

Management of Subtherapeutic INRs in Patients on Warfarin

This protocol provides guidance for managing adult patients on oral anticoagulation with a vitamin K antagonist (e.g. warfarin), with an International Normalised Ratio (INR) result below their target range.

Clinical decisions in these scenarios require individual patient considerations, including determining a reason for the result (e.g. missed dose), risk factors for thrombosis and bleeding, and patient preference. The decision to bridge may also be affected by anticipated poor compliance either with administration of heparin injections or with subsequent INR testing.

Low Thrombosis Risk

The following groups of patients have low thrombotic risk and do not require bridging with low molecular weight heparin (LMWH). Increase regular dose of warfarin. If INR < 1.4 consider a loading dose of warfarin for 1-2 days.

- AF without additional thrombotic risk factors
- VTE >4 weeks or recurrent VTE with target INR 2.5
- Low risk aortic valve replacement with no additional risk factors (see Table 1 below))

High Thrombosis Risk

- VTE within 4 weeks
- AF with CVA/TIA/embolism within 3 months, rheumatic mitral disease, or mitral stenosis
- Non-AF cardiac embolism within 4 weeks
- Mitral or aortic valve replacement of high or medium thrombotic risk (see table 1.0 below for classifying risk of valves)
- Recurrent VTE on anticoagulant (range 3-4)
- Antiphospholipid syndrome / Anti-thrombin deficiency

For patients at higher risk of thrombosis, including those specified by a consultant, consider prescribing bridging therapy with treatment dose low molecular weight heparin (e.g. dalteparin) until INR ≥ 2 if **INR ≤ 1.7 (for target 2.5) or ≤ 1.9 (for target ≥ 3.0).**

Table 1: Risk stratification for mechanical prostheses:

Risk	Type of valve
Low	Carbomedics, Medtronic Hall, ATS, Medtronic Open-Pivot, ST Jude Medical, Sorin Bicarbon
Medium	Other bileaflet valves with insufficient data
High	Lillehei-Kaster, Omniscience, Starr-Edwards (ball-cage), Bjork-Shiley and other tilting-disc valves

Patient related risk factors (if present raise the risk):

-Mitral or tricuspid valve replacement; previous thromboembolism, AF; mitral stenosis of any degree; LVEF < 35%

Table 2: Doses of Dalteparin for patients

Weight (kg)	Dose by subcutaneous injection using a pre-filled syringe (units)
Under 46 (Ask Haem if < 40kg)	7,500 once daily
46-56	10,000 once daily
57-68	12,500 once daily
69-82	15,000 once daily
83-120	18,000 once daily
Over 120	Ask Specialist advice

Table 3: Doses of Dalteparin in Renal disease (CrCl < 20ml/min):

Weight (kg)	Dose by subcutaneous injection (units)
Under 46	5,000 once daily
46-56	7,500 once daily
57-68	7,500 once daily
69-82	10,000 once daily
83-98	12,500 once daily
99-120	15,000 once daily
Over 120	18,000 once daily

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References:

- Alec Vahanian et al. (2021) ESC/EACTS Scientific Document Group, 2021 ESC/EACTS Guidelines for the management of valvular heart disease: Developed by the Task Force for the management of valvular heart disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS). European Heart Journal. [2021 ESC/EACTS Guidelines for the management of valvular heart disease | European Heart Journal | Oxford Academic \(oup.com\)](#)
- Keeling, D., Baglin, T., Tait, C., Watson, H., Perry, D., Baglin, C., Kitchen, S., Makris, M. Guidelines on oral anticoagulation with warfarin – fourth edition. British Journal of Haematology, 154: 311-324. (2011) [British Journal of Haematology | Wiley Online Library](#)
- Summary of Product Characteristics for Dalteparin 18,000 units/0.72ml solution for injections. Last updated on the eMC 23/2/2023. Accessed via www.medicines.org on 5/4/2023
- Perioperative Management of Antithrombotic Therapy: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest 2012;141;e326Se350S [Perioperative Management of Antithrombotic Therapy - PMC \(nih.gov\)](#)

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Title	Guidance on Management of Subtherapeutic INRs in Patients on Warfarin
Document reference	
Author	NHS BSW Medicines Optimisation staff and local haematology specialist pharmacists (acute trusts)
Adapted from	
Approved by	BSW Area Prescribing Committee
Date approved	July 2024
Next review date	July 2027