CMQCC
California Maternal
Quality Care Collaborative

Maternal Morbidity & CMQCC Toolkits

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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

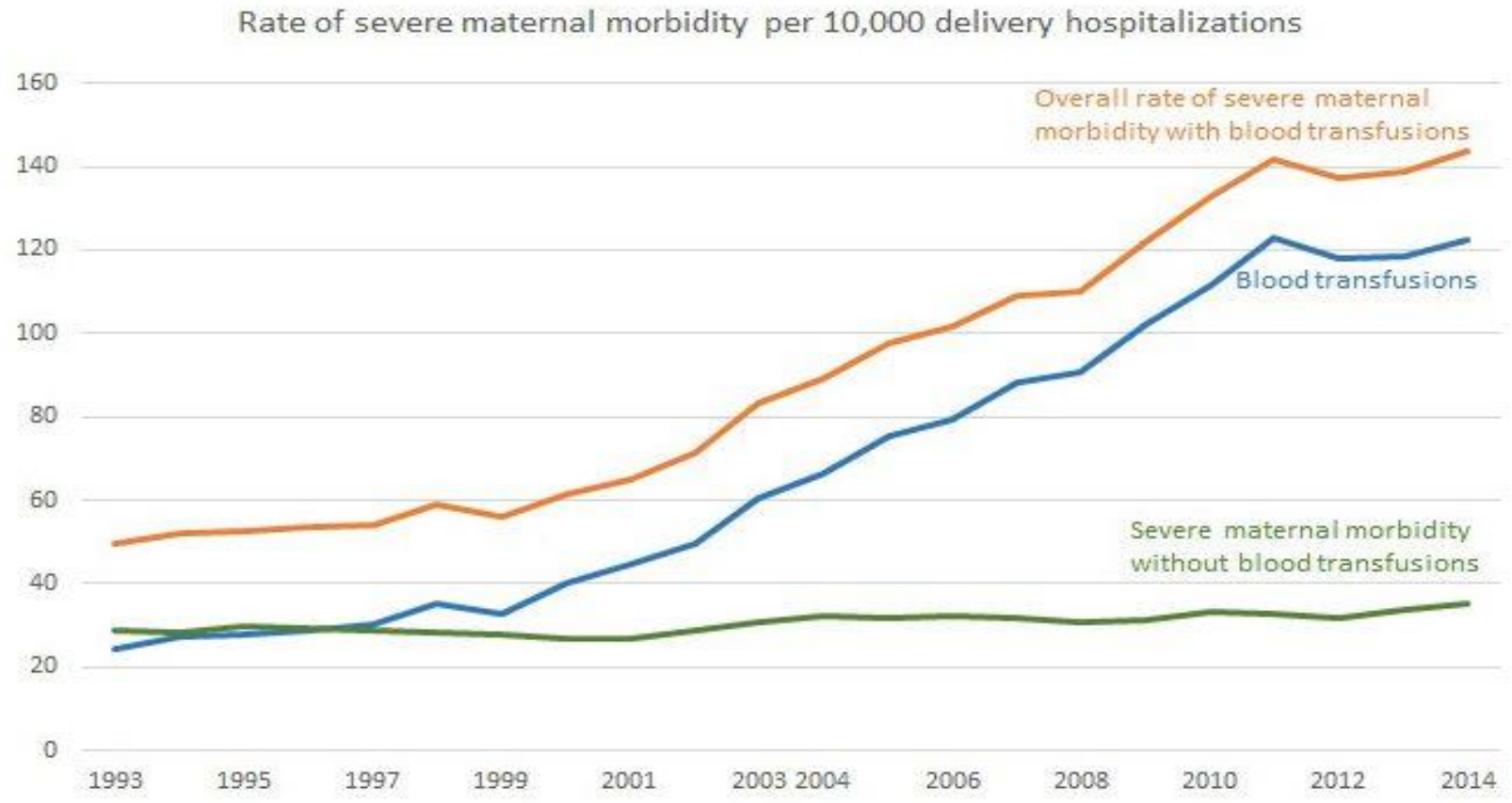
Temporary tracheostomy

Ventilation

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

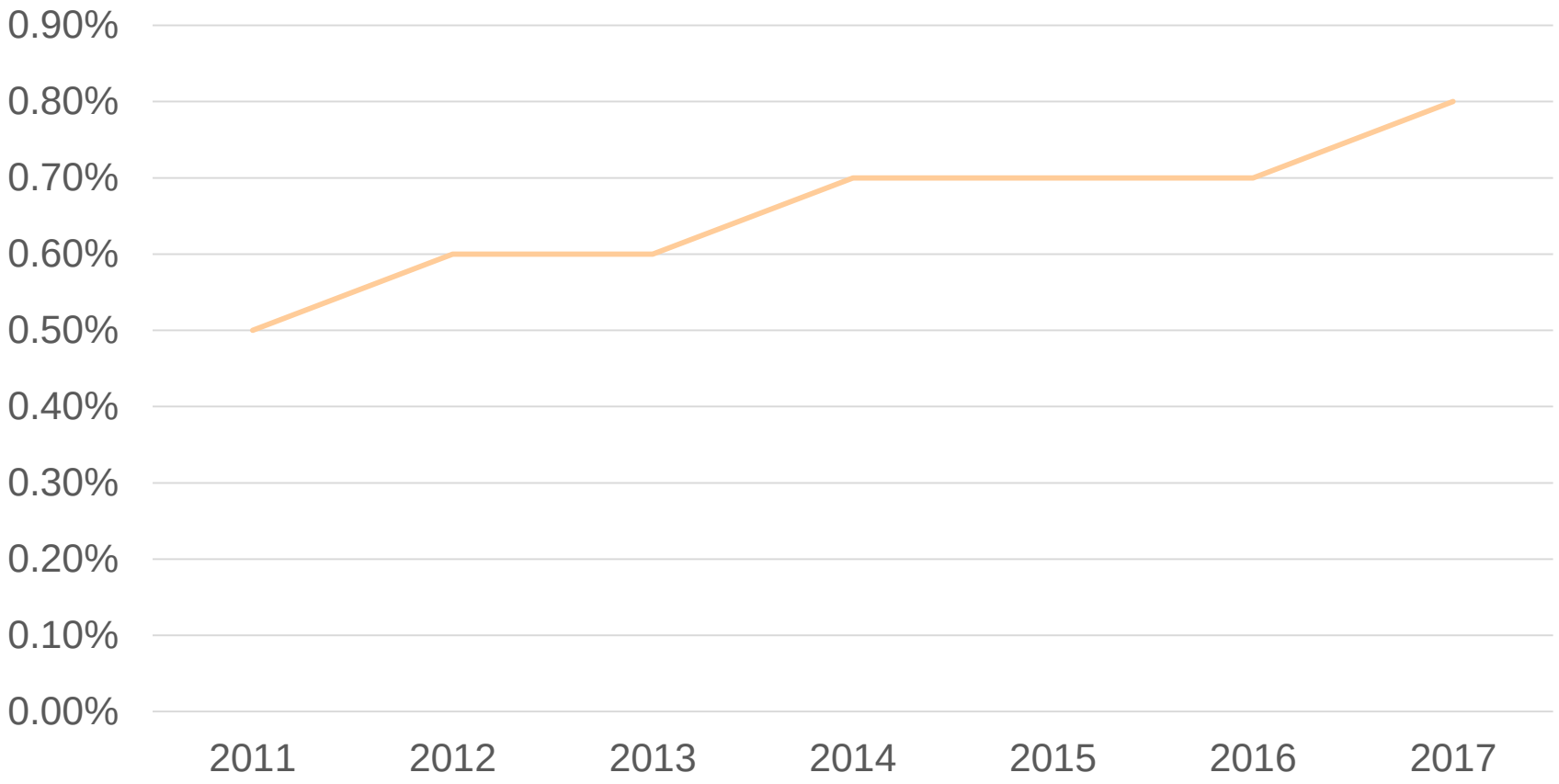
Last updated 2/7/18

Why Focus on SMM?



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

1. Alliance or Innovation on Maternal Health. (2016). AIM Severe Maternal Morbidity (SMM) Data Alert for Blood Transfusions.

2. American College of Obstetricians and Gynecologists and the Society for Maternal–Fetal Medicine, Kilpatrick SK, Ecker JL. Severe maternal morbidity: screening and review. *Am J Obstet Gynecol.* 2016;215(3):B17–B22.

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

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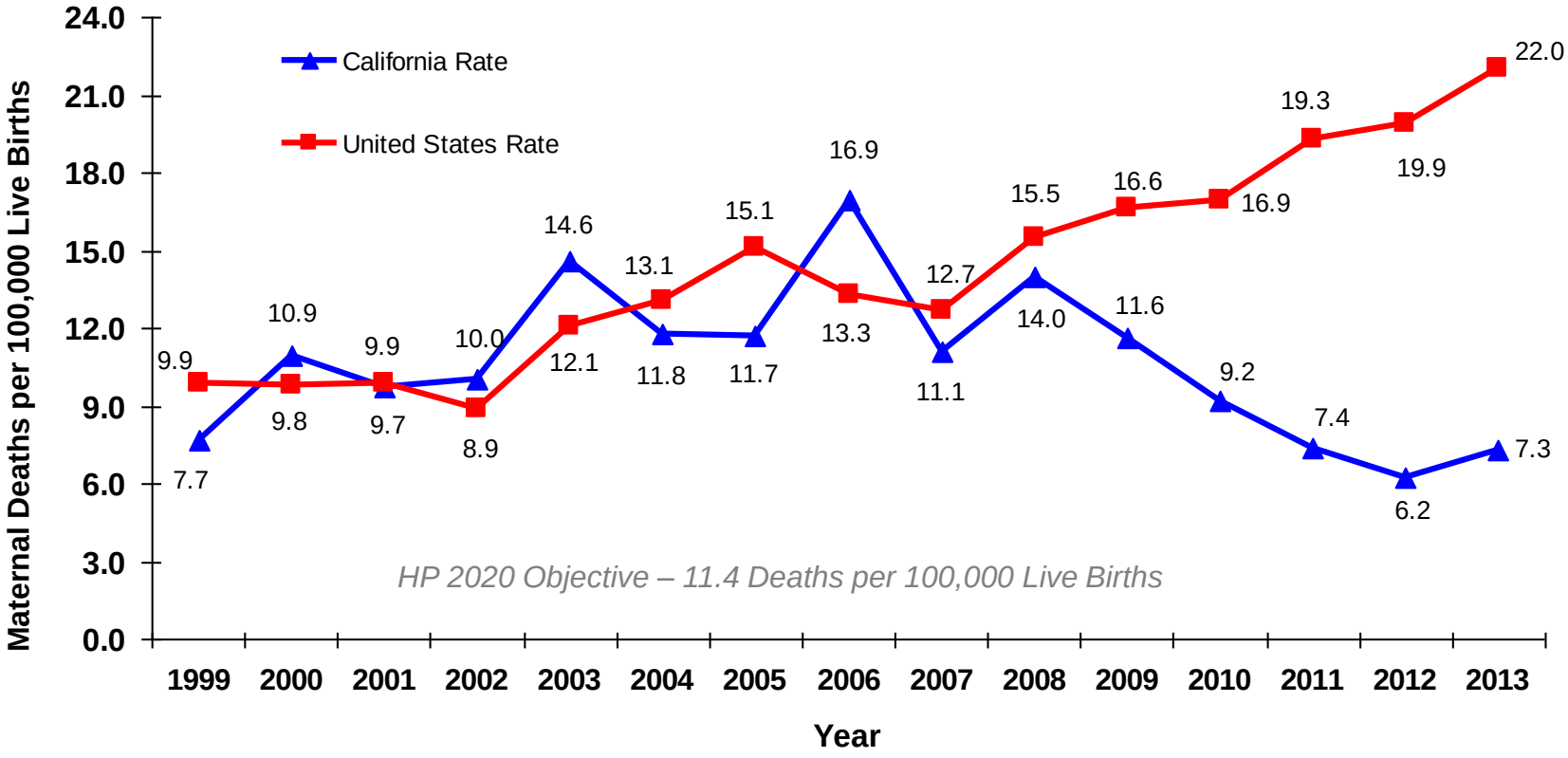
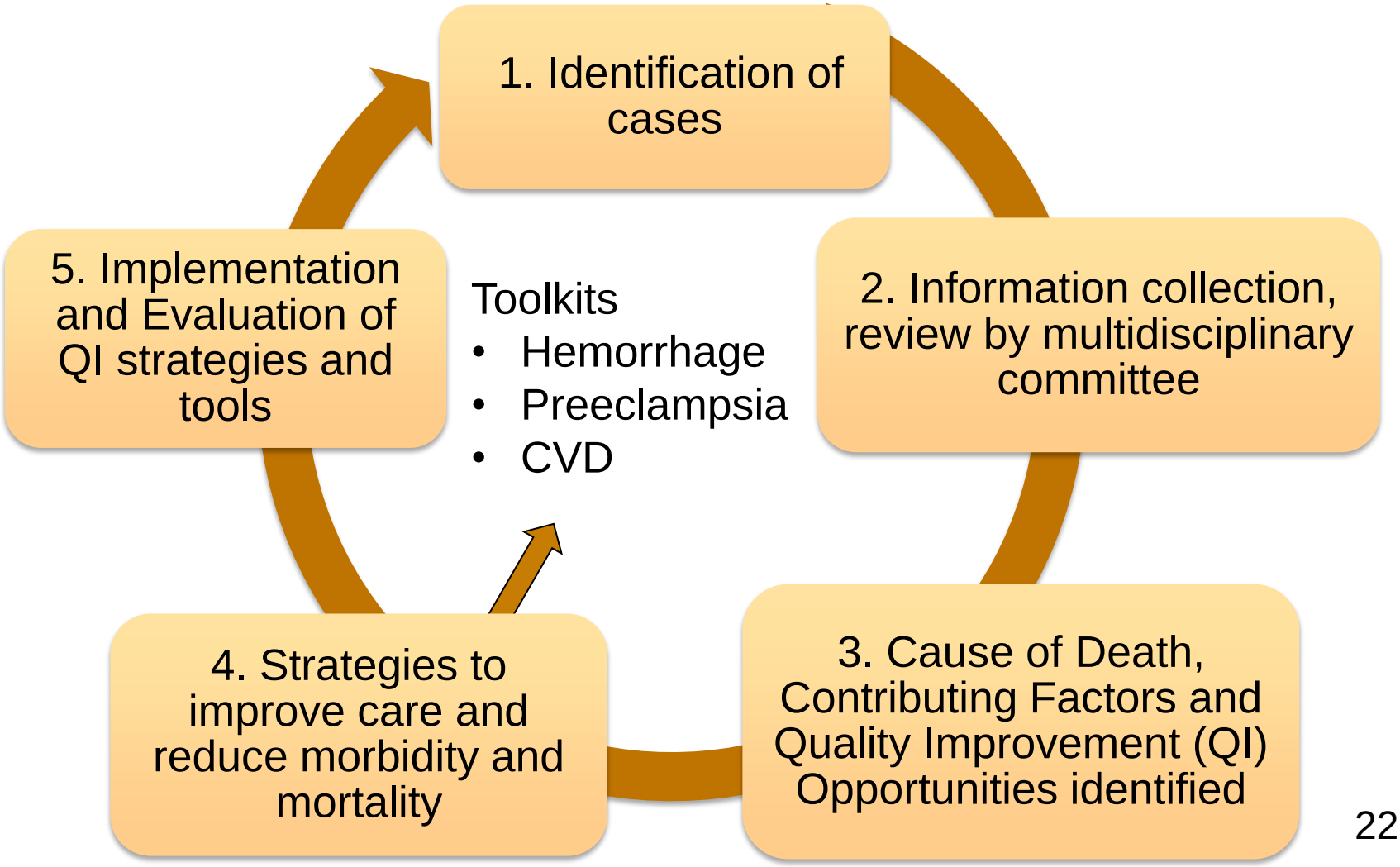
Toolkits

Maternal Mortality Rate
California and United States - 1999-2013



SOURCE: State of California, Department of Public Health, California Birth and Death Statistical Master Files, 1999-2013. Maternal mortality for California (deaths ≤ 42 days postpartum) was calculated using ICD-10 cause of death classification (codes A34, O00-O95,O98-O99). United States data and HP2020 Objective use the same codes. U.S. maternal mortality data is published by the National Center for Health Statistics (NCHS) through 2007 only. U.S. maternal mortality rates from 2008 through 2013 were calculated using CDC Wonder Online Database, accessed at http://wonder.cdc.govon March 11, 2015. Produced by California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division, March, 2015.

CA-PAMR Quality Improvement Review Cycle



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**

Disciplines & Departments	Needed?
Obstetrics	Yes
Nursing	
Anesthesia	
Blood Bank	
Laboratory	
Operating Room	
Support personnel	
IT/EMR	
QI	
Others unique to your setting?	

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

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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-

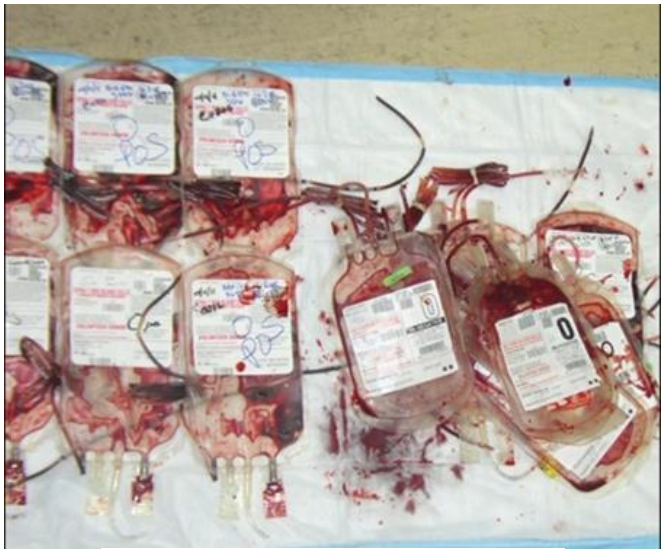


Photo courtesy of David Lagrew, MD and used with permission

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 crystaloid. 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.

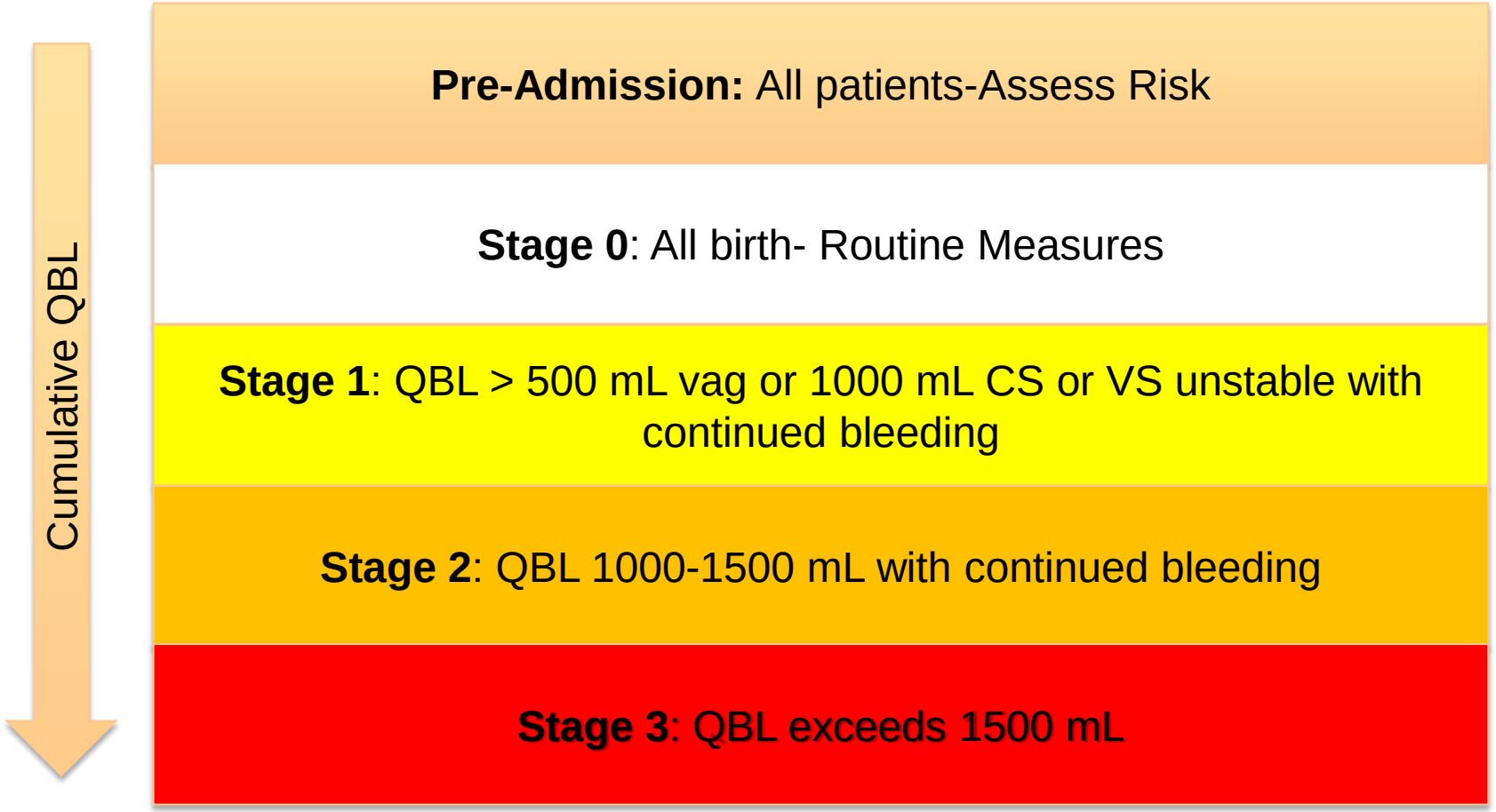
Summary of Recommendations

- 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**

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. 2nd line meds)
  - Replace EBL with QBL processes

Hemorrhage Guidelines: Staged Responses



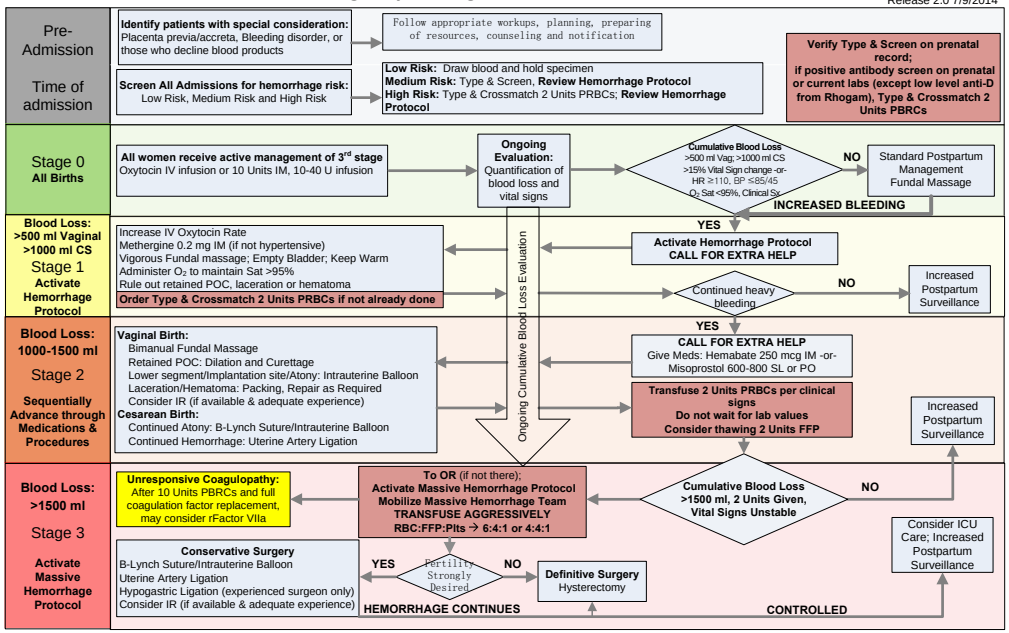
CMQCC OB Hemorrhage Emergency Management Plan

Obstetric Hemorrhage Emergency Management Plan: Table Chart Format
version 2.0

	Assessments	Meds/Procedures	Blood Bank
Stage 0	**Every woman in labor/giving birth**		
Stage 0 focuses on risk assessment and active management of the third stage.	· Assess every woman for **risk factors** for hemorrhage · Measure **cumulative quantitative blood loss** on every birth	**Active Management 3rd Stage:** · **Oxytocin** IV infusion or 10u IM · **Fundal Massage**- vigorous, 15 seconds min.	· If **Medium Risk:** T & Scr · If **High Risk:** T&C 2 U · If **Positive Antibody Screen** (prenatal or current, exclude low level anti-D from RhoGam):T&C 2 U
Stage 1	**Blood loss: > 500ml vaginal or >1000 ml Cesarean, or VS changes (by >15% or HR ³ 110, BP £85/45, O2 sat <95%)**		
Stage 1 is short: activate hemorrhage protocol, initiate preparations and give Methergine IM.	· Activate OB Hemorrhage Protocol and Checklist · Notify Charge nurse, OB/CNM, Anesthesia · VS, O2 Sat q5' · Record **cumulative** blood loss q5-15' · **Weigh** bloody materials · Careful inspection with good exposure of vaginal walls, cervix, uterine cavity, placenta	· **IV Access:** at least 18gauge · Increase IV fluid (LR) and **Oxytocin** rate, and repeat **fundal massage** · **Methergine** 0.2mg IM (if not hypertensive) May repeat if good response to first dose, BUT otherwise **move on** to 2nd level uterotonic drug (see below) · Empty bladder: straight cath or place foley with urimeter	· **T&C 2 Units PRBCs** (if not already done)
Stage 2	**Continued bleeding with total blood loss under 1500ml**		
Stage 2 is focused on sequentially advancing through medications and procedures, mobilizing help and Blood Bank support, and keeping ahead with volume and blood products.	**OB back to bedside** (if not already there) · **Extra help**: 2nd OB, Rapid Response Team (per hospital), assign roles · VS & **cumulative** blood loss q 5-10 min · Weigh bloody materials · **Complete evaluation** of vaginal wall, cervix, placenta, uterine cavity · Send additional labs, including DIC panel · If in Postpartum: Move to L&D/OR · Evaluate for special cases: -Uterine Inversion -Amn. Fluid Embolism	**2nd Level Uterotonic Drugs:** · **Hemabate** 250 mcg IM or · **Misoprostol** 800 mcg SL **2nd IV Access** (at least 18gauge) Bimanual massage **Vaginal Birth:** (typical order) · Move to OR · Repair any tears · D&C: r/o retained placenta · Place intrauterine balloon · Selective Embolization (Interventional Radiology) **Cesarean Birth:** (still intra-op) (typical order) · 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**		
Stage 3 is focused on the Massive Transfusion protocol and invasive surgical approaches for control of bleeding.	· **Mobilize team** -Advanced GYN surgeon -2nd Anesthesia Provider -OR staff -Adult Intensivist · **Repeat labs** including coags and ABG's · Central line · Social Worker/ family support	· **Activate Massive Hemorrhage Protocol** · Laparotomy: -B-Lynch Suture -Uterine Artery Ligation -Hysterectomy · Patient support -Fluid warmer -Upper body warming device -Sequential compression stockings	**Transfuse Aggressively** Massive Hemorrhage Pack · Near 1:1 PRBC:FFP · 1 PLT apheresis pack per 4-6 units PRBCs **Unresponsive Coagulopathy:** After 8-10 units PRBCs and full coagulation factor replacement: may consult re rFactor VIIa risk/benefit

Obstetric Emergency Management Plan: Flow Chart Format

Release 2.0 7/9/2014



California Maternal Quality Care Collaborative (CMQCC), Hemorrhage Taskforce (2009) visit: www.CMQCC.org for details
This project was supported by funds received from the State of California Department of Public Health, Center for Family Health; Maternal, Child and Adolescent Health Division

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

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CMQCC Hemorrhage Task Force Best Practice Documents:

Hemorrhage Management

- Active Management of 3rd 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

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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

Hameed A, Lawton E, McCain CL, et al. Pregnancy-Related Cardiovascular Deaths in California: Beyond Peripartum Cardiomyopathy. *American Journal of Obstetrics and Gynecology* 2015; DOI: 10.1016/j.ajog.2015.05.008

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.

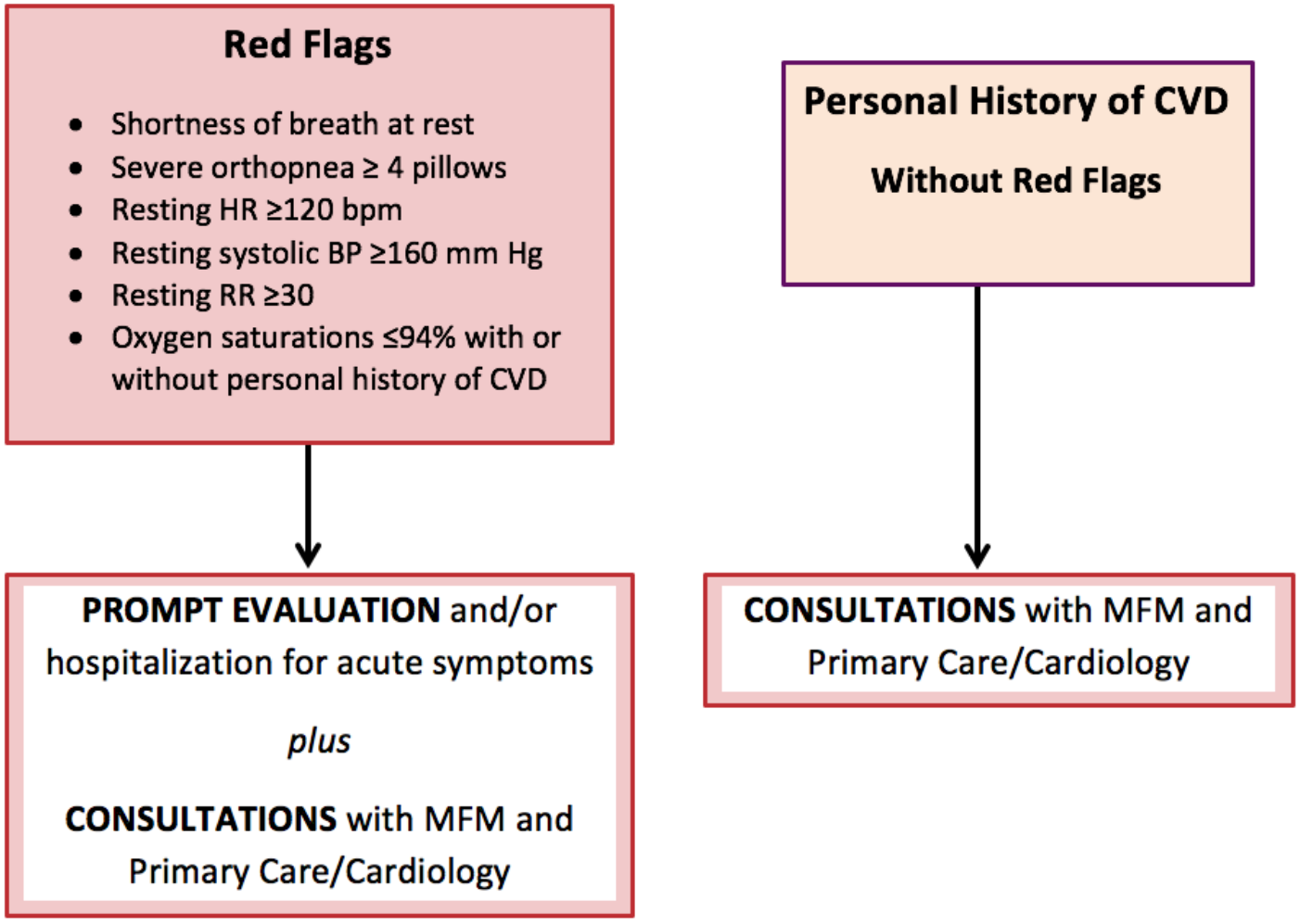
CVD Case Presentation (*CONTINUED*)

- 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



CARDIOVASCULAR DISEASE ASSESSMENT IN PREGNANT and POSTPARTUM WOMEN

(No Red Flags and/or no personal history of CVD, and hemodynamically stable)

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, methamphetamines)*
- History of chemotherapy

**PHYSICAL EXAM

ABNORMAL FINDINGS

Heart: Loud murmur or

Lung: Basilar crackles

NO

YES

≥ 1 Symptom + ≥ 1 Vital Signs Abnormal + ≥ 1 Risk Factor or

ANY COMBINATION ADDING TO ≥ 4

Consultation indicated:

MFM *and* Primary Care/Cardiology

Obtain: **EKG and BNP**
- **Echocardiogram +/- CXR** if HF or valve disease is suspected, or if the BNP levels are elevated
- 24 hour Holter monitor, if arrhythmia suspected
- Referral to cardiologist for possible treadmill echo vs. CTA vs. alternative testing if postpartum

Consider: **CXR**, **CBC**, Comprehensive metabolic profile, Arterial blood gas, Drug screen, TSH, etc.

Follow-up within one week

Results negative

Signs and symptoms resolved

Reassurance and routine follow-up

Results abnormal

CVD highly suspected

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

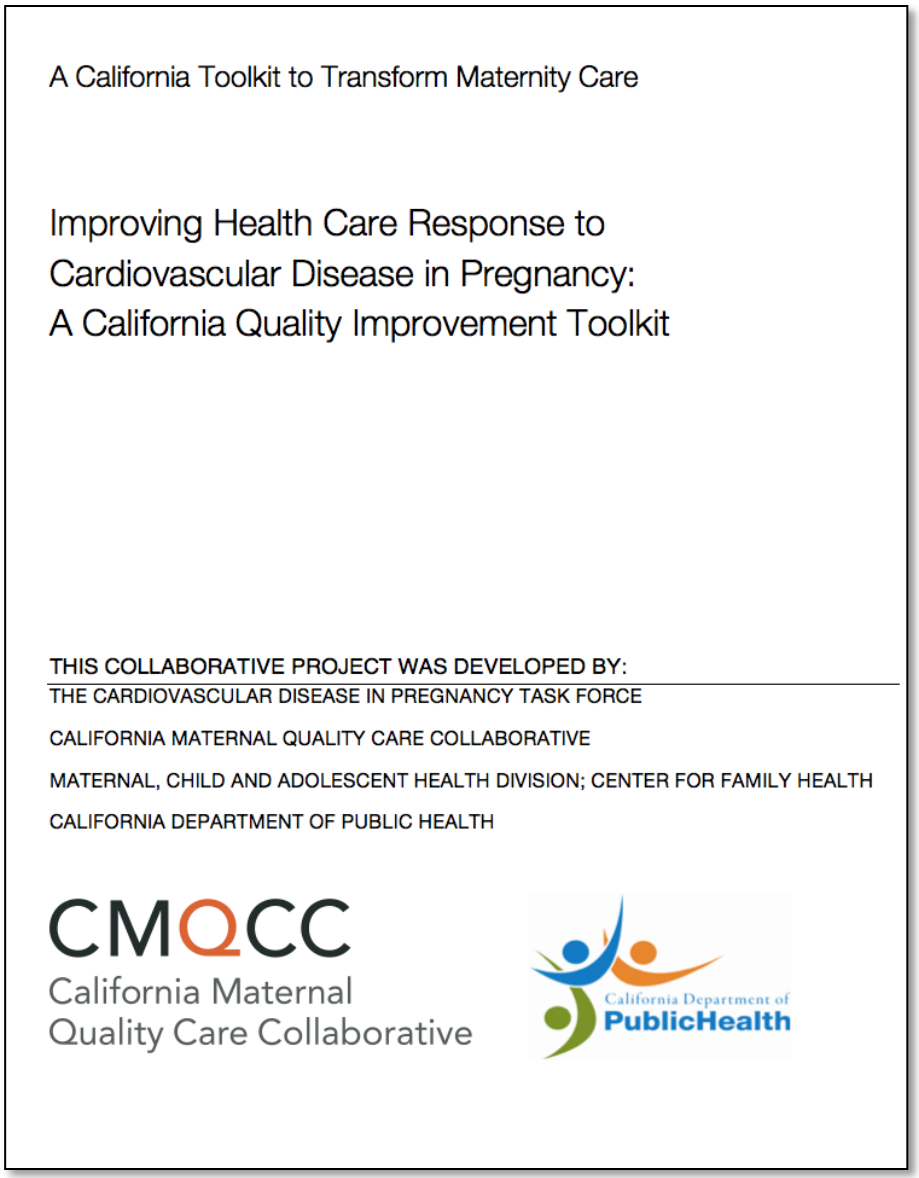
- Symptoms related to physiologic changes of pregnancy should be improving in the postpartum period.
- Any visits to Emergency Department for dyspnea should raise suspicion for cardiovascular disease.
- Women of childbearing age should be questioned about recent pregnancies, in addition to their last 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.cmqcc.org
- Or contact us: info@cmqcc.org

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California Department of PublicHealth

CMQCC
California Maternal Quality Care Collaborative

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

James, A.H., *Prevention and management of venous thromboembolism in pregnancy.* Am J Med, 2007. **120**(10 Suppl 2): p. S26-34.

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

Shojania KG, (Eds.).(2001). "Making healthcare safer; A critical analysis of patient safety practices (Evidence Report/Technology Assessment No. 43)." (AHRQ Publication NO.01-E058).
Joint Commission (2015). Specifications Manual for National Hospital Inpatient Quality Measures v.5.1
National Quality Forum. National Voluntary Consensus Standards for Prevention and Care of Venous Thromboembolism. (2006)

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

Risk Assessment

- 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

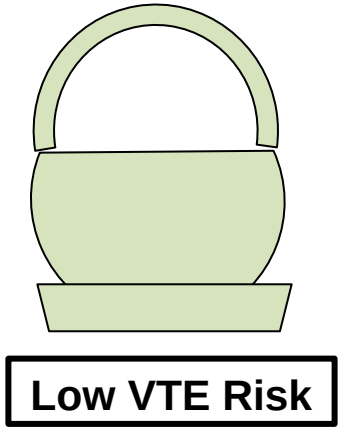
Risk Assessment

Effective Protocol Implementation

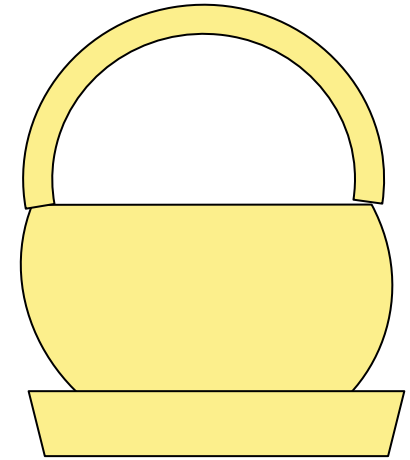
- **Link VTE risk** to appropriate strength **PROPHYLAXIS choices**
  - Higher VTE risk linked with stronger prophylaxis
- **Minimize levels of risk**
  - 3 bucket model
- **Minimize complexity**
  - Avoid complex point scoring system

3 Levels of VTE Risk

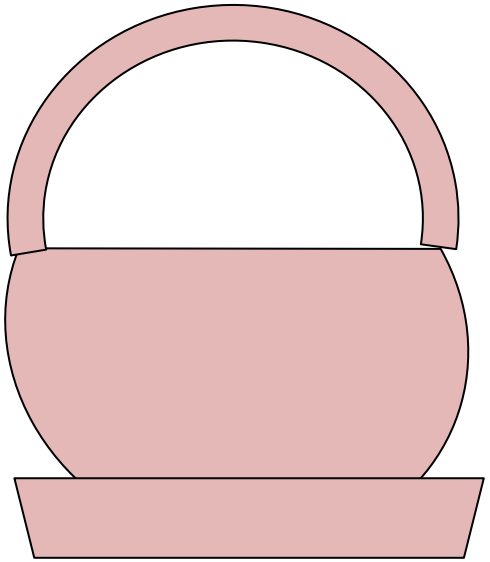
Utilize the “3 bucket model” risk assessment that stratifies VTE risk into three color-coded levels for rapid identification



Low VTE Risk



Medium VTE Risk



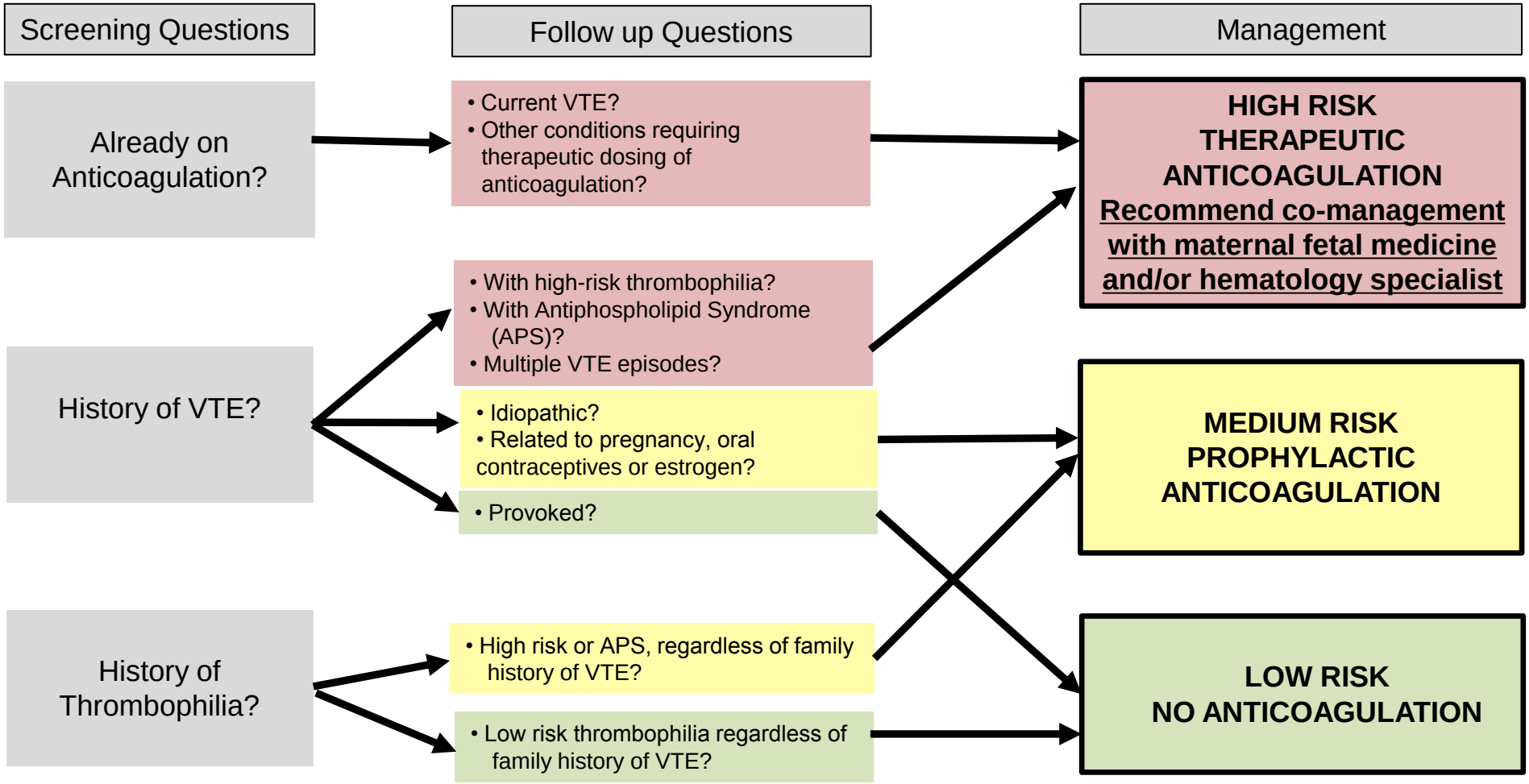
High VTE Risk

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



Antepartum Outpatient Prophylaxis First Prenatal Visit

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

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.

D'Alton, Friedman et al,Obstet Gynecol 2016;128:688–98,RCOG Green-top Guideline No. 37a April 2015

Antepartum Hospital Admission

- TWO LARGE COHORTS with SIMILAR RESULTS :

  - **HOSPITALIZED ≥ 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

Sultan, et al. BMJ. (2013 Nov); 7: 347, Virkus et. al. 2014 PLoS ONE 9(5): e96495. doi:10.1371/journal.pone.0096495

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

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Screening Questions

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

Yes

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

- Anticipated or actual length of stay > 72 hours?

Yes

No to all questions

MEDIUM RISK

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

LOW RISK

Mechanical prophylaxis only – reassess at 72 hours

(No pharmacologic prophylaxis indicated for isolated low risk thrombophilia)

Encourage ambulation and avoid dehydration for women at all risk levels

Antepartum Hospital Admission

- 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 thromboprophyalxis with *both*

=Mechanical compression device + UFH or **LMWH**

ACOG Practice Bulletin No 123, 2011

Cesarean Birth
Major and Minor VTE Risk Factors

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

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

Cesarean Birth VTE Risk Assessment and Suggested Prophylaxis

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

Delivery Risk Assessment

Prior VTE or Thrombophilia

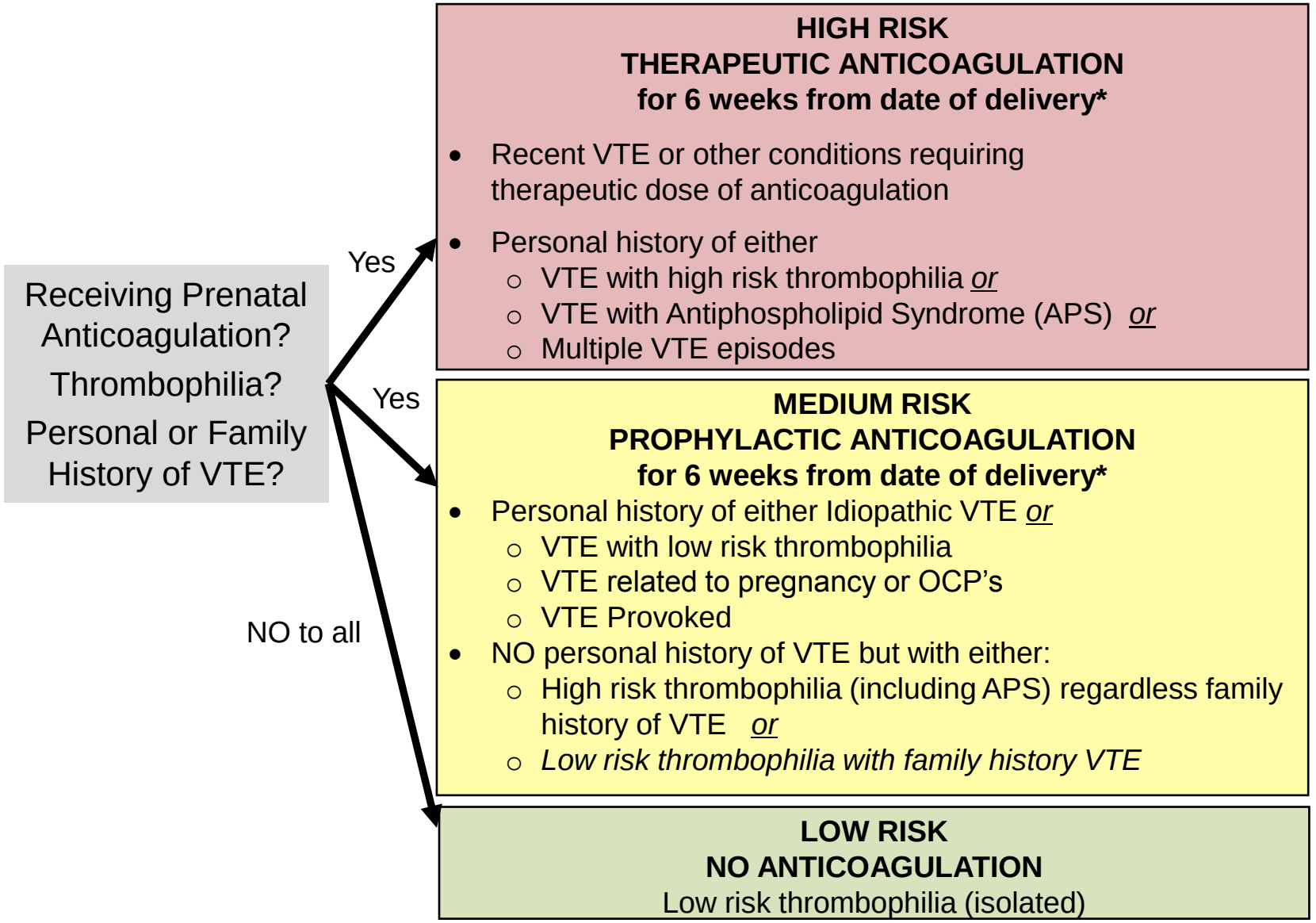
(most already on anticoagulation)

Clinical History	Risk Level	Prophylaxis Regimen
High risk thrombophilia (including acquired) no prior VTE, regardless of family history Prior provoked, idiopathic, or estrogen related VTE Low risk thrombophilia AND family history of VTE OR single prior VTE Patients already receiving LMWH or UFH as outpatient Multiple prior VTE Prior VTE with High Risk thrombophilia (including APS)	**HIGH**	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 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

Vaginal Birth VTE Risk Assessment and Suggested Prophylaxis

Clinical History	Risk Level	Anticoagulation
Encourage ambulation and avoid dehydration at all risk levels		
Delivery BMI ≥ 40 kg/m²	**LOW**	Mechanical prophylaxis placed prior to delivery and continued until fully ambulatory
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	**MEDIUM**	Mechanical prophylaxis placed prior to delivery and continued until fully ambulatory **PLUS** Prophylactic dose LMWH / UFH **postpartum hospitalization** **BMI ≥ 40 kg/m² plus thrombophilia** (consider LMWH/UFH continuation 6 weeks postpartum)
Prior VTE **High risk thrombophilia** **Already on anticoagulant** **OR** Low risk thrombophilia **AND** family history of VTE ***ANY*** single prior VTE	**HIGH**	Mechanical prophylaxis placed prior to delivery and continued until fully ambulatory **PLUS** Patient specific postpartum anticoagulation

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



Key Obstetric VTE Guidelines

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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