University Hospitals of Derby and Burton
NHS Foundation Trust

Assessment, Diagnosis and Treatment of Deep Vein Thrombosis - Full Clinical Guideline

Reference no.: CG-ED/2023/2229

1. Introduction

This guideline covers the assessment, diagnosis and management of patients referred for possible deep vein thrombosis (DVT) at Royal Derby Hospital only. This guideline does not cover inpatients, Burton Hospital or those included in the exclusion criteria. For obstetric patients please see the thromboembolism in pregnancy guideline on KOHA: https://derby.koha-ptfs.co.uk/cgi-bin/koha/opac-detail.pl?biblionumber=370

Aim and Purpose

The purpose of this document is to:

i. Describe the referral pathway for patients presenting from Primary Care and the Emergency Department

ii. Explain the use of Wells Score and appropriate investigations for diagnosing or excluding DVT

iii. Outline therapeutic options for initial and ongoing management of patients diagnosed with DVT

iv. Describe appropriate follow up arrangements for patients diagnosed with unprovoked DVT

2. Definitions, Keywords

DVT, deep vein thrombosis, blood clot, anticoagulation, Wells score, DDimer

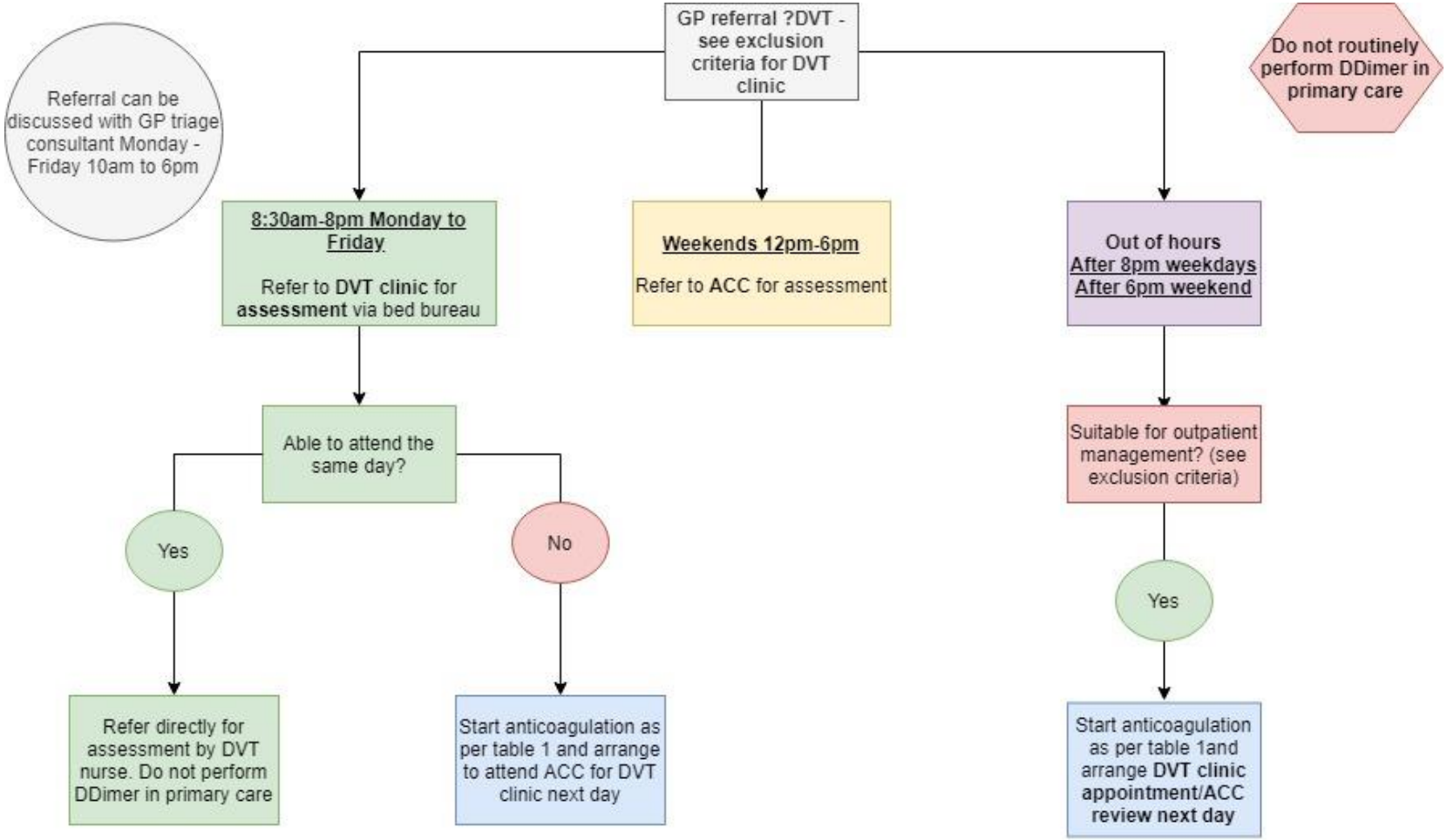
3. Deep Vein Thrombosis Assessment, Diagnosis and Management Algorithms

i. Primary Care Referral Algorithm (*Page 2*)

ii. Emergency Department Algorithm (*Page 3*)

iii. DVT clinic assessment, investigation and management algorithm (*Page 4 and 5*)

i. Primary Care Referral Algorithm



Exclusion Criteria

- **Immobility** - refer to MAU
- **Suspected pulmonary embolism** - follow PE guideline, refer ACC or MAU
- **Significant bleed in last 4 weeks** - MAU
- **Increased risk of bleeding complications** (liver cirrhosis, CKD with eGFR <20, recent (<1/12) haemorrhagic stroke) - refer to MAU
- **Pregnancy >20/40 or <6 weeks post partum** - refer to obstetrics
- **Suspected upper limb DVT** - refer to MAU

Table 1: Anticoagulation Options

First Line: Use DOAC unless contraindicated

- Rivaroxaban 15mg BD
- Apixaban 10mg BD

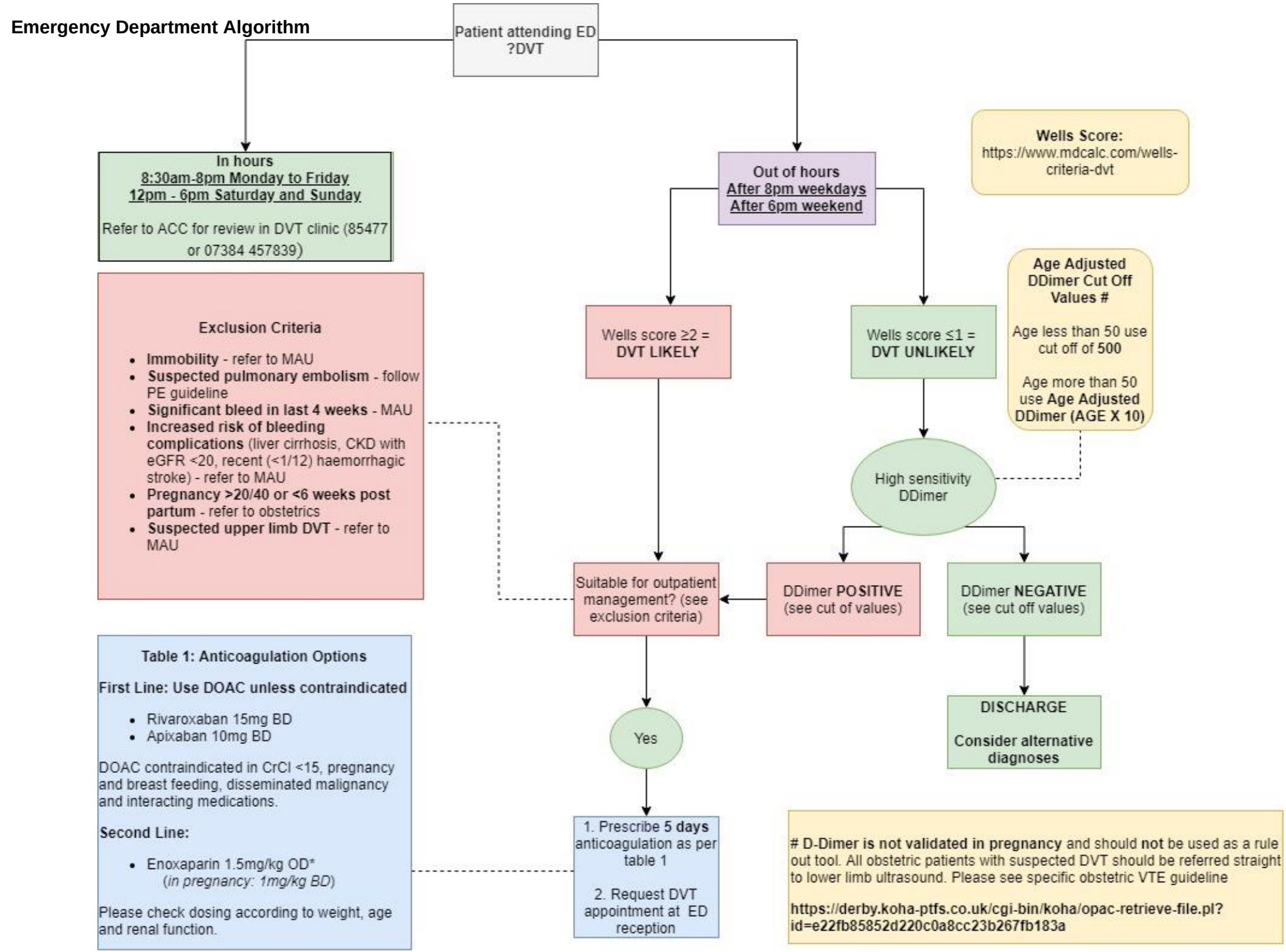
DOAC contraindicated in CrCl <15, pregnancy and breast feeding, disseminated malignancy and interacting medications.

Second Line:

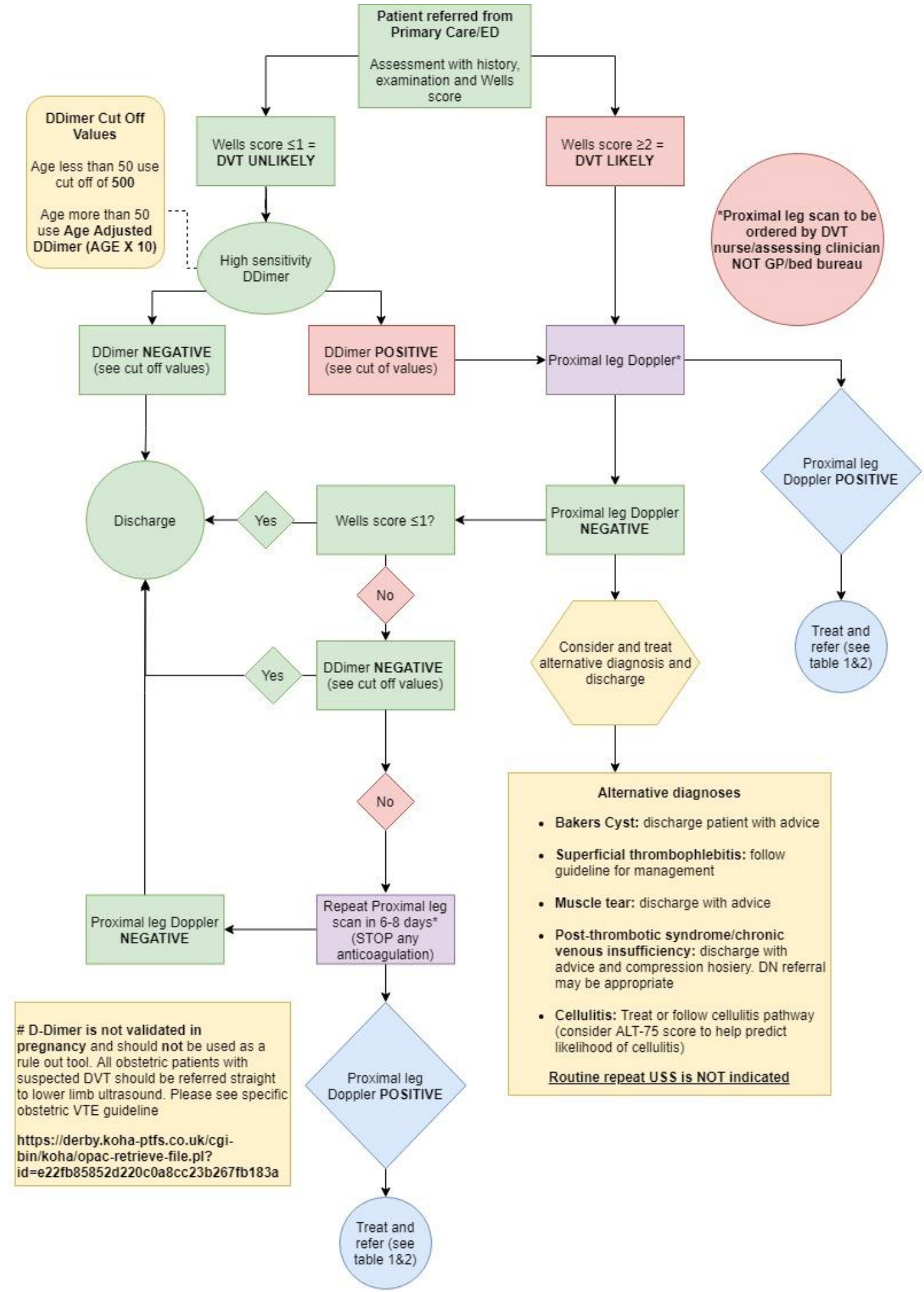
- Enoxaparin 1.5mg/kg OD*
  (*in pregnancy: 1mg/kg BD*)

Please check dosing according to weight, age and renal function.

ii. Emergency Department Algorithm



iii. DVT clinic assessment, investigation and management algorithm



iii. DVT clinic assessment, investigation and management algorithm continued…

Table 1: Treatment

Rivaroxaban or Apixaban are first line pharmacological treatment.

Doses:

- Rivaroxaban 15mg BD for 21 days then 20mg OD
- Apixaban 10mg BD for 7 days then 5mg BD
- Dose adjustment may be required according to renal function, age and weight - please check with pharmacy or BNF if in doubt
- Contraindications to DOAC: CrCl <15, pregnancy and breast feeding, disseminated malignancy, antiphospholipid syndrome or interacting medications
- In pregnancy use LMWH 1mg/kg BD

Duration:

- 3 to 6 months followed by assessment in thrombosis clinic as to risks and benefits of continuing anticoagulation
- Inform all patients of bleeding risks and duration of treatment

Further investigations:

- Consider further investigations for occult malignancy as directed by clinical history, examination and bloods
- NB CT scan in the absence of clinical or biochemical evidence of malignancy is not routinely recommended

Follow up:

- Refer patients with **unprovoked DVT** to thrombosis clinic via ExtraMed referral
- ALL obstetric patients with positive DVT should be:
    1. Discussed with gynaecology SpR on call to ensure follow up is arranged
    2. Consultant to consultant referral to antenatal clinic

****Ileofemoral DVT**:**

- If there is evidence of occlusive ileofemoral DVT consider referral to vascular surgery at Nottingham for consideration of catheter directed thrombolysis if the following criteria met:
- Onset of less than 14 days duration
- Good functional status
- Life expectancy >1 year
- Low bleeding risk

Table 2: Malignancy Screening

All patients with a positive **unprovoked** DVT should have the following:

- Physical examination (guided by history)
- Chest x-ray
- Urine dip
- Blood tests
- If not performed in the past year:
    - PSA in men over 40 years of age
    - Breast examination in women over 50 years of age

Note: Routine CT is not indicated unless suggested by history, examination or other findings

5.1 Referrals

The DVT clinic operates between the hours of 8:30am and 8:00pm Monday to Friday and 12:00 to 6:00pm at weekends and Bank Holidays. Referrals will be accepted from **primary care and ED** (see separate guideline for referral process).

Referrals will not be accepted from other inpatient locations unless the patient is planned to be discharged. If this is the case then the DVT nurse should be contacted on ACC via extension 87607 to arrange appropriate review. Otherwise, inpatient requests should go directly to clinical measurement who will perform a portable scan.

5.2 Exclusion Criteria

The following are exclusion criteria for the nurse led DVT clinic:

- **Significant immobility or bed bound**
  These patients should be referred to MAU for assessment.
- **Suspected pulmonary embolism**
  The pulmonary embolism guideline should be followed and these patients should be referred to ACC or MAU. If a patient with suspected PE has clinical signs and symptoms of DVT and a proximal leg scan is felt necessary this should be booked directly with clinical measurement and dedicated DVT clinic slots should not be used.
- **Increased risk of bleeding complications**
  These include liver cirrhosis, CKD with eGFR <20 and recent haemorrhagic stroke in the last month. These should be discussed with the GP telephone triage consultant or the medical team and may require admission to MAU or to be seen by the medical team on ACC.
- **Pregnancy more than 20 weeks and <6 weeks post-partum**
  These patients should be discussed with obstetrics and referred to GAU. Please see the thromboembolism in pregnancy guideline: https://derby.koha-ptfs.co.uk/cgi-bin/koha/opac-retrieve-file.pl?id=e22fb85852d220c0a8cc23b267fb183a
- **Suspected upper limb DVT**
  These patients should be discussed with the medical team and may need admission to MAU. Monday to Friday 10:00 to 18:00 please discuss with telephone triage consultant via bed bureau. Out of hours discuss with the medical SpR on call.

5.3 Wells Score

Every patient should be appropriately risk assessed and have a Wells score completed and documented. Those with a Wells score of 1 or less can be classified as **low risk** and should have D-Dimer performed (see below). Those with Wells score of 2 or more can be classified as **high risk** and should proceed straight to imaging with proximal leg ultrasound. The Wells score calculator can be found here: https://www.mdcalc.com/wells-criteria-dvt

5.4 D-Dimer

D-Dimer should always be used in conjunction with a Wells score.

D-Dimer has excellent negative predictive value in **low risk** DVT patients (Wells of 1 or less). A normal D-Dimer in this patient group can effectively rule out DVT and patients would not require any further investigations or treatment.

A normal D-Dimer in **high risk** patients (Wells of 2 or more) does **NOT** rule out DVT and these patients should proceed straight to imaging.

Evidence suggests that D-Dimer levels can increase with age and using an age adjusted D-Dimer cut off can help reduce unnecessary investigations and treatment in these patients. Therefore an **age adjusted** D-Dimer cut off of **age x 10** should be used in patients **over the age of 50.** For **patients younger than 50** the usual D-Dimer **cut off 500** should be used. For example, in a 75 year old patient the D-Dimer cut off would be 75 x 10 = 750.

As with all tests, D-Dimer should be used alongside clinical risk assessment and judgement. If there is ongoing clinical concern, consider discussing case with senior clinician for consideration of further imaging.

***D-Dimer is not validated in pregnancy** and should **not** be used as a rule out tool. All obstetric patients with suspected DVT should be referred straight for lower limb ultrasound.

5.5 Proximal leg ultrasound

Proximal leg ultrasound has excellent sensitivity at ruling out above knee DVT. All requests for proximal leg ultrasound for DVT assessment via the DVT clinic should go through the DVT nurses in ambulatory care. DVT clinic will not accommodate inpatients and these examinations should be requested by the ward team. Requests must be on clinical measurement paper forms. Proximal leg ultrasound is performed in **clinical measurement** NOT radiology.

If a proximal leg ultrasound cannot be performed on the same day then the patient will be given anticoagulation (see section 5.62) and asked to return for a dedicated scan time.

Clinical measurement will scan all veins above the knee and will include the gastrocnemius veins. Imaging of the calf vessels is not performed.

In low risk patients a negative above knee ultrasound is enough to rule out DVT and they can be safely discharged with advice.

In high risk patients with a **negative D-Dimer** a negative above knee ultrasound is enough to rule out DVT and they can be safely discharged with advice.

In high risk patients with a **positive D-Dimer** a **repeat proximal leg ultrasound** will be requested within the next 6-8 days. This increases the sensitivity of the ultrasound scan to rule out DVT and rules out clinically significant isolated calf vein DVT. **Anticoagulation should be stopped** before this scan is performed.

Ultrasound can also identify other causes for leg swelling. These findings should be considered before requesting repeat proximal leg ultrasound (see section 5.7).

5.6 Patients with positive DVT

5.61 Investigations for unprovoked DVT

If the proximal leg ultrasound is **positive**, patients will be seen by the medical team on ACC. It should be ascertained if patients have had a **provoked** or **unprovoked** DVT. All patients with **unprovoked DVT** who are not known to have cancer should have:

- Review of medical history
- Physical examination guided by history
- Baseline bloods including FBC, LFT, clotting, U&E
- Chest radiograph
- Urine dip
- If not performed in the last year:
    - PSA in men over the age of 40
    - Breast examination in women over the age of 50

Routine CT imaging is NOT recommended as current evidence suggests this does not have a significant impact on increased rate of cancer detection or on mortality.

5.62 Anticoagulant treatment for confirmed DVT

Unless there are contraindications, patients should be commenced on anticoagulation with a direct oral anticoagulant (DOAC), such as Rivaroxaban or Apixaban. Note that Edoxaban is NOT recommended for initial management of DVT as this requires initial treatment with low molecular weight heparin. See the NICE visual aid below. Drug dosing regimens can be found in appendix 1.

Contraindications to DOAC treatment include:

- Pregnancy and breast feeding (use low molecular weight heparin, enoxaparin 1mg/kg BD)
- CrCl<15
- Antiphospholipid syndrome (discuss with haematology)
- Interactions with other medications (e.g. phenytoin)
- Obesity (weight over 120kg discuss with haematology)

Rivaroxaban and apixaban can be used in patients with malignancy who have confirmed DVT, however intraluminal tumours (such as bowel, bladder and uterine tumours) may have an increased risk of bleeding. If in doubt then discuss with haematology.

All patients should have baseline FBC, U&E, LFT and coagulation profile before commencing on anticoagulant treatment.

All patients receiving anticoagulants should receive the following information:

- How to use anticoagulants
- How long to take anticoagulants
- Possible side effects
- How food and other medications can affect treatment
- Any monitoring requirements
- When to seek medical help
- How anticoagulants may affect activities such as sport and travel
- **Women of childbearing age** should also receive information on taking anticoagulants and risk of becoming pregnant on this treatment. They should be on contraception and should inform their doctor if they are planning to become pregnant

DVT or PE: anticoagulation

PE with haemodynamic instability

Offer continuous UFH infusion and consider thrombolytic therapy

Body weight

If body weight <50 kg or >120 kg consider anticoagulant with monitoring of therapeutic levels.

Note cautions and requirements for dose adjustments and monitoring in SPCs. Follow local protocols, or specialist or MDT advice

INR monitoring

Do not routinely offer self-management or self-monitoring of INR

Prescribing in renal impairment and active cancer

Some LMWHs are off label in renal impairment, and most anticoagulants are off label in active cancer.

Follow GMC guidance on prescribing unlicensed medicines

Treatment failure

If anticoagulation treatment fails:

- check adherence
- address other sources of hypercoagulability
- increase the dose or change to an anticoagulant with a different mode of action

- Measure baseline full blood count, renal and hepatic function, PT and APTT but start anticoagulation before results available. Review and if necessary act on results within 24 hours
- Offer anticoagulation for at least 3 months. Take into account contraindications, comorbidities and the person's preferences
- After 3 months (3 to 6 months for active cancer) assess and discuss the benefits and risks of continuing, stopping or changing the anticoagulant with the person. See long-term anticoagulation for secondary prevention in the guideline

No renal impairment, active cancer, antiphospholipid syndrome or haemodynamic instability	Renal impairment (CrCl estimated using the Cockcroft and Gault formula; see the BNF)	Active cancer (receiving antimitotic treatment, diagnosed in past 6 months, recurrent, metastatic or inoperable)	Antiphospholipid syndrome (triple positive, established diagnosis)
Offer apixaban or rivaroxaban If neither suitable, offer one of: • LMWH for at least 5 days followed by dabigatran or edoxaban • LMWH and a VKA for at least 5 days, or until INR at least 2.0 on 2 consecutive readings, then a VKA alone	CrCl 15 to 50 ml/min, offer one of: • apixaban • rivaroxaban • LMWH for at least 5 days then – edoxaban or – dabigatran if CrCl ≥ 30 ml/min • LMWH or UFH and a VKA for at least 5 days, or until INR at least 2.0 on 2 consecutive readings, then a VKA alone CrCl < 15 ml/min, offer one of: • LMWH • UFH • LMWH or UFH and a VKA for at least 5 days, or until INR at least 2.0 on 2 consecutive readings, then a VKA alone Note cautions and requirements for dose adjustments and monitoring in SPCs. Follow local protocols, or specialist or MDT advice	Consider a DOAC If a DOAC is not suitable, consider one of: • LMWH • LMWH and a VKA for at least 5 days or until INR at least 2.0 on 2 consecutive readings, then a VKA alone Offer anticoagulation for 3 to 6 months Take into account tumour site, drug interactions including cancer drugs, and bleeding risk	Offer LMWH and a VKA for at least 5 days or until INR at least 2.0 on 2 consecutive readings, then a VKA alone

5.63 Initial duration of anticoagulant treatment for confirmed DVT

Provoked DVT should receive 3 months anticoagulation.

Unprovoked DVT should receive 3 to 6 months anticoagulation

5.64 Follow up for confirmed DVT

All **unprovoked** DVT should be referred to the thrombosis clinic for review and to discuss anticoagulation options 3 months after diagnosis. This should be a consultant to consultant referral using the paper outpatient requests form. Long term anticoagulation for thromboprophylaxis will be discussed in thrombosis clinic.

All patients commenced on anticoagulation via the DVT clinic will be followed up with a phone call from our DVT nurses 3 weeks after diagnosis. The aim of this is to ensure there are no problems with anticoagulation dosing or prescriptions and to answer any general concerns or queries.

Pregnant patients with positive DVT should be discussed with the gynaecology SpR on call to ensure follow up is in place. There should also be a consultant to consultant referral to the antenatal clinic completed rather than thrombosis clinic.

5.7 Negative proximal ultrasound and DVT ruled out

There are multiple diagnoses for a swollen leg. These include, but are not exclusive to the following:

- **Bakers Cyst**
  This is usually seen on ultrasound. Patients with Bakers cyst do not routinely need repeat ultrasound as this is the likely cause of their swollen leg and most patients should be discharged with advice.

- **Post-thrombotic syndrome**
  This is a common complication of DVT where previous damage to the veins causes a reduction in venous return and can lead to leg swelling, pain and in severe cases, leg ulcers. It occurs in 30% of patients with DVT within 5 years, most presenting within 6 months to 2 years. Treatment can include compression stockings, raising the legs, exercise, weight loss and analgesia. Patient information can be found here: https://thrombosisuk.org/downloads/thrombosisuk-pts.pdf

- **Superficial thrombophlebitis**
  This is not DVT but can be associated with an increased risk of developing DVT depending on location. Please follow the separate superficial thrombophlebitis guideline. **All patients with superficial thrombophlebitis within 3cm of the sapheno-femoral junction should be treated as DVT**

- **Gastrocnemius muscle tear**
  Patients should be discharged with advice. If concern about significant haematoma, these patients should be discussed with orthopaedics

- **Cellulitis**
  Patients should be treated as per cellulitis guideline. Use ALT-70 score to guide diagnosis

Consider these diagnoses before requesting repeat proximal leg ultrasound.

5.8 Ileofemoral DVT

Some patients with significant ileofemoral DVT may benefit from catheter directed thrombolysis (CDT) to prevent the future risk of post-thrombotic syndrome. This is not currently performed at Derby. Patients who meet the criteria for consideration of catheter directed thrombolysis **and who are willing to have this treatment** should be discussed with vascular surgery at Nottingham University Hospitals

The NICE criteria for consideration of CDT are as follows:

- Confirmed ileofemoral DVT
- Onset within last 14 days
- Good functional status
- Life expectancy >1 year
- Low bleeding risk (the risk of major disabling intracranial bleed with CDT is ~1%)

6. References (including any links to NICE Guidance etc.)

https://www.nice.org.uk/guidance/ng158/resources/visual-summary-pdf-8709091453

https://www.nice.org.uk/guidance/NG158

https://www.mdcalc.com/wells-criteria-dvt

7. Documentation Controls

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1.0.0</td><td>Status
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Job Title: consultant acute and general medicine</td></tr>
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<tr><td>1.0.0</td><td>Oct 2020</td><td colspan="2">Dr Thomas Livingston in consultation with Dr Angela McKernan, Dr Rosie Hamilton, Ahtisham Saddick, Aleli Akani, Dr Kirstine Coomer, Nicola Palin, Claire Munro</td><td>New guideline</td></tr>
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<tr><td colspan="6">Linked Documents: State the name(s) of any other relevant documents</td></tr>
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Business Unit Sign Off	**Group:Review no change Dr Livingstone** **Date:Dec 2023**
Divisional Sign Off	**Group:** Medical Division **Date:Dec 2023**
EIRA Stage One Completed Yes / No *Delete as appropriate* Stage Two Completed Yes / No *Delete as appropriate*	
Date of Approval	Dec 2023
Review Date and Frequency	Dec 2024
Contact for Review	Dr Thomas Livingston (consultant acute and general medicine)
Lead Executive Director Signature	

8. Appendices

NICE NG158: https://www.nice.org.uk/guidance/ng158/resources/visual-summary-pdf-8709091453

Thromboembolism in Pregnancy: https://derby.koha-ptfs.co.uk/cgi-bin/koha/opac-retrieve-file.pl?id=e22fb85852d220c0a8cc23b267fb183a

Pulmonary Embolism Guideline: https://derby.koha-ptfs.co.uk/cgi-bin/koha/opac-retrieve-file.pl?id=817d826078787b65a16e1c6e10a984b4

Appendix 1: Anticoagulation Dosing Regimens and Options

Anticoagulation Options for Confirmed DVT				
	Apixaban	**Rivaroxaban**	**If DOAC not suitable: LMWH and VKA**	**Pregnancy**
Initial Treatment	10mg twice daily for 7 days	15mg twice daily for 21 days	Low risk: Enoxaparin 1.5mg/kg **once** daily plus warfarin High risk (obesity, symptomatic PE, cancer, recurrent VTE or iliac vein thrombosis): Enoxaparin 1mg/kg **twice** daily plus warfarin	Enoxaparin 1mg/kg **twice** daily
Ongoing Treatment	5mg twice daily	20mg once daily	Stop enoxaparin when INR >2 on two separate occasions. Warfarin dosed according to INR	Enoxaparin 1mg/kg **twice** daily
Duration of treatment	At least 3 months	At least 3 months	At least 3 months	At least 3 months
Other information			**Refer to anticoagulation service**	**Refer to obstetrics and ANC** **Specific obstetric guideline: https://derby.koha-ptfs.co.uk/cgi-bin/koha/opac-retrieve-file.pl?id=e22fb85852d220c0a8cc23b267fb183a**