Postpartum VTE Prophylaxis

Low Risk:
Mechanical prophylaxis

Medium Risk:
(see tables)
Mechanical prophylaxis
PLUS
Prophylactic dose of Heparin (5000U BID) until hospital discharge

High Risk:
(chronic inflammatory medical condition, prior VTE, low risk thrombophilia, high risk thrombophilia without prior VTE)
Mechanical prophylaxis
PLUS
Prophylactic dose of Heparin (5000U BID) until hospital discharge
PLUS
Prophylactic dose of LMWH until 6 weeks postpartum

Extremely High Risk:
(already receiving LMWH, multiple prior VTE, high risk thrombophilia with prior VTE, APS with prior VTE)
Mechanical propylaxis
PLUS
Therapeutic dose of LMWH until 6 weeks postpartum

Cesarean Birth

Major Risk Factors	Minor Risk Factors
BMI > 35 at delivery	Multiple gestation
Antepartum hospitalization > 3 days within the past month	Age > 40
Postpartum hemorrhage with transfusion, D&C, hysterectomy, or embolization	Postpartum hemorrhage > 1000mL (not requiring transfusion or procedure)
Chorioamnionitis, Endometritis, or other infection	Family history of VTE (first degree relative, < age 50)
	Preeclampsia
	Smoker

1 Major or 2 Minor Risk Factors is MEDIUM RISK and should receive in-hospital pharmacologic prophylaxis

Vaginal Birth

BMI > 40	*PLUS*	Antepartum hospitalization > 3 days within the past month

is MEDIUM RISK and should receive in-hospital pharmacologic prophylaxis

Thrombophilias

High Risk	Low Risk
Antithrombin III deficiency	Factor V Leiden heterozygote
Factor V Leiden homozygote or compound heterozygote	Prothrombin gene mutation heterozygote
Prothrombin gene mutation homozygote or compound heterozygote	Protein C or S deficiency

Chronic Inflammatory Medical Conditions:

Lupus, active Inflammatory Bowel Disease, Nephrotic Syndrome, active cancer, significant cardiac disease, Sickle Cell disease

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UIHC Maternal VTE Prophylaxis guidelines are adapted from the CMQCC Toolkit

Approach to Reduce Venous Thromboembolism (VTE) during and after Pregnancy—5/7/18, updated 7/16/18, 9/17/18, 9/24/18, and 9/25/18

Introduction:

The risk of venous thromboembolism (VTE) is increased during pregnancy and the puerperium compared to the non-pregnant state, and the risk is particularly increased in women who have high risk thrombophilias, other medical co-morbidities, and certain pregnancy-related complications. Several groups, including the American College of Obstetrics and Gynecology (ACOG), the Royal College of Obstetrics and Gynecology (RCOG), and the American College of Chest Physicians (ACCP) have made recommendations for evaluating the risk of VTE during pregnancy and administering prophylactic or therapeutic doses of unfractionated or low molecular weight heparin to women who are considered to be at high risk. The Council on Patient Safety in Women's Health Care reviewed these recommendations and summarized them in a webinar on assessing risk for antenatal venous thromboembolism and proposed an approach; this was expanded upon in print in October, 2016 (1). More recently, in February, 2018, the California Maternal Quality Care Collaborative (CMQCC) published a toolkit on this topic (2). The approach that is outlined here is based on consideration of the recommendations of all of the groups noted above; significant weight was given to the CMQCC toolkit as it represents a relatively simple, practical approach that takes into account many of the controversies that remain in the literature on this topic.

Please note that the management of women at the highest risk for VTE will not change (i.e. women with high risk thrombophilias, antiphospholipid syndrome, hx prior VTE who are or would be followed in the high risk obstetrics (HROB) clinic and have an individual management plan involving therapeutic or prophylactic anticoagulation).

Risk for VTE and a decision about the need for and type(s) of thromboprophylaxis should be undertaken at four time points, summarized in the following table, with the recommended method for assessing risk at each time point:

Time Point	Method/tool for assessing risk for VTE
1. First prenatal visit/outpatient prenatal care	**Assess:** **1. History of high or low risk thrombophilia, or antiphospholipid syndrome (APS)** **2. Personal history of VTE** **3. Family history of VTE**
2. Antepartum hospitalization (non-delivery)	**Assess:** **1. Extremely high risk conditions for which likely already on anticoagulation** **2. Hospitalization for >/= 72 hours**
3. Delivery hospitalization (cesarean and vaginal deliveries)	**After delivery, assess:** **1. Extremely high risk or high risk conditions.** **2. Medium risk conditions:** **a. After Cesarean delivery, assess major and minor risk factors (Table)** **b. After Vaginal delivery, assess** **(i.) BMI >/= 40 kg/m2 on admission for delivery,** **(ii.) hospitalization for >/= 72 hours in last month,**
4. Discharge after delivery	**1. Extremely high risk conditions** **2. High risk conditions, including:** **(a.) Hx chronic inflammatory condition,** **(b) maternal low risk thrombophilia**

High risk thrombophilias: Homozygous Factor V Leiden, Homozygous prothrombin gene mutation, Compound Factor V Leiden and prothrombin gene mutation, Antithrombin III deficiency (2, 3, 4)

Low risk thrombophilias: Heterozygous Factor V Leiden, Heterozygous prothrombin gene mutation, Protein C deficiency, Protein S deficiency (2, 3, 4)

Chronic inflammatory conditions: sickle cell anemia, systemic lupus erythematosus, significant cardiac disease, active inflammatory bowel disease, active cancer, nephrotic syndrome (2)

1. At initial prenatal visit assess for history of high risk (HR) or low risk (LR) thrombophilias or antiphospholipid syndrome (APS), personal history of VTE, and family history of VTE, and administer treatment doses or prophylactic doses of unfractionated heparin (UFH) or low molecular weight heparin (LMWH) as follows:

	Antepartum Outpatient Venous Thromboembolism (VTE) Treatment/Prophylaxis:		
Risk Category	**Clinical History**	**Anticoagulation**	**Laboratory studies prior to initiation**
Extremely high risk	**1. Multiple prior VTE episodes** **2. Prior VTE with high risk (HR) thrombophilia** **3. Prior VTE with acquired thrombophilia** **4. Prior VTE with APS** **5. Current VTE**	**Treatment dose of UFH or LMWH**	**1. Complete blood count (CBC with platelet count)** **2. Serum creatinine**
High risk	**1. Idiopathic prior VTE** **2. Prior VTE with pregnancy or oral contraceptive** **3. Prior VTE with low risk (LR) thrombophilia** **4. Family history of VTE with HR thrombophilia** **5. HR thrombophilia (including acquired) or APS**	**Prophylactic UFH or LMWH**	**1. Complete blood count (CBC with platelet count)** **2. Serum creatinine**
	1. Prior VTE provoked 2. Family history of VTE with LR thrombophilia 3. LR thrombophilia	No treatment or prophylaxis	None

Abbreviations: VTE = venous thromboembolism; HR = high risk; LR = low risk; UFH = unfractionated heparin; LMWH = low molecular weight heparin

High risk thrombophilias: Homozygous Factor V Leiden, Homozygous prothrombin gene mutation, Compound Factor V Leiden and prothrombin gene mutation, Antithrombin III deficiency (2, 3, 4)

Low risk thrombophilias: Heterozygous Factor V Leiden, Heterozygous prothrombin gene mutation, Protein C deficiency, Protein S deficiency (2, 3, 4)

2. For an antepartum hospitalization, heparin (UFH or LMWH) is recommended if:

	Antepartum Hospital Admission and Venous Thromboembolism (VTE) Treatment/Prophylaxis		
Risk Category	**Clinical Situation**	**Recommendation for pharmacologic or mechanical thromboprophylaxis**	**Laboratory studies prior to and after initiation of treatment/prophylaxis**
Extremely high risk/high risk	**1. Antepartum patient previously receiving outpatient treatment or prophylaxis with UFH or LMWH**	**1. Continue outpatient treatment or prophylaxis with UFH or LMWH**. a. **If at high risk for delivery, substitute mechanical thromboprophylaxis** (sequential compression devices (SCDs)) or prophylactic doses of UFH twice daily. b. **If at high risk for bleeding, substitute mechanical thromboprophylaxis** (SCDs)	1. Consider **platelet count and serum creatinine depending on when last drawn**
Medium risk/low risk	**2. All other hospitalized antepartum patients.**	**1. Mechanical thromboprophylaxis (sequential compression devices) when in bed, beginning at time of admission.** **2. Administer prophylaxis with twice daily UFH (with dose depending on trimester) beginning 72 hours after admission, if no contraindications.** (May consider daily LMWH if at a pre-viable gestational age, not at high risk for delivery or bleeding, and unlikely to require neuraxial anesthesia/analgesia in near future.)	**Prior to initiating UFH:** **1. Serum creatinine** **2. Complete blood count** (CBC with platelet count) **7 days after initiating UFH:** **1. Repeat CBC with platelet count**, to assess for HIT **2. PTT**

Abbreviations: VTE = venous thromboembolism; UFH = unfractionated heparin; LMWH = low molecular weight heparin; CBC = complete blood count; HIT = heparin-induced thrombocytopenia

3. Approach to VTE prophylaxis for hospital admission for labor or cesarean delivery:

	Hospital Admission for Labor and Venous Thromboembolism (VTE) Treatment/Prophylaxis		
Risk Category	**Clinical Situation**	**Recommendation for pharmacologic or mechanical thromboprophylaxis**	**Laboratory Studies on Admission**
Extremely high risk or high risk	**1. History of prior VTE or history of thrombophilia or APS**	**1. Intrapartum use of mechanical thromboprophylaxis** (sequential compression devices) while in bed	1. **If has taken UFH for > 4 days, check platelet count** to r/o HIT. 2. **If on therapeutic infusion of UFH, check PTT.** 3. **If receiving prophylactic or therapeutic UFH or LMWH SQ, see guidelines in Table 7 below** concerning timing of neuraxial blockade and checking PTT and platelet count.
Medium or low risk	**2. All other patients**	**1. Intrapartum use of mechanical thromboprophylaxis** (sequential compression devices) while in bed --for laboring patients, particularly encourage for women who are expected to have a lengthy induction of labor or magnesium (i.e. those who are likely to remain in bed for prolonged periods of time)	

Abbreviations: VTE = venous thromboembolism; UFH = unfractionated heparin; HIT = heparin-induced thrombocytopenia; PTT = partial thromboplastin time

4. Approach to VTE prophylaxis in the hospital after vaginal delivery:

	Approach to Venous Thromboembolism (VTE) Prophylaxis after Vaginal Delivery		
Risk Category	**Clinical Situation**	**Recommendation for pharmacologic or mechanical VTE prophylaxis**	**Laboratory studies prior to and after initiation of treatment/prophylaxis**
Extremely high risk	**1. Received treatment doses of LMWH during antepartum course** **2. Multiple prior VTE episodes** **3. Prior VTE with high risk (HR) thrombophilia** **4. Prior VTE with acquired thrombophilia** **5. Prior VTE with APS** **6. Current VTE**	**1. Mechanical prophylaxis (SCDs) until fully ambulatory PLUS** **2. Administer treatment doses of LMWH (decision made on individual basis depending on history) if no evidence of significant bleeding.** **a. Wait at least 24 hours after delivery and at least 4 hours after removal of epidural catheter or spinal needle to begin treatment doses of LMWH.**	**Prior to initiating UFH or LMWH:** **1. Complete blood count (CBC with platelet count)** **2. Serum creatinine** **If patient has received UFH or LMWH in the preceding 100 days, repeat a platelet count 24 hours after resuming UFH or LMWH.**
High risk	**1. Prior VTE without condition in Extremely high risk group** **2. High risk thrombophilia, acquired thrombophilia, or APS without prior VTE** **3. Low risk thrombophilia** **4. Chronic inflammatory condition**	**1. Mechanical prophylaxis (SCDs) until fully ambulatory PLUS** **2. Prophylactic UFH beginning at least 12 hours after delivery and at least 1 hour after removal of epidural catheter or spinal needle, and continued throughout hospitalization.**	**Prior to initiating UFH:** **1. Complete blood count (CBC with platelet count)** **2. Serum creatinine** **If patient has received UFH or LMWH in the preceding 100 days, repeat a platelet count 24 hours after beginning UFH .**
Medium risk	**BMI >/= 40 and antepartum hospitalization for >/= 72 hours within past month**	**1. Mechanical prophylaxis (SCDs) until fully ambulatory PLUS** **2. Prophylactic UFH beginning at least 12 hours after delivery**	**Prior to initiating UFH:** **1. Complete blood count (CBC with platelet count)** **2. Serum creatinine**

		and at least 1 hour after removal of epidural catheter or spinal needle, and continued throughout hospitalization.	**If patient has received UFH or LMWH in the preceding 100 days, repeat a platelet count 24 hours after beginning UFH.**
Low risk	**All other patients**	**1. Mechanical prophylaxis (SCDs) until fully ambulatory**	

Abbreviations: VTE = venous thromboembolism; UFH = unfractionated heparin; LMWH = low molecular weight heparin; BMI = body mass index

High risk thrombophilias: Homozygous Factor V Leiden, Homozygous prothrombin gene mutation, Compound Factor V Leiden and prothrombin gene mutation, Antithrombin III deficiency (2, 3, 4)

Low risk thrombophilias: Heterozygous Factor V Leiden, Heterozygous prothrombin gene mutation, Protein C deficiency, Protein S deficiency (2, 3, 4)

Chronic inflammatory conditions: sickle cell anemia, systemic lupus erythematosus, significant cardiac disease, active inflammatory bowel disease, active cancer, nephrotic syndrome (2)

5. Approach to VTE prophylaxis in the hospital after Cesarean Delivery:

	Approach to VTE prophylaxis after Cesarean Delivery		
Risk Category	**Clinical Situation**	**Recommendation for pharmacologic or mechanical VTE prophylaxis following cesarean delivery**	**Laboratory studies prior to and after initiation of treatment/prophylaxis**
Extremely high risk	**1. Received treatment doses of LMWH during antepartum course** **2. Multiple prior VTE episodes** **3. Prior VTE with high risk (HR) thrombophilia** **4. Prior VTE with acquired thrombophilia** **5. Prior VTE with APS** **6. Current VTE**	**1. Mechanical thromboprophylaxis (SCDs) until fully ambulatory PLUS** **2. Administer treatment doses of LMWH (decision made on individual basis depending on history) if no evidence of significant bleeding** **a. Wait at least 24 hours after delivery and at least 4 hours after removal of epidural catheter or spinal needle to begin treatment doses of LMWH**	**Prior to initiation:** **1. Complete blood count (CBC with platelet count)** **2. Serum creatinine** **If patient has received UFH or LMWH in the preceding 100 days, repeat a platelet count 24 hours after resuming UFH or LMWH.**
High risk	**1. Prior VTE without condition in Extremely high risk group** **2. High risk thrombophilia, acquired thrombophilia, or APS without prior VTE** **3. Low risk thrombophilia** **4. Chronic inflammatory condition**	**1. Mechanical prophylaxis (SCDs) until fully ambulatory PLUS** **2. Prophylactic UFH beginning at least 12 hours after delivery and at least 1 hour after removal of epidural catheter or spinal needle, and continued throughout hospitalization.**	**Prior to initiation:** **1. Complete blood count (CBC with platelet count)** **2. Serum creatinine** **If patient has received UFH or LMWH in the preceding 100 days, repeat a platelet count 24 hours after beginning UFH .**
Medium risk	**One major or two minor risk factors in Table 6 below**	**1. Mechanical prophylaxis (SCDs) until fully ambulatory PLUS** **2. Prophylactic UFH beginning at least 12**	**Prior to initiation:** **1. Complete blood count (CBC with platelet count)** **2. Serum creatinine**

		hours after delivery and at least 1 hour after removal of epidural catheter or spinal needle, and continued throughout hospitalization.	**If patient has received UFH or LMWH in the preceding 100 days, repeat a platelet count 24 hours after resuming UFH or LMWH.**
Low risk	**All other women**	**1. Mechanical thromboprophylaxis (SCDs) until fully ambulatory**	

Abbreviations: VTE = venous thromboembolism; UFH = unfractionated heparin; LMWH = low molecular weight heparin; BMI = body mass index

High risk thrombophilias: Homozygous Factor V Leiden, Homozygous prothrombin gene mutation, Compound Factor V Leiden and prothrombin gene mutation, Antithrombin III deficiency (2, 3, 4)

Low risk thrombophilias: Heterozygous Factor V Leiden, Heterozygous prothrombin gene mutation, Protein C deficiency, Protein S deficiency (2, 3, 4)

Chronic inflammatory conditions: sickle cell anemia, systemic lupus erythematosus, significant cardiac disease, active inflammatory bowel disease, active cancer, nephrotic syndrome (2)

Table 6. Cesarean delivery risk factors (Medium risk = 1 major risk factor or 2 minor risk factors)

Cesarean Delivery	
Major Risk Factors	**Minor Risk Factors**
1. BMI > 35 at delivery **2. Antepartum hospitalization > 72 hours within past month** **3. Postpartum hemorrhage with transfusion, D+C, hysterectomy, or embolization** **4. Chorioamnionitis, endometritis, or other infection**	**1. Multiple gestation** **2. Age > 40** **Postpartum hemorrhage > 1000 mL not requiring transfusion or procedure** **3. Family history of VTE (first degree relative, < age 50)** **4. Pre-eclampsia** **5. Cigarette use**

7. Prescribe LMWH after discharge from vaginal or cesarean delivery if:

	Approach to VTE prophylaxis following discharge after delivery		
Risk Category	**Clinical History**	**Anticoagulation Regimen**	**Laboratory studies after initiation of treatment/prophylaxis**
Extremely high risk	**1. Multiple VTE episodes** **2. Prior VTE with high risk (HR) thrombophilia** **3. Prior VTE with acquired thrombophilia** **4. Prior VTE with APS** **5. Current VTE**	**6 weeks of treatment doses of LMWH**	
High risk	**1. Idiopathic VTE** **2. VTE with pregnancy or oral contraceptive** **3. VTE with low risk (LR) thrombophilia** **4. Family history of VTE with HR thrombophilia** **5. HR thrombophilia (including acquired)** **6. VTE provoked*** **7. LR thrombophilia*** **8. Chronic inflammatory condition*** *Changes from antepartum outpatient recommendations (initial assessment)	**6 weeks of prophylactic LMWH**	

Abbreviations: VTE = venous thromboembolism; UFH = unfractionated heparin; LMWH = low molecular weight heparin; BMI = body mass index

High risk thrombophilias: Homozygous Factor V Leiden, Homozygous prothrombin gene mutation, Compound Factor V Leiden and prothrombin gene mutation, Antithrombin III deficiency (2, 3, 4)

Low risk thrombophilias: Heterozygous Factor V Leiden, Heterozygous prothrombin gene mutation, Protein C deficiency, Protein S deficiency (2, 3, 4)

Chronic inflammatory conditions: sickle cell anemia, systemic lupus erythematosus, significant cardiac disease, active inflammatory bowel disease, active cancer, nephrotic syndrome (2)

8. Timing of regional anesthesia in relation to administration of UFH or LMWH:

Timing of regional anesthesia in relation to administration of UFH or LMWH*	
Antepartum or Intrapartum	
1. UFH prophylaxis </= 5,000 IU SQ twice or 3 times a day (total dose </= 15,000 IU/ day)	Wait **6 hours** after last dose **or check PTT and platelet count** before neuraxial blockade
2. UFH prophylaxis or therapeutic with 7,500 – 10,000 SQ IU twice a day (total dose > 15,000 IU/day and </= 20,000 IU/day)	**Wait 12 hours** after last dose **and check PTT and platelet count** before neuraxial blockade
3. UFH > 10,000 IU/dose or total dose > 20,000 IU/day	Wait **24 hours** after last dose **and check PTT and platelet count** before neuraxial blockade
4. LMWH prophylaxis (enoxaparin </= 40 mg SQ daily or 30 mg SQ twice daily)	Wait **12 hours** after last dose before neuraxial blockade
5. LMWH intermediate dose prophylaxis	**Insufficient evidence** (discuss with anesthesia team)
6. LMWH therapeutic (enoxaparin 1 mg/kg SQ twice daily)	Wait **24 hours** after last dose before neuraxial blockade
Postpartum	
1. UFH prophylaxis </= 10,000 IU/day	Wait **at least 1 hour after epidural catheter removal or spinal needle placement** to initiate
2. UFH therapeutic	Wait **at least 1 hour after epidural catheter removal or spinal needle placement** to initiate
3. LMWH prophylaxis with enoxaparin </= 40 mg SQ daily or 30 mg SQ twice daily	Wait **at least 12 hours after the procedure** and **at least 4 hours after epidural catheter removal or spinal needle placement** to initiate
4. LMWH therapeutic or prophylaxis > 40 mg SQ daily or 30 mg SQ twice daily	Wait **at least 24 hours after procedure** and **at least 4 hours after epidural catheter removal or spinal needle placement** to initiate

*These guidelines are based on 2018 guidelines included in references at end of this document; would encourage discussing individual cases with anesthesia personnel

9. Dosing of unfractionated or low molecular weight heparin:

Goal		Subcutaneous dose of unfractionated heparin (UFH)
Therapeutic dosing		**>/= 10,000 IU BID adjusted based on target PTT**
Prophylactic dosing	**First trimester**	**5000 – 7500 IU BID**
	Second trimester	**7500 – 10,000 IU BID**
	Third trimester	**10,000 IU BID**
	Postpartum	**5000 IU BID**

Goal	Patient BMI	Subcutaneous dose of low molecular weight heparin (LMWH)
Therapeutic dosing		**1 mg/kg twice daily**
Prophylactic dosing	**BMI </= 40 kg/m2**	**40 mg daily**
	BMI > 40 kg/m2	**40 mg every 12 hours**

Abbreviations: BMI = body mass index; UFH = unfractionated heparin; IU = international units; BID = twice daily; LMWH = low molecular weight heparin; mg = milligrams; kg= kilograms

Modified from reference (2).

10. Contraindications to unfractionated or low molecular weight heparin:

Contraindications to unfractionated heparin (UFH) or low molecular weight heparin (LMWH)
1. Hemophilia or other known bleeding disorder
2. Active or threatened antenatal bleeding
3. Thrombocytopenia with platelet count < 75,000
4. Recent stroke (hemorrhagic or ischemic)
5. Severe liver disease (with prolongation of PT or PTT)
6. Uncontrolled hypertension (Systolic BP > 200 mmHg or diastolic BP > 120 mmHg)
Additional contraindications to low molecular weight heparin (LMWH)
1. Severe renal disease (GFR < 30 mL/min)

Abbreviations: UFH = unfractionated heparin; LMWH = low molecular weight heparin; PT = prothrombin time; PTT = partial thromboplastin time; BP = blood pressure; mmHg = millimeters of mercury; GFR = glomerular filtration rate; mL = milliliters; min = minutes

Modified from reference (3).

References:

(1) D'Alton ME, Friedman AM, Smiley RM, et al. National partnership for maternal safety consensus bundle on venous thromboembolism. Obstet Gynecol 2016; 128(4): 688-698.

(2) California Maternal Quality Care Collaborative. Improving Health Care Response to Maternal Venous Thromboembolism: A California Quality Improvement Toolkit. February, 2018.

(3) Friedman AM and D'Alton ME. Venous thromboembolism bundle: risk assessment and prophylaxis for obstetric patients. Sem Perinatol 2016; 40: 87-92.

(4) Chest 2012; 141 (2 suppl): e691S – e736S.

(5) Thromboembolism in pregnancy. ACOG Practice Bulletin no. 123. Obstet Gynecol 2011; 118: 718-29.

(6) Assessing Risk for Antenatal Venous Thromboembolism. Council on Patient Safety in Women's Health Care Safety Action Series Webinar, April 20, 2016.

(7) Leffert et al. The society for obstetric anesthesiologists and perinatologists consensus statement on the anesthesia management of pregnant and postpartum wormen receiving thromboprophylaxis or higher dose anticoagulation. www.anesthesia-analgesia.org 2018; 126(3): 928-45.

(8) Horlocker et al. Regional anesthesia in patients receiving antithrombotic or thrombolytic therapy. Regional anesthesia pain medicine 2018; 43: 263-309.

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