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Norfolk and Norwich University Hospitals NHS
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Trust Guideline for Thromboprophylaxis in Trauma and Orthopaedic Inpatients

A clinical guideline recommended for use

In:	Department of Orthopaedics, NNUHT
By:	Medical staff
For:	Trauma & Orthopaedic Inpatients
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Quick Reference Guide

1. All inpatients should receive the Patient Information Leaflet: **http://www.nnuh.nhs.uk/Leaflet.asp?ID=784&q=clot**
2. All inpatients should have their VTE prophylaxis and bleeding risks assessed
3. The risks and benefits of VTE should be discussed and the conclusions recorded. Fill in the risk assessment on the drug chart.
4. All patients should have mechanical prophylaxis (intra-operative calf stimulation and/or anti-embolism stockings – avoid anti-embolism stockings when risk of compartment syndrome or peripheral vascular disease). All patients should be mobilised early if possible.
5. If a patient requires pharmacological thromboprophylaxis then Tinzaparin 4500u od s.c. should be prescribed. In addition:
    a. Elective hip replacements - on discharge from hospital, patients should stop Tinzaparin 4500u od s.c. and start new oral anticoagulants, choice according to Trust formulary (Rivaroxaban or Dabigatran), to be continued for 4 weeks.
    b. Elective knee replacements - on discharge from hospital, patients should stop Tinzaparin 4500u od s.c. and start new oral anticoagulants, choice according to Trust formulary (Rivaroxaban or Dabigatran), to be continued for 10 days.
    c. Femoral neck fracture - on discharge from hospital, patients should continue Tinzaparin 4500u od s.c.for a total course of 28 days, if there is no contra-indication. This dose may need to be modified in the elderly – depending on clinical situations (phone pharmacy for advice).
6. The risk assessment should be monitored regularly whilst in hospital and prophylaxis changed accordingly.
7. On discharge the patients should be instructed about the signs and symptoms of VTE and the complications of prophylaxis.

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Risk factors for VTE

Increased risk of VTE if one or more of the following risk factors:

- Active cancer or cancer treatment
- Acute admission for a surgical condition
- Age > 60 years
- Dehydration
- Expected significant reduction in mobility
- Known thrombophilias
- Obesity (BMI > 30 kg/m2)
- One or more significant medical comorbidities (such as heart disease, metabolic, endocrine or respiratory pathologies, or inflammatory joint diseases)
- Personal or family history of VTE
- Pregnancy or ≤ 6 weeks post partum
- Surgical procedure with a total anaesthetic and surgical time of more than 90 minutes, or 60 minutes if the surgery involves the lower limb
- Use of hormone replacement therapy
- Use of oestrogen-containing contraceptive therapy
- Varicose veins with phlebitis

Risk factors for bleeding

Regard patients as being at risk of bleeding if they have any of the following risk factors:

- Active bleeding or a risk of bleeding (for example, stroke and multiple fractures)
- Surgery expected within the next 12–24 hours (depending on the half-life of the anticoagulant used)
- Surgery within the past 48 hours and/or a risk of clinically important bleeding
- Concurrent use of anticoagulants known to increase the risk of bleeding
- Already having therapeutic anticoagulation
- Any spinal intervention (contraindicated for 12–24 hours before or after procedures such as epidural catheter insertion or lumbar puncture, depending on the half-life of the anticoagulant used)
- Uncontrolled systolic hypertension (≥ 180 mmHg)
- New-onset stroke in line with ‘Stroke: diagnosis and management of acute stroke and transient attack (TIA)’ (NICE clinical guideline 68)

NB The hospital risk assessment charts have differences to the above. The hospital chart should still be used as a guide, although clinical judgement should be exercised over an individual patient’s risk.

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Introduction

Thromboprophylaxis is still very controversial in orthopaedics despite many trials on the subject. There is little doubt that prophylaxis for venous thrombosis is required in orthopaedic patients undergoing major operations such as lower limb joint replacement. The controversy lies in whether the use of *pharmacological* prophylaxis is mandatory or whether the risk of complications from anticoagulation (i.e. bleeding) outweighs the benefits.

Background

The two most important outcome measures are fatal pulmonary embolism and chronic venous ulceration following DVT. Few papers consider these endpoints.

BROAD RECOMMENDATIONS

Our Practice is based on the following NICE Recommendations

1. Hip and knee replacement patients should be enrolled on the National Joint Register
2. All patients should receive a Patient Information Leaflet
3. All inpatients should be assessed for risk of bleeding before offering pharmacological VTE prophylaxis. Do not offer pharmacological VTE prophylaxis to patients with any of the risk factors for bleeding unless the risk of VTE outweighs the risk of bleeding
4. All inpatients should be re-assessed for risk of bleeding and VTE within 24 hours of admission, regularly thereafter and whenever the clinical situation changes, to:
   - ensure that appropriate methods of VTE prophylaxis are used
   - ensure that VTE prophylaxis is being used correctly
   - identify adverse events resulting from VTE prophylaxis
5. Encourage patients to mobilise as soon as possible
6. Offer combined VTE prophylaxis with mechanical methods (such as anti-embolism stockings, intermittent pneumatic compression devices or foot impulse devices) and either LMWH or UFH to patients having surgery who are assessed to be at increased risk of VTE

7. **MAJOR TRAUMA** offer VTE prophylaxis only when the benefits of reducing the risk of VTE outweigh the risks of bleeding (see box). Regularly reassess the patient's risks of VTE and bleeding.
   - Offer combined VTE prophylaxis with mechanical and pharmacological methods to patients with major trauma, based on clinical judgement
   - Start mechanical VTE prophylaxis at admission or as early as clinically possible and continue until the patient is no longer significantly immobile. Use one of:
     a. Anti-embolism stockings (BEWARE COMPARTMENT PRESSURE SYNDROME)
     b. Foot impulse devices
     c. Intermittent pneumatic compression devices

- When the patient's risk of bleeding (see box) has been established as low, add pharmacological VTE prophylaxis and continue until the patient is no longer significantly immobile. Use one of:
  a. Fondaparinux sodium (NOT on NNUH formulary)
  b. LMWH
  c. UFH

8. **ELECTIVE HIP REPLACEMENT** offer combined VTE prophylaxis with mechanical and
   pharmacological methods:
   - Start mechanical VTE prophylaxis at admission and continue until discharge or until the patient is no longer significantly immobile. Use one of:
     a. Anti-embolism stockings
     b. Foot impulse devices
     c. Intermittent pneumatic compression devices
   - Provided there are no contraindications, start pharmacological VTE prophylaxis after surgery and continue for 28–35 days. Use one of:
     a. Dabigatran or Rivaroxaban
     b. Fondaparinux sodium (starting 6–12 hours after surgery) (NOT on NNUH formulary – D&T approval needed on named patient basis)
     c. LMWH (starting 6–12 hours after surgery)
     d. UFH (starting 6–12 hours after surgery)

9. **ELECTIVE KNEE REPLACEMENT** offer combined VTE prophylaxis with mechanical and pharmacological methods:
   - Start mechanical VTE prophylaxis at admission and continue until discharge or until the patient is no longer significantly immobile. Use one of:
     a. Anti-embolism stockings
     b. Foot impulse devices
     c. Intermittent pneumatic compression devices.
   - Provided there are no contraindications, start pharmacological VTE prophylaxis after surgery and continue for 10–14 days. Use one of:
     a. Dabigatran or Rivaroxaban
     b. Fondaparinux sodium (starting 6–12 hours after surgery) (NOT on NNUH formulary – D&T approval needed on named patient basis)
     c. LMWH (starting 6–12 hours after surgery)
     d. UFH (starting 6–12 hours after surgery)

10. **FRACTURED FEMORAL NECK** having offer combined VTE prophylaxis with mechanical and pharmacological methods.
    - Start mechanical VTE prophylaxis at admission and continue until discharge or until the patient is no longer significantly immobile. Use one of:
      a. Anti-embolism stockings
      b. Foot impulse devices
      c. Intermittent pneumatic compression devices.

- Provided there are no contraindications, provide pharmacological VTE prophylaxis for 28–35 days. Use one of:
  a. Fondaparinux sodium, provided there is no increased risk of bleeding starting 6–12 hours after surgery (NOT on NNUH formulary)
  b. LMWH or UFH, starting at admission, stopping 12 hours before surgery and restarting 6–12 hours after surgery
- Fondaparinux sodium is not recommended for use preoperatively for patients having surgery for fracture of the proximal femur. If it has been used preoperatively it should be stopped 24 hours before surgery and restarted 6–12 hours postoperatively, provided there is no increased risk of bleeding

11. **OTHER ORTHOPAEDIC OPERATIONS** in patients having orthopaedic surgery (other than hip replacement, knee replacement and surgery for fracture of the proximal femur) who are assessed to be at increased risk of VTE offer combined VTE prophylaxis with mechanical and pharmacological methods.
    - Start mechanical VTE prophylaxis at admission and continue until discharge, plaster cast removal (if applicable) or until the patient is no longer significantly immobile. Use one of:
      a. Anti-embolism stockings
      b. Foot impulse devices
      c. Intermittent pneumatic compression devices.
    - Start pharmacological VTE prophylaxis 6–12 hours after surgery and continue until discharge, plaster cast removal (if applicable) or the patient is no longer significantly immobile. Use either LMWH or fondaparinux (latter NOT on NNUH formulary)

12. Offer patients who are assessed to be at risk of VTE and for whom pharmacological VTE prophylaxis is contraindicated one of the following:
    a. Thigh-length anti-embolism stockings.
    b. Knee-length stockings may be substituted if thigh-length stockings are unsuitable for reasons of fit, adherence or surgical site.
    c. Foot impulse devices intermittent pneumatic compression devices

13. All patients should have a discussion with the consenting surgeon as to the appropriate prophylaxis for their needs:
    Before starting VTE prophylaxis, offer patients verbal and written information on:
    - the risks and possible consequences of VTE
    - the importance of VTE prophylaxis and its possible side effects
    - the correct use of VTE prophylaxis (for example, anti-embolism stockings, intermittent pneumatic compression devices or foot impulse devices)

    This should be recorded in the notes.

14. As part of the discharge plan, offer patients verbal and written information on:
    - The signs and symptoms of deep vein thrombosis and pulmonary embolism
    - The correct use of VTE prophylaxis at home (if discharged with prophylaxis)

- The implications of not using VTE prophylaxis correctly (if discharged with prophylaxis)
- The signs and symptoms of adverse events related to VTE prophylaxis (if discharged with prophylaxis)
- The importance of seeking medical help if deep vein thrombosis, pulmonary embolism or other adverse events are suspected.

Pharmacological prophylaxis and regional anaesthesia

Disordered clotting and anticoagulation increase the risk of vertebral canal haematoma in patients undergoing regional anaesthesia (spinal/epidural). Although the risk of this occurring is extremely low, permanent neurological damage can result if it is not diagnosed and treated within 8 hours.
See Trust guideline CA2031 Regional anaesthesia in patients receiving venous thromboprophylaxis with antocoagulant and antiplatelet drugs for details.

Warfarin

The INR should be 1.5 or less before spinal/epidural insertion or epidural catheter removal. The INR should not exceed 1.5 whilst the patient has an in-dwelling epidural catheter.

Other Drugs with Anticoagulant Activity

Aspirin and non steroidal anti-inflammatory agents do not appear to increase the risk of vertebral canal haematoma if used alone, however extra vigilance is required if combined with heparin or warfarin.

The risks associated with the ADP receptor antagonists (clopidogrel) or Gp IIb/IIIa antagonists are unknown. Regional anaesthesia should be used with extreme caution and the patients carefully monitored.

Monitoring

All patients should be observed for at least 12 hours following regional anaesthesia (including epidural catheter removal) for the new onset of any of the following signs of spinal cord compression:

Severe back pain
Bladder/bowel dysfunction
Motor loss
Sensory loss

The on-call anaesthetist should be contacted immediately (bleep 0900) if any of these signs develop.

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Clinical audit standards

- All patients should undergo a Thrombosis Risk Assessment, as documented on the NNUH drug chart, on admission to hospital. Audit of compliance with this standard to be carried out at least annually.
- Tinzaparin 4500 iu od should be prescribed for those patients in whom it is indicated (and not contraindicated) according to the Thrombosis Risk Assessment. Audit of compliance with this standard to be carried out at least annually.
- Mechanical thromboprophylaxis should be prescribed for those patients in whom it is indicated (and not contraindicated) according to the Thrombosis Risk Assessment. Audit of compliance with this standard to be carried out at least annually.

Summary of development and consultation process undertaken.

The guideline has been drafted by the author listed above on behalf of the Trauma & Orthopaedic Department. The details of thromboprophylaxis were reviewed at a series of clinical governance meetings. The Haemostasis Committee and the Department of Anaesthesia have reviewed the draft. The orthopaedic consultant staff have approved the final draft.

Distribution list/ dissemination method

To be sent to all medical nursing and allied professions working in the Department of Orthopaedics, with copies displayed in all inpatient clinical areas. Each inpatient to have the score sheet filed (or added to pathways documentation), completed and signed by the medical staff.

The guidelines to be incorporated onto the trust intranet.

References / source documents

Warwick D, Dahl OE, Fisher WD. Orthopaedic thromboprophylaxis: limitations of current guidelines. *J Bone Joint Surg [Br]* 2008; 90-B: 127-132.
http://www.nice.org.uk/Guidance/CG46
http://www.sign.ac.uk/pdf/sign62.pdf
http://www.aaos.org/research/guidelines/PEguide.asp

Published guidelines

There are three published guidelines that are relevant; NICE (National Institute for Health and Clinical Excellence) SIGN (Scottish Intercollegiate Guidelines Network), and AAOS (American Academy of Orthopaedic Surgeons). The original NICE committee had only

one orthopaedic representative and there is an orthopaedic subcommittee currently reviewing the recommendations. The AAOS only comments on hip and knee arthroplasty, but this and SIGN had significant input from orthopaedic surgeons. SIGN differs from other guidelines by recommending aspirin. Although heparins are better at reducing asymptomatic DVTs, aspirin is as effective at reducing the risk of fatal pulmonary embolism (risk of occurrence 0.4%).

Summary of published recommendations other than NICE

Scottish Intercollegiate Guidelines Network
Recommend:
Total hip or knee replacement:
Drug therapy

- Aspirin 150 mg/d for 35 days
- or LMWH for 7 to 15 days (4 weeks in high risk)
- or warfarin (INR 2.0 to 3.0)

Mechanical devices including TED stockings

Fractured Neck of femur
Surgery within 24 hours
Mechanical devices (NOT TED stockings)
Drug therapy

- Aspirin 150 mg/d for 35 days.
- LMHW for high-risk patients where aspirin and mechanical prophylaxis contra-indicated

Knee arthroscopy
None

Trauma (Spinal cord injury, multiple trauma, major lower limb fractures)
LMWH unless contra-indicated

At present there is no evidence that any prophylactic method reduces clinical DVT or mortality in trauma patients NB Plaster casts.

American Academy of Orthopaedic Surgeons

Hip and knee replacement
No difference between systemic interventions (LMWH, fondaparinux [not on NNUH formulary] and warfarin) and mechanical devices or aspirin alone.