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# FACILITATOR'S MANUAL FOR THE MANAGEMENT OF DEEP VEIN THROMBOSIS

First Edition | 2021

# FACILITATOR'S MANUAL FOR THE MANAGEMENT OF DEEP VEIN THROMBOSIS

# PREFACE

Cardiovascular diseases have been on the increase in developing countries mainly because of changing lifestyle driven by industrialisation and rural-urban migration. Physical inactivity, unhealthy diet, excessive alcohol intake and smoking have been the main lifestyle changes causing the risk factors such as hypertension, diabetes, dyslipidaemia, etc., which are the main driving forces behind cardiovascular diseases in Ghana. Cardiovascular diseases such as stroke, heart diseases and venous thromboembolism are the leading causes of death in Africa.

Venous thromboembolism is a common problem in Ghana causing deep vein thrombosis and/or pulmonary embolism. Some cases are found incidentally or at post-mortem because of misdiagnosis or low index of suspicion among clinicians. There are well-documented risk factors such as chronic and acute medical and surgical conditions, and immobility. High index of suspicion is key to detecting and managing patients with risk factors or those with the disease.

There are guidelines, structured clinical tools as well as diagnostic devices available worldwide for the detection and management of venous thromboembolism in most parts of the world. In most parts of Africa, however, this system is not available.

Development of a training manual, a facilitator's guide and actual training of clinicians to improve early detection and management of such conditions in Ghana will go a long way to reduce high morbidity and mortality associated with venous thromboembolism.



# ACKNOWLEDGEMENT

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# LIST OF ABBREVIATIONS

| | |
|---|---|
| CTEPH | chronic thromboembolism pulmonary hypertension |
| CUS | compression venous ultrasonography |
| D-dimer | Domain-dimer |
| DVT | deep vein thrombosis |
| INR | international normalized ratio |
| KATH | Komfo Anokye Teaching Hospital |
| NOACs | novel oral anticoagulants |
| PE | pulmonary embolism |
| PTS | post thrombotic syndrome |
| VTE | venous thromboembolism |

# CONTENT

# INTRODUCTION

## OVERVIEW OF TRAINING COURSE

### RATIONALE

This course manual has been developed to address an important need in Ghana. It is intended to improve the knowledge and practices related to the identification, diagnosis and management of deep vein thrombosis. It is based on the *National Guidelines for the Management of Cardiovascular Diseases*.
The training course includes lectures on the diagnosis and management of deep vein thrombosis, and hands-on training on the use of compression ultrasound for the diagnosis of deep vein thrombosis.

### MAIN OBJECTIVE OF THE TRAINING COURSE

The main objective of this course is to equip medical doctors with the necessary skills to identify, diagnose and manage patients with deep vein thrombosis (DVT).

### SPECIFIC OBJECTIVES

At completion of the training course, the participants will be able to:

- Identify patients with high risk for venous thromboembolism.
- Evaluate patients with suspected deep vein thrombosis.
- Perform point-of-care compression ultrasound for the diagnosis of deep vein thrombosis.
- Manage patients with deep vein thrombosis.
- Perform point-of-care D-dimer and INR tests in the management of deep vein thrombosis.
- Prevent DVT in high-risk patients.

### TARGET AUDIENCE

This training is meant for **medical doctors**.

### TRAINING METHODOLOGIES

- **Plenary presentation**

- **Group work**

- **Discussion**

- **Case Scenarios**

- **Brainstorming**

- **Hands-on Training**

## TRAINING AGENDA

| DAY 1 | TOPIC/ACTIVITY | FACILITATOR |
|---|---|---|
| 08.30-08.35 AM | Introduction | |
| 08.35-09.00 AM | Diagnosis of DVT | |
| 09.00-09.15 AM | Management of DVT | |
| 09.15-09.25 AM | Anatomy of deep veins of the upper and lower extremities | |
| 09.25-09.45 AM | Introduction to Compression Ultrasound | |
| 09.45-09.55 AM | Snack break | |
| 09.55-12.30 PM | Hands-on training | |
| 12.30-01.30 PM | Lunch | |
| 01.30-03.00 PM | Hands-on training | |
| 03.00-04.00 PM | Study protocol and data collection | |

| DAY 2 | TOPIC/ACTIVITY | FACILITATOR |
|---|---|---|
| 08.30–08.45 AM | Awareness strategies at KATH | |
| 08.45–09.45 AM | Hands-on training | |
| 09.45–09.55 AM | Snack break | |
| 09.55–12.30 PM | Hands-on training | |
| 12.30–01.30 PM | Lunch | |
| 01.30–04.00 PM | Hands-on training | |



# DELIVERING THE TRAINING COURSE

## 1 INTRODUCTION TO CARDIOVASCULAR DISEASES TRAINING COURSE

### RATIONALE

To achieve the learning objectives of this training course, the participants should be able to interact and work freely with each other during the 4-day course. They must, therefore, get to know each other.

This module serves to help the participants to get know to each other as well as the facilitator and to create a cordial environment within which to conduct the training.

### TRAINER'S ADVANCE PREPARATION

- **Prepare blank name tags for all the participants and yourself.**
- **Prepare all material and equipment needed for the module.**
- **Ensure hygiene and other relevant protocols are considered in the preparation.**

### PRESENTATION

**The facilitator should:**

- Welcome the participants to the course and introduce himself/herself to the class by mentioning his/her full name, place of work, occupation.
- He/she should mention key expectations (knowledge and skill areas) from the training.

- Mention the name he/she would prefer to be called during the training course.
- Write this preferred name on the name tag using a marker and pin the name tag to his/her chest.
- Ask all the participants to go through the same process to introduce themselves, highlighting the following:
  - Full name and preferred name to be used during the training course.
  - Place of work (name of health facility, category of health facility, district, region).
  - Profession and position in the health facility.
- Briefly inform the participants of any administrative issues related to the course organisation.

## EXERCISES

**The facilitator should make the participants conduct the following activities as part of the introductions:**

- Each participant should write their preferred name to be used during the course on the name tag and stick it to their chest.
- Each participant should explain and write down one (1) thing they expect to get out of the course on a sticky note sheet and stick it up on a designated space on one of the walls in the training hall.



## COURSE NORMS

### DO'S

**Participants should:**

- Attend every session fully.
- Arrive early each day.
- Participate fully in each exercise and group work.
- Put their phones on silent mode.

### DON'TS

**Participants should NOT:**

- Miss any session.
- Be late for each day's training.
- Refuse to participate in exercises and group work.
- Miss an opportunity to make a presentation on behalf of their group.
- Receive calls during training course.
- Use their laptops during the training course.

## MATERIALS NEEDED

- Flip charts and markers
- LCD projector
- Laptop
- Answer sheets
- Sticky notes
- A4 sheets
- Laminated copies of Well's Score for Deep Vein Thrombosis
- Ultrasound machine with a linear probe
- Ultrasound gel
- Tissue papers

# 2 DIAGNOSIS AND MANAGEMENT OF DEEP VEIN THROMBOSIS

## DEFINITION OF VENOUS THROMBOEMBOLISM

- The facilitator should ask the participants to discuss the definition of venous thromboembolism.
- The facilitator should summarise the collective thoughts and using the PowerPoint as a guide, take the participants through the definition of venous thromboembolism (**Slides 11–15**).

**Definition of Venous Thromboembolism**

Venous thromboembolism (VTE) is a complex vascular disease with a multifactorial pathogenesis that results in two major clinical manifestations. The first and more common manifestation is deep vein thrombosis (DVT), which usually arises in the deep veins of the lower extremities. DVT may less commonly affect other sites, including the upper limbs, subclavian, superior vena cava, intracranial and splanchnic veins. Pulmonary embolism (PE), the second and more serious manifestation of VTE, commonly occurs as a complication of DVT of the lower extremities.

It is estimated that about 50–60% of patients are likely to develop DVT, most of which are subclinical. The clinical course of DVT may be complicated acutely by the potentially fatal conditions of pulmonary embolism (PE), and in the long term by recurrent DVT and the debilitating post thrombotic syndrome (PTS). The incidence of chronic thromboembolic pulmonary hypertension (CTEPH) among survivors of pulmonary embolism is about 3%.



**!** The facilitator should emphasize the importance of identifying and managing deep vein thrombosis early in order to prevent pulmonary embolism and other complications associated with venous thromboembolism.

## RISK FACTORS OF DEEP VEIN THROMBOSIS (DVT)

- The facilitator should ask the participants to write down the possible risk factors of DVT on sticky notes. The facilitator should then collect the answers and paste them on a central board.
- The facilitator should ask the participants to discuss the risk factors and causative factors they noted down and how they increase an individual's risk of deep vein thrombosis.
- The facilitator should then take the participants through the PowerPoint presentation (**Slides 17–18**) on the risk factors of DVT, emphasizing the likelihood of the various risk factors in causing deep vein thrombosis as shown *next page*:

*Table 1:* **Risk factors for DVT**

| Weak risk factors | Moderate risk factors | Strong risk factors |
|---|---|---|
| ▪ Bed rest for 3 days<br>▪ Immobility due to sitting (e.g. prolonged car or air travel)<br>▪ Increasing age<br>▪ Laparoscopic surgery (e.g. cholecystectomy)<br>▪ Obesity<br>▪ Pregnancy/antepartum<br>▪ Varicose veins | ▪ Arthroscopic knee surgery<br>▪ Central venous lines<br>▪ Chemotherapy<br>▪ Congestive heart failure or chronic respiratory disease<br>▪ Hormone replacement therapy<br>▪ Malignancy<br>▪ Oral contraceptive therapy<br>▪ Paralytic stroke<br>▪ Pregnancy/postpartum<br>▪ Previous venous thromboembolism<br>▪ Thrombophilia | ▪ Fracture (hip or leg)<br>▪ Major orthopaedic surgery<br>▪ Major general surgery<br>▪ Trauma with multiple injuries<br>▪ Spinal cord injury |

## CASE SCENARIO (SLIDE 19)

- The facilitator should divide the participants into two (2) groups and ask them to discuss the following case scenario. Subsequently, each group should appoint one participant to present the summary of their discussion.
- The facilitator should discuss further to ensure that all the participants understand the importance of risk factors for DVT.

A 67-year old lady had a right knee replacement surgery done in Germany. Four weeks later, she returned to Ghana and presented to the medical out-patient unit with a 2-days history of painful left leg swelling.

**Discuss the risk factors for DVT in this patient.**

Risk Factors for DVT in this patient include:

- Age
- Major orthopaedic surgery (knee replacement surgery)
- Prolonged immobility – prolonged air travel

**The participants should take note of the need to exclude or prevent deep vein thrombosis in any patient on hospital admission who may have one or more of these risk factors, especially in those with moderate – strong risk factors.**

## CLINICAL PRESENTATION OF DVT

- The facilitator should ask the participants to describe the common signs and symptoms of deep vein thrombosis.
- The facilitator should take the participants through the PowerPoint presentation on the symptoms and signs of deep vein thrombosis (**Slides 21–23**).

## EVALUATION OF PATIENTS FOR DVT

- The facilitator should use *figure 1* and *table 2* in PowerPoint (**Slides 24–27**) to explain to the participants how the initial evaluation of patients for DVT should be done.
- The facilitator should explain the use of modified Well's Score for the diagnosis of deep vein thrombosis.
- The facilitator should also demonstrate to the participants the use of smart phones for assessing a patient's modified Well's score.

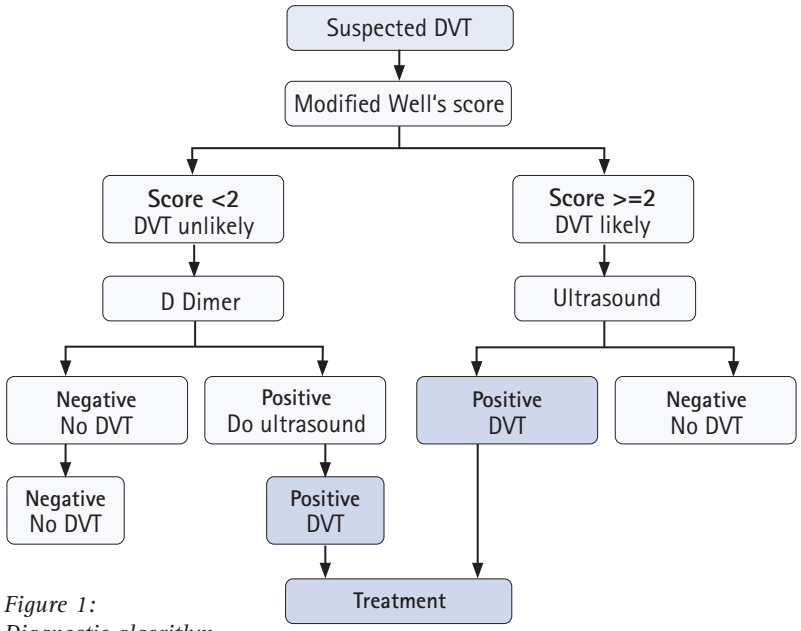


*Figure 1: Diagnostic algorithm for suspected DVT*

*Table 2:* **Modified Well's Score for DVT**

| Clinical feature | Points | Patient score |
|---|---|---|
| Active cancer (diagnosed within the last 6 months or undergoing treatment) | 1 | |
| Paralysis, paresis or recent plaster immobilisation of the lower extremities | 1 | |
| Recently bedridden for 3 days or more or major surgery within 12 weeks requiring general or regional anaesthesia | 1 | |
| Localised tenderness along the distribution of the deep venous system | 1 | |
| Calf swelling at least 3 cm larger than asymptomatic side | 1 | |
| Pitting oedema confined to the symptomatic leg | 1 | |
| Collateral superficial veins (non-varicose) | 1 | |
| Previously documented DVT | 1 | |
| An alternative diagnosis is as likely as DVT | - 2 | |
| **Clinical probability simplified score** | | |
| DVT likely | 2 points or more | |
| DVT unlikely | Less than 2 | |

**NOTE:**

In patients with symptoms involving both lower limbs, the more symptomatic leg should be used.

- If the score is ≥2 points = DVT likely: perform compression venous ultrasound. If positive, treat as DVT.
- If D-dimer test is positive and compression venous ultrasound is negative, repeat ultrasound in 1 week.

- If both D-dimer and compression venous ultrasound are negative, DVT is excluded.
- If the score is <2 points = DVT unlikely: Perform D-dimer test (where available). If D-dimer test is negative, DVT is excluded. If D-dimer test is positive, perform compression venous ultrasound.
- If compression venous ultrasound is negative, DVT is excluded; if positive, treat as DVT.

Alternative diagnoses may include superficial thrombophlebitis, post thrombotic syndrome, cellulitis, muscle strain, venous insufficiency, popliteal (Bakers) cyst, haematoma and pseudoaneurysm.

## CASE SCENARIO (SLIDES 28-29)

- The facilitator should ask the participants to per form the following exercise individually on sticky notes using the laminated Modified Well's score charts. Subsequently, ask one participant to demonstrate how he/she got the answer.
- The facilitator should discuss further to ensure that all other participants understand how to evaluate patients for suspected DVT.

A 60-year-old man, Mr Kwame Mensah, who was recently diagnosed with prostate cancer, presented with a 5-days history of a left leg swelling. On examination, the left leg was found to be swollen, tender with pitting oedema. The left leg was 4 cm larger than the right leg.



1. What will be the Modified Well's score for Mr Kwame Mensah?
2. Is DVT likely or unlikely in this patient?
3. What investigation is required?

Answers:

1. 4
2. DVT is likely because the Well's score is greater than 2
3. Compression venous ultrasonography (CUS)

- Assess the patient and score as per DVT Algorithm and Modified Well's Score for DVT.
- Laboratory investigations: D-dimer test when required.
- Compression venous ultrasound if DVT likely (Modified Well's Score) or DVT unlikely but D-dimer positive (Slide 30).

## TREATMENT OF DVT

- The facilitator should divide the participants into 2 groups and ask them to discuss the treatment of DVT. Subsequently, each group should appoint one participant to present the summary of their discussion.
- The facilitator should discuss further using the PowerPoint presentation of (**Slides 31-37**) to ensure that all the participants are able to treat patients with DVT.

## PHARMACOLOGICAL TREATMENT

If DVT is confirmed, start parenteral therapeutic anticoagulation as follows:

*Table 3:* **Pharmacological treatment**

| Medication | Route of administration | Frequency |
|---|---|---|
| Enoxaparin | subcutaneous | 1.5mg/kg daily (1mg/kg twice daily in obese patient)<br>**Caution:** if eGFR <30 ml/min: 1mg/kg daily subcutaneously |
| Dalteparin | subcutaneous | 100 IU/kg twice daily |
| Unfractionated Heparin | subcutaneous | Bolus of 80 units per kg, then 300 units per kg in divided doses daily |
| Fondaparinux◆ | subcutaneous | If body weight <50kg: 5mg daily<br>Body weight 50-100 kg: 7.5mg daily<br>Body weight >100 kg: 10 mg daily |
| **1. Vitamin K Antagonist (Warfarin)** | | |
| ▪ Starting dose: 5-10mg daily orally<br>▪ Initiate Warfarin on day 1 of parenteral anticoagulation therapy<br>▪ Check INR on the 3rd day and adjust dose accordingly<br>▪ Overlap Warfarin and parenteral anticoagulant until desired INR is maintained for 2 consecutive days, and then discontinue parenteral anticoagulation therapy<br>▪ Typical maintenance dose: 2 to 10mg orally once a day<br>▪ Dosage must be individualised according to the patient's INR<br>▪ Target INR: 2.5 (range: 2 to 3)<br>▪ Renal dose: no dosage adjustment is necessary for patients with renal failure | | |
| **or** | | |
| **2. Novel oral anticoagulants (NOACs)** | | |
| Rivaroxaban◆ | oral | 15mg twice daily for 21 days, then 20mg daily for at least 3 months |
| Apixaban◆ | oral | 10mg twice daily for 7 days, then 5mg twice daily for at least 3-6 months |
| Dabigatran◆ | oral | 150mg twice daily for at least 3-6 months (must be preceded by 5-10 days of LMWH) |
| Edoxaban◆ | oral | 60mg once daily for at least 3-6 months (30 mg once daily if CrCl <30 ml/min); must be preceded by 5-10 days of LMWH therapy |

**NOTE:** NOACs can be started without initial parenteral anticoagulation therapy.

## DURATION OF THERAPY

- For provoked DVTs, where there is a reversible risk factor, consider treatment for 3 months.
- For unprovoked DVTs, consider treatment for 6 months, however, if there is recurrence, consider lifelong treatment.

## SPECIAL POPULATIONS (CONSIDER LIFELONG ANTICOAGULATION)

- Recurrent DVT
- Active malignancy
- Thrombophilia's/antiphospholipid syndrome

*Table 4:* **Dosage of Pharmacologic Thromboprophylaxis**

| Medication | Route of administration | Frequency |
|---|---|---|
| Dalteparin | subcutaneous | 5,000 IU once daily |
| Enoxaparin | subcutaneous | 40mg once daily |
| Unfractionated Heparin | subcutaneous | 5,000 IU twice daily |
| Fondaparinux◆ | subcutaneous | 2.5mg daily |

# 3 OVERVIEW OF THE ANATOMY OF DEEP VEINS OF THE UPPER AND LOWER EXTREMITIES

- The facilitator should ask the participants to list the various deep veins of the upper and lower extremities on sticky notes.
- The facilitator should then collect the answers and paste them on a central board.
- The facilitator should take the participants through the presentation on the anatomy of the deep veins of the limbs: PowerPoint (**Slides 39–41**).

## INTRODUCTION TO COMPRESSION ULTRASOUND

- The facilitator should take the participants through the presentation on introduction to compression ultrasound: PowerPoint (**Slides 42–67**).



# 4 DEEP VEIN THROMBOSIS (DVT) AWARENESS STRATEGIES AT KOMFO ANOKYE TEACHING HOSPITAL (KATH)

## INTRODUCTION

The DVT Team at KATH developed awareness strategies to increase the level of awareness of DVT among the healthcare workers. The main objective of the awareness strategies was to equip the healthcare workers with basic knowledge of DVT for easy identification of patients presenting with DVT.

**Below are the main strategies adopted by the DVT Team:**


*DVT Poster for KATH DVT Team*

## 1. POSTERS

The DVT Team at KATH developed red posters with the motto: "Stop the Clot", which contained the main symptoms of lower limb DVT and the phone number of the DVT Team. The poster has a picture of the legs of a patient with asymmetrical swelling of the left lower limb due to DVT. The diagnosis of this patient was confirmed at the first workshop in May 2018.

The patient agreed that the picture of her legs can be used as a poster. The posters were distributed at different wards in the various departments at KATH, including the Directorates of Medicine, Surgery, Trauma/Orthopaedics, Obstetrics and Gynaecology, Intensive Care Unit and Emergency Department. Posters were also handed out to the participants during awareness workshops.

## 2. T-SHIRTS

*DVT Team member wearing the shirt*

The DVT Team at KATH designed blue polo shirts with the motto: „Stop the Clot" and the telephone number of the DVT Team. Each member of the DVT Teams at KATH, Kumasi South Hospital and Agogo Presbyterian Hospital received one of the T-shirts. The DVT Team members were encouraged to wear the T-shirts during a DVT training or awareness workshop.

## 3. DVT AWARENESS WORKSHOPS

Several awareness workshops were held for healthcare workers from KATH, Kumasi South and Agogo Presbyterian Hospitals. Medical doctors, nurses, midwives and pharmacists from different departments in these hospitals participated in the workshops. Over 200 healthcare workers, including the DVT-Team, participated in these workshops. The workshops were moderated by the DVT Team members.


*DVT Team members during a training programme*

## 4. DEPARTMENTAL MEETINGS

Arrangements were made for the DVT Team to join the departmental meetings of the various departments at KATH, at least once every three (3) months. During such meetings, slots were given to the DVT Team to share DVT awareness information with the doctors who were present in the meetings.

# IMPRINT



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