Nursing Management for Prevention of Deep Vein Thrombosis (DVT) / Venous Thrombo-Embolism (VTE) in Hospitalized Patients

February 2008
Levels of Evidence and Grades of Recommendation

<table>
<thead>
<tr>
<th>Level</th>
<th>Type of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1**</td>
<td>High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias.</td>
</tr>
<tr>
<td>1*</td>
<td>Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias.</td>
</tr>
<tr>
<td>1</td>
<td>Meta-analyses, systematic reviews, or RCTs with a high risk of bias.</td>
</tr>
<tr>
<td>2**</td>
<td>High quality systematic reviews of case-control or cohort studies, high quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal.</td>
</tr>
<tr>
<td>2*</td>
<td>Well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal.</td>
</tr>
<tr>
<td>2</td>
<td>Case-control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal.</td>
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<tr>
<td>3</td>
<td>Non-analytic studies e.g. case reports, case series.</td>
</tr>
<tr>
<td>4</td>
<td>Expert opinion.</td>
</tr>
</tbody>
</table>

Grade | Recommendation
---|------------------|
**A** | At least one meta-analysis, systematic review, or RCT rated as 1**, and directly applicable to the target population, or A body of evidence, consisting principally of studies rated as 1**, directly applicable to the target population, and demonstrating overall consistency of results. |
**B** | A body of evidence, including studies rated as 2**, directly applicable to the target population, and demonstrating overall consistency of results, or Extrapolated evidence from studies rated as 1** or 1*. |
**C** | A body of evidence including studies rated as 2**, directly applicable to the target population and demonstrating overall consistency of results, or Extrapolated evidence from studies rated as 2**. |
**D** | Evidence level 3 or 4, or Extrapolated evidence from studies rated as 2**. |

Scope of the Guidelines

These clinical practice guidelines are tools for guiding the delivery of nursing care to patients who are at risk of developing DVT / VTE, and are intended for healthcare workers who provide care and interventions for adults in healthcare institutions. The recommendations are not applicable for prevention of DVT / VTE in children population and patients with existing DVT / VTE.

Algorithm for the Nursing Management for Prevention of DVT / VTE in Hospitalized Patients

1. **Patient screened to identify risk factors**
   - **Yes:** Proceed to steps
   - **No:** Assess
2. **Rate of DVT**
   - **High risk:** Interventions to prevent DVT
3. **MOC**
   - **Credible evidence**
   - **High risk**
   - **Prophylaxis**
4. **Implementation**
   - **Evidence**
   - **Prophylaxis**
5. **Follow-up**
   - **Evidence**
   - **Prophylaxis**
Summary of Recommendations

A. ASSESSMENT

Risk Assessment Scale


B. INTERVENTIONS

Use the following DVT / VE risk stratification table to guide intervention.

DVT / VE Risk Stratification Table

<table>
<thead>
<tr>
<th>Score</th>
<th>Risk Categories</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Minimal risk</td>
<td>Ambulation and education</td>
</tr>
<tr>
<td>1</td>
<td>Low risk (≤2%)</td>
<td>Ambulation, ambulation and GECs</td>
</tr>
<tr>
<td>2-3</td>
<td>Moderate risk (2-5%)</td>
<td>Ambulation, education, GECs, IPCD and medical attention</td>
</tr>
</tbody>
</table>

Ambulation

For patient with minimal DVT / VE risk of ≤1, nurses should encourage early ambulation as soon as clinical condition permits.

Educational programmes

Educational programmes for DVT / VTE prevention should be individualized, comprehensive and directed to all levels of healthcare providers, patients and caregivers.

Initiation of patient education

Educate patients on DVT / VTE prevention as soon as possible, when clinical condition permits.

Topics for educating patients, family members and carers

- Educate on the risk factors for developing DVT / VTE.
- Educate on the signs and symptoms of DVT / VTE, and seek immediate medical attention.
- Teach the types of physical activities to prevent venous stasis and promote tissue perfusion.
- Teach on the correct technique of putting on and removing the GECs.
- Provide written health education materials on prevention of DVT / VTE to patients, family members and caregivers.

Education for health care providers

- Educate health care providers on the prevention of DVT / VTE and focus on assessment, risk factors, signs and symptoms, nursing interventions, medical treatment, and correct techniques for application of GECs and IPCD.

Graduated Elastic Compression Stockings (GECs)

For patient with low DVT / VE risk of 1-2, consider use of GECs in addition to early ambulation and education.

Contraindications for the use of GECs

In patient with current arterial insufficiency disease, do not use GECs.

Measurement of GECs

Measure GECs to fit the patient according to manufacturer’s recommendation.

Type of GECs

Use above knee GECs to prevent DVT.

Intermittent Pneumatic Compression Devices (IPCD)

Indications

- For patient with moderate DVT / VE risk of ≥3, use of IPCD may be considered in addition to early ambulation, education and GECs.
- IPCD and GECs are recommended for surgical patients.

Types of IPCD

- Apply calf-high IPCD to prevent DVT after non-lower extremity trauma.

Application of IPCD

- Ensure that the sleeves of the IPCD is properly applied, well fitted and the device is in operation at all times.
- Remove the sleeves of the IPCD at specified intervals daily to inspect the skin for redness or sign of skin break down.

Prophylactic anticoagulation

For patient with moderate DVT / VE risk of ≥3, consider addition of anticoagulation in addition to early ambulation, education and use of GECs to prevent or minimize risk of developing DVT / VE.

- Use a combination of above knee GECs and low molecular weight heparin (LMWH) to prevent DVT for post operative patients who are at risk of developing DVT.

Combination Therapy

- IPCD is recommended as an adjunct therapy to pharmacological prophylaxis.

C. REASSESSMENT AND MONITORING

Frequency of reassessment

Reassess for risk of DVT when there is a change in patient medical condition and mobility status.
Nursing Management for Prevention of Deep Vein Thrombosis (DVT) / Venous Thromboembolism (VTE) in Hospitalized Patients

February 2008
STATEMENT OF INTENT

This set of guidelines aims to guide healthcare workers who are involved in caring for patients who require to manage patients with risk of developing deep vein thrombosis (DVT) / venous thrombo-embolism (VTE) in hospitals.

The recommendations are based on the available research findings and existing evidence-based guidelines. However, there are some aspects in which there is insufficient published research and, therefore, consensus of experts in the field has been used to provide guidelines specific to conventional practice.

Every healthcare worker must exercise clinical judgement in the nursing management for prevention of DVT / VTE in hospitalized patients. It is recommended that the guidelines are used with consideration for the individual patient’s health status, overall preventive strategies, resource availability, institutional policies and other care options available.

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FOREWORD

The prevention of deep vein thrombosis (DVT) / venous thrombo-embolism (VTE) is challenging for professionals caring for patients with compromised mobility. Prediction through accurate assessment and concomitant prevention of DVT / VTE using appropriate measures are paramount to reduce an adverse incidence. This however requires the concerted effort of patients, caregivers and healthcare professionals.

I am pleased to present these clinical practice guidelines with the aim to reduce the occurrence of DVT / VTE and its undesirable complications for your setting. I hope you will incorporate these guidelines into your regular nursing practice for the benefit of our patients.

PAULINE TAN C J
CHIEF NURSING OFFICER
1 INTRODUCTION

1.1 Background

Deep vein thrombosis (DVT) is a silent killer and precursor of potentially fatal pulmonary embolism (Autar, 1996). DVT is a major health concern in many patient populations such as orthopaedics, oncology, trauma and patients with decreased mobility status. This condition can lead to life-threatening pulmonary embolism or lifelong circulatory system problems. According to Lee, Gu and Heng (2002), DVT is not uncommon in Singapore. The frequency rate of acute DVT of 15.8 per 10,000 admissions is much higher than previously reported rates of 2.6 and 7.9 per 10,000 admissions in 1990 and 1992, respectively. These findings confirm the need for increased awareness of venous thrombo-embolism (VTE) in local hospitals.

Nurses need to assess patients for the risk of developing DVT and implement necessary preventive measures to minimise the risk of DVT in hospitalized patients.

1.2 Definitions

Deep Vein Thrombosis (DVT) – It is a medical condition where there is the formation of a thrombus (blood clot) within a deep vein, commonly in the thigh or calf. It is potentially caused or aggravated by long periods of restricted movement.

Venous Thrombo-embolism (VTE) – It is a condition where a clot forms within a blood vessel. It can be damaging as it might block the flow of blood. Part of the clot might break away and block a blood vessel further along, cutting off the blood supply to important organs.

Graduated Elastic Compression Stockings (GECS) – It is a stocking made with elastic fibres such as spandex, with pressure highest at the ankle and gradually reducing along the length of the limb. GECS increases the blood flow velocity and clears blood from the valve cusps reducing stasis and preventing formation of emboli.
Intermittent Pneumatic Compression Device (IPCD) – It is a mechanical method to prevent DVT formation. IPCD compresses lower extremities intermittently (inflation pressure of 35-40mmHg at about 10-12s/min) to reduce venous stasis within the lower extremities and enhance fibrinolysis.

1.3 Scope of the Guidelines

These clinical practice guidelines are tools for guiding the delivery of nursing care to patients who are at risk of developing DVT / VTE.

The recommendations presented in this guideline are based on the available evidence. The guidelines aim to:

(a) specify nursing interventions to prevent DVT / VTE.
(b) improve patient outcomes through on-going DVT risk assessment and interventions.

These guidelines are intended for healthcare workers who provide care and interventions for adults in healthcare institutions. The recommendations are not applicable for prevention of DVT / VTE in children population and patients with existing DVT / VTE.

2 DEVELOPMENT OF GUIDELINES

2.1 Training and Guidance

Members of the workgroup attended a two-day workshop conducted by Dr Edwin Chan & Dr Miny Samuel of the Clinical Trials & Epidemiology Research Unit, to learn and discuss the theory and practical issues of developing evidence-based guidelines. The practical training revolved around topic selection and the development of “mock” evidence-based guidelines which developed into these present guidelines.

2.2 Strategy and Literature Review

The workgroup performed the literature search systematically using the key words such as ‘DVT’, ‘VTE’, ‘gradient compression elastic stockings’, ‘intermittent pneumatic compression device’, ‘ambulation and DVT’, ‘education and DVT’ in the following electronic databases: CINAHL, MEDLINE and the Cochrane Library. National Guideline Clearinghouse was searched for related guidelines. A systematic review of literature was carried out on the articles found.

2.3 Evaluation of Evidence and Grading of Recommendations

We have adopted the revised Scottish Intercollegiate Guidelines Network (SIGN) system which gives clear guidance on how to evaluate the design of individual studies and grade each study’s level of evidence (see 3.3.1 and 3.3.2); and how to assign a grade to the recommendation after taking into account external validity, result consistency, local constraints and expert opinion (see 3.3.3). For areas where available evidence was inconsistent or inconclusive, recommendations were made based on the clinical experience and judgement of the workgroup or expert committee reports.
2.3.1 Individual Study Validity Rating

All primary studies and reviews addressing a particular topic were appraised using a SIGN checklist appropriate to the study's design. These were individually rated for internal validity using the system below:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>++</td>
<td>All or most of the criteria have been fulfilled. Where they have not been fulfilled the conclusions of the study or review are thought very unlikely to alter.</td>
</tr>
<tr>
<td>+</td>
<td>Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought unlikely to alter the conclusions.</td>
</tr>
<tr>
<td>−</td>
<td>Few or no criteria fulfilled. The conclusions of the study are thought likely or very likely to alter.</td>
</tr>
</tbody>
</table>

2.3.2 Levels of Evidence

Each study is assigned a level of evidence by combining the design designation and its validity rating using the system below:

<table>
<thead>
<tr>
<th>Level</th>
<th>Type of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1+++</td>
<td>High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias.</td>
</tr>
<tr>
<td>1++</td>
<td>Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias.</td>
</tr>
<tr>
<td>1+</td>
<td>Meta-analyses, systematic reviews, or RCTs with a high risk of bias.</td>
</tr>
<tr>
<td>2+++</td>
<td>High quality systematic reviews of case-control or cohort studies. High quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal.</td>
</tr>
<tr>
<td>2++</td>
<td>Well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal.</td>
</tr>
<tr>
<td>2+</td>
<td>Case-control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal.</td>
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<tr>
<td>3</td>
<td>Non-analytic studies e.g. case reports, case series.</td>
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<td>4</td>
<td>Expert opinion.</td>
</tr>
</tbody>
</table>
2.3.3 Grades of Recommendation

The detailed results of each study and mitigating local circumstances were considered in formulation of each recommendation which was then graded using the system below:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>At least one meta-analysis, systematic review, or RCT rated as 1**+, and directly applicable to the target population; or a body of evidence, consisting principally of studies rated as 1*, directly applicable to the target population, and demonstrating overall consistency of results.</td>
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<tr>
<td>B</td>
<td>A body of evidence, including studies rated as 2**, directly applicable to the target population, and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 1** or 1*.</td>
</tr>
<tr>
<td>C</td>
<td>A body of evidence including studies rated as 2*, directly applicable to the target population and demonstrating overall consistency or results; or extrapolated evidence from studies rated as 2**.</td>
</tr>
<tr>
<td>D</td>
<td>Evidence level 3 or 4; or extrapolated evidence from studies rated as 2*.</td>
</tr>
</tbody>
</table>

2.3.4 Interpretation of the D/4 grading

The grading system emphasises the quality of the experimental support underpinning each recommendation. The grading D/4 was assigned in cases where

- it would be unreasonable to conduct a RCT because the correct practice is logically obvious;

- recommendations were derived from existing high quality evidence-based guidelines. We alert the user to this special status by appending the initials of their source e.g. D/4 – Joanna Briggs Institute, 2001.

2.4 Guidelines Review and Revision

Drafts of the guidelines were circulated to healthcare institutions for peer review on validity, reliability and practicality of the recommendations.

These guidelines will be reviewed and revised periodically to incorporate the latest relevant evidence and expert clinical opinion.

2.5 Limitations

These guidelines offer recommendations that are based on available scientific evidence and professional judgement. They are not intended as the legal standard of care.

Users of these guidelines should determine the appropriate and safe patient care practices based on assessment of the circumstances of the particular patient, their own clinical experiences and their knowledge of the most recent research findings.
4 GUIDELINE RECOMMENDATIONS

4.1 Assessment

4.1.1 Risk Assessment Scale

Assess all patients for risk of DVT upon admission using Autar (2003) Deep Vein Thrombosis Risk Assessment Scale. *(Refer to Appendix 1 – DVT Risk Assessment Scale)*

**(B/2++)**

**Rationale:**
Risk assessment is performed to identify patients in need of continuous monitoring and to alert the caregivers to consider appropriate preventive measure/s.

*(Autar, 1996; Autar, 2003)*

The prevention of DVT can be achieved by comprehensive DVT risk assessment, followed by the most appropriate form of prophylaxis.

*(Wallis and Autar, 2001)*

4.2 Interventions

- Use the following DVT / VE risks stratification table to guide intervention

**(B/2++)**

**Rationale:**
Patient with different risk categories required different intervention. Types of interventions should be tailored to the degree of risk in developing DVT.

*(Autar, 2003)*
**DVT / VE Risks Stratification Table**

<table>
<thead>
<tr>
<th>Score</th>
<th>Risk Categories</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6</td>
<td>Minimal risk</td>
<td>Ambulation and education</td>
</tr>
<tr>
<td>7-10</td>
<td>Low risk (&lt;10%)</td>
<td>Ambulation, education and/or GECS</td>
</tr>
<tr>
<td>&gt;11</td>
<td>Moderate risk (11-40%)</td>
<td>Ambulation, education, GECS, IPC and medical attention</td>
</tr>
</tbody>
</table>

4.2.1 Ambulation

- For patient with minimal DVT / VE risks of <6, nurses should encourage early ambulation as soon as clinical condition permits.

**Rationale:**

Early mobilisation stimulates calf muscles contraction and relaxation which prevents venous stasis and pooling of blood in the lower extremities.

(Aquila, 2001)

4.2.2 Education

4.2.2.1 Educational programmes

- Educational programmes for DVT / VTE prevention should be individualised, comprehensive and directed at all levels of healthcare providers, patients and caregivers.

(Rationale:)

Optimal patients’ outcomes for DVT / VTE prevention are achievable when healthcare workers, patients and caregivers participate actively in the educational programmes.

(Hohlt, 2000)

4.2.2.2 Initiation of patient education

- Educate patients on DVT / VTE prevention as soon as possible, when clinical condition permits.

(D4)

**Rationale:**

Educating patients and increasing their understanding on the importance of DVT / VTE prevention will enhance patients' compliance and reduce anxiety.

(Pout, Wimperis and Dilks, 1999)

4.2.2.3 Topics for educating patients, family members and carers

- Educate on the risk factors for developing DVT / VTE.

(D4)

- Educate on the signs and symptoms of DVT / VTE, and seek immediate medical attention.

(D4)

- Teach the types of physical activities to prevent venous stasis and promote tissue perfusion.

(D4)

- Teach on the correct technique of putting on and removing the GECS.

(D4)
Rationale:

Correct technique of putting on the GECS is important to ensure safe usage and optimal patients’ adherence. (Wallis and Autar, 2001)

- Provide written health education materials on prevention of DVT / VTE to patients, family members and caregivers. (Refer to Appendix 2 – Patient Education Guide) (D/4)

Rationale:

Preventive measures are cost-effective, less risky and better received by patients. (Aquila, 2001; Wallis and Autar, 2001; Launius and Graham, 1998)

Health education materials help to reinforce verbal instruction on the prevention of DVT / VTE and lead to increased patient compliance to treatments. (Pout, Wimperis and Dilks, 1999)

4.2.3 Graduated Elastic Compression Stockings (GECS)

- For patient with low DVT / VE risks of 7-10, consider use of GECS in addition to early ambulation and education. (D/4)

4.2.3.1 Contraindications for the use of GECS

- In patient with current arterial insufficiency disease, do not use GECS. (B/2++)

Rationale:

Wearing of GECS for long periods compromises blood supply to the lower limbs especially in patients with arterial insufficiency. (Heath, Kent and Young et al, 1987; Registered Nurses Association of Ontario, 2004)

4.2.3.2 Measurement of GECS

- Measure GECS to fit the patient according to manufacturer’s recommendation. (D/4)

Rationale:

Health care providers play a key role in the prevention of DVT / VTE in hospitalized patients. They have to be knowledgeable in this subject to achieve positive patients’ outcomes by prompt initiation of preventive measures and treatment for DVT / VTE. (Aquila, 2001; Launius and Graham, 1998)

GECS must be worn properly to ensure that there is no bunching-up of stockings. Multiple layers can cause tourniquet effect and swelling of the leg. (Joanna Briggs Institute, 2001)

Stockings need to fit properly and be applied correctly. If applied too tightly, they may exert a tourniquet effect, thereby promoting venous stasis causing redness and skin breakdown. If applied too loosely, the stocking will not provide adequate compression. (Aquila 2001; Wallis and Autar, 2001)
4.2.3.3 Type of GECS

• Use above knee GECS to prevent DVT.  
  \( \text{(A/1++)} \)

**Rationale:**

Above knee GECS are preferred than knee length GECS in preventing DVT. Thigh length GECS were significantly better at preventing postoperative DVT than the knee-length stockings.  
(Howard, Zaccagnini and Ellis et al, 2004)

Above knee GECS are effective in reducing risk of DVT in moderate risk surgical (non-orthopaedic) patients.  
(Joanna Briggs Institute, 2001)

Use of above knee GECS at the initial stage of hospitalization for acute stroke immobile patients reduces the risk of early DVT.  
(Muir, Watt and Baxter et al, 2000)

4.2.4 Intermittent Pneumatic Compression Devices (IPCD)

4.2.4.1 Indications

• For patient with moderate DVT / VE risks of >11, use of IPCD may be considered in addition to early ambulation, education and GECS  
  \( \text{(D/4)} \)

**Rationale:**

The moderate to high risk group are more susceptible to developing DVT.  
(Autar, 1996)

• IPCD and GECS are recommended for surgical patients.  
  \( \text{(D/4)} \)

**Rationale:**

IPCD with GECS is recommended in surgical patients to increase efficacy in reducing the incidence of DVT.  
(SIGN, 2002)

4.2.4.2 Types of IPCD

• Apply calf-thigh IPCD to prevent DVT after non-lower extremity trauma.  
  \( \text{(B/1+)} \)

**Rationale:**

Calf-thigh IPCD prevents DVT more effectively than plantar IPC after major trauma without lower extremity injuries.  
(SIGN, 2002; Elliott, Dudney and Egger et al, 1999)

There is a three times increased risk of DVT (95% CI: 1.1- 9.4) in plantar IPC compared to calf-thigh IPCD.  
(Elliott et al, 1999)

Calf-thigh IPCD compresses more tissues and results in greater local fibrinolysis.  
(SIGN, 2002)

4.2.4.3 Application of IPCD

• Ensure that the sleeve of the IPCD is properly applied, well fitted and the device in operation at all times.  
  \( \text{(D/4)} \)

• Remove the sleeves of the IPCD at specified intervals daily to inspect the skin for redness or sign of skin break down.  
  \( \text{(D/4)} \)

**Rationale:**

Proper application of the sleeves for IPCD and checking of the skin condition are important to ensure effectiveness of IPCD and prevent skin break down.  
(Aquila, 2001)
4.2.5 Prophylactic anticoagulation

- For patient with moderate DVT / VE risks of >11, consider addition of anticoagulation in addition to early ambulation, education and use of GECS to prevent or minimise risk of developing DVT / VE.
  
  (D/4)

- Use a combination of above knee GECS and low molecular weight heparin (LMWH) to prevent DVT for post operative patients who are at risk of developing DVT.
  
  (A/1++)

Rationale:
In patients who are at low or moderate risk of developing DVT, prophylaxis treatment using a combination of above knee GECS and LMWH can prevent DVT.
  
  (Howard et al, 2004)

A combination of GECS and LMWH is more effective in reducing the risk of developing DVT in post operative patients than GECS alone.
  
  (Amaragir and Lees, 2005)

4.2.6 Combination Therapy

- IPCD is recommended as an adjunct therapy to pharmacological prophylaxis.
  
  (D/4)

Rationale:
Physical compression complements pharmacological interventions.
  
  (Geerts, Pineo and Heit et al, 2004)

4.3 Reassessment and monitoring

4.3.1 Frequency of Reassessment

- Reassess for risk of DVT when there is a change in patient medical condition and mobility status.

  (B/2++)

Rationale:
Reassessment should be performed as risk of DVT may change as medical condition changes.

  (Autar, 1996)

4.3.2 Monitoring, assessment and skin care of lower limbs

- In patient with GECS, monitor circulation of lower limbs daily by removing the GECS. Do not remove GECS for more than 30 minutes daily.

  (D/4)

- Remove GECS once a day to allow skin care, hygiene and assessment of skin.

  (D/4)

- In patient with history of arterial insufficient disease, reassess and monitor the neurovascular status more frequently.

  (D/4)

Rationale:
Regular monitoring of neurovascular status is required to assess perfusion status. If GECS is tight fitting, bunched up or folded down, circulation to the limbs may be impaired.

  (Joanna Briggs Institute, 2001; SIGN, 2002)
5 QUALITY ASSURANCE

Healthcare administrators should consider these guidelines in their in-house quality assurance programmes. Nurses should critically review the implications of these guidelines for their routine care delivery, trainee teaching and patient education needs.

5.1 Parameters for Evaluation

In the nursing management for prevention of DVT / VTE in hospitalized patients, the quality of care may be evaluated using indicators such as:

- Prevalence rate of DVT / VTE in hospitalized patients

- Knowledge of health care workers in DVT / VTE assessment, risk factors, signs and symptoms, nursing interventions, medical treatment, and correct technique in application of GECS and IPCD. (Refer to Appendix 3 – Self Assessment)

Closer monitoring can be conducted for further evaluation of the quality of DVT / VTE nursing management.

5.2 Management Role

Healthcare administrators, together with quality assurance teams, should ensure that the targets for the outcome indicators are met. They may benchmark against hospitals or institutions that perform well.

6 IMPLEMENTATION OF GUIDELINES

It is expected that these guidelines will be adopted after discussion with healthcare administrators and clinical staff. They may review how these guidelines may complement or be incorporated into their existing institution protocols.

Feedback may be directed to the Ministry of Health for consideration for future review.


WORKGROUP MEMBERS

Chairperson:
Clair Khoo Siok Hiang
MSN (ACNP), BSc (Hon) Nursing Studies, APN (S’pore), CRNP (USA-Penn), Post-Grad Cert (Teaching), RN, Post-Basic Cert (INCC)

Members:
Ang Seok Khim
BHSN, RN, Post-Basic Cert (INCC)

Chng Mui Lee
MN, BHSN, RN, Adv Dip (MHN)

Giam Poh Eng
BHSN, RN, RM, Post-Basic Cert (MCN)

Lau Yoke Cheng
BHSN, RN, SCM, Post-Basic Cert (ONC)

Lee Poh Kim
RN, Higher Dip (Med/Surg)

Ng Wai May
BHSN, RN, Adv Dip (NSN)

Ng Yan Hoon
BHSN, RN, Adv Dip (GN)

Sia Yee Sim
RN, SCM

Wang Xiao Bei
BHSN, RN

Secretariat:
Serena Koh Siew Lin
RN, RM, BSc (Hons) Nursing Studies, Adv Dip (Midwifery)

External Consultants:
Dr Edwin Chan Shih-Yen
BSc, BCMS, PhD
Director / Head of Evidence-based Medicine
Clinical Trials & Epidemiology Research Unit

Dr Miny Samuel
PhD, MSc
Evidence-based Medicine Analyst
Clinical Trials & Epidemiology Research Unit

External Reviewer:
Dr Cosmas Chen Yun Yin
MBBS(S’pore), FRAS(Edinburgh), MMed(Surgery), FAMS
Cosmas Chen General Surgery & Vascular Centre Pte Ltd
### APPENDIX 1  DVT RISK ASSESSMENT SCALE

#### Name:
Adm No:
Ward:
Room / Bed No:

#### AGE SPECIFIC GROUP

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 - 20</td>
<td>0</td>
</tr>
<tr>
<td>21 - 30</td>
<td>1</td>
</tr>
<tr>
<td>31 - 40</td>
<td>2</td>
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<td>41 - 50</td>
<td>3</td>
</tr>
<tr>
<td>51 - 60</td>
<td>4</td>
</tr>
<tr>
<td>61 and +</td>
<td>4</td>
</tr>
</tbody>
</table>

#### BUILD

<table>
<thead>
<tr>
<th>BMI Group</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight (16 - 19)</td>
<td>0</td>
</tr>
<tr>
<td>Average (20 - 25)</td>
<td>1</td>
</tr>
<tr>
<td>Overweight (26 - 30)</td>
<td>2</td>
</tr>
<tr>
<td>Obese (31 - 40)</td>
<td>3</td>
</tr>
<tr>
<td>Very Obese (41 and +)</td>
<td>4</td>
</tr>
</tbody>
</table>

#### MOBILITY

<table>
<thead>
<tr>
<th>Level</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>Ambulant</td>
<td>0</td>
</tr>
<tr>
<td>Limited (seats still)</td>
<td>1</td>
</tr>
<tr>
<td>Very Limited (requires help)</td>
<td>2</td>
</tr>
<tr>
<td>Chair Bound</td>
<td>3</td>
</tr>
<tr>
<td>Complete Bed Rest</td>
<td>4</td>
</tr>
</tbody>
</table>

#### SPECIAL RISK CATEGORY

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contraceptive Kill (20 - 35 years)</td>
<td>1</td>
</tr>
<tr>
<td>Contraceptive Kill (26 - 40 years)</td>
<td>2</td>
</tr>
<tr>
<td>Pregnancy/Puerperum</td>
<td>3</td>
</tr>
</tbody>
</table>

#### TRAUMA RISK FACTORS

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest</td>
<td>1</td>
</tr>
<tr>
<td>Head &amp; Face</td>
<td>2</td>
</tr>
<tr>
<td>Spinal</td>
<td>2</td>
</tr>
<tr>
<td>Pelvic</td>
<td>3</td>
</tr>
<tr>
<td>Lower Limb</td>
<td>4</td>
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</tbody>
</table>

#### SURGICAL INTERVENTIONS

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor Surgery  &lt;30 mins</td>
<td>1</td>
</tr>
<tr>
<td>Major Surgery</td>
<td>2</td>
</tr>
<tr>
<td>Emergency Major Surgery</td>
<td>3</td>
</tr>
<tr>
<td>Pelvic</td>
<td>3</td>
</tr>
<tr>
<td>Thoracic</td>
<td>3</td>
</tr>
<tr>
<td>Abdominal</td>
<td>3</td>
</tr>
<tr>
<td>Orthopaedic (below waist)</td>
<td>4</td>
</tr>
<tr>
<td>Spinal</td>
<td>4</td>
</tr>
</tbody>
</table>

#### ASSESSMENT PROTOCOL

<table>
<thead>
<tr>
<th>Score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6</td>
<td>No Risk</td>
</tr>
<tr>
<td>7 - 10</td>
<td>Low Risk</td>
</tr>
<tr>
<td>11 - 15</td>
<td>Moderate Risk</td>
</tr>
<tr>
<td>&gt;15</td>
<td>High Risk</td>
</tr>
</tbody>
</table>

#### SCORING

1. Identify appropriate items, and record the scores below.

<table>
<thead>
<tr>
<th>Assessor</th>
<th>Date</th>
<th>Score</th>
</tr>
</thead>
</table>

#### HIGH RISK DISEASES

- Ulcerative Colitis 1
- Aneurysm 2
- Prothrombosis 2
- Haemorrhagic 3
- Chronic Heart Disease 3
- Myocardial Infarction 4
- Venous Stasis 5
- Previous DVT or CVA 6
- Previous DVT or CVA 7

(Adapted from Auer, 2003)

### APPENDIX 2  PATIENT EDUCATION GUIDE

#### PATIENT / FAMILY INFORMATION SHEET

**What is Deep Vein Thrombosis?**
Deep Vein Thrombosis, or DVT, is a condition in which blood clots form in a vein deep in the body.

**Who are at risk for developing DVT?**
Those who:
- have undergone major surgery
- have medical condition such as varicose veins, heart failure, acute myocardial infarction, cancer, stroke etc
- are inactive and on prolonged bed rest
- are obese
- are on birth control pills or hormone therapy
- are 60 and above
- are smokers

**What are the ways to minimise risks of DVT?**
- Early ambulation
- Drink lots of water
- Use of elastic stockings if prescribed
- Take oral medications as prescribed

**What are the signs & symptoms of DVT?**
- Swelling
- Pain
- Warm
- Tenderness
- Red or discoloured skin on the affected limb

**How is DVT diagnosed?**
Your doctor will obtain a medical history and examine you to determine if DVT is present. To confirm the diagnosis, special tests may be ordered by your doctor.
How is DVT treated?
Depending on the severity of your condition, you may be given oral medication or injection to treat DVT.

If you have any questions about DVT, please ask your doctors or nurses.

APPENDIX 3    SELF ASSESSMENT

1. Which of the following age group of patients has the HIGHEST risk of developing DVT / VTE?
   (a) 31-40
   (b) 41-50
   (c) 51-60
   (d) 61 and above

2. The frequency of assessing for DVT/VTE risk is
   (a) once per shift
   (b) any change in medical condition and mobility status
   (c) once upon admission
   (d) once per day

3. The DVT / VTE risk assessment score for a patient is 11, the appropriate intervention is
   (a) Education, ambulation, GECS, and/or IPC, immediate medical attention
   (b) Education, ambulation, GECS, IPC and medical attention
   (c) Education, ambulation and/or GECS
   (d) Education, ambulation

4. The preferred length of GECS is
   (a) waist length
   (b) calf length
   (c) above knee length
   (d) below knee length

5. The duration for removal of GECS for daily skin inspection, hygiene and skin care should not exceed
   (a) 5 minutes
   (b) 10 minutes
   (c) 20 minutes
   (d) 30 minutes
6. GECS should NOT be used for patient with medical / surgical history of
   (a) stroke
   (b) fracture of lower limbs
   (c) peripheral arterial insufficiency
   (d) peripheral venous insufficiency

7. The preferred length of IPC is
   (a) plantar length
   (b) calf length
   (c) above knee length
   (d) below knee length

8. The trauma risk fraction score in the DVT risk assessment tool for a
   patient with pelvis injury is
   (a) 3
   (b) 4
   (c) 1
   (d) 2

9. Education of patient on DVT / VTE prevention should be initiated
   (a) upon admission
   (b) upon transfer
   (c) upon discharge
   (d) as soon as possible, when clinical condition permits

10. Which of the following nursing interventions is MOST effective in
     prevention of DVT?
    (a) use of GCES
    (b) use of IPC
    (c) implement patient education on DVT/VTE prevention
    (d) encourage early ambulation when medical condition permits

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answer</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(d)</td>
<td>Refer to Appendix1</td>
</tr>
<tr>
<td>2</td>
<td>(b)</td>
<td>Refer to 4.1.2</td>
</tr>
<tr>
<td>3</td>
<td>(b)</td>
<td>Refer to 4.1.3</td>
</tr>
<tr>
<td>4</td>
<td>(c)</td>
<td>Refer to 4.2.1</td>
</tr>
<tr>
<td>5</td>
<td>(d)</td>
<td>Refer to 4.2.4</td>
</tr>
<tr>
<td>6</td>
<td>(c)</td>
<td>Refer to 4.2.5</td>
</tr>
<tr>
<td>7</td>
<td>(b)</td>
<td>Refer to 4.3.3</td>
</tr>
<tr>
<td>8</td>
<td>(a)</td>
<td>Refer to Appendix1</td>
</tr>
<tr>
<td>9</td>
<td>(d)</td>
<td>Refer to 4.5</td>
</tr>
<tr>
<td>10</td>
<td>(d)</td>
<td>Refer to 4.4</td>
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