2012
# NICU Evacuation 21 neonates 4.5 hours

The timeline of the NYULMC NICU power outage and evacuation.




**Michael Espiritu et al. Pediatrics 2014;134:e1662-e1669**



PEDIATRICS®

# Black Swan and Disaster
# The Fallback Plan Movement in the Arms

- New York Superstorm Sandy: 6 staff for each infant to navigate 9 flights of stairs with cell phone lighting
- Transported 6 different facilities
- Hand Carried Bassinets
- Hospital Staff went with patient nurses/RT/MD
- Warm Chain: Infant Carrier Worn By Staff
- Receiving hospitals were all no more than 3 miles away

Sources: Dr. Romansky Unique Vulnerabilities Pediatric Resiliency Presentation May 2016
Espiritu,M, et. al. “Evacuation of a Neonatal Intensive Care Unit in Disaster: Lessons From Hurricane Sandy” Pediatrics, December 2014

# How Many People and Will They Be There?

# Black Swan Evacuation Immediate Need Plan on Moving Bins of Preemies

Photo: Newborns arriving in bassinets
Spedale, S. B. Pediatrics 2006;117:S389-S395



PEDIATRICS®

# Transporting Fragile Infants With Limited Resources in Austere Conditions

**On the way to the health facility:**

- If the baby is able to breastfeed, feed the baby at least every two hours. Give only breast milk.
- Keep the baby warm. Keeping the baby skin-to-skin is best. Ensure the baby is:
  - Naked except for a nappy, hat and socks
  - Placed between the mother's breasts with the baby's legs along her ribs and the head turned to the side
  - Secured with a cloth
- If skin-to-skin care is not possible, wrap the baby well and keep her or him close to the mother.
- Where feasible, the health worker accompanying the caregiver and baby can provide counseling on care during transport, such as thermal care and breastfeeding.

# How Can We Make A Difference?

- **Whole Community Preparedness**
  - Preserves workforce
  - Reduces risk of unintended separation
  - Protects the Med/Health System at every level
- **Integrating Children in Disaster Planning at EVERY Level**
  - Improves reunification
  - Improves recovery
  - Mitigates long term child mental and physical health consequences resiliency

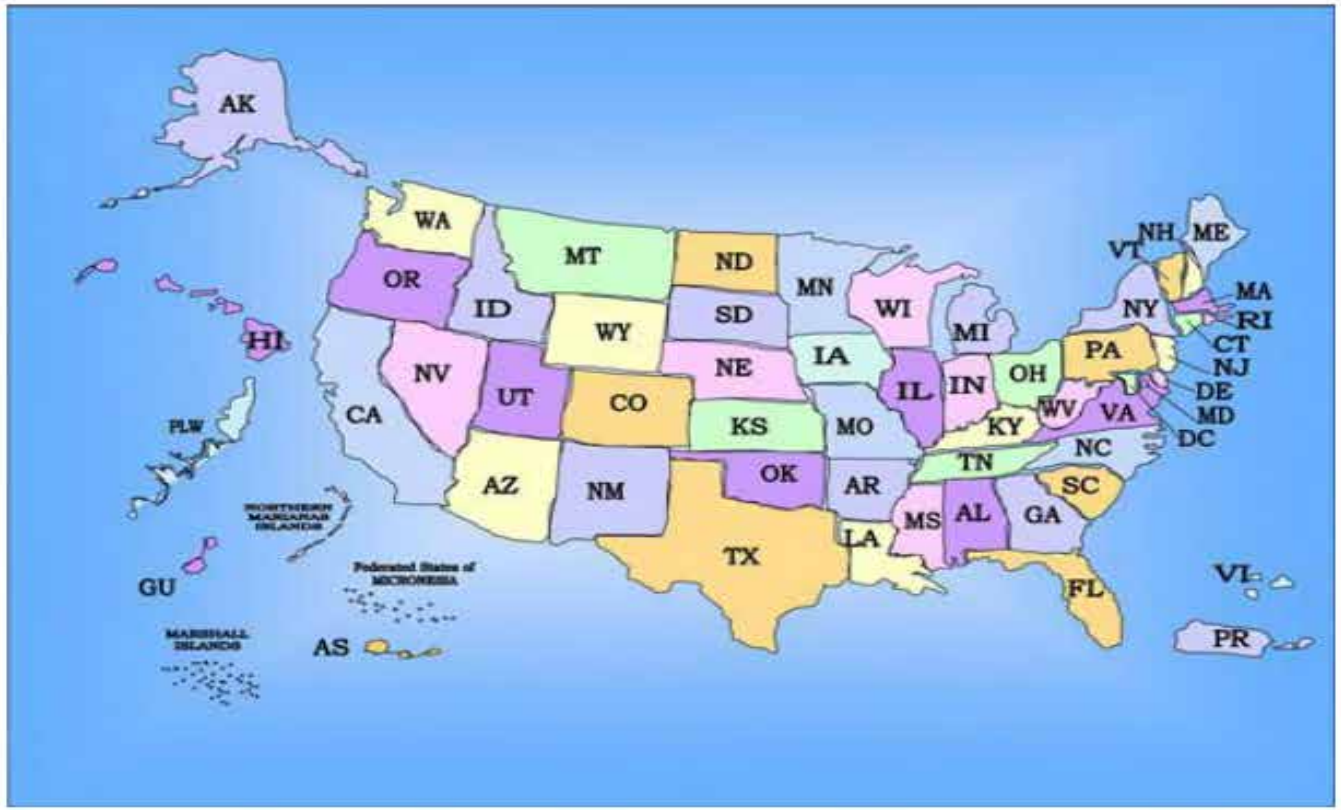
# A Personal Preparedness Plan

**Are You Prepared?**

- Family, pets
- Plan, supplies, food, H2O, medications
- Meeting place
- How long?

# “Change Begins with Champions”
## Identify Your Pediatric Med/Health Champions


# The future of Emergency Medical Services for Children





American College of Emergency Physicians
ADVANCING EMERGENCY CARE

ENA
EMERGENCY NURSES ASSOCIATION
SAFE PRACTICE, SAFE CARE

NASEMSO

Baylor College of Medicine

EMSC

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN

Texas Children's Hospital

# Priorities to Move Patients are Situational

## Assumes Transportation is at the Ready AND 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

Requires Consensus

**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

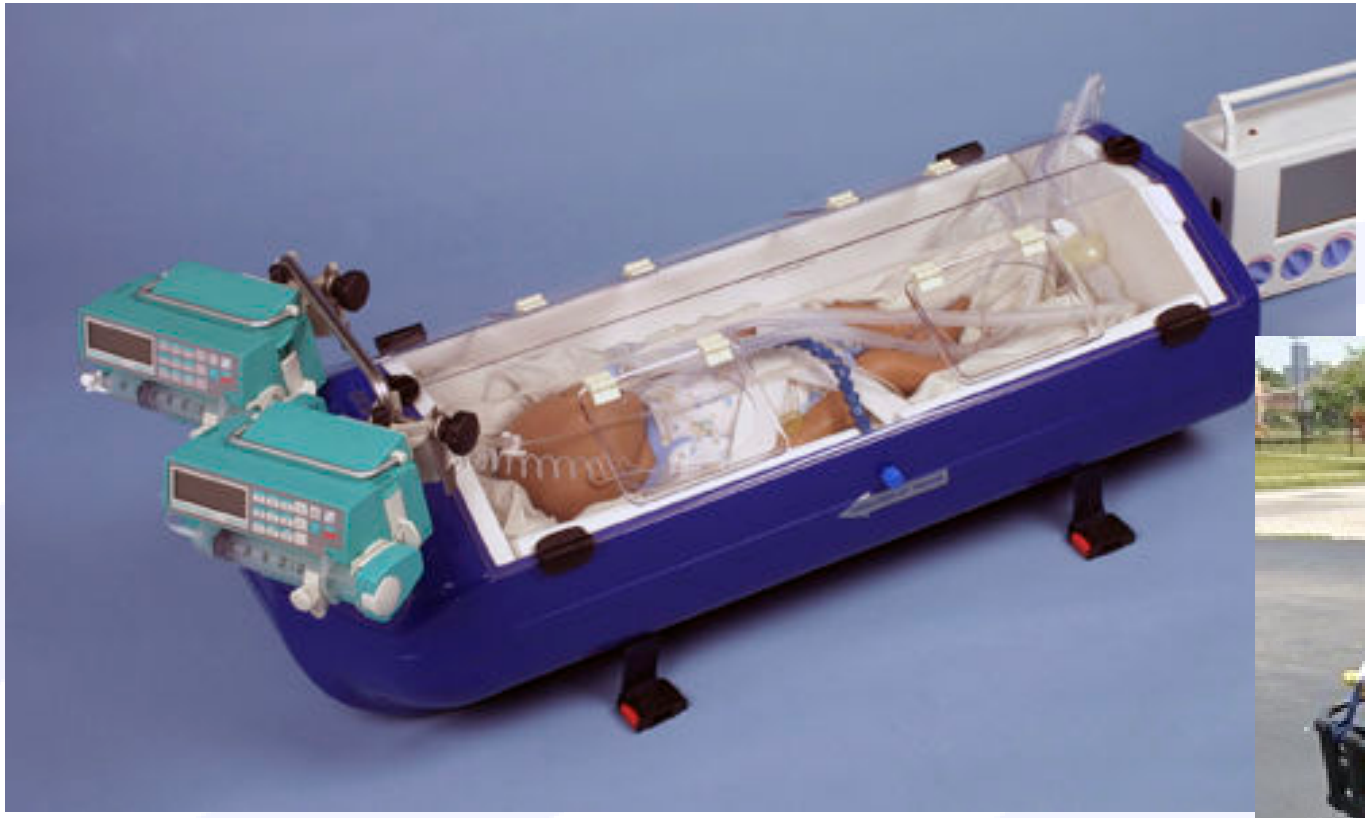
# Situations for Transporting Children in Emergency Ground Ambulance (EGA)

| Scenario | Description | Option(s) |
|---|---|---|
| 1 | For a child who is uninjured/not ill | Use vehicle other than EGA |
| 2 | For ill and /or injured child whose condition does not require continuous and/or intensive medical monitoring and/or interventions | Use BLS transport |
| 3 | For child whose condition requires continuous and/or intensive medical monitoring and/or interventions | Use ALS or CCT transport or BLS with Hospital RN |
| 4 | For a child or children who require transport as part of a multiple patient transport (newborn with mother, multiple children, family) | BLS or ALS transport per patient condition |

Adapted from NHTSA Recommendations for Ground Ambulance Safety 2010

# Consider Low Tech and No Tech Solutions Infant/Mother Transport Systems

# Dialogue with Vendors to Create Flexible Solutions



# TRAIN

## Move Patients to Resources - Move Resources to Patients Surge - Evacuation

### *Triage by Resource Allocation for IN-patients [TRAIN]©*

| Transport | Car | BLS | ALS | CCT | Specialized |
|---|---|---|---|---|---|
| Life Support | Stable | Stable | Minimal | Moderate | M…l |
| Mobility | Car/Carseat | Wheelchair or Stretcher | Wheelchair or Stretcher | Transport Rig | Immob… |
| Nutrition | All PO | Intermittent Enteral | Continuous Enteral or Partial Parenteral | TPN Dependent | TPN Depend… |
| Pharmacy | PO Meds | IV Lock | IV Fluids | IV Drip x1 | … |

| | | |
|---|---|---|
| **Life Support** | **Minimal =** | Hood or Low Flow Cannula O2, chest tube, etc. |
| | **Moderate =** | CPAP/BiPAP/Hi-Flow, Conventional Ventilator, Peritoneal Dialysis, Extern… continuous nebulizer treatments, etc. |
| | **Maximal =** | Highly specialized equipt., e.g., HFOV, ECMO, iNO, CVVH, Berlin Heart, wt ≤ 1.5 kg, etc. |
| **Mobility** | **Car/Carseat =** | Able to ride in automobile with age-appropriate restraints |
| | **Transport rig =** | Age-appropriate rig with equipment for connecting to ambulance |
| | **Immobile =** | Unsafe to move without special equipment e.g., neurosurgical/bariatric |

Adopt Innovations
Children's Stanford
NICU, Peds
PICU, Perinatal
and coming soon
Adult

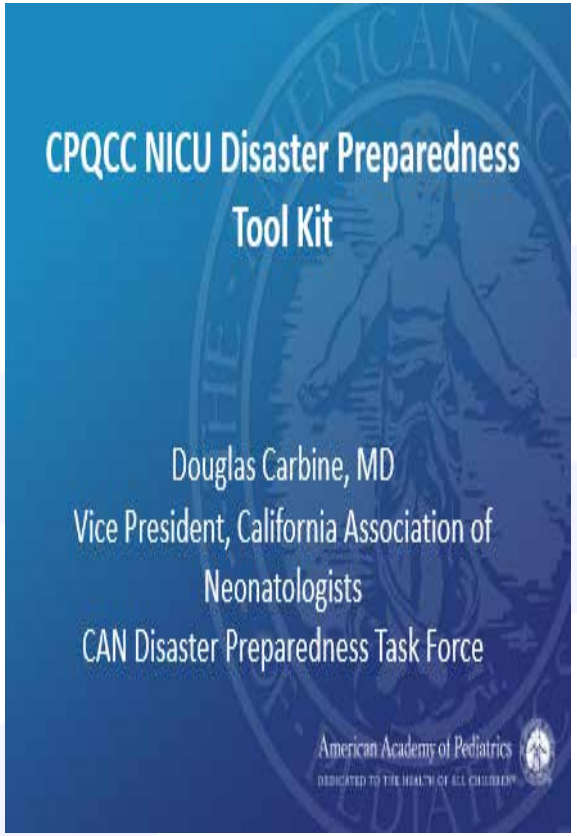
# Day-to-Day Pediatric Patient Movement
## EMS for Children (EMSC) Toolkit

- Evidence shows the **best outcomes** for critically ill children are achieved when treated at facilities **most prepared** to address their needs and are on **the same page**
- Interfacility Transfer and Regional agreements are the keys to success

Make National Guidelines Better

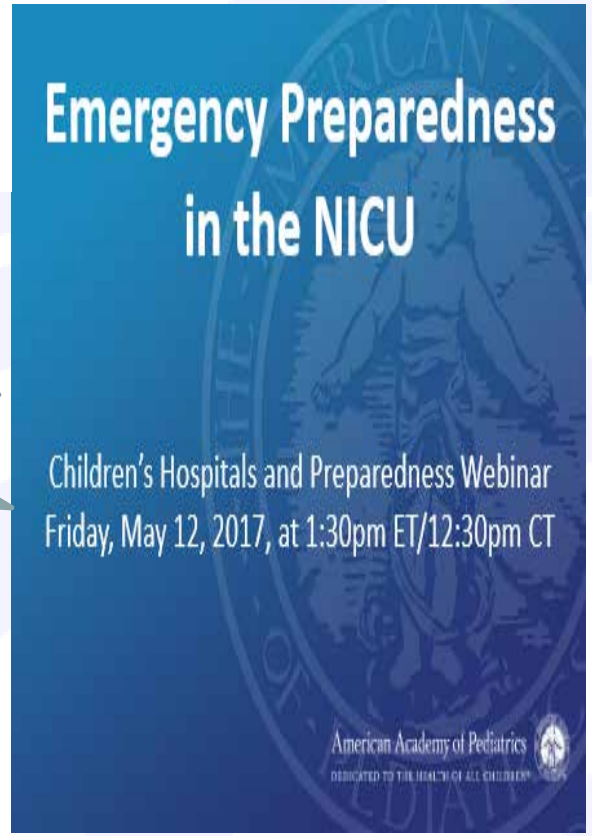

https://emscimprovement.center/resources/toolboxes/interfacility-transfer-toolbox/

California Association of Neonatologists




**Disaster Preparedness in Neonatal Intensive Care Units**
*Pediatrics*, vol 135, # 5, May 2017

Use Toolkits




http://www.chawisconsin.org/documents/EC4NICUToolkit.pdf

# Best Practice: “Bedside Go-Kits”


- Paper charting
- Medication administration record
- Blankets/formula/diapers/hat
- Bar-code stickers (patient specific)
- Patient evacuation tracking form
- Consents
- Flashlight
- Headlamp

Additional bedside supplies are added prior to evacuation

Source: National Working Model

# Best Practice “Use Designated Teams”

Source: Loma Linda Children’s Hospital

Medical Technical Specialists for Command Center Decision Support

# Best Practice Lesson Learned

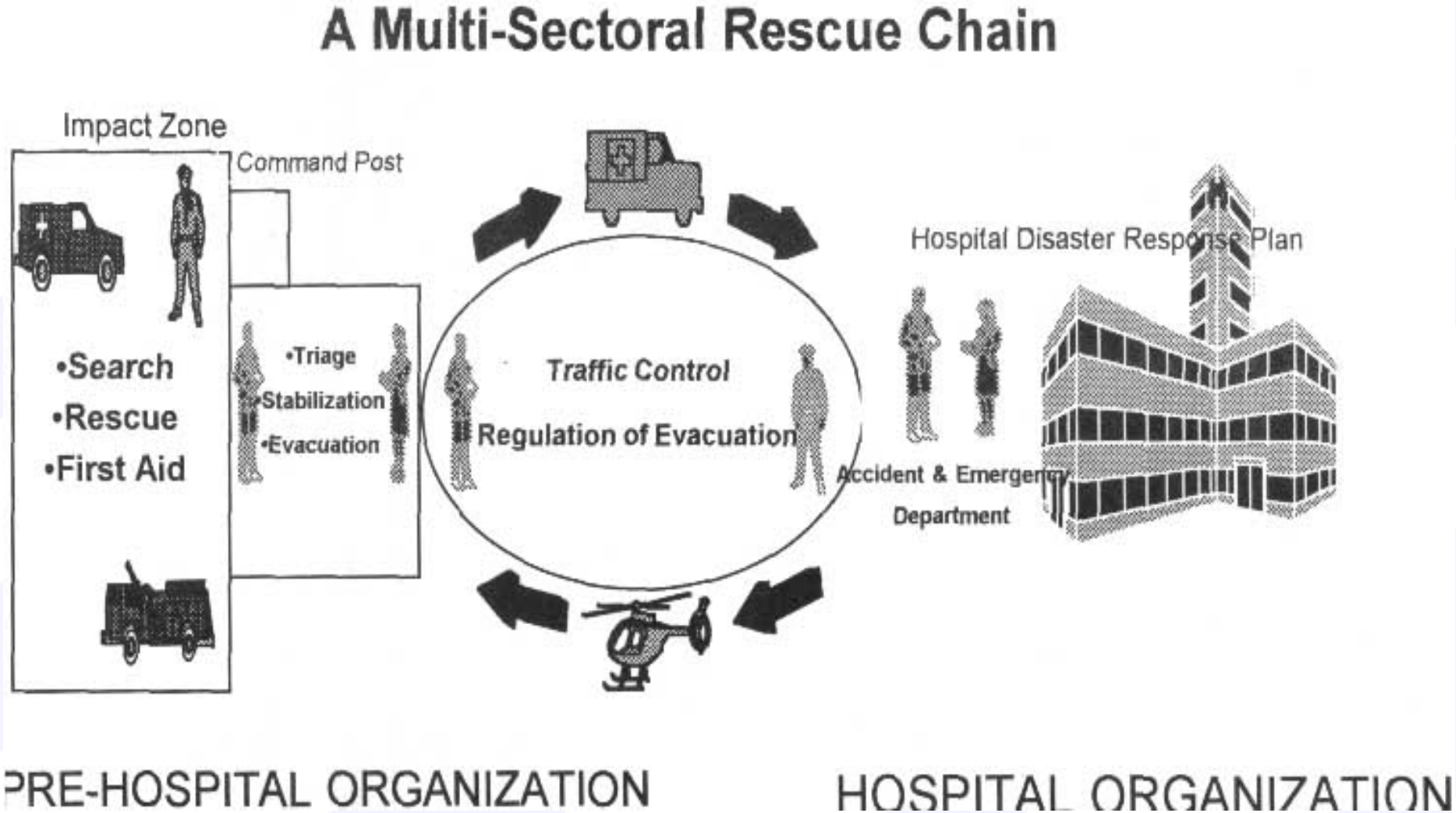
## “Evacuation Equipment Hands-On”



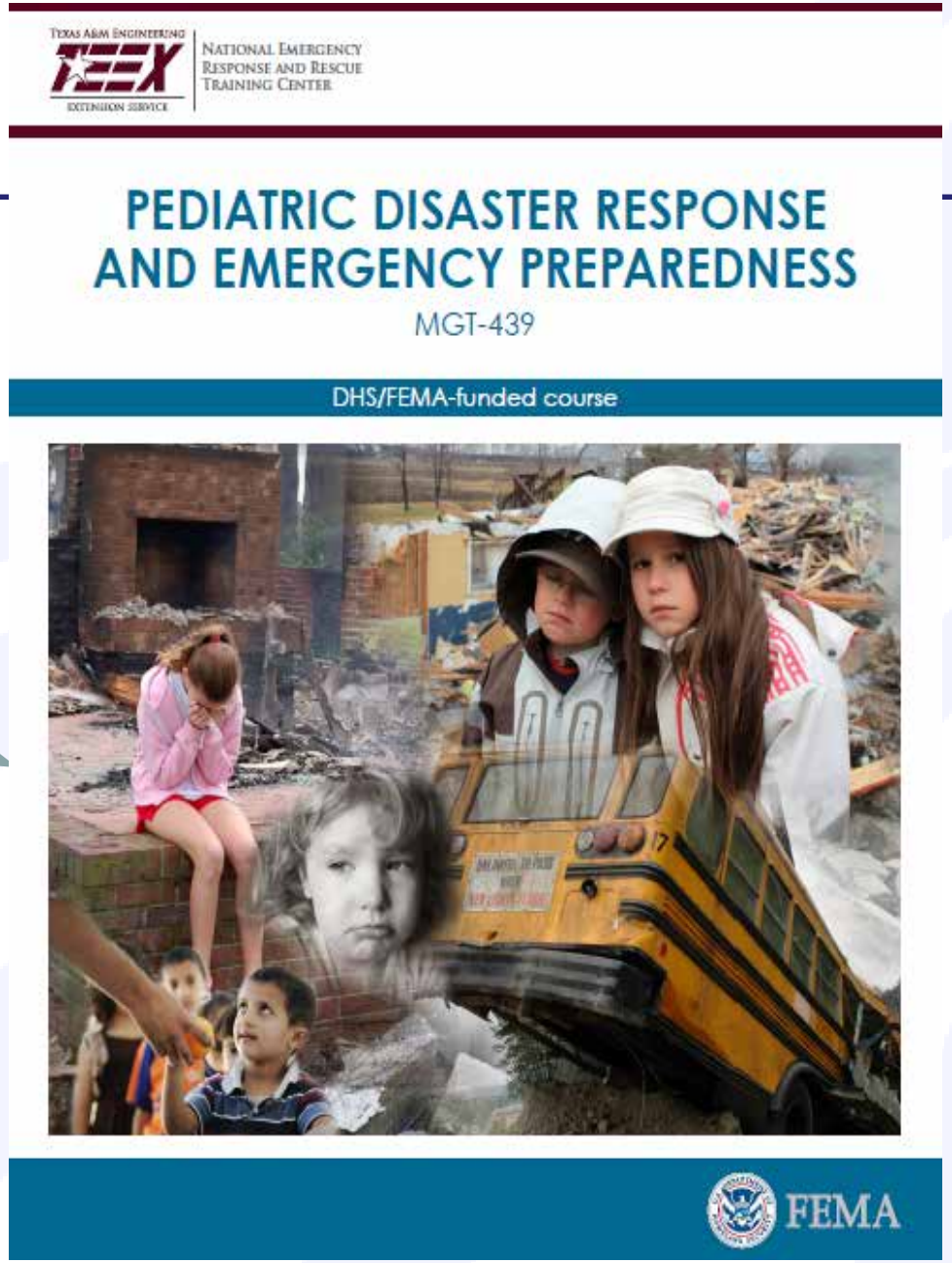

Source: Loma Linda

# More EMS Systems Pediatric Ready

## Learn How that Happens in Your Operational Area Participate in Patient Movement Exercises

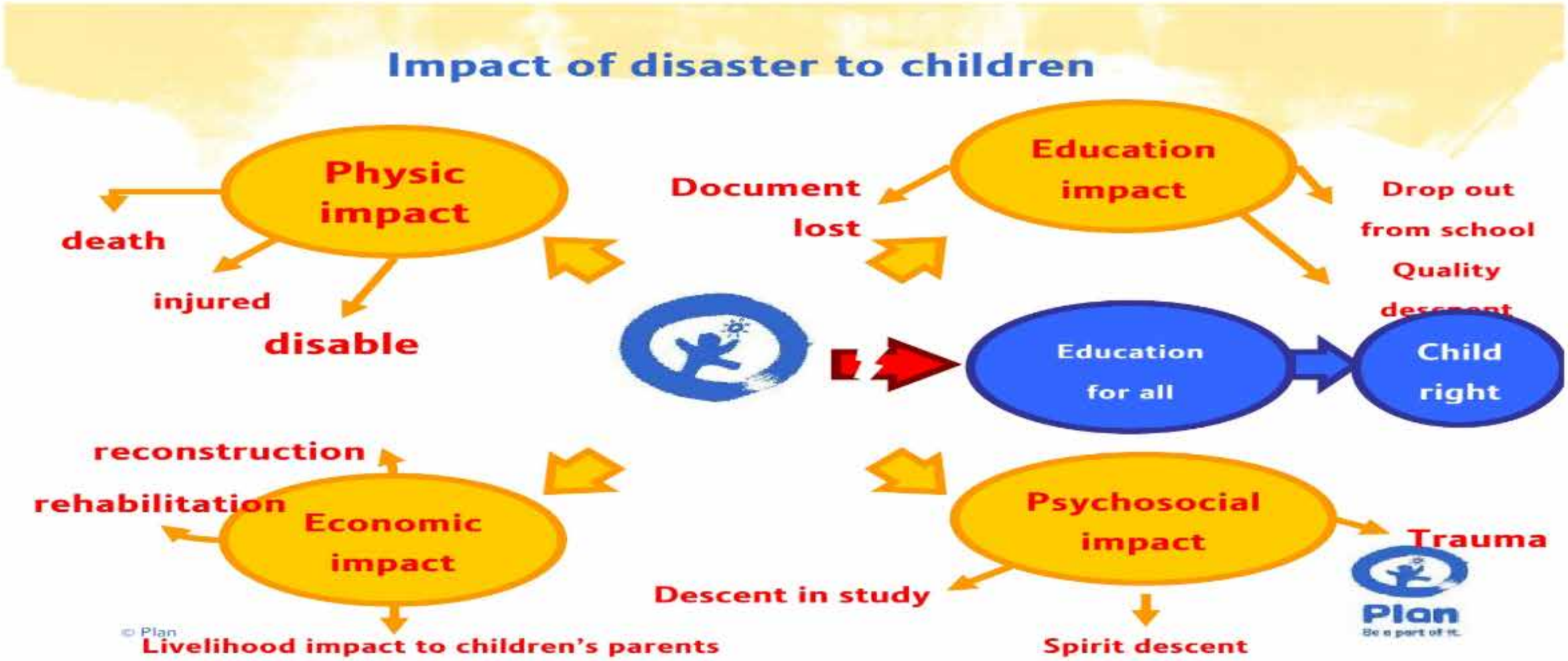


Pediatric Disaster National Curriculum



# A Pediatric Surge Plan is on the Way … CDPH State Emergency Operating Manual

# Impacts of Disaster on Children are Lifelong



# Pediatric Black Swans are Predictable So Mitigate Your Exposure …

- Avoid complacency
- Expect to handle unknown-unknowns
- Assess the likelihood of rare events
- Plan for the marathon
- Plan for austere conditions
- Prepare for Crisis Standards of Care
- Learn from Humanitarian Disaster Aid

# A MacGyver Approach to Pediatric Preparedness Is NOT Enough

# Raise the Bar for All Children in Our Community and Under Our Care

# Join Us

www.npdcoalition.org

Patricia.Frost@hsd.cccounty.us

# Questions

# Thank You

Patricia Frost, MS, RN, PNP
Director, Emergency Medical Services
Contra Costa County
Patricia.Frost@hsd.cccounty.us