Policy Directive

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Prevention of Venous Thromboembolism

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Summary To ensure routine venous thromboembolism (VTE) risk assessment is undertaken on all admitted adult patients and that patients identified at risk of developing a VTE receive appropriate mechanical and pharmacological prophylaxis.

Replaces Doc. No. Venothromboembolism (VTE) surgical and medical management posters and booklet [GL2008_014]

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Applies to Area Health Services/Chief Executive Governed Statutory Health Corporation, Board Governed Statutory Health Corporations, Affiliated Health Organisations, Affiliated Health Organisations - Declared, Public Health System Support Division, Dental Schools and Clinics, Government Medical Officers, Public Health Units, Public Hospitals

Audience Hospital administration, clinical governance, all clinical staff, nursing, allied health, pharmacy

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PREVENTION OF VENOUS THROMBOEMBOLISM

PURPOSE

To ensure routine venous thromboembolism (VTE) risk assessment is undertaken on all admitted adult patients and that patients identified at risk of developing a VTE receive appropriate mechanical and pharmacological prophylaxis.

MANDATORY REQUIREMENTS

- All adult patients admitted to NSW public hospitals must be assessed for risk of VTE.
- Patients identified at risk of VTE should receive preventive measures most appropriate to that risk and their clinical condition.
- All Public Health Organisations should have in place a mechanism for VTE risk assessment with decision support tools to guide prescription of prophylaxis appropriate for the patient's risk classification.
- All health services must monitor compliance with the Prevention of VTE Policy Directive and act on the results.

IMPLEMENTATION

NSW Department of Health

- Provides the mandatory requirements, standards and tools to support implementation of this policy.
- Evaluate implementation of policy by Public Health Organisations.
- Collect, collate and discuss audit results with Public Health Organisations as part of performance monitoring processes.

Chief Executives

- Assign responsibility and resources to ensure adult inpatients are assessed for VTE risk with those found to be at risk provided with appropriate prophylaxis.

Directors of Clinical Governance

- Ensure formulary management includes availability of medications recommended for VTE prophylaxis.
- Ensure systems are in place to monitor compliance with VTE risk assessment and prophylaxis and to report the results to the relevant local and State committees.

Director of Clinical Operations, Hospital, Facility and Clinical Network Managers

- Ensure all staff receive education regarding VTE prophylaxis.
- Distribute VTE risk assessment and prophylaxis decision support tools to all clinical units.
- Include compliance review in routine clinical audit programs
- Data on indicators for VTE will be advised and should be collected at clinical audit [1, 2] and provided, as required to:-
    - the Department of Health for state wide performance and compliance monitoring and
    - Clinical Department Heads to support local improvement strategies.
    - case review of patients developing a VTE that occurs during, or as a result of, a hospital admission.

- ensure each clinical unit regularly reviews their VTE data and develops strategies towards improving prophylaxis where required.

Attending Medical Officer

- Demonstrate leadership in improving and standardising clinical practice in relation to VTE management.
- Ensure VTE risk assessment is performed on all adult admitted patients.
- Review the patient's related bleeding risk and based on that assessment, ensure prescription and administration of appropriate prophylaxis as required.
- Discuss the reason for treatment, risks and consequences of VTE prophylaxis with the patient on admission and on transfer to community or home care where required.
- Document VTE risk assessment and prophylaxis treatment including any relevant dosage adjustment in the patient's health care record.
- Confirm appropriate peri-operative prescription of both pharmacological and mechanical prophylaxis where indicated.
- Ensure regular review of VTE risk is performed during the patient care episode and prophylaxis monitored and adjusted accordingly.
- Ensure clinical specialty protocols include VTE prophylaxis where appropriate.

REVISION HISTORY

Version	Approved by	Amendment notes
December 2010 (PD2010_077)	Deputy Director-General Health System Quality Performance and Innovation	New policy replacing GL2008_014.
September 2008 (GL2008_014)	Director-General	New guideline

ATTACHMENTS

1. Prevention of Venous Thromboembolism Policy Standard

ASSOCIATED DOCUMENTS

Australian Government National Health and Medical Research Council (NHMRC) Clinical Practice Guideline for the prevention of venous thromboembolism in patients admitted to Australian Hospitals 2009. http://www.nhmrc.gov.au/publications/synopses/cp115syn.htm

Consumer Medicines Information (CMI) https://www.ebs.tga.gov.au/

REFERENCES

[1] Indicators for Quality Use of Medicines in Australian Hospitals, NSW TAG, CEC Aug 2007
[2] Medication Safety Self Assessment for Antithrombotic Therapy in Australian Hospitals NSW TAG, CEC 2007

Prevention of Venous Thromboembolism

NSW HEALTH
POLICY STANDARD

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CONTENTS

1 BACKGROUND

Venous thromboembolism (VTE) includes deep venous thrombosis (DVT) and pulmonary embolism (PE) and is a significant potential health complication for hospitalised patients. Serious adverse outcomes may occur, including an increased risk of recurrent thrombosis, morbidity from post-thrombotic syndrome or death.

The risk of developing VTE depends on the patient's background risk factors and upon the condition or procedure for which the patient is admitted. Effective prophylaxis will be achieved through assessment of risk factors and existing medical conditions with application of appropriate drug therapy and/or mechanical devices. This Standard guides the assessment of risks and strategies to reduce the risk of VTE with provision of VTE prophylaxis.

While there is significant evidence reviewed in the National Health and Medical Research Council clinical guidelines on VTE[1], there is no current national consensus on risk assessment status, preferred pharmacological prophylaxis or treatment regimens. This policy requires Attending Medical Officers and their teams to review all adult patients for risk of VTE and, based on their assessment of the evidence, prescribe prophylaxis accordingly, noting reasons in the patient health care record. To provide additional support for clinicians in this process the Department will be working with the Agency for Clinical Innovation, the Clinical Excellence Commission and Public Health Organisations to develop specific locally agreed protocols.

1.1 KEY DEFINITIONS

Anticoagulant	Any agent used to prevent the formation of blood clots. These include oral agents, such as warfarin, and others which are injected into the vein or under the skin, such as heparin.
Attending Medical Officer (AMO)	The Attending Medical Officer (AMO) is the senior medical practitioner who has primary responsibility for the patient during admission. This medical officer is a consultant who may be a visiting medical officer or a staff specialist. The AMO may lead a team that includes related medical officers and this team plays a critical role in the assessment and treatment for VTE.
***Creatinine Clearance* (CrCl)**	The volume of serum or plasma that would be cleared of creatinine by excretion of urine over one minute. A measured or calculated renal function test.
***Deep Vein Thrombosis* (DVT)**	A blood clot that occurs in the "deep veins" in the legs, thighs or pelvis. ***Asymptomatic deep vein thrombosis*** is defined as painless DVT detected only by screening with fibrinogen scanning, ultrasound, or ascending venography and is often confined to the distal veins. ***Symptomatic deep vein thrombosis*** results from occlusion of a major leg vein and results in leg pain or swelling. It requires specific investigation and treatment which in hospitalised patients may delay discharge, or require readmission to hospital.
Foot Impulse Device (FID)	The foot impulse device is designed to stimulate the leg veins (venous pump) artificially by compressing the venous plexus and mimicking normal walking and reducing stasis in immobilised patients. Other names for this method of mechanical VTE prophylaxis include: foot impulse technology (FIT) or venous foot pump (VFP).
Graduated Compression Stockings (GCS)	Stockings constructed to provide graduated compression by putting pressure on the leg muscles to squeeze the vein valves, improving the flow of blood back to the heart. Compression is firmest at the ankle and gradually reduces as the distance from the ankle increases. GCS are indicated to treat and prevent various types of vein disease including blood clots (DVTs) in ambulatory

	patients. The stockings are used to help prevent varicose veins, vein deterioration, oedema and ulcers and can be worn as travel socks. Another type of GCS is **T**hrombo **E**mbolic **D**eterrent (TED) stockings or anti-embolism stockings indicated to help prevent blood clots in bedridden or non-ambulatory patients.
Intermittent pneumatic compression (IPC)	A mechanical method of VTE prophylaxis that comprises the use of inflatable garments wrapped around the legs inflated by a pneumatic pump. The pump provides intermittent cycles of compressed air which alternatively inflate and deflate the chamber garments, enhancing venous return.
Low Molecular Weight Heparins (LMWH)	Group of anticoagulant drugs termed the Low Molecular Weight Heparins (LMWH) e.g. enoxaparin sodium, dalteparin sodium.
Must	Indicates a mandatory action requiring compliance
Prescriber	A health professional legally entitled to prescribe medicines according to prevailing State Poisons and Therapeutic Goods Act and Regulations.
Pulmonary embolism (PE)	A blood clot that breaks off from the deep veins and travels around the circulation to block the pulmonary arteries (arteries in the lung). Most deaths arising from deep vein thrombosis are caused by pulmonary emboli. *(Plural = pulmonary emboli)*
Should	Indicates a recommended action that should be followed unless there are sound reasons for taking a different course of action.
Thrombo Embolic Deterrent (TED) stockings	A type of compression stocking sometimes called anti-embolism stockings indicated to help prevent blood clots in bedridden or non-ambulatory patients.
Thromboprophylaxis	Measures taken to assist in reduction of the risk of thrombosis.
Venous Thromboembolism (VTE)	The blocking of a blood vessel by a blood clot dislodged from the site of origin. Includes both deep vein thrombosis and pulmonary embolism.
Venous thrombosis	A condition in which a blood clot (thrombus) forms in a vein.

2 VENOUS THROMBOEMBOLISM PREVENTION

2.1 Risk Assessment and Treatment

For all patients, first assess the level of mobility[2] then follow the steps below (see also **Appendix 1**)[3]*:*

Step 1 Assess baseline risk

Step 2 Assess additional risks posed by hospitalisation or illness

Step 3a Assess risk of bleeding or contraindication to pharmacological prophylaxis

Step 3b Assess any contraindication to mechanical prophylaxis

Step 4 Formulate overall risk assessment (consider risk of prophylaxis against benefit).

Decide if VTE prophylaxis is required.

Step 5 Select the form of prophylaxis to be used based on the risk assessment

Inform patient/carer of the VTE prophylaxis measures to be undertaken

Step 6 Reassess prophylaxis regularly and if condition changes

Note further information to assist in selecting the type of prophylaxis is available in *Prevention of Venous thromboembolism in patients admitted to Australian hospitals, NHMRC Guideline Summary*

Appendix 2 and in *NHMRC Summary of Availability of Evidence for Use of Thromboprophylactic Agents by Clinical Category,* **Appendix 3**

2.2 Reducing the Risk of VTE

- To assist in reducing risk of VTE, commence prophylaxis as early as possible during the patient's admission or commence as scheduled after immediate care and risk assessment is carried out. Emergency Department clinicians should commence risk assessment and prophylaxis when the patient will not be seen by the in-patient team/consultant until the next day.
- Prior to planned surgery, medical officers must assess the risks and benefits of stopping pre-existing, established anticoagulation or anti-platelet therapy before discontinuing these therapies.
- Medical officers should review current evidence (including risks of unplanned pregnancy vs benefit of prevention of VTE) to determine whether patients, prior to, or during admission, should discontinue oestrogen-containing oral contraceptives or hormone replacement therapy if clinically appropriate. In the case of oestrogen-containing oral contraceptives, these risks should be communicated to the patient and if it is thought appropriate to stop oral contraceptives, adequate alternative contraception should be arranged until oral contraceptives are restarted.[4]
- Prophylaxis should be considered for day surgery patients based on evidence in situations of significantly reduced mobility, prolonged anaesthesia and for patients demonstrating one or more other risk factors. (refer for example to NHMRC guidance)[5]
- Risk assessment must be undertaken for both medical and surgical patients who have significantly reduced mobility for three days or longer or are expected to have ongoing reduced mobility relative to their normal state and have one or more risk factors.[6]
- Patients must remain adequately hydrated and must be encouraged to mobilise as soon as possible and to continue being mobile post discharge.[7]
- After the initial risk assessment, reassess the patient's risk of bleeding and of VTE regularly as clinically appropriate and if clinical condition changes[8] (e.g. unplanned surgery, changes in mobility) 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.

2.3 Anaesthesia and VTE Risk

The type of anaesthesia a patient receives has been identified as impacting on risk of VTE. Patients receiving regional anaesthesia (also referred to as central neural blockade), have significantly lower rates of DVT compared with those receiving general anaesthesia. As for all surgery (but particularly if central neural blockade is used), timing of pharmacological prophylaxis should be carefully planned with the anaesthetist to minimise the risk of developing an epidural haematoma.[9]

2.4 Prophylaxis

There are two types of prophylaxis, pharmacological and mechanical.

2.5 Pharmacological Prophylaxis

VTE prophylaxis agents may consist of:

- heparin or heparin-like substances in the following categories:
  - unfractionated heparin
  - low molecular weight heparins (e.g. enoxaparin, dalteparin),
  - factor Xa inhibitors (e.g. rivaroxaban, fondaparinux),
  - direct thrombin inhibitors, (e.g. dabigatran)
- Heparinoids
  - danaparoid

- selective thombin inhibitors (e.g. lepirudin)

- Based on evidence, for patients with heparin sensitivity or diagnosed as having heparin-induced thrombocytopenia (HIT), the heparin and heparin-like agents should generally be avoided and a heparinoid (e.g. danaparoid) or a selective thrombin inhibitor (e.g. lepirudin) substituted.[10] (See Contraindications 2.5.3)

- These drugs are recommended to be continued until the patient is mobile or transferred to home or other care setting. Pharmacological prophylaxis may need to be continued beyond the hospital stay, particularly in the case of joint replacement surgery (hip and knee).

- The choice of drug to use must be informed by evidence, (eg NHMRC guidelines); a clinical specialty protocol, as well as reference to drugs available on the hospital formulary.

- The risk of bleeding related to surgery is the main complication of pharmacological prophylaxis.

2.5.1 Individualising the Dose of Pharmacological Prophylaxis

Note: Some agents are contraindicated or require a reduction of dose in elderly patients or those with renal impairment

Prescribers should refer to current product information to select a safe dose for individual patients, taking care to select the dose recommended for prophylaxis and not the dose recommended for therapeutic anticoagulation.

Obese patients (body mass index >30kg/m^2) may have increased risk of VTE[11] and pharmacological prophylaxis doses chosen should be based on lean body weight calculated using the patient's height.

Lean body weight: Females 45.5 kg + 0.9 kg/cm for each cm >152 cm. Males 50 kg + 0.9 kg/cm for each cm >152 cm.[12]

2.5.2 Drug Interactions

Many drugs, including anticoagulants (eg warfarin), anti-platelet agents, selective and non-selective non-steroidal anti-inflammatory drugs and antithrombotic agents may interact with prophylactic agents to increase the risk of bleeding.[13] Decisions about appropriate concomitant use of these medications for VTE prophylaxis should be made on an individual patient basis in consultation with the Attending Medical Officer.

2.5.3 Contraindications to Pharmacological Prophylaxis

Patients having a risk of bleeding must not be treated with pharmacological VTE prophylaxis unless the AMO has assessed the risk of VTE to outweigh the risk of bleeding and this assessment is noted in the patient's health care record.

Additional contraindications beyond bleeding risk identified by the NHMRC may include[14]:

- Known hypersensitivity to agents used in pharmacological prophylaxis
- History of, or current, heparin-induced thrombocytopenia
- Creatinine clearance <30mL/minute

Medical officers should review patients receiving low dose aspirin for prevention or treatment of cardiovascular disease to determine continued therapy.

Where pharmacological prophylaxis is contraindicated, mechanical prophylaxis remains an option and should be considered, as indicated, until the patient is mobile.

2.6 Mechanical Prophylaxis

The following may be used as indicated:

- Graduated Compression Stockings (GCS) for ambulant patients or Thrombo Embolic Deterrent Stockings (TEDS) for immobile patients.
- Intermittent pneumatic compression (IPC) or foot impulse devices (FID)
- Intravascular filtration

Local protocols should guide the use of foot impulse devices (FIDs).

2.6.1 Graduated Compression Stockings and Compression Devices

- For surgical patients, thromboembolic deterrent stockings (TEDs) with appropriate pharmacological prophylaxis are usually provided until the patient is fully mobile. If pharmacological prophylaxis is contraindicated, the most appropriate mechanical device available (e.g. intermittent pneumatic compression (IPC) or foot impulse devices (FID) should be used until the patient is mobile.
- All stockings must be fitted and worn correctly according to the manufacturer's recommendations.
- It should be noted that graduated compression stockings may increase the risk of falls in mobilising patients. Patients should be instructed to wear appropriate non-slip footwear.
- Stockings must be removed daily to assess skin condition and perfusion and to provide skin care.

2.6.2 Contraindication to Graduated Compression Stockings, Thrombo Embolic Deterrent stockings/Devices

Compression stockings may be contraindicated in patients with:

- morbid obesity where correct fitting cannot be achieved
- inflammatory conditions of the lower leg
- severe peripheral arterial disease
- diabetic neuropathy (there is a risk of injury due to decreased sensation and discomfort if there is a problem with the fitting).
- severe oedema of the legs
- unusual leg deformity
- allergy to stocking material
- cardiac failure[15]

IPC or FID can exacerbate lower limb ischemic disease and are contraindicated in patients with peripheral arterial disease or arterial ulcers.[16] IPC is contraindicated in acute lower limb DVT. The NHMRC notes that a recent study provides no evidence to support the routine use of graduated compression stockings (GCSs or TEDs) in immobile, hospitalised patients following acute stroke.[17]

2.6.3 Complications of Mechanical Prophylaxis

Incorrect fitting may result in bunching of the stockings resulting in leg ulceration, pressure ulcers, slipping and falling on mobilisation.[18]

2.6.4 Intravascular Filtration

In exceptional circumstances, an Inferior Vena Cava filter (IVC) filter may be implanted into the inferior vena cava or other major blood vessel to prevent fatal pulmonary emboli in the event that anticoagulation prophylaxis is contraindicated.

2.7 Peri-operative Management of Patients Receiving Regular Anticoagulation

For major surgery an important consideration is the timing of stopping and restarting regular anticoagulants (eg warfarin), and the timing of prescription of pharmacological prophylaxis to bridge anticoagulation therapy for peri-operative patients. As an example after warfarin therapy is discontinued, it takes several days for the antithrombotic effect to recede. When warfarin is re-commenced, several days are required to reach therapeutic anticoagulation levels.

There is no current consensus on the appropriate peri-operative management of anticoagulation. Attending Medical Officers should review current evidence prior to planning treatment.

Attending Medical Officers should review current evidence regarding continuation of regular anticoagulants or antiplatelet therapy where only minor procedures (including dental) are planned.[19]

2.8 Documentation of Risk Assessment and Prophylaxis

After risk assessment has been completed and documented in the patient's health care record, pharmacological and/or mechanical prophylaxis must be scheduled and prescribed if the person is assessed as at risk where benefit outweighs risk.

All patients who present on admission with a VTE resulting from a previous hospitalisation or who develop a VTE during hospitalisation must have the incident documented in the patient's health care record. When a treatment decision has been made, medical practitioners must also document that the patient has received an explanation of risks and benefits of prophylaxis.

2.9 Reporting, Monitoring and Clinical Audit

Risk assessment and planned prophylaxis must be documented in the patient's health care record along with reviews and observations related to VTE prevention. Any significant unexpected change in a patient's condition relating to VTE prophylaxis including embolism and bleeding, should be considered an adverse event and be recorded in the incident monitoring system with the appropriate level of investigation initiated.

VTE incidents are to be reviewed with other clinical indicators and any incidents are to be included as part of the existing hospital morbidity and mortality review process.[20, 21]

2.10 Education

2.10.1 Staff Education

Clinical staff should be provided with education on VTE prophylaxis.

The NHMRC have a number of resources available for staff on their website http://www.nhmrc.gov.au/nics

2.10.2 Patient/Carer Information

Patients, carers and their families must be informed about signs and symptoms of VTE, risk factors specific to the patient's condition and effective interventions to reduce the risk of VTE developing. Patient information highlighting the risk of developing a blood clot in hospital should be available.

(e.g. http://www.healthinsite.gov.au/topics/Thrombosis , http://hcd2.bupa.co.uk/fact_sheets/html/Deep_Vein_Thrombosis.html)

Information about the pharmacological agent used must also be provided. *(eg Consumer Medicines Information (CMI)* https://www.ebs.tga.gov.au/).[22]

2.11 Continuity of Care

Attending Medical Officers must ensure development of a prospective action plan for patients requiring continuation of prophylaxis on transfer home or to another care level. The plan is to be communicated in a timely manner to the patient's care provider. This is particularly important when patients are transferred into community or residential aged care.

The recommended duration of pharmacological prophylaxis will vary depending on the patient's medical status. When determining the duration of prophylaxis, consideration should be given to the patient's mobility status and the clinical evidence related to their specific condition – see Appendix 2 for recommended duration.

Clinicians must comply with key principles for clinical handover (Policy Directive PD2009_060) with special regard to VTE prophylaxis treatment at all transition points including transfer home or to another facility.

On transfer to home or other setting, a patient's supplies of prophylactic medication should be arranged to enable uninterrupted treatment. Referral to another care model should be arranged including assurance of follow-up and continuity of supply as needed. Patients should understand the reason for ongoing treatment and the anticipated timeframe for discontinuation of the treatment. Patients must receive education on administration of treatment as needed and be encouraged to mobilise.

3 LIST OF ATTACHMENTS

Appendix 1: Sample risk assessment checklist for venous thromboembolism [23]
Appendix 2: NHMRC Prevention of Venous Thromboembolism in patients admitted to Australian hospitals – NHMRC Guideline Summary[24]
Appendix 3: NHMRC Summary of Availability of Evidence for Use of Thromboprophylactic Agents by Clinical Category[25]

4 REFERENCES

[1] *Australian Government National Health and Medical Research Council (NHMRC) Clinical Practice Guideline for the prevention of venous thromboembolism in patients admitted to Australian Hospitals 2009* *http://www.nhmrc.gov.au/publications/synopses/cp115syn.htm*
[2] National Institute for Health and Clinical Excellence (NICE) Guidelines January 2010 p 7 at: http://www.nice.org.uk/ (Accessed 15 July 2010)
[3] Ibid (2), NHMRC Guideline Summary Tool
[4] Scottish Guidelines Clearing House: http://www.sign.ac.uk/guidelines/fulltext/62/section10.html
[5] Ibid (1) p 21
[6] Ibid (2) p 3,7
[7] Ibid (2) p 4
[8] Ibid (2) p 4, 12-15
[9] Ibid (1) p 77
[10] Warkentin TE, Greinacher A, Koster A, Lincoff AM. Treatment and Prevention of Heparin-Induced Thrombocytopenia: American College of Chest Physicians Evidence-Based Clinical Practice guidelines (8th Edition) Chest 2008; 133(6_suppl):340S-80S.
[11] Hill J, Treasure T. Reducing the risk of venous thromboembolism in patients admitted to hospital: summary of NICE guidance. National Clinical Guideline Centre for Acute and Chronic Conditions BMJ Vol. 340 30 Jan 2010.
[12] eTherapeutic Guidelines - Ideal body weight calculator eTG complete
[13] Ibid (2) p 11
[14] Ibid (1) p 18
[15] Ibid (1) p 19
[16] Ibid (1) p 19
[17] Ibid (1) p 81
[18] Ibid (1) p 19
[19] Myths of dental surgery in patients receiving anticoagulant therapy. J Am Dent Assoc, Vol 131, No 1, 77-81. Whal MJ. © 2000 American Dental Association
[20] Indicators for Quality Use of Medicines in Australian Hospitals, NSW TAG, CEC Aug 2007
[21] Medication Safety Self Assessment for Antithrombotic Therapy in Australian Hospitals NSW TAG, CEC 2007
[22] Australian Register of Therapeutic Goods – Medicines Registered Product Information https://www.ebs.tga.gov.au/ebs/ANZTPAR/PublicWeb.nsf/cuMedicines?OpenView
[23] Department of Health e-VTE Programme in partnership with the NHS and Professional Bodies http://e-lfh.org.uk/projects/vte/launch (Accessed 15 July 2010).
[24] NHMRC Guideline Summary Tool
[25] Ibid (1) p 25

Appendix 1 Risk Assessment Check List for Venous Thromboembolism (VTE)

How To Read This Tool:

All patients should have their risk of VTE assessed on admission to hospital. Reassessment must be undertaken whenever the clinical situation changes.

These lists are not exhaustive

Assess all patients admitted to hospital for level of mobility (Tick 1 box for each patient):

FIRST **Assess mobility**	**Tick 1 box**
Medical patient NOT expected to have significantly reduced mobility relative to normal state	
If ticked, risk assessment complete – no preventive action necessary	
Surgical patient	
Medical patient expected to have ongoing REDUCED MOBILITY relative to normal state	
If either ticked, continue to Step (1) to assess	

Any Tick in Steps 1 or 2 : Thromboprophylaxis to be considered according to this policy.

Step (1) Assess baseline risk of VTE	**Tick any**
Age (incidence rises with each decade over age 40)	
Pregnancy & the puerperium	
Active or occult malignancy	
Previous VTE	
Varicose veins	
Marked obesity	
Prolonged severe immobility (bed rest, plaster cast or travel with limited movement and venous stasis	
Oestrogen-containing hormone replacement therapy or oral contraceptive	
Inherited or acquired thrombophilia: inheritied deficiency of antithrombinprotein C or protein S, homozygosity or double heterozygosity for factor V Leiden the G20120 Aprothrombin gene mutation	
Phospholipid antibody syndrome	

Any Tick in Steps 1 or 2 : Thromboprophylaxis to be considered according to this policy.

Step (2) Assess additional risk of VTE	**Tick any**
Dehydration	
Surgery, any but especially:	
Major joint surgery	
Curative surgery for cancer	
Abdominal	
Pelvic	
Thoracic	
Orthopaedic	
Leg injury requiring surgery or prolonged immobilisation	
Prolonged surgery and/or prolonged immobility	
General anaesthesia (vs regional anaesthesia)	
Medical conditions:	
Acute/acute - on chronic chest infection	
Heart failure	
Mycocardial infarction	
Stroke with immobility	
Some forms of cancer chemotherapy	
Acute inflammatory bowel disease	

Any Tick in Step 3a : Consider if bleeding risk is sufficient to preclude pharmacological intervention.

Step (3a) Assess risk of bleeding, contraindications to pharmacological prophylaxis	**Tick any**
Current active major bleeding (at least 2 units of blood/ blood products to be transfused in 24 hours)	
Current chronic, clinically significant and measurable bleeding over past 48 hours	
Bleeding disorders (e.g. haemophilia)	
Recent central nervous system bleeding	
Intracranial or spinal lesion	
Abnormal blood coagulation including underlying coagulopathy or coagulation factor abnormalities	
Thrombocytopenia (therapeutic prophylaxis not recommended with platelet count <50,000/microlitre)	
Severe platelet dysfunction	
Active peptic ulcer or active ulcerative gastrointestinal disease	
Obstructive jaundice or cholestasis	
Recent major surgical procedure of high bleeding risk	
Concomitant use of medication that may affect clotting (e.g. anticoagulants, antiplatelet agents, NSAIDs, thromblytics)	
Regional axial anaesthesia or recent lumbar puncture	
High risk of falls - take precautions	

Any Tick in Step 3b : Consider contraindications to mechanical prophylaxis.

Step (3b) Assess any contraindications to mechanical prophylaxis	**Tick any**
Graduated compression stockings may cause reduced blood flow, pressure ulcers or increase the risk of falls, and contraindicated with:	
Morbid obesity that prevents correct fitting of stockings	
Inflammatory conditions of the lower leg	
Severe peripheral arterial disease	
Diabetic neuropathy	
Severe oedema of the legs	
Severe lower limb deformity	
Intermittent pneumatic compression or foot pumps can exacerbate ischemic disease, so are contraindicated with peripheral arterial disease or artierial ulcers.	

Then follow Steps 4 and 5

Step (4) Formulate overall risk assessment
- consider risk of thromboprophylaxis vs benefits
- decide if VTE prophylaxis is required

Document in health care record.

Step (5) Select the form of prophylaxis to be used (unless contraindicated) Consider:
Reason for hospitalisation: see recommendations for patients hospitalised for surgery or medical conditions in NHMRC guidelines (**Appendix 2**) Note choice of agent (**Appendix 3**) Particularly note dose schedule and adjustment if needed.
Type of anaesthesia: Consider central neural blockade as an alternative to general anaesthesia. To minimise the risk of epidural haematoma with central neural blockade, timing of pharmacological thromboprophylaxis should be carefully planned and discussed in advance with the anaesthetist.

Discuss with patient /carer, the VTE prophylaxis measures to be undertaken and the importance of adherence.

Appendix 2 Prevention of Venous thromboembolism in patients admitted to Australian hospitals – NHMRC Guideline summary[22]

Thromboprophylaxis for admitted surgical patients

Anaesthesia	• Consider neuraxial block as an alternative to general anaesthesia if feasible. If neuraxial block is used, there is a risk of developing an epidural haematoma (A) • To minimise the risk of epidural haematoma associated with neuraxial block, timing of pharmacological thromboprophylaxis should be carefully planned and discussed in advance with the anaesthetist (GPP)

Type of surgery	Recommendations (and grade of recommendations)	
	Pharmacological options	**Mechanical options**
Total hip replacement	*Use either:* • LMWH (A) or • Fondaparinux (B) or • Rivaroxaban (B) or • Dabigatran etexilate (B) *For up to 35 days*	• Use GCS or IPC or foot pump (B) whether or not pharmacological prophylaxis is used • If pharmacological prophylaxis is contra-indicated, use GCS and foot pump (B) *Use until fully mobile*
Hip fracture surgery	*Use either:* • Fondaparinux (B) or • LMWH (B). If using LMWH, consider adding low dose aspirin (B) *For up to 35 days*	• If pharmacological prophylaxis is contra-indicated, use foot pump or IPC (C) *Use until fully mobile*
Total knee replacement	*Use either:* • LMWH (A) or • Fondaparinux (B) or • Rivaroxaban (B) or • Dabigatran etexilate (B) *For up to 14 days*	• Use foot pump or IPC (C) whether or not pharmacological prophylaxis is used *Use until fully mobile*
Knee arthroscopy	• Thromboprophylaxis is not recommended unless the patient has additional VTE risk factors (see Step 2, page 1) (C)	• Insufficient evidence; unable to make a recommendation
Lower leg fractures/ injuries with immobilisation in a brace or plaster cast	• LMWH (A) *For the entire period of immobilisation*	• Insufficient evidence; unable to make a recommendation
General surgery	*Use either:* • LMWH (B) or • UFH (B) *For up to one week or until fully mobile*	• Use GCS, whether or not pharmacological prophylaxis is used (B) *Use until fully mobile*
Urological surgery	• Consider thromboprophylaxis based on assessment of the patient's risk of VTE and of bleeding (GPP)	• Inconclusive evidence; unable to make a recommendation
Gynaecological surgery	*Use either:* • LMWH (B) or • UFH (B) *For up to one week or until fully mobile*	• Consider using GCS or other mechanical options, especially if pharmacological prophylaxis is contraindicated (GPP) *Use until fully mobile*
Abdominal surgery	• Use LMWH (B) *For 5–9 days*	• Use GCS, whether or not pharmacological prophylaxis is used (B) *Use until fully mobile*
Cardiac, thoracic and vascular surgery	*Use either:* • LMWH (B) or • UFH (B) *For up to one week or until fully mobile*	• Use GCS or IPC, whether or not pharmacological prophylaxis is used (C) *Use until fully mobile*
Neurosurgery	• Due to high risk of bleeding, use thromboprophylaxis with extreme caution (GPP) • If appropriate and not contraindicated, use LMWH or UFH (B)	• Use IPC, whether or not pharmacological prophylaxis is used (A) • Consider use of GCS (C) *Use until fully mobile*
Trauma and spinal surgery	• Use LMWH, starting 5 days after admission (C) • Do not start thromboprophylaxis until primary haemostasis has been established (GPP) *Use until fully mobile*	• In addition to pharmacological prophylaxis, use foot pump for trauma surgery patients, from admission (C) *Use until fully mobile*
Cancer patients having general, abdominal, pelvic or neurosurgery (see also next category)	• Use LMWH or UFH. In particular, consider risk of bleeding (GPP) *For at least 7–10 days post surgery* • Consider extending the duration of LMWH to 28 days for patients having major abdominal or pelvic surgery for cancer, especially if obese, slow to mobilise or with past history of VTE (GPP)	• Use GCS, if pharmacological prophylaxis is contraindicated (GPP) *Use until fully mobile*
Head and neck cancer patients having head and neck surgery	• Unless other significant VTE risk factors are present (see Step 2, page 1), thromboprophylaxis is **not recommended** (GPP)	• Insufficient evidence; unable to make a recommendation
Caesarean section	• Mobilise promptly post caesarean (GPP) • Use LMWH after caesarean delivery *for 5–7 days post caesarean or until fully mobile* (GPP) • For women with additional risk factors (see Step 2, page 1), extend LMWH or adjusted therapeutic dose warfarin *to six weeks* (GPP)	• Consider using IPC *during and 24 hours after caesarean* (GPP) • Consider using GCS if pharmacological prophylaxis is contraindicated (GPP)

Thromboprophylaxis for admitted medical patients

Medical condition	Recommendations (and grade of recommendations)	
	Pharmacological options	**Mechanical options**
Ischaemic stroke	• Consider LMWH, based on degree of immobility and risk of bleeding (B) • If LMWH is contraindicated or not available, use UFH (B)	• Inconclusive evidence; unable to make a recommendation
Haemorrhagic stroke	• **Do not use** any pharmacological prophylaxis due to the risk of intracranial bleeding (GPP)	• Inconclusive evidence; unable to make a recommendation
Myocardial infarction	• UFH (C), only when full anticoagulation is not in use	• Insufficient evidence; unable to make a recommendation
General medical: • **acute/ acute-on-chronic chest infection** • **heart failure** • **myocardial infarction** • **stroke with immobility** • **some forms of cancer chemo-therapy** • **acute inflammatory bowel disease**	*Use either:* • LMWH or UFH, based on assessment of patient's risk of VTE and bleeding (B)	• Insufficient evidence; unable to make a recommendation
Cancer (non-surgical)	• Use LMWH or UFH (GPP) *From admission until discharge*	• Use GCS, if pharmacological prophylaxis is contraindicated (GPP)
Pregnancy and childbirth (not caesarean – see surgical recommendations)	• Minimise immobilisation and ensure adequate hydration during pregnancy, labour and the puerperium (GPP) • For women with additional VTE risk factors (see Step 2, page 1), use LMWH or adjusted dose warfarin *for six weeks post vaginal delivery* (GPP)	• Consider using GCS if pharmacological prophylaxis is contraindicated or not used (GPP)

NHMRC grading of recommendations

A	Body of evidence can be trusted to guide practice
B	Body of evidence can be trusted to guide practice in most situations
C	Body of evidence provides some support for recommendation(s) but care should be taken in its application
D	Body of evidence is weak and recommendation must be applied with caution
GPP	Good practice point – consensus-based recommendations

Key

LMWH	Low molecular weight heparin
UFH	Unfractionated heparin
GCS	Graduated compression stockings
IPC	Intermittent pneumatic compression

This summary is based on the National Health and Medical Research Council's *Clinical Practice Guideline for the Prevention of Venous Thromboembolism in Patients Admitted to Australian Hospitals.*

This summary and the guideline on which it is based are available for download from **www.nhmrc.gov.au**

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Appendix 3 Summary of availability of evidence for use of thromboprophylactic agents by clinical category – excerpt from NHMRC[23]

✓	Evidence supports use of this agent for thromboprophylaxis for this clinical category
✓±	Evidence supports use of this agent for thromboprophylaxis with or without other thromboprophylactic agents for this clinical category
✓+	Evidence supports use of this agent for thromboprophylaxis only in addition with another thromboprophylactic agent for this clinical category
x	Evidence does not support use of this agent for thromboprophylaxis for this clinical category
x	This agent is not recommended for this clinical category
–	There is no conclusive level I or level II evidence available about this form of thromboprophylaxis for this clinical category

	UFH	LMWH	HEPARINOID	RIVAROXABAN	DABIGATRAN	FONDAPARINUX	WARFARIN	ASPIRIN	GCS	IPC	FOOT PUMP	REGIONAL ANAESTHESIA
Total hip replacement	x	✓	✓	✓	✓	✓	x	x	✓±	✓	✓ use with GCS	✓
Hip fracture surgery	x	✓	✓	–	–	✓	x	✓+	–	✓	✓	✓
Total knee replacement	–	✓	–	✓	✓	✓	x	x	–	✓	✓	✓
Knee arthroscopy	–	x	–	–	–	–	–	–	–	–	–	✓
Lower leg fractures and injuries with immobilisation	–	✓	–	–	–	–	–	–	–	–	–	–
General surgery	✓	✓	–	–	–	–	–	–	✓±	–	✓	✓
Urological surgery	x	–	–	–	–	–	–	–	–	–	–	✓
Gynaecological surgery	✓	✓	–	–	–	–	x	–	✓±	✓±	✓±	–
Abdominal surgery	–	✓	–	–	–	x	–	–	✓	–	–	✓
Cardiac, thoracic and vascular surgery	✓	✓	–	–	–	–	–	–	✓	✓	–	–
Neurosurgery	✓	✓	–	–	–	–	–	–	✓±	✓	–	–
Trauma surgery and spinal surgery	–	✓+	–	–	–	–	–	–	–	–	✓+	–
Stroke	✓	✓	–	–	–	–	–	–	–	–	–	–
Myocardial infarction	✓	–	–	–	–	–	–	–	–	–	–	–
General medical*	✓	✓	–	–	–	–	–	–	–	–	–	–
Cancer	–	–	–	–	–	–	–	–	–	–	–	–
Pregnancy and childbirth	–	–	–	–	–	–	–	–	–	–	–	–

Note: Only recommendations that are based on evidence have been included in this table (including graded recommendations and Good Practice point recommendations)

*Refer to the relevant section of the NHMRC guidelines[1] for a detailed description of patients considered in the general medical category as well as considerations for treatment in cancer and pregnancy/childbirth.