



Mahidol University
Faculty of Medicine Ramathibodi Hospital

VTE RAMA 2021

Hospital VTE Prophylaxis Guideline in medically and surgically ill

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Ramathibodi hospital, Mahidol university
26th August 2021

Disclosure

- Speaker name: **Nutsiri Kittitirapong**
- I have the following potential conflicts of interest to report:
- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)
- ☒ I do not have any potential conflict of interest

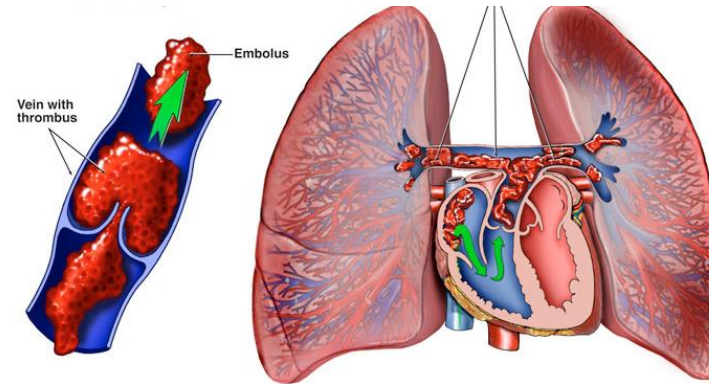
Outline

Hospital-Associated VTE prophylaxis Guideline

VTE prophylaxis implementation

VTE prophylaxis outcome in RAMATHIBODI hospital

Postoperative venous thromboembolism (VTE) events are a leading cause of morbidity and mortality



Deep venous thrombosis (DVT)

Pulmonary emboli (PE)

Venous hypertension

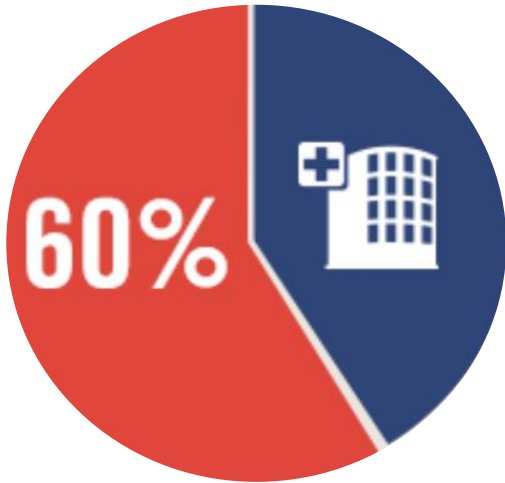
Death

Pulmonary hypertension

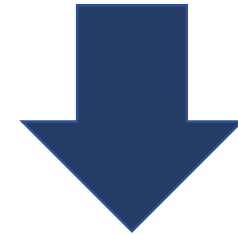




Hospital-Associated VTE



60 % of all VTE cases occur during or within 90 days of hospitalization



Preventable condition

Healthcare-Associated Blood Clots: Minimize Your Risk

The Problem

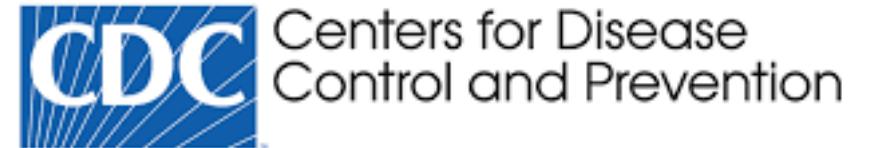
Healthcare-associated venous thromboembolism (blood clots) is a significant, deadly, costly, and growing public health problem.

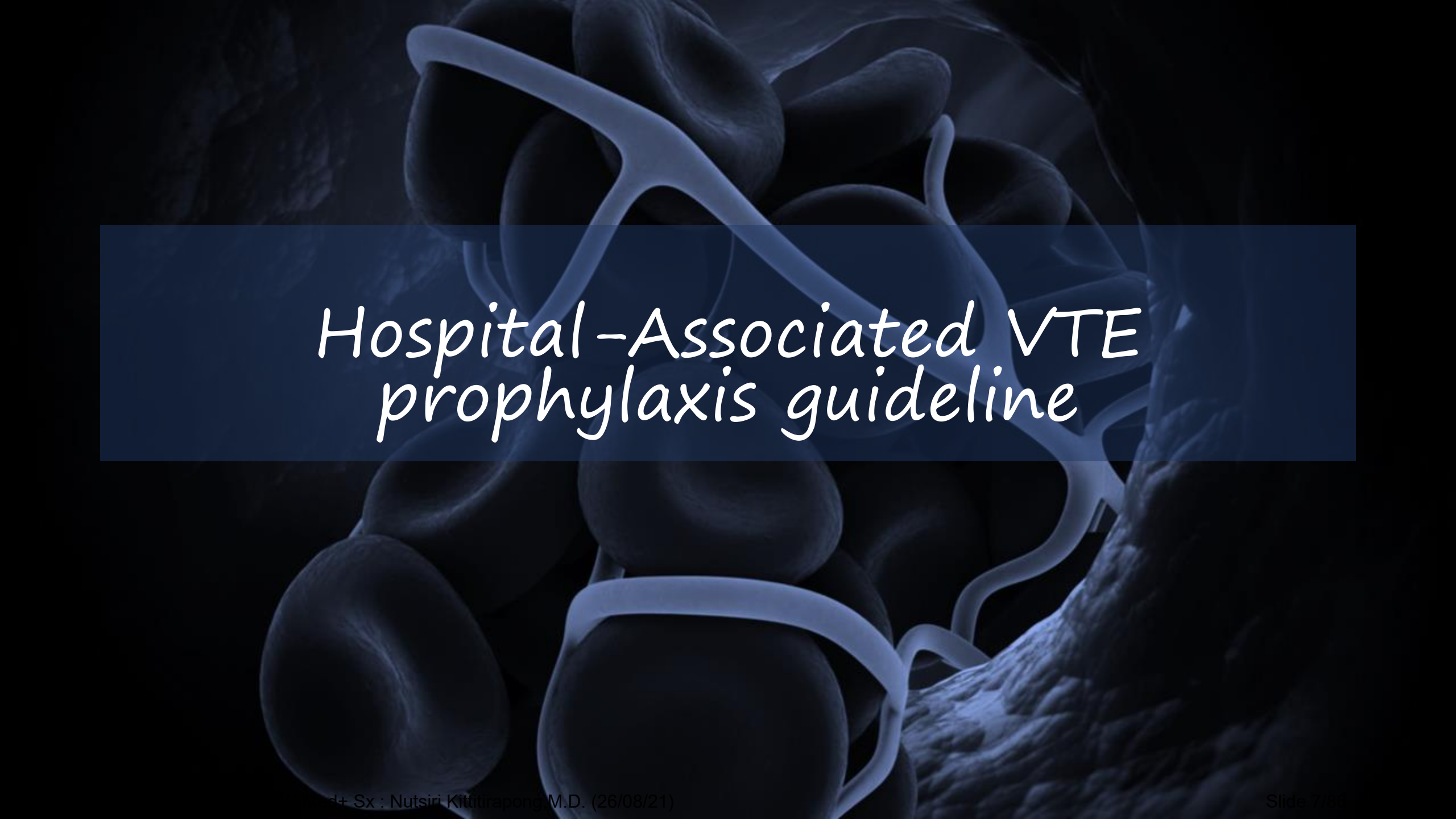
Prevention Can Save Lives

Proven ways to prevent blood clots from occurring during or after a healthcare encounter exist, but not all hospitals and healthcare facilities have put these prevention strategies into practice or use them routinely.



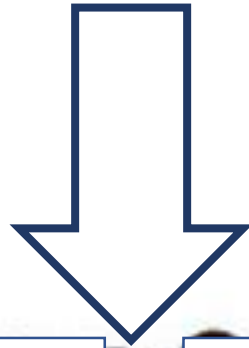
For more information, please visit
<http://www.cdc.gov/ncbddd/dvt/>





Hospital-Associated VTE prophylaxis guideline

Not all patients have the same risks



Identify high risk VTE patients

Identify high risk Bleeding patients

Benefit

>

Risk

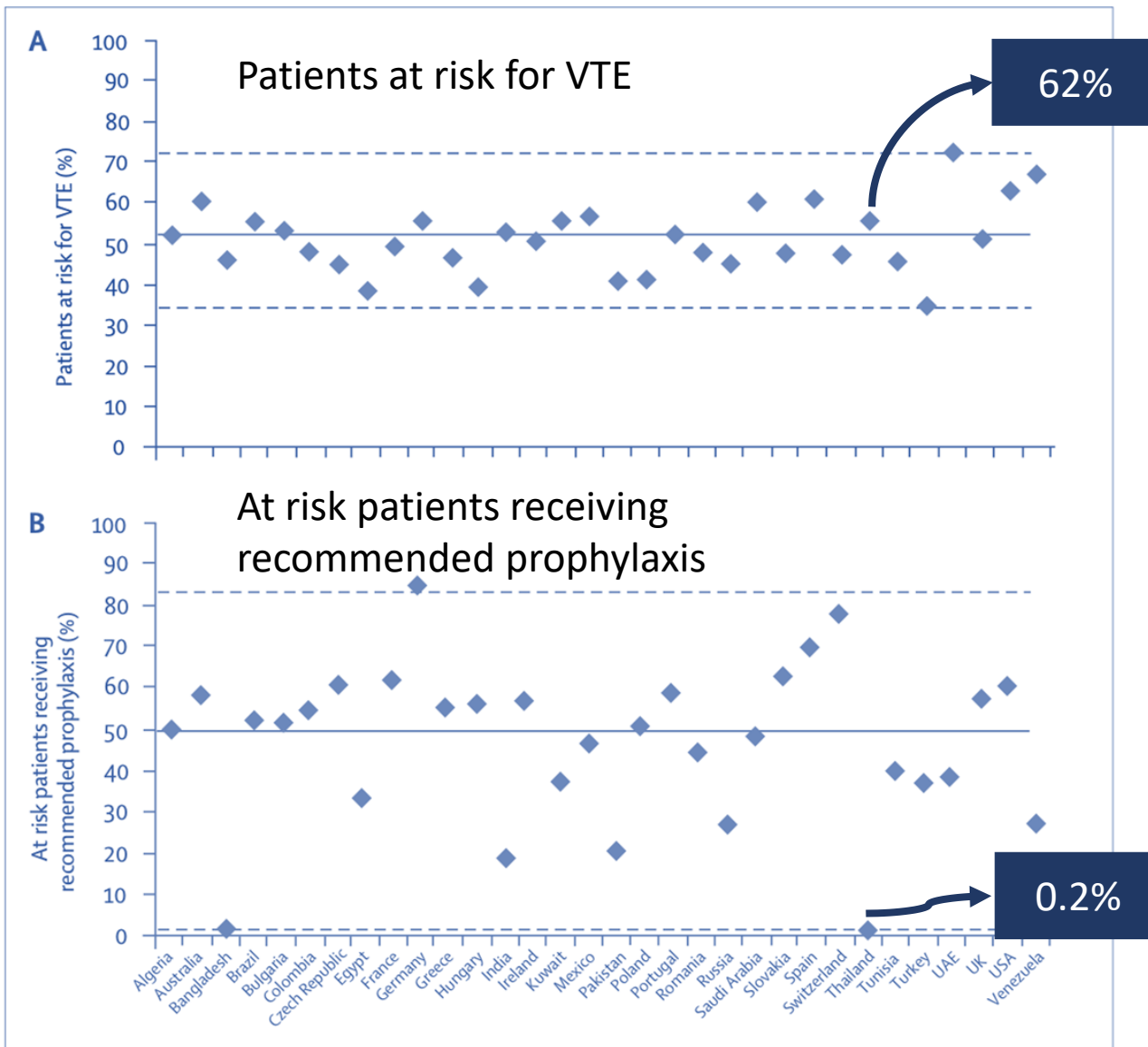


Figure 2: Proportion of patients at risk for VTE (A) and proportion of at-risk patients receiving recommended prophylaxis (B)

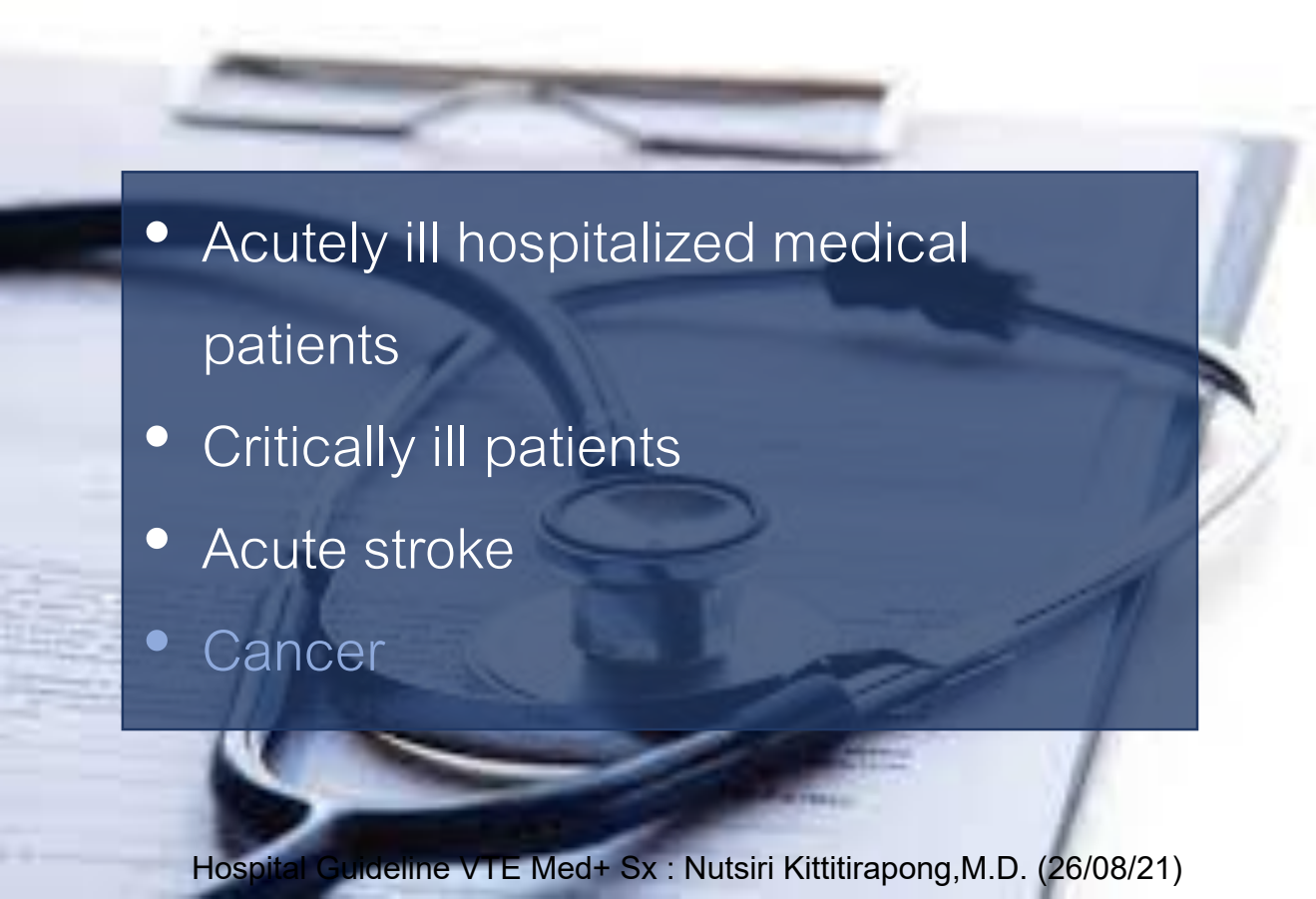
Venous thromboembolism risk and prophylaxis in the acute hospital care setting (ENDORSE study): a multinational cross-sectional study

Alexander T Cohen, Victor F Tapson, Jean-Francois Bergmann, Samuel Z Goldhaber, Ajay K Kakkar, Bruno Deslandes, Wei Huang, Maksim Zayaruzny, Leigh Emery, Frederick A Anderson Jr, for the ENDORSE Investigators*

Thailand			
Assessable medical patients	At-risk medical patients	At-risk medical patients receiving any prophylaxis	At-risk medical patients receiving ACCP-recommended prophylaxis*
823	406 (49%)	15 (4%)	15 (4%)
Assessable surgical patients	At-risk surgical patients	At-risk surgical patients receiving any prophylaxis	At-risk surgical patients receiving ACCP-recommended prophylaxis*
1001	618 (62%)	4 (0.6%)	1 (0.2%)

Hospital VTE prophylaxis Guideline

Medically illness

- 
- Acutely ill hospitalized medical patients
 - Critically ill patients
 - Acute stroke
 - Cancer

Surgical illness

- 
- Abdominopelvic surgical patients
 - Orthopedic surgical patients

Mode of VTE prophylaxis



Medically illness



Risk factors for Acute Deep Venous Thrombosis and Pulmonary Embolism



Risk Factor for DVT or PE	Odds Ratio	95% Confidence Interval
Hospitalization		
With recent surgery	21.72	9.44-49.93
Without recent surgery	7.98	4.49-14.18
Trauma	12.69	4.06-39.66

Heit JA. *Arch Intern Med.* 2000;160:809.

Predictive risk factors for the development of VTE in medically-ill patients



Immobilization



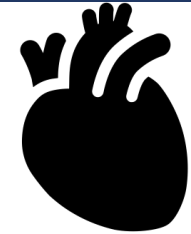
strokes



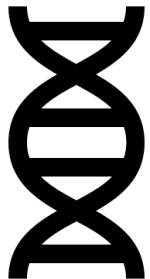
Obesity



infection



Cardiovascular disease



History of VTE



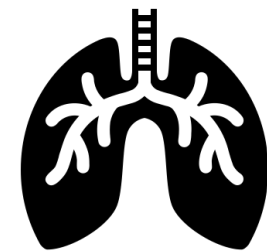
Autoimmune disease



Cancer



Advanced age



Respiratory disease

Schnemann HJ. Blood Adv. 2018 Nov 27;2(22):3198-3225.

Identify high risk VTE patients: Padua VTE RAM

Padua VTE RAM: score ≥ 4 indicates high VTE risk*

Reduced mobility	3
Active cancer	3
Previous VTE (excluding superficial thrombophlebitis)	3
Known thrombophilic condition	3
Recent trauma and/or surgery (<1 mo)	2
Elderly age (ie, >70 y)	1
Heart and/or respiratory failure	1
Acute myocardial infarction or ischemic stroke	1
Ongoing hormonal treatment	1
Obesity (body mass index >30)	1
Acute infection and/or rheumatologic disorder	1

- VTE incidence without VTE prophylaxis:
 - Padua score 0 - 3: 0.3%
 - **Padua score ≥ 4 : 11%**

ORIGINAL ARTICLE

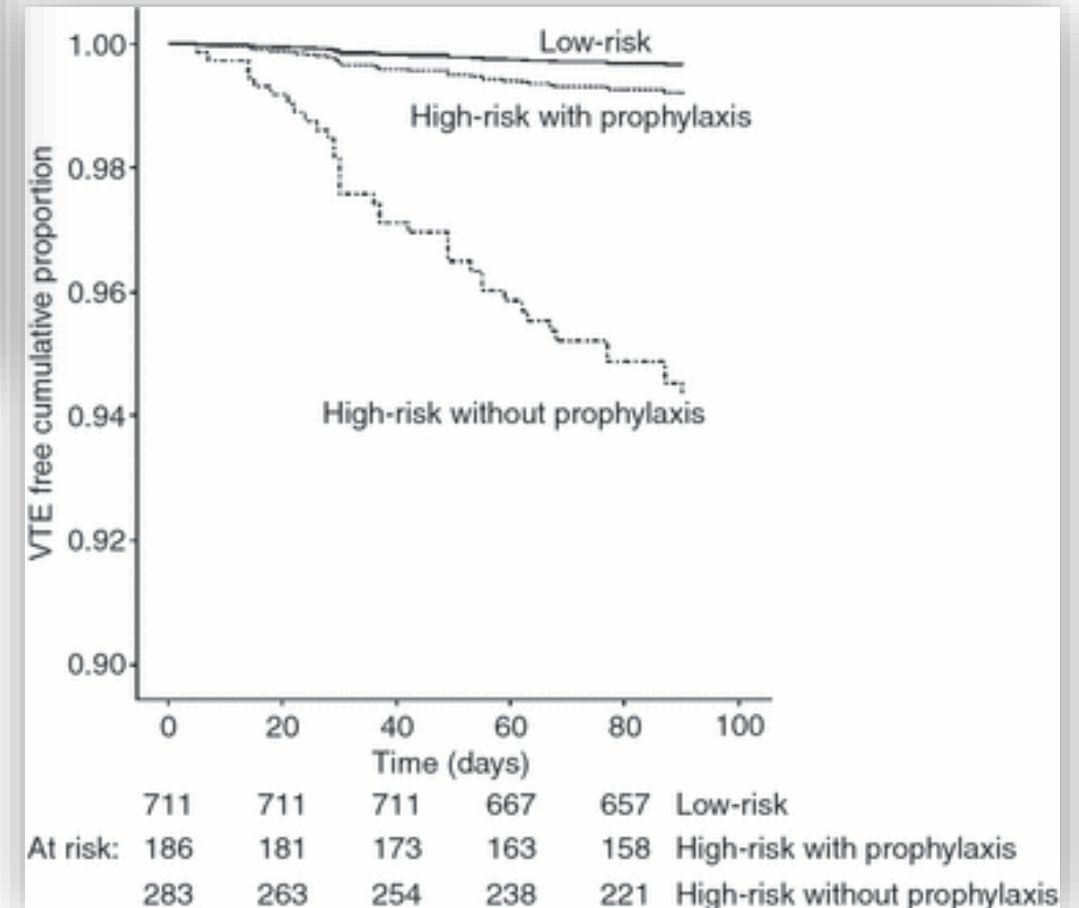
A risk assessment model for the identification of hospitalized medical patients at risk for venous thromboembolism: the Padua Prediction Score

S. BARBAR,* F. NOVENTA,† V. ROSSETTO,* A. FERRARI,* B. BRANDOLIN,* M. PERLATI,*
E. DE BON,* D. TORMENE,* A. PAGNAN* and P. PRANDONI*

*Department of Cardiothoracic and Vascular Sciences, Second Division of Internal Medicine; and †Department of Clinical and Experimental Medicine, Clinical Epidemiology Group, University of Padua, Padova, Italy

Among at-risk patients (Padua score ≥ 4)

- **VTE : No prophylaxis vs prophylaxis**
11% vs 2.2%; HR 0.13 (95% CI, 0.04-0.4)
- **Major or clinically relevant nonmajor bleeding with prophylaxis**
 - **1.6% (95% CI, 0.5-4.6)**



Among at-risk patients (Padua score ≥ 4),
the reduction in VTE appears to outweigh the increased risk of bleeding with pharmacologic prophylaxis.

Identify high risk VTE patients: IMPROVE VTE RAM

IMPROVE VTE RAM: score ≥ 2 indicates increased VTE risk†

Previous VTE	3
Known thrombophilia‡	2
Lower limb paralysis§	2
Active cancer	2
Immobilization ≥ 7 d	1
ICU/CCU stay	1
Age >60 y	1

IMPROVE bleeding RAM: score ≥ 7 indicates high bleeding risk¶

Renal failure (GFR 30-59 vs ≥ 60 mL/min per m^2)	1
Male vs female	1
Age 40-80 vs <40 y	1.5
Current cancer	2
Rheumatic disease	2
Central venous catheter	2
ICU/Critical Care Unit stay	2.5
Renal failure (GFR <30 vs ≥ 60 mL/min per square meter)	2.5
Hepatic failure (INR > 1.5)	2.5
Age ≥ 85 y vs <40 y	3.5
Platelet count $<50 \times 10^9/L$	4
Bleeding in 3 mo before admission	4

VTE risk

- 0 - 1 low risk (VTE 0.5%)
- 2 - 3 moderate risk (VTE 1.5%)
- 4 high risk (VTE 5.7%)

For scores ≥ 2 , VTE prophylaxis is indicated

Major bleeding/any bleeding:

- IMPROVE bleeding score < 7 : 0.4%/1.5%
- IMPROVE bleeding score ≥ 7 : 4.1%/7.9%.

Spyropoulos AC. Chest. 2011;140(3):706-714.

International guidelines



Mahidol University
Faculty of Medicine Ramathibodi Hospital



CHEST

Supplement

ANTITHROMBOTIC THERAPY AND PREVENTION OF THROMBOSIS, 9TH ED: ACCP GUIDELINES

Prevention of VTE in Nonsurgical Patients

**Antithrombotic Therapy and Prevention of Thrombosis,
9th ed: American College of Chest Physicians
Evidence-Based Clinical Practice Guidelines**

CLINICAL GUIDELINES

 blood advances®

American Society of Hematology 2018 guidelines for management of venous thromboembolism: prophylaxis for hospitalized and nonhospitalized medical patients



Acutely ill hospitalized medical patients

acutely ill medical patients as patients hospitalized for a medical illness

Recommendation 1,2,3

- ✓ In acutely ill medical patients, the ASH guideline panel suggests using **UFH, LMWH, or fondaparinux rather than no parenteral anticoagulant** (conditional recommendation, low certainty in the evidence effect).
- ✓ Among these anticoagulants, the panel suggests using **LMWH** (low certainty in the evidence of effects) **or fondaparinux** (very low certainty in the evidence of effects) **rather than UFH** (conditional recommendation).

Remark: These 3 recommendations also apply to anticoagulant choices when VTE prophylaxis is considered for patients with stroke.



Critically ill hospitalized medical patients

Suffering from an immediately life-threatening condition requiring hospitalization in an intensive or critical care unit.

Recommendation 4

In critically ill medical patients, the ASH guideline panel recommends using **UFH or LMWH over no UFH or LMWH**.

(strong recommendation, moderate certainty in the evidence of effects)

Recommendation 5

In critically ill medical patients, the ASH guideline panel suggests using **LMWH over UFH**

(conditional recommendation, moderate certainty in the evidence of effects).



Acutely or critically ill medical patients:

Mechanical prophylaxis vs
Pharmacological and mechanical vs
Pharmacological prophylaxis alone

Recommendation 6

In acutely or critically ill medical patients, the ASH guideline panel *suggests* using pharmacological VTE prophylaxis over mechanical VTE prophylaxis (conditional recommendation, very low certainty in the evidence of effects ⊕○○○).

Recommendation 7

In acutely or critically ill medical patients who do not receive pharmacological VTE prophylaxis, the ASH guideline panel *suggests* using mechanical VTE prophylaxis over no VTE prophylaxis (conditional recommendation, moderate certainty in the evidence of effects ⊕⊕⊕○).

Recommendations 8 and 9

In acutely or critically ill medical patients, the ASH guideline panel *suggests* pharmacological or mechanical VTE prophylaxis alone over mechanical combined with pharmacological VTE prophylaxis (conditional recommendation, very low certainty in the evidence of effects ⊕○○○).

Recommendation 10

In acutely or critically ill medical patients who are receiving mechanical VTE prophylaxis, the ASH guideline panel *suggests* using pneumatic compression devices or graduated compression stockings for VTE prophylaxis (conditional recommendation, very low certainty in the evidence of effects ⊕○○○).

Schnemann HJ. Blood Adv. 2018 Nov 27;2(22):3198-3225.



Acutely or critically ill medical patients:

Oral anticoagulant vs LMWH

DOAC VS LMWH

Any DOAC compared to LMWH for for VTE prophylaxis in acutely ill hospitalized medical patients

Patient or population: for VTE prophylaxis in acutely ill hospitalized medical patients
Setting: Inpatient
Intervention: any DOAC
Comparison: LMWH

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	No. of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with LMWH	Risk with any DOAC				
Mortality assessed with: VTE related death follow up: range 10 days to 14 days	1 per 1,000	1 per 1,000 (0 to 2)	RR 0.64 (0.21 to 1.98)	19900 (3 RCTs)	⊕⊕⊕⊕⊕ HIGH	
Pulmonary Embolism – representing the moderate marker state assessed with: Non-fatal PE follow up: range 10 days to 14 days	Study population		RR 1.01 (0.29 to 3.53)	19895 (3 RCTs)	⊕⊕⊕⊕⊖ MODERATE ^a	
	1 per 1,000	1 per 1,000 (0 to 4)				
	Moderate					
	4 per 1,000 ^b	4 per 1,000 (1 to 14)				
Proximal Deep Vein Thrombosis – representing the moderate marker state assessed with: Symptomatic DVT follow up: range 10 days to 14 days	Study population		RR 1.03 (0.34 to 3.08)	19900 (3 RCTs)	⊕⊕⊕⊕⊖ MODERATE ^a	
	1 per 1,000	1 per 1,000 (0 to 3)				
	Moderate					
	2 per 1,000 ^{c,d}	2 per 1,000 (1 to 6)				
Distal Deep Vein Thrombosis – representing the moderate distal DVT marker state assessed with: Symptomatic DVT follow up: range 10 days to 14 days	Study population		RR 1.03 (0.34 to 3.08)	19900 (3 RCTs)	⊕⊕⊕⊕⊖ MODERATE ^a	
	1 per 1,000	1 per 1,000 (0 to 3)				
	Moderate					
	6 per 1,000 ^{c,d}	6 per 1,000 (2 to 18)				
Major bleeding follow up: range 10 days to 14 days	Study population		RR 1.70 (1.02 to 2.82)	11821 (3 RCTs)	⊕⊕⊕⊕⊕ HIGH	
	2 per 1,000	4 per 1,000 (2 to 6)				
	Moderate					
	12 per 1,000 ^e	20 per 1,000 (12 to 34)				
Gastrointestinal bleeding follow up: range 10 days to 14 days	0 per 1,000	2 per 1,000 (0 to 13)	RR 6.00 (0.72 to 49.81)	17432 (1 RCT)	⊕⊕⊕⊕⊖ MODERATE ^a	
Heparin-Induced Thrombocytopenia (HIT) - not reported	-	-	-	-	-	

Schnemann HJ. Blood Adv. 2018 Nov 27;2(22):3198-3225.

Recommendation 11

In acutely ill hospitalized medical patients, the ASH guideline panel *recommends* using LMWH over DOACs as VTE prophylaxis (strong recommendation, moderate certainty in the evidence of effects ⊕⊕⊕○).



Extended-duration outpatient prophylaxis

Acutely ill medical patients

Critically ill medical patients

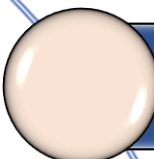
Recommendation 13

In acutely ill medical patients, the ASH guideline panel *recommends* inpatient over inpatient plus extended-duration outpatient VTE prophylaxis (strong recommendation, moderate certainty in the evidence of effects ⊕⊕⊕○). **Remark:** This recommendation applies to heparin and DOACs.

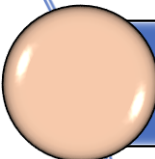
Recommendation 14

In critically ill medical patients, the ASH guideline panel *recommends* inpatient over inpatient plus extended-duration outpatient VTE prophylaxis (strong recommendation, moderate certainty in the evidence of effects ⊕⊕⊕○).

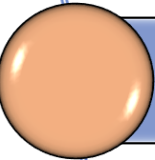
VTE prophylaxis in medically illness



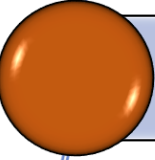
VTE prophylaxis > No VTE prophylaxis



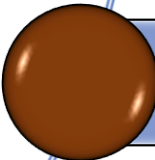
Pharmacological > Mechanical > No Prophylaxis



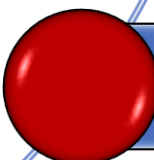
Pharmacological or Mechanical > Pharmacological + Mechanical



Pharmacological : LMWH > UFH, NOAC



Mechanical : IPC or GCS



Inpatient duration > extended duration



Stroke patients

International guidelines



Mahidol University
Faculty of Medicine Ramathibodi Hospital

Guidelines

European Stroke Organisation (ESO) guidelines for prophylaxis for venous thromboembolism in immobile patients with acute ischaemic stroke

Stroke

Volume 49, Issue 3, March 2018; Pages e46-e99

<https://doi.org/10.1161/STR.0000000000000158>

EUROPEAN STROKE JOURNAL

European Stroke Journal

2016, Vol. 1(1) 6–19

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2016

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DOI: 10.1177/2396987316628384

eso.sagepub.com



AHA/ASA GUIDELINE

2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Stroke patients and VTE risk



- The risk of VTE appears to be highest during the early post stroke phase and then falls over the next few weeks and months.
- DVTs : 40% - 80% of stroke patients
- PEs : 10% - 15% of all stroke patients
- PEs : 13% - 25% of early deaths after a stroke

Dennis M. European Stroke Journal 2016, Vol. 1(1) 6–19

Kappelle LJ. *Curr Treat Options Neurol.* 2011; 3(6):629–635.

European Stroke Organisation (ESO) guidelines for prophylaxis for venous thromboembolism in immobile patients with acute ischaemic stroke

Recommendation

We recommend that intermittent pneumatic compression (IPC) (thigh-length, sequential) should be used for immobile patients with ischaemic stroke. It should not be used in patients with open wounds on the legs and should be used with caution in those with existing DVT, heart failure, severe peripheral vascular disease or confusion where attempts to mobilise when unsupervised could lead to falls and injury.

Quality of evidence: Moderate ⊕⊕⊕

Strength of recommendation: Strong for ↑↑

Recommendation

Prophylactic anticoagulation with unfractionated heparin (UFH) (5000U ×2, or ×3 daily) or low molecular weight heparin (LMWH) or heparinoid should be considered in immobile patients with ischaemic stroke in whom the benefits of reducing the risk of venous thromboembolism is high enough to offset the increased risks of intracranial and extracranial bleeding associated with their use.

Quality of evidence: Moderate ⊕⊕⊕

Strength of recommendation: Weak for ↑?

Recommendation

Where a judgement has been made that prophylactic anticoagulation is indicated LMWH or heparinoid should be considered instead of UFH because of its greater reduction in risk of DVT, the greater convenience, reduced staff costs and patient comfort associated single daily dose vs. multiple daily injections but these advantages should be weighed against the higher risk of extracranial bleeding, higher drug costs and risks in elderly patients with poor renal function

Quality of evidence: Moderate ⊕⊕⊕

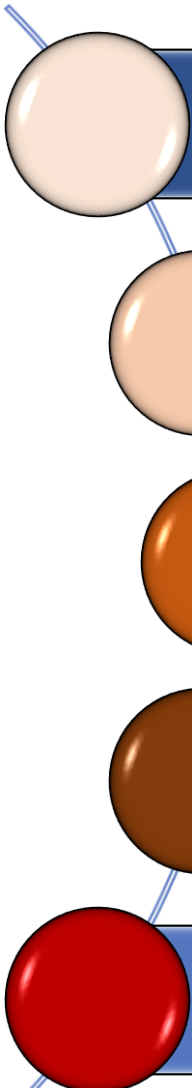
Strength of recommendation: Weak ↑?

AHA/ASA GUIDELINE

2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

4.8. Deep Vein Thrombosis Prophylaxis	COR	LOE	New, Revised, or Unchanged
1. In immobile stroke patients without contraindications, <u>intermittent pneumatic compression (IPC)</u> in addition to routine care (aspirin and hydration) is recommended over routine care to reduce the risk of deep vein thrombosis (DVT).	I	B-R	Recommendation revised from 2016 Rehab Guidelines.
2. The benefit of prophylactic-dose subcutaneous heparin (unfractionated heparin [UFH] or LMWH) in immobile patients with AIS is not well established.	IIb		Decrease symptomatic PE (OR, 0.69; 95% CI, 0.49–0.98), but increase ICH (OR, 1.68; 95% CI, 1.11–2.55)
3. When prophylactic anticoagulation is used, the benefit of prophylactic-dose LMWH over prophylactic-dose UFH is uncertain.	IIb	B-R	New recommendation.
4. In ischemic stroke, <u>elastic compression stockings should not be used.</u>	III: Harm	B-R	Recommendation wording modified from 2016 Rehab Guidelines to match Class III stratifications. COR and LOE amended to conform with ACC/AHA 2015 Recommendation Classification System.

VTE prophylaxis in Stroke



VTE prophylaxis > No VTE prophylaxis

Mechanical > Pharmacological (ICH)

Pharmacological : LMWH > UFH (convenience)

Mechanical : IPC (NOT GCS)

Duration (Not mention)



Surgical illness



Risk factors for Acute Deep Venous Thrombosis and Pulmonary Embolism



Risk Factor for DVT or PE	Odds Ratio	95% Confidence Interval
Hospitalization		
With recent surgery	21.72	9.44-49.93
Without recent surgery	7.98	4.49-14.18
Trauma	12.69	4.06-39.66

Heit JA. *Arch Intern Med.* 2000;160:809.



Surgical patient = High risk VTE

Perioperative/postoperative
immobilization



Transient changes in coagulation and
fibrinolysis



Potential for gross venous injury



Other risk factors



Age



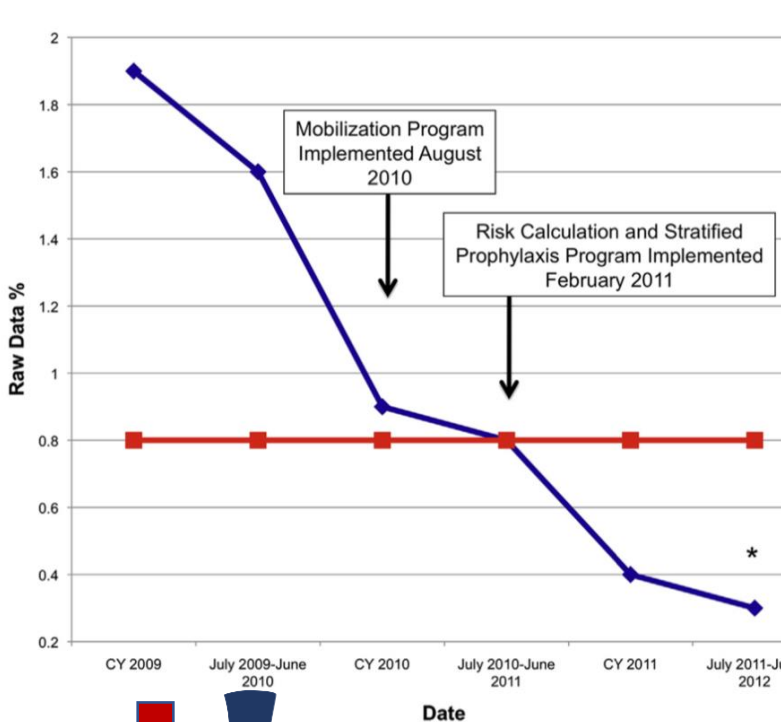
Coexistent thrombotic
risk factors



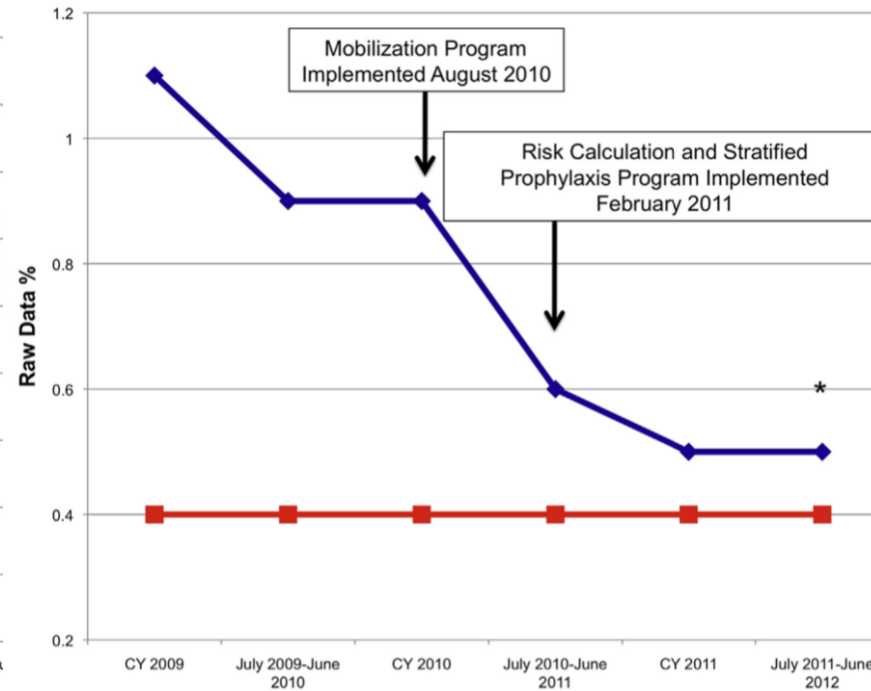
Type of procedure
Extent of surgical trauma
Length of procedure



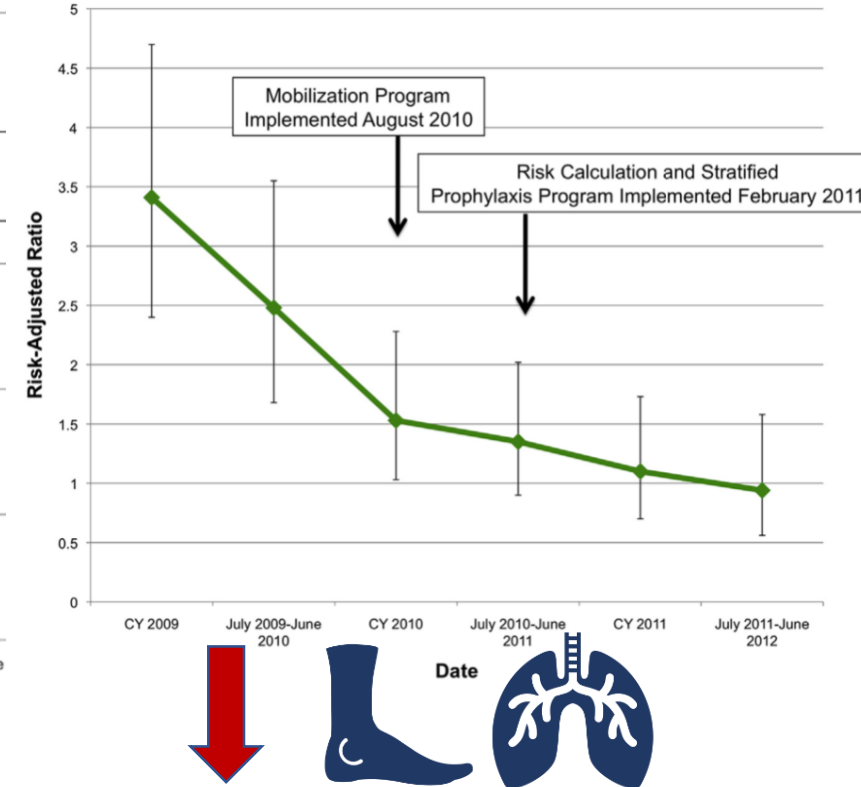
Reducing Postoperative Venous Thromboembolism Complications with a Standardized Risk-Stratified Prophylaxis Protocol and Mobilization Program



Decreased by 84%,
from 1.9% to 0.3% ($p < 0.01$)



Decrease by 55%,
from 1.1% to 0.5% ($p < 0.01$)



Risk-adjusted VTE outcomes steadily declined from an odds ratio of 3.41 to 0.94 ($p < 0.05$).

A photograph of three surgeons in an operating room, wearing blue scrubs, masks, and surgical caps. They are focused on a patient lying on the operating table. The scene is dimly lit, with bright surgical lights illuminating the patient and the surgeons' faces. The background shows medical equipment and a clock on the wall.

Abdominopelvic surgery

Patients Undergoing General, GI, Urological, Gynecologic, Bariatric, Vascular, Plastic, or Reconstructive Surgery

International guidelines



Mahidol University
Faculty of Medicine Ramathibodi Hospital



CHEST

Supplement

ANTITHROMBOTIC THERAPY AND PREVENTION OF THROMBOSIS, 9TH ED: ACCP GUIDELINES

Executive Summary

**Antithrombotic Therapy and Prevention of Thrombosis,
9th ed: American College of Chest Physicians
Evidence-Based Clinical Practice Guidelines**

[Evidence-Based Medicine]



Antithrombotic Therapy for VTE Disease CHEST Guideline and Expert Panel Report

Clive Kearon, MD, PhD; Elie A. Akl, MD, MPH, PhD; Joseph Ornelas, PhD; Allen Blaivas, DO, FCCP;
David Jimenez, MD, PhD, FCCP; Henri Bounameaux, MD; Menno Huisman, MD, PhD;
Christopher S. King, MD, FCCP; Timothy A. Morris, MD, FCCP; Namita Sood, MD, FCCP;
Scott M. Stevens, MD; Janine R. E. Vintch, MD, FCCP; Philip Wells, MD; Scott C. Woller, MD;
and COL Lisa Moores, MD, FCCP



Venous Thromboembolism Prophylaxis and Treatment in Patients With Cancer: ASCO Clinical Practice Guideline Update

Nigel S. Key, MB ChB¹; Alok A. Khorana, MD²; Nicole M. Kuderer, MD³; Kari Bohlke, ScD⁴; Agnes Y.Y. Lee, MD, MSc⁵;
Juan I. Arcelus, MD, PhD⁶; Sandra L. Wong, MD, MS⁷; Edward P. Balaban, DO⁸; Christopher R. Flowers, MD, MS⁹;
Charles W. Francis, MD¹⁰; Leigh E. Gates¹¹; Ajay K. Kakkar, MBBS, PhD¹²; Mark N. Levine, MD, MSc¹³; Howard A. Liebman, MD¹⁴;
Margaret A. Tempero, MD¹⁵; Gary H. Lyman, MD, MPH¹⁶; and Anna Falanga, MD¹⁷



CLINICAL GUIDELINES



American Society of Hematology 2019 guidelines for management of
venous thromboembolism: prevention of venous thromboembolism in
surgical hospitalized patients

Guyatt GH. CHEST 2012; 141(2)(Suppl):7S–47S
Kearon C. CHEST 2016; 149(2):315-352
Key NS. J Clin Oncol 38:496-520
Anderson DR. Blood advances. 2019

Identify high risk patients

Caprini score

Each Risk Factor Represents 1 Point

- ☐ Age 41-60 years
- ☐ Minor surgery planned
- ☐ History of prior major surgery (< 1 month)
- ☐ Varicose veins
- ☐ History of inflammatory bowel disease
- ☐ Swollen legs (current)
- ☐ Obesity (BMI > 25)
- ☐ Acute myocardial infarction
- ☐ Congestive heart failure (< 1 month)
- ☐ Sepsis (< 1 month)
- ☐ Serious lung disease incl. pneumonia (< 1 month)
- ☐ Abnormal pulmonary function (COPD)
- ☐ Medical patient currently at bed rest
- ☐ Other risk factors _____

Each Risk Factor Represents 3 Points

- ☐ Age over 75 years
 - ☐ History of DVT/PE
 - ☐ **Family history of thrombosis***
 - ☐ Positive Factor V Leiden
 - ☐ Positive Prothrombin 20210A
 - ☐ Elevated serum homocysteine
 - ☐ Positive lupus anticoagulant
 - ☐ Elevated anticardiolipin antibodies
 - ☐ Heparin-induced thrombocytopenia (HIT)
 - ☐ Other congenital or acquired thrombophilia
- If yes:

Type _____

*most frequently missed risk factor

Each Risk Factor Represents 2 Points

- ☐ Age 60-74 years
- ☐ Arthroscopic surgery
- ☐ Malignancy (present or previous)
- ☐ Major surgery (> 45 minutes)
- ☐ Laparoscopic surgery (> 45 minutes)
- ☐ Patient confined to bed (> 72 hours)
- ☐ Immobilizing plaster cast (< 1 month)
- ☐ Central venous access

Each Risk Factor Represents 5 Points

- ☐ Elective major lower extremity arthroplasty
- ☐ Hip, pelvis or leg fracture (< 1 month)
- ☐ Stroke (< 1 month)
- ☐ Multiple trauma (< 1 month)
- ☐ Acute spinal cord injury (paralysis)(< 1 month)

For Women Only (Each Represents 1 Point)

- ☐ Oral contraceptives or hormone replacement therapy
- ☐ Pregnancy or postpartum (<1 month)
- ☐ History of unexplained stillborn infant, recurrent spontaneous abortion (≥ 3), premature birth with toxemia or growth-restricted infant

Total Risk Factor Score

Recommendation for VTE prophylaxis



Mahidol University
Faculty of Medicine Ramathibodi Hospital

Table 51-2

Estimated Venous Thromboembolism Incidence According to the Adaptation of the Caprini Score by the 2012 American College of Chest Physicians Guidelines

Risk	Caprini Score	VTE Incidence*	Prophylaxis
Very low	0	0.5%	Early ambulation
Low	1-2	1.5%	IPC
Moderate	3-4	3.0%	LMWH, unfractionated heparin, IPC
High	≥5	6.0%	LMWH, unfractionated heparin + IPC or GCS



Kearon C. Chest. 2012 Feb;141(2 Suppl):e419S-e496S.

Hospital Guideline VTE Med+ Sx : Nutsiri Kittitirapong, M.D. (26/08/21)

Slide 44/86

Recommendation for VTE prophylaxis

Total Risk Factor score	Risk of VTE	Risk level	Prophylaxis regimen			Duration
			Pharmaco prophylaxis ● Enoxaparin 40mg SC daily (CrCl $\geq$ 30mL/min) ● Heparin 5000 units SC TID (CrCl < 30mL/min)	Mechanical prophylaxis (IPC > GCS) 18 hr daily compliance	Early ambulation	
0	< 0.5 %	VERY LOW			+	Hospitalization
1-2	1.5 %	LOW		+	+	Hospitalization
3-4	3 %	MODERATE	+	+ / -	+	Hospitalization
$\geq$ 5	6 %	HIGH	+	+	+	1-10 d (non cancer) 28 days (cancer)

VTE prophylaxis in Surgical patients



VTE prophylaxis > No VTE prophylaxis

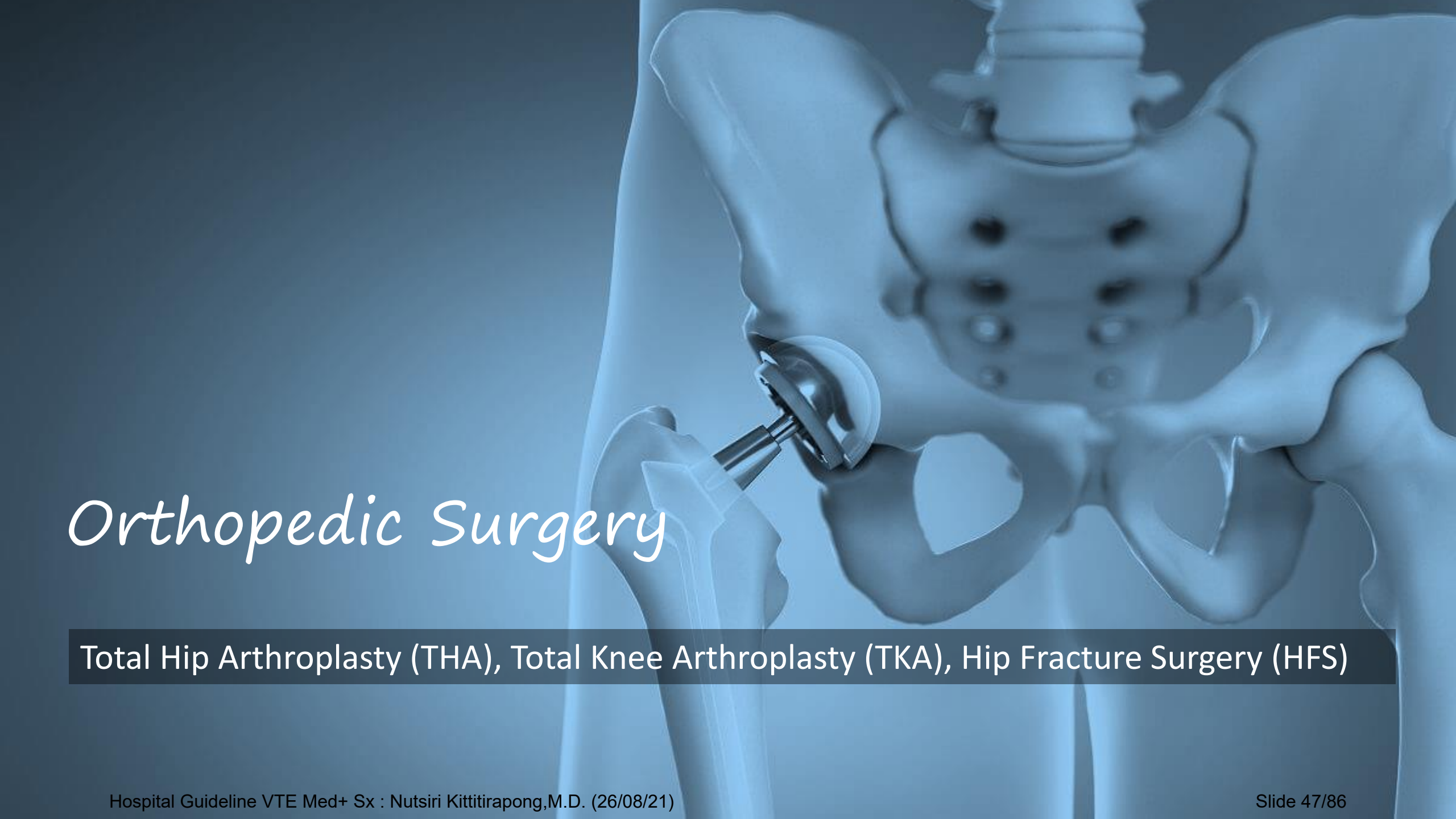
Method of prophylaxis depends on VTE risk category

In high Risk prefer Pharmacological + Mechanical+ early ambulation

Pharmacological : LMWH or UFH

Mechanical : IPC > GCS

Inpatient duration or extended duration depends on VTE risk

A 3D medical illustration of a human pelvis and hip joint. A prosthetic hip implant is shown being inserted into the joint. The implant consists of a metal femoral head and neck, and a white acetabular cup. The background is a solid blue color.

Orthopedic Surgery

Total Hip Arthroplasty (THA), Total Knee Arthroplasty (TKA), Hip Fracture Surgery (HFS)

Total Hip Arthroplasty (THA), Total Knee Arthroplasty (TKA), Hip Fracture Surgery (HFS)

Identify high risk patients

Each Risk Factor Represents 5 Points	
☐	Elective major lower extremity arthroplasty
☐	Hip, pelvis or leg fracture (< 1 month)
☐	Stroke (< 1 month)
☐	Multiple trauma (< 1 month)
☐	Acute spinal cord injury (paralysis)(< 1 month)

Caprini score

Recommendation for VTE prophylaxis

	Prophylaxis regimen			Duration
	Pharmacological prophylaxis	Mechanical prophylaxis (IPC > GCS)	Early ambulation or active flex/extend ankle	
Hip replacement surgery	LMWH, Fondaparinux, Apixaban, Dabigatran, Rivaroxaban, low-dose unfractionated heparin (LDUH), Adjusted-dose VKA	+/- 18 hr daily compliance	+	35 days
Total Knee Arthroplasty (TKA)		+/- 18 hr daily compliance	+	10-14 days

Enoxaparin 0.4 ml sc OD

Fondaparinux 2.5 mg sc OD

Low-dose unfractionated heparin (LDUH) 5000 IU sc q 8 hr

Rivaroxaban (Xarelto) (10) 1 tab oral OD (CrCl>30 mL/min)

Dabigatran(Pradaxa)(110) 1 tab oral OD and after hemostasis Dabigatran(110) 2 tab oral OD

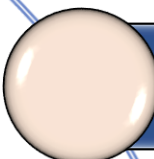
Apixaban (Eliquis) (2.5) 1 tab oral bid

NOAC > LMWH > UFH, Warfarin

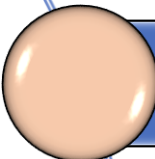
Guyatt GH. CHEST 2012; 141(2)(Suppl):7S–47S

Anderson DR. Blood advances. 2019; 49/86

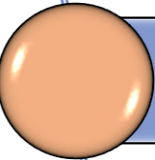
VTE prophylaxis in Orthopedic Surgery



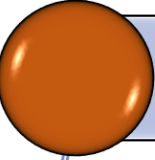
VTE prophylaxis > No VTE prophylaxis



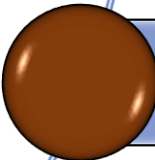
Pharmacological > Mechanical > No Prophylaxis



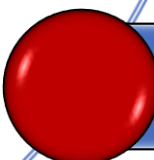
Pharmacological + Mechanical + early ambulation



Pharmacological : NOAC > LMWH > UFH



Mechanical : IPC was preferred than GCS

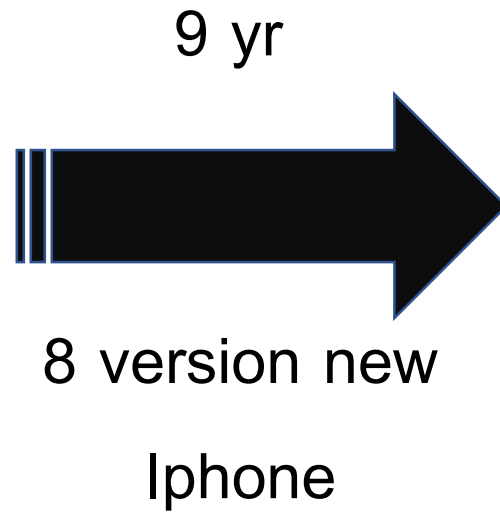


Extended duration > Inpatient duration

Long time ago...



2012
Iphone 4



2021
Iphone 12

The same recommended VTE prophylaxis guideline

A person in a dark jacket and pants is running across a rugged, snow-dusted mountain slope. The sun is low on the horizon, casting a warm, golden glow over the scene. The sky is filled with soft, orange-hued clouds. The mountain's surface is a mix of dark rocks and patches of white snow. The overall mood is one of determination and achievement in a challenging environment.

VTE Prophylaxis Implementation

Problem of inadequate VTE Prophylaxis

1. There is a fear of anticoagulant-associated bleeding.
2. There is a lack of awareness regarding VTE.
3. It is thought that guidelines are based on risks and benefits of prophylaxis in clinical trials that exclude recommendations for certain subsets of patients.
4. Individual risk assessment is necessary, making a protocol difficult to reinforce.

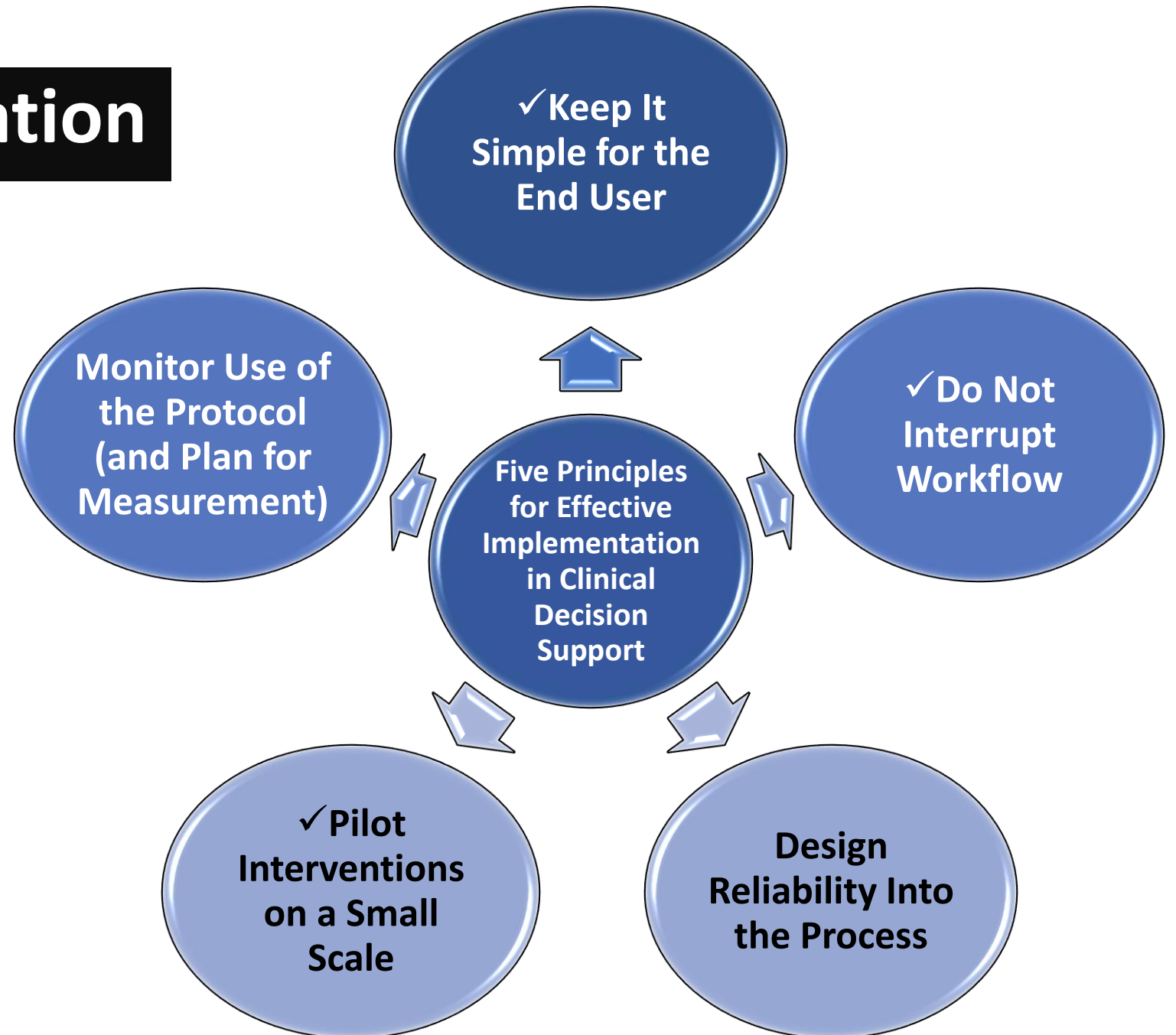
Buesing KL. *Surg Clin North Am.* 2015;95(2):285-300.

The first four failure modes for Effective implementation of the VTE prevention protocol

- No standardized protocols or order sets for VTE prevention exist
- Inadequate guidance
- The order set is bypassed or not used.
- Used incorrectly



Effective Implementation



1



for the End User

- Order set
- Minimize the calculations and data entry
 - Auto-populate data elements from elsewhere in the record
- Standardization by streamlining the choices



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2

Do Not Interrupt Workflow

- **Integrate VTE prevention order set into admission and transfer order sets** rather than as a standalone order set.
- **Computerized physician order entry (CPOE) systems**
 - After a VTE risk assessment, the appropriate prophylaxis options were chosen from their nested position under the risk designation.



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3

Design Reliability Into the Process



- The desired action has a ***forcing function***.
 - An **electronic or human forcing** function
- The desired action is the ***default*** action
 - The **protocol-preferred choices**
- The desired action is ***prompted*** by a reminder or a decision aid
 - A daily reminder for **a central venous catheter**



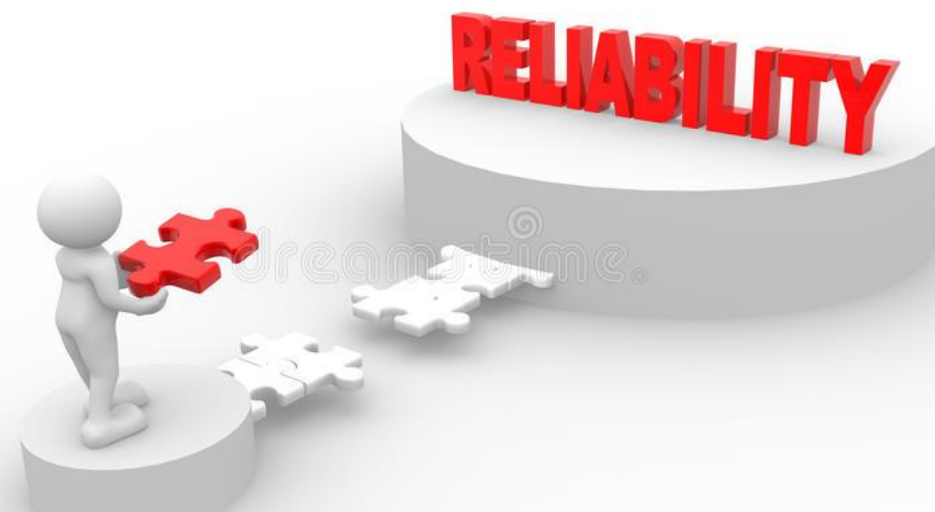
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3

Design Reliability Into the Process



- The desired action is ***standardized*** into a process
- The desired action is ***scheduled*** to occur at known intervals
- The desired action is **NOT *redundant*** for the same action
 - Electronic alert



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Order Set: DOM Admission Order Set

Order Items

☒ DOM Admission Orders

☒ DOM Lab Orders

☐ DOM Fever Workup

☒ VTE Prophylaxis: Internal Medicine

☐ Peripheral IV Catheter Insert Orderset

IV Therapy

☐

.Peripheral IV Catheter, Insert VAT - Order Update: Ordered

T

Routine

Second IV (Conditional Order)

☒

Peripheral IV Catheter, Insert 2nd VAT - Order Update: Ordered

T

Routine

?

Nurse will activate order to support medication/fluid administration <Avail. Activations=1>

Maintain IV

☒

.Peripheral IV Catheter, Maintain NUR - VAD Protocol MUST be implemented and followed! <Continuous>

T

Routine

Pharmacy

☒

Normal Saline Flush Inj - 2 ml IV q5min; PRN for VAD protocol. Flush each IV after each use or at least q8h when not in continuous use. (Peripheral IV)

Routine

Relevant Info

Select All

Deselect All

Edit...

Change Date...

OK

Cancel

Help

Order Set: DOM Admission Order Set

Order Items

☒	DOM Admission Orders		
☒	DOM Lab Orders		
☐	DOM Fever Workup		
☒	VTE Prophylaxis: Internal Medicine		
☐	Peripheral IV Catheter Insert Orderset		
IV Therapy			
☐	.Peripheral IV Catheter, Insert VAT -	Order Update: Ordered	
Second IV (Conditional Order)			
☒	Peripheral IV Catheter, Insert 2nd VAT -	Order Update: Ordered	T Routine
	Nurse will activate order to support medication/fluid administration <Avail. Activations=1>		
Maintain IV			
☒	.Peripheral IV Catheter, Maintain NUR - VAD Protocol MUST be implemented and followed! <Continuous>	T	Routine
Pharmacy			
☒	Normal Saline Flush Inj - 2 ml IV q5min; PRN for VAD protocol. Flush each IV after each use or at least q8h when not in continuous use. (Peripheral IV)		Routine

Sunrise Clinical Manager

This order item is mandatory in the set DOM Admission Order Set. If you delete it, you will also delete the entire set. Do you want to delete the set?

OK Cancel

Any Attempt to uncheck the order will give this message

Relevant Info Select All Deselect All Edit... Change Date...

OK Cancel Help

VTE Prophylaxis: Internal Medicine [1 orders of 6 are selected] - POETEST, PDS

Patient Age:
48y

Combined Measurements
Height (inches) Height (cm) Weight (lb) Weight (kg) BSA BMI
67 170.2 147 66.7 1.77 23

Relevant Results

Creatinine Clearance (Estimated (Cockcroft-Gault))
Creatinine (mg/dl) Creat Clear (est)
1 84.7
Entered - 07/04/2007 16:41

SECTION A: Does the patient have any major VTE risk factors?

- Previous VTE ☐
- Age greater than 60 years ☐
- Cancer - Metastatic or under treatment ☐
- Stroke with paresis less than 3 months ☐
- Known hypercoagulable state ☐
- NYHA class III/IV heart failure ☐
- Mechanical ventilation ☐
- Sepsis ☐
- Pregnancy to six weeks post partum ☐
- No major risk factors known ☐

SECTION B: Does the patient have any contraindications to pharmacologic prophylaxis?

- Current use of systemic anticoagulation ☐
- Active bleeding ☐
- High risk of bleeding ☐
- INR greater than or equal to 1.5 ☐
- APTT greater than or equal to 1.3 ☐
- Platelet count less than 50,000 cu/mm ☐
- No contraindications known ☐

Patient age, weight, renal function and relevant labs imported from database

Recommended Prophylaxis:

Prophylaxis Orders

	Order	Dose	UOM	Route	Frequency	Start Date	Start Time	Priority	Side of Body	Type	Instructions/Comments
☐	Heparin Inj	5000	unit	SubQ	q8h			Routine			
☐	Heparin Inj	5000	unit	SubQ	q12h			Routine			
☐	TED Stockings				<Continuous>	T		Routine	Bilateral	Knee	Review patient status daily....
☐	Compression Device, Sequential				<Continuous>	T		Routine			Review patient status daily....
☐	Foot Pump				<Continuous>	T		Routine			

Was VTE Prophylaxis Ordered as Recommended?

- Yes ☐
- No - Bleeding Risk Greater than VTE Risk ☐
- No - Pork Aversion ☐
- No - Prescriber Preference ☐

OK Cancel

VTE Prophylaxis: Internal Medicine [1 orders of 6 are selected] - POETEST, PDS

Patient Age:

48y

Relevant Results

Combined Measurements

Height (inches)	Height (cm)	Weight (lb)	Weight (kg)	BSA	BMI
67	170.2	147	66.7	1.77	23

Creatinine Clearance (Estimated (Cockcroft-Gault))

Creatinine (mg/dl)

1

Creat Clear (est)

84.7

☐ Actual☒ Estimated

Entered - 07/04/2007 16:41

SECTION A: Does the patient have any major VTE risk factors?

- ☐ Previous VTE
☐ Age greater than 60 years
☐ Cancer - Metastatic or under treatment
☐ Stroke with paresis less than 3 months
☐ Known hypercoagulable state
☐ NYHA class III/IV heart failure
☐ Mechanical ventilation
☐ Sepsis
☐ Pregnancy to six weeks post partum
☐ No major risk factors known

- Mandatory Selections
- Risk Factors
- Contraindications

SECTION B: Does the patient have any contraindications to pharmacologic prophylaxis?

- ☐ Current use of systemic anticoagulation
☐ Active bleeding
☐ High risk of bleeding
☐ INR greater than or equal to 1.5
☐ APTT greater than or equal to 1.3
☐ Platelet count less than 50,000 cu mm
☐ No contraindications known

Recommended Prophylaxis:

Prophylaxis Orders

Order	Dose	UOM	Route	Frequency
☒ Heparin Inj	5000	unit	SubQ	q8h
☐ Heparin Inj	5000	unit	SubQ	q12h
☐ TED Stockings				<Continuous>
☐ Compression Device, Sequential				<Continuous>
☐ Foot Pump				<Continuous>

Orders and Order Sets with Warnings or Errors

Order Set: VTE Prophylaxis: Internal Medicine

The following Order Set and/or Orders either have warnings or contain errors. Correct any errors by editing the order. You must review any Informational Messages before you can save the order.

Order Items:

VTE Prophylaxis: Internal Medicine -

The SECTION Labeled A and B may not be left blank. Please enter a value into the field

Select All Deselect All Edit OK Help

Was VTE Prophylaxis Ordered as Recommended?

Yes ☐No - Pork Aversion ☐No - Bleeding Risk Greater than VTE Risk ☐No - Prescriber Preference ☐

OK

Cancel



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Patient Age:

90y

Relevant Results

Creatinine, Serum.: 1.6(Mar01); INR, Prothrombin Time: 2.2(Mar01); Platelet Count.: 78(Mar01); Ratio,APTT: 1.8(Mar01);

Combined Measurements

Height (inches)	Height (cm)	Weight (lb)	Weight (kg)	BSA	BMI
		190	86		

Creatinine Clearance (Estimated (Cockcroft-Gault))

Creatinine (mg/dl)	Creat Clear (est)	☐ Actual	☒ Estimated
1.6	36.9		

Resulted - 03/01/2010 05:07

SECTION A: Does the patient have any major VTE risk factors?

- ☐ Previous VTE
☒ Age greater than 60 years
☐ Cancer - Metastatic or under treatment
☐ Stroke with paresis less than 3 months
☐ Known hypercoagulable state
☐ NYHA class III/IV heart failure
☐ Mechanical ventilation
☐ Sepsis
☐ Pregnancy to six weeks post partum
☐ No major risk factors known

SECTION B: Does the patient have any contraindications to pharmacologic prophylaxis?

- ☐ Current use of systemic anticoagulation
☐ Active bleeding
☐ High risk of bleeding
☐ INR greater than or equal to 1.5
☐ APTT greater than or equal to 1.3
☐ Platelet count less than 50,000 cu mm
☒ No contraindications known

**Prophylaxis
Recommendation**

Recommended Prophylaxis:

Choose Heparin 5000 units q8h (High Risk Prophylaxis)

Prophylaxis Orders

Order	Dose	UOM	Route	Frequency	Start Date	Start Time	Priority	Side of Body	Type	Instructions/Comments
☐ Heparin Inj	5000	unit	SubQ	q8h			Routine			
☐ Heparin Inj	5000	unit	SubQ	q12h			Routine			
☐ TED Stockings				<Continuous>	T		Routine	Bilateral	Knee	Review patient status daily...
☐ Compression Device, Sequential				<Continuous>	T		Routine			Review patient status daily...
☐ Foot Pump				<Continuous>	T		Routine	Bilateral		

☒ VTE Risk Assessment was Completed

Drug Info

OK

Cancel

Submit Order(s) for KROLL, IRVING

Hide Worksheet

Cancel

Help



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VTE Prophylaxis: General Surgery - LABPOE, CHARLES

VTE Prophylaxis: General Surgery [4 orders of 9 are selected] - LABPOE, CHARLES

No contraindications known ☒

Recommended Prophylaxis:
Choose Heparin 5000 units Q8H plus Mechanical Orders. (VERY HIGH Risk WITH Renal Impairment)

Prophylaxis Orders

	Order	Dose	UOM	Route	Frequency	Start Date	Start Time Priority	Pharmacy Instructions	Side of Body
☐	Enoxaparin Inj	40	mg	SubQ	q24h		Time Critical	First dose 2 hours Pre-Op and...	
☒	Heparin Inj	5000	unit	SubQ	q8h		18:00	Give first dose 2 hours Pre-...	
☐	Heparin Inj	5000	unit	SubQ	q12h		Time Critical	Give first dose 2 hours Pre-...	
☐	Ambulate with Assistance				tid	T	Routine		
☐	Ambulate without Assistance				tid	T	Routine		
☒	TED Stockings				<Continuous>	08/13/2007	Routine		Bilateral
☒	Compression Device, Sequential				<Continuous>	08/13/2007	Routine		
☐	Foot Pump				<Continuous>	T	Routine		

Was VTE Prophylaxis Ordered as Recommended?

Yes ☒ No - Religious Reasons ☐
 No - Bleeding Risk Greater than VTE Risk ☐ No - Prescriber Preference ☐
 No - VTE Risk Greater than Bleeding Risk ☐ No - Other ☐
 No - Heparin Allergy/Adverse Reaction ☐

☒ VTE Risk Assessment was Completed

Documentation of Risk Assessment

VTE_Risk Assess Completed - LABPOE, CHARLES

VTE Risk Assessment was Completed - LABPOE, CHARLES

Order: VTE Risk Assessment was Completed Order ID: 001BTB829

Requested By: Durette, Annette Template Name:

Messages:

Recommended Prophylaxis was:
Very High Risk WITH Renal Impairment

Repeat View Document OK Cancel

OK Cancel

4

Pilot Interventions on a Small Scale

- 5-minute focus group where five physicians give feedback on several versions of the protocol.
- Taking an order set out for a "test drive" is far more effective.



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5

Monitor Use of the Protocol and Plan for Measurement

- It is reasonable to anticipate variations from the protocol, but the team should **capture these instances, learn from them, and take steps to reduce them.**



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Mahidol University

Faculty of Medicine Ramathibodi Hospital

VTE Prophylaxis in Surgical patients in RAMATHIBODI Hospital



RAMATHIBODI HOSPITAL		
Department	Division	Ward
Attending Staff		Resident

ชื่อ
 HN
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 บ้านเลขที่

VTE risk assessment in Department of Surgery Ramathibodi Hospital
 Caprini VTE Risk Assessment

Diagnosis
 Current VTE ☐ มีผล consult หน่วย Vascular ☐ ไม่มีการประเมินต่อต้นล่าง

Add 1 point for each of the following statements that apply now or within the past month: ☐ Age 41-60 years ☐ Minor surgery (less than 45 minutes) is planned ☐ Past major surgery (more than 45 minutes) within the last month ☐ Visible varicose veins ☐ A history of Inflammatory Bowel Disease (IBD) (for example, Crohn's disease or ulcerative colitis) ☐ Swollen legs (current) ☐ Overweight or obese (Body Mass Index above 25) ☐ Heart attack ☐ Congestive heart failure ☐ Serious infection (for example, pneumonia) ☐ Lung disease (for example, emphysema or COPD) ☐ On bed rest or restricted mobility, including a removable leg brace for less than 72 hours ☐ Current use of birth control or hormone replacement therapy (HRT) ☐ Pregnant or had a baby within the last month ☐ History of unexplained stillborn infant, recurrent spontaneous abortion (more than 3), premature birth with toxemia or growth restricted infant.	Add 2 points for each of the following statements that apply: ☐ Age 61-74 years ☐ Current or past malignancies (excluding skin cancer, but not melanoma) ☐ Planned major surgery lasting longer than 45 minutes (including laparoscopic and arthroscopic) ☐ Nonremovable plaster cast or mold that has kept you from moving your leg within the last month ☐ Tube in blood vessel in neck or chest that delivers blood or medicine directly to heart within the last month (also called central venous access, PICC line, or port) ☐ Confined to a bed for 72 hours or more
Add 3 points for each of the following statements that apply: ☐ Age 75 or over ☐ History of blood clots, either Deep Vein Thrombosis (DVT) or Pulmonary Embolism (PE) ☐ Family history of blood clots (thrombosis) ☐ Personal or family history of positive blood test indicating an increased risk of blood clotting	Add 5 points for each of the following statements that apply now or within the past month: ☐ Effective hip or knee joint replacement surgery ☐ Broken hip, pelvis or leg ☐ Serious trauma (for example, multiple broken bones due to a fall or car accident) ☐ Spinal cord injury resulting in paralysis ☐ Experienced a stroke

Patient score	Total Risk Factor score	Risk of VTE	Risk level	Prophylaxis regimen			Duration
				Pharmaco prophylaxis • Enoxaparin 40mg SC daily (CrCl ≥ 30mL/min) • Heparin 5000 units SC TID (CrCl < 30mL/min)	Mechanical prophylaxis (IPC > GCS)	Early ambulation	
	0	< 0.5 %	VERY LOW			+	Hospitalization
	1-2	1.5 %	LOW		+	+	Hospitalization
	3-4	3 %	MODERATE	+	+ / -	+	Hospitalization
	≥ 5	6 %	HIGH or Previous VTE	+	+	+	1-10 d (non cancer) 28 days (cancer)

Please circle on the prophylaxis regimen that you choose

☐ มีข้อห้ามในการให้ Pharmacologic prophylaxis
☐ มีข้อห้ามในการให้ Mechanical prophylaxis
☐ VTE prophylaxis regimen ☐ Early ambulation ☐ PC ☐ GCS ☐ Pharmacologic (โปรดระบุในคำสั่งการรักษา)
☐ VTE occurred Date [Follow รับผิดชอบ ระบุ]

Signature CODE
 (แพทย์ผู้ประเมิน)

RAMATHIBODI HOSPITAL		
Department	Division	Ward
Attending Staff		Resident

ชื่อ
 H.N.
 อายุ ปี เดือน ปี

DOCTOR'S ORDER SHEET FOR PRE-OP VTE PROPHYLAXIS

Caprini score =
☐ Very low ☐ Low ☐ Moderate ☐ High or Previous VTE
☐ มีข้อห้ามในการให้ Pharmacologic prophylaxis
☐ มีข้อห้ามในการให้ Mechanical prophylaxis

QR Code Lime survey
 VTE Risk assessment



Patient score	Total Risk Factor score	Risk of VTE	Risk level	Prophylaxis regimen			Duration
				Pharmaco prophylaxis • Enoxaparin 40mg SC daily (CrCl ≥ 30mL/min) • Heparin 5000 units SC TID (CrCl < 30mL/min)	Mechanical prophylaxis (IPC > GCS)	Early ambulation	
	0	< 0.5 %	VERY LOW			+	Hospitalization
	1-2	1.5 %	LOW		+	+	Hospitalization
	3-4	3 %	MODERATE	+	+ / -	+	Hospitalization
	≥ 5	6 %	HIGH or Previous VTE	+	+	+	1-10 d (non cancer) 28 days (cancer)

Date Hour	Order for 1 day only	Date Hour	Order for continuation	Date Hour
	Consult vascular surgery เนื่องจาก สงสัยหรือวินิจฉัย venous thromboembolism ก่อนผ่าตัด Previous venous thromboembolism อื่นๆ ลงชื่อแพทย์.....รหัส..... หมายเหตุ: ถ้าแพทย์เจ้าของไข้สงสัยหรือวินิจฉัยภาวะ venous thromboembolism สามารถปรึกษา vascular surgery team ได้		<u>Mechanical prophylaxis</u> Intermittent pneumatic compression (IPC) Graduated compressive stocking (GCS) <u>Pharmacological prophylaxis</u> Enoxaparin 0.4 mL SC OD (if GFR > 30 mL/min) Heparin 5,000 units SC tid (if GFR < 30 mL/min) หยุดยา ก่อนผ่าตัด 12 ชั่วโมง 24 ชั่วโมง ลงชื่อแพทย์.....รหัส.....	

RAMATHIBODI HOSPITAL

Department	Division	Ward
Attending Staff		Resident

ชื่อ

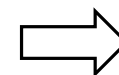
H.N.

อายุ ปี แผลวันที่

DOCTOR'S ORDER SHEET FOR PRE-OP VTE PROPHYLAXIS

Caprini score = _____ ☐ Very low ☐ Low ☐ Moderate ☐ High or Previous VTE ☐ มีข้อห้ามในการให้ Pharmacological prophylaxis ☐ มีข้อห้ามในการให้ Mechanical prophylaxis

QR Code Lime survey
VTE Risk assessment



Patient score	Total Risk Factor score	Risk of VTE	Risk level	Prophylaxis regimen			Duration
				Pharmaco prophylaxis • Enoxaparin 40mg SC daily (CrCl ≥ 30mL/min) • Heparin 5000 units SC TID (CrCl < 30mL/min)	Mechanical prophylaxis (IPC > GCS)	Early ambulation	
	0	< 0.5 %	VERY LOW			+	Hospitalization
	1-2	1.5 %	LOW		+	+	Hospitalization
	3-4	3 %	MODERATE	+	+ / -	+	Hospitalization
	≥ 5	6 %	HIGH or Previous VTE	+	+	+	1-10 d (non cancer) 28 days (cancer)

15:08 km.ra.mahidol.ac.th

VTE Risk assessment

0%

ส่วนที่ 1 ข้อมูลผู้ป่วย

***วัน/เวลาที่ประเมิน**

รูปแบบ : dd-mm-yyyy HH:MM

***HN**

กรุณาดำเนินการตามแบบฟอร์มของคำตอบของคุณ

กรุณาระบุเฉพาะตัวเลขให้ครบ 7 หลัก

***ชื่อ**

***นามสกุล**

15:18

VTE Risk assessment

ส่วนที่ 1 ข้อมูลผู้ป่วย

***วัน/เวลาที่ประเมิน**

19-04-2021 15:18

รูปแบบ : dd-mm-yyyy HH:MM

***HN**

กรุณาดำเนินการตามแบบฟอร์มของคำตอบของคุณ

กรุณาระบุเฉพาะตัวเลขให้ครบ 7 หลัก

***ชื่อ**

***นามสกุล**

***อายุ (ปี)**

กรุณาดำเนินการตามแบบฟอร์มของคำตอบของคุณ

***อายุ (ปี)**

กรุณาดำเนินการตามแบบฟอร์มของคำตอบของคุณ

กรุณาระบุเฉพาะตัวเลข (กรณีอายุน้อยกว่า 1 ปี ให้ใส่เลข 0)

***เพศ**

กรุณาเลือกเพียงหนึ่งคำตอบจากตัวเลือกที่ปรากฏ

☐ ชาย (male)

☐ หญิง (female)

***หน่วย**

กรุณาเลือกเพียงหนึ่งคำตอบจากตัวเลือกที่ปรากฏ

กรุณาเลือก...

***หอผู้ป่วย**

กรุณาระบุเฉพาะรหัส ward ตัวอย่างเช่น 3IC, 1OW, 2OW เป็นต้น

***การวินิจฉัยโรค (Diagnosis)**

กรุณากรอกเป็น free text หรือ รหัส ICD10

ต่อไป

14%

ส่วนที่ 2 VTE Assessment

*มีภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE) ก่อนนอนโรงพยาบาล และได้รับการรักษาอยู่ในขณะนี้



*ได้รับการวินิจฉัยภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE) จากการคัดกรองก่อนผ่าตัด



*มีอาการและอาการแสดงของภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE)



*

กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

☐ ขาบวมข้างเดียว

☐ ปวดขาข้างเดียวตาม deep vein

☐ เหนื่อย ใจสั่น เวียนศีรษะ หมดสติโดยไม่ทราบสาเหตุ

☐ อื่นๆ:

ก่อนหน้า

ต่อไป

ส่วนที่ 2 VTE Assessment

*มีภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE) ก่อนนอนโรงพยาบาล และได้รับการรักษาอยู่ในขณะนี้



*ได้รับการวินิจฉัยภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE) จากการคัดกรองก่อนผ่าตัด



*มีอาการและอาการแสดงของภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE)



สรุปข้อมูลผู้ป่วย

วัน/เวลาที่ประเมิน: 19-04-2021 15:07

HN: 1938456

ชื่อ -
นามสกุล:
ก ข

อายุ: 78 ปี

เพศ: ชาย
(male)

หน่วย: General

หอผู้ป่วย:
5SW

การวินิจฉัยโรค (Diagnosis): Ca lung

มีภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE) ที่ได้รับการรักษาอยู่ในขณะนี้: ใช่

ได้รับการวินิจฉัยภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE) ก่อนผ่าตัด: ไม่

มีอาการและอาการแสดงของภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE): ไม่

****กรุณาส่ง consult
vascular team****

สรุปข้อมูลผู้ป่วย

วัน/เวลาที่ประเมิน: 19-04-2021 15:07

HN: 1938456

ชื่อ -
นามสกุล:
ก ข

อายุ: 78 ปี

เพศ: ชาย
(male)

หน่วย: General

หอผู้ป่วย:
5SW

การวินิจฉัยโรค (Diagnosis): Ca lung

มีภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE) ที่ได้รับการรักษาอยู่ในขณะนี้: ใช่

ได้รับการวินิจฉัยภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE) ก่อนผ่าตัด: ไม่

มีอาการและอาการแสดงของภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE): ไม่

****กรุณาส่ง consult
vascular team****

DOCTOR'S ORDER SHEET FOR PRE-OP VTE PROPHYLAXIS

Caprini score = _____

☐ Very low ☐ Low ☐ Moderate ☐ High

☐ มีข้อห้ามในการให้ Pharmacological prophylaxis

☐ มีข้อห้ามในการให้ Mechanical prophylaxis

QR Code Lime survey

VTE Risk assessment



Patient score	Total Risk Factor score	Risk of VTE	Risk level	Prophylaxis regimen			Duration
				Pharmaco prophylaxis • Enoxaparin 40mg SC daily (CrCl $\geq$ 30mL/min) • Heparin 5000 units SC TID (CrCl < 30mL/min)	Mechanical prophylaxis (IPC > GCS)	Early ambulation	
	0	< 0.5 %	VERY LOW			+	Hospitalization
	1-2	1.5 %	LOW		+	+	Hospitalization
	3-4	3 %	MODERATE	+	+ / -	+	Hospitalization
	$\geq$ 5	6 %	HIGH	+	+	+	1-10 d (non cancer) 28 days (cancer)

Date Hour	Order for 1 day only	Date Hour	Order for continuation	Date Hour OFF
	Consult vascular surgery เนื่องจาก ☒ มีภาวะลิ่มเลือดอุดตันในหลอดเลือดดำที่ได้รับการรักษาอยู่ในขณะนี้ ☐ ได้รับการวินิจฉัยภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ ☐ มีอาการและอาการแสดงของภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ ☐ อื่น ลงชื่อแพทย์.....รหัส..... หมายเหตุ: ถ้าแพทย์เจ้าของไข้สงสัยหรือวินิจฉัยภาวะ venous thromboembolism สามารถปรึกษา vascular surgery team ได้		<u>Mechanical prophylaxis</u> Intermittent pneumatic compression (IPC) Graduated compressive stocking (GCS) <u>Pharmacological prophylaxis</u> Enoxaparin 0.4 ml sc OD (if GFR > 30 mL/min) Heparin 5,000 unit sc tid (if GFR < 30 mL/min) หยุดยาก่อนผ่าตัด 12 ชั่วโมง 24 ชั่วโมง ลงชื่อแพทย์.....รหัส.....	



ส่วนที่ 2 VTE Assessment

*มีภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE) ก่อนนอนโรงพยาบาล และได้รับการรักษาอยู่ในขณะนี้

☒ ใช่ ☐ ไม่

*ได้รับการวินิจฉัยภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE) จากการคัดกรองก่อนผ่าตัด

☒ ใช่ ☐ ไม่

*มีอาการและอาการแสดงของภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ (VTE)

☒ ใช่ ☐ ไม่

ก่อนหน้า

ต่อไป

ส่วนที่ 3 Caprini VTE Risk assessment

Age: 79 (75 years or over)

Type of surgery

กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ Minor surgery (less than 45 minutes) is planned
- ☐ Planned major surgery lasting longer than 45 minutes (including laparoscopic and arthroscopic)
- ☐ Past major surgery (more than 45 minutes) within the last month
- ☐ Elective hip or knee joint replacement surgery

Present and past history

กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ Current or past malignancies (excluding skin cancer, but not melanoma)
- ☐ A history of Inflammatory Bowel Disease (IBD) (for example, Crohn's disease or ulcerative colitis)
- ☐ Overweight or obese (BMI ≥ 25)
- ☐ Lung disease (for example, emphysema or COPD)

Recent Event (< 1 month)

กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ Heart attack
- ☐ Congestive heart failure
- ☐ Serious infection (for example, pneumonia)
- ☐ Non-removable plaster cast or mold that has kept you from moving your leg within the last month
- ☐ Broken hip, pelvis or leg
- ☐ Serious trauma (for example, multiple broken bones due to a fall or car accident)
- ☐ Spinal cord injury resulting in paralysis
- ☐ Experienced a stroke

Venous disease or clotting disorder

กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ Visible varicose veins
- ☐ Swollen legs (current)
- ☐ Tube in blood vessel in neck or chest that delivers blood or medicine directly to heart within the last month (also called central venous access, PICC line, or port)
- ☐ History of blood clots, either Deep Vein Thrombosis (DVT) or Pulmonary Embolism (PE)
- ☐ Family history of blood clots (thrombosis)
- ☐ Personal or family history of positive blood test indicating an increased risk of blood clotting

Reproductive

กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ Current use of birth control or Hormone Replacement Therapy (HRT)
- ☐ Pregnant or had a baby within the last month
- ☐ History of unexplained stillborn infant, recurrent spontaneous abortion (> 3), premature birth

Mobility

กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ On bed rest or restricted mobility, including a removable leg brace for less than 72 hours
- ☐ Confined to a bed for 72 hours or more

*

กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ ผู้ป่วยไม่มีความเสี่ยง

ก่อนหน้า

ต่อไป



VTE Risk assessment



57%

ส่วนที่ 4 มีข้อห้ามใช้ในการให้ Pharmacological prophylaxis

Absolute contraindication

! กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ Active hemorrhage
- ☐ Severe trauma to head or spinal cord with hemorrhage in the last 4 weeks

Relative contraindication

! กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ Intracranial hemorrhage within last year
- ☐ Craniotomy within 2 weeks
- ☐ Intraocular surgery within 2 weeks
- ☐ GI, GU hemorrhage within last month
- ☐ Thrombocytopenia or coagulopathy
- ☐ End stage liver failure
- ☐ Active intracranial lesion/neoplasms
- ☐ Hypertensive urgency/emergency
- ☐ Postoperative bleeding concerns
- ☐ Concurrent use of anticoagulant known to increase the risk of bleeding

Other contraindication

! กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ Immune mediated heparin induced thrombocytopenia
- ☐ Epidural analgesia with spinal catheter (current or planned)

*

! กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ No contraindication

ก่อนหน้า



ต่อไป



VTE Risk assessment



71%

ส่วนที่ 5 มีข้อห้ามใช้ในการให้
Mechanical prophylaxis

Contraindication

กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ PAD (คลำ foot pulse ไม่ได้ หรือABI<0.8)
- ☐ Severe leg edema
- ☐ Dermatitis
- ☐ DVT (IPC)



กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

☐ No contraindication

ก่อนหน้า

ต่อไป



VTE Risk assessment



85%

ส่วนที่ 6 Risk level & Prophylaxis

วัน/เวลาที่ประเมิน: 19-04-2021
15:18

HN: 2033556

ชื่อ - นามสกุล: กพ
นร

อายุ: 79 ปี

เพศ: หญิง
(female)

หน่วย: B/E

หอผู้ป่วย: 5Se

การวินิจฉัยโรค (Diagnosis): Ca
breast

Risk factor

•Planned major surgery lasting longer than
45 minutes (including laparoscopic and
arthroscopic)

•Current or past malignancies (excluding
skin cancer, but not melanoma)

มีข้อห้ามใช้ในการให้ Pharmacological prophylaxis

•No contraindication

มีข้อห้ามใช้ในการให้ Mechanical prophylaxis

•No contraindication

Caprini score = 7

Risk level = high (Risk of VTE 6%)

Recommendation

Risk level	Prophylaxis regimen	Duration
High	1. Early ambulation	1 – 10 days
	2. Pharmacological prophylaxis	(non-cancer) 28 days (cancer)
	- Enoxaparin 40 mg SC daily (CrCl $\geq$ 30 mL/min) - Heparin 5000 units SC TID (CrCl $<$ 30 mL/min)	
	3. Mechanical prophylaxis (IPC > GCS)	

*Plan

(กรุณา ดู recommendation ประกอบ)

! กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☐ Early ambulation
- ☐ Mechanical prophylaxis (IPC > GCS)
- ☐ Pharmacological prophylaxis

กรุณาเขียนคำสั่งการรักษาลงใน Doctor Order Sheet

ก่อนหน้า



ส่ง



มีข้อห้ามใช้ในการให้ Pharmacological prophylaxis

•No contraindication

มีข้อห้ามใช้ในการให้ Mechanical prophylaxis

•No contraindication

Caprini score = 7

Risk level = high (Risk of VTE 6%)

RAMATHIBODI HOSPITAL

Department	Division	Ward
Attending Staff		Resident

DOCTOR'S ORDER SHEET FOR PRE-OP VTE PROPHYLAXIS

Caprini score = 7

☐ Very low ☐ Low ☐ Moderate ☒ High

☐ มีข้อห้ามในการให้ Pharmacological prophylaxis

☐ มีข้อห้ามในการให้ Mechanical prophylaxis

QR Code Lime survey
VTE Risk assessment



Recommendation

Risk level	Prophylaxis regimen	Duration
High	1. Early ambulation 2. Pharmacological prophylaxis - Enoxaparin 40 mg SC daily (CrCl ≥ 30 mL/min) - Heparin 5000 units SC TID (CrCl < 30 mL/min) 3. Mechanical prophylaxis (IPC > GCS)	1 - 10 days (non-cancer) 28 days (cancer)

Patient score	Total Risk Factor score	Risk of VTE	Risk level	Prophylaxis regimen			Duration
				Pharmaco prophylaxis • Enoxaparin 40mg SC daily (CrCl ≥ 30mL/min) • Heparin 5000 units SC TID (CrCl < 30mL/min)	Mechanical prophylaxis (IPC > GCS)	Early ambulation	
	0	< 0.5 %	VERY LOW			+	Hospitalization
	1-2	1.5 %	LOW		+	+	Hospitalization
	3-4	3 %	MODERATE	+	+ / -	+	Hospitalization
7	≥ 5	6 %	HIGH	+	+	+	1-10 d (non cancer) 28 days (cancer)

***Plan**
(กรุณาดู recommendation ประกอบ)
กรุณาเลือกตัวเลือกที่เหมาะสม (อาจมีหลายคำตอบ)

- ☒ Early ambulation
- ☒ Mechanical prophylaxis (IPC > GCS)
- ☒ Pharmacological prophylaxis

กรุณาเขียนคำสั่งการรักษาลงใน
Doctor Order Sheet

ก่อนหน้า

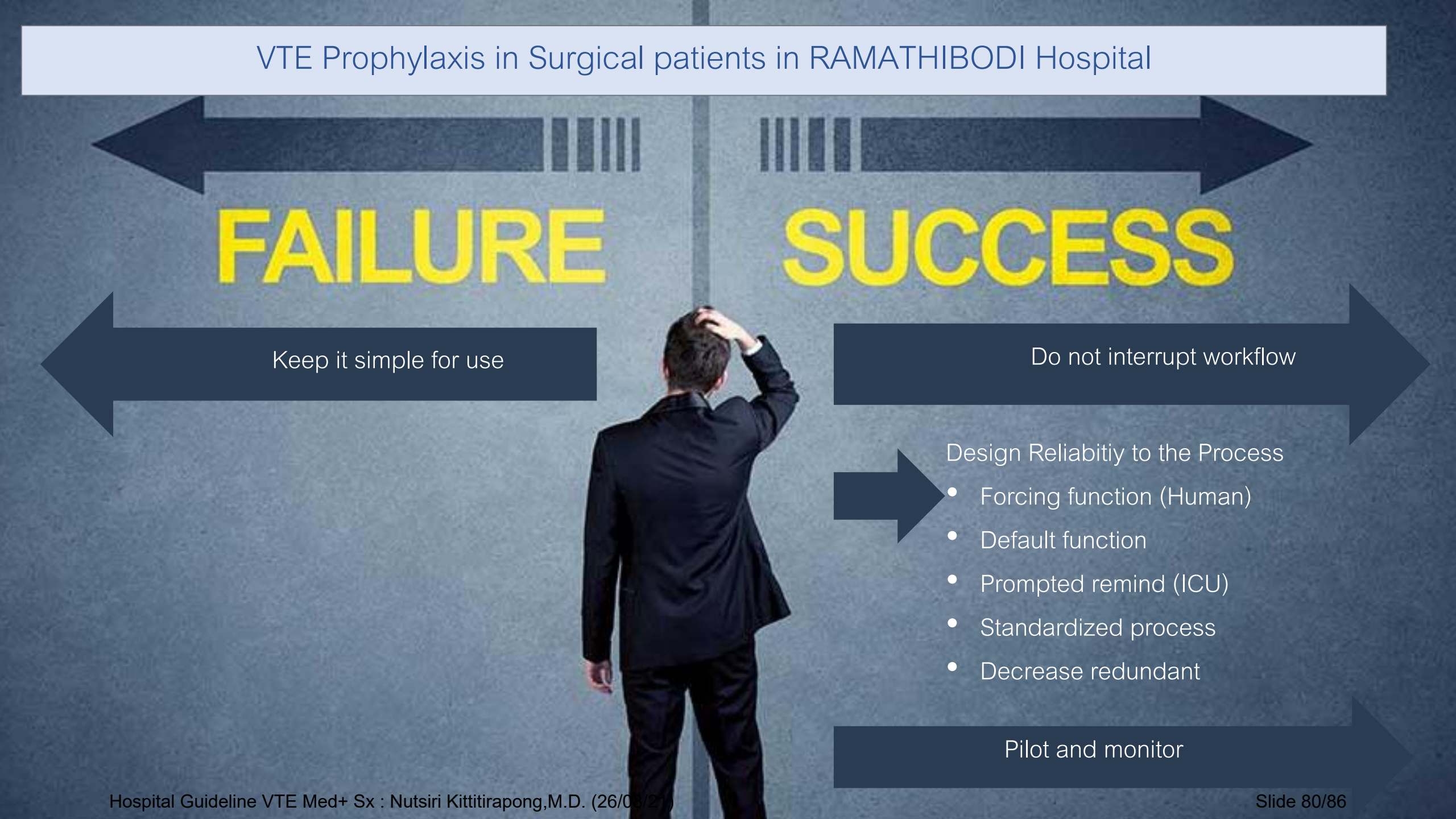


ส่ง

Patient score	Total Risk Factor score	Risk of VTE	Risk level	Prophylaxis regimen			Duration
				Pharmaco prophylaxis • Enoxaparin 40mg SC daily (CrCl ≥ 30mL/min) • Heparin 5000 units SC TID (CrCl < 30mL/min)	Mechanical prophylaxis (IPC > GCS)	Early ambulation	
	0	< 0.5 %	VERY LOW			+	Hospitalization
	1-2	1.5 %	LOW		+	+	Hospitalization
	3-4	3 %	MODERATE	+	+ / -	+	Hospitalization
7	≥ 5	6 %	HIGH	+	+	+	1-10 d (non cancer) 28 days (cancer)

Date Hour	Order for 1 day only	Date Hour	Order for continuation	Date Hour OFF
	Consult vascular surgery เนื่องจาก สงสัยหรือวินิจฉัยvenous thromboembolism ก่อนผ่าตัด Previous venous thromboembolism อื่นๆ _____ ลงชื่อแพทย์.....รหัส.....		<u>Mechanical prophylaxis</u> Intermittent pneumatic compression (IPC) ที่ OR Graduated compressive stocking (GCS) <u>Pharmacological prophylaxis</u> Enoxaparin 0.4 ml sc OD (if GFR > 30 mL/min) Heparin 5,000 unit sc tid (if GFR < 30 mL/min) หยุดยาก่อนผ่าตัด 12 ชั่วโมง 24 ชั่วโมง	

VTE Prophylaxis in Surgical patients in RAMATHIBODI Hospital



FAILURE

Keep it simple for use

SUCCESS

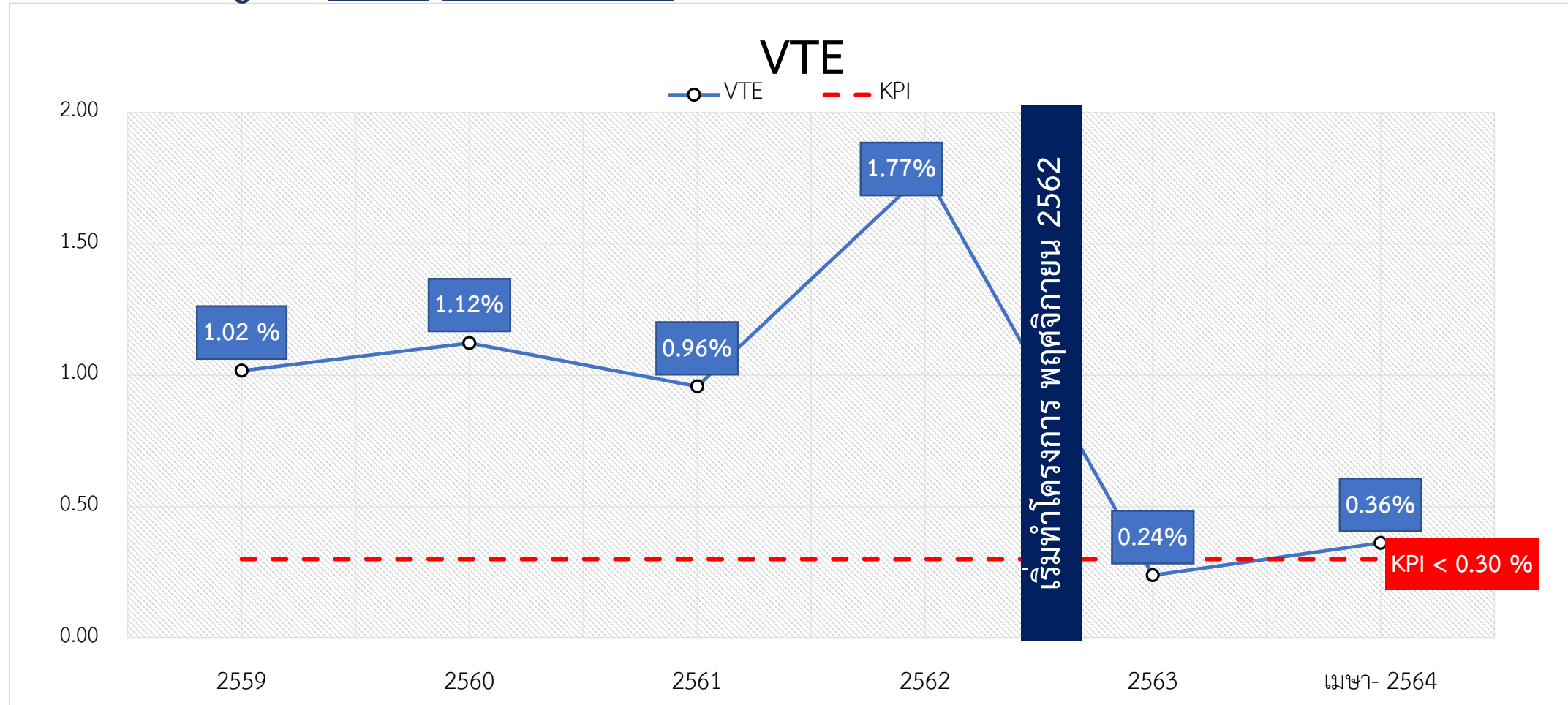
Do not interrupt workflow

Design Reliability to the Process

- Forcing function (Human)
- Default function
- Prompted remind (ICU)
- Standardized process
- Decrease redundant

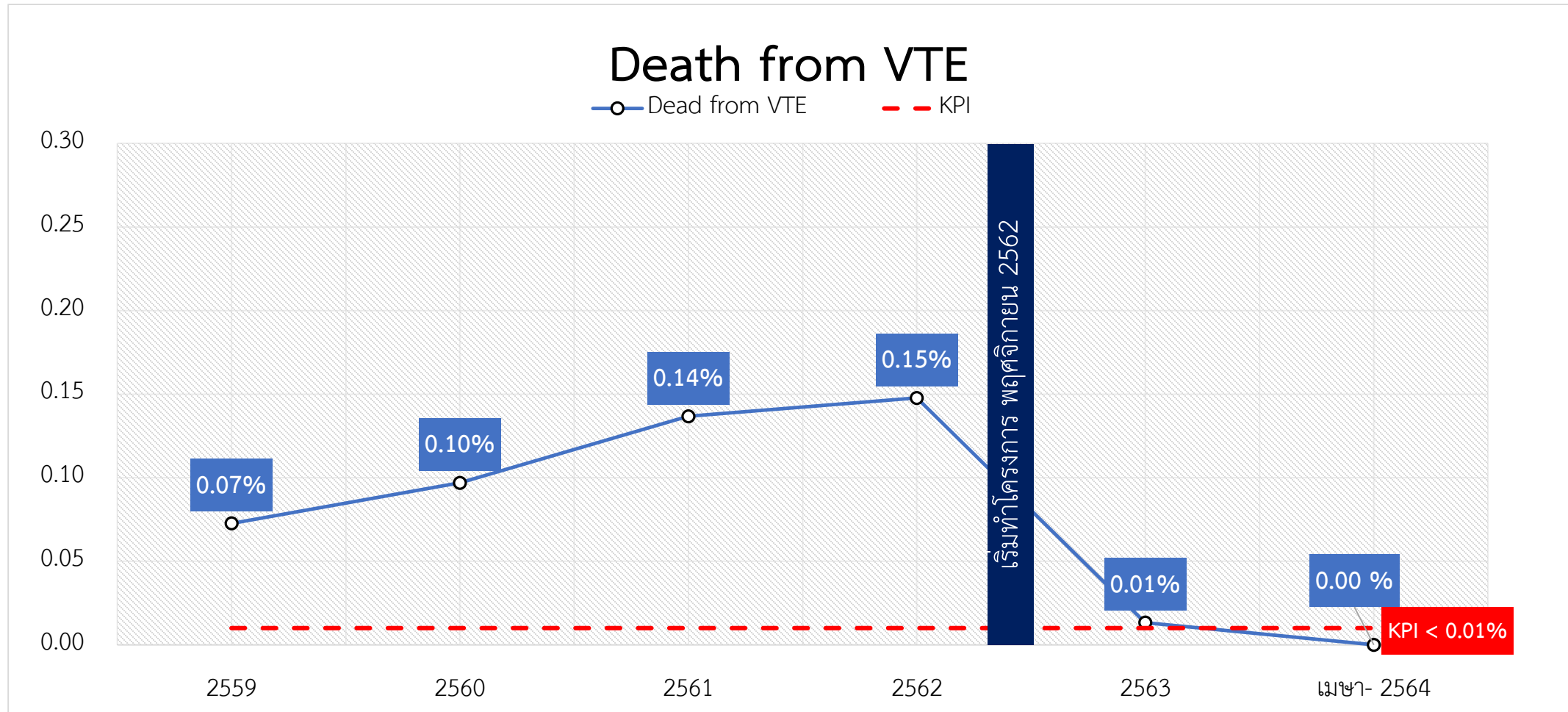
Pilot and monitor

ตัวชี้วัดสำคัญด้าน คลินิก ผลสำเร็จหลัก เปรียบเทียบระหว่างก่อนและหลังมีการจัดตั้ง VTE



*Cassidy MR, Rosenkranz P, McAneny D. J Am Coll Surg. 2014 Jun;218(6):1095-104.

ตัวชี้วัดสำคัญด้านคลินิก ผลสำเร็จหลัก เปรียบเทียบระหว่างก่อนและหลังมีการจัดตั้ง VTE

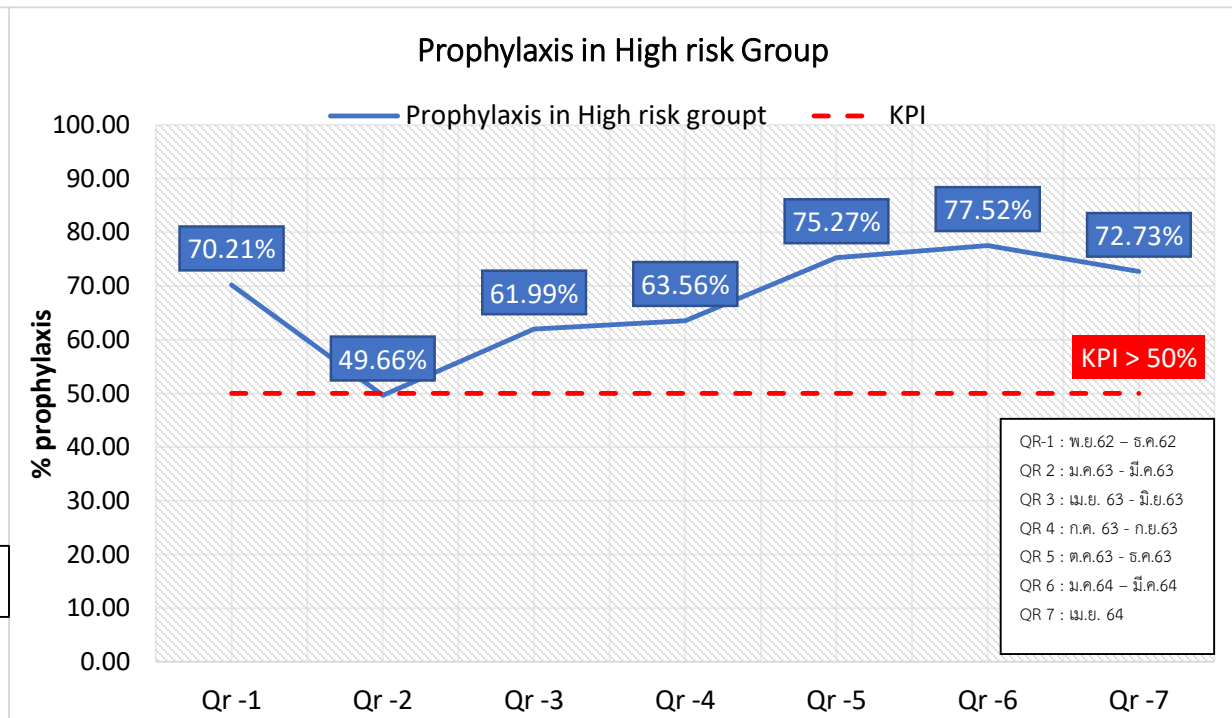
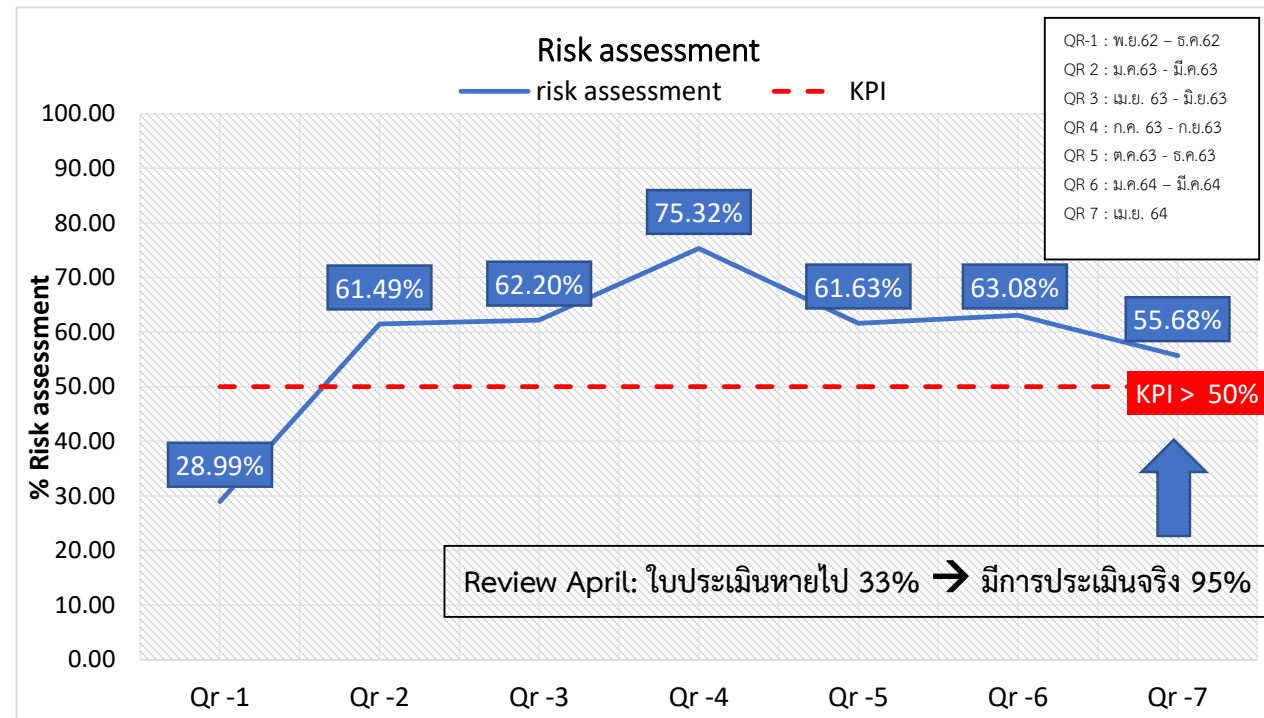


*Cassidy MR, Rosenkranz P, McAneny D. J Am Coll Surg. 2014 Jun;218(6):1095-104.

แสดงตัวชี้วัดสำคัญด้านบริการ ผลสำเร็จหลัก เปรียบเทียบระหว่างก่อนและหลังมีการจัดตั้งVTE

อัตราการได้รับการประเมินความเสี่ยง VTE
พ.ย.2562-เม.ย.2654

อัตราการให้การป้องกันภาวะลิ่มเลือดอุดตันในหลอดเลือดดำ
หลังการผ่าตัดในผู้ป่วยความเสี่ยงสูง พ.ย.2562-เม.ย.2654



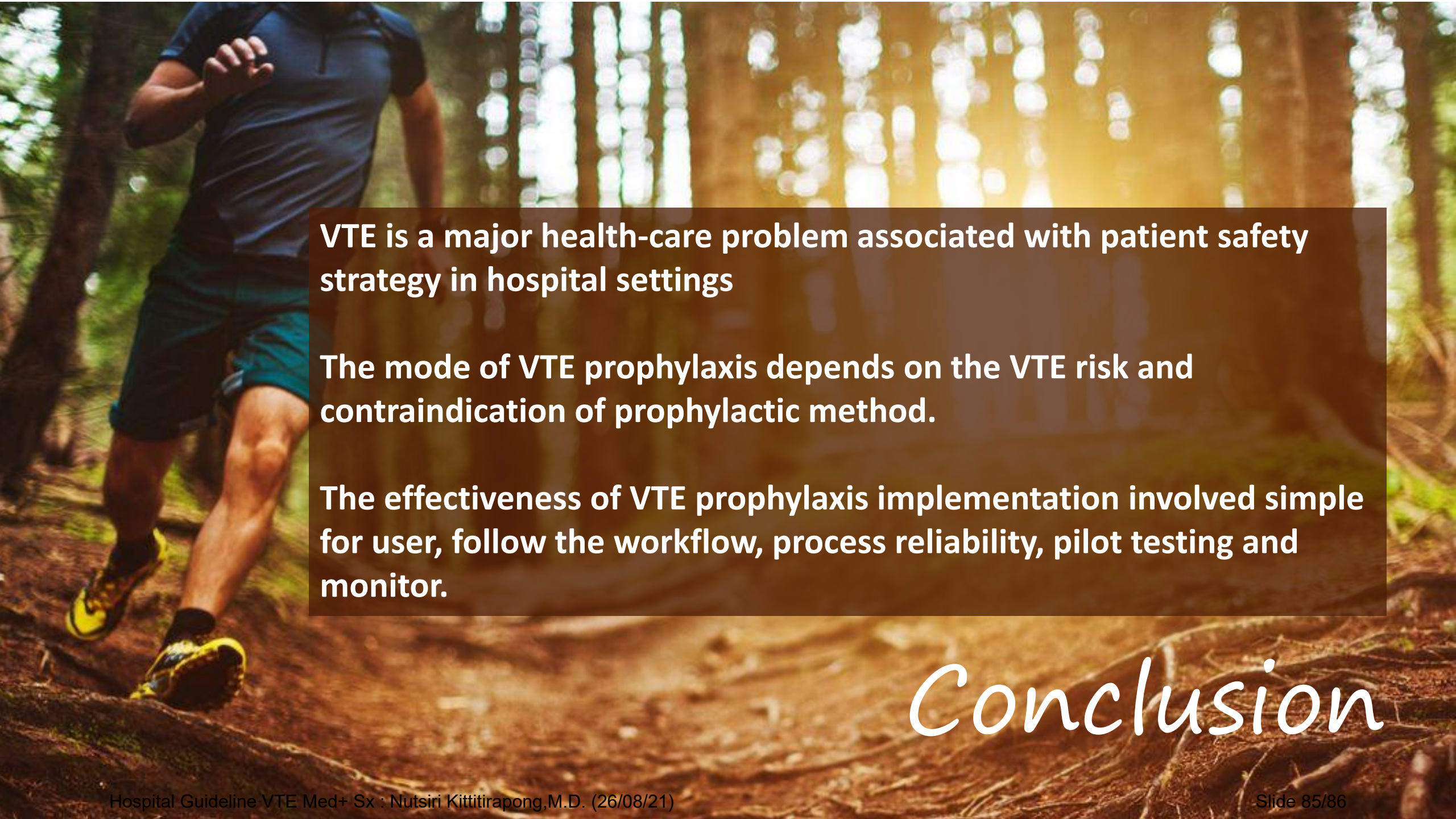
ก่อนการจัดตั้ง: ไม่มีการประเมินความเสี่ยง

ก่อนการจัดตั้ง: ไม่มีการเก็บรวบรวมข้อมูล



Risk factors predicting VTE in surgical patients in Ramathibodi hospital

Variable	VTE	No VTE	P-value	Univariate	P-value	Multivariate	P-value
	n = 17	n = 4,563		OR (95% CI)		OR (95% CI)	
Doctor access	11 (64.71)	4,182 (91.67)	0.002	0.17 (0.06–0.45)	<0.001	0.001 (0.000–0.006)	<0.001
Serious infection	3 (17.65)	31 (0.74)	<0.001	28.71 (7.86–104.94)	<0.001	18.86 (2.09–170.55)	0.009
Current or past malignancy	13 (76.47)	1,388 (33.17)	<0.001	2.56 (1.46–4.49)	0.001	2.23 (1.16–4.26)	0.015
Planned major surgery lasting >45 minutes	15 (88.24)	2,525 (60.33)	0.019	2.22 (1.06–4.65)	0.034	3.30 (1.22–8.96)	0.019
Confined to bed for >72 hours	6 (35.29)	292 (6.98)	0.001	2.70 (1.63–4.45)	<0.001	3.52 (1.81–6.85)	<0.001

A person is running on a dirt path in a forest. The person is wearing a blue short-sleeved shirt, dark shorts, and yellow and black running shoes. The background is a dense forest with sunlight filtering through the trees, creating a warm, golden glow. A semi-transparent brown box with white text is overlaid on the right side of the image.

VTE is a major health-care problem associated with patient safety strategy in hospital settings

The mode of VTE prophylaxis depends on the VTE risk and contraindication of prophylactic method.

The effectiveness of VTE prophylaxis implementation involved simple for user, follow the workflow, process reliability, pilot testing and monitor.

Conclusion



Mahidol University

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VTE RAMA 2021

Hospital VTE Prophylaxis Guideline for VTE in medically and surgically ill

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26th August 2021