UCSF Obstetric and Neonatal Simulation Training

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17 of 22 Perinatal Outreach Hospitals

Community Hospital of Monterey Peninsula
Dameron Hospital - Stockton
Mad River Community Hospital – Arcata
Marin General Hospital
Mendocino Coast District Hospital
Natividad Medical Center – Salinas
Petaluma Valley Hospital
Queen of the Valley Medical Center - Napa
Redwood Memorial Hospital – Fortuna
San Francisco General Hospital
San Joaquin General Hospital
Santa Rosa Memorial
Sonoma Valley Health Care District Hospital
St. Joseph Hospital of Eureka
St. Helena, Clearlake Hospital
Ukiah Valley Medical Center
ValleyCare Health System – Pleasanton
Washington Hospital Hospital - Fremont
Simulation Scenarios

- Customized scenarios that have been developed based on your learning needs
- Each simulation class has had measurable objectives tailored to your needs

**MATERNAL**
- Shoulder Dystocia
- Postpartum Hemorrhage
- Antepartum Hemorrhage
- Emergency Cesarean Section
  - Uterine Rupture
  - Prolapse Umbilical Cord
  - Fetal Bradycardia
- Precipitous Preterm Birth
- Eclampsia /MgSO₄ Toxicity
- Maternal Code Blue

**NEONATAL**
- Neonatal Depression
- Meconium Aspiration
- Hypovolemic Shock
- Tension Pneumothorax
- Preterm Infant Stabilization
- Ductal Dependent CHD
Collaborative Scenario Development

- Determine the metrics
  - What is going to be measured?
  - How will the metrics be incorporated into the drill?
  - short in duration (~8 minutes)
- Current policy and procedure of your department
- Current process – unit, department, hospital
- Review of literature
  - Evidence based, ACOG/AAP/AWHONN
- Write the scenario – realistic / suspend disbelief
  - List props, equipment, actors needed
- Keep all participant in their skill set
The Crown Jewel: The Debrief

• Confidential – safe forum for disclosure
• Provides a clear representation of the scenario
• Encouraged the participants to take the situation seriously
• Allowed the staff the rare opportunity to see how they practice with each other
• Reveals team performance behaviors
• Has uncovered system issues – findings/notes
• Promotes an improved work environment
So Why Simulation?

Common Obstetric High Risk Situations
- Abnormal fetal heart rate tracings
- Oxytocin, misoprostol, MgSO4 use
- Operative Vaginal Delivery
- VBAC
- Shoulder Dystocia

Common Neonatal High Risk Situations
- Perinatal Depression
- Preterm Delivery
- Congenital Anomalies
How have we done in Obstetrics over the last 2 decades?

- Erb’s palsy rate — No change
- Postpartum Hemorrhage rate — Increased *
- Peripartum Hysterectomy — Increased *
- Preeclampsia rate — Increased *
- Maternal Death — Increased

Many poor outcomes are not preventable, but some are.... notably, death from bleeding and preeclampsia

* Results were reported as mixed
What about neonatal outcomes?

**BIRTH PREVALENCE OF CHILDREN WITH SPASTIC CEREBRAL PALSY, 1985–2002**

What’s the Problem
Do we provide safe care?

- 98,000 deaths/year
- Historical focus individual blame
- Hospitals seen as large complex systems
- Focus shifted to systems and prevention
Preventable Medical Errors ranked above Diabetes, Alzheimer’s, and Influenza

<table>
<thead>
<tr>
<th>Leading Cause of Death in United States</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Disease</td>
<td>652,091</td>
</tr>
<tr>
<td>Cancer</td>
<td>559,312</td>
</tr>
<tr>
<td>Stroke</td>
<td>143,579</td>
</tr>
<tr>
<td>Chronic Lower Respiratory Disease</td>
<td>130,933</td>
</tr>
<tr>
<td>Accidents (unintentional injuries)</td>
<td>117,809</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preventable Medical Errors</th>
<th>98,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>75,119</td>
</tr>
<tr>
<td>Alzheimer’s Disease</td>
<td>71,599</td>
</tr>
<tr>
<td>Influenza/Pneumonia</td>
<td>63,001</td>
</tr>
<tr>
<td>Nephritis/Nephrosis</td>
<td>43,901</td>
</tr>
<tr>
<td>Septicemia</td>
<td>34,136</td>
</tr>
</tbody>
</table>
Fig 1 Most common causes of death in the United States, 2013.


- Cancer: 585k
- Heart disease: 611k
- COPD: 149k
- Suicide: 41k
- Firearms: 34k
- Motor vehicles: 34k

All causes: 2,597k

Based on our estimate, medical error is the 3rd most common cause of death in the US.

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Data source: http://www.cdc.gov/nchs/data/nvss/nvss64/nvss64_02.pdf

However, we’re not even counting this - medical error is not recorded on US death certificates.
Even the best....
Can make a mistake

Outcomes of medical errors

- Unnecessary blood transfusions
- Unnecessary cesarean birth
- Prolonged hospitalization
- Intrapartum fetal death
- Neonatal death
- Maternal death

High Alert Medications

- Oxytocin
- Magnesium
- Epidural infusion
- Opioids
- Heparin
- Insulin

• Well-rested/fed
• Highly confident
• Highly motivated
YOUR PRACTICE DOMAIN

- Stress
- Fatigue
- High stakes
- Time pressure
- Task saturation
- Auditory overload
- Two patients
- Language barrier
- High expectations
- Limited resources
- Multiple care teams
- Frantic spouse/family
How Errors Occur

Failures

Culture

Policies

Resources

Training

Communication

Defenses

Safeguards

Stop the line

Standard work

Flexible staffing

Self-checks

Harm

UCSF Medical Center

UCSF Benioff Children's Hospitals
Just a routine operation....
Maternal Mortality Rate, California and United States; 1999-2013

### CA-PAMR: Chance to Alter Outcome

<table>
<thead>
<tr>
<th>Grouped Cause of Death</th>
<th>Chance to Alter Outcome</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strong / Good (%)</td>
<td>Some (%)</td>
<td>None (%)</td>
<td>Total N (%)</td>
<td></td>
</tr>
<tr>
<td>Obstetric hemorrhage</td>
<td>69</td>
<td>25</td>
<td>6</td>
<td>16 (11)</td>
<td></td>
</tr>
<tr>
<td>Deep vein thrombosis/pulmonary embolism</td>
<td>53</td>
<td>40</td>
<td>7</td>
<td>15 (10)</td>
<td></td>
</tr>
<tr>
<td>Sepsis/infection</td>
<td>50</td>
<td>40</td>
<td>10</td>
<td>10 (7)</td>
<td></td>
</tr>
<tr>
<td><strong>Preeclampsia/eclampsia</strong></td>
<td><strong>50</strong></td>
<td><strong>50</strong></td>
<td><strong>0</strong></td>
<td><strong>25 (17)</strong></td>
<td></td>
</tr>
<tr>
<td>Cardiomyopathy and other cardiovascular causes</td>
<td>25</td>
<td>61</td>
<td>14</td>
<td>28 (19)</td>
<td></td>
</tr>
<tr>
<td>Cerebral vascular accident</td>
<td>22</td>
<td>0</td>
<td>78</td>
<td>9 (6)</td>
<td></td>
</tr>
<tr>
<td>Amniotic fluid embolism</td>
<td>0</td>
<td>87</td>
<td>13</td>
<td>15 (10)</td>
<td></td>
</tr>
<tr>
<td>All other causes of death</td>
<td>46</td>
<td>46</td>
<td>8</td>
<td>26 (18)</td>
<td></td>
</tr>
<tr>
<td><strong>Total (%)</strong></td>
<td><strong>40</strong></td>
<td><strong>48</strong></td>
<td><strong>12</strong></td>
<td><strong>145</strong></td>
<td></td>
</tr>
</tbody>
</table>
Labor & Delivery: A Unique Domain

ED + OR + ICU + NICU = L&D

- High stakes
- High payouts
Sentinel Event Analysis

Root Causes

- Communication (72%)
- Staff competency (47%)
- Orientation and training (40%)
- Inadequate fetal monitoring (34%)
- Unavailable monitoring equipment/drugs (30%)
- Credentialing/Privileging/Supervising MD CNM (30%)
- Staffing issues (25%)
- Physician unavailable or delayed (19%)
- Unavailable prenatal information (11%)
1. Conduct team training in perinatal areas to teach staff to work together and communicate more effectively.

2. For high risk events, such as emergency cesarean delivery, conduct clinical drills and debriefings to evaluate team performance and identify areas for improvement.
1. Develop written criteria describing MEWS
2. Identify specific triggers for responding to subtle vital sign changes and maternal condition....
3. Requirement to promptly seek assistance be in place
4. Use drills to train staff
Traditional Learning
Suspend disbelief:
simulation artifact

Practice crisis
skills not often
used
No potential harm; not random

Errors can be allowed to occur
Ability to Debrief

• Rarely a record of events & actions
• Rarely any systematic debriefing afterwards
• So...how does the team learn for next time?
Why Do We Videotape the Scenarios?

- Excellent debriefing tool
- Shows exactly what went on in the scenario
- Most learners agree that it is a valuable tool
- Allows learners to comment and discuss key events/actions during the scenario
“Finding good players is easy. Getting them to play as a team is another story”

Casey Stengel
Promote High Reliability

- **Lucky verses Good**
- By conducting a drill you can actually test your department’s capability to handle a rare obstetrical or neonatal emergency
- Measure outcomes in minutes
  - PRBC’s transfusing after requested
  - Time of birth after prolapse cord
  - Magnesium Sulfate bolus infusing
“Circumstance determined that it was this experienced crew that was scheduled to fly that particular flight on that particular day, but I know I can speak for the entire crew when I tell you we were simply doing the job we were trained to do.”

Chesley Sullenberger III
The Principles of Crew Resource Management

- Know your environment
- Anticipate and plan
- Assume the leadership role
- Communicate effectively
- Distribute work load optimally
- Allocate attention wisely
- Utilize all available information
- Utilize all available resources
- Call for help early enough
- Maintain professional behavior
Know Your Environment

- Sounds simple but it’s not!
- Emergency equipment rarely used
  - OR – arm boards, stirrups, rapid infuser
- Often there was a small widget needed
  - Suction failure, pentothal pin, stopcock
- Equipment and supplies move
- Staff vacations, relief/ float staff
Instrument & Supply Room
Access to Emergency Supplies

- Rearranged supplies and labeled bins
- Stocked emergency supplies in red bins & moved to upper shelves
- Re-labeled frequent use bins with known names
- Grouped related items
OB Hemorrhage Cart: 2014

- Quick access to emergency supplies
- Refrigerator for meds
- Establish necessary items and par levels
- Label drawers/compartment
- Include checklists
- Develop process for checking and restocking
- Educate nursing and physician staff

McNulty, 2014
Anticipate and Plan for Crisis

- Situational Awareness
- Don’t sleep on the job - Risk assess
- Know the department standards and guidelines
- Have a back up plan for your back up plan
COMMITTEE OPINION

- Number 590 • March 2014 (Replaces Committee Opinion Number 487, April 2011)

- Committee on Patient Safety and Quality Improvement

  This document reflects emerging concepts on patient safety and is subject to change. The information should not be construed as dictating an exclusive course of treatment or procedure to be followed.
Current Commentary

The Maternal Early Warning Criteria
A Proposal From the National Partnership for Maternal Safety
Mhyre, J., D’Oria, R., Hameed, A., et al
Examples of Tools for Managing Clinical Emergencies

- Availability of appropriate emergency supplies in a resuscitation cart (crash cart) or kit
- Development of a rapid response team
- Development of protocols that include clinical triggers
- Use of standardized communication tools for huddles and briefs (eg, SBAR)
- Implementation of emergency drills and simulations
- Abbreviation: SBAR, Situation–Background–Assessment–Recommendation.
This bundle was developed by the Council On Patient Safety in Women’s Health Care, National Partnership for Maternal Safety 2014
### STAGE 1: OB Hemorrhage

**Cumulative Blood Loss >500ml vaginal birth or >1000ml C/S**  
**-OR-**  
**Vital signs >15% change or HR ≥110, BP ≤85/45, O2 sat <95%**  
**-OR-**  
**Increased bleeding during recovery or postpartum**

**MOBILIZE**
- Primary nurse, Physician or Midwife to:
  - Activate OB Hemorrhage Protocol and Checklist

**Primary nurse to:**
- Notify obstetrician (in-house and attending)
- Notify charge nurse
- Notify anesthesiologist

**ACT**
- Primary nurse:
  1. Establish IV access if not present, at least 16 gauge
  2. Increase IV Oxytocin rate, 500 mL/hour of 10-40 units/1000mL solution; Titrate infusion rate to uterine tone
  3. Continue vigorous fundal massage
  4. Administer Methergine 0.2 mg IM per protocol (if not hypertensive); give once, if no response, move to alternate agent; if good response, may give additional doses q 2 hr
  5. Vital Signs, including O2 sat & level of consciousness (LOC) q 5 minutes
  6. Weigh materials, calculate and record cumulative blood loss q 5-15 minutes
  7. Administer oxygen to maintain O2 sat at >95%
  8. Empty bladder: straight cath or place Foley with urimeter
  9. Type and Crossmatch for 2 units Red Blood Cells STAT (if not already done)
  10. Keep patient warm

**THINK**
- Consider potential etiology:
  - Uterine atony
  - Trauma/Laceration
  - Retained placenta
  - Amniotic Fluid Embolism
  - Uterine Inversion
  - Coagulopathy
  - Placenta Accreta

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If: Continued bleeding or Continued Vital Sign instability, and <1500 mL cumulative blood loss  
proceed to STAGE 2

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### UTEROTONIC AGENTS for POSTPARTUM HEMORRHAGE

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Route</th>
<th>Frequency</th>
<th>Side Effects</th>
<th>Contraindications</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitocin® (Oxytocin)</td>
<td>10-40 units per 1000mL, rate titrated to uterine tone</td>
<td>IV infusion</td>
<td>Continuous</td>
<td>Usually none; Nausea, vomiting, hypertension (&quot;water intoxication&quot;) with prolonged IV admin.\n</td>
<td></td>
<td>10 units/ml</td>
</tr>
<tr>
<td>Methergine® (Methylergocovine)</td>
<td>0.2mg/ml</td>
<td>IM (not given IV)</td>
<td>-Q 2-4 hours; if no response after first dose, it is unlikely that additional doses will be of benefit</td>
<td>Nausea, vomiting, Severe hypertension, esp. with rapid administration or in patients with HTN or PHTN</td>
<td>Hypertension, PIH, Heart disease Hypersensitivity to drug Caution if multiple doses of ephedrine have been used, may exaggerate hypertensive response w/possible cerebral hemorrhage</td>
<td>Refrigerate Protect from light</td>
</tr>
<tr>
<td>Hemabate® (15-methyl PG F2a)</td>
<td>250mcg/ml</td>
<td>IM or intra-myometrial (not given IV)</td>
<td>-Q 15-90 min; Not to exceed 3 doses/24 hrs; if no response after several doses, it is unlikely that additional doses will be of benefit</td>
<td>Nausea, vomiting, Diarrhea Fever (transient), Headache Chills, shivering Hypertension Bronchospasm</td>
<td>Caution in women with hepatic disease, asthma, hypertension, active cardiac or pulmonary disease Hypersensitivity to drug</td>
<td>Refrigerate</td>
</tr>
<tr>
<td>Cytotec® (Misoprostol)</td>
<td>800-1000mcg</td>
<td>Per rectum (PR)</td>
<td>One time</td>
<td>Nausea, vomiting, diarrhea Shivering, Fever (transient) Headache</td>
<td>Rare Known allergy to prostaglandin Hypersensitivity to drug</td>
<td>Room temp</td>
</tr>
</tbody>
</table>
Comprehensive maternal hemorrhage protocols reduce the use of blood products and improve patient safety

Shields, L., et. al., (2014) *AJOG*

• Checklist for protocol and data compliance
  - Risk assess
  - Correct blood bank request
  - Quantified blood loss
  - Correct lab results were obtained
  - > 2 Uterotonics give w/o MD present
  - Blood given per protocol

Safehealthcareforeverywoman.org
Assume the Leadership Role

- The Primary Nurse

- What happens when the MD enters the scenario?
Communicate Effectively

- Again this sounds so simple
- How exactly does one learn to communicate effectively?
- Are there tools/strategies to promote effective communication?
- Communication is revealed on the video
  - Masks
  - Alarms
  - Incoming staff
Communicate Clearly!

- With all members of the team
- If you are asking for help, tell them why and what they can do to help.

- This is what is happening…
- This is what I need…
- This is what you can do…
Closed Loop Communication

- When possible assign a specific task to a specific person
- When assigned a task or to accept an unassigned task – **close the loop**
- If possible make eye contact & use the person’s name
Distribute Work Load Optimally

- Avoid the “one woman band”
  - Compressions
  - Ventilations
  - Delegate tasks

- Utilize staff in the area of expertise
  - Respiratory Therapists - airway
  - Nursing Supervisor - recorder
Allocate Attention Wisely

- Neonatal intubation
  - Time sensitive
  - Avoid fixation errors
- Avoid flitting
- Finish assigned tasks
Utilize all Available Information

- Lost in Translation
  - Prenatal record
  - Patient hand-offs
  - Nurse to Nurse report
  - Patient transfer

- Utilization Strategies
  - Sharing a mental model
  - Thinking out loud
Call for Help Early

- What is the culture - is it safe?
- Every hospital system is unique
  - How exactly does the staff call for help?
  - Variations on shifts and weekends
- What language is used to convey urgency
  - Ensure the staff knows what/how when to call
Call for Help Early

- Who responds?
  - Rapid Response Team?
    - What is the SBAR?
    - What is their role?
    - Who is leader?

Gee...she looks pretty good to me...

I wonder why we were called?
Maintain professional behavior

- Laughing
- Offensive language
The Schedule

- Brief
- Familiarization
- Scenarios
- ‘5 Minute’ Debrief
- Facilitated Debrief
- Confidentiality
Set-up / Reset
What You Can Expect From Us

- Professionalism
- Clear direction
- Orientation to equipment and how you will get information on the patient(s)
- Challenging scenarios
- No tricks
- A positive learning environment
What We Expect From You

▪ Professionalism
▪ Suspending disbelief
▪ Act as you would in a real situation
▪ Think out loud
▪ Ask questions if something is unclear
▪ All information about scenarios and participants strictly confidential
▪ Teamwork and communication
Ever wish for a second chance? We’ve all been there.

- Avoid negativity & perfectionism
- Performances & scenarios STAY HERE
Enhance Realism
The Wardrobe
Lights, Camera, Action!
Drill Outcomes

- Staff empowered to improve work environment
  - Suggestion box in staff lounge

- Data for Patient Safety and Risk Mgmt

- Posters placed on unit
  - Promotes staff awareness of system improvements derived from drills
Second Victim

• Julie Thao Story

• Medical errors should not be criminalized

• Fear is a major barrier to action
Promote a Culture of Safety
Thank You!

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