1. Introduction

1.1 This suite of guidelines covers the management of elective patients taking anticoagulant medication who need to undergo a procedure or an operation. It provides guidance on:

- which procedures or operations require stopping of the patient's usual anticoagulation
- how to estimate the risk of thromboembolic complications associated with stopping anticoagulation
- plans and timelines for bridging therapy for those patients who need to continue some form of anticoagulation peri-procedurally or peri-operatively.

1.2 The haematology department provide an anticoagulant bridging therapy service. Referrals can be made using the online electronic referral form available on Insite. This can be accessed by typing "bridging referral" into the Insite search engine.

2. Scope

These guidelines cover elective patients who need to undergo a procedure or operation that are taking the following anticoagulant medications:

- Warfarin or other coumarin anticoagulants
- Direct Oral AntiCoagulants (DOACs, formerly known as Novel Oral AntiCoagulants - NOACs)

3. Recommendations, Standards and Procedural Statements

3.1 How to use this guideline:

This guideline consists of an introduction and a number of appendices that cover all the steps required to safely manage peri-procedural/operative anticoagulation for elective patients. Table 1 shows these steps and the associated resources within this guideli

Table 1: Contents of this guideline and how to use it		
Step	**Resources:**	**Appendix number**
Step 1: Read the introduction to get an overview of bridging therapy.	Overview of bridging therapy	Section 3.2
Step 2: Decide whether anticoagulation needs to be stopped by assessing the bleeding risk associated with the operation or procedure.	List of "low risk of bleeding" operations or procedures that **do not** require anticoagulation to be stopped	1
	List of "high risk of bleeding" operations, procedures or types of anaesthetic that **do** need anticoagulation to be stopped	2
Step 3: Decide whether the patient needs bridging therapy by using the **thrombotic risk assessment tools.**	CHA_2DS_2VASC risk calculator	3
	Thrombotic risk assessment tool	4
Step 4: Choose the appropriate **bridging therapy plan** to follow.	High risk AF plan	5
	High risk VTE plan	6
	High risk metallic valve plan	7
	Low risk plan (OP)	8
	Low risk plan (IP)	9
	Low risk VTE plan	10
	Peri-operative management of DOACS	11
Step 5: Prescribe the correct dose of dalteparin.	Table of dalteparin dosages (including for patient with renal impairment)	12

Document reviewed August 2018 and no changes required. Supporting evidence for guidance remains valid and the guideline continues to be safe and fit for purpose.

3.2 OVERVIEW OF PERI-OPERATIVE ANTICOAGULATION BRIDGING:

3.2.1 Introduction to bridging therapy:

Anticoagulants generally need to be interrupted prior to major surgical procedures to minimise peri-operative bleeding risk [1-4]. However, many minor procedures can be safely performed without interruption of anticoagulation.

Interruption of anticoagulation increases peri-operative thrombotic risk (arterial, venous or cardioembolic) and hence a thorough evaluation of both bleeding and thrombotic risk is needed.

Some facts need to be borne in mind:

- 20% of arterial thromboembolic events are fatal and 40% result in serious permanent disability. In contrast, only about 3% of major post-operative bleeding events are fatal, with most making full and uneventful recovery after haemorrhagic complications [5]

- 6% of recurrent venous thromboembolic events are fatal

3.2.2 Stopping warfarin:

Based on the known half-life of warfarin (36-42 hours), with each elapsed half-life corresponding to 50% reduction in anticoagulant activity, it will require at least 5 days for most of the anticoagulant effect to be eliminated after stopping warfarin. A longer period (at least 6 days) may be required for, elderly patients, patients with congestive cardiac failure, patients on certain medication and patients on higher intensity anticoagulation (target INR range 3.0-4.0).

Patients on acenocoumarol (sinthrome), (half-life 8-11 hours), require only about 3-4 days interruption for elimination of anticoagulant effect.

3.2.3 Bridging with Low Molecular Weight Heparin (LMWH):

LMWH should generally be started 36-48 hours (approx. 2 days) after last dose of warfarin. For bridging a therapeutic dose is required. Prophylactic doses are used when the risk of stopping an anticoagulant is low from the cardio-embolic point of view but where there is a risk of venothromboembolism (VTE) associated with the operation or procedure.

3.2.4 Therapeutic dose dalteparin (100 units/kg BD): (Appendices 5-7)

Twice daily dosing is preferred for bridging. Administer half dose (100 units/kg OD) on day before procedure and ensure at least 24 hour interval between last dose and time of procedure. For high bleeding risk procedures it may be necessary to omit dalteparin completely on day before procedure. Discuss with surgeon and anaesthetist.

3.2.5 Weight adjusted prophylactic dalteparin (wt 50-150 kg): (Appendices 9 and 10)

Some clinical situations do not require bridging with LMWH [6]; warfarin is simply stopped 5-6 days pre-operatively and recommenced, usually at previous maintenance dose, and dose titrated over time to achieve the desired therapeutic INR. For patients on long term anticoagulation for VTE prophylactic doses of LMWH should be offered from the 2nd day after the last dose of warfarin, ensuring at least a 12 hour (low bleeding risk procedure) or 24 hour (high bleeding risk procedure) interval from time of last dose to scheduled time of procedure. For very high bleeding risk procedures, it may be necessary to omit LMWH completely on day before procedure. Discuss with surgeon and anaesthetist.
Prophylactic dose LMWH may be restarted 6 hours post-procedure (provided haemostasis is secure) and continued from the first post-op day, administered concurrently with warfarin until the INR is in the desired therapeutic range before withdrawing LMWH.

3.2.6 Patients with impaired renal function (estimated Creatinine Clearance (CrCl) < 30 ml/min):

Prophylactic dalteparin up to 5000 units can be administered safely without need for anti-Xa monitoring and without risk of accumulation [6-10]. For doses higher than 5000 units, discuss with the Haemostasis & Thrombosis team. Appendix 12 has a dosage schedule for patients with renal impairment.

3.2.7 Special categories of patients: The following categories of patients should be discussed with Haemostasis & Thrombosis team:

- *Pregnant women with mechanical heart valves,*
- *patients with history of heparin induced thrombocytopenia,*
- *bariatric patients (weight > 150 kg) or underweight adults (< 50kg),*
- *patients with known bleeding disorders or a bleeding history*.
- ***patients with mechanical prosthetic heart valves undergoing high bleeding risk procedures:***

The overall risk of valve thrombosis and/or cardio-embolisation in non-surgical patients after suspension of anticoagulation is very low (< 0.2% over a 7 day period) [11]. In the peri-operative setting, a retrospective analysis of 180 non-cardiac operations in 159 patients with valve prostheses in whom anticoagulation was withheld for an average total period of 6.6 days, the post-operative thromboembolic rate was 0% [2]. Consequently, in patients undergoing high bleeding risk procedures, full therapeutic anticoagulation can be safely and should be withheld for up to 72 hours post-operatively [13]

3.2.8 Learning from incidents: Case History from St. Elsewhere:

Mrs A was an 82 year old lady undergoing total mastectomy for breast cancer. She was on warfarin for atrial fibrillation and had a past history of transient ischaemic attack, hypertension and heart failure. Prior to surgery she was advised to stop her warfarin for ten days and following surgery was delayed in restarting due to a failure in communication. She did not receive an assessment of the risk of thromboembolism related to stopping her warfarin and therefore did not have a bridging therapy plan. Ten days post-operatively she suffered a major disabling stroke and died of complications two months later.

Learning points:

- Patients must have an assessment of their risk of thromboembolism
- The CHA_2DS_2VASC score can be used to estimate risk related to AF
- A bridging plan provides safe guidance on when to stop and restart warfarin and any therapy that is required to bridge the gap to minimise risk
- Getting it wrong can have catastrophic consequences

4. Education and Training

No education or training in the use of this guideline is required but awareness raising sessions have been held in the relevant specialty meetings.

5. Monitoring and Audit Criteria

Key Performance Indicator	Method of Assessment	Frequency	Lead
Percentage of patients undergoing surgery (who normally take warfarin managed on correct plan)	Clinical audit of patient records	Every two years	Associate Specialist in Haematology
Number of patients experiencing avoidable venous thromboembolism, arterial embolism or stroke following surgery.	Clinical audit of datix incidents	Every two years	Associate Specialist in Haematology

6. Legal Liability Guideline Statement

Guidelines or Procedures issued and approved by the Trust are considered to represent best practice. Staff may only exceptionally depart from any relevant Trust guidelines or Procedures and always only providing that such departure is confined to the specific needs of individual circumstances. In healthcare delivery such departure shall only be undertaken where, in the judgement of the responsible healthcare professional' it is fully appropriate and justifiable - such decision to be fully recorded in the patient's notes

7. Supporting Documents and Key References

7.1 References

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in patients with mechanical heart valve prostheses. Circulation 1994;89:635–41

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7.2 Supporting documents:

Venous thromboembolism risk assessment UHL Guideline

Venous thromboembolism UHL musculoskeletal guideline

8. Key Words

Bridging therapy

Anticoagulation

Warfarin

Peri-procedural Peri-

operative Bleeding

Haemorrhage

Venous-thromboembolism

DOACs

NOACs

Cardio-embolism

Elective surgery

Dentistry

Dental

Appendix 1

Low bleeding risk operations/procedures:

Anticoagulation does not need to be stopped for these operations/procedures*

Minor dermatological procedures
Excision of:
Basal and squamous cell skin cancers
Actinic keratoses and pre-malignant or cancerous skin naevi

Dental**
Dental fillings
Dental cleaning
Single dental extraction
Restorations
Prosthetics, endodontics

Ophthalmology
Cataract extraction

Gastroenterology
Diagnostic endoscopy, with or without biopsy
ERCP without sphincterotomy

Urology
Cystoscopy without biopsy

ENT
Diagnostic fibreoptic laryngoscopy or nasopharyngoscopy
Fine needle aspirate
Vocal cord injection

Gynaecological procedures
Diagnostic hysteroscopy, colposcopy
Insertion of intrauterine device

*An INR check should be performed pre-procedure to confirm the patient is in the therapeutic range

** INR should be <3.0 for all dental procedures
Do not prescribe non-steroidal anti-inflammatory drugs for patients on warfarin following dentistry

Appendix 2

High bleeding risk or critical area operations/procedures:

STOP anticoagulation for these operations/procedures

All major surgery

All vascular surgery

All cardiac/cardiothoracic surgery

Cardiovascular
Pacemaker or defibrillator placement
Coronary intervention and angiography
Electrophysiologic testing/ablation

Ophthalmologic surgery
Peri-orbital surgery
Vitreoretinal surgery

ENT
Any sinus surgery
Biopsy or removal of nasal polyps
Thyroidectomy
Parotidectomy
Septoplasty
Turbinate cautery

Dental
Reconstructive procedures

Orthopaedic
Arthroplasty

This list is not exhaustive – if in doubt about whether an anticoagulant should be stopped ask the consultant in charge of the patient's care.

Arthroscopy
Joint replacement surgery
Shoulder/hand/foot surgery
Spinal surgery

Gynaecologic surgery
Hysterectomy
Bilateral tubal ligation
Laparoscopic surgery
Cancer surgery

General surgery
Surgery on spleen, liver, kidney
Bowel resection
Laparoscopy
Abdominal hernia surgery
Laparoscopic cholecystectomy
Lymph node biopsy
Haemorrhoidectomy

Gastroenterology
Polypectomy
Percutaneous endoscopic gastrostomy
Percutaneous liver biopsy
Endoscopic Ultrasound with fine needle biopsy,
Endoscopic biliary or pancreatic sphincterotomy
Variceal banding

Urology
TURP
Bladder resection of tumour
Kidney biopsy
Extracorporeal shock-wave lithotripsy

Neurosurgery/neuraxial procedures
All procedures including lumbar puncture and myelography

Interventional radiology
Percutaneous transhepatic cholangiography or nephrostomy
Percutaneous drainage of liver abscess or gall bladder
Organ biopsy
Hickman and tunnelled dialysis catheter placement
Chest tube placement

Appendix 3

Use this risk calculator for patients with atrial fibrillation to estimate their risk of a thrombotic event when their anticoagulant is stopped.

RISK FACTOR	CHA_2DS_2VASC SCORE
Congestive heart failure	1
Hypertension	1
Age 65-74	1
Diabetes mellitus	1
Stroke/TIA/systemic thromboembolism	2
Vascular disease	1
Age ≥ 75	2
Sex **C**ategory (Female)	1

Use the total score in the table in Appendix 4 to estimate thrombotic risk and decide on an appropriate bridging plan.

Appendix 4

When to use this tool:

Use this tool for patients undergoing an operation or a procedure who need to stop their warfarin prior to their procedure.

What does the tool do?:

The tool identifies an estimate of the risk of a thromboembolic event occurring and directs you to an appropriate bridging therapy plan based on that risk.

How to use this tool:

1. IDENTIFY INDICATION FOR WARFARIN IN TABLE BELOW
2. IF THE PATIENT HAS ATRIAL FIBRILLATION USE THE CHA_2DS_2VASC TOOL IN APPENDIX 3 TO CALCULATE THEIR CHA_2DS_2VASC SCORE
3. SELECT APPROPRIATE THROMBOTIC RISK CATEGORY
4. SELECT APPROPRIATE BRIDGING PLAN AND TIMELINE USING APPENDICES 5 TO 10
5. USE APPENDIX 11 IF THE PATIENT IS ON DOACS
6. USE THE PRESCRIBING RESOURCES IN APPENDICES 12 TO HELP PRESCRIBE THE RIGHT DOSE OF DALTEPARIN

(based on BSH anticoagulation guidelines, ACCP 2012 and BRIDGE Study [6])

Risk of thrombo-embolism risk assessment tool:

NON-VALVULAR ATRIAL FIBRILLATION	VENOUS THROMBO-EMBOLISM (DVT/PE)	MECHANICAL PROSTHETIC HEART VALVE	OTHER DISCUSS WITH HAEMATOLOGY
HIGH THROMBOEMBOLIC RISK (BRIDGING WITH THERAPEUTIC ANTICOAGULATION REQUIRED)			
1. Previous TIA/stroke ***2. $CHA_2DS_2VASC^* \geq 6$*** **High risk AF bridging plan (appendix 5)**	**DVT or PE < 3 months**. Can operation be postponed? **NO:** **High VTE risk bridging plan (appendix 6)** **and Consider** **IVC Filter)** **YES**: reschedule for at least 3 months from event	**All Mitral** **Aortic + risk factors*** **High risk metallic valve bridging plan (appendix 7)** *atrial fibrillation, CCF, age > 75y, diabetes, increased fibrinogen levels, LV dysfunction, left atrial dilatation (diameter >50mm	**Atrial fibrillation with mitral stenosis** **Antiphospholipid syndrome** **Antithrombin deficiency** **DVT/PE with target INR 3.0-4.0** **History of Heparin induced thrombocytopenia (HIT) or Heparin allergy**
LOW THROMBOEMBOLIC RISK (PROPHYLACTIC LMWH REQUIRED ONLY FOR VTE THROMBOPROHYLAXIS AS NEEDED)			
1.No previous TIA/Stroke ***2. $CHA_2DS_2VASC^* < 6$*** Outpatient procedure: **Low risk plan (OP) (appendix 8)** Inpatient procedure: **Low risk plan (IP) (appendix 9)**	***DVT or PE > 3 months*** **Low risk VTE plan (appendix 10)**	**Aortic:** **no cardiovascular risk factors** Outpatient procedure: **Low risk plan (OP) (appendix 8)** Inpatient procedure: **Low risk plan (IP) (appendix 9)**	

Bridging timeline for high risk AF risk

Day	Warfarin dose	DALTEPARIN DOSE (for patients with CrCl < 30 ml/min see appendix 12)	
-6 (INR range 3.0-4.0 or 2.5-3.5, age >75 years, Congestive cardiac failure)	Last dose of warfarin	Nil	
-5 (INR range 2.0-3.0)	Last dose of warfarin	NIL	
-4	No warfarin	NIL	
-3	No warfarin	**100 units/kg morning**	**100 units/kg evening**
-2	No warfarin	**100 units/kg morning**	**100 units/kg evening**
-1	No warfarin	**100 units/kg morning**	**Omit evening dose**
		Last dose administered no less than 24 hours pre-op	
0 (day of procedure)	Restart warfarin at usual maintenance dose	NIL	
+1	Warfarin at maintenance dose	Weight adjusted prophylactic dose, provided haemostasis is secure. (Use therapeutic dose if low bleeding risk procedure)	
+2	Warfarin at maintenance dose	Weight adjusted prophylactic dose, provided haemostasis is secure. (Use therapeutic dose if low bleeding risk procedure)	
+3	Warfarin at maintenance dose (Check INR)	Recommence therapeutic Dalteparin 100 units/kg BD	
+4 and after	Dose titrate warfarin until INR in therapeutic range (Check INR)	Stop DALTEPARIN when INR is in therapeutic range on two occasions, at least 24 hr apart	

Bridging timeline for high VTE risk

Day	Warfarin dose	DALTEPARIN DOSE (for patients with CrCl < 30 ml/min see appendix 12)
-6 (INR range 3.0-4.0 or 2.5-3.5, age >75 years, Congestive cardiac failure)	Last dose of warfarin	Nil
-5 (INR range 2.0-3.0)	Last dose of warfarin	NIL
-4	No warfarin	NIL
-3	No warfarin	**Weight adjusted therapeutic dose**
-2	No warfarin	**Weight adjusted therapeutic dose**
-1	No warfarin	**Half of therapeutic dose (morning)** **Last dose administered no less than 24 hours pre-op**
0 (day of procedure)	Restart warfarin at usual maintenance dose	*Consider prophylactic dose 6 hours post-op provided haemostasis is secure. If not defer till day +1*
+1	Warfarin at maintenance dose	Weight adjusted prophylactic dose, provided haemostasis is secure. (Use therapeutic dose if low bleeding risk procedure)
+2	Warfarin at maintenance dose	Weight adjusted prophylactic dose, provided haemostasis is secure. (Use therapeutic dose if low bleeding risk procedure)
+3	Warfarin at maintenance dose (Check INR)	Recommence **Weight adjusted therapeutic dose**
+4 and after	Dose titrate warfarin until INR in therapeutic range (Check INR)	Stop DALTEPARIN when INR is in therapeutic range on two occasions, at least 24 hr apart

Appendix 7

Bridging timeline for high risk metallic valve

Day	Warfarin dose	DALTEPARIN DOSE (for patients with CrCl < 30 ml/min see appendix 12)	
-6 (INR range 3.0-4.0 or 2.5-3.5, age >75 years, Congestive cardiac failure)	Last dose of warfarin	Nil	
-5 (INR range 2.0-3.0)	Last dose of warfarin	NIL	
-4	No warfarin	NIL	
-3	No warfarin	**100 units/kg morning**	**100 units/kg evening**
-2	No warfarin	**100 units/kg morning**	**100 units/kg evening**
-1	No warfarin	**100 units/kg morning**	**Omit evening dose**
		Last dose administered no less than 24 hours pre-op	
0 (day of procedure)	Restart warfarin at usual maintenance dose	NIL	
+1	Warfarin at maintenance dose	Weight adjusted prophylactic dose, provided haemostasis is secure. (Use therapeutic dose if low bleeding risk procedure)	
+2	Warfarin at maintenance dose	Weight adjusted prophylactic dose, provided haemostasis is secure. (Use therapeutic dose if low bleeding risk procedure)	
+3	Warfarin at maintenance dose (Check INR)	Recommence Dalteparin 100 units/kg BD	
+4 and after	Dose titrate warfarin until INR in therapeutic range (Check INR)	Stop DALTEPARIN when INR is in therapeutic range on two occasions, at least 24 hr apart	

Appendix 8

WARFARIN TIMELINE FOR OUTPATIENT LOW RISK AF, LOW RISK AORTIC PROSTHETIC VALVE WITH NO IDENTIFIABLE INHERENT PERI-OP VTE RISK (E.G. OUTPATIENT PROCEDURES)

Day	Warfarin dose	DALTEPARIN DOSE (UNITS)
-6 (INR range 3.0-4.0 or 2.5-3.5, age >75 years, Congestive cardiac failure)	Last dose of warfarin	*No Dalteparin bridging required*
-5 (INR range 2.0-3.0)	Last dose of warfarin	
-4	No warfarin	
-3	No warfarin	
-2	No warfarin	
-1	No warfarin	
0 (day of procedure)	Restart warfarin at usual maintenance dose in the evening	
+1	Warfarin at maintenance dose	
+2	Warfarin at maintenance dose	
+3 (Check INR)	Warfarin at maintenance dose	
+4 (Check INR)	Dose titrate warfarin until INR in therapeutic range (Check INR)	

Appendix 9

Bridging timeline: low risk AF, low risk Aortic prosthetic valve		
Day	**Warfarin dose**	**DALTEPARIN DOSE (UNITS)** (for patients with CrCl < 30 ml/min see appendix 12)
-6 (INR range 3.0-4.0 or 2.5-3.5, age >75 years, Congestive cardiac failure)	**Last dose of warfarin**	**No Bridging required** *If patient admitted prior to surgery follow UHL thromboprophylactic guidelines from day of admission* **If thromboprohylaxis indicated, ensure at least 12 hour interval between last dose of Dalteparin and scheduled time of commencement of procedure**
-5 (INR range 2.0-3.0)	**Last dose of warfarin**	
-4	**No warfarin**	
-3	**No warfarin**	
-2	**No warfarin**	
-1	**No warfarin**	
0 (day of procedure)	**Restart warfarin at usual maintenance dose in the evening**	**Consider weight adjusted prophylactic dose 6 hours post-op PROVIDED HAEMOSTASIS IS SECURE**
+1	**Warfarin at maintenance dose**	**Weight adjusted Prophylactic dose Dalteparin**
+2	**Warfarin at maintenance dose**	**Weight adjusted Prophylactic dose Dalteparin**
+3 (Check INR)	**Warfarin at maintenance dose**	**Weight adjusted Prophylactic dose Dalteparin**
+4 (Check INR)	**Dose titrate warfarin until INR in therapeutic range (Check INR)**	Stop DALTEPARIN when INR is in therapeutic range. For high thrombotic risk procedures, stop Dalteparin only after INR therapeutic on two occasions at least 24 hr apart

Appendix 10

Bridging timeline for low risk VTE patients (VTE > 3 months)		
Day	**Warfarin dose**	**DALTEPARIN DOSE (UNITS)** (for patients with CrCl < 30 ml/min see appendix 12)
-6 (INR range 3.0-4.0 or 2.5-3.5, age >75 years, Congestive cardiac failure)	Last dose of warfarin	**NIL**
-5 (INR range 2.0-3.0)	Last dose of warfarin	
-4	No warfarin	
-3	No warfarin	**Weight adjusted Prophylactic dose Dalteparin**
-2	No warfarin	**Weight adjusted Prophylactic dose Dalteparin**
-1	No warfarin	**Weight adjusted Prophylactic dose Dalteparin** **Ensure 24 hour interval between this dose and time of operation**
0 (day of procedure)	Restart warfarin at usual maintenance dose in the evening	**Consider prophylactic Dalteparin 6 hours post-op, provided haemostasis is secure. If not defer till Day +1 post-op**
+1	Warfarin at maintenance dose	**Weight adjusted Prophylactic dose Dalteparin**
+2	Warfarin at maintenance dose	**Weight adjusted Prophylactic dose Dalteparin**
+3 (Check INR)	Warfarin at maintenance dose	**Weight adjusted Prophylactic dose Dalteparin**
+4 (Check INR)	Dose titrate warfarin until INR in therapeutic range (Check INR)	Stop DALTEPARIN when INR is in therapeutic range. For high thrombotic risk procedures, stop Dalteparin only after INR therapeutic on two occasions at least 24 hr apart

Appendix 11

Peri-operative management of DOACs is influenced by :

1. *Type of DOAC*
2. *Patient co-morbidities*
3. *Patient renal function*
4. *Time of ingestion of last dose*
5. *Peri-operative bleeding risk of procedure*
6. *Timing of operation (emergency, elective)*

Pre-operative suspension of DOAC

	DABIGATRAN		RIVAROXABAN-APIXABAN	
CrCl (ml/mim)	Low bleeding risk	High bleeding risk	Low bleeding risk	High bleeding risk
≥ 80 ml/min	Omit 24 hr	Omit 48-72 hr	Omit 24 hr	Omit 48 hr
50-79 ml/min	Omit 36 -48 hr	Omit 72-96 hr	Omit 24 hr	Omit 48-72 hr
30-49 ml/min	Omit 48 hr	Omit 96 hr	Omit 24 hr	Omit 72-96 hr
15-29 ml/min	NA	NA	Omit 48 hr	Omit 96-120 hr

Post operative management

LOW BLEEDING RISK	HIGH BLEEDING RISK	
	Low thromboembolic risk	High thromboembolic risk
		PROPHYLACTIC LMWH: starting 24 hr post procedure (provided haemostasis is secure) then every 24 hr until resumption of DOAC
Resume DOAC 6-8 hr	Resume DOAC 48-72 hr	Resume DOAC 48-72 hr

Appendix 12

PROPHYLACTIC DALTEPARIN

WEIGHT kg	CREATININE CLEARANCE > 30 ml/min	CREATININE CLEARANCE < 30 ml/min [7-11]
40-49	2500 UNITS OD	2500 UNITS OD
50-99	5000 UNITS OD	5000 UNITS OD
100-139	7500 UNITS OD	5000 UNITS OD
140-179	10000 UNITS OD	5000 UNITS OD
> 180	DISCUSS WITH HAEMATOLOGY	

THERAPEUTIC DALTEPARIN OR (100 UNITS/kg BD)

WEIGHT kg	CREATININE CLEARANCE > 30 ml/min	CREATININE CLEARANCE <30 ml/min
< 46	7500 UNITS OD	5000 UNITS OD
46-56	10000 UNITS OD	7500 UNITS OD
57-68	12500 UNITS OD	10000 UNITS OD
69-82	15000 UNITS OD	10000 UNITS OD
> 83-100	18000 UNITS OD	12500 UNITS OD
> 100	100 UNITS/kg BD	Discuss with haematology

NB: these doses are approved by haematology and in use by the bridging therapy team. They differ slightly from the usual regimen used for VTE prophylaxis.

A creatinine clearance calculator can be found at http://nephron.com or via google. This requires the patient's gender, weight, serum creatinine and age to estimate a creatinine clearance

This line signifies the end of the document

This table is used to track the development and approval and dissemination of the document and any changes made on revised / reviewed versions

DEVELOPMENT AND APPROVAL RECORD FOR THIS DOCUMENT		
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Approved by:		**Date Approved:**

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Date	**Issue Number**	**Reviewed By**	**Description Of Changes (If Any)**
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