Guideline on Prevention and Treatment of Venous-Thromboembolism in Obstetrics and Gynaecology in Sri Lanka

December 2025

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Guideline Number 1.0

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Sri Lanka College of Obstetricians & Gynaecologists

Sri Lanka College of Haematologists

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Acronyms & Abbreviations:

APS/ APLS – Antiphospholipid syndrome

ART – Assisted reproductive technology

BMI – Body mass index

DVT – Deep vein thrombosis

DM – Diabetes mellitus

EFW – Estimated fetal weight

FVL – Factor V Leiden

FGR – Fetal growth restriction

FSH/ HMG – Follicle-stimulating hormone / Human menopausal gonadotropin

GCS – Graduated compression stockings

HIT – Heparin-induced thrombocytopenia

HMWH / UFH – High molecular weight heparin / Unfractionated heparin

IBD – Inflammatory bowel disease

IVDU – Intravenous drug users

IVF – In-vitro fertilisation

IPC – Intermittent pneumatic compression

LMWH – Low molecular weight heparin

LVEF – Left ventricular ejection fraction

MI – Myocardial infarction

MIS – Minimally invasive surgery

MMR – Maternal mortality ratio

MRV – Magnetic resonance venography

OHSS – Ovarian hyperstimulation syndrome

PE – Pulmonary embolism

PPH – Postpartum haemorrhage

PT/ INR – Prothrombin time / International normalized ratio

SC – Subcutaneous

SLE – Systemic lupus erythematosus

SVT – Superficial vein thrombophlebitis

TEDS – Thromboembolic deterrent stockings

VKA – Vitamin K antagonists

V/Q – Ventilation–perfusion (lung scan)

VTE – Venous thromboembolism

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1. Guideline development and scope of the guideline

1.1 Guiding principles

The development of this guideline was guided by the following principles:

- **Equity:** Ensuring access to essential care for all women in Sri Lanka, regardless of socioeconomic status.
- **Feasibility:** Prioritizing recommendations that can be realistically implemented with available resources.
- **Cost-Effectiveness:** Advocating for interventions that provide the greatest health benefit for the investment.
- **Simplicity:** Providing clear, unambiguous recommendations and algorithms to minimize complexity at the point of care.
- **Evidence-based practice:** Ensuring that all recommendations are consistent with the best available international and local evidence, while adapting them to the Sri Lankan context.

1.2 Methodology of guideline development

1.2.1 Guideline committee

The guideline committee comprised a multidisciplinary team: guideline committee of the Sri Lanka College of obstetricians and gynaecologists (SLCOG) and Sri Lanka College of Haematologist (SLCH).

1.2.2 Literature search and synthesis

A systematic search for evidence was conducted in electronic databases: PubMed, Cochrane Library and cited reference search. The search focused on guidelines, systematic reviews, randomized controlled trials, observational studies and local publications.

1.2.3 Formulation of recommendations

Recommendations were formulated during consensus meetings of the guideline committee. Evidence was categorised according to the scope areas and presented to guideline committee

that was analysed by the guideline committee considering following principles: balance of benefits and harms, the quality of evidence, cultural acceptance, and resource implications.

1.2.4 Peer review and approval

The draft guideline was subjected to external review by the consultant obstetricians and gynaecologists (SLCOG) and consultant haematologists (SLCH) who were not part of the guideline committee. Their feedback was collated, reviewed and incorporated in the final version of the guideline by the guideline committee.

1.2.5 Plan for update

This guideline is scheduled for a full review in 2028 or sooner if new, practice-changing evidence emerges. The joint guideline committee of SLCOG and SLCH will monitor for new evidence.

1.3 Scope of the guideline

The purpose of this guideline is to explore the epidemiology, risk factors, diagnostic challenges, and management strategies of thromboembolism in obstetrics and gynaecology within the Sri Lankan context.

By examining available data and identifying gaps in healthcare delivery, this aims to highlight the significance of thromboembolism as a preventable cause of maternal morbidity and mortality in Sri Lanka.

Also, thromboembolism preventive strategies are implemented in a limited manner among gynaecological patients in Sri Lanka. This gap in practice should be addressed through the development and dissemination of appropriate guidelines and increased awareness among healthcare professionals.

2. Introduction and background epidemiology of thromboembolism in pregnancy and gynaecology

2.1 Thromboembolism in pregnancy

Thromboembolism, including deep vein thrombosis (DVT) and pulmonary embolism (PE), is a leading cause of maternal mortality worldwide, accounting for approximately 10% of maternal deaths in high-income countries (1). The risk of venous thromboembolism (VTE) during pregnancy is four to five times higher than in non-pregnant women, with an incidence of 1-2 cases per 1,000 pregnancies (2). In Sri Lanka, the maternal mortality ratio (MMR) is 25 per 100,000 live births in 2023 (3). Among the causes of maternal mortality, thromboembolism remains a critical issue, particularly in high-risk pregnancies. Although national data on thromboembolism in pregnancy remain limited, annual reports from the Family Health Bureau indicate an incidence of three per 10,000 deliveries per year between 2018 and 2022 (3). This emphasises the critical need for enhanced awareness and the establishment of systematic data collection mechanisms to improve monitoring and management. (6)

A systematic review done in 2017 stated that venous thromboembolism in Asian population is lower than that of in western population. Incidence estimates in Asia were approximately 15 to 20% of the levels recorded in western countries but have increased over time (4).

Risk factors for thromboembolism in pregnancy include advanced maternal age, obesity, multiparity, caesarean delivery, and a personal or family history of VTE (5). In Sri Lanka, cultural practices such as prolonged bed rest during pregnancy and the rising prevalence of obesity, diabetes in pregnancy and IVF pregnancies further exacerbate these risks.

The caesarean section rate in Sri Lanka, which reached 43.1% in 2022 (3), significantly increases the risk of VTE, underscoring the need for tailored thromboprophylaxis protocols. Diagnosing thromboembolism in pregnancy is challenging due to overlapping symptoms with normal physiological changes, such as lower extremity oedema and dyspnoea. However, cost, availability barriers and lack of standardised national guidelines hinder effective care.

2.2 Thromboembolism in gynaecology

In addition to the above, venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE), is a major postoperative complication in gynaecological patients. Risk is particularly high following major gynaecological surgeries, malignancies, and assisted reproductive techniques (ART). Without thromboprophylaxis, the incidence of confirmed deep vein thrombosis (DVT) in major abdominal surgery ranges from 17 to 40%. Despite continued efforts to reduce its incidence, postoperative VTE remains the second most common perioperative complication and the third most common cause of mortality (6).

2.3 Maternal mortality and morbidity figures in Sri Lanka

Sri Lanka has made significant progress in reducing maternal mortality over the years, achieving one of the lowest maternal mortality ratios (MMR) in South Asia at 25 maternal deaths per 100,000 live births in 2023. **(Figure 1)**

Figure 1: Trend of maternal mortality in Sri Lanka

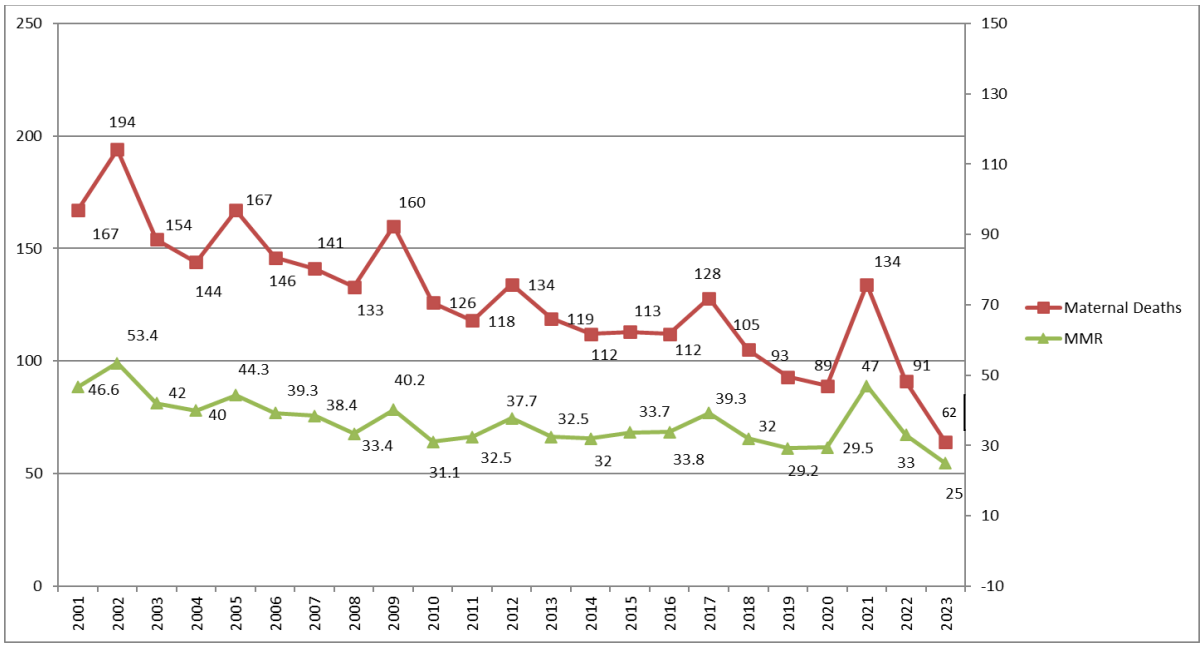
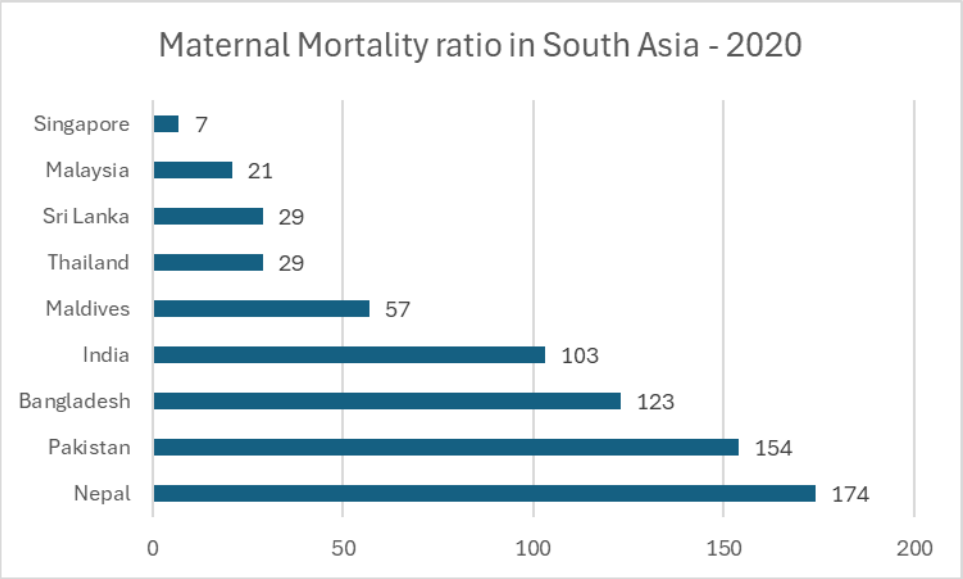


Figure 2: Maternal mortality ratio in South Asia



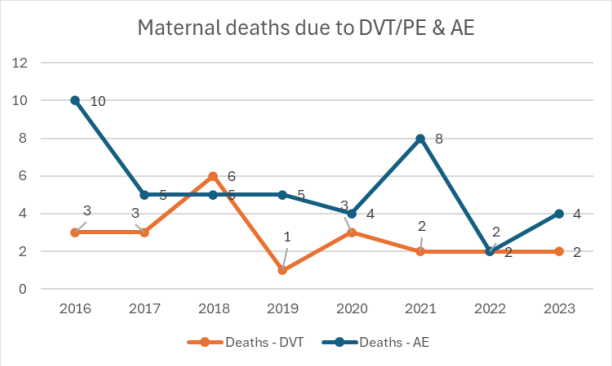
Sri Lanka's maternal mortality figures are considerably lower than those of neighbouring South Asian countries **(Figure 2)**.

Though amniotic fluid embolism (AFE) remains an inherently non-preventable cause of maternal death, thromboembolism is a clearly preventable entity. National maternal mortality trends consistently show that thromboembolic deaths persist despite being avoidable, underscoring the need for strengthened, systematic preventive strategies **(Table 1, Figure 3)**.

Table 1: Comparison of mortality due to VTE & AFE over the years in Sri Lanka

Year	Number of deaths due to VTE	Number of deaths due to AFE
2016	3	10
2017	3	5
2018	6	5
2019	1	5
2020	3	4
2021	2	8
2022	2	2
2023	2	4

Figure 3: Comparison of mortality due to VTE and AFE over the years in Sri Lanka



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3. Risk assessment for VTE in pregnancy

3.1 Categorisation of risk factors

Risk factors can be divided into the following categories as shown in **Table 2**. All the risk factors can be further stratified according to the degree of risk as shown in **Figure 4** (1).

I. Pre-existing risk factors
II. Obstetric risk factors: Antenatal & Postnatal
III. Transient risk factors: These risk factors are potentially modifiable. They may either emerge later in pregnancy or resolve over time.

So, it is essential to conduct continuous, individualised risk assessments throughout the gestational period.

Table 2: Risk factors for VTE in pregnancy

Pre-existing risk factors	Previous VTE	
	Thrombophilia	Heritable (2) - Antithrombin deficiency - Protein C deficiency - Protein S deficiency - Factor V Leiden - Prothrombin gene mutation
		Acquired - Antiphospholipid syndrome (3) - Persistent lupus anticoagulant and/or persistent moderate/high titre anticardiolipin antibodies and/or β_2-glycoprotein I antibodies
	Family history of unprovoked or estrogen-related VTE	
	Medical comorbidities (e.g., cancer; heart failure; active SLE, inflammatory polyarthropathy or IBD; nephrotic syndrome; type 1	

	diabetes mellitus with nephropathy; sickle cell disease; current intravenous drug user)
	Age > 35 years
	Obesity (BMI ≥ 30 kg/m²) either pre-pregnancy or at booking
	Parity ≥ 3
	Smoking
	Gross varicose veins (Symptomatic or above knee or with associated phlebitis, oedema/skin changes)
	Paraplegia
Obstetric risk factors	**Antenatal risk factors:** Multiple pregnancy Assisted reproductive technology (ART) Current pre-eclampsia
	Postnatal risk factors: Elective or Emergency Caesarean section Prolonged labour (> 24 hours) Mid-cavity or rotational operative delivery Stillbirth Preterm birth Postpartum haemorrhage (> 1 litre/requiring transfusion)
Transient risk factors	Any surgical procedure in pregnancy or puerperium except immediate repair of the perineum.
	Hyperemesis
	Ovarian hyperstimulation syndrome (first trimester only)
	In vitro fertilization (IVF)
	Admission or immobility (e.g. ≥ 3 days bed rest, pelvic girdle pain restricting mobility)
	Current systemic infection requiring intravenous antibiotics or admission to hospital (e.g. pneumonia, pyelonephritis) Postpartum wound infection
	Long-distance travel (>4 hours)

3.2 Timing of risk assessment

It is recommended to perform risk assessment at following occasions.

- Early pregnancy/ At booking visit
- At 28 weeks
- Repeat assessment if:
  - Antenatal admission to hospital
  - Development of pregnancy complication (e.g. pre-eclampsia)
  - Prolonged immobility
  - Intrapartum
  - Postpartum within 6 hours of birth

Care plan on each occasion includes (4):

- Discuss options for VTE thromboprophylaxis with woman
- Multidisciplinary approach of care: If high risk or any doubtful cases, refer to haematologist for further assessment
- Discuss with the anaesthetic team to decide on the peripartum management plan

Figure 4: Flowchart for risk assessment VTE prophylaxis during antenatal and postnatal period

High Risk Factors

1

ANY ONE OF
- Pre-pregnancy therapeutic anticoagulation (any reason)
- Any previous VTE plus antithrombin deficiency
- Recurrent VTE (2 or more)
- VTE associated with APLS

→ **Therapeutic anticoagulation**
- Continue/commence antenatal
- Continue for 6 weeks postpartum

High prophylactic dose may be appropriate

2

ANY ONE OF
- Any single previous VTE not provoked by surgery
- Any VTE related to estrogen/ any transient risk factor other than surgery
- Any previous VTE with other thrombophilia defects

→ **LMWH standard prophylaxis**
- From first trimester
- Continue for 6 weeks postpartum

3

IF THROMBOPHILIA
- More than one high-risk thrombophilia defect (No personal history of VTE)
- Asymptomatic antithrombin, protein C or protein S deficiency
- A family history of VTE and an identified thrombophilia

→ **LMWH standard prophylaxis**
- Consider antenatally and get expert opinion
- Continue for 6 weeks postpartum

4

ANY ONE OF
- Ovarian hyperstimulation syndrome (first trimester only)
- Any surgery (pregnancy or postpartum) except perineal repair
- Severe hyperemesis or dehydration requiring IV fluid

→ **LMWH Standard Prophylaxis**
- While in hospital or until resolves

5

ANY ONE OF
- Low-risk thrombophilia without VTE
- Presence of APLS antibodies without VTE

→
- Consider LMWH if additional risk factors present
- Expert opinion

All Risk Factors

6

SELECT ALL THAT APPLY

At every assessment (antenatal or postnatal)

Family history (1st degree relative) of unprovoked or estrogen-provoked VTE	1
Age > 35 years	1
Parity ≥ 3	1
Smoking (any amount)	1
Gross varicose veins	1
IVF/ART	1
Multiple pregnancy	1
Pre-eclampsia in current pregnancy	1
Immobility	1
Current systemic infection (requiring IV antibiotics or hospital admission)	1
Known low risk thrombophilia (no VTE)	1
Elective caesarean section	1
Prolonged labour > 24 hours	1
Operative vaginal birth	1
Preterm birth (<37+0 weeks) in current pregnancy	1
PPH > 1 L or transfusion	1
Stillbirth in current pregnancy	1
Current BMI 30–39 kg/m²	1
Current BMI ≥ 40 kg/m²	2
Caesarean section in labour	2
Single VTE provoked by surgery	3
Medical comorbidity (e.g- cancer, nephrotic syndrome, heart failure, sickle cell disease, Type 1 DM with nephropathy, active SLE, inflammatory polyarthropathy/ IBD, current IVDU)	3

Sum Risk Score =

→ **Antenatal Risk Score**

ALL	Mobilise, avoid dehydration
3	**LMWH standard prophylaxis** • From 28 weeks
≥4	**LMWH standard prophylaxis** • From time of assessment

→ **Postnatal Risk Score = antenatal + postnatal score**

ALL	Mobilise, avoid dehydration
2	**LMWH standard prophylaxis** • at least 10 days • If persisting, consider extending
≥3	**LMWH standard prophylaxis** • for six weeks

GCS/TED stockings
- Consider for postnatal women until fully mobile.
- Consider if receiving LMWH

Enoxaparin Standard Prophylaxis (subcut)

• **50-90 kg**	40 mg daily	• **131-170 kg**	80 mg daily
• **91-130 kg**	60mg daily	• **>170 kg**	0.5mg/kg

How to use the flowchart for risk assessment VTE prophylaxis during antenatal and postnatal period:

Scenarios 1 to 5 → Follow the given recommendations without calculating the risk score.

Scenario 6 → Calculate the Risk score. Follow recommended antenatal & postnatal plans.

High risk thrombophilia: antithrombin deficiency, protein c or s deficiency, compound or homozygous for low-risk thrombophilia (homozygous Factor V Leiden, homozygous prothrombin mutation, compound heterozygous FVL/prothrombin mutation)

Low risk thrombophilia: heterozygous FVL, heterozygous prothrombin mutation

APS: antiphospholipid syndrome; **ART**: artificial reproductive technology; **BMI**: body mass index; **FVL**: factor V Leiden; **GCS**: graduated compression stockings; **IVF**: in-vitro fertilisation; **LMWH**: low molecular weight heparin; **PE**: pulmonary embolism; **PPH**: postpartum haemorrhage; **SLE**: systemic lupus erythematosus; **TEDS**: thromboembolic deterrent stockings; **VTE**: venous thromboembolism; IBD: inflammatory bowel disease; IVDU: intravenous drug users; Gross varicose veins= symptomatic, above knee or associated with phlebitis/oedema/skin changes; ≥: greater than or equal to; >: greater than

The above flowchart shows the risk assessment and management plan for the given risk. Red colour column on left shows high risk factors and the next right column shows the management plan.

Subsequently, the blue colour column on left side shows all the risk factors. Risk scores should be calculated during recommended period and prophylaxis should be given as mentioned on right side boxes.

It is recommended by the guideline committee to use this chart to risk stratify every patient and attach this to the Bed Head Tickets.

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4. Guidelines for thrombophilia testing in pregnancy

4.1. General principles in thrombophilia testing

Thrombophilia is an inherited or acquired condition that predispose individuals to thromboembolism. In pregnancy, the hypercoagulable state further increases thrombotic risk (1, 2).

- Not all pregnant women require thrombophilia testing.
- Testing should be targeted to specific clinical scenarios where results will influence management.
- The timing of testing is crucial as pregnancy and anticoagulation can affect test results.
- Cost-effectiveness should be considered in the Sri Lankan healthcare setting (3).
- Family history of thrombophilia or VTE is an important factor in decision-making.

4.2. Indications for testing

4.2.1 Strong indications (Recommended testing):

1. Personal history of unprovoked VTE or VTE associated with hormonal therapy
2. First-degree relative with high-risk thrombophilia (e.g., Antithrombin deficiency, Factor V Leiden homozygosity)
3. Recurrent pregnancy loss (≥3 first-trimester losses, less than 10 weeks or ≥1 second-trimester loss of a morphological normal fetus)
4. Previous pregnancy with severe, early-onset pre-eclampsia (<34 weeks) or HELLP syndrome
5. Previous pregnancy with unexplained FGR (<10th percentile of AC/EFW associated with Doppler abnormalities) or stillbirth
6. History of arterial thrombosis under age 50 without conventional risk factors

Women fulfilling criteria 3, 4 or 5 with persistently positive APLS antibodies are classified as having **Obstetric APLS** (4). In this group, anticoagulation is not required for venous

thromboembolism prevention. However, Enoxaparin 40 mg daily should be commenced from the time of a positive pregnancy test, continued throughout the pregnancy and up-to 6 weeks postpartum period.

It is also recommended to commence Aspirin 150 mg once daily, from the time of a positive pregnancy test and continue till 36 weeks to improve obstetric outcomes.

4.2.2 Relative indications (Consider testing):

1. Single late fetal loss (>10 weeks)
2. Placental abruption with fetal compromise
3. Family history of an unprovoked or estrogen-provoked VTE in a first-degree relative, aged under 50 years
4. Severe pre-eclampsia (at any gestational age)
5. Multiple medical risk factors for VTE during pregnancy

4.2.3 Not recommended:

1. Routine testing in women with no personal or family history of VTE or adverse pregnancy outcomes (1, 2)
2. Testing during acute VTE (may give false results)
3. Universal screening in pregnancy
4. Testing in women with provoked VTE from major transient risk factors (e.g., major surgery)

4.3. Types of thrombophilia tests

4.3.1 Inherited thrombophilia:

- Factor V Leiden mutation
- Prothrombin gene (G20210A) mutation
- Antithrombin deficiency
- Protein C deficiency
- Protein S deficiency

4.3.2 Acquired thrombophilia:

Antiphospholipid antibodies:

- Lupus anticoagulant (LA)
- Anticardiolipin antibodies (aCL) IgG and IgM
- Anti-β2-glycoprotein I (aβ2GPI) IgG and IgM (4)

4.4.Timing of testing

- Ideally performed before pregnancy or at least 3 months after:
    - Completion of anticoagulation therapy
    - Resolution of acute thrombotic event
- Six weeks are sufficient following delivery or pregnancy loss.
- Protein S, protein C, and antithrombin levels are affected by pregnancy, hormonal contraception, and acute thrombosis.
- Antiphospholipid antibody testing should be repeated after 12 weeks to confirm persistence if initially positive (4).

4.5. Interpretation and management

- Positive results should be interpreted within the clinical context
- Consider referral to haematologist.
- Genetic counselling should be offered for hereditary thrombophilia.
- Management decisions should be based on:
    - Type and severity of thrombophilia
    - Personal and family history of VTE
    - Previous pregnancy complications
    - Additional risk factors for VTE

4.6. Practical approach for Sri Lankan setting

4.6.1. Testing at resource - limited setting:

- Prioritize testing for women with the strongest indications
- Consider a stepwise approach, starting with more common thrombophilias
- Reserve comprehensive testing for specialized centres

4.6.2. Referral pathway:

- Peripheral health centres should refer to tertiary care for testing
- Collaborative management between obstetrics and haematology teams (3)

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5. Acute management of thromboembolism in pregnancy

5.1. General facts

- Confirm DVT by imaging (Refer chapter 6)
- D-Dimer physiologically increases during the pregnancy, but has a high negative predictive value (1)
- Following baseline investigations should be carried out prior to commence treatments (2):
    - PT/INR, APTT
    - FBC
    - Serum Creatinine
    - LFT (AST/ALT)
- Booking body weight should be considered for dose calculation (3)
- Special treatment may be required based on individual basis such as,
    - Embolectomy
    - Thrombectomy
    - Thrombolytic therapy

5.2. Treatments

Follow **Table 3** for different treatment options at various clinical scenarios.

Table 3: Treatment options at various clinical scenarios

Clinical Scenario	Treatment Options
Suspect DVT	Commence Heparin. Available options are Low Molecular Weight Heparin (LMWH) and High Molecular Weight Heparin (HMWH)/ Unfractionated Heparin. Confirm diagnosis by investigations (Compression duplex ultrasound). Continue the treatments as given below;

	Suspicious Doppler, but not confirmed DVT o Stop Heparin o Repeat scan in 3 days & 7days if high level of clinical suspicion exists (4). However, if there is a persistent clinical suspicion, treatment should be continued and repeat scan in 3 days & 7days later. If low level of suspicion treatments should be stopped.
Treatment (When baseline investigations are normal)	LMWH 1mg/ kg BD (Body weight at booking visit) OR 1.5 mg/kg once daily. Doses should be round-off to vial size. HMWH: o 5000 IU bolus followed by 18IU/kg/hr infusion o Monitor APTT, maintain 1.5 - 2 times normal o Check Platelet count between 4 -14 days once in 3 days
Treatment (When serum creatinine is high)	Lower doses of LMWH (Enoxaparin and Dalteparin) should be employed if the creatinine clearance is less than 30 ml/minute or Tinzaparin if less than 20 ml/minute. Renal dose of LMWH is usually 20-40 mg daily (Obtain expert opinion). HMWH – Doses are as above.
Massive PE	Intravenous unfractionated heparin Expert advice and thrombolysis - Thrombolytic therapy or thoracotomy and surgical embolectomy
Special treatment options (Refer chapter 6)	Thoracotomy, embolectomy and thrombolytic therapy on individual basis. IVC Filter – indicated when there are recurrent PE and thrombus involving Iliac veins.

Treatment maintenance	Therapeutic dose of LMWH should continue throughout pregnancy and 6 weeks post-partum or up to at least 3 months in total (1, 2).
Deciding on Heparin closer to delivery	DVT at term: • Continue HMWH infusion till 6 hours prior to expected time of delivery (5) • LMWH treatment dose should be stopped 24 hrs prior to delivery
When patient is with epidural OR had a spinal anaesthesia	LMWH should not be given for 4 hours after the use of spinal anaesthesia or after the epidural catheter has been removed (6,7). Epidural catheter should not be removed within 12 hours of the most recent injection.
Special facts	• In the initial management of DVT, the leg should be elevated and a graduated elastic compression stocking applied to reduce oedema. (controversial evidence) • Mobilisation with graduated elastic compression stockings should be encouraged • When there is a high risk of haemorrhage Heparin infusion is preferred. • Post partum period to be managed with Warfarin or LMWH, as they are not contraindicated during breast feeding (1,8) • Avoid warfarin till 5th day of post-partum period or longer in case of bleeding • Post Thrombotic Syndrome to be avoided by ➢ Wearing of stockings (controversial evidence) ➢ Use of anticoagulant for 3 months • Thrombophilia screening should be planned with haematologist (Refer chapter 4).

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6. Role of radiology in diagnosis, treatment and prevention

6.1. Introduction

Early radiological diagnosis and interventional procedures play a critical role in preventing fatal complications such as PE in these high-risk categories (1, 2).

In Sri Lanka, there is a growing need for a standardised approach to early radiological detection and intervention to minimise mortality and improve patient outcomes in obstetrics and gynaecology (3, 4).

6.2. Early radiological diagnosis of Deep Vein Thrombosis (DVT)

The primary imaging modality for diagnosing DVT is Compression Ultrasound Scan (CUS) with Doppler (1, 3).

Pelvic or iliac vein thrombosis is often missed on standard ultrasound, especially after gynaecological cancer surgery or in pregnancy.

In pregnancy, Magnetic Resonance Venography (MRV) is recommended. (1, 4).

For non-pregnant gynaecological patients, CT venography is recommended to diagnose post-surgical pelvic DVT, particularly in cases of ovarian or endometrial cancer-related thrombosis (2). While Contrast Venography remains the gold standard, it is rarely used due to its invasive nature (5).

6.3. Radiological diagnosis of Pulmonary Embolism (PE)

For suspected PE, CT Pulmonary Angiography (CTPA) is the gold standard due to its high sensitivity and specificity, especially when CXR is abnormal (1,5).

CTPA enables rapid and accurate detection of pulmonary thromboembolism. It can also identify alternative diagnoses such as pneumonia or amniotic fluid embolism (4).

While radiation exposure is a concern in pregnancy, modern low-dose protocols and proper shielding techniques significantly minimize fetal radiation risks (3).

Ventilation–Perfusion (V/Q) scanning remains the preferred first-line imaging modality for suspected pulmonary embolism (PE) in pregnancy when the chest X-ray is normal. V/Q

scanning provides lower maternal breast radiation exposure. However, the availability of V/Q scanning across Sri Lankan tertiary and secondary care centres is extremely limited, resulting in constrained real-world applicability of this recommendation.

This guideline therefore adopts a context-aligned, safety-driven escalation pathway:

- Normal CXR + V/Q scan available → V/Q scan first line.
- Normal CXR but V/Q scan not available → Proceed directly to CTPA.
- Abnormal CXR or alternative pathology suspected → CTPA preferred.

6.4. Interventional radiological options to prevent PE in high-risk patients

For high-risk patients who cannot receive anticoagulation, interventional radiology provides life-saving treatment options (1, 2). These include:

- Inferior Vena Cava (IVC) filters to prevent clot migration to the lungs.
- Catheter-Directed Thrombolysis (CDT), which involves the targeted infusion of thrombolytic agents.
- Mechanical Thrombectomy, a procedure that physically removes clots using aspiration devices.

6.5. Newer advances in radiological thromboprophylaxis

Emerging radiological and intervention techniques offer safer and more effective options for diagnosing and managing thrombosis, including (2, 4):

- Contrast-Enhanced Ultrasound (CEUS) for detecting pelvic DVT without radiation exposure.
- Ultrasound-Assisted Catheter Thrombolysis (USAT) for enhanced thrombolytic delivery.

Due to the limitations of some facilities in Sri Lanka, direct engagement with the interventional radiologist/ radiologist early is recommended to support clinical decision-making.

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7. Special circumstances in obstetrics

7.1. Thromboprophylaxis for pregnant women with mechanical heart valves

Pregnant women with Mechanical Heart Valves (MHVs) face significant challenges due to their high thrombotic risk combined with the hypercoagulable state of pregnancy (1-3). Management requires balancing maternal thromboembolism risk against risks of bleeding and adverse fetal outcomes (3,4).

Although mechanical-valve thrombosis differs pathophysiologically from VTE, the guideline committee recognised its unique pregnancy anticoagulation requirements and therefore included it as a separate dedicated section.

7.1.1. Pre-conception counselling

- All women with mechanical heart valves should receive pre-pregnancy counselling regarding anticoagulation management and associated risks (4)
- Discuss maternal and fetal risks associated with different anticoagulation regimens.
- Counsel on the need for close monitoring throughout pregnancy.
- Consider valve type when planning pregnancy (bi-leaflet mechanical valves in the aortic position carry lower thrombotic risk)

7.1.2. Anticoagulation regimens during pregnancy

Option 1: Vitamin K Antagonists (VKA) throughout pregnancy (5,6)

- Advantages: Most effective in preventing valve thrombosis
- Disadvantages:
    - Risk of embryopathy- 6 -10% (vs 0.45 – 0.9% with low-dose warfarin)
    - Increased risk of fetal haemorrhage and stillbirth when used between 6-12 weeks.

Option 2: Low Molecular Weight Heparin (LMWH) throughout pregnancy

- Advantages: No risk of embryopathy
- Disadvantages:
    - Higher risk of valve thrombosis (4.4 - 8.7%) compared to VKAs
    - Requires monitoring of anti-Xa levels weekly

Option 3: Sequential therapy

- LMWH during 6-12 weeks of gestation
- VKAs for remainder of pregnancy
- Switch to LMWH or UFH at 36 weeks in preparation for delivery

7.1.3. Specific recommendations for each regimen

7.1.3.1 Vitamin K antagonist (Warfarin) regimen (7,8)

- Target should be according to the type of valve. Eg - Aortic - target 2-3. (higher target like 3-3.5 for mitral, older-generation, or multiple mechanical valves)
- Monitor INR weekly or bi-weekly
- Consider dose-adjustment based on pregnancy-related changes in metabolism
- Switch to LMWH or UFH at 36 weeks to reduce risk of fetal intracranial haemorrhage during delivery
- If warfarin is stopped and INR has normalised, vaginal delivery is acceptable.
- If delivery starts while on a VKA or in less than 2 weeks after discontinuation of a VKA, where INR is not normalized, caesarean section is recommended.

7.1.3.2 LMWH regimen

- Twice-daily dosing (e.g., Enoxaparin, Dalteparin).
- Adjust dose according to body weight.
- Monitor peak anti-Xa levels 4-6 hours post-dose: target anti-Xa levels 4–6 gynaecolo post-dose at 0.8–1.2 U/l (aortic valve prosthesis) or 1.0–1.2 IU/mL (mitral and right-sided valve prostheses).
- Monitor anti-Xa levels immediately before next dose: target >0.6 U/mL.
- Monitor anti-Xa levels daily while in hospital until achieve target.
- Thereafter, monitor weekly anti-Xa during first trimester, then every 2-4 weeks if remains stable (9).

7.1.3.3 Unfractionated Heparin (UFH) regimen

- Administer subcutaneously, twice daily.
- Target aPTT ratio: 2.0 – 3.0 × control or anti-Xa level of 0.35-0.70 U/mL.
- Monitor aPTT or anti-Xa levels frequently (at least weekly).
- May consider in resource-limited settings or when LMWH monitoring is not available.

7.1.4. Risk stratification and personalized approach

High-risk patients (ANY of the following):

- Mitral position mechanical valve
- Right sided valves
- Older generation valve (ball-and-cage, tilting disc)
- Multiple mechanical valves
- Previous thromboembolic event
- Atrial fibrillation
- LVEF <35%
- Valve dysfunction, especially stenosis
- Hypercoagulable state
- Other clotting risks (smoker)

Risk-adapted recommendations:

- High-risk: VKA throughout pregnancy is preferred unless patient declines due to fetal risk.
- Lower risk (aortic position bi-leaflet valve without other risk factors): Sequential therapy is more acceptable.

7.1.5. Delivery planning

Planned vaginal delivery

- Discontinue VKA at 36 weeks and switch to LMWH or UFH
- Stop LMWH 24 hours before induction or planned caesarean section
- Stop UFH 4-6 hours before anticipated delivery
- Consider reversal agents if urgent delivery needed while on anticoagulation

Caesarean section

- May be preferred for women on therapeutic anticoagulation
- If delivery starts while the mother is on VKAs or less than 2 weeks after discontinuation of VKAs, caesarean section is recommended.

7.1.6. Postpartum management

- Resume anticoagulation 4-6 hours after vaginal delivery and 6-12 hours after caesarean section if haemostasis is adequate.
- VKA started 5 days post-delivery if no bleeding complications.
- Continue LMWH/ UFH until INR reaches therapeutic target.
- Safe to breastfeed while on warfarin, LMWH, or UFH.

7.1.7. Additional considerations for Sri Lanka

- Consider availability and cost of LMWH monitoring facilities.
- In resource-limited settings where frequent anti-Xa monitoring is unavailable, VKA throughout pregnancy (except first 6-12 weeks) may be preferred.
- Establish regional centres with expertise in managing these high-risk pregnancies.
- Consider low-dose aspirin (75-100 mg daily) in addition to anticoagulation for high-risk patients (from 12 weeks of gestation).

7.1.8. Management of complications

Valve thrombosis (10)

- Urgent evaluation with echo-cardiography
- Intravenous UFH while planning intervention
- Consider thrombolysis or emergency surgery based on clinical status

Haemorrhage

- Discontinue anticoagulation and urgent discussion with haematologist
- Consider Protamine sulphate for LMWH/UFH
- Vitamin K, PCC, or FFP for VKA reversal
- Restart anticoagulation when safe

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7.2. Management of superficial vein thrombophlebitis (SVT) in pregnancy

In pregnancy, superficial vein thrombophlebitis (SVT) is characterised by the formation of a thrombus and inflammation in a superficial vein, typically in the lower extremities (1).

Although SVT is typically self-limiting, it can progress to the deep venous system, which elevates the likelihood of pulmonary embolism (PE) and deep vein thrombosis (DVT) (2).

7.2.1. Risk factors for superficial vein thrombophlebitis in pregnancy

Following are risk factors for SVT during pregnancy:

- High parity
- Advanced maternal age
- Obesity
- Immobility (e.g., protracted bed rest, long distance travels)
- Assisted reproduction and ovarian hyperstimulation syndrome
- Thrombophilia (e.g., antiphospholipid syndrome, Factor V Leiden mutation)
- History of prior venous thromboembolism (3).

7.2.2. Clinical presentation

Symptoms are frequently unilateral and typically manifest in the great saphenous vein or small saphenous vein. Localised tenderness, redness, warmth, and oedema in a superficial vein can be elicited in examination (4).

Thickening of the afflicted vein become palpable and resembles a cord. There is no substantial leg swelling, which is more indicative of DVT (2).

Warning signs of DVT or PE include:

- Sudden swelling and pain throughout the entire limb
- Tachycardia, chest pain, and shortness of breath
- Haemodynamic instability or cyanosis (5).

7.2.3. Diagnosis

The diagnosis is predominantly clinical, based on localised inflammation along the superficial vein (1).

Compression Doppler ultrasound (USG):

• Necessary when there is a suspicion of extension towards deep vessels.

• Aids in the differentiation of SVT from DVT, particularly in cases of symptomatic DVT (4).

D-dimer test:

• The levels are physiologically elevated, rendering them unreliable during pregnancy.

• Utilised exclusively when systemic coagulopathy or thrombophilia is suspected (6).

Blood tests:

• FBC and CRP (if infection is suspected).

• Coagulation profile (in patients with a history of VTE or known thrombophilia) (6).

7.2.4. Management

7.2.4.1 Conservative management (Uncomplicated SVT, localised <5 cm)

• Compression stocking (Class II or III, 20–30 mmHg) to enhance venous return (2).

• Elevate the legs to alleviate discomfort and oedema.

• Promote ambulation (avoid prolonged periods of bed rest).

• Compresses that are either warm or chilly are employed to alleviate discomfort.

• Paracetamol or NSAIDs (e.g., Ibuprofen) for pain relief (NSAIDs should be avoided in the third trimester) (5).

7.2.4.2 Anticoagulation therapy (For high-risk cases or extensive SVT)

Anticoagulation indicates if:

- SVT with a length of at least 5 cm
- SVT near the deep venous system (e.g., the great saphenous vein near the saphenofemoral junction)
- Pregnant women with thrombophilia
- Recurrent SVT or previous VTE
- Extension of SVT despite conservative management

Anticoagulants that are advised during pregnancy include:

- Low molecular weight heparin (Preferred choice):
  - Enoxaparin 40 mg SC once daily (prophylactic dose)
  - Enoxaparin 1 mg/kg SC twice daily (therapeutic dose, if high risk for DVT/PE)
  - Continue for a minimum of 4–6 weeks or until 6 weeks postpartum if the patient is at a high risk. (1).

- Unfractionated heparin (UFH): Used in high-risk cases with renal impairment or planned early delivery.

It is not recommended to use Direct Oral Anticoagulants (DOACs) during pregnancy, such as Apixaban and Rivaroxaban (5).

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8. Thromboprophylaxis in gynaecological patients

8.1. Introduction

The prevalence of VTE after gynaecologic surgery varies from 15% to 30%. Fatal PE occurs in 0.2–0.9% of patients.

Risk factors for VTE in gynaecological patients are depicted in **Table 04.**

The risk of VTE after gynaecologic laparoscopic surgery is uncertain (1,2).

The American College of Chest Physicians (ACCP) originally incorporated the Caprini Risk Assessment Model, where each independent risk factor is weighted from 1 to 5 points, and the cumulative score drives the intensity of thromboprophylaxis required (1). A 2022 update published in *The Obstetrician & Gynaecologist (TOG)* re-evaluated the Caprini model against NICE, RCOG, ACOG, and ACCP guidance and produced a modified version tailored specifically for gynaecological patients (3). For national standardisation, this guideline adopts the validated TOG-modified chart to support operational decision-making in routine gynaecological practice **(Table 4)**.

It is recommended by the guideline committee to use Table 4 and Table 5 for every patient undergoing gynaecological surgery and attach to the Bed Head Tickets.

Table 4: Risk factors and scoring

Risk Factor	Score
Risk Factor (Patient-Related)	
Age 41–60 years	+1
61–74 years	+2
≥75 years	+3
BMI ≥30	+1
≥40	+2
COCP/oral HRT use	+1
Pregnancy or within 6 weeks following delivery/miscarriage	+3
Varicose veins	+1
Pelvic mass of a significant size (e.g., fibroid >12 weeks in size)	+1
Personal VTE history	+3
Family history of unprovoked VTE	+3
Known high-risk inherited thrombophilia	+3
Currently on bed rest (inability to walk 10 meters)	+1
Patient confined to bed >72 hours	+2
Medical conditions (acute MI, COPD, Inflammatory bowel disease, Heart failure, Sepsis, pneumonia, diabetes on insulin)	+1
Major surgery in the past month	+1
Hip, pelvis or leg fracture; stroke; multiple trauma; acute spinal cord injury	+5
Past/present cancer	+2
Smoking	+1
Immobilizing plaster cast	+2
Blood transfusion	+1
Risk Factor (Procedure-Related)	
Duration of surgery (From anaesthesia to end of surgery) <60 minutes	+1
Duration of surgery >60 minutes	+2
Total Score	

Table 5: Summary on recommended thromboprophylaxis methods for various risk stratifications in gynaecology

Risk score	Risk stratum	Thromboprophylaxis
0	Low risk	Ambulation alone or IPC or GCS during hospitalisation
1–4	Moderate risk	IPC ± GCS during hospitalisation
5–8	High risk	IPC + LMWH or LMWH alone for 7–10 days
≥9	Highest risk	IPC + LMWH or LMWH alone for 30 days

Abbreviations for the table 6: VTE = venous thromboembolism; IPC = intermittent pneumatic compression; GCS = graduated compression stockings; LMWH = low-molecular-weight heparin.

8.2. Methods of thromboprophylaxis in gynaecology

Refer **Table 5** for recommended thromboprophylaxis methods for various risk scores (3).

8.2.1. Mechanical prophylactic measures

- Graduated Compression Stockings (GCS) – Effective in reducing DVT risk but may need to be combined with pharmacologic prophylaxis (4)
- Intermittent Pneumatic Compression (IPC) – Shown to reduce DVT incidence by up to 69% (4)

8.2.2. Pharmacological prophylaxis

Table 6 highlights the various pharmacological options for thromboprophylaxis in gynaecology (4-6).

Table 6: Summary of different pharmacological prophylaxis agents used in gynaecological thromboprophylaxis

Agent	Dose	Advantages	Disadvantages / Considerations
Low Molecular Weight Heparin (LMWH)	Enoxaparin: 40 mg SC (0.5mg/kg) once daily daily Dalteparin: 5000 IU SC once daily	Once-daily dosing Greater bioavailability Lower risk of HIT compared to UFH	Requires renal dose adjustment Local injection site reactions Rare risk of HIT
Unfractionated Heparin (UFH)	5000 IU SC every 8–12 hours	Effective Shorter half-life Easier perioperative control	Requires frequent dosing Higher risk of bleeding HIT (up to 6% incidence)

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9. Special circumstances in gynaecology

9.1. Thromboprophylaxis in gynaecological malignancies

9.1.1. Increased VTE risk in gynaecological malignancies

Patients with cancer have up to a 7-fold increased risk of venous thromboembolism (VTE) compared to the general population (1, 2).

Among gynaecological oncology patients, the risk is even more significant, with approximately 38% experiencing perioperative thromboembolic complications in the absence of prophylaxis (3).

This elevated risk is attributed to multiple cancer-related factors, including the malignancy itself, advanced age, vascular compression by pelvic masses, prolonged surgical procedures, vascular injury and chemotherapy-induced hypercoagulability (4).

9.1.2. Tumour-specific VTE risk

- Ovarian cancer:

  Ovarian cancer has one of the highest VTE incidence rates among gynaecological malignancies, with reported rates ranging from 5% to 16.6% (5). Risk factors for early VTE include surgery and chemotherapy. Later VTE events are associated with older age, prior DVT, advanced FIGO stage (IIC–IV), and residual tumour following primary surgery (6).

- Endometrial carcinoma:

  This is one of the most prevalent gynaecologic cancers. Prominent VTE risk factors include metabolic syndrome components such as obesity, hypertension, insulin resistance, diabetes, and dyslipidaemia (7).

- Cervical Cancer:

  VTE risk in cervical cancer varies widely from 0% to 34%, with the highest rates observed in mucin-producing tumours (8).

9.1.3. Impact of oncological treatments on VTE risk

Treatment modalities in oncology further contribute to thrombosis risk. These include:

- Major surgery
- Chemotherapy
- Antiangiogenic drugs
- Immunomodulatory agents
- Erythropoiesis-stimulating agents (ESAs)
- Blood transfusions
- Central venous catheters

Each of these factors has been independently associated with an increased likelihood of developing VTE.

9.1.4. Recommendations for prophylaxis

All women undergoing gynaecological surgery including those with gynaecological malignancies should be risk-stratified using the TOG-modified Caprini Risk Assessment Model (2022), which has been benchmarked against NICE, RCOG, ACOG, and ACCP frameworks and validated for gynaecological practice. This model is adopted as the standardised national tool for operational VTE risk assessment in Sri Lanka **(**Table 4).

It is recommended by the guideline committee to use Table 4 and Table 5 for every patient undergoing surgery for gynaecological malignancies and attach to the Bed Head Tickets.

In addition to that, The American College of Chest Physicians (ACCP) recommends extended-duration pharmacologic prophylaxis (i.e., 4 weeks of LMWH) for women undergoing gynaecological cancer surgery who are at high risk of VTE and not at elevated risk for bleeding (10).

Individualised risk assessment and expert opinion should be taken for extended duration of pharmacological prophylaxis.

Despite limited data regarding minimally invasive surgery (MIS), it is recommended to follow the same thromboprophylaxis guidelines as for laparotomy.

9.1.5. VTE risk with chemotherapy and antiangiogenic therapy

Patients receiving chemotherapy or antiangiogenic agents face a heightened risk of VTE. In such cases, Low Molecular Weight Heparin (LMWH) is the preferred anticoagulant due to its efficacy and safety profile in cancer patients.

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9.2. Thromboprophylaxis in assisted reproduction

9.2.1. Venous thromboembolism (VTE) risk in In-Vitro-Fertilisation (IVF)

VTE occurrence is estimated at approximately 1 per 1,000 in spontaneous pregnancies, rising to around 2 per 1,000 in pregnancies following IVF (1).

Incidence can rise up to 1.7% if developed ovarian hyperstimulation syndrome (OHSS) with hospitalization (2)

OHSS affects about 5–7% of IVF cycles, with severe forms accounting for up to a 100-fold increased risk of VTE (3).

9.2.2. Recommendations for thromboprophylaxis in IVF

Refer the **Table 7** for recommendations adopted from the Swedish Association of Obstetrics and Gynaecology (SFOG) .

It is recommended by the guideline committee to use this chart (Table 7) to risk stratify every patient undergoing IVF and attach this to the Bed Head Tickets.

Table 7: Recommendations adopted from the Swedish Association of Obstetrics and Gynaecology (SFOG) for thromboprophylaxis in IVF

Score	Risk Factors
1	• Heterozygous FV Leiden • Heterozygous prothrombin mutation • Obesity (BMI >28 at booking) • Caesarean section • Hereditary factors: VTE in a 1st degree relative < 60 years • Age >40 years • Preeclampsia • Hyperhomocysteinemia • Placental abruption • Inflammatory bowel disease
2	• Protein S deficiency • Protein C deficiency • Immobilization (strict immobilization or if the patient has a cast)
3	• Homozygous FV Leiden • Homozygous prothrombin • More than one thrombophilia defect
4	• Prior VTE • APLS without VTE • OHSS
Very high Risk	• Mechanical aortic valve • Condition warranting continuous thromboprophylaxis • APLS with VTE • Recurrent VTE • Antithrombin deficiency
Treatment according to score:	
1 point	Thromboprophylaxis not needed
2 points	Thromboprophylaxis postpartum once daily for at least 7 days, this includes thromboprophylaxis for a transient risk factor
3 points	Thromboprophylaxis once daily for 6 weeks postpartum
4 or higher points	Thromboprophylaxis once daily throughout pregnancy and at least for 6 weeks postpartum
Very high risk	Thromboprophylaxis twice daily (double dose) throughout pregnancy and at least for 12 weeks postpartum

In addition to that, it is recommended to follow the guiding principles given below.

- No thromboprophylaxis for IVF patients without known risk factors.
- LMWH prophylaxis should continue in pregnant patients diagnosed with OHSS until its resolution and at least until 12 + 6 weeks of gestation. Continue longer if additional risks are present, guided by a standardized risk score **(Figure 4)**.
- Discontinue prophylaxis four weeks after OHSS resolution in non-pregnant patients.
- Preconception risk assessment and decision-making on prophylaxis (for risk score ≥2) is recommended before IVF stimulation and during pregnancy.
- Initiate prophylaxis at the start of FSH/HMG or estrogen stimulation in indicated patients.
- Individualised dosing plan (standard vs. high dose), especially in "very high risk" patients should be discussed with consultant haematologist.
- In women with known thrombotic risk factors, frozen embryo transfer is best performed in a natural cycle; if ovarian stimulation is required, thromboprophylaxis should begin at the onset of stimulation.

References

1.Rova K, Passmark GYNAECOLO, Lindqvist PG. Venous thromboembolism in relation to in-vitro fertilization: an approach to determining the incidence and increase in risk in successful cycles. Fertil Steril. 2012;97(1):95-100.

2.Nelson SM. Venous thrombosis during assisted reproduction: novel risk-reduction strategies. Thromb Res. 2013;131(Suppl 1):S1-S3. doi:10.1016/S0049-3848(13)00023-6.

3. Swedish Society of Obstetrics and Gynecology (SFOG). Guideline for thromboprophylaxis during in vitro fertilisation (IVF). Stockholm: SFOG; 2018.

10. Quick reference guide

Patient category	Quick reference
Thromboprophylaxis in all antenatal and postnatal women	Figure 4
Acute management of thromboembolism in pregnancy in various clinical scenarios	Table 3
All gynaecological patients	Table 4 and Table 5
Thromboprophylaxis in gynaecological malignancies	Table 4 and Table 5 Expert opinion for extended use
Thromboprophylaxis in assisted reproduction	Table 7