Venous Thromboembolism (VTE) Prophylaxis in Acutely Ill Medical Patients

BOTTOM LINE

DO	DON'T	CONSIDER	CAUTION
• Use VTE risk assessment at admission, throughout hospitalization, and at discharge[3] • Use bleeding risk assessment[3] • Use pharmacologic prophylaxis in patients with high VTE risk and acceptable bleeding risk[3] • Use mechanical prophylaxis in patients with high VTE risk and high bleeding risk[3] • Use low molecular weight heparin (LMWH) instead of unfractionated heparin (UFH) in patients with adequate renal function[3]	• Do not give all patients VTE prophylaxis indiscriminately without risk assessment • Do not use combined pharmacologic and mechanical prophylaxis in medically ill patients[3]	• Extended post-discharge VTE prophylaxis in appropriate patients (see criteria below)[5]	• This information is based on expert opinion in the absence of robust data • Some patients will be appropriate for a different approach

Background:
In 2008 the surgeon general issued a Call to Action to prevent DVT and PE and recognized VTE as a significant public health concern.[1]

In 2020, the American Heart Association issued a call to action for better implementation of VTE risk stratification, prevention and tracking.[2]

Scope:
Hospitalized non-surgical medically and critically ill patients

Considerations for extended duration thromboprophylaxis (EDT) among high risk medically ill patients at discharge

Pharmacologic Dosing Options

Enoxaparin

Standard Dosing	40mg SC once daily
CrCl <30mL/min	30mg SC once daily
CrCl <20mL/min	Avoid use
Obese patients (BMI > 40kg/m^2)	40 mg BID 60mg BID (BMI >47kg/m^2)[6,12] 0.5mg/kg QD[8]

Dalteparin

Standard Dosing	5000 units SC once daily
CrCl <30mL/min	Avoid use
Obese patients (BMI > 40kg/m^2)	7500 units SC once daily[10, 11]

Unfractionated Heparin (UFH)

Standard Dosing	5000 units SC 8-12 hours
Obese patients (BMI>40kg/m2)	7500 units BID-TID* [9,10] *Evidence is limited.

Fondaparinux

Standard Dosing (pt wt ≥50kg)	2.5mg SC once daily
Wt <50 kg or CrCL< 30 mL/min	Avoid use

Rivaroxaban*

Standard Dosing (Extended Duration)	10mg once daily continued for 31-39 days total

*Indicated for use during hospitalization and post-hospital discharge in adults admitted for an acute medical illness who are at risk for thromboembolic complications due to moderate or severe restricted mobility and other risk factors for VTE and not at high risk of bleeding (refer to criteria chart)

Cockcroft-Gault should be used to calculate CrCl

Examples of Risk Assessment Models[4]

Several VTE risk assessment models (RAMs) exist, none of which have been extensively studied in impact analysis. As such, contemporary guidelines do not give preference to any single RAM. Rather, it is suggested to use a validated RAM to assess both VTE risk and bleeding risk to identify patients who are (and who are not) at sufficient risk for prophylaxis and preferred treatment modality (pharmacologic vs mechanical)[3].

Padua VTE: **Low risk: 0-3** **High risk: ≥4**		**IMPROVE VTE 7:** **Low risk: 0-1** **High risk: ≥2**		**IMPROVE VTE 4:** **Low risk: 0-1** **High risk: ≥2**		***IMPROVE Bleeding:*** **Low risk: <7** **High risk: ≥7**	
Risk Factor	**Score**	**Risk Factor**	**Score**	**Risk Factor**	**Score**	**Risk Factor**	**Score**
Reduced mobility	3	Previous VTE	3	Previous VTE	3	Male	1
Active cancer	3	Known thrombophilia	2	Malignancy (treated or untreated w/in 6 months)	1	Current cancer	2
Previous VTE	3	Lower limb paralysis	2	Thrombophilia	3	Rheumatic disease	2
Known thrombophilic condition	3	Active cancer	2	Age >60 yrs	1	Central venous catheter	2
Recent trauma and/or surgery (<1mo)	2	Immobilization ≥7d	1			ICU/CCU stay	2.5
Elderly age (>70yr)	1	ICU/CCU stay	1			Hepatic failure (INR>1.5)	2.5
Heart and/or respiratory failure	1	Age >60yr	1			GFR <30 mL/min/m^2	2.5
Acute MI or ischemic stroke	1					GFR 30-59 mL/min/m^2	1
Ongoing hormonal tx	1					Age 40-84 yr	1.5
Obesity (BMI>30)	1					Age ≥ 85yr	3.5
Acute infection and/or rheumatologic disorder	1					Gastroduodenal ulcer	4.5
						Bleeding in prior 3 months	4
						Admission platelets <50,000	4

Low Risk: Do not require prophylaxis[4]
High Risk: Should receive in-hospital prophylaxis[4]
High Bleeding Risk: Might indicate preference for mechanical prophylaxis while bleeding is high: reassessment is warranted[4]

Extended Duration Thromboprophylaxis (EDT)[5]

Rationale: Up to 70-80% of VTE occur after hospital discharge.
Length of stay is now much shorter than in seminal studies that utilized 6-14 days of LMWH[7]

The following criteria pertain to rivaroxaban, which is currently the only commercially available, FDA-approved agent for EDT.

Consider rivaroxaban 10 mg PO daily for a total of up to 39 days in patients who meet selection criteria below:

For patients aged >60 and hospitalized for ≥1 of the following acute medical conditions:
Decompensated heart failure • Respiratory insuffiency or COPD exacerbation • Infectious or inflammatory disease
Ischemic stroke with lower extremity paresis and reduced mobility

OR

For patients aged 40-59, hospitalized for ≥ 1 of the above acute medical illnesses AND
Have history of prior VTE or active cancer AND ≥1 of the below additional VTE risk factor(s):
Previous VTE or superficial vein thrombosis • History of NYHA Class III or IV HF • Concomitant acute infection
Obesity (BMI >35) • History of cancer • Inherited or acquired thrombophilia
Current use of erythropoiesis-stimulating agent • Hormone therapy

Exclusion Criteria:
Contraindications to anticoagulant prophylaxis • Creatinine Clearance <30mL/min
Concomitant combined P-gp and strong CYP3A4 inhibitors and inducers • Pregnant or breastfeeding
Currently on dual antiplatelet therapy (DAPT) • Active bleeding within the last 3 months
Gastroduodenal ulcers within the last 3 months
History of bronchiectasis, pulmonary cavitation, or pulmonary hemorrhage
Active cancer (undergoing acute in-hospital cancer treatment)

Bolded exclusion criteria have been linked to increased fatal or major bleeding events[5]

References: 1. Office of the Surgeon General (US); 2008. PMID: 20669525. **2.** Henke PK. Circulation. 2020. PMID: 32375490. **3.** Schünemann HJ. Blood Adv. 2018. PMID: 30482763. **4.** Barkoudah E. Am J Med. 2020. PMID: 32362349. **5.** Spyropoulos AC. Clin Appl Thromb Hemost. 2019. PMID: 31746218 **6.** Borkgren-Okonek MJ. Surg Obes Relat Dis. 2008. PMID: 18261965. **7.** Amin AN. J Hosp Med. 2012. PMID: 22190427. **8.** Rondina MT. Thromb Res. 2010. PMID: 19272635 **9.** Samuel S. J Thromb Thrombolysis. 2015. PMID: 25736986. **10.** Streiff MB. J Natl Compr Canc Netw. 2015. PMID: 26358792. **11.** Simoneau MD. Obes Surg. 2010. PMID:18931882. **12.** Scholten DJ. Obes Surg. 2002 Feb;12(1):19-24. PMID: 11868291.

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