Institute for Healthcare Improvement (IHI)

Perinatal Improvement Community
Special Webinar
"VENOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS: TARGETING MATERNAL PATIENTS"

January 22, 2014
Speakers

Michael Wong, Founder
PPAHS

Sue Gullo, Director
PIC

Peter Cherouny, Faculty Chair
PIC
Objectives of Today’s Webinar

1. Discuss the most up to date data that supports VTE as a leading cause of maternal morbidity and mortality.

2. Describe the development of the VTE Safety Checklist.

3. Identify specific components of the care process that have been identified as problem prone and unreliable.

4. Identify opportunities to be involved in testing.
VENOUS THROMBOEMBOLISM (VTE):
SAFETY RECOMMENDATIONS
TARGETING MATERNAL PATIENTS
Maternal Death Rate Has More Than Doubled

No. of pregnancy-related deaths per 100,000 live births per year

http://www.cdc.gov/reproductivehealth/MaternalInfantHealth/PMSS.html
Maternal Death Rate Has More Than Doubled

“These statistics may represent a conservative estimate of the problem. Why? Not all pregnancy-related deaths are accurately identified and reported. Hence, pregnancy-related deaths identified at the national level likely undercount the true number.”

William M. Callaghan, MD, MPH
Chief, Maternal and Infant Health Branch
Division of Reproductive Health
National Center for Chronic Disease Prevention and Health Promotion
Centers for Disease Control and Prevention
### US Maternal Death Rate Compared to Other Countries


<table>
<thead>
<tr>
<th>RANK</th>
<th>COUNTRY</th>
<th>(DEATHS/100,000 LIVE BIRTHS 2010)</th>
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<td>1</td>
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<tr>
<td>24</td>
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# US Maternal Death Rate Compared to Other Countries

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<tr>
<td>26</td>
<td>France</td>
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<td>Brunei</td>
<td>24</td>
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The United States has a higher ratio of maternal deaths than at least 40 other countries, even though it spends more money per capita for maternity care than any other:\(^1\)

- Venous thromboembolism costs the health care system more than $1.5 billion/year\(^2\)
- Cost of managing an initial episode:\(^2\)
  - deep vein thrombosis $7,712-$10,804 (est.)
  - pulmonary embolism $9,566-$16,644 (est.)

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Why Focus on VTE

Pregnancy is a major risk factor for developing venous thrombosis and pulmonary embolism, especially following cesarean delivery and up to one month post partum.¹

“For pregnant women, the risks of VTE is 4-5 times higher than women who are not pregnant. Moreover, this risk is at least twice as much following cesarean delivery.”²

VTE Risk for Maternal Patients

Dr. Andra James
Professor of Obstetrics & Gynecology,
Division of Maternal Fetal Medicine
University of Virginia School of Medicine

To ensure VTE Prevention is maximally used, harm reduction strategies should be used:
• consistently by clinicians
• effectively with hand off communications

1. “Pregnancy-Related Mortality Surveillance” – Centers for Disease Control & Prevention, Feb. 21, 2013
2. http://ppahs.org/2013/05/02/preventing-death-following-cesarean-delivery/
One Patient is One Too Many:
The True Reason for OB VTE Prevention

Amber Scott:
• On May 22, 2012, husband came home from work and found her unresponsive.
• After determining that Amber had a blood clot in her brain, doctors performed an emergency caesarian section.

One Patient is One Too Many:
The True Reason for OB VTE Prevention

• Adeline was born, 6.5 pounds, healthy and beautiful
• While Adeline was thriving, Amber was fighting for her life:
  - lay in a coma as doctors performed a series of surgeries to remove the clot in her brain.
  - weeks later, came out of the coma, when Amber held up two fingers after being shown a picture of Adeline.

Amber’s progress:
• Continues with rehabilitation more than a year after delivery.
• Amber continues to make great progress in her daily outpatient therapy sessions.
• She is now able to pull herself up and stand on her own as she steadily regains strength in both the left and right side of her body.

One Patient is One Too Many: Preventable Deaths

Amee VanTassell
Died of blood clot just four days after cesarean delivery of healthy daughter

Eleven days after undergoing what she thought was “an uncomplicated C-section,” Samara McAuliffe developed a blood clot in her lungs.

Lisa Boyd suffered a blood clot in her leg a week after giving birth to her second child. She nearly died.

Jessica Phillips survived a life-threatening blood clot right after giving birth by C-section.
VENOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS:

TARGETING MATERNAL PATIENTS

Peter Cherouny, M.D.
Emeritus Professor, Obstetrics, Gynecology and Reproductive Sciences, University of Vermont
Chair and Lead Faculty: IHI Perinatal Improvement Community
VENOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS: TARGETING MATERNAL PATIENTS

*Note: Number of pregnancy-related deaths per 100,000 live births per year.*
VENOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS: TARGETING MATERNAL PATIENTS

Percent of First Births* by Mother’s Age, 1970-2010

Percentages may not add up to 100 due to rounding.

Figure 2. Cesarean delivery at 37, 38, 39, and 40 weeks of gestation: United States, final 1996–2010 and preliminary 2011

NOTES: Singleton only. Thirty-seven and 38 weeks are considered early term; 39 and 40 weeks are considered full term. Access data table for Figure 2 at: http://www.cdc.gov/nchs/data/databriefs/db124_tables.pdf#1. SOURCE: CDC/NCHS, National Vital Statistics System.
Joint Commission Sentinel Event
Alert Issue #44

- Relationship between route of delivery and maternal death

Vaginal 1.7
Primary Cesarean 16.3
Repeat Cesarean 7.4
Total Cesarean 12.7
Totals 6.5

VENOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS: TARGETING MATERNAL PATIENTS
### MMWR Pregnancy Related Mortality

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Embolism</td>
<td>20%</td>
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<tr>
<td>Hemorrhage</td>
<td>17%</td>
</tr>
<tr>
<td>Preeclampsia/Eclampsia</td>
<td>16%</td>
</tr>
<tr>
<td>Infection</td>
<td>13%</td>
</tr>
<tr>
<td>Cardiomyopathy</td>
<td>8%</td>
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Maternal Death NYS

- All Causes
  - Embolism 24%
  - PIH 24%
  - Hemorrhage 15%
  - Infection 15%
Joint Commission Sentinel Event
Alert Issue #44

Causal relationship between route of delivery and maternal death

<table>
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<tr>
<th>Route of Delivery</th>
<th>Rate</th>
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<tr>
<td>Vaginal</td>
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<tr>
<td>Primary Cesarean</td>
<td>2.5*</td>
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<tr>
<td>Repeat Cesarean</td>
<td>1.1</td>
</tr>
<tr>
<td>Total Cesarean</td>
<td>2.0*</td>
</tr>
<tr>
<td>Totals</td>
<td>1.4</td>
</tr>
</tbody>
</table>

*p<0.001 for VD

Joint Commission Sentinel Event
Alert Issue #44

Causal relationship between route of delivery and maternal death excluding PE

<table>
<thead>
<tr>
<th>Route of Delivery</th>
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<tr>
<td>Vaginal</td>
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VENOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS: TARGETING MATERNAL PATIENTS

4.0 million USA deliveries

\[ \times 33.7\% \text{ cesarean} = \]

- 1.34 million Cesarean Sections
  - Even low incidence outcomes become important
Definitions

- Deep Venous Thrombosis - DVT
- Pulmonary Embolism - PE
- DVT + PE = VTE
- Thromboembolic disease
VENOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS: TARGETING MATERNAL PATIENTS

Incidence
- 1-2/1000 pregnancies
- 4-5 fold relative risk in pregnancy
- ½ during pregnancy and ½ postpartum
- >1/100,000 maternal deaths (10%)
VENOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS: TARGETING MATERNAL PATIENTS

Risk Factors

- Prior history VTE
- Thrombophilias
- Bed rest
- Obesity
- Smoking
- Operative delivery
Although bed rest and hydration have been recommended to women with symptoms of preterm labor to prevent preterm delivery, these measures have not been shown to be effective for the prevention of preterm birth and should not be routinely recommended. Furthermore, the potential harm, including venous thromboembolism, bone demineralization, and deconditioning, and the negative effects, such as loss of employment, should not be underestimated.
VENUOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS: TARGETING MATERNAL PATIENTS

Cesarean delivery

- All in moderate risk unless surgery is less than 30 minutes and patient under 40 without other risk factors
VENOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS: TARGETING MATERNAL PATIENTS

- Prevention
- Recognition
- Treatment
VENOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS: TARGETING MATERNAL PATIENTS

Prevention
- Risk assessment
- Risk appropriate prophylaxis
- REPEAT
Effective Risk Assessment

- Initial visit
- During pregnancy
- Admission for delivery
VENOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS: TARGETING MATERNAL PATIENTS

Effective Risk Assessment

- Low risk (surgery less than 30’, patient <40yo)
- Moderate risk
- High risk
- Highest risk
Effective Prophylaxis Assessment

- Risk-based
- All patients having a cesarean delivery should have PCD (pneumatic compression devices) placed
VENOUS THROMBOEMBOLISM (VTE) SAFETY RECOMMENDATIONS: TARGETING MATERNAL PATIENTS

Prevention
- Risk assessment
- Risk appropriate prophylaxis
- REPEAT
PPAHS VTE Checklist Group: Health Expert Panel

Rose Mary Ainsworth, RN, MSN  
Mother/Baby Unit  
Huntsville Hospital for Women and Children  
Richard Berkowitz, MD  
Quality Assurance Director  
Columbia University Medical Center  
William M. Callaghan, MD, MPH  
Chief, Maternal & Infant Health Branch  
Division of Reproductive Health National Center  
Centers for Disease Control and Prevention  
Peter Cherouny, MD  
Lead Faculty, Perinatal Community,  
Institute for Healthcare Improvement  
Nancy Chescheir, MD  
Clinical Professor, Maternal-Fetal Medicine  
Obstetrics and Gynecology, UNC School of Medicine  
Steven Clark, MD  
Medical Director, Women & Newborns Clinical Services  
Hospital Corporation of America  
Michèle G. Curtis, MD, MPH, MML  
CeeShell Consulting  
editor of “Glass’ Office Gynecology”  
Raiyomand Dalal, FRANZCOG, MD, DNB, FCPS, DGO, DFP, MNAMS  
Senior Lecturer  
School of Medicine, University of Western Sydney  
Mary D’Alton, MD  
Chair, Department of Obstetrics & Gynecology  
Maternal-Fetal Medicine  
Columbia University Medical Center  
Lisa J. Enslow, MSN, RN-BC  
Nurse Educator  
Women's Health and Ambulatory Care Services  
Hartford Hospital  
Frank Federico, RPh  
Patient Safety Advisory Group, The Joint Commission  
Executive Director, Institute for Healthcare Improvement  
Sue Gullo, MS, RN  
Director, Perinatal Improvement Community  
Institute for Healthcare Improvement  
Roy Jackson, MD, B.Sc., MB.BCh., F.R.C.S  
Southern Health Centre  
Andra James, MD  
John M. Nokes Professor of Obstetrics & Gynecology  
Division of Maternal-Fetal Medicine  
University of Virginia  
Betty Janey  
Project Manager, Perinatal Community  
Institute for Healthcare Improvement  
Deborah Karsnitz, DNP, CNM, FACNM  
Nurse Educator, Frontier Nursing University  
John Keats, MD  
President and Medical Director, California HealthFirst Physicians  
member, ACOG’s Patient Safety & Quality Improvement Committee  
Colleen Lee MS, RN  
Maternal/Perinatal Patient Safety Officer  
Montefiore Medical Center  
Michael Paidas, MD  
Co-Director, Yale Women and Children’s Center for Blood Disorders  
Department of Obstetrics, Gynecology and Reproductive Sciences  
Yale University School of Medicine  
Jody Paxton  
Coordinator, Statewide Intensive Care Clinical Network  
Department of Health, Queensland, Australia  
Janet N. Press, RNC, MS, CT  
Perinatal/Obstetrical Coordinator  
C.N.Y.RegionaPerinatal Program  
Perinatal Bereavement Services Coordinator  
Crouse Hospital  
Peter Pronovost, MD, PhD, FCCM  
Professor, Depts. of Anesthesiology/Critical Care Medicine & Surgery  
The Johns Hopkins University School of Medicine  
Richard Smiley, MD  
Chief, Obstetric Anesthesia  
Columbia University Medical Center
Simple, Cost-Effective Solutions: Easily Adopted and Ensures Maximal VTE Prevention

“Ensuring the identification of pregnant women at-risk for VTE and applying measures to reduce VTE risks would assist in reducing blood clots, particularly for women following cesarean delivery.”

Dr. John Keats
(ex-officio member of ACOG’s Patient Safety and Quality Improvement Committee)

“Fortunately, risk factors for VTE can be reduced by simple and cost-effective measures, such as fitting inflatable compression devices on a woman’s legs before cesarean delivery and using inflatable compression sleeves until the woman is able to walk after delivery.”

Dr. Andra James
(Professor of Obstetrics & Gynecology, Division of Maternal Fetal Medicine, University of Virginia School of Medicine)

http://ppahs.org/2013/05/02/preventing-death-following-cesarean-delivery/
## OB/GYN VTE Safety Recommendations for the Prevention of VTE in Maternal Patients

### Step 1: Admission/Transfer of Care
Assess Patient for VTE Risk and Document

#### Risk Factor(s)
(check all that apply)

- Minor surgery planned
- Age over 35 years old
- Prior major surgery < 1 month
- Pregnancy or < 1 month postpartum
- Varicose veins (current)
- Inflammatory bowel disease (history/current)
- Overweight (obesity BMI > 30 kg/m²)
- Oral contraceptives or hormone replacement therapy (history)
- Preeclampsia (history/current)
- Smoking (history/current)
- Postpartum hemorrhage (current)
- Unexplained stillbirth (history)
- Major surgery (> 45 min.)
- Laparoscopic surgery (> 45 min.)
- Patient confined to bed > 72 hrs.
- Currently on bedrest/restricted mobility in the antepartum/postpartum period
- Immobilizing plaster cast (current)
- Central venous catheter (current)
- Cesarean-section delivery (current)
- Diabetes (including pre-gestational diabetes (history/current)
- Malignancy and/or chemotherapy (history/current)
- Parity > 5
- Assisted reproduction (current)
- Patient admitted for chronic major illness:
  - Myocardial infarction
  - Congestive heart failure
  - Kidney disease
  - Chronic hypertension
  - Severe sepsis/infection (current)
  - VTE (DVT or PE) (history)
  - Factor V Leiden/activated protein C resistance (history/current)
  - Antithrombin III deficiency (history/current)
  - Protein C or S deficiency (history/current)
  - Prothrombin 20210A (history/current)
  - Homocysteinemia (history/current)
  - Other congenital or acquired thrombophilia (history/current)
  - Blood transfusion (history/current)

#### Risk Factor Assessment (RFA) =

These recommended steps maximize VTE prevention, promote patient safety and health outcomes. There may be other indications for VTE prophylaxis that are not listed.

November 2013
# Recommended Prophylaxis Regimen

## LOW
### Antepartum
- Pharmacological prophylaxis not recommended unless indicated:
- Ordered: Prophylactic low-molecular weight heparin
- If LMWH unavailable: unfractionated heparin 5000 IU BID
- Not ordered (why?)

### Postpartum
- Early ambulation as prescribed by health provider
- Pharmacological prophylaxis not recommended unless indicated (not administered until 12 hours after vaginal delivery/episiotomy removal or 24 hours after cesarean delivery):
- If previous VTE, thrombophilia BMI >25 kg/m² & antepartum immobilization:
- Prophylactic low-molecular weight heparin
- Not ordered (why?)

- Mechanical prophylaxis prescribed:
- Graduated compression stockings & either:
- Intermittent pneumatic compression or venous foot pump

- Mechanical prophylaxis ongoing:
- On patient
- Properly worn
- Patient provided with information on proper use and wearing

- Initiate discharge planning:
- Discussed with patient/family
- Anticipated discharge date determined
- Evaluate patient for home use of:
  - Intermittent pneumatic compression (IPC)
  - Venous foot pump (VFP)
  - No IPC/VFP
- If evaluated for IPC/VFP, initiate availability on discharge

## MEDIUM
### Antepartum
- Pharmacological prophylaxis not recommended unless indicated:
- Ordered: Low-molecular weight heparin
- If LMWH unavailable: unfractionated heparin 5000 IU BID
- Not ordered (why?)

### Mechanical prophylaxis prescribed:
- Graduated compression stockings & either:
- Intermittent pneumatic compression or venous foot pump

### Mechanical prophylaxis ongoing:
- On patient
- Properly worn
- Patient provided with information on proper use and wearing

### Initiate discharge planning:
- Discussed with patient/family
- Anticipated discharge date determined
- Evaluate patient for home use of:
  - Intermittent pneumatic compression (IPC)
  - Venous foot pump (VFP)
  - No IPC/VFP
- If evaluated for IPC/VFP, initiate availability on discharge

## HIGH
### Antepartum
- Pharmacological prophylaxis:
  - Ordered if VTE unprovoked and/or thrombophilia and/or hormonally provoked:
  - Prophylactic low-molecular wt. heparin
  - If LMWH unavailable: unfractionated heparin BID (I trimester 5000 IU; II trimester 7500 IU; III trimester 10000 IU)
  - Not ordered (why?)

### Mechanical prophylaxis prescribed:
- Graduated compression stockings & either:
- Intermittent pneumatic compression or venous foot pump

### Mechanical prophylaxis ongoing:
- On patient
- Properly worn
- Patient provided with information on proper use and wearing

### Initiate discharge planning:
- Discussed with patient/family
- Anticipated discharge date determined
- Evaluate patient for home use of:
  - Intermittent pneumatic compression (IPC)
  - Venous foot pump (VFP)
  - No IPC/VFP
- If evaluated for IPC/VFP, initiate availability on discharge

## HIGHEST
### Antepartum
- Pharmacological prophylaxis:
  - Ordered:
    - Prophylactic low-molecular wt. heparin
    - If LMWH unavailable: unfractionated heparin BID (I trimester 5000 IU; II trimester 7500 IU; III trimester 10000 IU)
  - Not ordered (why?)

### Mechanical prophylaxis prescribed:
- Graduated compression stockings & either:
- Intermittent pneumatic compression or venous foot pump

### Mechanical prophylaxis ongoing:
- On patient
- Properly worn
- Patient provided with information on proper use and wearing

### Initiate discharge planning:
- Discussed with patient/family
- Anticipated discharge date determined
- Evaluate patient for home use of:
  - Intermittent pneumatic compression (IPC)
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- If evaluated for IPC/VFP, initiate availability on discharge

---

**Note:** These recommended steps maximize VTE prevention, promote patient safety and health outcomes. There may be other indications for VTE prophylaxis that are not listed.

*November 2013*
**Patient Reassessment**

Repeat assessment if Patient hospitalized longer than 24 hrs., before surgery or with any significant change in patient condition.

- Assess Patient for VTE Risk and Document [see step 1]
- Pharmacological prophylaxis:
  - continued as prescribed
  - not ordered
- Mechanical prophylaxis:
  - not prescribed
  - graduated compression stockings
  - intermittent pneumatic compression
  - venous foot pump
- Mechanical prophylaxis, if prescribed:
  - on patient
  - properly worn
  - patient provided with information on proper use and wearing
- Initiate discharge planning:
  - discussed with patient/family
  - anticipated discharge date determined
  - evaluate patient for home use of:
    - intermittent pneumatic compression (IPC)
    - venous foot pump (VFP)
    - no IPC/VFP
  - if evaluated for IPC/VFP, initiate availability on discharge

**Patient Discharge**

- Discharge instructions include:
  - healthcare provider contact information
  - signs and symptoms of DVT and PE
  - evaluate patient for home use of:
    - intermittent pneumatic compression (IPC)
    - venous foot pump (VFP)
    - no IPC/VFP
- Discharge instructions:
  - reviewed with patient and read back
  - received by patient
- Patient understands DVT/PE risk factors and how to prevent in postpartum period
- Follow up appointment made
- If immobility or bedrest required in antepartum period or extending 6 weeks postpartum:
  - healthcare provider orders completed, including:
    - evaluated patient for home use of:
      - intermittent pneumatic compression (IPC)
      - venous foot pump (VFP)
  - length of IPC/VFP treatment
  - durable medical equipment unit notified of start date of IPC/VFP treatment
  - patient provided with information on:
    - purpose of IPC/VFP
    - proper use and wearing
    - importance on maintaining use at home until MD discontinues
    - removed for ambulation and skin inspections (every 8 hrs)
    - worn minimally 16-20 hours per day
Questions/Discussion

- Sue Gullo - sgullo@IHI.org
- Pete Cherouny – peter.cherouny@vtmednet.org
- Michael Wong - mwong@ppahs.org
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Please email PIC Project Coordinator Evan Bittel at ebittel@ihi.org if you have any questions or would like additional information.