Venous Thromboembolism (VTE) Prevention Program
Objectives

• Provide an introduction to VTE
• Discuss the burden of VTE
• Demonstrate how to use the eMR VTE Risk Assessment Tool
• Practice using the tool using patient scenarios
## Venous Thromboembolism

- **VTE** = Deep vein thrombosis (DVT) and/or pulmonary embolism (PE)

<table>
<thead>
<tr>
<th>DVT</th>
<th>PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occurs in deep veins (most commonly in legs and groin)</td>
<td>Occurs after DVT dislodges and travels to the lungs</td>
</tr>
<tr>
<td>Can cause long-term issues – ‘post-thrombotic syndrome’ (PTS)</td>
<td>Serious complication which can lead to death</td>
</tr>
<tr>
<td>PTS affects 23-60% of DVT patients within 2 years</td>
<td></td>
</tr>
<tr>
<td>Lower-extremity DVT has 3% PE-related mortality rate</td>
<td>Patients with PE have 30-60% chance of dying from it</td>
</tr>
</tbody>
</table>
What causes VTE?

Virchow’s Triad = categories of factors contributing to blood clot formation
Hereditary and acquired risk factors

**Stasis**
Alteration in normal blood flow

**Endothelial Injury**
Injury or trauma to the inside of the blood vessel

**Hypercoagulability**
Alternation in the constitution of blood causing blood to clot more easily
The Impact of VTE

- More than 14,000 Australians develop a VTE per year
- More than 5,000 of them will die as a direct result
- VTE causes 7% of all hospital deaths
- Incidence 100 times greater in hospitalised patients than community residents
- Largely preventable

VTE causes more deaths than bowel Ca and breast Ca
Hospitalisation

• Hospitalisation = ↑ risk of VTE

• ~ 50% of VTE cases occur during or soon after hospitalisation
  – 24% (surgery)
  – 22% (medical illness)

• Incidence 100 times greater in hospitalised patients than community residents
What’s the Harm?

- 71 year old male
- C/O: L hip pain
- Hx: recent L THR
- Dislocated prosthesis
- Underwent closed reduction
- L knee Zimmer splint
- Difficulty mobilising
What’s the Harm?

• 10 days post-op: noticed nil VTE prophylaxis
• Prophylaxis prescribed
• Physio
• Collapse and LOC → Rapid response
• Cardiac arrest → deceased
• Coroner’s report: PE at time of death
What’s the Harm?

- Elderly patient; admitted for UTI and cellulitis
- Immobile during admission
- 9 days post-discharge re-presents
- Swelling, erythema to L lower leg

- Doppler: Extensive occlusive L leg DVT
- 5 day admission: IV heparin and commenced on warfarin
What’s the Harm?

VTE symptomatic DVT/PE, fatal PE, cost of investigation, risks and costs of treatment, long term complications

Mortality

Fatal PE

Morbidity

Readmission
Increased LOS
Post-thrombotic syndrome

Mortality

Fatal PE

Morbidity

Post-thrombotic syndrome
VTE Risk Assessment

Prevention of Venous Thromboembolism PD2014_032 states that the MO must:

• Assess VTE risk within 24 hours of admission
• Review bleeding risk and prescribe appropriate prophylaxis
• Discuss treatment with the patient
• Document VTE risk assessment and prophylaxis treatment
• Reassess VTE risk regularly (at least every 7 days), if clinical condition changes, and at transfer of care
About the VTE Risk Assessment Tool

The CEC’s Adult Venous Thromboembolism Risk Assessment Tool was developed to:

• aid MOs with assessing and managing VTE risk
• provide a standardised approach to VTE Risk Assessment
• provide a form of documentation showing the MO’s risk assessment process and decision
Electronic: VTE Risk Assessment Tool

- The CEC has developed an electronic version of the paper VTE Risk Assessment Tool in collaboration with eHealth.
- Used to assess VTE risk for ADULT INPATIENTS within 24 hours of admission
Accessing the VTE Risk Assessment in the eMR

Via the Patient Summary Screen

![Diagram of the Patient Summary Screen with highlighted VTE Risk Assessment option]
Accessing the VTE Risk Assessment in the eMR

• Via Ad Hoc Charting
Using the Tool

Venous Thromboembolism (VTE) Risk Assessment

Mouse, Micky
MRN: 543412
DOB: 14/11/1968
AGE: 46 Years
SEX: M
LOC: 1N; 102; 2
MC: 9999999999

13 Dismal Swamp Rd DISMAL SWAMP SA 5291

Indicates there is Reference Text for the field. To access, right click in the field and select "Reference Text".

Previous VTE Risk documented for this admission

Last assessment completed on: 18/02/2015 09:23  By: Bninister, Iurie, DBA
Last recorded VTE Risk: Moderate Risk
Expected Date of Discharge: 31/01/2015
Expected LOS: 2.0 days

Is the patient pregnant or <6 weeks post-partum?  No

If yes, has the Obstetrics team been consulted?  Yes No

Would you like to use the VTE Risk Assessment tool?  Yes No

VTE Risk
Lower Risk Moderate Risk Higher Risk
Assess for Higher Risk

VTE Risk Assessment Tool

Mouse, Micky
MRN: 543412
DOB: 14/11/1968
AGE: 46 Years
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Assess Venous Thromboembolism Risk and allocate patient into Risk Category

Assess for Higher Risk

- None
- Total hip replacement, total knee replacement, or hip fracture surgery
- Abdominal or pelvic surgery for cancer
- Multiple major trauma
- Acute spinal cord injury with paresis
Identify VTE Risk Factors

**Patient Age**
- Age is less than 60

**Patient Height**
- cm

**Patient Weight**
- kg

**Body Mass Index**
- 

**VTE Risk Factors**
- No other risk factors present
- Moderate to major surgery (operating time > 45 min and/or involves abdomen)
- Prior history of VTE
- Known thrombophilia (including inherited disorders)
- Active malignancy or cancer treatment
- Congestive heart failure
- Myocardial infarction
- Active or chronic lung disease
- Active infection
- Inflammatory bowel disease
- Active rheumatic disease
- Obesity (BMI greater than 30)
- Hormonal replacement therapy
- Oestrogen based contraceptives
- Myeloproliferative neoplasms
- Varicose veins/chronic venous stasis
- Nephrotic syndrome
- Dehydration

**Does the patient have significantly reduced mobility relative to normal state?**
- Yes
- No

**Is the Expected Length of Stay less than or equal to 2 days?**
- Yes
- No

**VTE Risk**
- Higher Risk
- Moderate Risk
- Lower Risk

**Proceed to check for Contraindications to Pharmacological and Mechanical prophylaxis**
- Yes
- No

Contraindications do not need to be identified for patients who have Lower Risk allocated. Consider education and early mobilisation. Also, see reference text for patient education information.
# VTE Risk Factors

## Intrinsic Risk Factors
- Age > 60 years
- Obesity (BMI > 30kg/m²)
- Prior history of VTE
- Pregnancy or post-partum
- Known thrombophilia (including inherited disorders)
- Varicose veins

## Extrinsic Risk Factors
- Significantly reduced mobility (relative to normal state) due to injury or illness
- Active malignancy or treatment with chemotherapy
- Use of HRT or oral contraception
- Surgical intervention, particularly major orthopaedic surgery or abdominal/pelvic surgery for cancer
- Active infection
- Inflammatory bowel disease
VTE Risk Factors

Before ticking relevant boxes, consider transient VTE Risk factors which could be removed. For e.g.

- **Dehydration**
  - Consider hydration unless contraindicated due to clinical condition e.g. fluid restriction due to congestive cardiac failure.

- **Medications containing oestrogen (HRT and oestrogen-based contraceptives)**
  - Review current evidence: risks of unplanned pregnancy vs. benefit of VTE prevention
  - If appropriate, consider discontinuing HRT or oestrogen- containing oral contraceptives. Consult senior clinician when making this decision.
  - Communicate risks of stopping contraceptives to the patient and arrange alternative contraception until restarted

*Hormones must be ceased for at least 4 weeks to reduce the VTE risk – usually not practical*
Other medications may increase the risk of developing VTE, particularly during periods of immobilisation or following surgery.

For example,

- Tamoxifen
- Epoetin alfa
- Strontium ranelate
- Raloxifene

Consider the temporary cessation of such agents or use VTE prophylaxis where appropriate. Consult senior clinician when making this decision.
Once VTE risk factors, patient’s mobility and LOS fields have been completed, the tool automatically allocates the patient into a risk category, that is higher, moderate or lower risk depending on the information entered earlier.
Identify contraindications and other conditions to consider with pharmacological prophylaxis.
Other conditions to Consider with Pharmacological Prophylaxis

- These conditions may require special courses of action. For e.g.
  - Heparin-sensitivity or history of heparin-induced thrombocytopenia (HIT)
    - Consult haematologist for alternative treatment to LMWH/heparin e.g. danaparoid
  - the insertion or removal of an epidural catheter or spinal needle (lumbar puncture) should be carried out:
    - ≥ 4 hours before a prophylactic dose of LMWH AND
    - ≥ 10 hours after a previously administered dose

Further guidance exists in reference text. Right click in the field.
Identify Contraindications to Mechanical Prophylaxis

- Mechanical prophylaxis may be appropriate despite the presence of some ‘contraindications’: use your clinical judgement
- Consider severity, extent and location of the contraindication e.g. skin ulceration
- Some types of mechanical prophylaxis may be suitable in certain conditions (see brackets for suggestions).
More on Mechanical Prophylaxis

Note the following:

• Intermittent Pneumatic Compression (IPC) or Foot Impulse Devices (FID) can exacerbate lower limb ischemic disease and are contraindicated in patients with peripheral arterial disease or arterial ulcers.
• 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 in immobile, hospitalised patients following acute stroke.
- Consider tool’s recommendations
- Indicate prescribing decision

Prescribing guidance exists in reference text. For access, **right click** in the field.
Reference text provides prescribing guidance based on risk categories.
Points to consider:

- It is only guidance and does not preclude the use of clinical judgement
- If unsure, consult/refer to a senior clinician
- Encourage early mobilisation and provide patient education for ALL patients regardless of risk level
- Keep patients adequately hydrated (unless contraindicated due to their clinical condition e.g. fluid restriction due to CCF)
- Dosing adjustment in renal impairment
- Preference for Low Molecular Weight Heparin (LMWH) such as enoxaparin or dalteparin in hip and knee replacement surgery
- Alternative oral agents may be used for Orthopaedic Surgical patients
- Where pharmacological prophylaxis is contraindicated, mechanical prophylaxis could be considered, as indicated, till the patient is mobile.
Pharmacological Prophylaxis

Main anticoagulants include:

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>Agents</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMWH</td>
<td>Enoxaparin</td>
<td>Most commonly used agents</td>
</tr>
<tr>
<td></td>
<td>Dalteparin</td>
<td>Require dosage adjustment in renal impairment</td>
</tr>
<tr>
<td>Unfractionated heparin</td>
<td>Unfractionated heparin</td>
<td>Preferred in patients with renal impairment</td>
</tr>
<tr>
<td>Factor Xa inhibitors</td>
<td>Apixaban</td>
<td>Alternative for prophylaxis in post-hip or knee replacement</td>
</tr>
<tr>
<td></td>
<td>Rivaroxaban</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fondaparinux</td>
<td>Alternative for prophylaxis in post-hip or knee replacement and hip fracture surgery</td>
</tr>
<tr>
<td>Direct thrombin inhibitors</td>
<td>Dabigatran</td>
<td>Alternative for prophylaxis in prophylaxis post-hip or knee replacement</td>
</tr>
<tr>
<td>Heparinoid</td>
<td>Danaparoid</td>
<td>Used in heparin-sensitivity or HIT</td>
</tr>
</tbody>
</table>
Duration of Therapy

Consider duration of therapy:

• VTE prophylaxis use is recommended till the patient’s mobility returns to baseline

• In some cases, it may be needed post-discharge. For e.g. in hip and knee surgery
  – Consider the patient’s ongoing management if prophylaxis is required post-discharge:
    • Patient education
    • Discharge medication supply
    • Inform GP/relevant HCP via discharge summary
Completing the VTE Risk Assessment

- Use button in the top left corner to navigate back to first screen.
- The form can be signed when all mandatory fields in active sections are complete. Sign the form by clicking on the green tick.

Ticks indicate that sections have been completed. If incomplete, red asterisk * will appear.

Click on green tick to sign the form.
Viewing VTE Risk Assessment Results

• Via Patient Summary Screen

• Via ContinuousDoc
Case 1

Presenting Problem: One week history of fatigue, SOB at rest, 7kg weight gain
Diagnosed with acute decompensated heart failure

Admitting Team: Cardiology

Patient Background:
- Male
- 45 years old
- Obese
- Creatinine clearance 35mL/min
- WCC: 5.6
- RCC: 4.8
- Hb: 150
- Platelets: 298
- Neutrophils: 5.5
- Lymphocytes: 2.7
- BP: 142/87

Medical History:
- Coronary artery disease
- MI x 2
- CABG 8 years ago
- Hyperlipidemia
- Hypertension
- CCF

Medications:
- Ramipril 5mg daily
- Aspirin 100mg daily
- Atorvastatin 80mg nocte
- Metoprolol 50mg bd
- Frusemide 20mg mane (stopped) – now on IV frusemide 20mg bd
Case 2

Presenting Problem: Femoral wound R groin ulcer, breakdown and bleeding. Deep collection at base. For surgery (when warfarin reversed – INR 1.5)

Admitting Team: Vascular Surgery

Patient Background:
- Female
- 74 years old
- Creatinine clearance 57mL/min
- WCC: 6.2
- RCC: 4.7
- Hb: 129
- Platelets: 346
- Neutrophils: 3.4
- Lymphocytes: 2.3
- BP: 140/82

Medical History:
- RLL ischaemia 3/52 ago
- Failed thrombolysis
- Developed R leg compartment syndrome, fasciotomy, MRSA
- NIDDM
- Hypothyroidism
- L nephrectomy (normal renal function)

Medications:
- Warfarin 3mg daily
- Thyroxine 100mcg mane
- Gliclazide SR 30mg mane
Case 3

**Presenting Problem:** BIBA. Post-MVA, presenting with multiple traumas to lower extremities. Requires hip fracture surgery with open reduction

**Admitting Team:** Orthopaedic Surgery

**Patient Background:**
- Male
- 45 years old
- Obese
- Creatinine clearance 40mL/min
- WCC: 5.3
- RCC: 3.78
- Hb: 143
- Platelets: 336

**Medical History:**
- NIDDM
- Hypertension
- Gout

**Medications:**
- Metformin 500mg bd
- Allopurinol 100mg daily
- Ramipril 5mg daily
- Aspirin 100mg daily
- Atorvastatin 20mg nocte

• Neutrophils: 5.0
• Lymphocytes: 2.6
• BP: 167/90
Case 4

**Presenting Problem:** BIBA. Agitated, threatening neighbours. Believes neighbours have implanted cameras in her brain.

**Admitting Team:** Psychiatry

**Patient Background:**
- Female
- 45 years old
- Creatinine clearance 63mL/min
- ETOH abuse
- Drug abuse
- WCC: 6.7
- RCC: 3.9
- Hb: 146
- Platelets: 312
- Neutrophils: 5.1
- Lymphocytes: 2.2
- BP: 139/87

**Medical History:**
- Schizophrenia

**Medications:**
- Methadone 5mg daily
- Olanzapine 15mg daily (non-compliant)
How to use the NIMC VTE prophylaxis section
The VTE section has been placed above the warfarin section to assist with the recognition of patients who are already receiving therapeutic anticoagulation and do not require additional VTE prophylaxis.
VTE prophylaxis section: How it works

<table>
<thead>
<tr>
<th>Date</th>
<th>Medicine (print generic name)</th>
<th>Route</th>
<th>Dose</th>
<th>Frequency and NOW enter times</th>
<th>VTE risk assessed:</th>
<th>Prophylaxis not required</th>
<th>Contraindicated</th>
<th>Signature:</th>
<th>Date: 12/5/13</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/5/13</td>
<td>ENOXAPARIN</td>
<td>Dose</td>
<td>40mg</td>
<td>Morning</td>
<td>Yes</td>
<td></td>
<td></td>
<td>B. Jones</td>
<td></td>
</tr>
</tbody>
</table>

**VTE prophylaxis**

- **Indication:** Pharmacy
- **Prescriber signature:** B. Jones
- **Print your name:** Brian Jones
- **Contact:** 9847

**Mechanical prophylaxis**

- **TED STOCKINGS**
- **Prescriber/Nursing staff signature:** B. Jones
- **Print your name:** Brian Jones
- **Contact:** 9847

**Times:**
- **AM check:** PD PD
- **PM check:** PD

**Dispense?** Yes / No
**Yes / No**
**Duration:**
**Continue on discharge?** Yes / No
**Yes / No**

Slide 40 of n
Step 1: Document patient’s VTE risk assessment

**Authorised clinician:**
- Determines patient’s risk for VTE (as per local policy, using risk assessment tool)
- Assesses patient’s risk of bleeding/contraindications to VTE prophylaxis vs. benefits of VTE prophylaxis and formulates overall risk assessment
- Documents if VTE prophylaxis **NOT** required/contraindicated by ticking the appropriate box*
- Documents assessment is complete by ticking the **VTE risk assessed** box and signing and dating in the field provided

* Specific contraindications to VTE prophylaxis should be documented in the medical record
Step 2: Order pharmacological VTE prophylaxis

- Prescriber selects an appropriate agent *if indicated*
- Choice of agent depends on patient’s VTE risk level (See hospital’s Guidelines Anticoagulation (Adult) for VTE prevention)
- Specify route, dose, frequency & administration times
- Nurse initials the administration of medication

**Order pharmacological prophylaxis if indicated: medication, route, dose and frequency**

**Document administration of medication**
Step 3: Order mechanical VTE prophylaxis

- Authorised clinician orders mechanical prophylaxis where appropriate (*e.g.* graduated compression stockings, foot pump)
- Authorised personnel - a nurse or a doctor, as per hospital policy (Nursing policy under development based on PD2010_077 Prevention of Venous Thromboembolism)
- Nurse signs when mechanical prophylaxis checked

<table>
<thead>
<tr>
<th>VTE risk assessed:</th>
<th>Prophylaxis not required</th>
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<tr>
<td>Date</td>
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<td>40mg Morning</td>
</tr>
<tr>
<td>Indication</td>
<td>Pharmacy</td>
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<tr>
<td>VTE prophylaxis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prescriber signature</td>
<td>Print your name</td>
<td>Contact 9847</td>
</tr>
<tr>
<td>Prescriber/NI signature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical prophylaxis</td>
<td>TED STOCKINGS</td>
<td></td>
</tr>
<tr>
<td>Prescriber/NI signature</td>
<td>Print your name</td>
<td>Contact 9847</td>
</tr>
</tbody>
</table>

Order mechanical prophylaxis if required

Document mechanical prophylaxis checked
VTE prophylaxis contraindicated

• **Q:** What should I do if VTE prophylaxis is contraindicated?

• **A:** Complete the risk assessment section indicating that VTE prophylaxis is contraindicated and cross out the relevant ordering section (pharmacological and/or mechanical). The prescriber should also write “contraindicated” and sign in the administration section.

• *when the specified time elapses and the contraindication is no longer an issue the NIMC-VTE section of a new chart should be completed and the previous section crossed out.*
Changing orders

**Q:** What should I do if the VTE prophylaxis ordered needs to be changed?

**A:** If the dose of VTE prophylaxis medicine needs to be changed, a new order should be prescribed on a subsequent chart and the old order ceased.
### Treatment NOT prophylaxis

- If VTE therapy is required e.g. for a pre-existing DVT, it should be ordered in the regular medicines space and **not** in the pre-printed VTE prophylaxis section.

<table>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>B. Jones</td>
<td>12/5/13</td>
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</tbody>
</table>

**VTE risk assessed: Yes**

<table>
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<tr>
<th>Route</th>
<th>Frequency and NOW enter times</th>
<th>Dose</th>
<th>Indication</th>
<th>Prescriber signature</th>
<th>Pharmacy</th>
<th>Contact</th>
<th>AM check</th>
<th>PM check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
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<td>12</td>
<td>B.Jones</td>
<td>B.Jones</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DVT**

*PATIENT ON FULL ANTICOAGULATION*

**Contraindicated**

**DOCTORS MUST ENTER administration times**
Other Ways to Help Prevent VTE
Empowering Patients

• Engage your patients
Thank you for contributing to the prevention of VTE.

Stop Clots, Stop Harm

MEDICATION SAFETY AND QUALITY
VTE Prevention

CLINICAL EXCELLENCE COMMISSION
Ten years of quality and safety