Maternal Morbidity & CMQCC Toolkits

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California Maternal Quality Care Collaborative (CMQCC)
Objectives

- SMM
- Describe the rise of maternal mortality in the state of California
- Discuss the four objectives of the CMQCC OB Hemorrhage Task Force
- Discuss implementation of the CMQCC OB Hemorrhage tools
- Describe the CMQCC OB Hemorrhage Care Guidelines
What is Severe Maternal Morbidity (SMM)

- **Severe Maternal Morbidity (SMM)** describes unanticipated outcomes of the labor and delivery process that result in significant short or long term consequences to a woman’s health\(^1\)
- Conditions associated with transfer to intensive care or a higher level of care
- 19 indicators have been identified by the CDC and based on ICD-10 diagnosis codes
CDC SMM Diagnosis Codes:

Acute myocardial infarction
Aneurysm
Acute renal failure
Adult respiratory distress syndrome (ARDS)
Amniotic fluid embolism
Cardiac arrest/ventricular fibrillation
Conversion of cardiac rhythm
Disseminated intravascular coagulation
Eclampsia
Heart failure/arrest during surgery or procedure
Puerperal cerebrovascular disorders
CDC SMM Diagnosis Codes (cont.)

Puerperal cerebrovascular disorders
Pulmonary edema/acute heart failure
Severe anesthesia complications
Sepsis
Shock
Sickle cell disease with crisis
Air and thrombotic embolism
Blood transfusion
Hysterectomy
Temporary tracheostomy
Ventilation

CDC-https://www.cdc.gov/reproductivehealth/maternalinfanthealth/smm/severe-morbidity-ICD.htm

Last updated 2/7/18
Why Focus on SMM?

![Graph showing trends in severe maternal morbidity per 10,000 delivery hospitalizations over time. The graph compares the overall rate of severe maternal morbidity with blood transfusions, severe maternal morbidity without blood transfusions, and blood transfusions.]

CDC, Updated 11/27/17
MDC SMM Without Transfusions

Importance of SMM

- Incidents of severe maternal morbidity can be considered “near misses”
- If these cases are not identified and treated appropriately, they have the possibility of escalating to maternal mortality\(^1\)
- Reviewing incidents of severe maternal morbidity provides a unique opportunity to improve our understanding of the primary contributing factors of these conditions with a potential to improve the health care delivery system\(^4\)
SMM Case Debriefings for Improvement and Sustainability

- Review your hospital data (MDC)
- Track and trend the data routinely – frequency based on delivery volume
- Perform a case review on all fallouts to determine opportunities for improvement
Case Review Process

- Does the case qualify?

- Participants in the review process should include members of the health care team involved in the care of the patient

- Review prenatal records to identify risk factors

- Was patient informed of risk? - Shared Decision Making
Case Review Process

- Comprehensive history and physical completed and documented on admission?
- Appropriate personnel/preparation available as indicated by H&P review?
- Comprehensive communication handoffs between caregivers regarding patient history, condition changes and delivery summary completed?
- Patient condition monitored at the correct frequency?
Case Review Process

- Documentation reflect that the patient/family were kept informed of the condition throughout the birthing process?
- Neonatal team kept informed of the patient condition on admission and throughout the labor process?
- Opportunities for improvement?
Action Steps for Improvement and Sustainability

- Set the expectation for quality sustainability
- Systematic review of bundle compliance for all toolkits at least quarterly.
  - The MDC assists with data review prompts and cases available for review
  - Review SMM trends as an outcome measure for all interventions and sustainability activities
  - Report quality findings to the OB health care team, Quality Department and Administration
Action Steps for Improvement and Sustainability

- Establish action plans for any identified opportunities for improvement
- Set stretch (bold) goals
- Small tests of change to evaluate action plans
  - Start with “early wins” and advance to bigger projects as goals are achieved
- Celebrate Successes!
Considerations for Antepartum Approaches for Reducing SMM

- Preconception Planning education for patients focusing on pre-pregnancy control of weight, hypertension, blood sugar management, activity

- Childbirth education to set the expectation for the labor process and reduce the likelihood of primary cesareans

- Open a dialogue regarding alternative birthing options at your facility (VBAC’s, midwives, doulas, delayed admissions, intermittent fetal monitoring, etc.)
Communication and Preparation

- The most frequent identified drivers of SMM are transfusions and sepsis
- SMM reduction strategy suggestions focus on communication and preparation
  - Insist on complete prenatal records which focus on risk factors. Add risk factors to hospital problem list.
  - Complete nursing care plans on identified risk factors with preparation plan documented
  - Ensure comprehensive assessments for identified risk factors are completed on admission (hemorrhage risk assessments, lab work analysis, GBS status)
Communication and Preparation

- Ensure systematic and ongoing assessments are completed and documented throughout the labor, delivery and postpartum process
  - Blood loss, time elapsed since rupture of membranes, vital signs including maternal temperature, fetal heart rate

- Have all required personnel and equipment available on the unit/at the bedside when risk factors are identified
  - Anesthesia, Scrub tech, blood products ordered, hemorrhage cart
References


3. Callaghan, W., Grobman, W., Kilpatrick, S., Main, E., D’Alton, M. Facility-based identification of women with severe maternal morbidity: It is time to start. *Obstet Gynecol.* 2014;123(5) 978-981. doi: 10.1097/AOG.0000000000000218
References

4. CDC, Severe Maternal Morbidity Indicators and Corresponding ICD Codes during Delivery Hospitalizations https://www.cdc.gov/reproductivehealth/maternalinfanthealth/smm/severe-morbidity-ICD.htm Last updated 2/7/18

Toolkits
Maternal Mortality Rate
California and United States - 1999-2013

CA-PAMR Quality Improvement Review Cycle

1. Identification of cases

2. Information collection, review by multidisciplinary committee
   - Hemorrhage
   - Preeclampsia
   - CVD

3. Cause of Death, Contributing Factors and Quality Improvement (QI) Opportunities identified

4. Strategies to improve care and reduce morbidity and mortality

5. Implementation and Evaluation of QI strategies and tools
CMQCC Maternal Quality Improvement Toolkits

- Aim to improve the health care response to leading causes of preventable death among pregnant and postpartum women
- Include a compendium of best practice tools and articles, care guidelines in multiple formats, hospital-level implementation guide, and professional education slide set.
- Developed in partnership with key experts from across California, representing the diverse professionals and institutions that care for pregnant and postpartum women.
Lessons from the Field

- It takes a broad team
- Easy wins matter
- Goals and timelines are very useful
- It takes time and persistence to get the systems running smoothly
- Must have champions

<table>
<thead>
<tr>
<th>Disciplines &amp; Departments</th>
<th>Needed?</th>
</tr>
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<tbody>
<tr>
<td>Obstetrics</td>
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<tr>
<td>Nursing</td>
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<tr>
<td>Anesthesia</td>
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<td>Laboratory</td>
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<td>Operating Room</td>
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<td>Support personnel</td>
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<td>IT/EMR</td>
<td>Y</td>
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<tr>
<td>QI</td>
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<tr>
<td>Others unique to your setting?</td>
<td>Y</td>
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</table>
CMQCC Toolkits

- Elimination of Non-medically Indicated (Elective) Deliveries Before 39 Weeks Gestational Age
- Improving Health Care Response to Preeclampsia,
- Improving Health Care Response to Obstetric Hemorrhage, V2.0
- Support Vaginal Birth and Reduce Primary Cesareans,
- Improving Health Care Response to Cardiovascular Disease in Pregnancy and Postpartum
- Improving Health Care Response to Maternal Venous Thromboembolism
Obstetric Hemorrhage: Toolkit
Obstetric Hemorrhage Safety Bundle

**Readiness: (every unit)**

- Hemorrhage Cart
- Hemorrhage medications kit
- Establish a response team:
  - Multiple partnerships
  - Unit education
  - Drills
  - Debriefs
- Establish MTP/O-

Photo courtesy of David Lagrew, MD and used with permission
Obstetric Hemorrhage Safety Bundle

Recognition: (every patient)

- Assessment of hemorrhage risk (prenatal, on admission, ongoing in labor & PP)
- Measurement of CUMMULATIVE blood loss
- Active Management of 3rd Stage (oxytocin after birth)
Obstetric Hemorrhage Safety Bundle

Response: (every hemorrhage)

- Unit-standard, stage-based OB Hemorrhage Emergency Management Plan with checklist
- Support program for patients, families and staff
Obstetric Hemorrhage Safety Bundle

**Reporting / Systems Learning: (every unit)**

- Establish a culture of huddles for high-risk patients and debriefings
- Review all stage 3 hemorrhages for systems issues
- Monitor outcome and process metrics in perinatal QI committee
Composite Case: 24 y/o woman, G2 P1 at 38 wks gestation induced for “tired of being pregnant”

1. After 8 hr active phase and 2 hr 2nd stage, had a NSVD of an 8 lb. 6 oz. infant.

2. After placental delivery she had an episode of atony that firmed with massage. A second episode responded to IM methergine and the physician went home (now 1 am).

3. The nurses called the physician 30 min later to report more bleeding and further methergine was ordered.

4. 60 min after the call, the physician performed a D&C with minimal return of tissue. More methergine was given.
Composite Case: 24 y/o woman, G2 P1 at 38 wks gestation induced for “tired of being pregnant”

5. 45 min later a second D&C was performed, again with minimal returns. EBL now > 2,000.

6. Delays in blood transfusion because of inability to find proper tubing.

7. Anesthesia is delayed, but a second IV started for more crystalloid. VS now markedly abnormal, P=144, BP 80/30.

8. One further methergine given and patient taken for a 3rd D&C. Now she has received 2u PRBCs.

9. After completion, she had a cardiac arrest from hypovolemia /hypoxia and was taken to the ICU when she succumbed 3 hours later.
Summary of Recommendations

- Quantification of blood loss for all
- Active management of the 3rd stage for all
- Vital sign triggers
- “Move along” on uterotonic medications
- Intrauterine balloon/B-Lynch suture
- A new approach to blood products
- The value of a formal protocol
- Toolkit at [www.cmqcc.org/ob_hemorrhage](http://www.cmqcc.org/ob_hemorrhage)
Selected Areas of Initial Focus for Hemorrhage Protocol

*Likely* Easy Wins
- Hemorrhage carts
- Active management (oxytocin at birth)

Essential Elements, may take more time
- Risk assessment
- Massive transfusion protocols
- Other overall protocol details (e.g. 2\textsuperscript{nd} line meds)
- Replace EBL with QBL processes
Hemorrhage Guidelines: Staged Responses

**Pre-Admission:** All patients-Assess Risk

**Stage 0:** All birth- Routine Measures

**Stage 1:** QBL > 500 mL vag or 1000 mL CS or VS unstable with continued bleeding

**Stage 2:** QBL 1000-1500 mL with continued bleeding

**Stage 3:** QBL exceeds 1500 mL
### Obstetric Hemorrhage Emergency Management Plan: Table Chart Format

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>Every woman in labor/giving birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessments</td>
<td>Meds/Procedures</td>
</tr>
<tr>
<td>Stage 0 focuses on risk assessment and active management of the third stage.</td>
<td></td>
</tr>
<tr>
<td>Assess every woman for risk factors for hemorrhage.</td>
<td>Measure cumulative quantitative blood loss on every birth.</td>
</tr>
<tr>
<td>3rd Stage: Oxytocin IV infusions or 10u IM</td>
<td>Fundal Massage</td>
</tr>
<tr>
<td>May refine if high response should be first dose, but otherwise move on to 2nd level uterine drug (see below).</td>
<td>Empty bladder: straight cath or Foley with unmiter</td>
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<tr>
<td>(if not already done)</td>
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### Stage 1

**Blood loss: > 500ml vaginal or >1000 ml Cesarean, or VS changes (by +15% or HR > 110, BP < 85/45, O2 sat <95%)**

- **Stage 1 is short: activate hemorrhage protocol, initiate preparations and give Methylene IM.**
- **Activate OB Hemorrhage Protocol and Checklist.**
- Notify Charge nurse, OB/GYN, Anesthesia VS, O2 Sat 0%.
- Record cumulative blood loss q5-15
- Weigh bloody materials
- Careful inspection of vaginal walls, cervix, uterine cavity, placenta
- IV Access: at least 18gauge
- Increase IV fluid (LR) and Oxytocin rate, and repeat fundal massage
- Methylene 0.2mg IM (if not hypertensive)
- May repeat if good response to first dose, but otherwise move on to 2nd level uterine drug (see below)
- Empty bladder: straight cath or Foley with unmiter
- T&G 2 Units PRBCs (if not already done)

### Stage 2

**Continued bleeding with total blood loss under 1500ml**

- OB back to bedside (if not already there)
- **Extra help:** 2nd OB, Rapid Response Team (per hospital), assign nurse
- VS cumulative blood loss q5-10 min
- Weigh bloody materials
- Complete evaluation of vaginal wall, cervix, placenta, uterine cavity
- Send additional labs, including DIC panel
- II in Postpartum: Move to L&D/OR
- Evaluate for special cases:
  - Uterine Inversion
  - Amn. Fluid Emboilism

**2nd Level Utropionic Drugs:**
- Nifedipine 250 mg IM or Misoprostol 800 mcg SL
- 2nd IV Access (at least 18gauge)
- Rigors
- Vaginal Birth:
  - Typical order
  - Move to OR
  - Repair any tears
- O&G: reinsert placenta
- Place intrauterine balloon
- Selective embolization (Interventional Radiology)
- Cesarean Birth:
  - (still intra-op)
  - Inspect broad lig, posterior uterus and retained placenta
- B-Lynch Suture
- Place intrauterine balloon

**Notify Blood Bank of OB Hemorrhage**
- Bring 2 Units PRBCs to bedside, transfuse per clinical signs – do not wait for lab values
- Use blood warmer for transfusion
- Consider thawing 2 FFP (takes 35+ min), use if transfusing > 2u PRBCs
- Determine availability of additional RBCs and other Coag products

### Stage 3

**Total blood loss over 1500ml, or >2 units PRBCs given or VS unstable or suspicion of DIC**

- **Mobilize team**
  - Advanced GYN surgeon
  - 2nd Anesthesia Provider OR staff
  - Adult intensivist
  - Repeat labs including cesag and ABG’s
  - Central line
  - Social Worker family support

- **Activate Massive Hemorrhage Protocol**
  - Laparotomy
  - B-Lynch Suture
  - Uterine Artery Ligation
  - Hysterecomy
  - Patent support
  - Fluid warmer
  - Upper body warming device
  - Sequential compression stockings

- **Transfuse Aggressively**
  - Massive Hemorrhage Pack
  - Near 1:1 PRBC:FFP
  - 1 PLET apheresis platelet
  - 4-6 units PRBCs

- **Unresponsive:**
  - Hyper-8 units PRBCs and/or Coagulation factor replacement: may consider factor VIII
  - Definitive Surgery Hysterectomy

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**Every hospital will need to customize the protocol—but the point is every hospital needs one.**
TXA
CMQCC Hemorrhage Task Force
Best Practice Documents:

Hemorrhage Background and Preparation

- Definitions, Early Recognition and Response Triggers
- Congenital Coagulation Disorders
- OB Care for Pregnant Women who Decline Transfusion
  - Checklist for OB Care for Jehovah’s Witness
  - Informed Consent for Blood Products Jehovah’s Witness
  - Protocol for IV Iron Sucrose
- Placenta Accreta and Percreta: Risks, Dx and Tx
- Hemorrhage Kits, Carts and Trays
- Simulations and Drills-Scenarios and Worksheets
- Lessons Learned from New York and Washington State Taskforces

www.cmqcc.org/ob_hemorrhage
CMQCC Hemorrhage Task Force
Best Practice Documents:

Hemorrhage Management

- Active Management of 3\textsuperscript{rd} Stage Labor
- Blood Loss: Clinical Techniques for Ongoing Quantitative Measurement
- Blood Product Replacement
  - Massive Transfusion Protocol
  - Intrauterine Balloons (coming Soon)
- Surgery: B-Lynch Sutures, Uterine Artery Occlusion
- Utertonic Agent Summary Sheet
- Anti-Shock Garments
- Family Support

[www.cmqcc.org/ob_hemorrhage](http://www.cmqcc.org/ob_hemorrhage)
Improving Health Care Response to Cardiovascular Disease in Pregnancy and Postpartum: Toolkit

Funding for the development of this toolkit was provided by: Federal Title V MCH block grant funding from the California Department of Public Health; Maternal, Child and Adolescent Health Division and Stanford University.
CA-PAMR Findings
Timing of Diagnosis and Death
2002-2006

- Timing of CVD Diagnosis (n=64)

  □ Preexisting (prior to pregnancy)
  □ Prenatal period
  □ At labor and delivery
  □ Postpartum period
  □ Postmortem

- Timing of Death
  ▪ 30% of all CVD deaths were >42 days from birth/fetal demise vs. 7.3% of non CVD pregnancy-related deaths
  ▪ Driven by Cardiomyopathy deaths, with 42.9% deaths >42 days

Rationale for Toolkit

Cardiovascular Disease is

- the leading cause of maternal mortality in CA and U.S.
- under-recognized in pregnant or postpartum women
- higher among African-American women

- 25% of deaths attributed to cardiovascular disease may have been prevented if the woman’s heart disease had been diagnosed earlier.

- Pregnancy is a period of frequent interaction with health care providers and offers an opportunity to detect and treat heart disease, improve pregnancy outcomes, and affect future cardiovascular health.
CVD Toolkit Goals

- Encourage obstetric and other healthcare providers to retain a high index of suspicion for CVD, particularly among women with risk factors who present with symptoms in late pregnancy or early postpartum period.

- To serve as resource for generalists who provide maternity care to women, with special emphasis on:
  - Prenatal visits
  - Postpartum encounters
  - Emergency room visits
CVD Toolkit Components

- Cardiac disease assessment
  - Screening and diagnosis algorithm
  - Referral guidelines
  - Diagnostic testing - EKG, BNP, echocardiogram as resource for work up and follow up

- Racial/ethnic disparities and CVD

- Clinician and facility resources for treating women with CVD

- CVD medications in pregnancy and breastfeeding
CVD Toolkit Components

- Contraception considerations for women with CVD
- Patient Information
- Infographics
  - Rationale
  - Lifetime risk of heart disease after pregnancy complications
  - Signs and symptoms of heart disease during pregnancy and postpartum
CVD Case Presentation

- 25 year old obese (BMI 38) African-American G2P2 presents 10 days after an uncomplicated vaginal delivery with fatigue and persistent cough since delivery.
- BP 110/80, HR 110, RR 28, afebrile, with O2 sat 94% on room air.
- She gets diagnosed with respiratory infection and is prescribed an antibiotic. Fatigue is attributed to lack of sleep.
CVD Case Presentation (CONTINUED)

- One week later, she presents again with continued symptoms. Antibiotics are switched and beta-agonists are added for presumptive “new-onset asthma.”

- Two days later, the patient experiences cardiac arrest at home and resuscitation attempts are unsuccessful.

- Autopsy findings were indicative of cardiomyopathy.
CVD Algorithm Validation

- We applied the algorithm to 64 CVD deaths from 2002-2006 CA-PAMR.

- 56 out of 64 (88%) cases of maternal mortality would have been identified.

- Detection increased to 93% when comparison was restricted to 60 cases that were symptomatic.
CVD Assessment Algorithm
For Pregnant and Postpartum Women

Red Flags

- Shortness of breath at rest
- Severe orthopnea ≥ 4 pillows
- Resting HR ≥120 bpm
- Resting systolic BP ≥160 mm Hg
- Resting RR ≥30
- Oxygen saturations ≤94% with or without personal history of CVD

PROMPT EVALUATION and/or hospitalization for acute symptoms

plus

CONSULTATIONS with MFM and Primary Care/Cardiology

Personal History of CVD

Without Red Flags

CONSULTATIONS with MFM and Primary Care/Cardiology
CARDIOVASCULAR DISEASE ASSESSMENT IN PREGNANT and POSTPARTUM WOMEN

**SYMPTOMS**
- NYHA class > II
- Suggestive of Heart Failure:
  - Dyspnea
  - Mild orthopnea
  - Tachypnea
  - Asthma unresponsive to therapy
- Suggestive of Arrhythmia:
  - Palpitations
  - Dizziness/syncope
- Suggestive of Coronary Artery Disease:
  - Chest pain
  - Dyspnea

**VITAL SIGNS**
- Resting HR ≥110 bpm
- Systolic BP ≥140 mm Hg
- RR ≥24
- Oxygen sat ≤96%

**RISK FACTORS**
- Age ≥40 years
- African American
- Pre-pregnancy obesity (BMI ≥35)
- Pre-existing diabetes
- Hypertension
- Substance use (nicotine, cocaine, alcohol, methamphetamine)
- History of chemotherapy

**PHYSICAL EXAM**
- ABDOMINAL FINDINGS
  - Heart: Loud murmur or
  - Lung: Basilar crackles

**NO**
- Consultation indicated:
  - MFM and Primary Care/Cardiology

**RESULTS ABNORMAL**
- CVD highly suspected

**RESULTS NEGATIVE**
- Signs and symptoms resolved
- Reassurance and routine follow-up

©California Department of Public Health, 2016; supported by Title V funds. Developed in partnership with California Maternal Quality Care Collaborative Cardiovascular Disease in Pregnancy and Postpartum Taskforce. Visit: [www.CMQCC.org](http://www.CMQCC.org) for details
Key Clinical Pearls

- First presentation of cardiovascular disease may be during pregnancy or early postpartum.
- The highest risk period for CVD worsening is between 24-28 weeks or postpartum.
- CVD symptoms or vital sign abnormalities should not be ignored in pregnant/postpartum women.
- New onset or persistent asthma may be a sign of heart failure.
- Bilateral infiltrates on CXR may be due to heart failure rather than pneumonia.
Key Clinical Pearls (continued)

- Pregnancy or postpartum women with significant risk factors should be counseled regarding future CVD risk.
- Women with known CVD should receive pre- & inter-conception counseling by an experienced perinatologist and cardiologist.
- Contraception choices should be tailored to the individual.
- Provider and patient education is essential.
- High index of suspicion, early diagnosis, appropriate referrals and follow up are the key elements to a successful outcome.
Postpartum Presentations to the ED, PCP or OB Provider

When a woman presents in the postpartum period with complaints of shortness of breath, ask if she has experienced:

- Worsened level of exercise tolerance
- Difficulty performing activities of daily living; Unexpected fatigue
- Symptoms that are deteriorating, especially chest pain, palpitations, or dizziness
- New onset of cough or wheezing
- Leg edema and if it is improving or deteriorating
- Inability to lay flat; if this is a change; how many pillows she uses to sleep
- Failure to lose weight or unusual weight gain, and how much
- A history of cardiac or pulmonary conditions
- A history of substance abuse and/or cigarette use
- Or has been seen by other providers or in other Emergency Departments since giving birth.
Postpartum Presentations to the ED, PCP or OB Provider - Key Points

- Symptoms related to physiologic changes of pregnancy should be improving in the postpartum period.
- Any visits to Emergency Department for dyspnea should raise suspicion for cardiovascular disease.
- Women of childbearing age should be questioned about recent pregnancies, in addition to their last menstrual period (LMP).
- Postpartum dyspnea or new onset cough is concerning for cardiovascular disease.
Postpartum Presentations to the ED, PCP or OB Provider - Key Points

- New onset asthma is rare in adults.
- Bilateral crackles on lung examination are most likely associated with Congestive Heart Failure (CHF).
- Improvement of dyspnea with bronchodilators does not confirm the diagnosis of asthma, as CHF may also improve with bronchodilators. Likewise, a lack of response to bronchodilators should prompt the entertainment of a diagnosis other than asthma.
Racial Disparities in CVD Clinical Implications

- **Listen to women.** Take patient complaints seriously, and maintain a high index of suspicion for CVD especially in ALL African-American women.
- Any co-morbidity should further heighten the clinical index of suspicion.
- African-American women with chronic or gestational hypertension, high BMI (>35) who present with symptoms suggestive of CVD or vital signs indicated in the CVD Assessment Algorithm should be evaluated carefully and thoroughly for potential CVD.
For More Information and to Download the Toolkit

- Visit our website: [www.cmqccc.org](http://www.cmqccc.org)
- Or contact us: [info@cmqccc.org](mailto:info@cmqccc.org)
References Cited  
(in order of presentation)


Improving Health Care Response to Maternal Venous Thromboembolism: Toolkit

Funding for the development of this toolkit was provided by: Federal Title V block grant funding from the California Department of Public Health; Maternal, Child and Adolescent Health Division and Stanford University
Venous Thromboembolism (VTE) is a Leading Cause of Maternal Mortality and Severe Morbidity

VTE occurs in 1-4 per thousand pregnancies

VTE encompasses:
- Deep Venous Thromboembolism (DVT)
  - 80% of VTE in pregnancy presents as DVT
- Pulmonary Embolism (PE)
  - 20% of VTE in pregnancy manifests as PE

VTE Risk Assessment: Standard Practice for all Medical Surgical Patients

- **AHRQ** (The Agency for Healthcare Research and Quality) defined VTE as the “number one patient safety practice” for hospitalized patients.

- **Joint Commission** All hospitalized patients to have VTE prophylaxis or documentation why no VTE prophylaxis was given – Quality measure VTE 1

- **NQF** (National Quality Forum) Safe practices published recommendations:
  - Routine evaluation of hospitalized patients for risk of VTE
  - Use of appropriate prophylaxis


VTE Prophylaxis

VTE is the “single cause of death most amenable to reduction by systematic change in practice”

Steven Clark, M.D., Semin Perinatol 2012;36(1):42-7
VTE risk assessment tools should be applied to every patient to determine risk for VTE

Risk assessment based on major guidelines:
- NPMS - National Partnership for Maternal Safety
- ACOG - American College of Obstetricians and Gynecology
- ACCP - American College of Chest Physicians
- RCOG - Royal College Obstetricians and Gynecologists

Pharmacologic prophylaxis may be with:
- Unfractionated heparin (UFH) or
- Low-molecular weight heparin (LMWH)
  - LMWH is a preferred antepartum medication
Risk Assessment
Effective Protocol Implementation

- **Link VTE risk** to appropriate strength PROPHYLAXIS choices
  - Higher VTE risk linked with stronger prophylaxis

- **Minimize levels of risk**
  - 3 bucket model

- **Minimize complexity**
  - Avoid complex point scoring system
3 Levels of VTE Risk

Utilize the “3 bucket model” risk assessment that stratifies VTE risk into three color-coded levels for rapid identification:

- **Low VTE Risk**
- **Medium VTE Risk**
- **High VTE Risk**
VTE Taskforce Recommendations

4 critical time points for risk assessment and prophylaxis

- First Prenatal Visit/Outpatient prenatal care
- Antepartum hospitalization (non-delivery)
- Birth Hospitalization including cesarean and vaginal
- Post-discharge extended-duration anticoagulation
Algorithm 1: 1st Prenatal Visit Maternal VTE Risk Assessment

Screening Questions

- Already on Anticoagulation?
- History of VTE?
- History of Thrombophilia?

Follow up Questions

- Current VTE?
- Other conditions requiring therapeutic dosing of anticoagulation?
- With high-risk thrombophilia?
- With Antiphospholipid Syndrome (APS)?
- Multiple VTE episodes?
- Idiopathic?
- Related to pregnancy, oral contraceptives or estrogen?
- Provoked?
- High risk or APS, regardless of family history of VTE?
- Low risk thrombophilia regardless of family history of VTE?

Management

- HIGH RISK THERAPEUTIC ANTICOAGULATION
  Recommend co-management with maternal fetal medicine and/or hematology specialist
- MEDIUM RISK PROPHYLACTIC ANTICOAGULATION
- LOW RISK NO ANTICOAGULATION

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# Antepartum Outpatient Prophylaxis First Prenatal Visit

<table>
<thead>
<tr>
<th>Clinical History</th>
<th>Risk Level</th>
<th>Management</th>
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</thead>
<tbody>
<tr>
<td>• Low risk thrombophilia (isolated)</td>
<td>LOW</td>
<td>No treatment</td>
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<tr>
<td>• Low risk thrombophilia with family history of VTE</td>
<td></td>
<td></td>
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<tr>
<td>• Prior <em>provoked</em> VTE</td>
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<td></td>
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<tr>
<td>• Prior VTE idiopathic</td>
<td>MEDIUM</td>
<td>Prophylactic dose LMWH or UFH</td>
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<tr>
<td>• Prior VTE with pregnancy or oral contraceptive</td>
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<td></td>
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<tr>
<td>• Prior VTE with low risk thrombophilia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Family history of VTE with high risk thrombophilia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• High risk or antiphospholipid syndrome (APS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Current VTE or other conditions requiring therapeutic dose of anticoagulation</td>
<td>HIGH</td>
<td>Therapeutic dose LMWH or UFH</td>
</tr>
<tr>
<td>• Multiple prior VTE episodes</td>
<td></td>
<td><em>Recommend co-management with maternal-fetal medicine and/or hematology specialist</em></td>
</tr>
<tr>
<td>• Prior VTE with high-risk thrombophilia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Prior VTE with APS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Antepartum Hospital Admission

The Council for Patient Safety in Women’s Healthcare working group recommends thromboprophylaxis with daily LMW heparin or twice-daily unfractionated heparin for all antepartum patients hospitalized for at least 72 hours who are not at high risk for bleeding or imminent childbirth.

Antepartum Hospital Admission

- TWO LARGE COHORTS with SIMILAR RESULTS:
  - HOSPITALIZED $\geq$ 3 days: 12-18 increased VTE risk
  - HOSPITALIZED $<$ 3 days: 4 times increased VTE risk

- VTE risk in hospitalized pregnant women approaches that of high-risk non-pregnant patients in whom VTE thromboprophylaxis is currently recommended such as those with prior events and high-risk thrombophilia

Antepartum Hospital Admission

- All women hospitalized antepartum should be encouraged to:
  - Maintain Full Ambulation
    - Specific activity levels should be individualized
    - Use of specific goals, such as “ambulate every hour while awake,” will make implementation more successful
  - Ensure Hydration
  - Utilize Mechanical Prophylaxis (knee length sequential compression devices) while in bed
Algorithm 2: Antepartum Hospitalization: Maternal VTE Risk Assessment

**Screening Questions**

- Already on anticoagulation?
- Personal history of any VTE?
- High risk thrombophilia?
- Low risk thrombophilia PLUS family history of VTE?

- Anticipated or actual length of stay > 72 hours?

**LOW RISK**
Mechanical prophylaxis only – reassess at 72 hours
(No pharmacologic prophylaxis indicated for isolated low risk thrombophilia)

**MEDIUM RISK**
Mechanical prophylaxis placed on admission PLUS prophylactic dose LMWH/UFH, continue through discharge

**HIGH RISK**
HEPARIN dose depends on VTE risk
Consult with Anesthesia prior to starting heparin regarding choice and dose of pharmacological prophylaxis

**Mechanical prophylaxis combined with UFH / LMWH on admission continue through discharge**

Prophylactic or Therapeutic dose consistent with outpatient dose if:
- Previously on antepartum anticoagulation
- Prophylactic dose if:
  - Prior provoked VTE or
  - Low risk thrombophilia plus family history of VTE

**Encourage ambulation and avoid dehydration for women at all risk levels**

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Benefits of VTE risk reduction may be outweighed by risks of emergent general anesthesia we strongly recommend anesthesia consult prior to a decision to initiate pharmacologic prophylaxis.

For women at high risk of delivery or bleeding, mechanical thromboprophylaxis should be utilized.

Consider prophylaxis with low dose unfractionated heparin as an alternative to LMWH, which may facilitate neuraxial anesthesia.
Birth Hospitalization

- “Placement of mechanical compression devices prior to cesarean and continued post-op is recommended for all women”

- “For patients undergoing cesarean with additional risk factors for thromboembolism, individual risk assessment may require thromboprophylaxis with both = Mechanical compression device + UFH or LMWH”
### Cesarean Birth
### Major and Minor VTE Risk Factors

<table>
<thead>
<tr>
<th><strong>MAJOR VTE RISK FACTORS</strong></th>
<th><strong>MINOR VTE RISK FACTORS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMI &gt; 35 kg/m² @ delivery</strong></td>
<td>Multiple gestation</td>
</tr>
<tr>
<td><strong>Low risk thrombophilia</strong></td>
<td>Age &gt; 40</td>
</tr>
<tr>
<td><strong>Postpartum hemorrhage requiring:</strong></td>
<td>Postpartum hemorrhage ≥1000 ml but <em>not</em> requiring:</td>
</tr>
<tr>
<td>Transfusion or further operation, (e.g. hysterectomy, D&amp;C) or Interventional Radiology procedure</td>
<td>Transfusion or further operation, (e.g. hysterectomy, D&amp;C) or Interventional Radiology procedure</td>
</tr>
<tr>
<td><strong>Infection requiring antibiotics</strong></td>
<td>Family history of VTE (VTE occurring in a first-degree relative prior to age 50)</td>
</tr>
<tr>
<td><strong>Antepartum hospitalization ≥ 72 hours, current or within the last month</strong></td>
<td><strong>Smoker</strong></td>
</tr>
<tr>
<td><strong>Chronic medical conditions:</strong> Sickle Cell disease, Systemic Lupus Erythematosus, Significant Cardiac disease, active Inflammatory Bowel Disease, active cancer, Nephrotic syndrome</td>
<td><strong>Preeclampsia</strong></td>
</tr>
</tbody>
</table>

Women with one major or two minor risk factors should receive in-hospital post cesarean pharmacologic prophylaxis

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### Cesarean Birth VTE Risk Assessment and Suggested Prophylaxis

<table>
<thead>
<tr>
<th>Clinical History</th>
<th>Risk Level</th>
<th>Prophylaxis Regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encourage ambulation and avoid dehydration at all risk levels. All women having cesarean birth receive mechanical prophylaxis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not meeting medium or high risk criteria</td>
<td>LOW</td>
<td>Mechanical prophylaxis placed prior to cesarean and continued until fully ambulatory</td>
</tr>
<tr>
<td><strong>Cesarean Delivery with 1 Major or ≥ 2 Minor Risk Factors</strong></td>
<td>MEDIUM</td>
<td>Mechanical prophylaxis placed prior to cesarean and continued until fully ambulatory <strong>PLUS</strong> Prophylactic dose LMWH / UFH postpartum, continue until discharge</td>
</tr>
<tr>
<td>Prior VTE High risk thrombophilia Already on anticoagulant</td>
<td>HIGH</td>
<td>Mechanical prophylaxis placed prior to cesarean and continued until fully ambulatory <strong>PLUS</strong> Patient specific anticoagulation plan</td>
</tr>
</tbody>
</table>
## Delivery Risk Assessment

Prior VTE or Thrombophilia  
(most already on anticoagulation)

<table>
<thead>
<tr>
<th>Clinical History</th>
<th>Risk Level</th>
<th>Prophylaxis Regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>High risk thrombophilia (including acquired) no prior VTE, regardless of family history</td>
<td>HIGH</td>
<td>Mechanical prophylaxis placed prior to cesarean and continued until fully ambulatory PLUS Prophylactic dose LMWH / UFH in hospital and continued until 6 weeks from date of delivery</td>
</tr>
<tr>
<td>Prior provoked, idiopathic, or estrogen related VTE</td>
<td></td>
<td>Mechanical prophylaxis placed prior to cesarean and continued until fully ambulatory PLUS Therapeutic dose LMWH / UFH postpartum (Postpartum dose ≥ Antepartum dose) in hospital and continued until 6 weeks from delivery date after discharge</td>
</tr>
<tr>
<td>Low risk thrombophilia AND family history of VTE OR single prior VTE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients already receiving LMWH or UFH as outpatient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple prior VTE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior VTE with High Risk thrombophilia (including APS)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Vaginal Birth VTE Risk Assessment and Suggested Prophylaxis

<table>
<thead>
<tr>
<th>Clinical History</th>
<th>Risk Level</th>
<th>Anticoagulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encourage ambulation and avoid dehydration at all risk levels</td>
<td>LOW</td>
<td>Mechanical prophylaxis placed prior to delivery and continued until fully ambulatory</td>
</tr>
<tr>
<td>Delivery BMI ≥ 40 kg/m²</td>
<td>MEDIUM</td>
<td>Mechanical prophylaxis placed prior to delivery and continued until fully ambulatory PLUS Prophylactic dose LMWH / UFH postpartum hospitalization</td>
</tr>
<tr>
<td>Delivery BMI ≥ 40 kg/m² PLUS Antepartum hospitalization ≥ 3 days, anticipated currently or within past month OR Delivery BMI ≥ 40 kg/m² PLUS Low Risk Thrombophilia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery BMI ≥ 40 kg/m² PLUS Low Risk Thrombophilia</td>
<td>HIGH</td>
<td>Mechanical prophylaxis placed prior to delivery and continued until fully ambulatory PLUS Patient specific postpartum anticoagulation</td>
</tr>
<tr>
<td>Prior VTE High risk thrombophilia Already on anticoagulant OR Low risk thrombophilia AND family history of VTE ANY single prior VTE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Algorithm 3: Post-Discharge Extended Duration Anticoagulation: Maternal VTE Risk Assessment

HIGH RISK
THERAPEUTIC ANTICOAGULATION for 6 weeks from date of delivery*

- Recent VTE or other conditions requiring therapeutic dose of anticoagulation
- Personal history of either
  - VTE with high risk thrombophilia or
  - VTE with Antiphospholipid Syndrome (APS) or
  - Multiple VTE episodes

MEDIUM RISK
PROPHYLACTIC ANTICOAGULATION for 6 weeks from date of delivery*

- Personal history of either Idiopathic VTE or
  - VTE with low risk thrombophilia
  - VTE related to pregnancy or OCP’s
  - VTE Provoked
- NO personal history of VTE but with either:
  - High risk thrombophilia (including APS) regardless family history of VTE or
  - Low risk thrombophilia with family history VTE

LOW RISK
NO ANTICOAGULATION
Low risk thrombophilia (isolated)
Key Obstetric VTE Guidelines


References in order of appearance (1)

- Joint Commission, *Specifications Manual for National Hospital Inpatient Quality Measures v.5.1 (applicable 7/1/2016 - 12/31/2016)*, Joint Commission, Editor. 2015, Joint Commission: Chicago IL.
References in order of appearance (2)


Summary

- Monitor quality outcomes
- Consider monitoring outcomes using different filters (MDC)
  - By race, NICU level, payer
  - Are you meeting your goals for all of your patients
- Review your SMM measure analysis outcomes to identify trends (MDC)
- Involve your team members in the quality improvement plans to ensure sustainability
Questions