Oral Anticoagulation with Warfarin and Coumarins UHL Guideline

University Hospitals of Leicester NHS
NHS Trust

Trust Ref: B44/2016

Contents

1. INTRODUCTION

1.1. This document sets out the University Hospitals of Leicester (UHL) NHS Trusts guidelines for the management of patients who are prescribed warfarin (and other vitamin K antagonists (VKAs)) by way of anticoagulation.

2. SCOPE

2.1. The guideline applies to health care professionals who are involved in the prescription and monitoring of warfarin/VKAs; and managing patients with complications associated with this drug class (e.g. bleeding)

2.2. The guideline is intended to apply to all areas of the Trust in which warfarin/VKAs are used, although drug doses apply only to adults and would need adjustment for paediatric patients.

2.3. The guideline covers important aspects of anticoagulation with warfarin, and in particular:

Initiation of warfarin, indications for treatment with warfarin, INR target range recommendations, contraindications to warfarin, management of out of range INRs, drug interactions, counselling of patients on initiation, the UHL INReach service, and safe discharge.

2.4. This guideline does not cover patients taking Direct Oral Anticoagulants (DOACs, formerly known as Novel Oral Anticoagulants - NOACs)

2.5. The management of anticoagulation in the peri-operative setting is contained in a separate guideline.

2.6. The guideline pertains to the management of warfarin once a decision is made to prescribe; condition specific information will be located in other clinical guidelines.

2.7. Please note the majority of dosing information and evidence applies to warfarin unless otherwise stated, but overall management of anticoagulation (e.g. processes, teams, reversal) with this class of drug in UHL applies to VKAs

3. RECOMMENDATIONS, STANDARDS AND PROCEDURAL STATEMENTS

AF	Atrial fibrillation. An abnormal heart rhythm which predisposes towards stroke and systemic embolization.
Alert card Yellow book	Important literature to be given to patients, providing a source of information about the drug and a place to document INRs and drug dosing schedule
APTT	Activated partial thromboplastin time – a measure of coagulation
ATE	Arterial thromboembolism
BD	Twice per day
CHA_2DS_2VASc	A measure of stroke risk in the setting of AF
DOAC	Direct oral anticoagulant
DVT	Deep vein thrombosis
FBC	Full blood count
HASBLED	A scoring system for estimating the bleeding risk for patients taking warfarin
INR	International normalised ratio – a standardised ratio of the prothrombin time, which acts as a measure of warfarin effect
INReach	This is a team of anticoagulation specialist nurses who assist in managing patients on warfarin as in-patients, as well as running a small outpatient service.
INRstar	Software used to manage warfarin
LFT	Liver function tests
LMWH	Low molecular weight heparin
PCC	Prothrombin complex concentrate. This is a coagulation factor concentrate which typically contains the 4 vitamin K dependent coagulation factors (II, VII, IX, X).
PE	Pulmonary embolism
PT	Prothrombin time – a measure of coagulation
OD	Once per day
Sinthrome	An alternative vitamin K antagonist that may be used instead of warfarin (for the same indications)
Thrombophilia	An increased tendency to thrombosis. Examples include deficiency of antithrombin, or the presence of Factor V Leiden
TTR	Time in therapeutic range – a measure of the quality and safety of anticoagulation with warfarin/VKA
U&E	Urea and electrolytes – a measure of renal function

VKA / Vitamin K antagonists	This class of drug includes warfarin, but there are other drugs which act in this manner, and can be used as an alternative to warfarin
VTE	Venous thromboembolism
Warfarin	Type of oral anticoagulant which acts by reducing levels of vitamin K dependent coagulation factors

3.1. Initiation of warfarin

3.1.1. Patients should be carefully counselled prior to initiation of anticoagulation with warfarin. At a minimum, after counselling, the patient should be aware of:

- the reason(s) for anticoagulation
- their target INR (+-range)
- the intended duration of treatment (if known)
- follow up arrangements
- the need to carry an anticoagulation alert card stating personal details and that the patient is on warfarin
- the need to have a yellow book (or other written record) to record important dosing information, contact details of their warfarin management service
- how to recognise, and what to do in the case of a bleeding episode
- certain foods/drinks/medications can alter INR and hence warfarin safety. See appendix i.

3.1.2. Prior to initiation of warfarin patients should have a baseline FBC, U&E, LFT, APTT and PT/INR. Abnormal results should be explained prior to initiation and may represent a contraindication to warfarin use. A low platelet count, low haemoglobin (especially if iron deficient), and raised baseline INR will need particular attention in order to allow safe ongoing warfarin use. See also appendix viii

3.1.3. Initial dosing of warfarin should be in accordance with the hospital warfarin chart or another recognised initiation regimen as advised by the INReach service (using dosing algorithm software).See appendix viii + appendix xii.

3.1.4. Prescribers should consider whether an immediate acting anticoagulant effect is required. If so, and warfarin is the choice of long term anticoagulant, LMWH may be used alongside warfarin until the INR is at an acceptable level for the indication in question. This is typically the case for acute thrombotic events, and typically NOT the case for atrial fibrillation or low thrombotic risk prosthetic heart valves, for example.

3.2. Dosing of warfarin

3.2.1. The daily maintenance dose is typically between3–9 mg daily,however there is wide variation. Very high doses (>20mg/day) may raise questions about

compliance, genetic warfarin resistance and significant medication interactions

3.2.2. The strength of warfarin tablets should be carefully considered, especially on discharge from hospital. There are 4 strengths of warfarin tablet which could lead to dramatic differences of total dose if not administered with care. Typically 1mg (brown) tablets are used in UHL to avoid confusion.

3.2.3. Warfarin should ideally be taken at the same time each day, at a time that will be convenient for the patient.

3.2.4. Patients should be encouraged to have an honest and "non-blaming" conversation about lifestyle factors that may affect INR level should the INR be unstable or unexpectedly out of range, in order to allow safe ongoing prescribing.

3.2.5. The timing of INR monitoring tests should depend on an assessment of INR level, INR stability, concomitant illness, concomitant medications, and the balance between thrombosis and bleeding risks. This may be highly variable in the hospital setting. More frequent monitoring is typically required in the following situations:

- people with severe liver disease (including alcoholic liver disease)or renal failure
- people on high target INR anticoagulation(e.g. INR 3.0-4.0)
- age 65 years or over
- highly variable INRs or a past history of this
- history of gastrointestinal bleed risk
- uncontrolled hypertension
- cerebrovascular disease
- significant heart disease
- thrombocytopenia
- anaemia
- coagulation disorders
- malignancy
- trauma
- comorbidities such as intercurrent illness,or exacerbations of chronic conditions;
- changes in medication (for example, starting or stopping drugs such as amiodarone, statins, metronidazole or even some over- the-counter medicines)

N. B. Bleed risk may also be assessed using the HASBLED score

3.3. Safe prescribing and discharge of patients taking warfarin

3.3.1. The prescription of warfarin for inpatients should be on the e-prescribing system or paper drug chart, with a statement for indication and target INR (or range). A separate paper chart should be used for dosing the warfarin according to the INR tests.

3.3.2. Patients should have a record of their warfarin dose documented both in their yellow book AND on the anticoagulation discharge summary

3.3.3. The anticoagulant effect of Warfarin metabolism may be affected by drug interactions, diet, including alcohol intake, thyroid status and genetic variability (e.g. polymorphisms in CYP2CP or VKORC1)

3.3.4. Contraindications to warfarin treatment include:

- acute haemorrhagic stroke
- bleeding disorders (e.g. active bleeding or uncorrected major bleeding disorders such as haemophilia)
- uncontrolled severe hypertension (e.g. systolic BP greater than 200mmHg or diastolic greater than 120mmHg)
- pregnancy (except in exceptional circumstances)
- warfarin allergy or intolerance

N.B This list is not exhaustive – see also summary of product characteristicshttps://www.medicines.org.uk/emc/medicine/32628

3.3.5. Cautions for the use of warfarin include:

- a person with potential bleeding lesions: anticoagulation should be considered with caution and a careful risk/benefit assessment should be carried out before initiation—for example:
  - active peptic ulcer
  - bleeding oesophageal varices
  - cerebral aneurysm
  - proliferative retinopathy
  - recent organ biopsy
  - recent trauma or surgery to head, orbit, or spine
  - recent stroke
  - confirmed intracranial or intraspinal bleed
  - within 72 hours of major surgery with risk of severe bleeding
  - within 48 hours postpartum
- the person is uncooperative or unreliable — as there maybe compliance and follow- up issues.

- the person is prone to repeated falls or unstable gait — since there is an increased chance of injury and head trauma - this is not a contraindication to anticoagulation but caution is advised. The risk of major bleeding with falls is approximately 1:300.
- Concomitant use of antiplatelet drugs because of increased bleeding risks. Decision making about use of warfarin and anti-platelet drugs should be carefully considered and involve discussion between specialist (e.g. cardiologist/haematologist), GP and patient. In principle, time spent on both warfarin and anti-platelet drugs should be minimised where possible and will involve a periodic risk assessment tailored to the clinical situation.
- Concomitant use of non-steroidal anti-inflammatory drugs, selective serotonin-reuptake inhibitors (SSRIs), venlafaxine, or duloxetine — there is an increased risk of gastrointestinal bleeding (see appendix i).
- Protein C and Protein S deficiency — a risk of skin necrosis and worsening of thrombosis on initiation of warfarin requires caution. The risk of skin necrosis is greatly minimised by concurrent administration of LMWH for at least 5 days or until INR is therapeutic, whichever is latest

3.4. Indications, target INR and duration of treatment:

3.4.1. The table in appendix ii provides guidance on typical INR target/ranges and durations for the majority of indications. It is advisable to review target INR at a minimum annually when using warfarin long-term

3.4.2. A target INR of 2.5 is adequate for the majority of situations but the target INR may be increased in certain circumstances, provided the risk of bleeding is felt to be outweighed by the thrombotic risk

3.4.3. The target INR is taken to be the midpoint of the desired therapeutic INR range (e.g. 3.5 is the target for a range of 3.0-4.0)

3.4.4. Duration of anticoagulation must be stated at initiation (if known) and, if not known, follow-up must with an appropriate a specialist must be arranged in order to make this decision. See appendix ii for broad guidance on duration of therapy

3.5. Drug interactions

3.5.1. For advice on individual drugs and interactions, it is advisable to check in the British National Formulary or an interaction checker before prescribing. These are available on UHL's iNsite page. Advice may also be sought from UHL's medicine's information service.

3.5.2. If it is essential to start a drug that could affect the INR this should be documented in the patients' medical record

3.6. Management of bleeding

3.6.1. The management of bleeding for patients on warfarin should involve a careful assessment of the severity of the bleed. If a decision to rapidly reverse

warfarin due to either the critical rate or critical site of bleeding, the UHL Prothrombin Complex Concentrate (PCC) guideline should be followed. If less urgent reversal is required, vitamin K may be used. See also appendix vi.a and vi.b.

3.6.2. The use of Fresh Frozen Plasma is no longer recommended for the reversal of warfarin because it is less effective for rapid reversal than PCC, and if rapid reversal of warfarin is not required, vitamin K will produce the desired results without exposure to transfusion risks.

3.6.3. In the event of a massive haemorrhage whilst on warfarin, please refer to the UHL Massive Haemorrhage protocol -Trust Ref: C263/2016

3.7. Management of INRs not in the target range

3.7.1. Management of out-of-range INRs may be different for different patient groups. Typically, dosing software will provide advice on dosing based on algorithms for stable patients. Acute in-patients are likely to require more INR tests, and a careful review of the balance of bleeding and thrombotic risks, and interacting medications. The situation is likely to be more dynamic than for stable outpatients and requires a careful review of changes in the patient's situation and their results.

3.7.2. Appendices iv, v & vi.a typically apply more to stable outpatients but provide a framework for risk assessment and the use of other medications, such as vitamin K and low molecular weight heparin should the INR be out of the desired range.

3.7.3. For complex situations, health care professionals may wish to contact the INReach anticoagulation service for advice +- patient review.

3.7.4. Patients awaiting discharge who have an out-of-range INR do not need to be kept in hospital for this reason provided a plan can be made with the patient's usual anticoagulation service (typically the GP) for an INR check and dose adjustment. Good communication in this scenario is critical and an appointment should be **actively arranged** rather than assumed. Please note: responsibility for the patient's anticoagulation at this point rests with the UHL clinical team.

3.8. Anticoagulation infrastructure in UHL – the anticoagulation committee and the INReach service

3.8.1. Given the importance of anticoagulant safety in UHL these guidelines are overseen by the Anticoagulation Committee. Warfarin safety will be addressed by the committee in order to review a number of key performance indicators and adverse events will be the subject of root cause analysis.

3.8.2. The INReach service is a nurse-led service, whose primary aim is to assist in the safe initiation and monitoring of patients on warfarin whilst in UHL, as well as assisting in ensuring a safe discharge back to primary care. The service remit also includes the promotion of safe anticoagulation, warfarin and anticoagulant education to UHL staff, and the running of an outpatient clinic for patients with complex anticoagulation requirements.

3.8.3. Patients admitted into UHL who are taking warfarin should be referred to the INReach service and patient reviews will be triaged on the basis of clinical need.

4. EDUCATION AND TRAINING

Basic training in anticoagulant management is expected for prescribers and those administering warfarin and VKAs. Opportunistic training is carried out by the UHL INReach team and a package of anticoagulant educational materials is under development with oversight from the anticoagulation committee.

5. MONITORING AND AUDIT CRITERIA

Key Performance Indicator	Method of Assessment	Frequency	Lead
INRs > 6.0	Via AC committee search	6m	AC Chair
Missed doses of warfarin	Via AC committee search	6m	AC Chair
Bleeds occurring whilst on warfarin	Datix and safety alerts and referrals to AC Committee	6m	AC Chair

6. LEGAL LIABILITY GUIDELINE STATEMENT

See section 6.4 of the UHL Policy for Policies for details of the Trust Legal Liability statement for Guidance documents

7. SUPPORTING DOCUMENTS AND KEY REFERENCES

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8. KEY WORDS

Warfarin, acenocoumarol, Sinthrome, anticoagulation, bridging, INR, INReach

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

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Date	**Name**	**Dept**	**Received**

9. WARFARIN POLICY 2019 APPENDICES

Appendix i – Target INR and duration of anticoagulation

Indication	Target INR	Notes/Duration of treatment
Venous thromboembolism		**Commence warfarin and therapeutic LMWH on Day 1. Continue heparin for at least 5 days and until INR > 2 for two days.**
Pulmonary embolus	2.5	At least 3 months, followed by specialist review of recurrence risk to decide if long-term anticoagulation is indicated.
Proximal DVT	2.5	At least 3 months, followed by specialist review of recurrence risk to decide if long-term anticoagulation is indicated.
Calf vein thrombus/Superficial vein thrombosis	2.5	Six weeks
Recurrence of DVT when no longer on warfarin	2.5	Long term following discussion/advice from haematologist
Recurrence of DVT whilst still on warfarin that was within target range	3.0-3.5	Consider LMWH/DOAC as an alternative Long-term following discussion/advice from haematologist
Thrombophilias		
Symptomatic inherited thrombophilia	2.5	Long-term
Antiphospholipid syndrome (variable) Arterial Venous	(variable) 3.5 2.5	Long-term
Atrial fibrillation and cardio-embolism **NB: For non-valvular AF DOAC may also be considered**		**Often no need for rapid anticoagulation – low dose initiation should be considered**
Non-rheumatic atrial fibrillation with stroke risk requiring anticoagulation (according to CHA_2DS_2Vasc)	2.5	Long-term
Atrial fibrillation due to rheumatic heart disease, congenital heart disease, thyrotoxicosis	2.5	Long-term
Cardio-version	2.5	Long-term – target must be within range for 3 weeks prior to cardio-version and 4 weeks after (or as directed by cardiologist)
Mural thrombus	2.5	Long-term
Cardiomyopathy	2.5	Long-term
Mechanical heart valve	Depends on valve type	Long-term
Bio-prosthetic heart valve	Not required	N.B. Anticoagulation is typically given for 3 months post-surgery but not for long term use in this situation
Bio-prosthetic heart valve – with history of embolism/atrial thrombus	2.5	Long-term

Indication	Target INR	Notes/Duration of treatment
Acute arterial embolism	2.5-3.0	Long-term
Cerebral ischaemia		
Stroke without atrial fibrillation	Not required	
Transient ischaemic attack or stroke with atrial fibrillation	2.5	Long term
Retinal vessel occlusion with positive antiphospholipid antibodies	2.5	Anticoagulate if patient has anti-phospholipid syndrome - long-term
Other		
Peripheral arterial thrombosis/bypass graft thrombosis (without atrial fibrillation)	Not required	Discuss with vascular surgeon grafts that are considered high risk
Coronary artery thrombosis*)*	Not required	*Anticoagulation may be required if* persistent positive antiphospholipid antibodies
Coronary artery graft thrombosis	Not required	
Coronary angioplasty and stents	Not required	
Vena Cava Filter	2.5	For duration of filter but should be reviewed by a haematologist

Appendix ii UHL counselling checklist for patients who are new to warfarin

University Hospitals of Leicester NHS
NHS Trust

Checklist for New Patients taking warfarin

Patient details

Hospital	
Ward	
Date	
Diagnosis	
Anticoagulant	
Range	
Duration	

Please state yes or no for each point once patient has been informed of the following:

For All Patients:	Y or N
1. Clinical need for anticoagulation therapy	
2. How Heparin works (if applicable)	
3. How Warfarin works / Drug Interaction and the need to inform anticoag clinic if medications change and to seek advice if planning to buy over the counter medications	
4. How/When to take and What to do if a dose is accidentally missed	
5. Need for Regular INR monitoring (Using a Calendar for dose adjustments and appointments)	
6. Obtaining supply of medication from: Hospital initially: Repeat prescriptions from GP	
7. Visiting other healthcare professional e.g. dentists	
8. Aware of possible side effect e.g. bruising & bleeding and what to do	
Things that can affect the control of anticoagulation:	
9. Advise on alcohol consumption Need for moderation (no more than 2 units/day) Not to "binge" - and the effect of alcohol combined with warfarin.	
10. Dietary advice given, especially regarding avoidance of crash diets	
11. Lifestyle issues discussed - smoking, exercise, weight control and work	
12. For women only; contraception, periods, pregnancy and HRT	
13. Ensure medics are aware of the need to complete the adult anticoagulation discharge letter	
To be given to patient :	
1. Oral anticoagulation "patient information booklet" and anticoagulation alert card	
2. Completed yellow warfarin dosing book	
Notes for Doctors:	

Name of Person Completing form……..

Signature……Date……

Appendix iii – Table for assessing thrombotic risk

Using the table: Identify your patient's indication for warfarin according to condition, then look down the column to find the details that best fit. The row in which you find this information will have a description of the patient's thrombotic risk, classified as Very High, High, Intermediate or Low. Included below for convenience is the "Who needs additional anticoagulant" summary table –see appendix v for further details.

Risk category (approx. risk) ATE = arterial thromboembolism VTE = venous thromboembolism	**Indication for warfarin**		
	Mechanical Heart Valve	**Atrial Fibrillation**	**VTE**
Very high (statistical risk uncertain from trials)	Anyone with warfarin INR range 3.0 to 4.0	Anyone with warfarin INR range 3.0 to 4.0	Anyone with warfarin INR range 3.0 to 4.0
High (>10% per year risk of ATE or >10% per month of VTE)	Any mechanical mitral valve prosthesis Any caged-ball or tilting disc aortic valve prosthesis Recent (within 6 months) stroke or transient ischemic attack	CHA_2DS_2VASc 6+ Recent (within 3 months) stroke or transient ischemic attack Rheumatic valvular heart disease	VTE within 3 months Severe thrombophilia (e.g. deficiency of protein C/S or antithrombin, antiphospholipid antibodies, compound thrombophilia states)
Intermediate (4-10% per year risk of ATE or 4-10% per month risk of VTE)	Bileaflet aortic valve prosthesis and one or more of the of following risk factors: atrial fibrillation, prior stroke or transient ischemic attack, hypertension, diabetes, congestive heart failure, age > 75 years	CHA_2DS_2VASc 4-5	Recurrent VTE Active cancer (treated within 6 months or palliative)
Low (<4% per year risk of ATE or <4% per month risk of VTE)	Bileaflet aortic valve prosthesis without atrial fibrillation and no other risk factors for stroke	CHA_2DS_2VASc ≤3 (assuming no recent stroke or transient ischemic attack)	VTE > 3 months ago

Risk category	**Consider additional anticoagulant if**
Very high	INR < 2.5
High	INR < 2.0
Intermediate	INR < 1.5 for ≥ 1 week on serial testing OR INR 1.5 - 2.0 for ≥ 2 weeks on serial testing
Low	Consider if INR < 1.5 on serial testing for ≥ 1 month

Appendix iv – Suggestions for managing a below-range INR

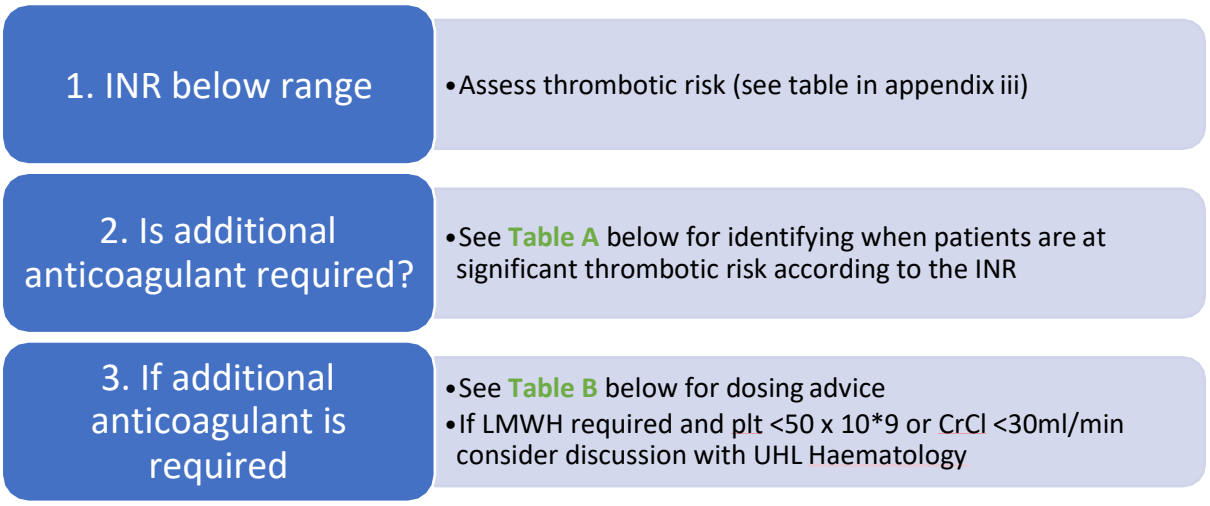


Table A When to consider additional anticoagulant.

Risk category	Consider additional anticoagulant if
Very high	INR < 2.5
High	INR < 2.0
Intermediate	INR < 1.5 for ≥ 1 week on serial testing OR INR 1.5 - 2.0 for ≥ 2 weeks on serial testing
Low	Consider if INR < 1.5 on serial testing for ≥ 1 month

Below range INR. If additional anticoagulant required – next steps:

- Check renal function and platelet count (do not await results)
- Initiate LMWH; remember to chase up U&E and platelet count.
- Review warfarin dose, cause for low INR, consider warfarin "boost" or dose adjustment (according to INRStar or clinical decision)
- Recheck INR after 4-7 days
- Discontinue LMWH once INR within range

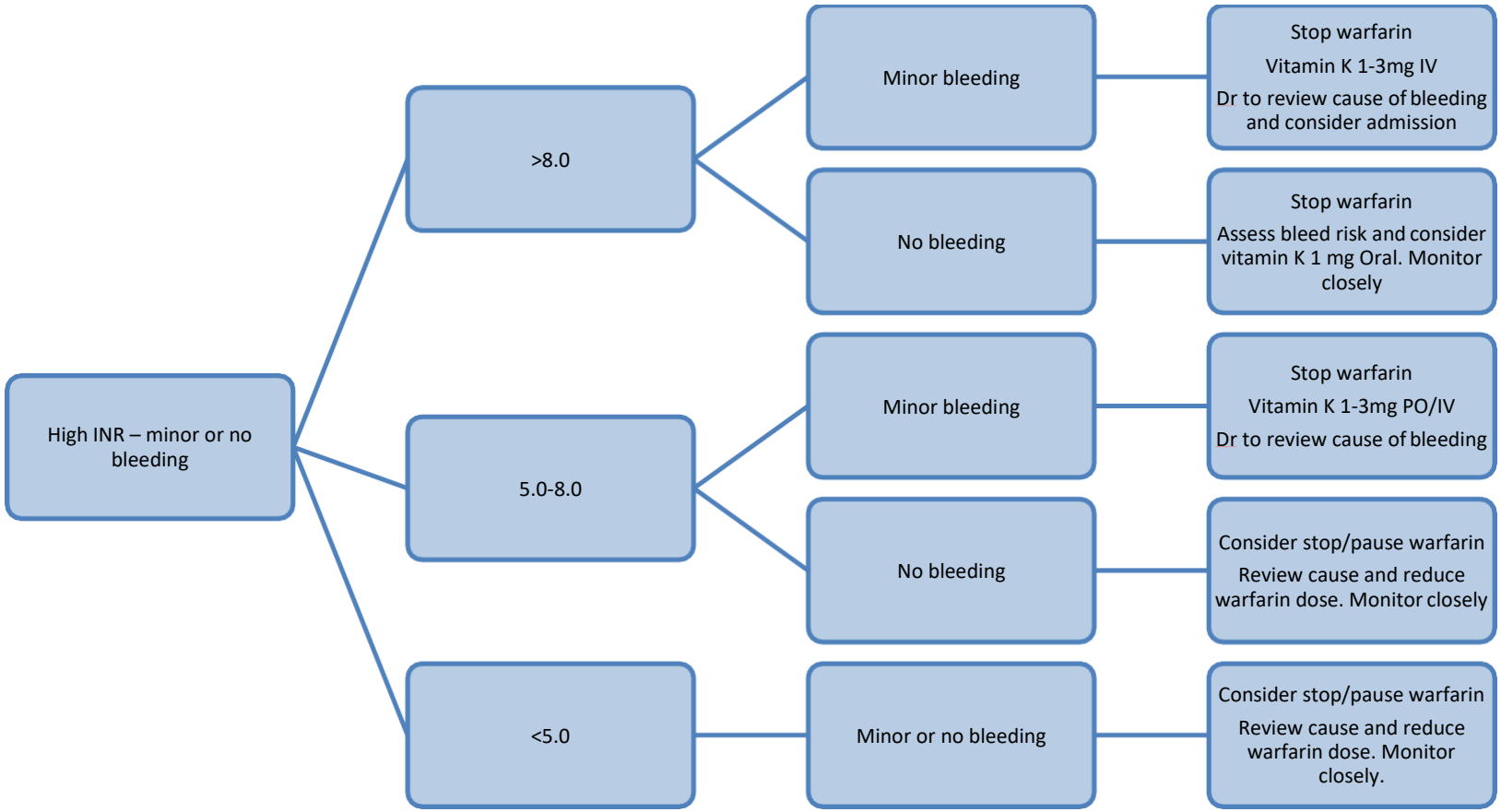
Table B Enoxaparin dosing for below range INR:

Indication	Dosing
Mechanical valve	Therapeutic low molecular weight heparin: Enoxaparin 1mg/kg/BD (or use 1.5mg/kg/OD if BD is not possible for practical reasons – suggest using weight adjusted dose banding)
VTE: very high/high risk	Therapeutic low molecular weight heparin: Enoxaparin 1.5/kg/OD (suggest using weight adjusted dose banding)
VTE: intermediate/low risk	Prophylactic low molecular weight heparin: Enoxaparin weight based see dosing table here

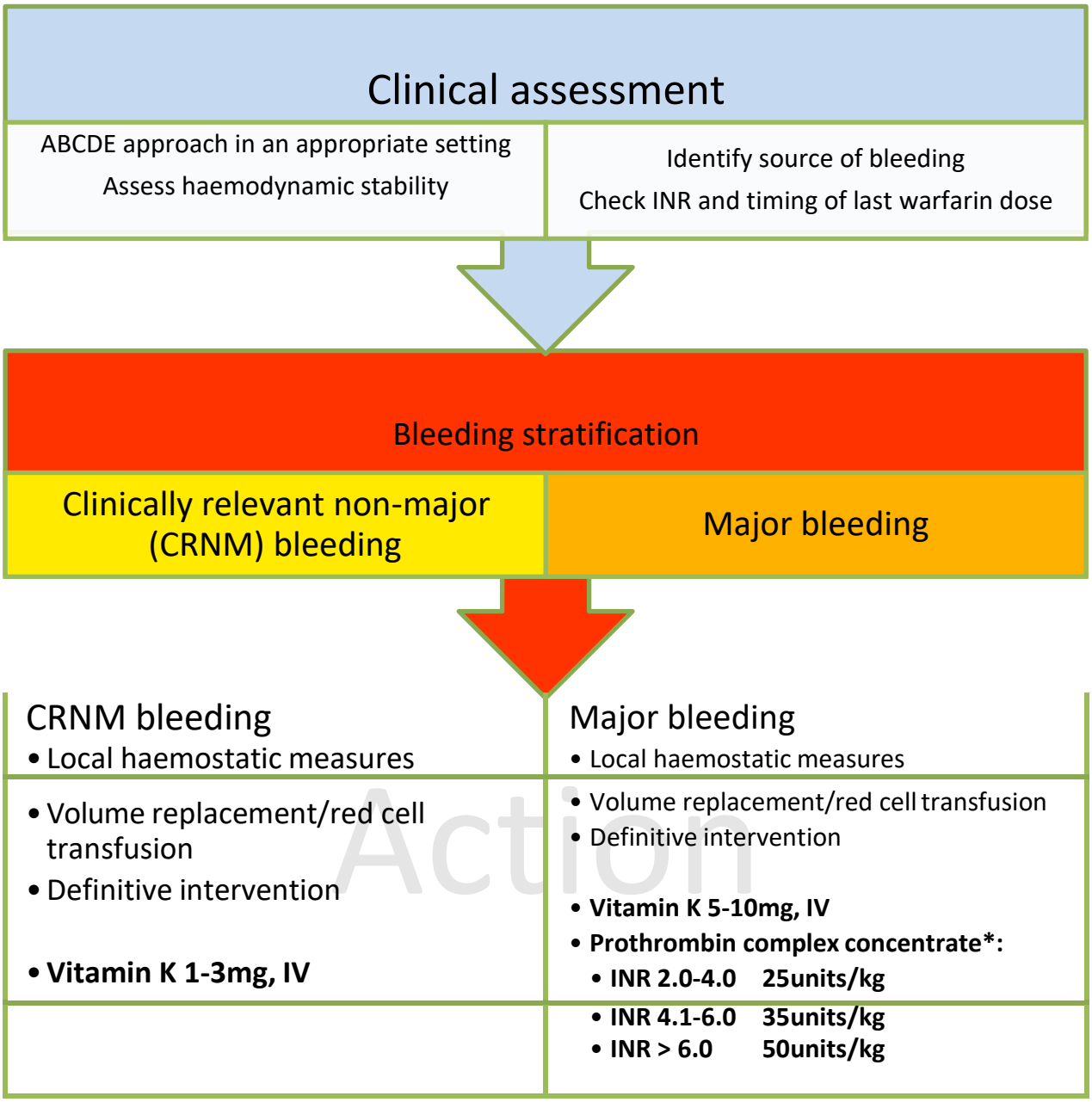
Appendix v – Managing an above-range INR with no bleeding or minor bleeding

Notes on managing an above-range INR:

- Vitamin K dose may be 1-3mg (BNF guidance: 1-5mg) – the authors suggest 1mg will be adequate in most circumstances
- For dose adjustments, see INR star and/or appendix vii./INReach
- Adapted from previous Anticoagulation service guidance and BNF



Appendix vi Management of bleeding for patients on warfarin.



*PCC = Octaplex/Beriplex. See Prothrombin complex concentrate clinician pack on UHL Intranet

CONSIDER ALSO:

Tranexamic acid 1g IV

Activation of Massive Haemorrhage protocol, see UHL Policy

Platelet transfusion to reverse anti-platelet drug effects

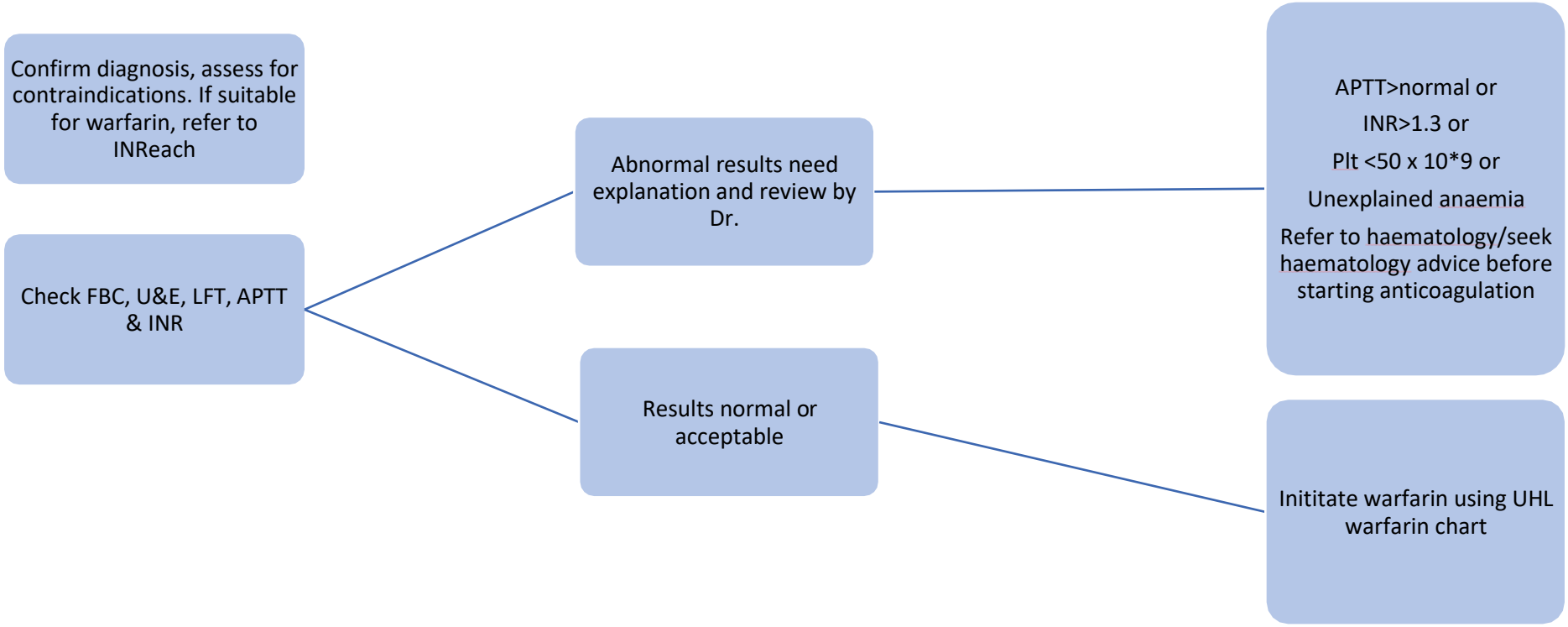
Appendix vii -manual and booster dosing

It is recommended to follow INRstar dosing adjustments where possible. If this is not suitable for a patient or clinical situation, the table below provides advice on how to proceed according to patient's target INR and current INR. Specific dosing recommendations for high target (3.0-4.0) is not included but it is reasonable to use the 2.5-3.5 guidance and adjust according to patient response.

To use this table: identify patient's INR target (either right or left column) and follow action in the central column.

For target INR 2.5	**Suggested dose adjustment**	**For target INR 3.0**
INR < 1.5	Single booster dose of 1.5-2 x daily maintenance dose +- increase maintenance dose by 10-20%	INR < 2.0
INR 1.5 – 1.7	Single booster dose of 1.5 – 2 x daily maintenance dose +- increase maintenance dose by 5-15%	INR 2.0 – 2.3
INR 1.8 – 1.9	Single booster dose of 1.5-2 x daily maintenance dose +- increase maintenance dose by 5-10%	INR 2.3 – 2.4
INR 2.0 – 3.0	No dose adjustment indicated	INR 2.5 – 3.5
INR 3.1 – 3.2	Decrease maintenance dose by 5-10%	INR 3.6 – 3.7
INR 3.3 – 3.4	Hold 1 dose or give 1 dose at 50% normal maintenance dose; +- decrease maintenance dose by 5-10%	INR 3.8 – 3.9
INR 3.5 – 3.9	Hold 1 dose +- decrease maintenance dose by 5-15%	INR 4.0 – 4.4
INR 4.0 +	Hold until INR falling to near or within therapeutic range. Review cause and decrease maintenance dose by 10-15% (or more depending on INR level and cause for high INR)	INR 4.5 +

Appendix viii – warfarin/VKA initiation



Appendix ix - Responsibilities for management of peri-procedural anticoagulation

Anticoagulation service responsibilities (primary care provider)	Operator team/Secondary care responsibilities	Haemostasis team responsibilities
Referral for procedure	Pre-procedural assessment	Advice/guidance
Communication about details of anticoagulant to operator	Creation of peri-procedural anticoagulant plan with either: • No cessation of anticoagulant • Operator's plan • Refer for Bridging Plan via iNsite (with 10 working days' notice)	Creation of peri-procedural plan on request for complex cases within 10 working days or 72 hours for 2WW. N.B. Clinic appointment may occasionally be required in complicated or high risk cases
	Communication of plan to: • GP • Patient • Consultant responsible for patient • Notes	
	Prescription of peri-procedural medications (usually low molecular weight heparin) for up to one week before and one week after procedure	
	Education of patient/carer in administration of medication. Default position is for patient or carer to be taught to inject – if not possible, arrange district nurse	
	Clear plan regarding restarting anticoagulant, including date range for INR checks post procedure if required	
Take back of anticoagulation responsibility post procedure, including: • INR check day 3-5 as directed/agreed in plan • Prescription of on-going bridging therapy from day 7 if required • On-going monitoring and dosing of warfarin NB. May vary depending on procedure and date of discharge		

Appendix x - Switching between oral anticoagulants

Table 1. warfarin and DOACs

	To warfarin	From warfarin
Apixaban	Apixaban to warfarin Start warfarin and stop apixaban within 3 days	Warfarin to apixaban Stop warfarin and start apixaban when INR is at the lower limit of patient range (typically < 2.0) OR when INR predicted to reach this level e.g. after 3-5 days
Dabigatran	Dabigatran to warfarin Start warfarin and stop dabigatran within 3 days (or 2 days if CrCl 30-50ml/min)	Warfarin to dabigatran Stop warfarin and start apixaban when INR is at the lower limit of patient range (typically < 2.0) OR when INR predicted to reach this level e.g. after 3-5 days
Edoxaban	Edoxaban to warfarin Start warfarin and stop edoxaban within 3 days	Warfarin to edoxaban Stop warfarin and start apixaban when INR is at the lower limit of patient range (typically < 2.0. Manufacturer recommends 2.5) OR when INR predicted to reach this level e.g. after 3-5 days.
Rivaroxaban	Rivaroxaban to warfarin Start warfarin and stop rivaroxaban within 3 days	Warfarin to rivaroxaban Stop warfarin and start apixaban when INR is at the lower limit of patient range (typically < 2.0. Manufacturer recommends 3.0) OR when INR predicted to reach this level e.g. after 3-5 days

Table 2 Warfarin and Sinthrome

Direction of switch	Transition factor	95% confidence intervals
Warfarin to Sinthrome	0.53	0.51-0.55
Sinthrome to warfarin	1.85	1.78-1.92

Adapted from Van Leeuwen Y, Rosedaal FR et al. The relationship between maintenance dosages of three vitamin K antagonsits: acenocoumarol, warfarin and phenprocoumon. Thromb res 2008; 123(2):225-30.

Appendix xi - Responsibilities for management of peri-procedural anticoagulation

Anticoagulation service responsibilities (primary care provider)	Operator team/Secondary care responsibilities	Haemostasis team responsibilities
Referral for procedure	Pre-procedural assessment	Advice/guidance
Communication about details of anticoagulant to operator	Creation of peri-procedural anticoagulant plan with either: • No cessation of anticoagulant • Operator's plan • Refer for Bridging Plan via iNsite (with 10 working days' notice)	Creation of peri-procedural plan on request for complex cases within 10 working days or 72 hours for 2WW. N.B. Clinic appointment may occasionally be required in complicated or high risk cases
	Communication of plan to: • GP • Patient • Consultant responsible for patient • Notes	
	Prescription of peri-procedural medications (usually low molecular weight heparin) for up to one week before and one week after procedure	
	Education of patient/carer in administration of medication. Default position is for patient or carer to be taught to inject – if not possible, arrange district nurse	
	Clear plan regarding restarting anticoagulant, including date range for INR checks post procedure if required	
Take back of anticoagulation responsibility post procedure, including: • INR check day 3-5 as directed/agreed in plan • Prescription of on-going bridging therapy from day 7 if required • On-going monitoring and dosing of warfarin NB. May vary depending on procedure and date of discharge		

Appendix xii. Copy of UHL in-patient warfarin prescription chart

ANTICOAGULATION TREATMENT CHART

University Hospitals of Leicester NHS Trust

NHS

PATIENT LABEL			
	Hospital		**INReach Label** If no yellow label attached, refer to Anticoag INReach Service
	Ward		
	Indication		
	Target Range		
	Duration		

Tait and Sefcick Algorithm For Warfarin Initiation

1. Check Baseline Bloods (FBC, UE's, LFT's INR & APTT)
2. Prescribe Warfarin on Drug Chart daily
3. Consider Heparin cover for higher risk patients and should continue until INR is in range for two consecutive tests.
4. Heparin cover should be for a minimum of 5 days
5. Commence Warfarin at 5mg Daily for FOUR DAYS and check INR on Day 5

INR on day 5	Dose for days 5-7	INR on day 8	Dose from day 8
<=1.7	5mg	<=1.7	6mg x 7 days
		1.8-2.4	5mg x 7 days
		2.5-3.0	4mg x 7 days
		>3.0	3mg x 4 days
1.8-2.2	4mg	<=1.7	5mg x 7 days
		1.8-2.4	4mg x 7 days
		2.5-3.0	3.5mg x 7 days
		3.1-3.5	3mg x 4 days
		>3.5	2.5mg x 4 days
2.3-2.7	3mg	<=1.7	4mg x 7 days
		1.8-2.4	3.5mg x 7 days
		2.5-3.0	3mg x 7 days
		3.1-3.5	2.5mg x 4 days
		>3.5	2mg x 4 days
2.8-3.2	2mg	<=1.7	3mg x 7 days
		1.8-2.4	2.5mg x 7 days
		2.5-3.0	2mg x 7 days
		3.1-3.5	1.5mg x 4 days
		>3.5	1mg x 4 days
3.3-3.7	1mg	<=1.7	2mg x 7 days
		1.8-2.4	1.5mg x 7 days
		2.5-3.0	1mg x 7 days
		3.1-3.5	0.5mg x 4 days
		>3.5	omit x 4 days
>3.7	0 mg	<2.0	1.5mg x 4 days
		2.0-2.9	1mg x 4 days
		3.0-3.5	0.5mg x 4 days

Patients usual Dose:

UHL Anticoagulation INReach Service

1. Warfarin Patients referred to the UHL Anticoag service on Admission and Initiation.
2. DOAC patients referred on Initiation.
3. Available for INReach, ward based service, offering advice on dosing, management and patient education.
4. Discharge advice
5. Ward referrals taken via ICE
6. Verbal referrals not accepted

anticoagulation@UHL-tr.nhs.uk

Patient telephone number:0116 258 5069

Clinician: 6720 Helpline: 0796 077 9941

Please ensure Adult Anticoagulation Discharge Letter is completed on discharge for ALL anticoagulation patients...

BLEEDING WHILST ANTICOAGULATED: 4 CATEGORIES

1, Life threatening haemorrhage Stop Warfarin 5mg Vitamin K by slow injection (refer to IV policy) Consider administering clotting factors	3, INR high without haemorrhage INR >4.5 withhold Warfarin for 1-2 days and review INR >8.0 give 0.5mg Vitamin k by slow injection
2, Less Severe haemorrhage Withhold Warfarin for 1 or more days and review And/or give 0.5mg vitamin K by slow injection	4, Unexpected bleeding at therapeutic levels Investigate underlying cause 5, Contact the UHL Anticoagulation INReach Service for further advice if required.
NB: Take care in reversing anticoagulation in patients with prosthetic valves	

Completed By (BLOCK CAPITALS):	Signature:	Date:

UHL_warfarin-chart_V1_01.2019

Appendix xiii. Example of warfarin “yellow book” from NPSA “Actions that can make anticoagulation safer 2007”