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Department of Neurosurgery

Institution Name: Directorate General of Khoula hospital

Document Title: Protocol for Venous Thrombo-Embolism Prophylaxis in Neurosurgery

Approval Process

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Contents Table:

Acronyms:

HRT	Hormonal replacement therapy
UFH	Unfractionated heparin
VTE	Venous thromboembolism
DVT	Deep vein thrombosis
INR	International normalized ratio
BMI	Body mass index
LMWH	Low molecular weight heparin
SIADH	Syndrome of inappropriate secretion of ADH
PE	Pulmonary embolism
s.c	Subcutaneous
U	Units

Protocol for Venous Thrombo-Embolism Prophylaxis in Neurosurgery

1. Introduction

DVT occurs in over 50% of some categories of hospitalized patients although many are asymptomatic. It prolongs the length of hospital stay, increases drug and laboratory costs and causes potentially fatal PE. PE remains the commonest cause of preventable death; 1% of all hospital admissions will die from this.

Traditionally in neurosurgery, specially trauma, it was regarded that patients who have venous thromboembolism was low. Over the recent years, this has been found to be much higher and was erroneously being under-reported.

Emphasis of balancing the risk of intracranial / spinal bleeding versus the risk of VTE has to be weighed. This balance is extremely precarious and needs to be finely tuned on an individual basis. This document aims to help in guiding the clinician in the use of VTE in neurosurgery patients.

2. Scope

This policy of Directorate General of Khoula hospital applies to all neurosurgery Surgeons, Nurses, pharmacist who are involved in the care of patients admitted with neurosurgery ailments.

3. Purpose

3.1. To create uniform guidelines for preventing Venous Thromboprophylaxis in neurosurgery patients.

4. Definition:

4.1. Venous Thrombo Embolism (VTE) is a spectrum of disease, ranging from asymptomatic calf vein thrombosis to symptomatic deep vein thrombosis (DVT), which may lead to potentially fatal pulmonary embolism (PE).

5. Policy

It is policy of Directorate General of Khoula Hospital to ensure:

5.1 Applicability of the Document:

5.1.1. Adults (18 years and older) admitted in Neurosurgery department including:

A. Patients with risk factors.

B. Brain tumour patients, admitted for surgery with special considerations, like post myocardial infarctions, excessive body mass index, previous VTE, on HRT, or patients with hypercoagulable states etc.

C. Trauma inpatients – traumatic brain injury patients with or without polytrauma

D. Neurosurgery patients admitted to intensive care units

E. Spinal injury patients

F. Stroke patients

5.1.2. Patients undergoing long-term rehabilitation in hospital

5.1.3. Patients admitted to a hospital bed for day care medical or surgical procedures.

5.2 Assessing and defining the risks of VTE and Bleeding:

5.2.1 VTE Risk :

A. Non Operated Patients at increased risk:

i. If mobility is significantly reduced for more than 3 days and expected to have on-going reduced mobility relative to normal state plus any VTE risk factor.

ii. Patients with Neurosurgery problems

iii. Active peripheral cancer or cancer treatment

iv. Age > 35 years

v. Critical care admissions

vi. Dehydration
vii. Excess blood loss or blood transfusion
viii. Known thrombophilia
ix. Obesity (pre-pregnancy or early pregnancy BMI > 30 kg/m2)
x. Significant medical comorbidity (such as heart disease, metabolic, endocrine or respiratory pathologies, acute infectious diseases or inflammatory conditions)
xi. Personal history or first-degree relative with history of VTE

B. Neurosurgical patients and patients with trauma at increased risk:

i. If total anaesthetic and surgical time is more than 90 minutes
ii. If surgery involves pelvis or lower limb and total anaesthetic + surgical time more than 60 minutes
iii. If acute surgical admission with inflammatory or intra-abdominal condition or if expected to have significant reduction in mobility
iv. If any VTE risk factor present.

5.2.2 Bleeding Risk

A. Presence of active bleeding

i. Concurrent use of anticoagulants known to increase the risk of bleeding (such as warfarin with INR > 2)
ii. Lumbar puncture/epidural/spinal anaesthesia within the previous 4 hours or expected within the next 12 hours.

B. Predisposition

i. Presence of Acute ischaemic stroke
ii. Thrombocytopenia (platelets < 50000/mm3)
iii. Uncontrolled systolic hypertension (≥ 230/120 mmHg)

iv. Untreated inherited bleeding disorders (such as haemophilia or von Willebrand's disease)
v. History of Gastrointestinal Bleeding
vi. Severe Liver Disease with INR > 1.3

5.3 Reducing the risk of VTE:

5.3.1 Physical Methods

A. Prevent Dehydration unless clinically indicated (SIADH / cardiac failure etc).
B. Encourage patients to mobilize as soon as possible.
C. Consider offering temporary inferior vena-cava filters to patients who are at very high risk of VTE (such as patients with a previous VTE event or an active malignancy) and for whom mechanical and pharmacological VTE prophylaxis are contraindicated.

5.4 VTE Prophylaxis:

5.4.1: Choice of VTE prophylaxis

A. Consider the choice of Mechanical VTE prophylaxis as per the clinical condition, surgical procedure and patient preference. (see appendix 1) Choose any one of:

i. Anti-embolism stockings (thigh or knee length)
ii. Intermittent pneumatic compression devices (thigh or knee length).

B. Consider the choice of Pharmacological VTE prophylaxis on clinical condition (for example,renal failure) and patient preference either of following can be used

i. Low Molecular Weight Heparin (eg. Enoxaparin)
ii. Dalteparin 5000 U s.c. ONCE DAILY

iii. Fondaparinux 2.5 mgs s.c.ONCE DAILY

iv. Unfractionated Heparin 5000 U s.c. THREE TIMES A DAY

5.4.2 Duration:

A. Duration of VTE Prophylaxis should be individualized.

B. Continue until mobility no longer significantly reduced (Usually 5 – 7 days) and patient no longer at increased risk of VTE.

C. For patients who are admitted for a major surgery in abdomen and pelvis (specially for tumours) requiring admission to neurosurgery , continue pharmacological VTE prophylaxis for at least 28 days after surgery.

D. For Knee Replacement and admitted for neurosurgery, continue pharmacological VTE prophylaxis for 10–14 days, unless contraindicated from the neurosurgery perspective.

E. For Hip Replacement and admitted for neurosurgery, continue pharmacological VTE prophylaxis for 28 – 35 days, unless contraindicated from the neurosurgery perspective.

5.4.3 DVT Prophylaxis is a must for:

A. Patients with BMI >30

B. Females on HRT or oral contraceptive pills

C. Non ambulant patient

D. Hyper-coagulatory state

E. Increased Hemoglobin

F. Chronic Smokers

G. Chronically ill patients.

5.4.4 No Prophylaxis is recommended for :

A. Hemorrhagic Strokes

B. On anticoagulants / antiplatelets - stop and convert to LMWH / UFH

C. On Warfarin with INR > 2

D. Liver Dysfunctions with INR > 1.3

E. Increased bleed tendencies.

6 . Procedure:

This process should be followed by Neurosurgery Doctor.

6.1. Approach to Patient:

6.1.1. Assess VTE risk in all patients at admission

6.1.2. Assess Bleeding Risk in all patients at admission

6.1.3. Balance the risks of VTE and Bleeding

6.1.4. Offer VTE prophylaxis if appropriate. Do not offer pharmacological VTE prophylaxis if patient has any risk factor for bleeding and risk of bleeding outweighs risk of VTE.

6.1.5. Reassess the risks of VTE and Bleeding within 24 hours of admission and whenever clinical situation changes.

6.2 VTE Prophylaxis:

6.2.1 Patients with Medical problems and Critical Care:

A. Offer pharmacological VTE prophylaxis to medical patients assessed to be at increased risk of VTE. Choose any one of mentioned above.

B. Start pharmacological VTE prophylaxis as soon as possible after risk assessment has been completed – refer to the charts.

C. Continue until the patient is no longer at increased risk of VTE.

D. Consider Mechanical Prophylaxis for patients in whom pharmacological VTE prophylaxis is contraindicated. Intermittent Pneumatic Compression Devices is considered the best in these patients and is mandated. .

6.2.2 Stroke Patients:

A. Do not use anti-embolism stockings for VTE prophylaxis.
B. If Hemorrhagic Stroke is excluded and risk of bleeding is low, consider offering prophylactic dose LMWH or UFH if at increased VTE Risk.
C. Until the patient can have pharmacological VTE prophylaxis, use intermittent pneumatic compression device.

6.2.3 Patient with Central Venous Catheter:

A. Consider pharmacological VTE prophylaxis with LMWH (UFH for patients with renal failure) to patients with central venous catheters who are at increased risk of VTE

6.2.4 Special Considerations:

A. Start VTE prophylaxis for patients already having anti-platelet or anticoagulant therapy to treat other conditions
B. Consider offering additional mechanical or pharmacological VTE prophylaxis if patient is at risk of VTE.
C. If the risk of VTE outweighs the risk of bleeding, consider offering pharmacological VTE prophylaxis according to the reason for admission.
D. If the risk of bleeding outweighs the risk of VTE, offer mechanical VTE prophylaxis.
E. Do not offer additional pharmacological or mechanical VTE prophylaxis to patients who are taking vitamin K antagonists and who their INR is within therapeutic range, providing anticoagulant therapy is continued.

7. Responsibilities

7.1. Head of department of Neurosurgery and unit heads shall:

7.1.1. Ensure that the policy is available and accessible to all staff.

7.1.2. Encourage all staff to be aware of this policy and strictly follow it.

7.2. Neurosurgery doctors shall:

7.2.1. Ensure to follow the policy strictly.

7.2.2. Encourage the nursing staff to adhere to the protocol.

7.3. Staff Nurse shall:

7.3.1. Ensure to follow the policy strictly.

7.3.2. Administer the prophylaxis medication/ hydration solution as prescribed by the treating doctor.

7.4 Pharmacist shall:

7.4.1 Ensure the timely supply of necessary modalities of treatment.

8. **Document History and Version Control**

Document History and Version Control			
Version	**Description of Amendment**	**Author**	**Review Date**
01	Initial Release	Dr. Sharad Samson Dr. Pravinchandra Kharangate	2021
02			
03			
04			

Written by	**Reviewed by**	**Approved by**
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9. Attachment

9.3. Alogrithm for VTE prophylaxis in neurosurgery patients.

10. References:

Title of book/ journal/ articles/ Website	Author	Year of publication	Page
1. https://www.nice.org.uk/guidance/cg92/evidence/full-guideline-243920125			
2. https://www.guideline.gov/summaries/summary/44342/deep-venous-thrombosis-andthromboembolism-in-patients-with-cervical-spinal-cord-injuries-in-guidelines-for-themanagement-of-acute-cervical-spine-and-spinal-cord-injuries?			
3. https://www.guideline.gov/summaries/summary/43752/traumatic-brain-injury-medicaltreatment-			
4. https://www.guideline.gov/summaries/summary/49437/venous-thromboembolism-in-adultsadmitted- to-hospital-reducing-the-risk?			
5. https://www.guideline.gov/summaries/summary/48145/prophylaxis-and-treatment-of-venousthromboembolism-in-patients-undergoing-treatment-for-solid-tumours?			
6. Combined anti platelet and anticoagulant therapy: clinical benefits and risks;, Journal of Thrombosis and Haemostasis, 5(Suppl. 1): 255-263	Eikelboom J.W, Hirsh J		

Appendix 1

ALOGRITHM FOR VTE PROPHYLAXIS IN NEUROSURGERY PATIENTS

1. Cranial Pathology

	Intra-Op (< 3 hrs)	Intra-op (> 3 hrs)	Post-op
Tumours	Nil	Mechanical Chemical +/-	Mechanical Chemical - After 3 days
Strokes	Immediate / Perioperative		
Hemorrhagic	Mechanical		Mechanical Chemical - After 3-7 days
Ischaemic (Treated)	Mechanical		Mechanical Chemical - After 3-7 days
Ischaemic (Untreated)	Mechanical Chemical +/-		Mechanical Chemical

2. Spinal Pathology

Status	Preop	Intra-Op (< 2hrs)	Intra-op (>2hrs)	Post-op
Ambulant	Nil	Nil	Mechanical	Mechanical Chemical - After 3-7 days - if there are post-op deficits.
Restricted / Limited Mobility (<2.5kms/day)	Mechanical Chemical +/-	Mechanical Chemical +/-	Mechanical Chemical +/-	Mechanical Chemical - After 3-7 days
Immobile (Bed/Wheelchair)	Mechanical Chemical +/-	Mechanical Chemical +/-	Mechanical Chemical +/-	Mechanical Chemical - After 3-7 days

3. Neurotrauma

	Intra-Op (< 2hrs)	Intra-op (>3 hrs)	Post-op
Surgical	Nil	Mechanical	Mechanical Chemical - After 3-7 days
Non Surgical			
No Bleed / Contusion	Mechanical		Mechanical Chemical - After 24-48 hours (CT shows no hematomas)
Bleeds/Contusion	Mechanical		Mechanical Chemical - After 3-7 days

4. Chemical treatment should be started only after coagulation profile and platelets are in normal range and CT scan brain is acceptable from bleeding point of view.

5. **PROPHYLAXIS SUGGESTED**

- Enoxaparin 40 mgs s.c. OD
- Dalteparin 5000 U s.c. OD
- Fondaparinux 2.5 mgs s.c. OD
- Unfractionated Heparin 5000 U s.c. TDS