

OBSTETRIC HEMORRHAGE

Paul Ogburn, MD

Director, Maternal-Fetal Medicine
Stony Brook University

IMPROVEMENTS IN HEALTHCARE

- MOTIVATION
- KNOWLEDGE
- RESOURCES
- SYSTEMS

OBJECTIVES

- Motivate your involvement in decreasing maternal mortality due to Hemorrhage
- Increase your Knowledge in treating Obstetric Hemorrhage
- Describe a System for managing Obstetrical Hemorrhage emergencies
- Offer Resource assistance for your development of systems improvement

MOTIVATION

- Every day across the United States, 2-3 women die due to pregnancy-related complications (World Health Report 2005)
- New York State has the highest rate of maternal mortality in the United States, 12.8/100,000 (2002).
- The most common causes of maternal death are pregnancy induced hypertension (PIH), embolism, obstetrical hemorrhage and infection.
- Obstetrical hemorrhage is known as the most *preventable* cause of maternal mortality.

MOTIVATION II

- Hemorrhage accounted for 15.2% of all reported maternal mortalities in New York State between 2003 and 2005 (SMI ACOG Report 2005).
- Ninety-seven percent (97%) of all hemorrhagic deaths occurred while women were hospitalized.
- These deaths spanned all socioeconomic classes; in addition to the deaths, an even larger number of “near misses”, women who had severe hemorrhages but survived, were reported.

MOTIVATION III

- **To Decrease Maternal Mortality due to Hemorrhage, ACOG and the NYDOH recommend that all Obstetric Units develop effective guidelines for the management of Obstetrical Hemorrhage.**

KNOWLEDGE

- What is the mechanism of death in acute obstetric hemorrhage?
- How can you delay this death with one hand?

KNOWLEDGE

- What is the mechanism of death in acute hemorrhage? --- Cardiac Decompensation
- The coronary arteries fill only in diastole.
- Hemorrhage decreases diastolic pressure and filling time (decreasing O₂ to the heart) while increasing cardiac oxygen requirements.

KNOWLEDGE

How can you delay this death with one hand? --- Manual Compression at the Bifurcation of the Aorta.

Restores diastolic pressure and slows heart rate to allow improved coronary perfusion and decreased cardiac oxygen consumption.

“Buys time” until blood and help can come.

SYSTEM

In an effort to decrease the risk of maternal hemorrhage related morbidity and mortality, the Perinatal Service at Stony Brook University Hospital developed a Maternal Hemorrhage Task Force.

Code Noelle: An Interdisciplinary Approach to Reducing Maternal Morbidity and Mortality Secondary to Maternal Hemorrhage

A. Combs, RNC, W. Davila, RNC,
A. Lynch, RNC, D. Galanakis, MD,
T. Griffin, MD, P. Ogburn, MD,
E. Steinberg, MD, R. Adsumelli, MD



METHODS I

- An interdisciplinary group was formed and charged with improving the processes related to caring for pregnant women at risk for hemorrhage and systems that impact their care.
- The task force then developed interdisciplinary hemorrhage protocols with emphasis on rapid access to blood products.

METHODS II

- Educational programs with didactic components and simulation drills were developed to assist the staff with preparing for emergencies and to identify system issues.
- Monthly debriefing meetings to review the responses to simulated and real maternal hemorrhages and to identify areas of strength and areas that require improvement have been established.

OUTCOMES I

- Order sets have been developed by a team including Nursing, Obstetrics, Anesthesiology, and Blood Bank.
- The order sets include admission orders for all OB patients which identify risk of hemorrhage and a set of orders specifically designed for maternal hemorrhage.
- A “Code Noelle” administrative policy and procedure has been developed.

OUTCOMES II


- Education and ongoing simulation drills utilizing a computerized obstetrical mannequin are ongoing.
- Monthly interdisciplinary meetings occur to address issues identified by reviewing evaluation tools from simulations and chart review for any actual maternal hemorrhage.

OUTCOMES


ORDERS for L&D


INCLUDES:

1. Risk Assessment
2. Risk Appropriate Orders

 Labor and Delivery Admission: PHYSICIAN'S ORDERS				
ORDERS: Must include physician's signature and ID# STAT ORDERS MUST BE COMMUNICATED TO NURSE			Transcriber's Initials/ID#	
One of the following must be chosen:				
<input type="checkbox"/> Low Risk for Hemorrhage OR <input type="checkbox"/> Moderate Risk for Hemorrhage May include but not limited to: Cesarean Sections, previous uterine incision, multiple gestations, macrosomia, prior post partum hemorrhage, uterine fibroids, and any other increased risk identified by the physician or CNM. CBC with platelets Type and Screen Additional Labs: _____				
<input type="checkbox"/> High Risk for Hemorrhage May include but not limited to: placenta previa, suspected placenta accreta, suspected placental abruption, Hematocrit less than 26%, vaginal bleeding on admission, coagulation defects and any other increased risk identified by physician or CNM. CBC with platelets Type, Screen and Crossmatch for 2 units of Packed Red Blood Cells PT/APTT Fibrinogen Additional Labs: _____ Start primary IV: 18 gauge or larger, _____ at _____ mL/hr Start second IV: 18 gauge or larger, Normal Saline, with Y tubing for blood administration at _____ mL/hr Anesthesia Consult Maternal Fetal Medicine Consult <input type="checkbox"/> Contact Cell Saver Team 800 235 5728				
MD/LIP/NP Signature:		ID#	Date:	Time:
Nurse's Signature:		ID#	Date:	Time:

Obstetrical Hemorrhage Orders

 OBSTETRICAL HEMORRHAGE PHYSICIAN'S ORDER SHEET		Transcriber's Initials/ID#
ORDERS: Must include physician's signature and ID# STAT ORDERS <u>MUST</u> BE COMMUNICATED TO NURSE		
Labwork: CBC with platelets, PT/APTT, Fibrinogen, D-Dimer, Urinalysis		
Blood Bank orders: Type and Screen, and 4 crossmatched Packed Red blood Cell units		
Other Labwork		
Use fluid warmer to infuse IV fluids and blood products		
Start <u>second</u> IV Normal Saline, 16 or 18 gauge, with Y tubing for blood administration		
IV fluids: #1 Lactated Ringers at 125 mL/hr #2 Normal Saline at 125 mL/hr (adjust IV fluids rate as directed by responsible physician)		
Transfuse 2 units available Packed Red Blood Cells immediately		
Thaw 2 units Fresh Frozen Plasma: Transfuse as directed by responsible physician.		
<input checked="" type="checkbox"/> Hetastarch (HEXTEND) 500 mL x 1 pm volume depletion. Infuse as directed by responsible physician.		
Document Blood Pressure, Pulse, Respirations q 5 minutes during acute hemorrhage, and every 15 minutes when stable		
Temperature Q 1 Hour		
Continuous cardiac monitoring, pulse oximetry		
Oxygen at 10 L /minute by nonrebreather mask		
Insert indwelling Foley catheter		
Strict hourly intake and output		
Anesthesia Consult		
Maternal Fetal Medicine Consult		
MD/LIP/NP Signature:	ID#	Date:
		Time:
Nurse's Signature:	ID#	Date:
		Time:

 OBSTETRICAL HEMORRHAGE PHYSICIAN'S ORDER SHEET		Transcriber's Initials/ID#
ORDERS: Must include physician's signature and ID# STAT ORDERS <u>MUST</u> BE COMMUNICATED TO NURSE		
Medications:		
<input type="checkbox"/> Oxytocin ___units/L in ___ to run at ___mL/hr, times ___Liters		
<input type="checkbox"/> Methylergonovine (METHERGINE) 0.2 mg IM X 1 (<i>Prescriber : Use with extreme caution in hypertensive patients</i>)		
<input type="checkbox"/> Carboprost (HEMABATE) 250 micrograms IM X 1		
<input type="checkbox"/> Misoprostol (CYTOTEC) _____micrograms per rectum by physician X 1		
<input type="checkbox"/> Interventional Radiology consult (4-2413, or page radiology resident on call)		
<input type="checkbox"/> GYN Oncology Consult		
<input type="checkbox"/> Surgical Trauma Consult		
<input type="checkbox"/> Call Cell Saver Team (800 235 5728)		
Other Orders:		
MD/LIP/NP Signature:	ID#	Date:
		Time:
Nurse's Signature:	ID#	Date:
		Time:

Developing Simulation Drills

- **Noelle, TM, Gaumard Scientific Company Inc is an Obstetric, computerized mannequin.**
- **She has the capability to give birth, elicit simulated FHR strips and can be used with ultrasound technology.**
- **Noelle was modified to be used in hemorrhage simulation.**

Noelle™, Gaumard Scientific Company Inc.



Developing Simulation Drills

- Noelle is admitted to the hospital census with a MRN and encounter number.
- Blood is also drawn and processed by the lab and blood bank.
- Results appear under her name in the Power Chart system.



Self-Laminating
Wrist Band

Self-Laminating
Wrist Band

0172 (11/04)

STEP ONE
PRINT
Print sheet on laser
or inkjet printer.

STEP TWO
SEPARATE
Push down at * and separate
imaged band from sheet.

STEP THREE
FOLD
Begin in center of wristband, fold
laminated over imaged area and
smooth out to the ends.

STEP FOUR
SECURE
Wrap laminated wristband
around wrist. Secure with
adhesive tabs.

©2004, LaserBand LLC. Licensed under one or more of the following: U.S. Patent #5,653,472 and LaserBand U.S. Patents #6,510,634; #6,438,881; #6,067,739; #6,000,160; #5,933,993 and others pending.

	<p>MANNEQUIN , NOELLE 010032480583 01/01/1967 38 Y F CAT 30250790 10/27/05 OBS 08N H348 2</p>	<p>MANNEQUIN , NOELLE 010032480583 01/01/1967 38 Y F CAT 30250790 10/27/05 OBS 08N H348 2</p>	<p>MANNEQUIN , NOELLE 010032480583 01/01/1967 38 Y F CAT 30250790 10/27/05 OBS 08N H348 2</p>
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PLS-102AXM



INPATIENT ADMITTING

MOTHER'S MR#	PATIENT'S MR#
MOTHER'S ENCF	PATIENT'S ENCF

PATIENT'S NAME MANNEQUIN , NOELLE		PAT. CAT.	DATA OF BIRTH	AGE	BIRTH PL.	PATIENT OCCUPATION
PATIENT'S ADDRESS 31 RESEARCH WAY		IA	01/01/1967	38 Y	NY	
CITY		CNTY	STATE	ZIP CODE	ETHNIC	GENDER
EAST SETAUK		47	NY	11733	B	F
HOME TELEPHONE		RELIGION	MST	MAIDEN NAME		
(631)939-3939		CAT	M	DUMMY		
SOCIAL SECURITY NUMBER		930-39-3039				

ADMIT TYPE	ADMIT DATE	ADMIT TIME	ADMITTING DIAGNOSIS	PATIENT TYPE	
D	10/27/05	23:00	PREG FOR DELIVERY	S	
ADMITTING PHYSICIAN	PHYSICIAN #	PHY SER	HOSP SERV	COMM CTR	
QUIRK, J. GERALD	032813	OBG	OBS	08N	
PREVIOUSLY HOSPITALIZED AT	DATE FROM	DATE TO	ROOM	BED	
	/ /	/ /	H348	2	
REFERRING / PRIMARY CARE PHYSICIAN		QUIRK, J. GERALD			

NEXT OF KIN	DATE OF BIRTH	HOME TELEPHONE NUMBER	RELATION TO PATIENT
MANNEQUIN , MAN		(631)939-3939	U SPOUSE
ADDRESS	CITY	STATE	ZIP CODE
31 RESEARCH WAY	EAST SETAUK	NY	11733-

GUARANTOR NAME	DATE OF BIRTH	GUARANTOR TELEPHONE	RELPT	GUARANTOR OCCUPATION
C/O BUSSINESS ,OFFICE	02/14/67	() -	O	
ADDRESS	CITY	STATE	ZIP CODE	
31 RESEARCH WAY	EAST SETAUK	NY	11733-	
SECONDARY CONTACT	NAME	PHONE NUMBER		
		-		

PATIENT'S POLICY NUMBER	PATIENT'S NAME ON CARD	PART A (Y/N) EFF. DATE	INS PLAN
I.P.R.O. NUMBER	PATIENT'S EMPLOYER	PART B (Y/N) EFF. DATE	INS PLAN

MEDI CAID ID NO	I.P.R.O. NUMBER	INS PLAN

SUBSCRIBER'S NAME	REL/INS	D.O.B	POLICY NUMBER	LOCAL NUMBER	INS PLAN
		/ /			
SUBSCRIBER'S SSN	SUBSCRIBER'S EMPLOYER (NAME/LOCATION)				
- -					
SUBSCRIBER'S NAME	REL/INS	D.O.B	POLICY NUMBER	LOCAL NUMBER	INS PLAN
		/ /			
SUBSCRIBER'S SSN	SUBSCRIBER'S EMPLOYER (NAME/LOCATION)				
- -					

INSURANCE COMPANY	POLICY NUMBER	WC	NF	INS PLAN
SELF PAY IP				H01
ADDRESS	EAST SETAU NY	11733	TELEPHONE NUMBER	
31 RESEARCH WAY			(631)939-3939	
SUBSCRIBER'S NAME	DOB	REL/INS	SUBSCRIBER'S SSN	
MANNEQUIN ,MANNY	/ /	2	- -	
SUBSCRIBER'S EMPLOYER (NAME/LOCATION)	EMPLOYER'S TELEPHONE		() -	
	-		-	

INSURANCE COMPANY	POLICY NUMBER	WC	NF	INS PLAN
ADDRESS	TELEPHONE NUMBER			
	() -			
SUBSCRIBER'S NAME	DOB	REL/INS	SUBSCRIBER'S SSN	
	/ /		- -	
SUBSCRIBER'S EMPLOYER (NAME/LOCATION)	EMPLOYER'S TELEPHONE		() -	
	-		-	

DATE OF ACC	TIME	PLACE OF ACCIDENT	CITY	STATE	ACC CODE
			0		

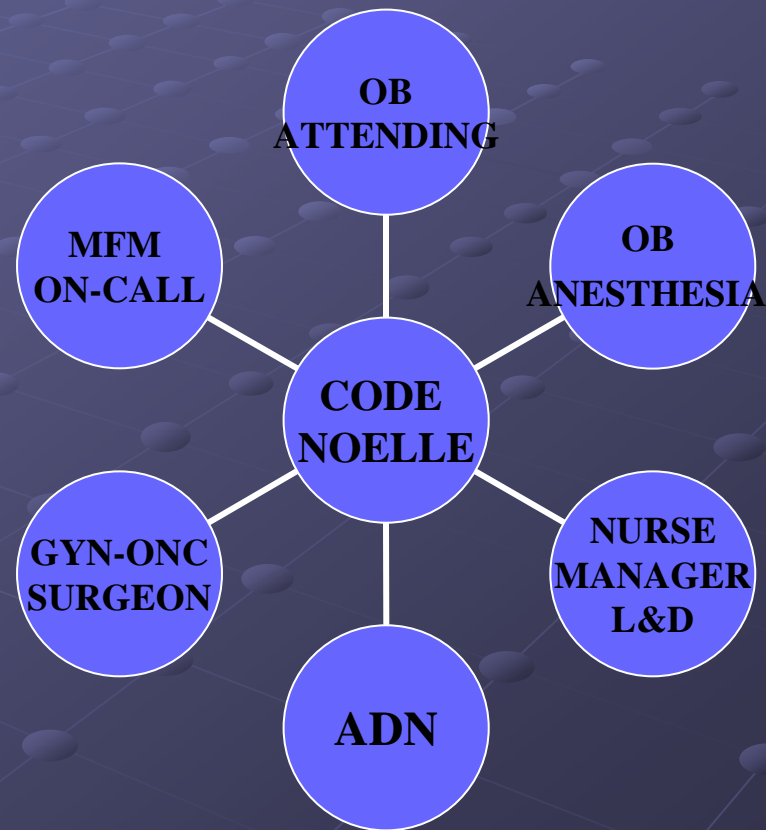
MRN:	ENC:	REGISTRAR	FN CLASS
		KCOTE	P

MEDICAL RECORD COPY

AD4812 / AD2C101 (R1/05) (P9/99)

Developing Simulation Drills

- The hospital operators call an overhead Code Noelle and initiate a “Group Page” of critical personnel.
- Distribution services assist during the drill with the transporting of blood products, specimens and personnel.





Pictured above: T. Griffin and "Noelle"™, Gaumard Scientific Company Inc.



Pictured above: L. Gioia, MD, A. Miller, RN, A. Hall, RN and other members of the L&D staff during a "Code Noelle" drill.



Pictured Above: E. Steinberg, MD, M. Kang, MD, A. Hall, RN, S. Micelli, RN during simulation.

OB Residents Applying Bimanual Compression



Pictured Above: N. Ostrov, MD and M. McDowell, MD.

OB and Anesthesia



Pictured Above: P. Ogburn, MD, M. Kang, MD and T. Saunders, MD

Post Code Noelle Debriefing



Code Noelle Drill Evaluation Forms

1

Code Noelle Drill

Evaluation Form
Stony Brook University Hospital

Date of drill: _____ Time of drill: _____

Evaluator _____

Staff present:

Obstetricians: _____

Anesthesiologists: _____

Nurses: _____

Ancillary (ORT, NA, NSC): _____

Nursing:

Element	Completed (check)	Time (if applicable)	Comments
Applies O2 at 10L/m			
Positions patient (Trendelenburg if appropriate)			
BP q 5 min or more frequently			
Continuous pulse oximetry			
Starts 2 nd IV/ large gauge			
Inserts Foley			
Obtains/sets up fluid warmer			
Administers blood/fluids as ordered			
Administers/documents medications:			
Oxytocin			
Methergine			
Hemabate			
Misoprostol (Cytotec)			
Draws/sends labs			
Hemodynamic monitoring			
Monitors I&O hourly			
Communicates with team			
Other:			
Other:			

OB physicians:

Element	Completed (check)	Time (if applicable)	Comments
Calls <i>Code Noelle</i>			
Identifies cause(s) of bleeding			
Atony			
Laceration			
Rupture			
Placental			
Other:			
Signs Hemorrhage Orders pg 1			
Completes pg 2/ pt- specific orders/meds			
Administers medications:			
Misoprostol (Cytotec)			
Other:			
Verbalizes/performs indicated procedures:			
Bimanual compression			
Laceration Repair			
Hysterotomy/Laparotomy			
Uterine artery ligation			
Hypogastric artery ligation			
Hysterectomy			
Other:			
Other:			
Calls for additional resources			
Orders <i>Cell Saver</i>			
Labwork results reviewed			
Starts OB Hemorrhage Flow Sheet			
Communicates with team			
Other:			
Other:			

Anesthesia Physicians:

Element	Completed (check)	Time (if applicable)	Comments
Calls <i>Code Noelle</i>			
Coordinates team activities			
<i>Initially</i> evaluates airway, cardiorespiratory, hemodynamic status			
Orders/starts additional IV lines/hemodynamic monitoring			
Orders/verifies blood products			
Administers fluids/blood products, with fluid warmer			
Monitors fluid status/I&O			
<i>Continuously</i> monitors airway, cardiorespiratory, hemodynamic status			
Orders <i>Cell Saver</i>			
Labwork results reviewed			
Communicates with team			
Other:			
Other:			

Ancillary Staff (NSC, ORT, NA) & miscellaneous:

Element	Completed (check)	Time (if applicable)	Comments
NSC calls operator for <i>Code Noelle</i>			
NSC generates lab/blood reqs correctly			
NSC pages additional support personnel as needed			
NA assists RN, MD's prn			
NA gathers necessary equipment			
NA transports specimens			
NA picks up blood products			
ORT prepares OR			
ORT obtains fluid warmer			
ORT transports specimens			
ORT picks up blood products			
ORT assists RN, MD prn			
Other:			
Miscellaneous:			
Blood products received-time			
Labwork results received-time			
Pager system: Responsible physicians, nursing leadership, paged appropriately			
Other:			

Monthly Code Debriefing



Name/MRN# _____
 Month of Review _____
 Date _____

Element(s)	Present/ Complete/ adequate	Not present/ Incomplete/ inadequate	Comments
RISK assessment in L&D admission orders			
OB Hemorrhage Order SET			
MD Hemorrhage 24 hour assessment flow sheet			
MD Daily Progress notes			
Blood product administration			
Laboratory			
Paging system			
Transport			
MFM/GYN backup			
Consults/ Interventional Radiology			
Anesthesia			
Nursing: Coordination Pt care Documentation			
Operating room: ORT/Scrub Instrumentation Other			
NS Clerks			
Nursing assistants			

PHYSICIAN OBSTETRICAL HEMORRHAGE FLOW SHEET



Paul L. Ogburn, MD

 										
* O B 2 C 2 8 9 *										
OBSTETRIC HEMORRHAGE FLOW SHEET										
To be completed by Obstetric Service for first 24 hours after Emergency Hemorrhage.										DATE: _____
Time Following Hemorrhage	BP	Pulse	RR	Recent H&H*	Bleeding Status	Urine Total	Total Intake	Total Blood Products Infused	MFM Notified (Name, Date/ Time)	Physician Signature/ID#
0 Hours Time: _____										
2 Hours Time: _____										
4 Hours Time: _____										
6 Hours Time: _____										
8 Hours Time: _____										
12 Hours Time: _____										
18 Hours Time: _____										
24 Hours Time: _____										
COMMENTS:										
Date/Time	Comment**								Signature/ID#	
Maternal Fetal Medicine Comments:										
MFM Physician Signature: _____ ID# _____ DATE: _____ TIME: _____										
* Include Time Drawn										
** Include Appropriate Lab Values										

PRACTICE CHANGES: COMMUNICATION

- The development of an overhead “Code Noelle” group page to rapidly notify critical personnel
- The development of roles for the professional and ancillary nursing staff including triage, nurse scribe and runners
- The involvement of distribution services to facilitate elevator availability to move specimens, blood products and personnel
- The development of a unit based telephone directory that contains important hospital extensions

PRACTICE CHANGES: DOCUMENTATION

- **The creation of forms to assist clinicians in the assignment of hemorrhage risk and the development of a complete order set to facilitate rapid response in the event of an actual hemorrhage**
- **The development and implementation of the MD OB Hemorrhage Flow Sheet for inter-service ongoing patient assessment and management**

PRACTICE CHANGES: EQUIPMENT

- **Organization of supplies for OB emergencies**
- **Synchronization of the clocks in the LDRs and ORs on the computer systems, to assure accuracy and proper documentation of events**
- **The review of existing surgical trays for adequacy of instruments**

PRACTICE CHANGES: EDUCATION

- **Comprehensive interdisciplinary OB Hemorrhage Education for all faculty, private physicians, midwives and in hospital OB staff**
- **Improved education regarding blood products, how to requisition them and differentiating between stat and emergency blood requests**
- **The development of objective criteria to call a “Code Noelle”**

CONCLUSIONS

A systematic, team based, maternal hemorrhage protocol has been implemented at SBUH.

- **Drills provide a platform to identify system issues and prepare for maternal emergencies.**
- **Hemorrhage drills and systematic, non-punitive chart review of actual maternal hemorrhages will decrease the risk of adverse maternal outcomes.**

Obstetric Hemorrhage

Stony Brook University Hospital has implemented a system for dealing with obstetrical hemorrhage to decrease the risk of maternal mortality. The components of the system include:

1. Education
2. Preparation
3. Vigilance
4. Persistence
5. Continuous improvement

Obstetric Hemorrhage

1. Education – includes an educational CD.

2. Preparation – includes:

- a. standard admission orders for labor/delivery;
- b. standard orders for obstetrical hemorrhage emergency;
- c. a system developed to maintain obstetrical continuity with Maternal Fetal Medicine supervision for 24 hours after initiation of the obstetrical hemorrhage emergency;
- d. appropriate equipment for labor and delivery;
- e. appropriate training for physicians and nurses.

Obstetric Hemorrhage

3. Vigilance - is maintained by virtue of the system of orders, training, and monitoring which includes the education and preparation mentioned above.
4. Persistence - occurs for each individual patient by virtue of the mandated 24 hour monitoring (supervised by the perinatal and obstetrical teams) following the acute hemorrhage event.
5. Formal training - concerning obstetrical hemorrhage will occur for physicians and nurses (with additional practical drills).

RESOURCES

- Copy of this Powerpoint presentation
- Copy of SBUH mandatory educational Powerpoint presentation
- Commitment from Stony Brook RPC to give technical assistance (if requested) to each obstetric unit/hospital in Suffolk County in developing individualized Obstetric Hemorrhage protocols

SPECULATION

**Continued focus on
improving
systems and
interdisciplinary
communication
will decrease long
term maternal
morbidity and
mortality.**

