Thromboprophylaxis in the Antenatal, Intrapartum and Postnatal Period (VTE)

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Associated Policies and Written Control Documents

Version Control

Version	Summary of Changes/Amendments	Publication Date
1	Version 1	July 2023
2	Updated to reflect the implementation of the electronic patient record. Updated evidence and research on VTE added as supporting evidence.	1/09/2026
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1.0 Procedural Information

1.1 Scope

This guideline applies to all midwives providing care to women accessing maternity services across Powys Teaching Health Board, including those working in community settings and delivering antenatal, intrapartum and postnatal care.

1.2 Introduction

Pregnancy is a well-recognised risk factor for venous thromboembolism (VTE), increasing the risk by approximately four- to five-fold compared with women of the same age who are not pregnant. The increased risk begins in early pregnancy, persists throughout all three trimesters, and rises substantially in the postpartum period, particularly during the first week after birth. Although the risk gradually declines, it remains elevated for up to six weeks postpartum, with some evidence suggesting a persistent increase for up to 12 weeks in women with additional risk factors.

VTE remains one of the leading causes of direct maternal mortality in the UK despite being largely preventable through timely risk assessment, thromboprophylaxis, prompt recognition, and appropriate management. The latest MBRRACE-UK maternal mortality data (2021–2023) confirms that thrombosis and thromboembolism remain the leading cause of maternal death during pregnancy and up to six weeks after the end of pregnancy. Although overall maternal mortality has shown a small, non-significant reduction compared with the previous reporting period, deaths from VTE continue to highlight opportunities to improve the identification of women at risk and ensure consistent implementation of evidence-based prevention strategies.

This guideline outlines the current evidence-based approach to the assessment of VTE risk, thromboprophylaxis, investigation, and management of suspected or confirmed venous thromboembolism during pregnancy and the postnatal period, in line with national recommendations and best practice.

1.3 Purpose

To provide evidence-based guidance for the assessment, prevention, investigation, management and ongoing care of women at increased risk

of venous thromboembolism (VTE), and for women with suspected VTE during pregnancy, labour, birth and the postnatal period.

The guideline aims to reduce preventable maternal morbidity and mortality from deep vein thrombosis (DVT) and pulmonary embolism (PE) through systematic VTE risk assessment at key points throughout pregnancy and the puerperium, timely initiation of thromboprophylaxis where indicated, prompt recognition and investigation of suspected VTE, and delivery of appropriate multidisciplinary care.

This guideline should be used alongside current national guidance, including:

- RCOG Green-top Guideline No. 37a: Reducing the Risk of Venous Thromboembolism during Pregnancy and the Puerperium (2015).
- NICE Guideline NG201: Antenatal Care (2021).
- NICE Guideline NG121: Intrapartum Care for Women with Existing Medical Conditions or Obstetric Complications and Their Babies (2019)

The guideline supports all healthcare professionals involved in maternity care in Powys Maternity Services to undertake and document VTE risk assessments throughout pregnancy and the postnatal period, make timely referrals to senior obstetric, anaesthetic and haematology teams, and provide safe, individualised care through effective multidisciplinary working and shared decision-making with women and their families.

1.4 Acronyms and Definitions

- **PTHB** – Powys Teaching Health Board
- **LMWH**- Low molecular weight heparin
- **OLC -** Obstetric led care
- **MLC**- Midwifery led care
- **MDT**- Multi disciplinary team
- **ART**- Assisted Reproductive Technology
- **BMI**- Body Mass Index
- **CEMACH**- Confidential Enquiries into Maternal and Child Health
- **CMACE**- Centre for Maternal and Child Enquiries
- **MBRRACE** - Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries
- **DVT-** Deep vein thrombosis
- **IOL-** Induction of labour
- **IVF-** In vitro fertilisation
- **OHSS-** Ovarian Hyper stimulation syndrome
- **PE-** Pulmonary Embolism
- **VTE-** Venous Thromboembolism
- **SLE –** Systemic lupus erythematosus

- **IBD –** Inflammatory bowel disease
- **EPR** – Electronic Patient Record
- **CIS** – Clinical Information Sharing Report

2.0 VTE in the Antenatal, Intrapartum and Postnatal Period

2.1 Risk Factors for VTE

Pregnancy is associated with an increased risk of venous thromboembolism (VTE) due to physiological changes including increased coagulation factors, reduced venous flow, and vascular changes. The risk of VTE is further increased in the presence of additional maternal, obstetric, medical, and thrombophilia-related risk factors. All women should undergo VTE risk assessment at booking and throughout pregnancy, with reassessment following any change in clinical circumstances, during labour, and in the postnatal period.

Previous VTE

- Previous VTE (except a single event related to major surgery)
- Previous VTE provoked by major surgery
- Family history of unprovoked or estrogen-related VTE in first-degree relative

Thrombophilia

- High-risk thrombophilia:
    - Antithrombin deficiency
    - Protein C deficiency
    - Protein S deficiency
    - Homozygous Factor V Leiden mutation
    - Homozygous Prothrombin gene mutation
    - Combined Factor V Leiden and Prothrombin gene mutations
    - Antiphospholipid syndrome (APS)
- Low-risk thrombophilia:
    - Heterozygous factor V Leiden mutation
    - Heterozygous prothrombin gene mutation

Maternal Risk Factors

- Age over 35 years
- Obesity (BMI ≥30 kg/m²)
- Parity ≥3
- Smoking
- Gross varicose veins (particularly with phlebitis or above-knee involvement)
- Paraplegia or significant immobility
- Long-distance travel or prolonged immobility
- Dehydration

- Assisted reproductive treatment (ART)
- Multiple pregnancy
- Low socioeconomic status (where associated with additional risk factors)
- Current intravenous drug user

Medical Risk Factors

- Heart disease / failure
- Lung disease (including pneumonia)
- Inflammatory conditions (e.g. inflammatory bowel disease, systemic lupus erythematosus)
- Nephrotic syndrome
- Sickle cell disease
- Cancer
- Severe infection or sepsis
- Type I diabetes mellitus with nephropathy
- Current or recent hospital admission

Obstetric Risk Factors

- Caesarean birth (particularly emergency caesarean section)
- Pre-eclampsia
- Hyperemesis gravidarum
- Ovarian hyperstimulation syndrome
- Prolonged labour
- Preterm birth
- Stillbirth
- Postpartum haemorrhage
- Operative vaginal birth
- Significant perineal trauma
- Major obstetric surgery

Transient Risk Factors Requiring Reassessment

Women should have their VTE risk reassessed if they have:

- Admission to hospital during pregnancy or the postnatal period
- Reduced mobility or prolonged bed rest
- Hyperemesis
- Significant infection
- Dehydration
- Surgical procedures
- New medical conditions or deterioration in existing conditions

Identification of VTE risk factors should inform individualised care planning, including consideration of thromboprophylaxis with low molecular weight heparin (LMWH), advice regarding mobilisation and hydration, and appropriate referral for obstetric review where indicated.

2.2 Assessment of risk for VTE

All women should be assessed for their risk of venous thromboembolism (VTE) using the VTE risk assessment tool on the Electronic Patient Record (EPR) at the following points during pregnancy and the postnatal period:

- At the initial booking appointment with the named midwife (and repeated following the dating scan if indicated).
- At any antenatal contact if an intercurrent problem or change in clinical condition occurs.
- On presentation in labour.
- In the immediate postpartum period, before transfer home following a local birth.
- At the first postnatal home visit if the birth occurred outside of Powys.

The VTE risk assessment tool should be reviewed at every patient contact to ensure no changes are required. If any changes occur, please complete a new VTE risk assessment on the EPR.

VTE Risk Assessment Scoring: Antenatal

- If total score ≥ 4 antenatally, consider thromboprophylaxis from the first trimester.
- If total score 3 antenatally, consider thromboprophylaxis from 28 weeks.

VTE Risk Assessment Scoring: Postnatal

- If total score ≥ 2 postnatally, consider thromboprophylaxis for at least 10 days
- If total score > 3 postnatally, thromboprophylaxis may be extended for up to 6 weeks following an obstetric review

Indications for 6/52 postnatal LMWH

- Previous history of confirmed VTE
- Anyone requiring antenatal LMWH
- Family history of VTE particularly pregnancy or hormone related and/or an identified thrombophilia
- Antithrombin deficiency
- Antiphospholipid syndrome
- High risk thrombophilia – Homozygous Factor V Leidens, Compound heterozygote Protein C or S deficiency

- Low risk thrombophilia – Factor V Leidens, prothrombin gene mutation

Contraindications to LMWH use

- Known bleeding disorder (e.g. haemophilia, von Willebrand's disease or acquired coagulopathy)
- Active antenatal or postpartum bleeding
- Women considered at increased risk of major haemorrhage (e.g. placenta praevia)
- Thrombocytopenia (platelet count < 75 × 109/l)
- Acute stroke in previous 4 weeks (haemorrhagic or ischaemic)
- Severe liver disease
- Uncontrolled hypertension (blood pressure > 200 mmHg systolic or > 120 mmHg diastolic).
- Women at high risk of haemorrhage with risk factors including major antepartum haemorrhage, coagulopathy, progressive wound haematoma, suspected intra-abdominal bleeding and postpartum haemorrhage may be managed with anti-embolism stockings (AES), foot impulse devices or intermittent pneumatic compression devices. Unfractionated heparin (UFT) may also be considered.
- Women with previous or current allergic reactions to LMWH should be offered an alternative preparation or alternative form of prophylaxis
- Severe renal disease

2.3 Documentation and Communication

Informed Choice

Where the need for thromboprophylaxis is identified during pregnancy, this should be discussed with the woman. If she consents to treatment, a referral should be made for obstetric review to confirm and plan ongoing management. Women should receive a comprehensive discussion with their midwife and/or obstetrician to support informed decision-making regarding thromboprophylaxis. The discussion should be evidence-based and include a balanced explanation of the woman's individual risk of venous thromboembolism (VTE), together with the potential benefits and risks of thromboprophylaxis and documented on the EPR.

The consultation should also consider the woman's individualised plan of care, intended place of birth, and the suitability and benefits of birth settings where clinically appropriate. This discussion should be reviewed throughout the antenatal period as the woman's clinical circumstances

or preferences change and should be clearly documented within the management plan on the EPR.

Midwife Responsibilities

The midwife is responsible for completing and reviewing the maternity VTE risk assessment at booking, throughout the antenatal period whenever the woman's clinical circumstances change, on admission in labour, and again during the postnatal period. The assessment should be documented and updated within the woman's EPR. Each VTE risk assessment should include the date of assessment, the VTE risk score, and whether thromboprophylaxis is indicated.

The midwife is responsible for making timely referrals to the obstetric team when indicated and for liaising with the multidisciplinary team to ensure that women requiring prophylactic low molecular weight heparin (LMWH) are reviewed and prescribed treatment in accordance with the appropriate guidance.

The outcome of each assessment, any prescribed thromboprophylaxis, and the agreed management plan should be clearly documented in the EPR. Documentation should be updated whenever there is a change in the woman's risk status to ensure that the plan of care remains clear, safe, effective, and appropriate throughout pregnancy and the postnatal period.

2.4 Management of cases where postnatal thromboprophylaxis is required for MLC women birthing in Powys only

Where there is an antenatal VTE score of 2 or more, and postnatal thromboprophylaxis is accepted, midwives should follow the guidance provided below. The requirement for postnatal LMWH doesn’t prevent a woman from birthing in Powys.

Where women are MLC but require postnatal thromboprophylaxis the following should be completed:

- A referral to obstetric care in the antenatal period – which includes the VTE risk assessment tool and digital referral cover letter on the Electronic Patient Record
- An obstetric review by 28/40 and a prescription completed by an obstetrician for postnatal LMWH. This consultation can take place remotely if required
- A review of the VTE Risk Assessment Tool (antenatal and postnatal) at 36/40 by the community midwife to ensure LMWH has been prescribed appropriately for the postnatal period

- A demonstration by the community midwife to the women on how to administer LMWH at home
- Ensure a sharps bin has been provided for safe disposal of needles

Please note: the digital referral on the EPR is for MLC women, wishing to birth in Powys that require postnatal thromboprophylaxis only

2.5 Intrapartum Care for Women at Risk of Venous Thromboembolism (VTE)

Women receiving antenatal thromboprophylaxis should receive individualised counselling regarding the implications for labour and birth. This discussion should be documented and include the potential benefits and risks associated with anticoagulation during the antenatal and intrapartum period.

The following recommendations should be shared (See Appendix B for full detail of evidence and references):

- Women and Birthing people should be informed of the possible increased chance of minor PPH with LMWH, this may exist even where LMWH has not been received for 12-24 hours.
- Increased chance of bleeding is seen but mean blood loss and blood transfusion are not thought to increase but this is based on low grade evidence.
- A decision as to whether to accept thromboprophylaxis should be made with the woman or birthing person and be balanced against the chance of VTE. Consideration of place of birth and the known benefits of midwifery led settings for suitable women should also be a part of the conversation.
- Where thromboprophylaxis is accepted by the woman or birthing person care should be transferred to a named obstetrician.
- Women on prophylactic LMWH should be advised of potential minor bleeding risks, but current evidence does not support routine obstetric unit birth solely due to LMWH use.
- An active third stage is also recommended in all birth settings.
- Women or birthing people on thromboprophylaxis planning to birth in midwifery led settings should have individual care plans (CIS) to support their births.
- This review should form a part of the review of the all Wales PPH guideline and the OBS Cymru stage 0 assessment.
- More research is needed to explore the chance of PPH in women on prophylactic LMWH, who would otherwise meet the criteria for midwifery led care. This should be conducted in midwifery led

settings as this detail is missing from the data and the environment may impact on outcome. A research suggestion will be forwarded to UKMidSS

An individualised discussion should take place regarding the planned place of birth. The All-Wales Place of Birth Assessment Criteria (2023) recommends an obstetric-led birth at the 36-week risk assessment for women scoring 3 or 4 on VTE risk assessment and on prophylactic or therapeutic anticoagulants. If women choose to birth in Powys in a Midwifery led setting, this will be outside of recommended guidance and will require a Clinical Information Sharing (CIS) Report.

An active management of the third stage of labour is recommended for all women receiving antenatal thromboprophylaxis, regardless of the planned place of birth, unless clinically contraindicated.

Planned Birth

Where induction of labour or planned caesarean birth is anticipated, a documented plan should be agreed with the obstetric team regarding the timing of discontinuation of LMWH. Prophylactic LMWH should be withheld for at least 12 hours before planned birth or the administration of regional anaesthesia. Therapeutic LMWH should be withheld for at least 24 hours before planned birth or the administration of regional anaesthesia.

Spontaneous Labour

Women should be advised not to administer any further doses of LMWH once labour begins or if they suspect they are in labour, have spontaneous rupture of membranes, or experience vaginal bleeding. They should contact the maternity service immediately for advice and assessment.

Women Choosing Birth Outside an Obstetric Unit

If a woman chooses to labour and give birth in Powys despite a recommendation for birth in an obstetric unit due to thromboprophylaxis or other VTE-related risk factors, the following should be undertaken:

- A documented discussion outlining the recommendation for birth in an obstetric unit and the reasons for this recommendation.
- An offer of review by an obstetrician to discuss the potential risks and benefits, answer questions, and support informed decision-making.

- Completion of the Clinical Information Sharing (CIS) process, where appropriate, with circulation of the agreed birth plan to all relevant members of the multidisciplinary team. Please refer to MAT 079 Informed Choice, Personalised Care And The Care Of Women. Making Choice Outside Of Recommended Guidelines
- Documentation of the woman's informed decision, agreed management plan, and escalation arrangements should complications arise during labour or the immediate postnatal period.

2.6 Prevention of VTE

Measures to reduce the risk of VTE include:

- **Regular VTE risk assessment** at key points throughout maternity care, including booking, antenatal reviews where clinical circumstances change, presentation in labour, and the postnatal period.
- **Early identification of risk factors** such as previous VTE, thrombophilia, obesity, reduced mobility, infection, pre-eclampsia, multiple pregnancy, hyperemesis, and medical comorbidities.
- **Consideration of thromboprophylaxis** with low molecular weight heparin (LMWH) for women identified as being at increased risk, in line with RCOG guidance and individual assessment.
- **Encouraging regular mobilisation** and avoiding prolonged periods of immobility or bed rest where clinically appropriate.
- **Supporting early mobilisation following birth**, including after caesarean birth or periods of hospital admission, when safe to do so.
- **Maintaining adequate hydration** to support circulation and reduce venous stasis.
- **Encouraging a healthy lifestyle**, including weight management advice and smoking cessation support where appropriate.
- **Providing women with information** on the signs and symptoms of VTE and when to seek urgent medical advice.
- **Ensuring clear communication and documentation** of VTE risk assessments, discussions, treatment decisions, and management plans across all maternity care settings.

2.6 Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE) Signs and Symptoms

The clinical presentation of VTE in pregnancy can be challenging as some symptoms may overlap with normal physiological changes of pregnancy. A high index of suspicion should therefore be maintained, particularly in

women with known risk factors for VTE. Healthcare professionals should be aware of the signs and symptoms of both DVT and PE and ensure timely escalation for further assessment and investigation.

Deep Vein Thrombosis (DVT) Signs and Symptoms

DVT most commonly occurs in the left leg during pregnancy but may affect either limb. Symptoms may include:

- Unilateral leg swelling, particularly involving the calf or thigh
- Pain, tenderness, or discomfort in the leg, which may be worse on walking or standing
- Increased warmth, redness, or erythema of the affected limb
- A feeling of heaviness or tightness in the affected leg
- Enlargement of the circumference of one leg compared with the other

Healthcare professionals should be aware that the absence of classic symptoms does not exclude VTE, and clinical assessment alone is insufficient to rule out DVT. Women presenting with symptoms suggestive of DVT should undergo urgent assessment in an Emergency Department.

Pulmonary Embolism (PE) Signs and Symptoms

Pulmonary embolism may present with a range of symptoms and can be life-threatening if not recognised and treated promptly. Symptoms may include:

- Sudden onset of shortness of breath or difficulty breathing
- Chest pain, particularly pleuritic pain that worsens with breathing
- Persistent cough, which may be accompanied by haemoptysis (coughing blood)
- Palpitations or a rapid heartbeat
- Dizziness, collapse, or loss of consciousness
- A sense of anxiety or feeling that something is seriously wrong
- Unexplained deterioration in maternal condition

In pregnancy, symptoms such as breathlessness and increased heart rate may occur physiologically; however, new, sudden, severe, or disproportionate symptoms should prompt further clinical assessment in an Emergency Department.

Clinical Assessment and Escalation

Any woman presenting with signs or symptoms suggestive of VTE should receive prompt clinical assessment in an Emergency Department. Healthcare professionals should consider the woman's individual risk factors and clinical presentation when assessing the likelihood of VTE.

Women with suspected VTE should not be reassured based on symptoms alone. Where clinical suspicion exists, appropriate diagnostic investigations should be arranged promptly, and treatment initiated as indicated while awaiting confirmation where clinically appropriate.

All assessments, discussions, referrals, and management decisions should be clearly documented within the woman's EPR.

3.0 Additional Information and Appendices

3.1 Roles and Responsibilities

Head of Midwifery and Sexual Health

The Head of Midwifery and Sexual Health must:

- Provide overall leadership for the implementation of VTE prevention and management within maternity services.
- Ensure maternity VTE practice aligns with current national guidance, including RCOG and NICE recommendations.
- Ensure appropriate systems, policies, and pathways are in place for VTE risk assessment, prevention, escalation, and management.
- Ensure appropriate resources, education, and training are available to support midwifery competency in VTE assessment and management.
- Monitor compliance with VTE standards through audit, clinical governance processes, and review of incidents and learning.
- Support service improvement initiatives to reduce maternal morbidity and mortality associated with VTE.
- Ensure women receive safe, evidence-based, and equitable care throughout pregnancy, birth, and the postnatal period.

Assistant Head of Midwifery and Sexual Health Services

The Assistant Head of Midwifery and Sexual Health Services must:

- Support the Head of Midwifery in the implementation and monitoring of VTE prevention strategies across maternity services.
- Promote adherence to the VTE guideline within clinical areas and support staff to follow agreed pathways.
- Support the delivery of education, training, and competency updates for midwifery staff.

- Assist with monitoring compliance, audit activity, and identification of areas for improvement.
- Support review of VTE-related incidents, themes, and learning to improve clinical practice.
- Work collaboratively with multidisciplinary teams to promote effective communication, escalation, and safe management of women at risk of VTE.
- Support the development and review of patient information and resources to promote informed choice and understanding of VTE prevention.

Band 7 operational lead midwife

The Operational lead midwife must:

- Support the implementation and monitoring of the VTE guideline across maternity services.
- Provide clinical leadership and guidance to midwives regarding VTE risk assessment, prevention, and escalation.
- Ensure VTE risk assessments, documentation, and referral pathways are embedded within clinical practice.
- Support staff education, competency, and awareness of VTE prevention and management.
- Monitor compliance, contribute to audit and quality improvement activity, and support learning from incidents.
- Work collaboratively with the multidisciplinary team to ensure safe, effective, and coordinated care for women at risk of VTE.

This is an opportunity to include any associated or relevant information but can be removed if not required.

Consultant Midwife

The consultant midwife must:

- Provide expert midwifery advice and leadership to support evidence-based VTE prevention and management.
- Support the implementation, review, and ongoing improvement of this guideline across maternity services.
- Review emerging evidence, national guidance, and best practice recommendations that may impact VTE care and service provision.
- Communicate relevant changes in guidance or clinical advice to the Midwifery Leadership and Management Team for consideration and implementation where required.
- Provide specialist advice and support for complex cases or situations where care falls outside the scope of the guideline.

- Support education, audit, research, and quality improvement initiatives to enhance VTE care and outcomes.
- Promote consistent, safe, and effective midwifery practice through collaboration with the wider multidisciplinary team.

Women and Children's Risk and Governance Lead

The Women and Childrens Risk and Governance Lead must:

- Support implementation, monitoring, and review of the VTE guideline in line with national guidance and governance requirements.
- Monitor compliance with VTE risk assessment, documentation, and management processes through audit and quality improvement.
- Review VTE-related incidents, identify learning, and support actions to improve safety and outcomes.
- Support the review and dissemination of new evidence, guidance, and safety recommendations.
- Work collaboratively with multidisciplinary teams to promote safe, effective, and consistent VTE care.

Midwives

All midwives working in PTHB maternity services must:

- Complete and review VTE risk assessments at key stages of maternity care and following any change in clinical circumstances.
- Identify VTE risk factors, recognise signs and symptoms, and escalate concerns appropriately.
- Provide women with information and advice on VTE prevention, including mobilisation, hydration, and when to seek medical advice.
- Ensure accurate documentation of assessments, discussions, referrals, and management plans.
- Make timely referrals and liaise with the multidisciplinary team to support safe and effective VTE management.
- Maintain knowledge and competency through ongoing education and training.

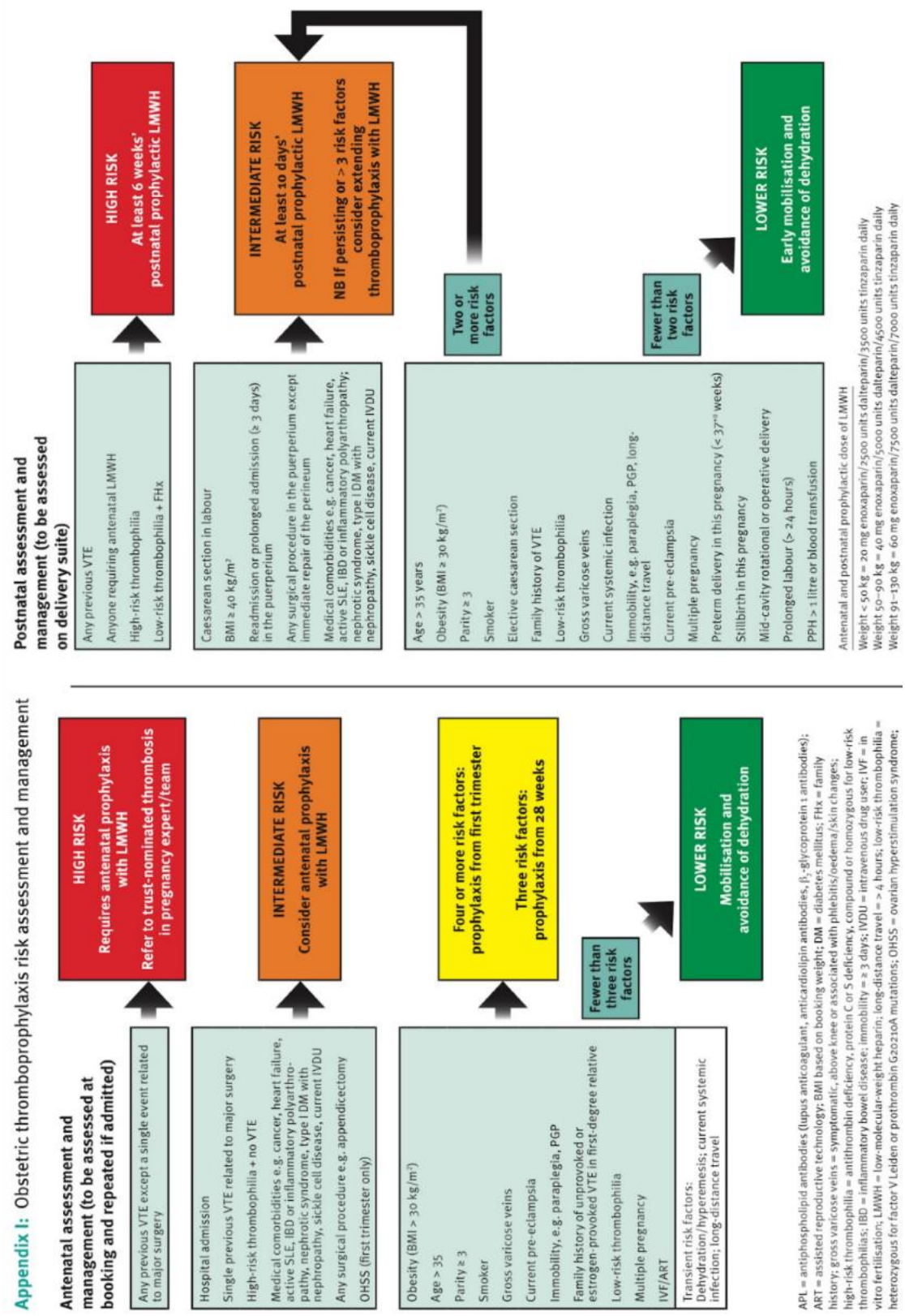
3.2 Monitoring Compliance, Audit & Review

An audit will be conducted on the compliance of performing a VTE risk assessment, accurate assessment of risk factors and appropriate referral for thromboprophylaxis through the EPR audit reports

This document will be reviewed every three years or earlier should audit results or changes to legislation / practice within PTHB indicate otherwise.

3.3 Appendices

Appendix A - RCOG – Risk Assessment and Management



Appendix B – Evidence to support VTE discussions

Clinical Reference Guide-4
Author- Victoria Owens

Clinical Situation:
The introduction of universal Venous Thrombo--Embolism (VTE) risk assessment for all pregnant women[1] is well embedded in Wales. This has led to a clinical scenario where women, who would otherwise be suitable for Midwifery Led care[2] are offered and often take up recommended antenatal thromboprophylaxis. It is unclear if antenatal thromboprophylaxis increases the chance of Postpartum Haemorrhage and recommended place of birth is not detailed in guiding literature[1]. This document will consider the literature in order to make a reasonable recommendation around place of birth for this group of women in the All Wales Midwifery Led Guidelines. To ensure that all women who are suitable for a midwifery led intrapartum model are identified.
Background:
Since 2015 The Royal College of Obstetricians and Gynaecology has recommended antenatal VTE risk assessment for all women[1]. Current research is of very low certainty in relation to the impact of antenatal thromboprophylaxis[3]. A recent Cochrane review[3] reports that '*The evidence is very uncertain about benefits and harms of VTE thromboprophylaxis in women during pregnancy and the early postnatal period at increased risk of VTE'* questioning universal adaption of this recognised screening and treatment. Some women suitable for midwifery led intrapartum care will meet the pre-defined criteria to be offered antenatal thrombo prophylaxis[1], this is usually offered up to birth and into the postnatal period. Low molecular weight heparin (LMWH) is the recommended form of anticoagulant[1], prophylactic doses may differ from therapeutic doses used to treat VTE. The numbers of women in Wales suitable for midwifery led care but administering antenatal thromboprophylaxis is unknown but is considered to be low. There is no mention in guiding literature[1,2] of the impact of prophylactic administration of LMWH on planned place of birth. Anticoagulant medication is frequently cited as a risk factor for postpartum haemorrhage[3] including severe haemorrhage of >1500mls[4]. Anticoagulant medication does not appear as a risk factor on nationally accepted risk assessment[5] for PPH in used in Obstetric Units (OU's) in Wales. This implies some inconsistency in the application of the empirical evidence around the haematological and/or biological effects of prophylactic LMWH in pregnancy.

For women and birthing people, with uncomplicated pregnancies, planning to birth in a midwifery led setting is known to reduce the chance of birth related intervention[6,7,8,9] and reduce long and short term morbidity linked to this intervention.

Postpartum Haemorrhage remains a leading cause of maternal morbidity and mortality[10]. An increased incidence of PPH has been associated to thromboprophylaxis in pregnancy with LMWH. Where postpartum haemorrhage is significantly more likely to occur then women are generally advised to birth in the obstetric unit where preventative medical care and emergency medical assistance, including blood transfusion services, may reduce the chance long and short term morbidity and or mortality due to PPH. The potential benefit of these interventions and management usually outweigh the known increase chance of intervention and is clearly accepted where PPH is a known risk factor[2].

It is imperative that women are provided with evidence based information[2] around place of birth recommendations to support them to make informed birth choices. These antenatal conversations may guide them in antenatal decisions which may impact on chance of birth complication and recommended place of birth. These should be discussed and weighted against the benefits of any recommended treatment.

Assessment:

Review of the literature.

Author & Year	Where	Type of study	Main outcomes	Considerations
ANITA SYLVEST ANDERSEN, JØRGEN G. BERTHELSEN & THOMAS BERGHOL (2010)[11]	Denmark	Retrospective Cohort	166 women treated with LMWH versus 308 control. Included therapeutic and prophylactic doses. Reported PPH defined as bleeding >1000mls.	No difference in incidence of PPH >1000mls in treated versus untreated controls.
Ian A. Greer and Catherine Nelson-Piercy (2005)[12]		Systematic review	2777 participants from 64 studies. Mixed	Rates of PPH >500mls In treated group 26/2777, 0.94%

			prophylactic and therapeutic. PPH defined as > 500mls.	95% CI. No increase in PPH
Galambosi PJ, Kaaja RJ et al, 2012[13]	Finland	Retrospective Cohort	648 exposed to LMWH compared to 626 unexposed. Unclear if prophylactic or therapeutic.	Chance of PPH> 1000mls was the same in both groups.
Knol,Schulting, veeger 2012[14]	Netherlands	Retrospective Cohort	88 women on therapeutic doses of LMWH. Controls pregnant women without LMWH matched for parity, mode of birth, gestational age and maternal age. PPH defined as >500mls in vaginal birth and >1000mls in CS, severe PPH >1000Mls in vaginal birth.	Risk of PPH after vaginal birth was 30% and 18% for LMWH-users and non-users, respectively (OR 1.9, 95%CI 1.1-3.5). Risk of severe PPH after vaginal birth was not different (5.6 vs 5.0%; OR 1.1; 0.4-3.6). Risk of PPH after CS was 12% in LMWH-users and 4% in non-users (OR 2.9; 0.5-19.4). There is an increased chance of PPH >500ml in Therapeutic LMWH but not in PPH >1000mls in vaginal birth. Increased chance of PPH

				>500mls was found where therapeutic dose was received within 24 hours of birth where the increase was 1.2 fold higher. The interval between last dose of LMWH and delivery does not influence the risk of PPH.
Kominiarek, Angelopoulos et al 2007[15]	USA	Retrospective Cohort	Case control investigation included therapeutic 37/55 and prophylactic 18/55 treatment. 55 pregnancies treated with LMWH compared to 110 matched controls.	There was no statistical difference in EBL (296±146 vs 307±112 cm3, P¼0.62 for vaginal delivery; 688±252 vs 765±313 cm3, P¼0.34 for caesarean delivery), PPH (6/55, 11% vs 9/110, 8.2%; OR 1.37, 95% CI 0.16 to 11.5) or postpartum RBC transfusion (3/55, 5.4% vs 4/110, 3.6%; OR 1.50, 95% CI 0.3 to 7.48) between the cases and controls, respectively.
Roshani, Cohn, Stehouwer et al 2011[16]	Netherlands	Retrospective cohort	95 therapeutic users of LMWH and	The incidence of PPH was 18% in LMWH users (N=95)

			524 controls not using LMWH. PPH >500mls, severe PPH >1000mls	and 22% in non-users (N=524) (RR 0.8; 95% CI 0.5 to 1.4). The incidence of severe PPH was 6% in both groups (RR 1.2; 0.5 to 2.9). The median amount of blood loss differed only in normal vaginal deliveries. It was 200 ml in LMWH users and 300 ml in non-users (difference -100 ml; 95% CI -156 to -44).
Sirico, Saccone, Maruotti 2019[17]			Systematic review - Meta analysis- Eight studies including 22,162 women were analyzed. Of the 22,162 women, 1320 (6%) were administered prophylactic LMWH, 20,842 (94%) women formed the nonexposed group (control	Women treated with LMWH had a higher risk of PPH (RR 1.45, 95%CI 1.02-2.05) compared to controls; there was no difference in mean of blood loss at delivery (MD -32.90, 95%CI 68.72-2.93) and in risk of blood transfusion at delivery (RR 1.24, 95%CI 0.62-2.51), respectively.

			group). Primary outcome incidence of PPH. Different parameters for PPH existed and some studies included birth via Caesarean section.	

There is some suggestion, in the literature, that primary outcomes in studies vary by definition of PPH and inclusion of both prophylactic and therapeutic doses of LWMH. This creates variables which are difficult to control for. In these instances it is challenging to consider a conclusive finding in relation to the chance of PPH in women using prophylactic doses only. There is a variety of findings in the literature with some indeed suggesting no increased chance of PPH in either therapeutic or prophylactic anticoagulant.

The most recent meta analysis[17] may provide the most relevant detail for this review. It considers only studies assessed to be of low bias, where prophylactic doses of LWMH where administered in the treated groups and where PPH was a primary outcome of the study. It is acknowledged that only two, of the eight studies in the review found an increased chance of PPH, but the numbers of participants in these 2 studies enabled the researchers to reach their overall conclusions.

It is however noted that definitions of PPH still remain inconsistent in some of the studies included, it also reports on mean blood loss in women receiving LMWH although the number of studies and participants where mean blood loss was reported were low, indicating a higher bias in these findings and questioning validity and application to practice.

This systematic review indicates that there is a significant increase in minor PPH in women administering Prophylactic LMWH during pregnancy but that mean blood loss or blood transfusion is not increased.

The selective inhibition of coagulation factor Xa by LMWH confers antithrombotic activity with a relatively low risk of bleeding, as thrombin inhibition is a major contributor to bleeding syndromes [17].

Recommendation:

- Women and Birthing people should be informed of the possible increased chance of minor PPH with LMWH, this may exist even where LMWH has not been received for 12-24 hours.
- Increased chance of bleeding is seen but mean blood loss and blood transfusion are not thought to increase but this is based on low grade evidence.
- A decision as to whether or not to accept thromboprophylaxis should be made with the woman or birthing person and be balanced against the chance of VTE. Consideration of place of birth and the known benefits of midwifery led settings for suitable women should also be a part of the conversation.
- Where thromboprophylaxis is accepted by the woman or birthing person care should be transferred to a named obstetrician.
- Women on prophylactic LMWH should be advised of potential minor bleeding risks, but current evidence does not support routine obstetric unit birth solely due to LMWH use.
- An active third stage is also recommended in all birth settings.
- Women or birthing people on thromboprophylaxis planning to birth in midwifery led settings should have individual care plans to support their births.
- This review should form a part of the review of the all Wales PPH guideline and the OBS Cymru stage 0 assessment.
- More research is needed to explore the chance of PPH in women on prophylactic LMWH, who would otherwise meet the criteria for midwifery led care. This should be conducted in midwifery led settings as this detail is missing from the data and the environment may impact on outcome. A research suggestion will be forwarded to UKMidSS

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5.0 Equality Impact Assessment

It is not mandatory to complete an Equality Impact Assessment (EIA) for a written control document. If you feel it would be of benefit, please complete the box below and attach an EIA as an appendix to this document.

Has an Equality Impact Assessment (EIA) been completed	YES:	NO: **X**
Name of the person giving this response	E.Doman	
If NO:	Not required for this guideline	
If YES:	Attach EIA as an appendix to this document	