Addressing the Tragedy of Maternal Mortality & Morbidity in America

A presentation for HealthTrust Members by
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Disclosures

• The presenter has no financial relationships with any commercial interests pertinent to this presentation.
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Learning Objectives

• Discuss the concept of high reliability that could be replicated at any healthcare organization.
• Explain the foundations of team culture as exhibited by institutions that prioritize patient safety.
• Define the pillars upon which highly reliable clinical systems of care are built.
High Reliability & Safety in Obstetrics: A Life-saving Approach
Maternal Mortality

An American Failure

• America is the most dangerous country in the developed world to give birth
• U.S. ranks 60th in the world regarding maternal death rate*
• Increased from 14 to 26.4 / 100,000 Births from 1990–2015

ACOG Patient Safety and Quality Improvement
Maternal Morbidity is Extreme

- Shock
- Acute Kidney Injury
- Pulmonary Embolism
- Respiratory Distress Syndrome
- Myocardial Infarction
- Sepsis
- Increased by 45% from 2006 - 2015
- Affects 80,000 mothers per year

Maternal Mortality

An American Tragedy

• 40% of maternal deaths are *Preventable*
• Most maternal deaths from hemorrhage are *Preventable*

Source: Mary D’Alton, MD 51st Annual Update in OBGyn HMS 2014
Healthcare is a Team Sport
Healthcare is a Team Sport

HealthTrust Team Members

- Nursing
- Pharmacy
- Laboratory Medicine
- Physicians
- Administrators
Healthcare is a Team Sport

Maternal mortality and morbidity crisis cannot be fixed by obstetricians alone.

Need your help in your sphere of influence.
Pathway 1

• Full-term pregnancy
• C/S for breech presentation (twin A)
• Two hours after delivery, increased bleeding in recovery room
• Physician called
• Medications ordered
Pathway 1

- Continued bleeding
- Physician called again
- More medication ordered
- Continued bleeding
- Physician requested to come to hospital
Pathway 1

- Doctor at bedside 5 hours later
- Patient in shock
- Emergency hysterectomy
- Patient coded and died on OR table
Pathway 2

- Full-term pregnancy
- C/S for breech presentation
- Bleeding in recovery room
Pathway 2

- Team assessed patient
- Nurse, obstetrician, CRNA and OR staff at bedside
- Medication given
- Continued bleeding
Pathway 2

- Patient taken to OR
- Uterine Tamponade Balloon placed
- Two units of blood given
- Patient and twins home on post-op day three
Choice to Be Made

• Maternal death is the greatest tragedy in medicine today
• Pathway to success
• Pathway to failure
Choice to Be Made

PATIENT SAFETY SUPERSEDES ALL

• Physician Convenance
• Nurse Convenance
• Patient Convenance
Choice to Be Made

Five Pillars Which Support High Reliability in Obstetrics

Physician  Nursing  Administration

Three Champions
## MTH Family Birthing Suites

<table>
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<tr>
<th>Date</th>
<th>OB Physicians</th>
<th>Births</th>
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<td>2400</td>
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<tr>
<td>2007</td>
<td>16</td>
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MTH Family Birthing Suites

- Level 3A Neonatal Intensive Care Unit (NICU)
- Patient catchment area extends to southern New York/Western New Jersey
- Maternal and Neonatal High Risk transfers
- 40% of patients classified as high risk
A 38-Year-Old Woman With Fetal Loss and Hysterectomy

Benjamin P. Sachs, MR, BS, Discussant

Dr Del Banco: Mrs W is a married, self-employed, healthy woman living in a community several hours from Boston. She has private health insurance. At age 38, she was admitted to the hospital for elective delivery of her first child, but the admission ended tragically with fetal loss, hysterectomy, and a prolonged hospitalization.

The pregnancy, her first, was wanted and uneventful. When seen initially by her obstetrician, Mrs W's blood pressure was 112/80 mm Hg. She showed no sign of labor at term. At 40 weeks of pregnancy, her blood pressure was 126/78 mm Hg, rising shortly thereafter to 144/85 mm Hg. She had trace proteinuria. Her creatinine level was 0.8 mg/dL (70.7 µmol/L), and her uric acid level was 6.5 mg/dL. At 41 weeks of gestation, her obstetrician, Dr F, decided to admit her for misoprostol induction. Dr F was not on call that night.

On admission, the cervix was closed and 50% effaced, and her blood pressure was 124/90 mm Hg. She was given misoprostol (25 µg, vaginally) and sent home that evening at 10 PM. On the way home, she noted more contractions, turned around, and was admitted to the hospital at midnight in active labor. She was breathing uncomfortably with contractions, vomiting, and was hypertensive with a blood pressure of 174/104 mm Hg. The cervix was still soft and closed; the fetal heart rate was in the 130s, and no decelerations accompanied the contractions. At 1:30 AM, her membranes ruptured, and contractions were noted every 1 to 2 minutes. At 3:30 AM, her cervix was dilated to 2 cm and 90% effaced. The fetal heart rate was 120/min, with contractions every 1 to 2 minutes. She was given a test dose for epidural anesthesia (3 mL of 1%-9% lidocaine). At that point, her blood pressure dropped to 53/33 mm Hg, but it returned to 107/50 mm Hg with ephedrine. Accompanying the test dose, the fetal heart rate dropped to 80/min for 3.5 minutes, but then returned to the 130s. The epidural anesthesia was then initiated.

At 4:30 AM, the fetal heart rate was noted to have a sawtooth (sawtooth pattern) with occasional late decelerations, and her cervix was dilated 4 to 5 cm. At 5:20 AM, she was fully dilated. She was having contractions every 1 to 2 minutes, and her medical record reveals that she was asked to start pushing. Thirty minutes later the fetal heart rate was 115/min, with late decelerations. It quickly dropped to 90/min for 3 minutes, followed by further slowing for about 11 minutes. A low-forceps delivery (+2 station, right occiput anterior with caput and molding) was attempted at 6:20 AM and failed. She was rapidly transferred to the operating room; the fetal heart rate was in the 130s. An emergency cesarean delivery was performed. When the abdominal cavity was entered, the uterus was found to have ruptured in the lower segment and the placenta was in the abdomen. A stillborn male fetus, weighing 10 lb, was delivered at 6:45 AM; the fetal weight was determined after extensive efforts at resuscitation. The uterus was repaired, and Mrs W was transferred to the recovery room.

At 7:30 AM, the patient received 4 units of blood, along with misoprostol again for uterine atony. By 10 AM, a hysterectomy was performed for uterine atony unresponsive to uterine massage and intravenous pitocin, rectal misoprostol, and intramuscular 15-methyl prostaglandin F2α (Hemabate). This was followed by numerous complications, including bleeding with disseminated intravascular coagulation requiring the transfusion of 38 units of packed red blood cells, 4 units of fresh frozen plasma, 60 units of cryoprecipitate, and 111 bags of platelets. She required 3 weeks of hospital care thereafter, including 18 days in the intensive care unit. She encountered and overcame complex medical issues including prolonged disseminated intravascular coagulopathy, acute respiratory distress syndrome, sepsis, and a wound infection. She recovered steadily, was transferred to a rehabilitation hospital for further care for a few days, and then returned home where she received intensive physical therapy, occupational therapy, and other supportive care.
• 38-year-old primigravida full-term
• Induction of labor
• Preeclampsia undiagnosed
• Fetal distress undetected
• Forceps delivery failed
• Emergency Cesarean Section
• Ruptured uterus
• Dead baby
• Hysterectomy, near maternal death

Source: JAMA August 17, 2005 Vol. 294 No. 7
Obstetrical Catastrophe

- Reality check
- This could happen here
High Reliability
High Reliability

• The Right Thing
• The Right Way
• Every Time

*Concept originated in the military, aviation industry and nuclear industry*

Source: ACOG Patient Safety and Quality Improvement
Training Audacity
Culture of Safety Conference, September 2006

Stephen Ray Mitchell, M.D.  
Stephen Pratt, M.D.
High Reliability / Safety in Obstetrics
Team Huddles 9AM, 8PM, PRN
Team Members

- Labor Nurses
- Post-partum Staff
- NICU Staff
- Neonatologist
- Anesthesiologist
- CRNA
- Nursing Supervisor
- Secretaries
- Custodial Staff
- Labor & Birth Manager

- Director Women's/Children’s Services
- OB Attending
- Chief Medical Officer
- Chief Nursing Officer
- Director of Quality & Safety
- Pharmacy Staff
- Social Work
- Chief Executive Officer
What Happens?

We Communicate!

• Review all patients
• Gain situational awareness
• Discuss Utilization / Allocation of Resources
• Resolve Conflicts
• Look for Potential Pitfalls

We Attempt to Outthink FATE

Silo Mentality

My Patient

• One doctor
• One nurse
• One patient

• Tunnel vision
• Increased risk of injury

Team Culture

• Our patient
• Everyone’s responsibility

• Power of collective intellect
• Injury risk mitigated

Source: Mann Contemporary OB/Gyn January 2006
Change is a Loss for Someone

- Loss of hierarchical status
- Loss of power
- Loss of autonomy

“I am tired of people telling ME what to do with MY patient”
Change is difficult!

Change requires endurance.

Full implementation requires 12 to 24 months.
High Reliability / Safety in Obstetrics

TEAM HUDDLES

JUST CULTURE
Just Culture

Non-negotiable Mutual Respect

Critical Components

- Lack of hierarchy
- Freedom to speak up
- Willingness to speak up
- Audacity and courage

Source: Gardner ACOG Patient Safety & Quality Improvement 2009
Near Miss

- Preterm labor patient on Procardia
- Super imposed preeclampsia
- Magnesium Sulfate ordered

Magnesium + Ca Channel Blocker

Synergistic Calcium Antagonism

Potential Death or Injury
Individuals Fail

Teams Win

“Dr. Kolucki, are you sure you want to start magnesium now?
She was just dosed with Procardia.”

Every member of the OB team is required to step forward when a process is deemed unsafe.
High Reliability / Safety in Obstetrics

- Team Huddles
- Just Culture
- Evidence-Based Medicine
- Protocol
The Enemy of Quality: Unsubstantiated Variation
Evidence-based Protocols / Bundles

- Preterm Labor
- Preterm Premature Rupture of Membranes
- Hypertensive Emergencies
- Ecclamptic Seizure
- Amniotic Fluid Embolism / Anaphylactoid Syndrome of Pregnancy
- Maternal Cardiac Arrest
- Oxytocin Utilization Bundles
- Placenta Previa Algorithm
- Prothrombin Complex Concentrate (Kcentra) Protocol
- Factor VII Protocol
- RiaSTAP (Lyophilized Fibrinogen) protocol
Evidence-based Protocols / Bundles

- Chorioamnionitis
- Fulminant DIC Protocol
- Delayed Cord Clamping
- Fetal Death in Utero Protocol
- Emergency Uterine Relaxation
- Imminent Delivery
- Neonatal Resuscitation
- EMR – Best practice care plans
MTH Code Crimson v19

Code Crimson — Level 1
For patients with potential / actual hemorrhage

FBS Staff - Notify Switchboard of Code Crimson (x5555) for overhead page
Switchboard will alert Laboratory, Anesthesia, Ultrasound, Interventional Radiology, Nursing Supervisor, and Pharmacy to await further instructions.

Draw the following STAT Labs and tube specimens to Laboratory for:
Code Crimson: CBC; PT / PTT; Fibrinogen; CMBP;
Type and Screen; and Type and Cross Three (3) Units Packed Red Blood Cells, Three (3) Units Fresh Frozen Plasma, and One (1) Unit Apheresed Platelets.
Notify Lab (x6300) of inbound STAT Blood Work.
Repeat Labwork every 60 minutes or after every completed MTP.
Ensure IV access & Potency.
Confirm treatment with Tranexamic Acid 1 gm IV repeat in 30 minutes if bleeding continues.
Obtain Uterine Tamponade Balloon.
Prepare OR Hystereotomy pan.
Notify CRNA to prepare Rapid Infuser/ Blood Warmer.

Code Crimson — Level 2
For patients with a life threatening potential/actual hemorrhage

Notify Switchboard of Code Crimson (X5555) for overhead page and alerts.
Confirm treatment with Tranexamic Acid 1 gm IV repeat in 30 minutes if bleeding continues.

FBS Staff - Draw the following STAT Labs and tube specimens to Laboratory for:
CBC; PT / PTT; Fibrinogen; Type and Screen; CMBP, and Type and Cross.
Six (6) Units Packed Red Blood Cells, Six (6) Units Fresh Frozen Plasma, One (1) Unit Apheresed Platelets, and Ten (10) Unit Cryoprecipitate (only 1 unit in hospital; additional units will be procured by lab)
Notify Lab (x6300) and Blood Bank (x6381) of inbound STAT Blood Work.
T/L will designate one person to be in contact with lab for blood products and to obtain when ready (blood runner).
Repeat Labwork every 60 minutes or after every completed MTP.

- Ensure two (2) large bore (#18) IV access
- Prepare OR Hyster pan/Prepare Uterine Tamponade Balloon
  Ready Second MTP2 PACKAGE
  - 6 Units RBCs
  - 6 Units FFP
  - 1 Unit Apheresed Platelets
  - 10 Units Cryoprecipitate
  - Administer 10 mg Vitamin K IV for dose.
  - Calcium Gluconate 2 gm (4.6 smear / 1 mg) IV
    (lab will procure any additional blood products as needed)

Nursing Supervisor (x6987/6768)
Anesthesiologist
Anesthesia CRNA (x6925)
Prepare Rapid Infuser / Blood Warmer

If necessary, Anesthesia will notify Cell Saver perfusionist - James Yi (H) 570-587-2510
  (C) 570-815-6577

Operating Room (x6400)
Interventional Radiology (x7306) (OB/GYN Physician or designee must speak directly with radiologist)
If necessary, Notify Rapid Response Team (RRT)
Dial #5555, provide Switchboard Operator with Room Number / location for RRT response.
Notify ICU of possible transfer (x5100).
Notify second in-house OB physician of situation.
IF ANTICIPATING ONGOING BLEEDING:
  - Repeat STAT LABS - CBC; PT / PTT; Fibrinogen;
  - CMBP
  - INITIATE ADDITIONAL MTP2 PACKAGES with 20 Units of Cryoprecipitate
  - Consider For Continued Life Threatening Hemorrhage

Prethrombin Complex Concentrate (Kcentra)
Factor VII (NovoSeven)
Riststp for consumptive coagulopathy/DIC; severe hypofibrinogenemia or volume overload

Calculating Corrected Calcium Equation
4 - [ (0.8 X Albumin) + serum Ca = corrected Ca]
Massive Transfusion Protocol: Code Crimson

Electrolytes including potassium and calcium can fluctuate wildly.

Massive Transfusion Protocol: Code Crimson

- Kcentra
- Prothrombin complex concentrate should be used as a last resort in refractory cases of hemorrhage
- More favorable safety profile than Factor 7

High Reliability / Safety in Obstetrics
Checklists help in multistep processes where omission of any step can lead to injury.
Checklists Prevent Normalization of Deviance

Most times things go well...without complication
Checklists We Now Utilize

• Surgical Timeout
• IOL Core Measure Compliance
• Pre-oxytocin checklist
• Operative Vaginal Delivery Documentation
• Shoulder Dystocia Documentation
• Magnesium Sulfate for Neonatal Neuroprotection
• Prevention of Elective IOL to decrease C/S rate. 34% to 18%
• Peripartum Venous Thromboembolism Prophylaxis
The Wisdom of Dr. Jimmy Moore

“We’ve got to get this right. She is FTD.”
“Hours of boredom punctuated with moments of sheer terror!”
High Reliability / Safety in Obstetrics
OB Drills / Simulation

- Shoulder Dystocia
- Postpartum Hemorrhage
- Ecclamptic Seizure
- Cesarean Hysterectomy
- Maternal Cardiac Arrest
- Code Stork
- Infant Abduction
Types of Simulation: Formal
Types of Simulation:
- Formal
- In Situ
- Micro Sim

simulation unveils pitfalls to rapid effective care

Steven Pratt, M.D. 2013
• The mortar that supports and repairs the pillars
• Not about blame or shame
• Focus is improving systems of care to help teams win the day
• The practice of quality medicine is not static
• It is decidedly dynamic
• Change is a constant in medicine
• Make a change for the good
Peer Review / Debriefing

- Immediately debrief all near misses or serious adverse events
- Peer review all cases with four units PRBC or ICU admit and serious adverse events
- Lessons learned, both successes and failures are applied to quality improvement
Do These Pillars Work?

Don’t know unless you measure it.
Adverse Outcome Index

- Developed by a panel of experts and the ACOG committee on patient safety and quality improvement to assess quality in L&D units
- Cumulative outcome of 10 major indicators with clinical significance
- Each is weighted for severity adjustment
<table>
<thead>
<tr>
<th>Adverse Outcome</th>
<th>Weight</th>
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<tr>
<td>Maternal Death</td>
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<tr>
<td>Intrapartum or neonatal death (greater than 2500g)</td>
<td>400</td>
</tr>
<tr>
<td>Uterine Rupture</td>
<td>100</td>
</tr>
<tr>
<td>Maternal admission to ICU</td>
<td>65</td>
</tr>
<tr>
<td>Birth trauma</td>
<td>60</td>
</tr>
<tr>
<td>Return to OR/ Labor and delivery</td>
<td>40</td>
</tr>
<tr>
<td>Admission to NICU (greater than 2500 g for over 24 hours)</td>
<td>35</td>
</tr>
<tr>
<td>APGAR score &lt;7 at 5 minutes</td>
<td>25</td>
</tr>
<tr>
<td>Blood transfusion</td>
<td>20</td>
</tr>
<tr>
<td>Third or fourth degree perineal tear</td>
<td>5</td>
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</table>
**Two subsets**

- **Weighted adverse outcome score**
  - Cumulative weighted points per patient
- **Severity index**
  - Cumulative weighted points per patient with adverse outcome
- Utilized by many highly reliable units as their main metric
OB AOI

Benchmark Range
5.9 to 16.6

Sample Hospital

Target Rate (9.2)
Weighted Adverse Outcome Score

sum of weighted points per patient

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Benchmark Range
1.0 to 6.0

Sample Hospital

Target Rate (3)
Severity Index

sum of weighted points per patient with an adverse outcome

Benchmark Range
1.0 to 6.0

Sample Hospital
Average (31)
Malpractice Data

- Review of hospitals who have implemented a culture of safety has shown a significant decrease in malpractice lawsuits
- Clear Indicator of Patient Safety
- Strong Argument for Fiscal Responsibility/Stewardship
Case Report, February 2008

- 25 yo G2 P1 25 Weeks Severe abdominal pain – Emergency Laparotomy
- Placenta Percreta / Ruptured Uterus Massive Hemorrhage
- Baby 650 gr / 1.1 lbs. to NICU
- Code Crimson / Massive Transfusion Protocol Ranger Rapid Transfuser
- Factor VII Hysterectomy Pelvic Packing / ICU
- Reoperation status post 48 hrs.
Highly Reliable Collaborative Care

• 2 Patients in Extremis – 12 Liter Blood Loss
• 5 Hours of Cumulative Surgery – 54 Blood Units of Blood Component Therapy
• 41 hospital staff
• 7 specialties and sub-specialties
• 1 Mother and 1 Baby Saved
Thank you

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