

Bon Secours Richmond
Pharmacy & Therapeutics Committees
Prevention of Venous Thromboembolism
1/06

Recommendations:

- A print printed physician order form will be developed for the committees review, see attached example.

- Risk stratification Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy: Evidence-Based Guidelines

Level of Risk	DVT %		PE %		Successful Prevention Strategies
	Calf	Proximal	Clinical	Fatal	
Low risk (1 Risk Factor) Minor surgery in patients < 40 years with no additional risk factors	2	0.4	0.2	Less than 0.01	No specific prophylaxis; early and persistent mobilization
Moderate (2 Risk Factors) Minor surgery in patients with additional risk factors; Surgery in patients 40-60 years with no additional risk factors	10-20	2-4	1-2	0.1-0.4	LDUH <i>Q12h</i> , LMWH daily, GCS, or IPC
High risk (3-4 Risk Factors) Surgery in patients greater than 60 years, or age 40-60 years with additional risk factors (prior VTE, cancer, hypercoagulability)	20-40	4-8	2-4	0.4-1	LDUH <i>q8h</i> , LMWH daily, or IPC
Highest risk (5 or more Risk Factors) Surgery in patients with multiple risk factors (age greater than 40 years, cancer, prior VTE) Hip of knee replacement, hip fracture surgery, Major trauma, spinal cord injury	40-80	10-20	4-10	0.2-5	Warfarin, LMWH, or IPC/GGS plus LDUH/LMWH

*GSC (graduated compression stockings), IPC (intermittent pneumatic compression devices)

Cost Analysis			
	\$ per Dose	Doses per Day	Cost per Day
Arixtra 2.5 mg	\$21.30	1	\$21.30
Fragmin 2500 Internation Units	\$14.64	1	\$14.64
Fragmin 5000 Internation Units	\$23.76	1	\$23.76
Heparin 5000 Units	\$0.54	2	\$1.08
Heparin 5000 Units	\$0.54	3	\$1.62
Lovenox 30 MG	\$13.69	2	\$27.38
Lovenox 40 MG	\$18.26	1	\$18.26

Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy: Evidence-Based Guidelines

General Surgery	
Risk Group	Recommended Prophylaxis
Low-risk <ul style="list-style-type: none"> Minor procedure in patients less than 40 years, with no additional risk factors 	<ul style="list-style-type: none"> Early and persistent ambulation
Moderate-risk <ul style="list-style-type: none"> Minor procedure, with additional risk factors for thrombosis; Non-major surgery in patients 40-60 years Major surgery in patients less than 40 years, with no additional risk factors 	<ul style="list-style-type: none"> Low dose unfractionated heparin (<i>LDUH</i>) 5000 units q12h or Low molecular weight heparin (LMWH) once daily or Graded compression stockings (GCS) or Intermittent pneumatic compression devices (IPC)
Higher-risk <ul style="list-style-type: none"> Non major surgery in patients greater than 60 years or with additional risk factors Major surgery in patient greater than 40 years, or with additional risk factors 	<ul style="list-style-type: none"> <i>LDUH</i> 5000 unit q8h or LMWH once daily or Intermittent pneumatic compression devices (IPC)
High Risk with multiple risk factors	<ul style="list-style-type: none"> <i>LDUH</i> 5000 units q8h or LMWH daily, combined with mechanical methods (GCS and/ or IPC)
Patients with greater than usual risk for bleeding	<ul style="list-style-type: none"> Mechanical prophylaxis with GCS or IPC, at least initially until the bleeding risk decreases.
Post hospital discharge prophylaxis of selected high risk patients, including those who have undergone major cancer surgery	<ul style="list-style-type: none"> LMWH
Additional risk factors include: cancer, previous VTE, obesity, varicose veins, estrogen use, increasing age	

Burns	
Burns with one or more additional risk factors (advanced age, morbid obesity, extensive or lower extremity burns, concomitant lower extremity trauma, use of a femoral venous catheter, and/or prolonged immobility)	<ul style="list-style-type: none"> <i>LDUH</i> or LMWH as soon as it is considered safe to do so.

Critical Care Patients	
Moderate Risk (medically ill or postoperative)	<ul style="list-style-type: none"> <i>LDUH</i> or LMWH
High Risk (such as major trauma, orthopedic surgery)	<ul style="list-style-type: none"> LMWH
High risk of bleeding	<ul style="list-style-type: none"> GCS and/or IPC until the bleeding risk decreases

Gynecologic Surgery	
Brief procedure (less than 30 minutes) for benign disease	<ul style="list-style-type: none"> Early and persistent mobilization
Laparoscopic gynecologic procedures with additional risk factors	<ul style="list-style-type: none"> <i>LDUH</i> or LMWH with or without IPC or GCS
Major gynecologic surgery for benign disease with no additional risk factors	<ul style="list-style-type: none"> <i>LDUH</i> twice daily or LMWH daily or IPC device started just before surgery and used continuously while the patient is not ambulating
Extensive surgery for malignancy or patients with additional risk factors	<ul style="list-style-type: none"> <i>LDUH</i> 5000 units three times a day or LMWH daily or IPC device unit discharge or <i>LDUH</i> heparin 5000 units q8h or LMWH daily plus mechanical prophylaxis with GCS or IPC
Post discharge prophylaxis for high risk, including those who have undergone cancer surgery and who are greater than 60 years or age or have previously experienced a VTE	<ul style="list-style-type: none"> Continue prophylaxis for 2-4 weeks post discharge
Additional risk factor include: malignancy, older age, previous VTE, prior pelvic radiation therapy, abdominal surgical approach	

Laparoscopic Surgery	
Laparoscopic Surgery	<ul style="list-style-type: none"> • Early and persistent mobilization
Laparoscopic Surgery with additional risk factors	<ul style="list-style-type: none"> • One or more of the following: LDUH or LMWH or IPC or GCS

Lower extremity injuries	
Isolated lower extremity injuries	<ul style="list-style-type: none"> • Prophylaxis not recommended

Medical Conditions	
CHF or severe respiratory disease or who are confined to bed and have one or more additional risk factors including: active cancer, previous VTE, sepsis, acute neurologic disease, or inflammatory bowel disease	<ul style="list-style-type: none"> • LDUH or LMWH • If anticoagulant prophylaxis is contraindicated: GCS or IPC device

Neurosurgery Surgery	
Intracranial neurosurgery	<ul style="list-style-type: none"> • IPC device, with or without GCS or • LDUH or postoperative LMWH • High-risk patients: ES or IPC device with LDUH or postoperative LMWH
High risk neurosurgery	<ul style="list-style-type: none"> • GCS and/or IPC and LDUH or LMWH
Risk factors for DVT: intracranial surgery (rather than spinal surgery), active malignancy, more lengthy procedures, the presence of leg weakness, and advanced age.	

Trauma, and Acute Spinal Cord Injury	
Trauma, with identifiable risk factor for thromboembolism	<ul style="list-style-type: none"> • LMWH, as soon as considered safe; if delayed, or contraindicated because of bleeding concerns: initial used of IPC, or GCS • If prophylaxis is suboptimal, offer duplex ultrasound screening of high-risk patients (spinal cord injury, lower extremity or pelvic fracture, major hear injury, or an indwelling femoral venous line) • If proximal DVT is demonstrated and full dose anticoagulation is contraindicated or planned major surgery in the near surgery, inferior vena cava filter insertion is recommended. Therapeutic anticoagulation should be started as soon as it is considered safe to administer. • NOT RECOMMENDED: IVC filter as primary prophylaxis
Continue prophylaxis until hospital discharge, including the inpatient rehabilitation period.	<ul style="list-style-type: none"> • LMWH or warfarin (Goal INR 2.5)
Acute spinal cord injury	<ul style="list-style-type: none"> • LMWH once primary hemostasis is evident or • IPC with either LDUH or LWMH once primary hemostasis is evident • IPC and/or GCS if early use of anticoagulants is contraindicated • Rehabilitation phase, LMWH, or adjusted dose oral anticoagulation (Goal INR 2.5) • NOT RECOMMENDED: LDUH, GCS, or IPC as single prophylaxis and IVCF as primary prophylaxis against PE
Continue prophylaxis during rehabilitation phase.	<ul style="list-style-type: none"> • LMWH or • Warfarin (Goal INR 2.5)

Orthopedic Surgery	
Elective Total Hip Replacement	<ul style="list-style-type: none"> Adjusted Dose Warfarin (Goal INR 2.5) or LMWH (Lovenox 30 mg q 12h) Continue prophylaxis for 28-35 days after surgery NOT RECOMMENDED: Aspirin, dextran, LDUH, GCS, IPC, or venous foot pump (VFP) as sole prophylaxis
Hip fracture surgery	<ul style="list-style-type: none"> Adjusted dose warfarin or LMWH (Lovenox 30 mg q 12 h) Continue prophylaxis for 28-35 days after surgery NOT RECOMMENDED: Aspirin as sole prophylaxis
High Bleeding Risk	<ul style="list-style-type: none"> IPC
Delayed surgery	<ul style="list-style-type: none"> LDUH or LMWH until surgery
Elective Total Knee Replacement	<ul style="list-style-type: none"> Adjusted Dose Warfarin (Goal INR 2.5) or LMWH (Lovenox 30 mg q 12h) or IPC Continue prophylaxis for at least 10 days NOT RECOMMENDED: Aspirin, LDUH, or VFP as sole prophylaxis
Knee Arthroscopy	<ul style="list-style-type: none"> Early mobilization
Knee Arthroscopy with additional risk factors	<ul style="list-style-type: none"> LMWH

Elective Spinal Surgery	
Spinal surgery	<ul style="list-style-type: none"> Early and persistent mobilization
Spinal surgery with additional risk factors such as advanced age, known malignancy, presence of a neurologic deficit, previous VTE or anterior surgical approach	<ul style="list-style-type: none"> LDUH or LMWH IPC or GCS
Multiple risk factors present	<ul style="list-style-type: none"> LDUH or LMWH with GCS and/or IPC

Urologic Surgery	
Transurethral surgery, or other low risk procedures	<ul style="list-style-type: none"> Early and persistent mobilization
Major, open procedures	<ul style="list-style-type: none"> LDUH 5000 units 2 to 3 times daily or LMWH or IPC and/or GCS
Urologic surgery patients who are actively bleeding or are at very high risk for bleeding	<ul style="list-style-type: none"> GCS and /or IPC at least until the bleeding risk decreases
Highest risk (multiple risk factors)	<ul style="list-style-type: none"> GCS and/or IPC device added to LDUH or LMWH
Additional risk factors: advanced age, malignancy, use of the lithotomy position intraoperatively, pelvis surgery with or without lymph node dissection, open procedures, and longer duration procedures	

Vascular Surgery	
Vascular surgery without additional thromboembolic risk factors	<ul style="list-style-type: none"> Prophylaxis not recommended
Major vascular surgery with additional risk factors	<ul style="list-style-type: none"> LDUH or LMWH
Additional risk factors include: advanced age, limb ischemia, long duration of surgery, intraoperative local trauma	

Findings:

- LDUH versus LMWH
 - Advantages of LMWH prophylaxis
 - Once daily administration
 - Lower risk of heparin induced thrombocytopenia
 - Disadvantages of LMWH
 - More expensive
 - Less reversible (50% reversibility with protamine)
 - No difference in DVT, PE or bleeding
- Risk factors for DVT
 - Acute medical illness
 - Acute MI
 - Age > 40 years, risk increases with age
 - Cancer therapy (hormonal, chemotherapy, or radiotherapy)
 - Central venous catheterization
 - Coagulopathy
 - Estrogen-containing oral contraception, hormone replacement therapy, selective estrogen receptor modulators
 - Heart failure
 - History of DVT/PE
 - Immobility; paresis
 - Increasing age
 - Inflammatory bowel disease
 - Inherited or acquired thrombophilia
 - Malignancy
 - Myeloproliferative disorders
 - Nephrotic syndrome
 - Obesity
 - Paralysis
 - Paroxysmal nocturnal hemoglobinuria
 - Pneumonia
 - Pregnancy and the postpartum period
 - Respiratory failure
 - Previous VTE
 - Selective estrogen receptor modulators
 - Sepsis
 - Smoking
 - Surgery
 - Trauma (major or lower extremity)
 - Thrombophilic disorders: Factor V Leiden (Activated protein C resistance); Protein C, S, or antithrombin deficiencies; antiphospholipid antibodies; Prothrombin 20210A; homocysteinemia
 - Varicose veins
- Absolute risk of DVT in Hospitalized Patients not receiving thromboembolism prophylaxis (DVT prevalence)
 - Medical patients 10-20%
 - General Surgery 15-40%
 - Major gynecologic surgery 15-40%
 - Major urologic surgery 15-40%
 - Neurosurgery 15-40%
 - Stroke 20-50%
 - Hip or knee arthroplasty, hip fracture surgery 40-60%
 - Major trauma 40-80%
 - Spinal cord injury 60-80%
 - Critical care patients 10-80%
- Mechanical Methods of Prophylaxis
 - IPC should be started just before surgery, used continuously while the patient is not ambulating, and stopped just before hospital discharge.
 - Use in patients at high risk of bleeding
 - As an adjunct to anticoagulant based prophylaxis
 - Are less efficacious than anticoagulant based options
 - Have not been shown to reduce the risk of death or PE
 - Mechanical methods have relatively poor compliance
 - GCS should be used with caution in patients with arterial insufficiency
- Aspirin prophylaxis for VTE is not recommended in any group

- Absolute Contraindications
 - Active bleeding
 - Severe bleeding diathesis or platelet count less than or equal to 20,000 per mm³
 - Neurosurgery, ocular surgery, or intracranial bleeding within past 10 days
 - Traumatic brain injury with progression on head CT greater than 24 hours post-injury
 - Hypersensitivity to LMWH, UFH, porcine protein
 - Heparin Induced Thrombocytopenia
 - Spin tap or epidural (lumbar puncture) within the last 12 hours
 - Epidural catheter present (consult anesthesia)
- Possible Exclusion Criteria for Pharmacologic DVT Prophylaxis
 - Bleeding
 - Hypersensitivity to UFH or LMWH, may use
 - Uncontrolled hypertension
 - Coagulopathy
 - Heparin induced thrombocytopenia
 - Recent intraocular or intracranial surgery
 - Spinal tap or epidural anesthesia
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- Antithrombotic drugs in neuraxial anesthesia/analgesia (add data for other write up)
 - Avoid in patients with a known bleeding disorder
 - Avoid in patients whose hemostasis is impaired by antithrombin drugs
 - Delay insertion of spinal needle or epidural catheter until the anticoagulant effect of the medication is minimal
 - 8-12 hours after subcutaneous heparin or twice daily prophylactic LMWH or 18 hours after once daily LMWH injection
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	Dalteparin (Fragmin)	Enoxaparin (Lovenox)	Fondaparinux (Arixtra)	Heparin
Abdominal Surgery	2500-5000 units daily	40 mg daily		
DVT prophylaxis	2500-5000 units daily	40 mg daily		
THR/TKR	5000 units daily	30 mg q12h	2.5 mg daily	
Half-life				60 minutes, Dose dependent