



Venous Thromboembolism Prevention

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What is a Clinical Pathway?

An evidence-based guideline that decreases unnecessary variation and helps promote safe, effective, and consistent patient care.

Objectives of Pathway

- To identify inpatients at risk for VTE
- To reduce VTE events without increase in adverse events
- To ensure appropriate VTE prevention based on risk level

Why is Pathway Necessary?



- Hospital-acquired venous thromboembolism (HA VTE) is a significant morbidity and mortality risk for our pediatric patients
- HA VTE may be prevented using mechanical and pharmacologic prophylaxis in patients at risk. By providing a standardized approach, we may decrease the overall VTE events in our patients
- Solutions for Patient Safety, a network of 150+ pediatric hospitals working together to help each individual hospital make progress on a journey to zero harm, recommends development of a screening process and pathway for HA VTE prophylaxis, making this the gold standard for children's hospitals

Children's Hospitals'
Solutions for
Patient Safety
Every patient. Every day.

Background

- Hospital-acquired venous thromboembolism (VTE) is a life-threatening condition that includes deep vein thrombosis (DVT) and pulmonary embolism (PE), and it is the most common preventable cause of hospital death in adults (*ISTH Steering Committee 2014, Lozano 2012*)
- Thromboprophylaxis is highly effective at preventing VTE, and the Agency for Healthcare Research and Quality identified thromboprophylaxis as the “number one patient safety practice”
- In the early 2000's, it was found that there was a significant increased in VTE in children admitted to children's hospitals (70% increase using PHIS database 2001-2007) (*Raffini 2009*)
- Pediatric studies have identified risk factors associated with the development of in-hospital VTE including ICU stay, central venous catheter presence, mechanical ventilation, and systemic infection (*Mahajerin 2015, Jaffray 2022*)

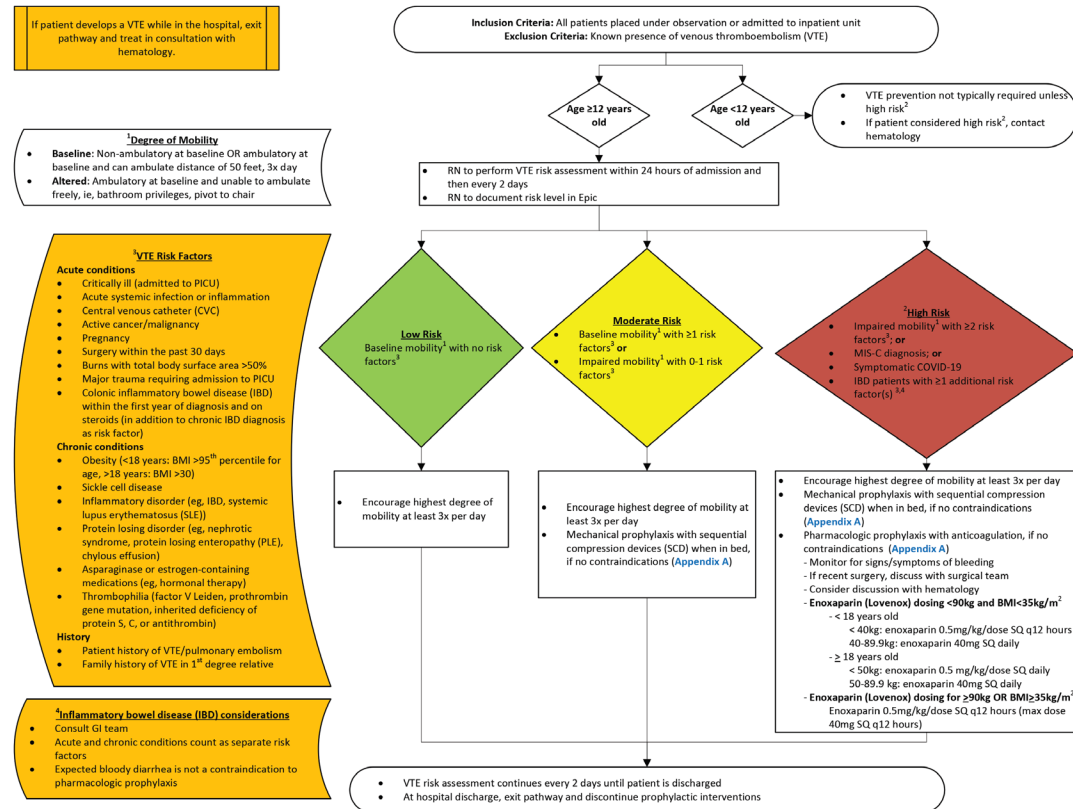
Pathway Review

This is the VTE Prevention Clinical Pathway.

Each component will be reviewed in the following slides.

CLINICAL PATHWAY: Venous Thromboembolism Prevention

THIS PATHWAY
SERVES AS A GUIDE
AND DOES NOT
REPLACE CLINICAL
JUDGMENT.



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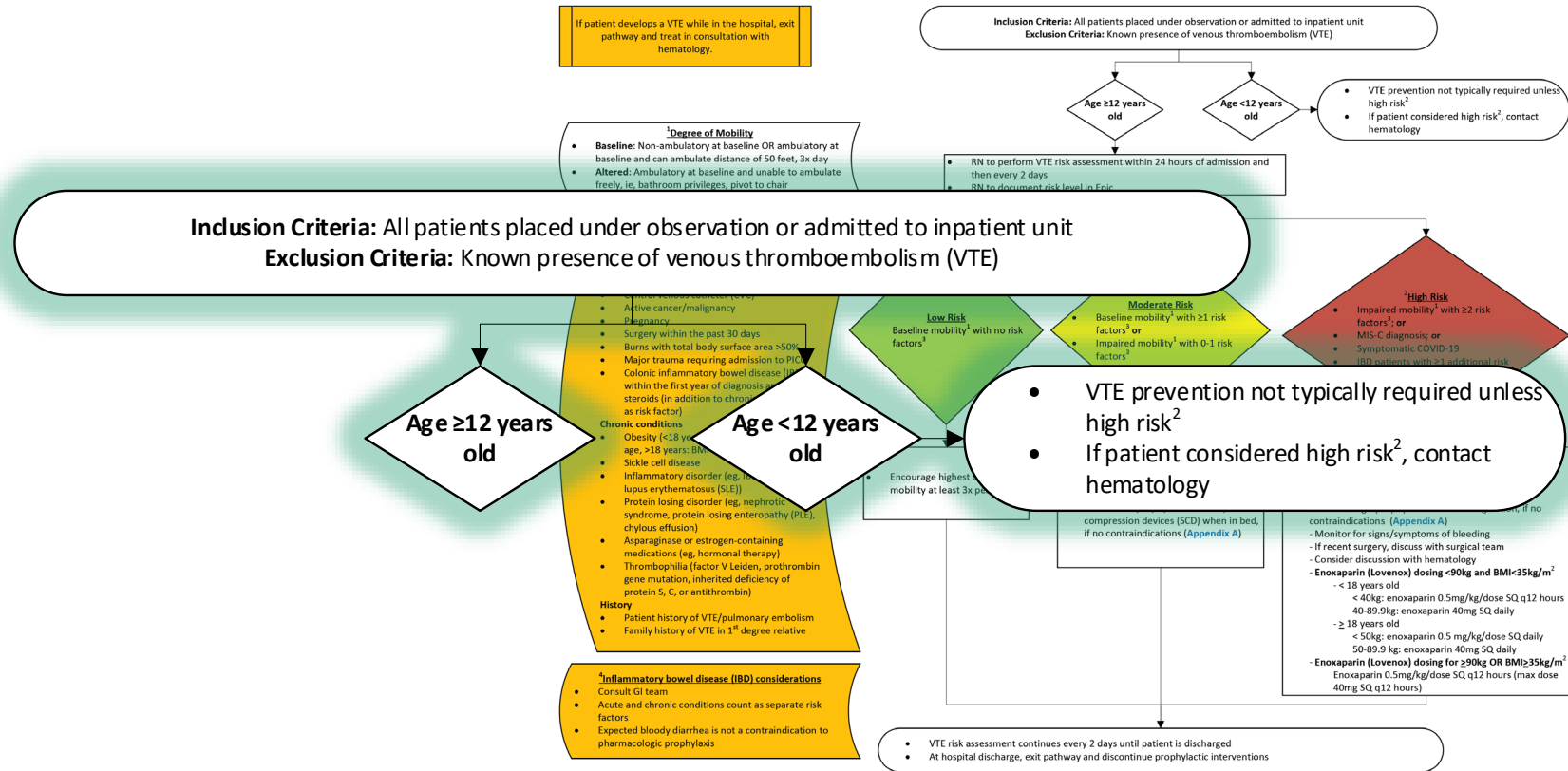
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- All patients ≥ 12 years should be assessed for VTE risk
- Patients < 12 years old that are high risk can be considered for VTE prevention, and if meets criteria, hematology should be consulted (outside of scope of this pathway)



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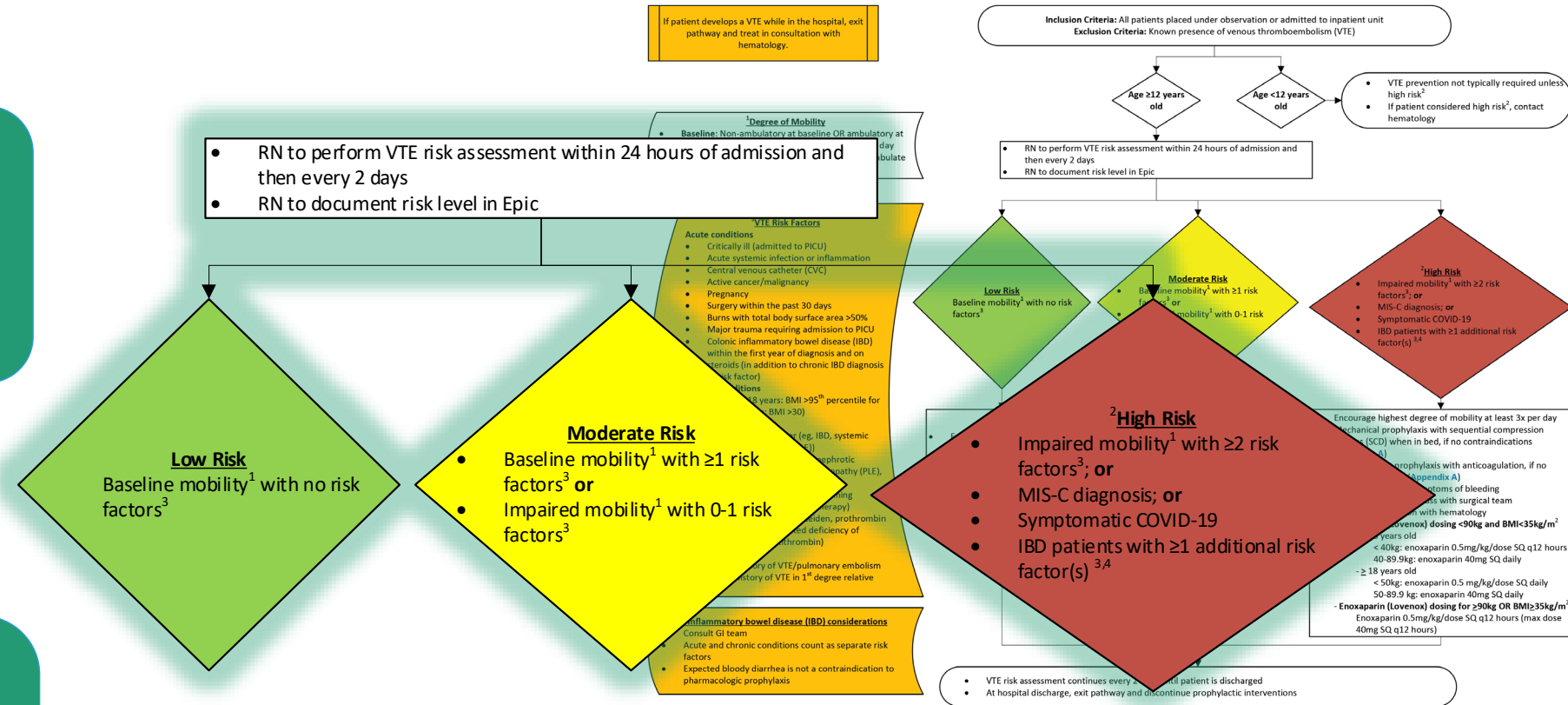
Bedside RN performs VTE screen in EPIC

- See EPIC tutorial slides



VTE screen completion will trigger an OPA (Our Practice Advisory) to prompt provider to address VTE risk

- See EPIC tutorial slides



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Risk level is determined by:

- Level of mobility
- Other VTE risk factors, including known acute conditions, chronic conditions, and patient/family history factors associated with VTE

³VTE Risk Factors

Acute conditions

- Critically ill (admitted to PICU)
- Acute systemic infection or inflammation
- Central venous catheter (CVC)
- Active cancer/malignancy
- Pregnancy
- Surgery within the past 30 days
- Burns with total body surface area >50%
- Major trauma requiring admission to PICU
- Colonic inflammatory bowel disease (IBD) within the first year of diagnosis and on steroids (in addition to chronic IBD diagnosis as risk factor)

Chronic conditions

- Obesity (<18 years: BMI >95th percentile for age, >18 years: BMI >30)
- Sickle cell disease
- Inflammatory disorder (eg, IBD, systemic lupus erythematosus (SLE))
- Protein losing disorder (eg, nephrotic syndrome, protein losing enteropathy (PLE), chylous effusion)
- Asparaginase or estrogen-containing medications (eg, hormonal therapy)
- Thrombophilia (factor V Leiden, prothrombin gene mutation, inherited deficiency of protein S, C, or antithrombin)

History

- Patient history of VTE/pulmonary embolism
- Family history of VTE in 1st degree relative

CLINICAL PATHWAY: Venous Thromboembolism Prevention

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Low Risk
Baseline mobility¹ with no risk factors³

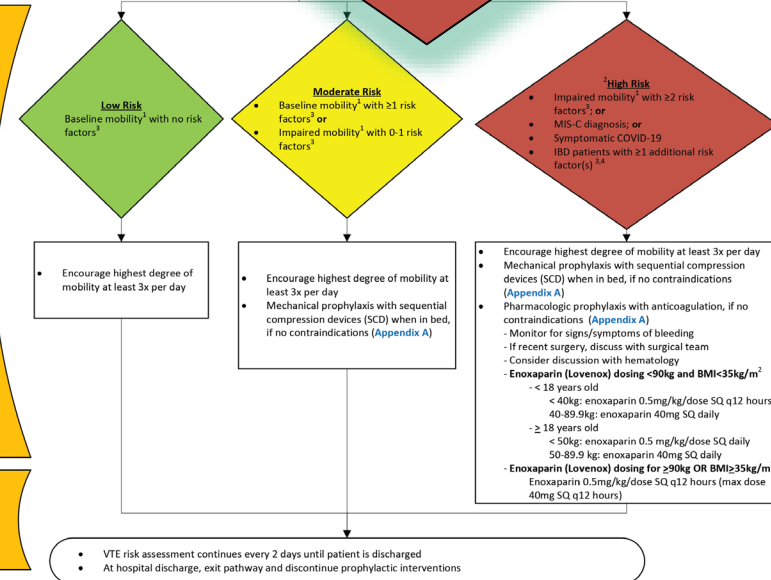
Moderate Risk
• Baseline mobility¹ with ≥1 risk factors³ or
• Impaired mobility¹ with 0-1 risk factors³

²High Risk
• Impaired mobility¹ with ≥2 risk factors³; or
• MIS-C diagnosis; or
• Symptomatic COVID-19
• IBD patients with ≥1 additional risk factor(s)^{3,4}

³VTE Risk Factors

- Acute conditions**
- Critically ill (admitted to PICU)
 - Acute systemic infection or inflammation
 - Central venous catheter (CVC)
 - Active cancer/malignancy
 - Pregnancy
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- Obesity (<18 years: BMI >95th percentile for age, >18 years: BMI >30)
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 - Asparaginase or estrogen-containing medications (eg, hormonal therapy)
 - Thrombophilia (factor V Leiden, prothrombin gene mutation, inherited deficiency of protein S, C, or antithrombin)
- History**
- Patient history of VTE/pulmonary embolism
 - Family history of VTE in 1st degree relative

- ⁴Inflammatory bowel disease (IBD) considerations**
- Consult GI team
 - Acute and chronic conditions count as separate risk factors
 - Expected bloody diarrhea is not a contraindication to pharmacologic prophylaxis



¹Degree of Mobility

- **Baseline:** Non-ambulatory at baseline OR ambulatory at baseline and can ambulate distance of 50 feet, 3x day
- **Altered:** Ambulatory at baseline and unable to ambulate freely, ie, bathroom privileges, pivot to chair

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Of note, patients with **Inflammatory Bowel Disease (IBD)** are specifically called out in this pathway

³VTE Risk Factors

Acute conditions

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- Acute systemic infection or inflammation
- Central venous catheter (CVC)
- Active cancer/malignancy
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History

- Patient history of VTE/pulmonary embolism
- Family history of VTE in 1st degree relative

⁴Inflammatory bowel disease (IBD) considerations

- Consult GI team
- Acute and chronic conditions count as separate risk factors
- Expected bloody diarrhea is not a contraindication to pharmacologic prophylaxis

If patient develops a VTE while in the hospital, exit pathway and treat in consultation with hematology.

¹Degree of Mobility

Baseline: Non-ambulatory at baseline OR ambulatory at baseline and can ambulate distance of 50 feet, 3x day
Altered: Ambulatory at baseline and unable to ambulate freely, ie, bathroom privileges, pivot to chair

³VTE Risk Factors

- Acute conditions
- Critically ill (admitted to PICU)
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- Obesity (<18 years: BMI >95th percentile for age, >18 years: BMI >30)
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- Thrombophilia (factor V Leiden, prothrombin gene mutation, inherited deficiency of protein S, C, or antithrombin)
- History
- Patient history of VTE/pulmonary embolism
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⁴Inflammatory bowel disease (IBD) considerations

- Consult GI team
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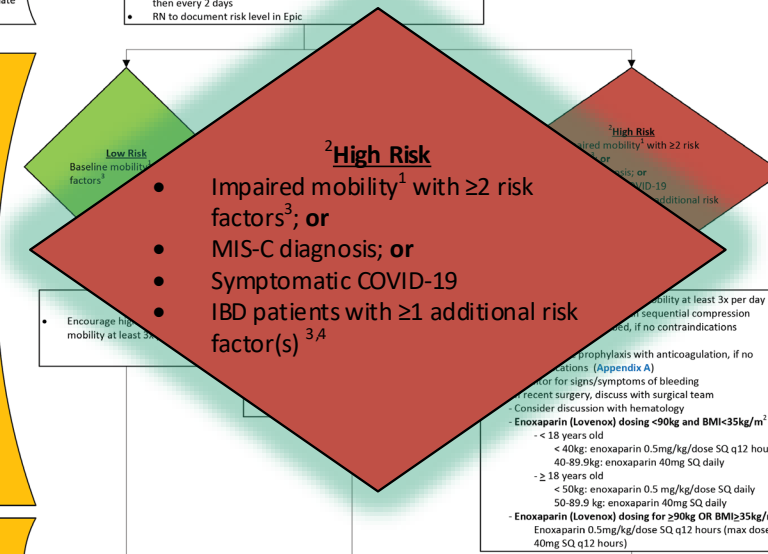
Inclusion Criteria: All patients placed under observation or admitted to inpatient unit
Exclusion Criteria: Known presence of venous thromboembolism (VTE)

Age ≥12 years old

Age <12 years old

- VTE prevention not typically required unless high risk²
- If patient considered high risk², contact hematology

- RN to perform VTE risk assessment within 24 hours of admission and then every 2 days
- RN to document risk level in Epic



- VTE risk assessment continues every 2 days until patient is discharged
- At hospital discharge, exit pathway and discontinue prophylactic interventions

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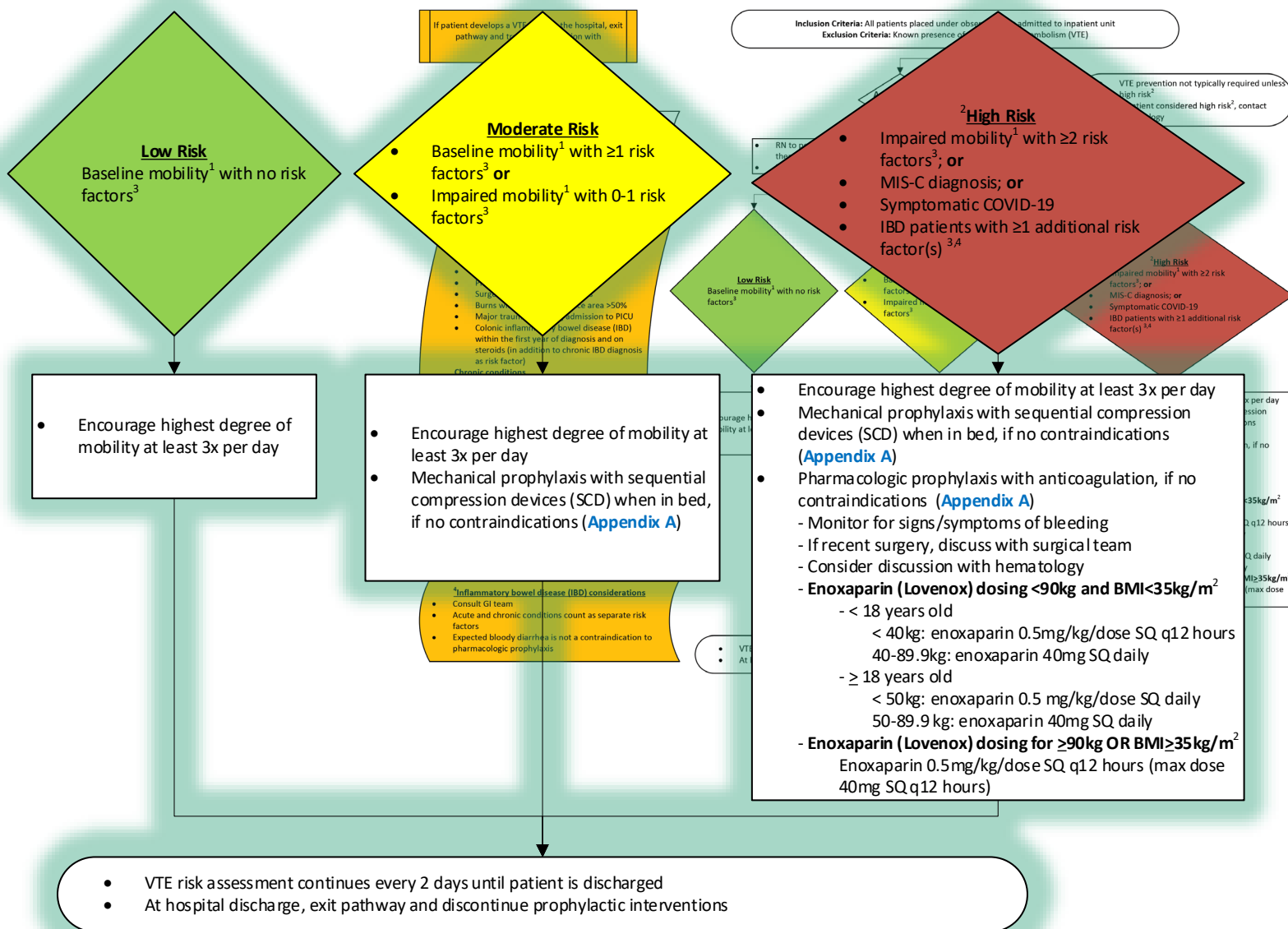
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VTE prophylaxis interventions are determined by level of risk

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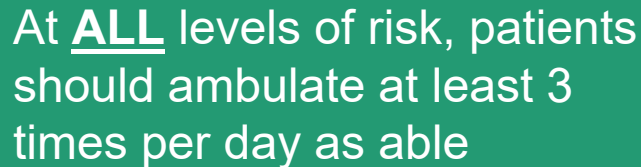
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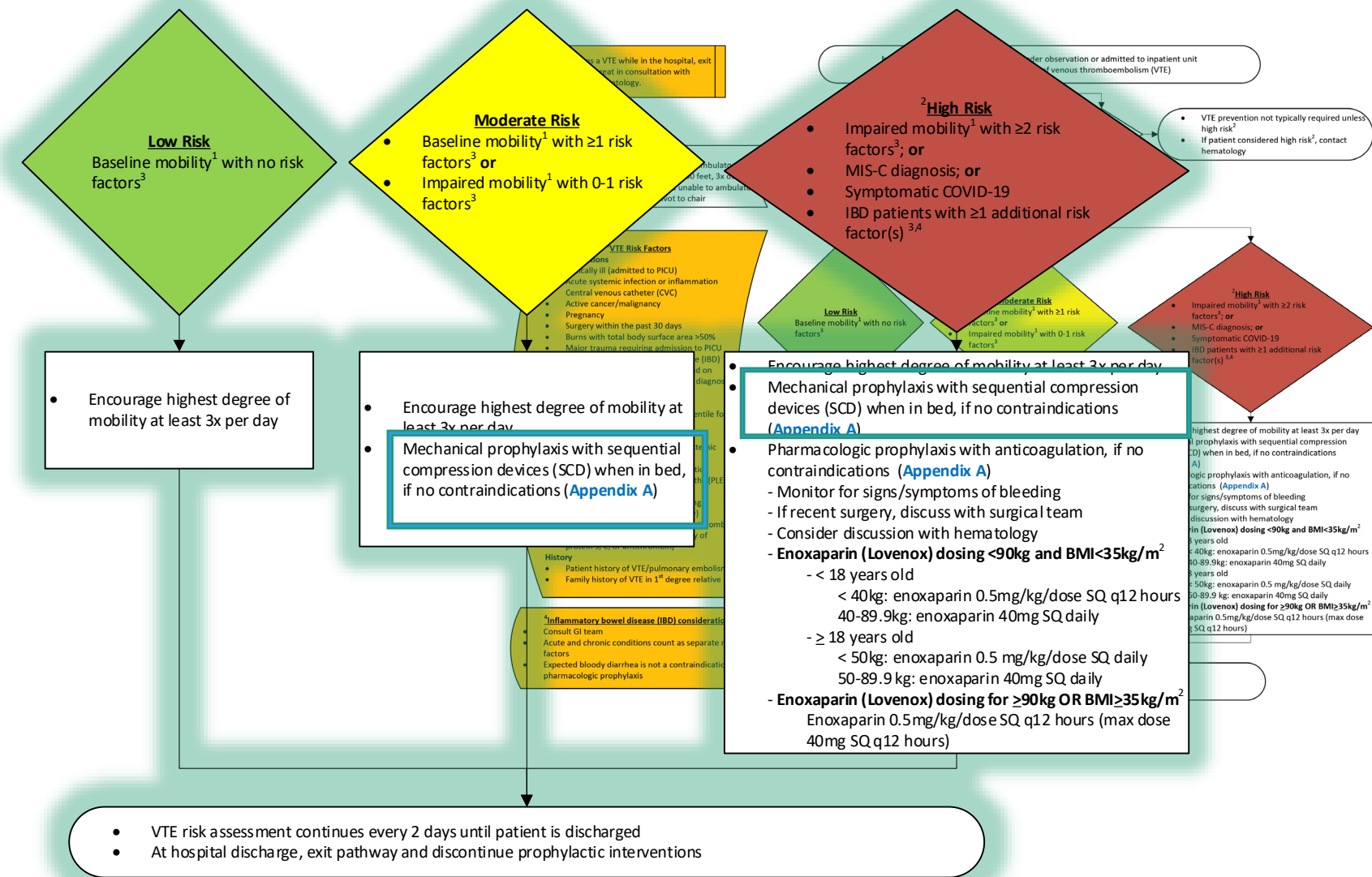
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For moderate and high risk, order mechanical prophylaxis with sequential compression devices as long as there are no contraindications

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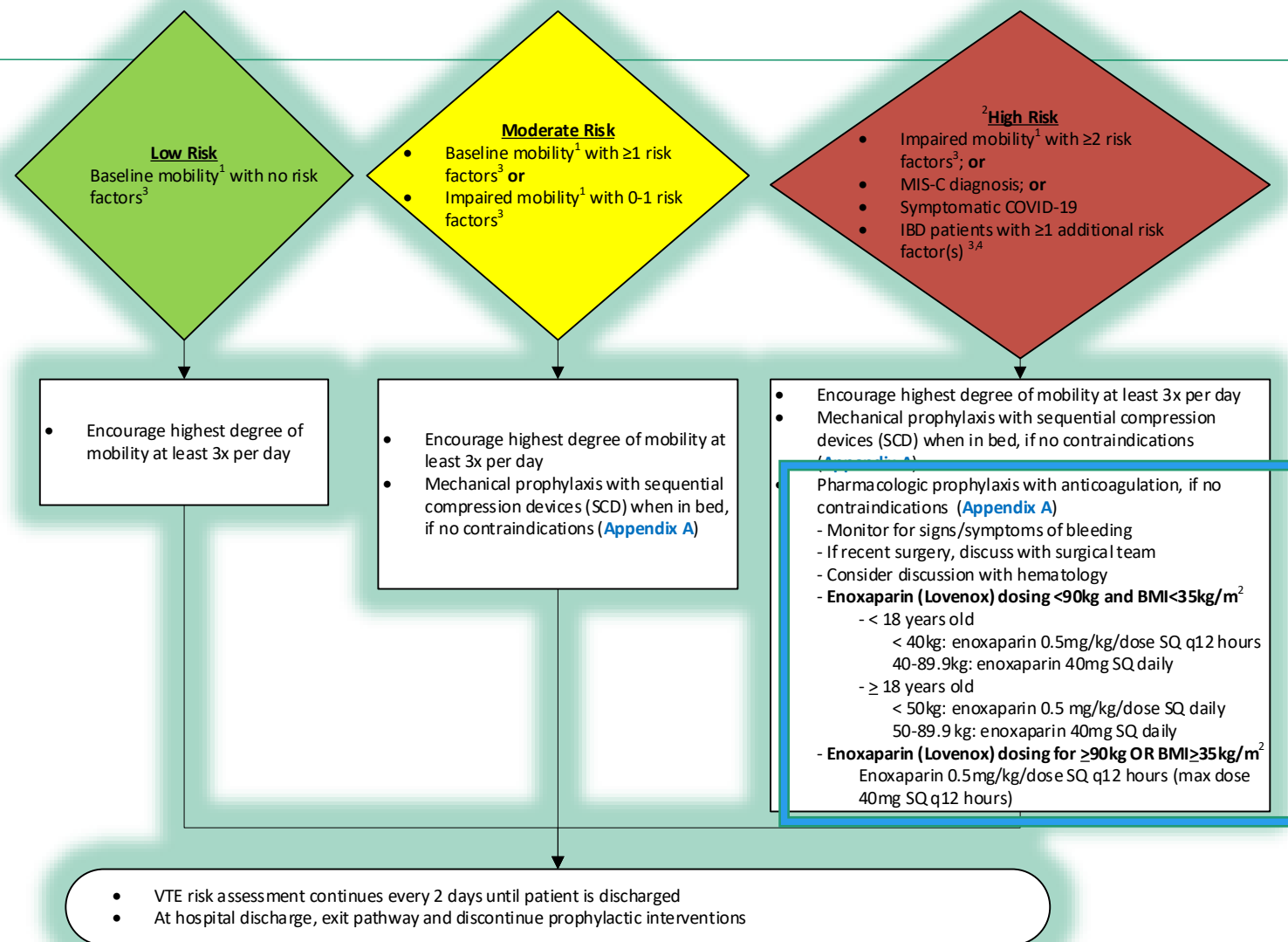
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For **high** risk, consider pharmacologic prophylaxis with enoxaparin (Lovenox) as long as there are no contraindications

Please note that monitoring of anti Xa levels is **NOT** necessary when administering enoxaparin as prophylaxis



Appendix A lists contraindications to both mechanical and pharmacologic VTE prophylaxis

CLINICAL PATHWAY:

Venous Thromboembolism Prevention

Appendix A: Contraindications to Mechanical and Pharmacologic Venous Thromboembolism Prophylaxis

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Contraindications to sequential compression device (SCD):

- Suspected or existing VTE (use graded compression stockings)
- Acute fracture of extremity (use device on unaffected extremity)
- Skin conditions affecting extremity (e.g., dermatitis, burn)
- PIV in extremity (use device on unaffected extremity)
- Lower extremity conditions that result in significant pain with compression (e.g., solid tumor, vaso-occlusive episode in sickle cell disease)
- Unable to achieve correct fit due to patient size

Contraindications to pharmacologic prophylaxis:

ABSOLUTE

- Intracranial hemorrhage
- Congenital or acquired bleeding disorder
- Platelet count unable to be sustained >50,000/m³
- Uncorrected coagulopathy
- Acute stroke or brain ischemia
- Allergy to heparin or enoxaparin [e.g., hx of heparin induced thrombocytopenia (HIT)]
- Ongoing and uncontrolled bleeding (exceptions include bloody diarrhea in inflammatory bowel disease flare; discuss with GI team)

RELATIVE

- Intracranial mass
- Lumbar puncture or epidural catheter placement within last 4 hours or removal in prior 12 hours
- Uncontrolled severe hypertension
- Anticipated invasive procedure in next 24 hours
- Spine surgery or injury
- Suspected or known paraspinal hematoma

EPIC Tutorial (RN Role)



5/23/25 0800

VTE Identified Risk Factors

1m 5m 10m 15m 30m 1h 2h 4h 8h 24h Interval Start: 0700 Reset Now

Admission (Current) from 5/1/2025 in Integrated Care

5/23/2025

0800 0900

Peripheral Neurovascular

Peripheral Neurovascular WDL

VTE Mobility Assessment ! Mobility Altered from Baseline

VTE Identified Risk Factors (#) 1

VTE Screening Risk Level Moderate Risk

VTE Prevention/Management

Additional Documentation

Gastrointestinal

Gastrointestinal WDL

Additional Documentation

Genitourinary

Genitourinary WDL (Pediatric)

Additional Documentation

Reproductive

Additional Documentation

Skin

Skin WDL

Four Eyes Skin Assessment Com...

Second Healthcare Team Member N...

Additional Documentation

Braden QD

Mobility

Sensory Perception

Friction & Shear

Nutrition

Tissue Perfusion & Oxygenation

Number of Medical Devices

Braden QD Score (Greater or equal t...

Current Number of VTE

Risk Factors:

1

1 Total Score

! Central venous catheter(s) (CVC)

Risk Factors NOT Documented in Chart

- PICU admission
- Acute systemic infection/inflammation
- Active cancer/malignancy
- Pregnancy
- Surgery (past 30 days)
- Burn TBSA > 50%
- Trauma admission in PICU
- Acute IBD (diagnosis < 1yr ago)
- Obesity
- Sickle cell disease
- Inflammatory diagnosis (IBD/SLE)
- Protein losing disorder
- Asparaginase or estrogen medications
- Thrombophilia
- History of VTE/PE
- Family history of VTE/PE

5/23/25 0800

VTE Mobility Assessment

1m 5m 10m 15m 30m 1h 2h 4h 8h 24h Interval Start: 0700 Reset Now

ED to Hosp-Admission (Disch... Admission (Current) from 5/...

4/21/2025 5/23/2025

0915 0800

Peripheral Neurovascular

Peripheral Neurovascular WDL

VTE Mobility Assessment Altered from Baseline

VTE Identified Risk Factors (#) None

VTE Screening Risk Level Moderate Risk

VTE Prevention/Management

Additional Documentation

Gastrointestinal

Gastrointestinal WDL

Additional Documentation

Genitourinary

Genitourinary WDL (Pediatric)

Additional Documentation

Reproductive

Additional Documentation

Skin

Skin WDL

Four Eyes Skin Assessment Com...

Second Healthcare Team Member N...

Additional Documentation

5/23/25 0800

VTE Mobility Assessment

Mobility Altered from Baseline !

Baseline Mobility

Mobility Altered from Baseline

Comments (Alt+M)

Value Information

Mobility Altered from Baseline !

Taken by: Inpatient Nurse, RN at 5/23/25 0800 (today)

Recorded by: Inpatient Nurse, RN at 5/23/25 0856 (today)

Row Information

What is classified as baseline mobility for this screening?

- Ambulatory at baseline and meeting goals of ≥ 50 ft, 3x/day
- Patients who do not ambulate at baseline are classified as baseline mobility

EPIC Tutorial (RN Role)

Pedi A&I

Restraint, Violent-Se...

Pedi A&I

II Show All

☒

☒

☒

☒

☒

☒

☒

☒

☐ Accordion

☐ Expanded

☒ View All

1m 5m 10m 15m 30m 1h 2h 4h 8h 24h

Interval Start: 0700

Reset Now

Admission (Current) from 5/1/2025 in Med/Surg 6

5/22/2025	5/23/2025
0900	0800

Peripheral Neurovascular

Peripheral Neurovascular WDL

VTE Mobility Assessment

VTE Identified Risk Factors (#)

VTE Screening Risk Level

VTE Prevention/Management

Additional Documentation

Baseline Mobility	! Mobility Altered from Ba...
None	None
Low Risk	Moderate Risk

Gastrointestinal

5/23/25 0800

VTE Prevention/Manage...

Select multiple options (F5)

compression stockings on

compression stockings off

foot pump device on

foot pump device off

SCDs (sequential compression devi...

SCDs (sequential compression devi...

patient refused intervention

other (see comments)

Comments (Alt+M)

patient refuse

EPIC Tutorial (Provider Role)

When RN completes VTE screen an OPA (Our Practice Advisory) will fire to providers when they access "manage orders"

OurPractice Advisory - Sophia, Blanche

VTE Prevention Screening

Blanche Sophia has screened at **HIGH** risk for venous thromboembolism (VTE).
Click to consult the [VTE prevention pathway](#)

Most Recent VTE Mobility Assessment: Baseline Mobility

Number of VTE Risk Factors: 1

1	Total Score
!	Central venous catheter(s) (CVC)
Risk Factors NOT Documented in Chart	
PICU admission	
Acute systemic infection/inflammation	
Active cancer/malignancy	
Pregnancy	
Surgery (past 30 days)	
Burn TBSA>50%	
Trauma admission in PICU	
Acute IBD (diagnosis <1yr ago)	
Obesity	
Sickle cell disease	
Inflammatory diagnosis (IBD/SLE)	
Protein losing disorder	
Asparaginase or estrogen medications	
Thrombophilia	
History of VTE/PE	
Family history of VTE/PE	

Moderate Risk Interventions	High Risk Interventions
<ul style="list-style-type: none">Sequential compression device (SCD)	<ul style="list-style-type: none">Sequential compression device (SCD)Consider enoxaparin (Lovenox)

Order	Do Not Order	Sequential compression device
Order	Do Not Order	Enoxaparin for VTE prevention

Override Reason

[Defer to primary team](#) [Will reevaluate enoxaparin in 48h](#) [Defer](#)

[Accept](#) [Dismiss](#)

← Patients risk level

← Link to clinical pathway

← Risk factors the patient may have based on what's documented in EPIC

← Orderable SCDs and enoxaparin (Lovenox)

EPIC Tutorial (Provider Role)

OurPractice Advisory - Sophia, Blanche

① VTE Prevention Screening

Blanche Sophia has screened at **HIGH** risk for venous thromboembolism (VTE).

Click to consult the [VTE prevention pathway](#)

Most Recent VTE Mobility Assessment: Baseline Mobility

Number of VTE Risk Factors: 1

1 Total Score

! Central venous catheter(s) (CVC)

Risk Factors NOT Documented in Chart

PICU admission
Acute systemic infection/inflammation
Active cancer/malignancy
Pregnancy
Surgery (past 30 days)
Burn TBSA>50%
Trauma admission in PICU
Acute IBD (diagnosis <1yr ago)
Obesity
Sickle cell disease
Inflammatory diagnosis (IBD/SLE)
Protein losing disorder
Asparaginase or estrogen medications
Thrombophilia
History of VTE/PE
Family history of VTE/PE

Moderate Risk Interventions

- Sequential compression device (SCD)

High Risk Interventions

- Sequential compression device (SCD)
- Consider enoxaparin (Lovenox)


Order

Do Not Order

 Sequential compression device

Order

Do Not Order


 Enoxaparin for VTE prevention

Override Reason

Defer to primary team

Will reevaluate enoxaparin in 48h

 Defer

 Accept

Dismiss

If the patient is **MODERATE** risk, an order related to mechanical prophylaxis will silence the OPA

- Orders for mechanical prophylaxis:
SCD (sequential compression device)
- GCS (graded compression stockings)
- Order that states there is a contraindication to mechanical prophylaxis (*found in VTE prevention order set*)

If the patient is **HIGH** risk, the patient must have mechanical prophylaxis (above) *and* pharmacologic prophylaxis to silence the OPA. This is typically enoxaparin (Lovenox) but includes any type of anticoagulation.

EPIC Tutorial (Provider Role)

OurPractice Advisory - Sophia, Blanche

VTE Prevention Screening

Blanche Sophia has screened at **HIGH** risk for venous thromboembolism (VTE).
Click to consult the [VTE prevention pathway](#)

Most Recent VTE Mobility Assessment: Baseline Mobility

Number of VTE Risk Factors: 1

1	Total Score
!	Central venous catheter(s) (CVC)

Risk Factors NOT Documented in Chart

- PICU admission
- Acute systemic infection/inflammation
- Active cancer/malignancy
- Pregnancy
- Surgery (past 30 days)
- Burn TBSA>50%
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Moderate Risk Interventions	High Risk Interventions
<ul style="list-style-type: none">Sequential compression device (SCD)	<ul style="list-style-type: none">Sequential compression device (SCD)Consider enoxaparin (Lovenox)

Order **Do Not Order** Sequential compression device

Override Reason

Override reasons function as follows:

- Defer to primary team - defers for current provider for 4 hours
- Will reevaluate enoxaparin in 48h - defers for 48 hours for all users
- Defer - is a *NEW* functionality, and makes the OPA a banner for 24 hours

If a team decides enoxaparin is not appropriate for the patient, click this option

EPIC Tutorial (Provider Role)

OurPractice Advisory - Sophia, Blanche

VTE Prevention Screening

Blanche Sophia has screened at **HIGH** risk for venous thromboembolism (VTE).
Click to consult the [VTE prevention pathway](#)

Most Recent VTE Mobility Assessment: Baseline Mobility

Number of VTE Risk Factors: 1

1 Total Score

Central venous catheter(s) (CVC)

Risk Factors NOT Documented in Chart

- PICU admission
- Acute systemic infection/inflammation
- Active cancer/malignancy
- Pregnancy
- Surgery (past 30 days)
- Burn TBSA>50%
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- History of VTE/PE
- Family history of VTE/PE

Moderate Risk Interventions	High Risk Interventions
• Sequential compression device (SCD)	• Sequential compression device (SCD) • Consider enoxaparin (Lovenox)

Order Do Not Order Sequential compression device

Order Do Not Order Enoxaparin for VTE prevention

Override Reason

Defer to primary team Will reevaluate enoxaparin in 48h

Defer

Accept Dismiss

Defer is a *NEW* functionality, and makes the OPA become a banner for 24 hours.

You can hover over banner to view OPA
You can click on banner to get OPA pop up

OurPractice Advisory - Sophia, Blanche

You deferred this advisory less than a minute ago.
Some actions may no longer be applicable to this patient.

VTE Prevention Screening

Blanche Sophia has screened at **HIGH** risk for venous thromboembolism (VTE).
Click to consult the [VTE prevention pathway](#)

Most Recent VTE Mobility Assessment: Baseline Mobility

Current Number of VTE Risk Factors: 3

3 Total Score

Central venous catheter(s) (CVC)

Acute IBD (diagnosis <1yr ago)

Inflammatory diagnosis (IBD/SLE)

Risk Factors NOT Documented in Chart

- PICU admission
- Acute systemic infection/inflammation
- Active cancer/malignancy
- Pregnancy
- Surgery (past 30 days)
- Burn TBSA>50%
- Trauma admission in PICU
- Obesity
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- History of VTE/PE
- Family history of VTE/PE

Moderate Risk Interventions	High Risk Interventions
• Sequential compression device (SCD)	• Sequential compression device (SCD) • Consider enoxaparin (Lovenox)

Order Do Not Order Sequential compression device

Order Do Not Order Enoxaparin for VTE prevention

Override Reason

Defer to primary team Will reevaluate enoxaparin in 48h

Accept Cancel

"No longer applicable" silences the OPA until a new VTE screen is completed

Cancel (at bottom) sends OPA back to the banner

PD

Dell, Presley

Male, 16 y.o., 7/3/200

MRN: 1802499

Bed: 622

Code: Full (no ACP do

Legal Guardian: Dell,Ste

Problems: Ketogenic d

Active FYIs: Suicide Ris

VTE Prevention Screening

Review of Key Points

- VTE screening should be completed by nursing within 24 hours of admission and every 2 days thereafter
- Providers should use the order panel to order appropriate VTE prophylaxis based on patient's risk level

Quality Metrics

- Percentage of patients with VTE risk assessment completed within 24 hours of admission to hospital unit
- Counts of patients who are low, moderate and high risk
- Percentage of patients with appropriate VTE prevention based on risk level
- Percentage of patients screened as high risk who receive anticoagulation medication
- Number of VTE events

Pathway Contacts

- Donna Boruchov, MD – Hematology/Oncology
- Joanna Young, PharmD, BCPS – Pharmacy
- Jessica Winters, MD – Critical Care
- Katherine Baldwin, MD – Gastroenterology

References



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Thank You!



About Connecticut Children's Pathways Program

Clinical pathways guide the management of patients to optimize consistent use of evidence-based practice. Clinical pathways have been shown to improve guideline adherence and quality outcomes, while decreasing length of stay and cost. Here at Connecticut Children's, our Clinical Pathways Program aims to deliver evidence-based, high value care to the greatest number of children in a diversity of patient settings.

These pathways serve as a guide for providers and do not replace clinical judgment