Policy Directive

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Prevention of Venous Thromboembolism

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Summary The policy has been revised to include guidance on VTE prevention in high risk groups, such as those being discharged from emergency and those that are pregnant or post-partum. The policy outlines the processes that require implementation by all NSW hospitals to reduce the risk of hospital-associated VTE.

Replaces Doc. No. Prevention of Venous Thromboembolism [PD2010_077]

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Applies to Local Health Districts, Board Governed Statutory Health Corporations, Chief Executive Governed Statutory Health Corporations, Specialty Network Governed Statutory Health Corporations, Affiliated Health Organisations, Public Health System Support Division, Dental Schools and Clinics, Ministry of Health, Public Health Units, Public Hospitals, Cancer Institute (NSW)

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POLICY STATEMENT

PREVENTION OF VENOUS THROMBOEMBOLISM

PURPOSE

The purpose of this policy is to ensure routine venous thromboembolism (VTE) risk assessment is undertaken on adult patients, and that patients identified at risk of developing a VTE receive appropriate pharmacological and / or mechanical prophylaxis.

MANDATORY REQUIREMENTS

- All adult patients admitted to NSW public hospitals must be assessed for the risk of VTE within 24 hours and regularly as indicated / appropriate.
- All adult patients discharged home from the Emergency Department who as a result of acute illness or injury, have significantly reduced mobility relative to normal state, must be assessed for risk of VTE.
- Patients identified at risk of VTE are to receive the pharmacological and / or mechanical prophylaxis most appropriate to that risk and their clinical condition.
- All health services must comply with the Prevention of VTE Policy.
- All Public Health Organisations must have processes in place in compliance with the actions summarised in the VTE Prevention Framework (Appendix 4.1 of the attachment). A VTE risk assessment must be completed for all admitted adult patients and other patients identified at risk, and decision support tools made available to guide prescription of prophylaxis appropriate for the patients risk level.

IMPLEMENTATION

Clinical Excellence Commission

- Provide the tools and resources to support implementation of this policy.

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.

Director of Clinical Governance

- Ensure local processes 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.
- Ensure formulary management includes availability of medications recommended for VTE prophylaxis.

- Data on indicators for VTE should be collected at clinical audit and provided, as required to:
  - The NSW Ministry of Health for state wide performance and compliance monitoring
  - Clinical Department Heads to support local improvement strategies.
- Ensure 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 (or Delegate)

- Ensure VTE risk assessment is performed on all adult admitted patients within 24 hours, and those discharged from an Emergency Department with significantly reduced mobility relative to normal state.
- 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 on the VTE National Inpatient Medication Chart (NIMC), where in use. This, and other significant information, including any relevant dosage adjustment can be documented in the patient's health care record, approved risk assessment tools, or other locally approved forms.
- 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, particularly as clinical condition changes, and that prophylaxis is monitored and adjusted accordingly.
- Ensure clinical speciality protocols include VTE prophylaxis where appropriate.

REVISION HISTORY

Version	Approved by	Amendment notes
September 2014 (PD2014_032)	Deputy Secretary, Governance, Workforce and Corporate	This policy includes statements on VTE management of high-risk patient groups and replaces PD2010_077.
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: Procedures

Prevention of Venous Thromboembolism

NSW GOVERNMENT Health

PROCEDURES

Issue date: September-2014

PD2014_032

CONTENTS

1 BACKGROUND

1.1 About this document

Venous thromboembolism (VTE) involves the formation of a blood clot within the deep veins, most commonly of the legs or pelvis (deep venous thrombosis or DVT). These blood clots may become dislodged and then obstruct the pulmonary artery or one of its branches (pulmonary embolism or PE). VTE is a significant preventable adverse event for hospitalised patients.

The incidence of developing a VTE has been shown to be 100 times greater among hospitalised patients than those in community[1]. Serious adverse outcomes resulting from VTE 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 intrinsic risk factors such as existing medical conditions, age, or family history, and extrinsic risk factors such as surgical intervention, medical treatment, or immobility. Effective prevention of VTE is achieved through assessment of risk factors and the provision of appropriate prophylaxis.

This Procedure describes the strategies for standard workflow and clinical practice to reduce a patient's risk of developing VTE. These strategies include:

- Identifying patients who should be assessed for VTE risk
- Assessing VTE risk
- Prescribing appropriate prophylaxis
- Reassessing VTE risk during care
- Engaging the patient
- Monitoring performance and practice, to assess compliance in implementing the strategies described and current clinical practice.

The Prevention of Venous Thromboembolism Framework (Appendix 4.1) provides a summary of the required actions for NSW public hospitals and health services.

This procedure applies to Attending Medical Officers, nurses/midwives and pharmacists. It requires Attending Medical Officers and their medical teams to review all adult patients that require assessment for risk of VTE and, based on that assessment in correlation with evidence-based guidelines, prescribe prophylaxis accordingly. Assessment outcome must be noted in the patient health care record or other approved form, and the rationale behind decision to prescribe or withhold prophylaxis should also be noted. Nursing staff/midwives and pharmacists are to be aware of VTE risk and assist in ensuring the processes for prevention are implemented.

To support the implementation of this policy, the Clinical Excellence Commission has developed a supporting tool for VTE risk assessment (available at: http://www.cec.health.nsw.gov.au/programs/vte-prevention/risk-assessment#avter). The use of this tool is NOT mandatory. Where this tool is not used, a similar tool meeting the requirements set out in this Procedure must be implemented.

The Clinical Excellence Commission will be working with LHDs to facilitate VTE prevention strategies across NSW public hospitals.

1.2 Key definitions

Anticoagulant	Any agent used to prevent the formation of blood clots. These include oral agents, such as warfarin, dabigatran, rivaroxaban and apixaban, and others which are injected into the vein or under the skin, such as unfractionated heparin and low molecular weight heparin e.g. enoxaparin sodium.
Attending Medical Officer (AMO)	The Attending Medical Officer (AMO) is the senior medical practitioner who has primary responsibility for the patient during admission. This AMO 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 prevention of VTE.
Clinically Significant Bleeding	Major haemorrhage that is life threatening and is likely to result in the need for a massive transfusion; haemorrhage of a smaller volume in a critical area or organ resulting in patient morbidity or mortality; or chronic blood loss resulting in patient morbidity or mortality over time.
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.
Extrinsic Risk Factor	Risk factor external to patient eg surgery, hospitalisation.
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. Caution is required to avoid falls when wearing GCS due to slipping. Non-slip oversocks or footwear should be worn to avoid falls. (Another type of compression stocking are anti- embolism stockings indicated to help prevent blood clots in bedbound or non- ambulatory patients.)
Heparin-induced thrombocytopenia (HIT)	Thrombocytopenia occurring due to treatment with heparin.
Intermittent	A mechanical method of VTE prophylaxis that comprises the use of inflatable

pneumatic compression (IPC)	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.
Intrinsic Risk Factor	Risk factor internal to patient or individual risk factors eg age, family history.
Low Molecular Weight Heparins (LMWH)	Group of anticoagulant drugs termed the Low Molecular Weight Heparins (LMWH) which are obtained by fractionation of heparin with mass < 8000 e.g. enoxaparin sodium, dalteparin sodium.
Mechanical Prophylaxis	VTE prophylaxis in the form of a GCS, anti-embolic stocking, IPC or FID.
Must	Indicates a mandatory action requiring compliance.
Post-partum Period	Period beginning immediately after the birth of a child and extending for about six weeks.
Prescriber	A health professional legally entitled to prescribe medicines according to prevailing *NSW Poisons and Therapeutic Goods Act 1966* 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.
Significantly Reduced Mobility Relative to Normal State	Refers to patients who are bedbound, or likely to spend a substantial proportion of the day in bed or in a chair due to the clinical condition for which they are being treated, or unable to walk unaided due to injury such as severe lower leg injury (e.g. fracture, dislocation, complete tendon rupture), requiring ridged immobilisation, or non-weight bearing status. The change in mobility should be assessed in relation to the patient's normal state of functioning.
Anti-embolic stockings	A type of compression stocking indicated to help prevent blood clots in bedbound 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. Includes both deep vein thrombosis and pulmonary embolism.
Venous thrombosis	A condition in which a blood clot (thrombus) forms in a vein.
VTE Risk Outcome	The decision reached after a risk assessment is carried out to evaluate the likelihood of a patient developing a VTE due to existing risk factors. The patients risk outcome can fall under one of three categories: **Lower Risk:** Patient has a lower risk of developing a VTE and requires no active treatment. **Moderate Risk:** Patient is at risk of developing a VTE and requires treatment with pharmacological prophylaxis (where no contraindications exist) and mechanical prophylaxis should be used where pharmacological therapy is contraindicated. **Higher Risk:** Patient is at a relatively higher risk of developing a VTE and requires combination treatment (where no contraindications exist) with both pharmacological AND mechanical prophylaxis.

2 VENOUS THROMBOEMBOLISM PREVENTION

2.1 Identifying Patients for Assessment

2.1.1 Patients in the Emergency Department

Adult patients to be discharged home from an Emergency Department who, as a result of their acute illness or injury (including interventions such as leg casts/braces), have significantly reduced mobility relative to normal state must undergo VTE risk assessment and be prescribed appropriate prophylaxis by an Emergency Department clinician prior to leaving the Emergency Department.

All other patients to be discharged home from an Emergency Department do not need to be assessed for VTE risk.

Adult patients being admitted to an inpatient ward or unit from an Emergency Department:

- Who will not be seen by the admitting team until the next day, must undergo a VTE risk assessment and be prescribed appropriate prophylaxis by an Emergency Department clinician as part of their interim orders prior to leaving the Emergency Department
- Must undergo a VTE risk assessment and be prescribed appropriate prophylaxis by the admitting team if transferred within the same day.

2.1.2 Admitted Patients

All adult patients admitted to a NSW public hospital or health service must undergo a VTE risk assessment within 24 hours of admission and, if appropriate, be prescribed pharmacological and/or mechanical prophylaxis.

2.1.3 Pregnant and Post-Partum Women

All pregnant and post-partum women must undergo VTE risk assessment:

- During the first antenatal review and/or during booking
- During admission into a non-obstetric setting for a non-pregnancy related complaint
- During admission into an obstetric setting for a pregnancy or non-pregnancy related complaint
- Immediately after birth (postnatal period).

2.1.4 Planned Admission

Patients undergoing planned surgical and invasive interventions and/or imaging guided invasive interventions:

- Prior to planned surgery and invasive procedures, and/or imaging guided invasive procedures, medical officers must assess the risks and benefits of stopping pre-existing, established anticoagulation or anti-platelet therapy before discontinuing these therapies.

- Prophylaxis should be considered for day surgery patients based on evidence in situations of significantly reduced mobility relative to normal state, prolonged anaesthesia and for patients demonstrating one or more other risk factors. Examples are provided on page 21 of National Health and Medical Research Council (NHMRC) guidelines.[2]

2.2 Risk Assessment

2.2.1 Assessing VTE Risk

A VTE risk assessment must be completed within 24 hours of admission. A standardised, approved risk assessment tool must be made available to all Attending Medical Officers (and delegates) (see CEC website http://www.cec.health.nsw.gov.au/programs/vte-prevention/risk-assessment#avter for NSW VTE Risk Assessment Tool).

The risk assessment tool must ensure the following steps are undertaken during the assessment.

Step 1 Assess baseline risk (intrinsic risk).

Step 2 Assess additional risks posed by hospitalisation or illness (extrinsic risk), particularly level of mobility relative to normal state.

Step 3 Assess contraindications.

a. Assess risk of bleeding or contraindication to pharmacological prophylaxis.

b. Assess any contraindication to mechanical prophylaxis.

Step 4 Formulate overall risk assessment outcome (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 (at least every 7 days), if condition changes, and at transfer of care.

2.2.2 Assessing VTE Risk in Pregnant and Post-Partum Women

- A standard risk assessment tool can be used for a pregnant woman admitted into a non-obstetric setting for a non-pregnancy related complaint.
- Any other tools used to assess VTE risk in a non-obstetric setting must identify all pregnant and postpartum women to be at risk of VTE. The decision to commence pharmacological and/or mechanical prophylaxis must be referred to an obstetrics consultant/team.

- A dedicated obstetric VTE risk assessment tool should be used to assess pregnant and postpartum women in an obstetrics setting. It should identify risk factors, contraindications and evidence-based treatment options that are unique to this patient group.

2.2.3 Documenting VTE Risk

- Attending Medical Officers (or delegate) must document:
  - That a risk assessment has been completed
  - The outcome of the risk assessment.
- The National Inpatient Medication Chart (NIMC) includes a dedicated VTE section (not included on the long-stay version). When in use, medical officers must use this section to document when a risk assessment has been completed.
- Additional areas for documentation may include:
  - The patients' health care record
  - Approved risk assessment tools
  - Other locally approved forms, such as patient care plans
  - Electronic medical record.

2.2.4 Additional Prevention Strategies

Irrespective of a patient's VTE risk outcome, the following measures should be observed during the episode of care:

- Patients must remain adequately hydrated (unless contraindicated due to their clinical condition e.g. fluid restriction due to congestive cardiac failure) and must be encouraged to mobilise as soon as possible and to continue being mobile post discharge.[3]
- A plan for early mobilisation should be developed by a multidisciplinary team with the patient and their family/carer.

2.3 Prescribing Appropriate Prophylaxis

- To assist in reducing risk of VTE, prophylaxis should be commenced as early as possible during the patient's admission or commenced as scheduled after immediate care and risk assessment is carried out.
- The standardised risk assessment tool made available should provide clinical decision support for Attending Medical Officers when prescribing prophylaxis
- 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 4.2) and *NHMRC Summary of Availability of Evidence for Use of Thromboprophylactic Agents by Clinical Category,* (Appendix 4.3).

There are two types of prophylaxis, pharmacological and mechanical.

2.4 Pharmacological Prophylaxis

VTE prophylaxis agents may consist of:

- Heparin
  - Unfractionated heparin
  - Low molecular weight heparins (e.g. enoxaparin, dalteparin)
- Factor Xa inhibitors (e.g. rivaroxaban, fondaparinux, apixaban)
- Direct thrombin inhibitors, (e.g. dabigatran)
- Heparinoids
  - Danaparoid
- 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. A heparinoid (e.g. danaparoid) can be used as a substitute.[2 4] (See Contraindications 2.4.3). A Haematologist should be consulted for further advice when managing a patient with heparin sensitivity or HITs.
- These drugs are recommended to be continued until the patient regains normal mobility or is 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.
- The decision to commence pharmacological prophylaxis should be made after considering the benefits of treatment i.e. reducing VTE risk, against the risk associated with treatment (bleeding and other contraindications).

2.4.1 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 an increased risk of VTE[5] and may require higher pharmacological prophylaxis doses. Evidence is limited regarding the recommended dosing regimen, therefore clinician discretion is warranted, taking into account both the risk of clotting and the risk of bleeding.

Patients with renal impairment often require a reduced dose of pharmacological prophylaxis; or depending on level of impairment, one agent may be preferred over the other. Renal impairment should be calculated using creatinine clearance as the unit of measure before decisions regarding pharmacological prophylaxis are made.

$$\text{Creatinine clearance in mL/min} = \frac{(140 - \text{age (years)}) \times \text{ideal body weight (kg)}}{0.815 \times \text{serum creatinine concentration (micromol/L)}}$$

(Multiple by 0.85 for females)

2.4.2 Drug Interactions

Drugs like anticoagulants (e.g. warfarin, dabigatran), 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[3]. Other drugs may interact with prophylactic agents to increase bleeding risk or reduce their efficacy. Check carefully and refer to product information and/or appropriate clinical references.

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.

2.4.3 Contraindications to Pharmacological Prophylaxis

Contraindications to pharmacological prophylaxis must be considered before a patient is prescribed therapy.

Contraindications can be either absolute or relative. Where an absolute contraindication exists, the use of pharmacological prophylaxis should be avoided due to life-threatening risk, while relative contraindications require caution to be exercised and the benefits of therapy to be weighed against the risk.

Absolute contraindications may include (but not limited to):

- Known hypersensitivity to agents used in pharmacological prophylaxis
- History of, or current, heparin-induced thrombocytopenia (alternative agents available)
- Active bleeding or risk of clinically significant bleeding.

Relative contraindications may include (but not limited to):

- Any risk of bleeding
- Creatinine clearance < 30mL/minute (reduced dosages or specific agents may be used in some cases)
- Use of low dose aspirin for prevention or treatment of cardiovascular disease or other antiplatelet therapy.

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

2.4.4 Anaesthesia and VTE

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 and imaging guided invasive procedures (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.[2]

The NHMRC[2] recommends:

- No pharmacological prophylaxis with LMWH should be administered prior to establishment of neural blockade, or the block should be performed ≥ 12 hours after the last does of LMWH if preoperative prophylaxis has been administered with this drug. Dosing after surgery should start ≥ 6 hours postoperatively.
- If an epidural catheter has been placed it should be removed:
  - ≥ 2 hours before a postoperative dose of pharmacological prophylaxis with LMWH; and
  - ≥ 10 hours after a previously administered LMWH dose
- Because of the longer half-life of fondaparinux and dabigatran etexilate, special arrangements should be made between the surgical and anaesthetic teams if these drugs are to be used.

2.5 Mechanical Prophylaxis

The following may be used as indicated:

- Graduated Compression Stockings (GCS) for ambulant patients or anti-embolic stockings for immobile patients.
- Intermittent pneumatic compression (IPC) or foot impulse devices (FID).
- Intravascular filtration.

Local protocols are to be developed to guide the use of foot impulse devices (FIDs).

2.5.1 Graduated Compression Stockings and Compression Devices

- For higher risk surgical patients, mechanical prophylaxis with appropriate pharmacological prophylaxis are usually provided until the patient is fully mobile or as indicated. 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 or as indicated.
- 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. Approved non-slip oversocks or appropriate footwear should be worn to avoid falls.

- Stockings must be removed daily to assess skin condition and perfusion and to provide skin care. Outcome should be documented in the patient's medical notes.
- Pressure areas (such as the heel, toes and behind the knee) should be checked twice daily, most preferably at every shift. Outcome should be documented in the patient's medical notes.

2.5.2 Contraindications to Graduated Compression Stockings, Anti-embolic 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.[2]

IPC or FID can exacerbate lower limb ischemic disease and are contraindicated in patients with peripheral arterial disease or arterial ulcers.[2] 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 anti-embolic stockings in immobile, hospitalised patients following acute stroke.[2]

2.5.3 Complications of Mechanical Prophylaxis

Bunching of the stockings from incorrect fitting could result in leg ulceration, pressure injuries, slipping and falling on mobilisation.[2]

2.5.4 Intravascular Filtration

In exceptional circumstances, an Inferior Vena Cava (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.

2.6 Documentation of Prophylaxis

Once the decision is made to prescribe pharmacological and/or mechanical prophylaxis, an order must be written.

The regular NIMC contains a dedicated VTE section. Where this chart is used, the Attending Medical Officer (or delegate) must prescribe pharmacological and/or mechanical prophylaxis within the dedicated section. Prescribing outside of this section may lead to duplication of orders and risk of patient harm.

Where other versions of the NIMC without this section are in use, such as the long-stay chart, prescribing should be completed within the normal sections.

Checks associated with mechanical prophylaxis must also be documented at least twice daily by nursing staff/midwives. Checks should be documented on the NIMC, where mechanical prophylaxis has been prescribed.

Where electronic prescribing systems are in use, Attending Medical Officers should prescribe pharmacological and/or mechanical prophylaxis as per local protocol.

2.7 Other Patient Groups

2.7.1 Peri-operative and Peri-procedural Management of Patients Receiving Regular Anticoagulation

For surgery and invasive procedures an important consideration is the timing of stopping and restarting regular anticoagulants (e.g. 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 (or delegate) 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.

2.7.2 Patients on Medication containing Oestrogen

Medical officers should review current evidence (including risks of unplanned pregnancy vs benefit of VTE prevention) 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.[6]

2.7.3 Patients on Medication Increasing the Risk of VTE

There are a number of other medications that may increase the risk of developing a VTE, particularly during periods of immobilisation or after surgery. These may include (but not limited to) agents such as tamoxifen, epoetin alfa, strontium ranelate, and raloxifene. Medical officers should consider temporary cessation of such agents or VTE prophylaxis where appropriate.

2.8 Engaging the Patient

Patients, carers and their families must be informed about:

- What a VTE is

- Signs and symptoms of VTE
- Risk factors specific to the patient's condition
- Effective interventions to reduce the risk of VTE developing
- Any pharmacological and/or mechanical prophylaxis they are receiving
- VTE prevention discharge plans (where required).

Written information should accompany any counselling points. Patient information highlighting the risk of developing a blood clot in hospital should be available, and patient leaflets summarising key points should be provided. Resources are available at:

- CEC VTE website http://www.cec.health.nsw.gov.au/programs/vte-prevention
- ACQSHC website http://www.nhmrc.gov.au/guidelines-publications/cp125

Information about the pharmacological agent used must also be provided. For example, Consumer Medicines Information (CMI) is available at https://www.ebs.tga.gov.au/.

2.8.1 Documentation of Patient Information

When a treatment decision has been made, clinicians must document that the patient has received an explanation of risks and benefits of prophylaxis. This should be recorded within the patients' health care record and/or other approved form/tool.

Clinicians must also document when they provide patients/carers additional information regarding VTE prevention.

2.9 Reassessing VTE Risk

After the initial risk assessment, the patient's risk of bleeding and of VTE should be reassessed:

- Regularly as clinically appropriate, as a minimum every 7 days
- When clinical condition changes(e.g. unplanned surgery, changes in mobility)
- At transfer of care[3]

Reassessment is required 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 or its absence.

2.9.1 Reassessing Risk at Discharge and Continuity of Care

Patients who have been identified as being at risk of VTE during their admission should be reassessed at the point of discharge. Consideration should be made regarding the need for extended prophylaxis.

Attending Medical Officers must ensure the development of a prospective action plan for patients requiring continuation of pharmacological and/or mechanical 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 and explained

to the patient/carer/family. 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 4.2 for recommended duration.

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

On transfer to home or another care services, 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 the administration of treatment as needed and be encouraged to mobilise (unless instructions for mobility restriction are in place).

2.10 Monitoring Performance and Practice

2.10.1 Reporting

Any significant unexpected change in a patient's condition relating to VTE prophylaxis including embolism and bleeding, must be considered an adverse event and be recorded in the incident monitoring system (IIMS) with the appropriate level of investigation initiated.

All patients who present on admission with a VTE resulting from a previous hospitalisation (within 90 days of discharge) or who develop a VTE during hospitalisation must have the incident documented in the patient's health care record and recorded into IIMS.

2.10.2 Clinical Audit

Health services should ensure monitoring processes are in place to assess compliance with risk assessment completion and the prescription of appropriate prophylaxis.

A number of audit measures are available to assist with review of clinical processes. These include:

- The Quality Use of Medicines indicators[7] and the Medication Safety Self Assessment for Antithrombotic Therapy at CEC website http://www.cec.health.nsw.gov.au/programs/vte-prevention/monitoring-practice#ca
- The NIMC VTE Prophylaxis Section Audit and Reporting Tool at http://www.safetyandquality.gov.au/our-work/medication-safety/medication-chart/nimc/vteprophylaxis/

- CEC developed VTE prevention parameters (see CEC website http://www.cec.health.nsw.gov.au/programs/vte-prevention/monitoring-practice#ca).

It is recommended that clinical audit be conducted at least annually, more frequently where compliance is poor.

2.10.3 Feedback to Clinical Staff

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.

The outcome of clinical audits should also be communicated to clinicians in a timely manner in order to review practice and procedure.

2.10.4 Staff Education

Clinical staff should be provided with education on VTE prevention strategies.

Training resources can be found at:

- The CEC website http://www.cec.health.nsw.gov.au/programs/vte-prevention/education#navigation
- ACQSHC website: VTE resource centre: http://www.safetyandquality.gov.au/our-work/medication-safety/vte-prevention-resource-centre/
- ACQSHC website: Use of VTE section of NIMC: http://www.safetyandquality.gov.au/our-work/medication-safety/medication-chart/support-material/

3 REFERENCES

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7. NSW Therapeutic Advisory Group. Indicators for Quality Use of Medicines in Australian Hospitals. 2014.

4 APPENDIX

4.1 VTE Prevention Framework

Prevention of Venous Thromboembolism Framework

MEDICATION SAFETY AND QUALITY
VTE Prevention

This Framework has been developed to guide LHDs and facilities in the implementation of the *Prevention of Venous Thromboembolism Policy Directive*

To Prevent VTE	What this means for Patients	Actions Required by NSW Hospitals and Health Services
Identify Patients 	• Patients with a potential to be at risk of VTE are identified	1.1 All patients admitted to a ward or unit will undergo VTE risk assessment 1.2 All patients discharged from Emergency Departments with significantly reduced mobility relative to normal state will undergo VTE risk assessment 1.3 All pregnant and postpartum women will be referred to an Obstetrics consultant / team to undergo appropriate VTE risk assessment
Assess and Document VTE Risk 	• VTE assessment is promptly completed • Risk vs. benefit of treatment is considered • The outcome of the assessment is clearly documented and easily accessible by health care providers	2.1 VTE risk assessments are completed within 24 hours of patient admission 2.2 A standardised, approved risk assessment tool should be made available to all clinical staff 2.3 The risk assessment tool enables clinicians to weigh the risk of clotting against the risk of bleeding 2.4 Outcome of the risk assessment is clearly documented in an approved record such as (i) National Inpatient Medication Chart (NIMC) (ii) Patient health care record (iii) Approved risk assessment tool (iv) Other locally approved form
Prescribe Appropriate Prophylaxis 	• Treatment is based on the best clinical knowledge and evidence • Prescribed therapy is clearly documented and easily accessible by health care providers	3.1 Clinical decision support is available for all clinicians, and encourages review of risk vs. benefit of prophylactic treatment 3.2 Clinical decision support is be based on evidence-based guidelines 3.3 Access to a range of antithrombotic agents is available on the formulary 3.4 Where the regular NIMC is used, prescribing of both pharmacological and mechanical prophylaxis is completed in the dedicated VTE section
Engage the Patient 	• Decisions actively involve patient/carers • Patients/carers are aware of the risks and symptoms of VTE	4.1 Patients/carers are informed of VTE risks and treatment options 4.2 Patients/carers are involved in treatment plans 4.3 A standardised patient information leaflet is available for clinicians to provide to patients
Reassess 	• Patients are regularly assessed for VTE throughout admission • Prevention of VTE continues after discharge if required	5.1 VTE risk is reassessed regularly (at least every 7 days) OR as clinical condition changes 5.2 Clinicians are prompted at discharge to assess the need of prolonged prophylaxis
Monitor Practice 	• Hospitals monitor performance and strive to improve processes • Health professionals are updated and aware of requirements	6.1 Rates of risk assessment completion are audited periodically (at least annually, or more frequently if compliance is poor) 6.2 Rate of provision of appropriate prophylaxis are audited periodically 6.3 Results of audit and review are reported back to clinicians to drive change 6.4 Clinicians are educated on the need for VTE prevention measures

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

(http://www.nhmrc.gov.au/guidelines-publications/cp115)

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 this risk 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 pharma-cological 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 contraindi-cated (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), thromboproph-ylaxis 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**

December 2010

4.3 Summary of availability of evidence for use of thromboprophylactic agents by clinical category – excerpt from NHMRC[2]

✓	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 guidelines1 for a detailed description of patients considered in the general medical category as well as considerations for treatment in cancer and pregnancy/childbirth.