Disaster Preparedness for OB Units

Where babies come from

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Stanford University
School of Medicine

Keeping mom and baby together…

• In the days after Hurricane Katrina struck Louisiana, 125 critically ill newborn babies and 154 pregnant women were evacuated to Woman’s Hospital in Baton Rouge

• It was at least 10 days before some of the infants and mothers were reunited

Washington Post 2006
If there is an OB Unit in your hospital..

The American College of Obstetricians and Gynecologists note:

“Providers of obstetric care and facilities that provide maternity services, offer services to a population that has many unique features warranting additional consideration”

Disaster Planning
Earthquakes: Where art thou?

- Alaska registers the most earthquakes in a given year
- California was second until 2014
- Oklahoma is now #2 with 585 quakes to California's 200
  - Of lower magnitude
- Earthquakes occur in other areas of the USA
  - ARIZONA (last night)
  - Missouri
  - South Carolina
  - Colorado
  - Montana
  - Virginia/Washington DC

http://earthquake.usgs.gov/
The hospital as the “patient”  
Joplin Regional Medical Center, Joplin, MO 2011

Why Moms and their Babies are at Risk in Disasters?

- >97% of all births in the US occur in a hospital or clinical setting…which may not be accessible or may be severely damaged during a disaster event

- Mom and babies are physically more vulnerable to disaster-related toxins
Why Moms and their Babies are at Risk in Disasters?

- Pregnant women are subject to the usual risks of injury at a disaster, but with more complicated care

Hospital disaster planning: OB is Unique

One size ≠ all in a disaster setting for OB

Within the same footprint of any OB unit there exists a large variety of patient acuity and needs
- Healthy postpartum patients with their newborns
- Laboring women
- Intra op and post operative patients
Why is OB unique?

We always have 2 patients

- Ante partum = mom and fetus
- Postpartum = mom and newborn

We all need a plan.....

“In preparing for battle I have always found that plans are useless, but planning is indispensable”

~ Dwight D. Eisenhower
Disaster Planning for OB:
A Triage Algorithm

**OB TRAIN*** =

*Triage by Resource Allocation for IN patient*

*Based on the triage system created by Dr. Ron Cohen for the NICU at Lucile Packard Children's Hospital*
Lessons Learned....so far

• TRAIN is practical, efficient and useful

• Supports EMS in transporting patients at appropriate levels of care

• Streamlines communication by using a simple code

• Decreases amount of time for assessing patient needs during evacuation

• Allows facilities to determine surge capacity

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OB TRAIN for AP + L&D

<table>
<thead>
<tr>
<th>Transport</th>
<th>CAR (Discharge)</th>
<th>RES</th>
<th>ALS</th>
<th>SPC</th>
<th>SHELTER IN PLACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor Status</td>
<td>None</td>
<td>Early</td>
<td>Active</td>
<td>At risk for EN route delivery</td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>Ambulatory*</td>
<td>Ambulatory or Non-ambulatory</td>
<td>Non-ambulatory</td>
<td>Non-ambulatory</td>
<td></td>
</tr>
<tr>
<td>Epidural Status</td>
<td>None</td>
<td>Placement &gt; 1 hour**</td>
<td>Placement &lt; 1 hour**</td>
<td>N/A</td>
<td></td>
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<tr>
<td>Maternal or Fetal Risk</td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Moderate/High</td>
<td>High</td>
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</tr>
</tbody>
</table>

(SPC) Specialized = must be accompanied by MD or Transport RN
* Modified Bromage Score 6 = Patient is able to perform a partial knee bend from standing
** Epidural catheter capped off

(S) Specialized = must be accompanied by MD or Transport RN
* MBS 6 = Patient is able to perform a partial knee bend from standing
** Epidural catheter capped off
Basis of Triage System for OB TRAIN

- Labor status
- Mobility
- Anesthesia status
- Maternal risk factors / fetal risk factors

OB TRAIN Triage Example

26yrs @ 40 weeks
- Early labor: 4cm
- Can ambulate
- No epidural
- Cat 1 FHR
- No significant maternal or fetal risk factors
OB TRAIN Triage Example #2

32 yrs @ 31 weeks with severe preeclampsia undergoing induction of labor

- Early labor: 2 cm
- Nonambulatory
- Epidural in place < 1 hr
- Cat 1 FHR
- Intermittent IV labetalol for BP control
- On 2 g IV magnesium sulfate
Levels of Maternity Care
ACOG Consensus Feb 2015

SENDING THE RIGHT PATIENT TO THE RIGHT HOSPITAL

1. Levels
   • Birthing Centers
   • Basic Care (Level I)
   • Specialty Care (Level II)
   • Subspecialty Care (Level III)
   • Regional Perinatal Health Care Centers (Level IV)

2. Capabilities

3. Types of providers
<table>
<thead>
<tr>
<th>Distance (mi)</th>
<th>Hospital</th>
<th>City</th>
<th>Neonatal</th>
<th>Maternal</th>
<th>Hospital Phone</th>
<th>L&amp;D Phone Number</th>
<th>L&amp;D Phone Number</th>
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<td>0.0</td>
<td>LPCH</td>
<td>Palo Alto</td>
<td>3</td>
<td>3</td>
<td>(650) 497-8000</td>
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<tr>
<td>18.4</td>
<td>Santa Clara Valley Medical Center</td>
<td>San Jose</td>
<td>3</td>
<td>3</td>
<td>(408) 885-5000</td>
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<tr>
<td>34.6</td>
<td>UCSF</td>
<td>SF</td>
<td>3</td>
<td>3</td>
<td>(415) 476-9000</td>
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<tr>
<td>36.0</td>
<td>CPMC</td>
<td>SF</td>
<td>3</td>
<td>3</td>
<td>(415) 600-6000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.4</td>
<td>Kaiser Oakland</td>
<td>Oakland</td>
<td>3</td>
<td>3</td>
<td>(510) 752-1000</td>
<td></td>
<td></td>
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<tr>
<td>45.5</td>
<td>Kaiser San Francisco</td>
<td>San Francisco</td>
<td>2</td>
<td>2</td>
<td>(415) 833-6353</td>
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<tr>
<td>78.5</td>
<td>John Muir</td>
<td>Walnut Creek</td>
<td>3</td>
<td>3</td>
<td>(925) 939-3000</td>
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<tr>
<td>81.2</td>
<td>El Camino</td>
<td>Mountain View</td>
<td>2</td>
<td>2</td>
<td>(650) 940-7000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.9</td>
<td>Alta Bates</td>
<td>Berkeley</td>
<td>2</td>
<td>2</td>
<td>(510) 204-4444</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.5</td>
<td>Dominican</td>
<td>Santa Cruz</td>
<td>3</td>
<td>3</td>
<td>(831) 462-7700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.9</td>
<td>Natividad Medical Center</td>
<td>Salinas</td>
<td>2</td>
<td>2</td>
<td>(831) 647-7611</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.7</td>
<td>Sierra Vista Regional Medical Center</td>
<td>San Luis Obispo</td>
<td>2</td>
<td>2</td>
<td>(805) 546-7600</td>
<td></td>
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</tr>
<tr>
<td>22.7</td>
<td>Sequoia</td>
<td>Redwood City</td>
<td>2</td>
<td>2</td>
<td>(650) 369-5811</td>
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</tr>
<tr>
<td>22.9</td>
<td>O'Connor</td>
<td>San Jose</td>
<td>2</td>
<td>2</td>
<td>(408) 947-2500</td>
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<td></td>
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<tr>
<td>22.9</td>
<td>Regional Medical Center</td>
<td>San Jose</td>
<td>2</td>
<td>2</td>
<td>(408) 259-5000</td>
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</tbody>
</table>

SHELTER IN PLACE
Being prepared to evacuate L&D

There’s gonna be one NOW! No,... Now! Okay, maybe... Now! Alright, it’s gonna be... Now! Okayy... Now!

Another long day down at the Bureau of Earthquake Prediction

WE’VE GOT TO GO!!
L&D Disaster Plan: Evacuation

New Orleans Airport Triage Area
COMMUNICATION: Peds ↔ OB

How will peds know where OB is evacuating to?
  • Is there a system in place for notification?

Who from peds has been designated to go with OB?
  • To care for ‘shelter in place’ in deliveries

Pediatric planning to assist OB units

Who is bringing neonatal equipment?
What is in your grab and go bag?
  • Bulb syringe
  • Self inflating bag
  • Hard surface
  • O₂ and air tanks if possible
  • Intubation equipment
  • Other?
**POSTPARTUM EVACUATION**

**OB TRAIN for Post Partum**

<table>
<thead>
<tr>
<th>Transport (Discharge)</th>
<th>BLS</th>
<th>ALS</th>
<th>SPC</th>
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</thead>
<tbody>
<tr>
<td>Delivery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VD &gt; 6 hours or CD &gt; 48 hours</td>
<td>VD &lt; 6 hours or CD &lt; 48 hours</td>
<td>Complicated VD or CD</td>
<td>Medically complicated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mobility</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambulatory*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambulatory or Non-ambulatory</td>
<td>Ambulatory or Non-ambulatory</td>
<td>Non-ambulatory</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post Op</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 2 hours from non-CD surgery**</td>
<td>&lt; 2 hours from CD</td>
<td>&lt; 2 hours from non-CD surgery</td>
<td>&lt; 2 hours from CD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maternal Risk</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low/Moderate</td>
<td>Moderate/High</td>
<td>High</td>
</tr>
</tbody>
</table>

*Modified Bromage Score: Patient is able to perform a parallel knee bend from standing!

**If adult supervision is available for 24 hours!
Basis of Triage System for OB TRAIN
Post partum

• Delivery
  - NSVD versus Cesarean delivery
  - Time from delivery

• Mobility

• Anesthesia status

• Maternal risk factors

We’ve got to go!!

Evacuation: One pediatrician in the house, X # of babies
How to use obstetricians to discharge ‘Well Babies’?

Give them a Checklist:

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baby &gt; 24 hrs old?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is Mom going home?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby ≥ 38 weeks gestation?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has the baby had a normal MD exam?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the baby feeding well without any issues?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has the baby lost &lt; 10% of its birth weight?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the baby have normal vital signs?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR = 100-160 bpm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR = 30-60 /min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temp = 36.5-37.5°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the bilirubin level:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 6.0 at 24 hrs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>or &lt; 9.0 at 36 hrs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>or &lt; 11.0 at 72+ hrs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have ALL (3) the following screening tests been done?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiac Screening (O2 sat)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hearing (ALGO)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newborn Screen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If indicated, baby has blood glucose ≥ 45 x3?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car seat available?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Coordination of OB and Pediatrics

Ideas to insure that mom and baby are not separated

- On baby’s transfer forms - mom’s information
- On mom’s transfer form – baby’s info
  - Newborn screening # or other unique identifier
- Record where both baby and mom are being transferred to in multiple sites
- Arm bands with matching information
Mom’s transfer forms with baby info

Both OB and nursery units should maintain records of transfer sites for both mom and baby.
Food for thought

- Determine how to assure mom is able to continue to breast feed during a disaster
- How to monitor that babies are being adequately hydrated and fed during a disaster

Are there long term effects on the fetus after a disaster?

World Trade Center 2001 –
- Women who were pregnant on 11 September 2001 and were living within a 2-mile radius of the WTC showed significant decrements in term birth weight (−149 g) and birth length (−0.82 cm), compared with infants born to the other pregnant women
WTC 2001

- Women in the first trimester of pregnancy at the time of the WTC event delivered infants with significantly shorter gestation (~3.6 days) and a smaller head circumference (~0.48 cm), compared with women at later stages of pregnancy.

- The WTC cohort had a 2-fold increased risk of IUGR compared with the nonexposed cohort.

Are there long term effects on the fetus after a disaster?

Northridge earthquake 1994
- Early gestation at time of quake found to have shorter gestational length.

Israel study
- Excess incidence of schizophrenia in offspring born to mothers who experienced stress in early pregnancy.

Meta analysis
- Associations were not consistently found even when using the same measures such as PTB or LBW.
Next steps: Collaborative network on a regional, statewide and national level

Lessons from Katrina

- Communications essential but are always a challenge
  - Phone lines may be down
  - Internet may be off

- All disaster response is local for the first 48–96 hours

- The ability to mobilize resources depends on a pre-existing local collaborative network

In summary: To accomplish a comprehensive obstetric disaster plan there needs to be:

1. Adoption of an obstetric-specific triage system like OB TRAIN to allow a universal language for evacuation and surge processes
2. A system in place to transfer OB patients to the appropriate hospital (the right patient to the right hospital)

In summary

3. An comprehensive *shelter in place* plan for laboring patients that includes:
   - Grab and go bags/equipment
   - Communication with peds

4. Postpartum plan that takes into consideration transport of mom and baby
   - Avoid maternal-neonatal separation when possible
   - Accurately track location if separated

5. Create a regional and ultimately national collaborative network of maternity hospitals
Online access to disaster tools

Stanford Disaster OB Planning “Tool kit”
http://obgyn.stanford.edu/community/disaster-planning.html

NICU TRAIN

Kay Daniels
k.daniels@stanford.edu

THANK YOU FOR YOUR ATTENTION

Stanford University - Main Quad
References


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6. ACOG Consensus : Levels of Maternal Care Obstet Gyecol Feb 2015:125 No 2


8. Lederman et al. The Effects of the World Trade Center Event on Birth Outcomes among Term Deliveries at Three Lower Manhattan Hospitals. Environ Health Perspect 2004 Dec;112(17)


11. Berkowitz et al. The World Trade Center Disaster and Intrauterine Growth Restriction Research letters JAMA, August 6, 2003 Vol 290, No. 5