Perspectives in Maternal Morbidity and Mortality

with

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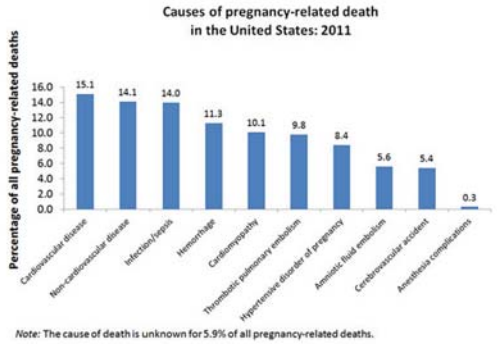
PRMES
PERINATAL RISK MANAGEMENT AND EDUCATION SERVICES

Fall of 2013

CDC statistics

CDC statistics



CDC statistics

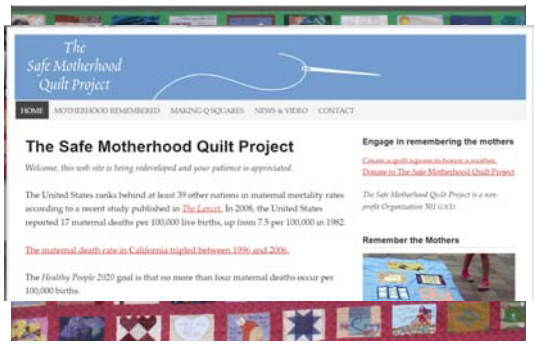
Most recent CDC data (2011)

- Of the 1,751 deaths within a year of pregnancy termination that occurred in 2011 and were reported to CDC, 702 were found to be pregnancy-related. The pregnancy-related mortality ratio was 17.8 deaths per 100,000 live births in 2011.
- Considerable racial disparities in pregnancy-related mortality exist. In 2011, the pregnancy-related mortality ratios were:
  - 12.5 deaths per 100,000 live births for white women.
  - 42.8 deaths per 100,000 live births for black women.
  - 17.3 deaths per 100,000 live births for women of other races.

Are you surprised by these findings?

- We spend more of our GNP on healthcare than any other developed country in the world, yet we rank 50th for maternal mortality.
- CEOs of U.S. nonprofit hospitals earn an average of almost $600,000 a year, with CEOs of large academic institutions have median salaries of more than $1.5 million. These compensation rates are not tied to quality measures such as mortality rates.
- Yet, when hospitals look to cutting costs, staffing and education for staff are the first areas to come under fire.

This affects all of us…



Kolby's Story

- G1P0…unremarkable pre-pregnancy or prenatal history
- 33 weeks – increased BP…Pre-eclampsia labs WNL except for 24h urine (300+).
- No other S/S other than edema
- Bedrest
- 34 weeks – increased BP continues. Edema continues
- 35 weeks – higher BP. To L & D with intention to transfer and deliver

Kolby's Story

- Hospital #1-
  - IV
  - MgSO4
  - IV anti-hypertensive
  - Ambulance to tertiary care facility

Kolby's Story

- Hospital #2-
  - Cervical ripening x 2.5 days
  - Remains hypertensive
  - MgSO4/Anti-hypertensives continue
  - Labs WDL except K…low
  - SROM/clear followed by rapid labor/delivery
    - Vigorous baby girl ☺
  - O2 required for momma immediate PP period

Kolby's Story

- Hospital #2 continued-
  - Baby – clinically stable, breastfeeding initiated
  - Momma –
    - BPs remain elevated. On anti-hypertensives
    - Otherwise unremarkable
  - DC'd to home after 2.5 days

Kolby's Story

- 12h after DC (0100)…
  - Acute onset of coughing & shortness of breath
- Ambulance ride #2
  - Lasix
  - Nitro
  - CPAP
  - Initial O2 sat…62%

Kolby's Story

- Hospital #3
  - ED
  - ICU
  - Mother/Baby
    - 4 day stay
    - IV/O2/Meds/RT
  - Diagnosis: ***Acute Flash Pulmonary Edema*** secondary to Pre-eclampsia

Risk Management & Safety

- **Risk Reduction** - creating systems and supporting work environments where preventable adverse outcomes are avoided, thus *reducing the possibility of litigation*
- **Mitigation of Risk** - *managing liability exposure* following an adverse outcome (preventable or unpreventable).

So what can we do?

- We must begin making honest assessments of our individual strengths and weaknesses as clinicians
- Next we need to look at our institutions and systems, where are our knowledge gaps? What areas need improvement?
- At the broader level, we must begin to look at statewide health and health disparities.
- And most importantly , we must engage our communities - patients and families that are our neighbors, our friends, and our shared responsibility when it comes to safety.
- These findings on preterm birth rates, maternal mortality & morbidity, and knowledge gaps in normal labor & delivery care must be seen not as tragedies, but as opportunities - chances for us to create safer systems and informed populations, two keys for improved healthcare in the United States.

Successful programs

- California, Illinois, and New York are three states that have developed exemplary programs in the reduction of maternal mortality & morbidity secondary to hemorrhage.
- Let's take a look at some of the highlights and key points, and review resources that provide direction for state public health initiatives, healthcare system changes, and individual professional growth.
- How many of these resources are familiar to you & your colleagues? Who else needs to know?

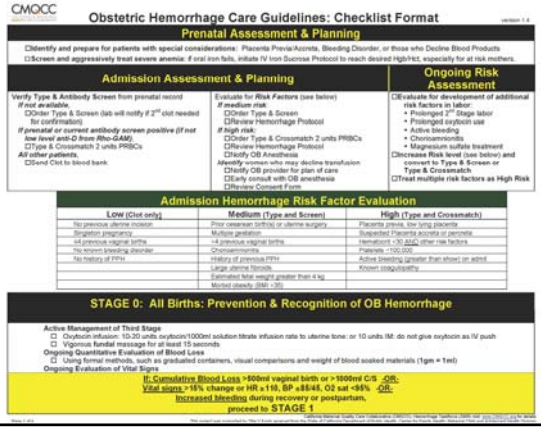
California's Collaborative Success

A California Toolkit to Transform Maternity Care

Improving Health Care Response to Obstetric Hemorrhage

THIS COLLABORATIVE PROJECT WAS DEVELOPED BY:

- California Pregnancy Related Maternal Mortality Review (CA-PAMR) found that OB hemorrhage was one of the leading causes for maternal death and a major contributor to maternal morbidity, much of the mortality deemed preventable.
- In 2009, California Maternal Quality Care Collaborative (CMQCC) performed a survey of California maternity services and found most hospitals were lacking in updated hemorrhage treatment methods. Few hospitals had massive transfusion protocols and most lacked an updated obstetric hemorrhage protocol.
- CMQCC and the Hemorrhage Task Force developed a toolkit, "Improving Health Care Response to Obstetric Hemorrhage."



CMQCC

Obstetric Hemorrhage Care Guidelines: Checklist Format

Prenatal Assessment & Planning

☐Identify and prepare for patients with special considerations: Placenta Previa/Accreta, Bleeding Disorder, or those who Decline Blood Products
☐Screen and aggressively treat severe anemia: if oral iron fails, initiate IV Iron Sucrose Protocol to reach desired Hgb/Hct, especially for at risk mothers.

Admission Assessment & Planning

Verify Type & Antibody Screen from prenatal record
If not available,
☐Order Type & Screen (lab will notify if 2nd clot needed for confirmation)
If prenatal or current antibody screen positive (If not low level anti-D from Rho-GAM):
☐Type & Crossmatch 2 units PRBCs
All other patients,
☐Send Clot to blood bank

Evaluate for *Risk Factors* (see below)
If medium risk:
☐Order Type & Screen
☐Review Hemorrhage Protocol
If high risk:
☐Order Type & Crossmatch 2 units PRBCs
☐Review Hemorrhage Protocol
☐Notify OB Anesthesia
Identify women who may decline transfusion
☐Notify OB provider for plan of care
☐Early consult with OB anesthesia
☐Review Consent Form

Ongoing Risk Assessment

☐Evaluate for development of additional risk factors in labor:
- Prolonged 2nd Stage labor
- Prolonged oxytocin use
- Active bleeding
- Chorioamnionitis
- Magnesium sulfate treatment

☐Increase Risk level (see below) and convert to Type & Screen or Type & Crossmatch
☐Treat multiple risk factors as High Risk

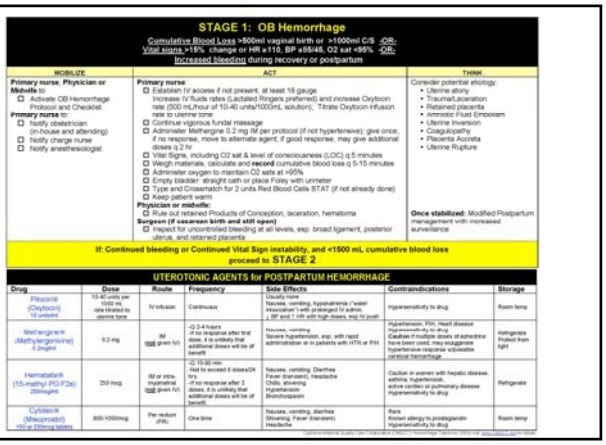
Admission Hemorrhage Risk Factor Evaluation

Low (Clot only)	Medium (Type and Screen)	High (Type and Crossmatch)
No previous uterine incision	Prior cesarean birth(s) or uterine surgery	Placenta previa, low lying placenta
Singleton pregnancy	Multiple gestation	Suspected Placenta accreta or percreta
≤4 previous vaginal births	>4 previous vaginal births	Hematocrit <30 and/or other risk factors
No known bleeding disorder	Chorioamnionitis	Platelets <100,000
No history of PPH	History of previous PPH	Active bleeding (greater than shown on admit
	Large uterine fibroids	Known coagulopathy
	Estimated fetal weight greater than 4 kg	
	Morbid obesity (BMI >35)	

STAGE 0: All Births: Prevention & Recognition of OB Hemorrhage

Active Management of Third Stage
☐ Oxytocin infusion 10-20 units oxytocin/1000ml solution titrate infusion rate to uterine tone; or 10 units IM: do not give oxytocin as IV push
☐ Vigorous fundal massage for at least 15 seconds
Ongoing Quantitative Evaluation of Blood Loss
☐ Using formal methods, such as graduated containers, visual comparisons and weight of blood soaked materials (1gm = 1ml)
Ongoing Evaluation of Vital Signs

If: 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, proceed to STAGE 1



STAGE 1: OB Hemorrhage

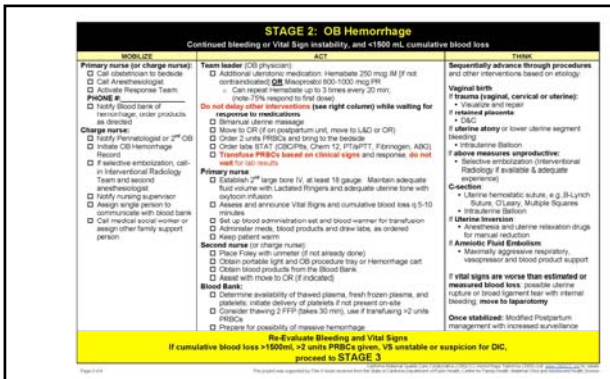
Cumulative Blood Loss >500ml vaginal birth or >1000ml C/S -OR- Vital signs >15% change or HR ≥110, BP ≤85/45, O2 sat <95% -OR- Increased bleeding during recovery or postpartum

MOBILIZE	ACT	THINK
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	**Primary nurse** ☐ Establish IV access if not present, at least 18 gauge. Increase IV fluids rates (Lactated Ringers preferred) and increase Oxytocin rate (500 mL/hour of 10-40 units/1000mL solution); Titrate Oxytocin infusion rate to uterine tone ☐ Continue vigorous fundal massage ☐ 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 ☐ Vital Signs, including O2 sat & level of consciousness (LOC) q 5 minutes ☐ Weigh materials, calculate and **record** cumulative blood loss q 5-15 minutes ☐ Administer oxygen to maintain O2 sats at >95% ☐ Empty bladder: straight cath or place Foley with urimeter ☐ Type and Crossmatch for 2 units Red Blood Cells STAT (if not already done) ☐ Keep patient warm **Physician or midwife:** ☐ Rule out retained Products of Conception, laceration, hematoma **Surgeon (if cesarean birth and still open)** ☐ Inspect for uncontrolled bleeding at all levels, esp: broad ligament, posterior uterus, and retained placenta	Consider potential etiology: • Uterine atony • Trauma/Laceration • Retained placenta • Amniotic Fluid Embolism • Uterine Inversion • Coagulopathy • Placenta Accreta • Uterine Rupture **Once stabilized:** Modified Postpartum management with increased surveillance

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

UTEROTONIC AGENTS for POSTPARTUM HEMORRHAGE

Drug	Dose	Route	Frequency	Side Effects	Contraindications	Storage
Pitocin® (Oxytocin) 10 units/ml	10-40 units per 1000 mL rate titrated to uterine tone	IV infusion	Continuous	Usually none Nausea, vomiting, hyponatremia ("water intoxication") with prolonged IV admin. ≥ 8P and ? HR with high doses, esp IV push	Hypersensitivity to drug	Room temp
Methergine® (Methylergonovine) 0.2mg/ml	0.2 mg	IM (not given IV)	-Q 2-4 hours -If no response after first dose, it is unlikely that additional doses will be of benefit	Nausea, vomiting Severe hypertension, esp. with rapid administration or in patients with HTN or PIH	Hypertension, PIH, Head disease Hypersensitivity to drug **Caution** if multiple doses of ephedrine have been used, may exaggerate hypertensive response w/possible cerebral hemorrhage	Refrigerate Protect from light
Hemabate® (15-methyl PGF2α) 250mcg/ml	250 mcg	IM or intra-myometrial (not given IV)	-Q 15-90 min -Not to exceed 8 doses/24 hrs -If no response after 3 doses, it is unlikely that additional doses will be of benefit	Nausea, vomiting, Diarrhea Fever (transient), Headache Chills, shivering Hypertension Bronchospasm	Caution in women with hepatic disease, asthma, hypertension, active cardiac or pulmonary disease Hypersensitivity to drug	Refrigerate
Cytotec® (Misoprostol) 100 or 200mcg tablet	800-1000mcg	Per rectum (PR)	One time	Nausea, vomiting, diarrhea Shivering, Fever (transient) Headache	Rare Known allergy to prostaglandin Hypersensitivity to drug	Room temp

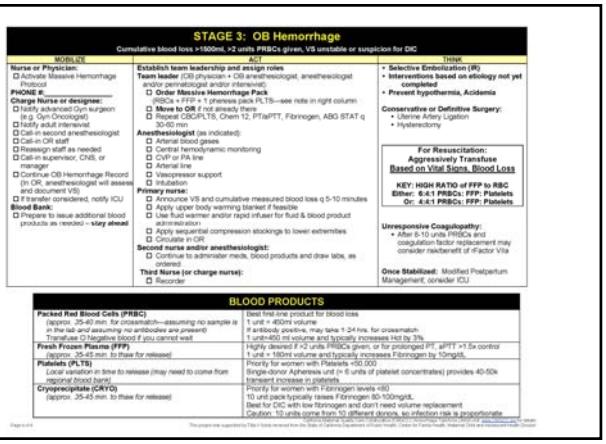


STAGE 2: OB Hemorrhage

Continued bleeding or Vital Sign instability, and <1500 mL cumulative blood loss

MOBILIZE	ACT	THINK
Primary nurse (or charge nurse): ☐ Call obstetrician to bedside ☐ Call Anesthesiologist ☐ Activate Response Team: **PHONE #:** _____ ☐ Notify Blood bank of hemorrhage, order products as directed **Charge nurse:** ☐ Notify Perinatologist or 2nd OB ☐ Initiate OB Hemorrhage Record ☐ If selective embolization, call-in Interventional Radiology Team and second anesthesiologist ☐ Notify nursing supervisor ☐ Assign single person to communicate with blood bank ☐ Call medical social worker or assign other family support person	**Team leader** (OB physician) ☐ Additional uterotonic medication: Hemabate 250 mcg IM (if not contraindicated) **OR** Misoprostol 800-1000 mcg PR ○ Can repeat Hemabate up to 3 times every 20 min; (note-75% respond to first dose) **Do not delay other interventions (see right column) while waiting for response to medications** ☐ Bimanual uterine massage ☐ Move to OR (if on postpartum unit, move to L&D or OR) ☐ Order 2 units PRBCs and bring to the bedside ☐ Order labs STAT (CBC/Plts, Chem 12, PT/aPTT, Fibrinogen, ABG) ☐ **Transfuse PRBCs based on clinical signs** and response, **do not wait for lab results** **Primary nurse** ☐ Establish 2nd large bore IV, at least 18 gauge. Maintain adequate fluid volume with Lactated Ringers and adequate uterine tone with oxytocin infusion ☐ Assess and announce Vital Signs and cumulative blood loss q 5-10 minutes ☐ Set up blood administration set and blood warmer for transfusion ☐ Administer meds, blood products and draw labs, as ordered ☐ Keep patient warm **Second nurse** (or charge nurse) ☐ Place Foley with urimeter (if not already done) ☐ Obtain portable light and OB procedure tray or Hemorrhage cart ☐ Obtain blood products from the Blood Bank ☐ Assist with move to OR (if indicated) **Blood Bank:** ☐ Determine availability of thawed plasma, fresh frozen plasma, and platelets; initiate delivery of platelets if not present on-site ☐ Consider thawing 2 FFP (takes 30 min), use if transfusing >2 units PRBCs ☐ Prepare for possibility of massive hemorrhage	**Sequentially advance through procedures** and other interventions based on etiology: **Vaginal birth** **If trauma (vaginal, cervical or uterine):** • Visualize and repair **If retained placenta:** • D&C **If uterine atony** or lower uterine segment bleeding: • Intrauterine Balloon **If above measures unproductive:** • Selective embolization (Interventional Radiology if available & adequate experience) **C-section** • Uterine hemostatic suture, e.g.,B-Lynch Suture, O'Leary, Multiple Squares • Intrauterine Balloon **If Uterine Inversion** • Anesthesia and uterine relaxation drugs for manual reduction **If Amniotic Fluid Embolism:** • Maximally aggressive respiratory, vasopressor and blood product support **If vital signs are worse than estimated or measured blood loss**: possible uterine rupture or broad ligament tear with internal bleeding; **move to laparotomy** **Once stabilized:** Modified Postpartum management with increased surveillance

Re-Evaluate Bleeding and Vital Signs
If cumulative blood loss >1500ml, >2 units PRBCs given, VS unstable or suspicion for DIC, proceed to STAGE 3



STAGE 3: OB Hemorrhage

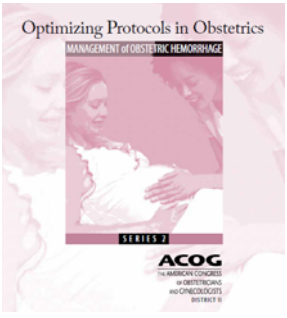
Cumulative blood loss >1500ml, >2 units PRBCs given, VS unstable or suspicion for DIC

MOBILIZE	ACT	THINK
Nurse or Physician: ☐ Activate Massive Hemorrhage Protocol **PHONE #:** _____ **Charge Nurse or designee:** ☐ Notify advanced Gyn surgeon (e.g. Gyn Oncologist) ☐ Notify adult intensivist ☐ Call-in second anesthesiologist ☐ Call-in OR staff ☐ Reassign staff as needed ☐ Call-in supervisor, CNS, or manager ☐ Continue OB Hemorrhage Record (In OR, anesthesiologist will assess and document VS) ☐ If transfer considered, notify ICU **Blood Bank:** ☐ Prepare to issue additional blood products as needed – **stay ahead**	**Establish team leadership and assign roles** **Team leader** (OB physician + OB anesthesiologist, anesthesiologist and/or perinatologist and/or intensivist) ☐ **Order Massive Hemorrhage Pack** (RBCs + FFP + 1 pheresis pack PLTS—see note in right column ☐ **Move to OR** if not already there ☐ Repeat CBC/PLTS, Chem 12, PT/aPTT, Fibrinogen, ABG STAT q 30-60 min **Anesthesiologist** (as indicated): ☐ Arterial blood gases ☐ Central hemodynamic monitoring ☐ CVP or PA line ☐ Arterial line ☐ Vasopressor support ☐ Intubation **Primary nurse:** ☐ Announce VS and cumulative measured blood loss q 5-10 minutes ☐ Apply upper body warming blanket if feasible ☐ Use fluid warmer and/or rapid infuser for fluid & blood product administration ☐ Apply sequential compression stockings to lower extremities ☐ Circulate in OR **Second nurse and/or anesthesiologist:** ☐ Continue to administer meds, blood products and draw labs, as ordered **Third Nurse (or charge nurse):** ☐ Recorder	• **Selective Embolization (IR)** • **Interventions based on etiology not yet completed** • **Prevent hypothermia, Acidemia** **Conservative or Definitive Surgery:** • Uterine Artery Ligation • Hysterectomy **For Resuscitation: Aggressively Transfuse Based on Vital Signs, Blood Loss** **KEY: HIGH RATIO of FFP to RBC** **Either: 6:4:1 PRBCs: FFP: Platelets** **Or: 4:4:1 PRBCs: FFP: Platelets** **Unresponsive Coagulopathy:** • After 8-10 units PRBCs and coagulation factor replacement may consider risk/benefit of rFactor VIIa **Once Stabilized:** Modified Postpartum Management, consider ICU

BLOOD PRODUCTS

Packed Red Blood Cells (PRBC) (approx. 35-40 min. for crossmatch—assuming no sample is in the lab and assuming no antibodies are present) Transfuse O Negative blood if you cannot wait	Best first-line product for blood loss 1 unit = 450ml volume If antibody positive, may take 1-24 hrs. for crossmatch 1 unit=450 ml volume and typically increases Hct by 3%
Fresh Frozen Plasma (FFP) (approx. 35-45 min. to thaw for release)	Highly desired if >2 units PRBCs given, or for prolonged PT, aPTT >1.5x control 1 unit = 180ml volume and typically increases Fibrinogen by 10mg/dL
Platelets (PLTS) Local variation in time to release (may need to come from regional blood bank)	Priority for women with Platelets <50,000 Single-donor Apheresis unit (= 6 units of platelet concentrates) provides 40-50k transient increase in platelets
Cryoprecipitate (CRYO) (approx. 35-45 min. to thaw for release)	Priority for women with Fibrinogen levels <80 10 unit pack typically raises Fibrinogen 80-100mg/dL Best for DIC with low fibrinogen and don't need volume replacement Caution: 10 units come from 10 different donors, so infection risk is proportionate

New York State & ACOG District II



Core Elements

- Definition
- Risk Factors/Etiology
- Initial Interventions
- Medical Treatment
- Surgical Treatment
- Defined Care Team and Escalation Role Clarity
- Checklist Algorithm
- Transfusion Policy
- Drills

WHAT MATERNAL MORTALITY REVIEW CAN ACCOMPLISH: ILLINOIS'S MATERNAL MORTALITY REVIEW COMMITTEE

Illinois is one of only a few states to routinely review maternal morbidity, as well as mortality. All Illinois birthing hospitals are required to report any obstetrics patient admitted to the ICU or who receives more than 3 units of blood. Quality Improvement standards for case review are in place in all birthing hospitals.

In 2010, Illinois's Maternal Mortality Review Committee (MMRC) completed their Statewide Obstetric Hemorrhage Education Program. Based on the cases they reviewed, the MMRC developed and implemented a comprehensive education program – including lecture, hands-on skills training to evaluate volume of blood loss, simulation and debriefing sessions – which was completed by over 35,000 physicians, midwives, and obstetric nurses between July 2008 and December 2009. The program was mandatory and reportedly very well received by participants and hospitals. A final hospital assessment in 2010 found that all Illinois birthing hospitals now have Rapid Response Teams (RRT) trained to respond to hemorrhage, and many hospitals have expanded the RRT to include all obstetric emergencies.

Preliminary data supports great improvement in the statewide response to hemorrhage and allows the MMRC to focus efforts on assessing preventability of near miss or severe morbidity, which can ultimately reduce the number of maternal deaths.[73]

Illinois State Mandated
Obstetric Hemorrhage Education Project

Key Points

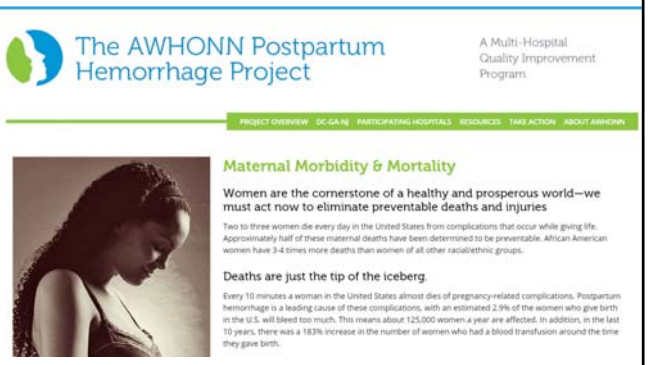
- Illinois Department of Public Health & Perinatal Advisory Committee
- Sanctions for failure to train/participate

Program Components

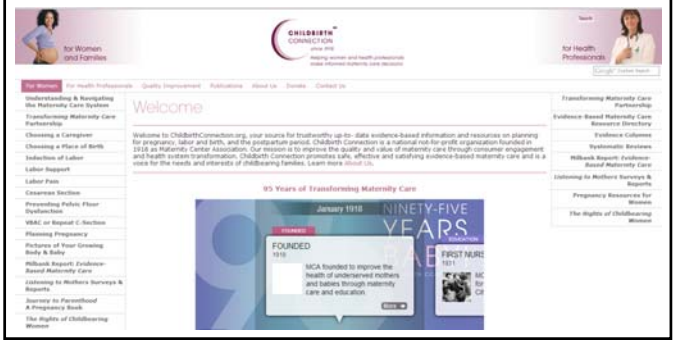
- Benchmark assessment validation
- Didactic lecture and discussion
- Skill stations
- Simulation drills
- Debriefing

New Directions & New Responsibilities

- We are making strides in disclosure, transparency and evaluation of medical and nursing error.
- Our next goals must include involving and educating the consumers of perinatal care, and evaluation of the evidence that is based on patient outcomes.
- Both physicians and nurses also need to look at sharing information across disciplines, and using each other's literature jointly when creating educational programs.



Childbirth Connection



Oregon Perinatal Collaborative

Oregon Perinatal Collaborative

The Oregon Perinatal Collaborative (OPC), a group of perinatal health care leaders in Oregon, commits to safely reduce the rate of Cesarean Sections (C-Section) births, particularly for women who haven't delivered in this manner before. In order to safely reduce first-time C-Sections, the OPC leaders are implementing strategies for a successful birth in labor and delivery departments throughout Oregon. The OPC recommends all Oregon Providers delivering babies review and adopt these best practices strategies that will support safe deliveries in all labor units. The OPC will continue to monitor and revise these strategies for best practice on a regular basis.

Oregon Perinatal Collaborative: Steering Committee Members

Members:	Association	Function
Aaron Caughey MD	OHSU	Chair
Beth Jocelyn	March of Dimes	Member
Bruce Gutelius MD	OR Health Authority	Member
David Labby MD	HealthShare Oregon	Collaborative Leader
Debbie Heim	Good Samaritan Regional Medical Center	Member
Diane Waldo	OR Association Hospitals & Health Systems	Collaborative Leader
Dick Lowenstein MD	March of Dimes Program Services Chair	Member
Duncan Neilson MD	Legacy	Collaborative Leader
Helen Bellanca MD	HealthShare Oregon	Member
Joanne Rogosky	March of Dimes	Collaborative Leader
Kathy Criswell	Providence	Member
Laurel Durham	Providence	Member
Leona Logue	Legacy	Member
Lori Irwin	OHSU	Member
Lyn Iacobs MD	Virginia Garcia	Member
Mark Tomlinson MD	Providence St. Vincent's	Collaborative Leader
Michal Bryant	Good Samaritan Regional Medical Center	Member
Myla Christensen	Oregon Health Care Quality Corporation	Member
Patrice Chatterton	Kaiser Permanente	Member
Shelora Mangan	Legacy	Member
Suzanne Lubarsky MD	Kaiser Permanente	Member
Sylvana Bennett MD	Tuality	Member
Yvonne Gordon	March of Dimes - QI Consultant / Facilitator	Member/Facilitator

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IN FOCUS

The Effect of Collaboration on Obstetric Patient Safety in Three Academic Facilities

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Keywords
collaboration
communication
interprofessional collaboration
patient safety nurse
perinatal patient safety
teamwork

ABSTRACT
Interprofessional collaboration is critical to the provision of safe patient care and provider satisfaction. Collaboration is an active process that can help maximize positive patient outcomes. Three academic institutions implemented collaborative processes as part of their perinatal patient safety initiatives based on anecdotal experiences and safety culture surveys that demonstrated positive outcomes. Reliable tools and additional research are needed to measure the extent and impact of collaboration on patient outcomes in perinatal care.

JOGNN, 42, 606-616; 2013. DOI: 10.1111/1552-6909.12234

Accepted April 2013

It is not the population…

"Blaming women for the rise in maternal mortality, e.g., they need to take better care of themselves, will not solve the current issues. Indeed, the bulk of the solutions that will have the greatest impact are those solutions that occur at the system-level beyond the control of the individual woman."

- Debra Bingham,
Former Executive Director
California Maternal Quality Care Collaborative
28 February 2010