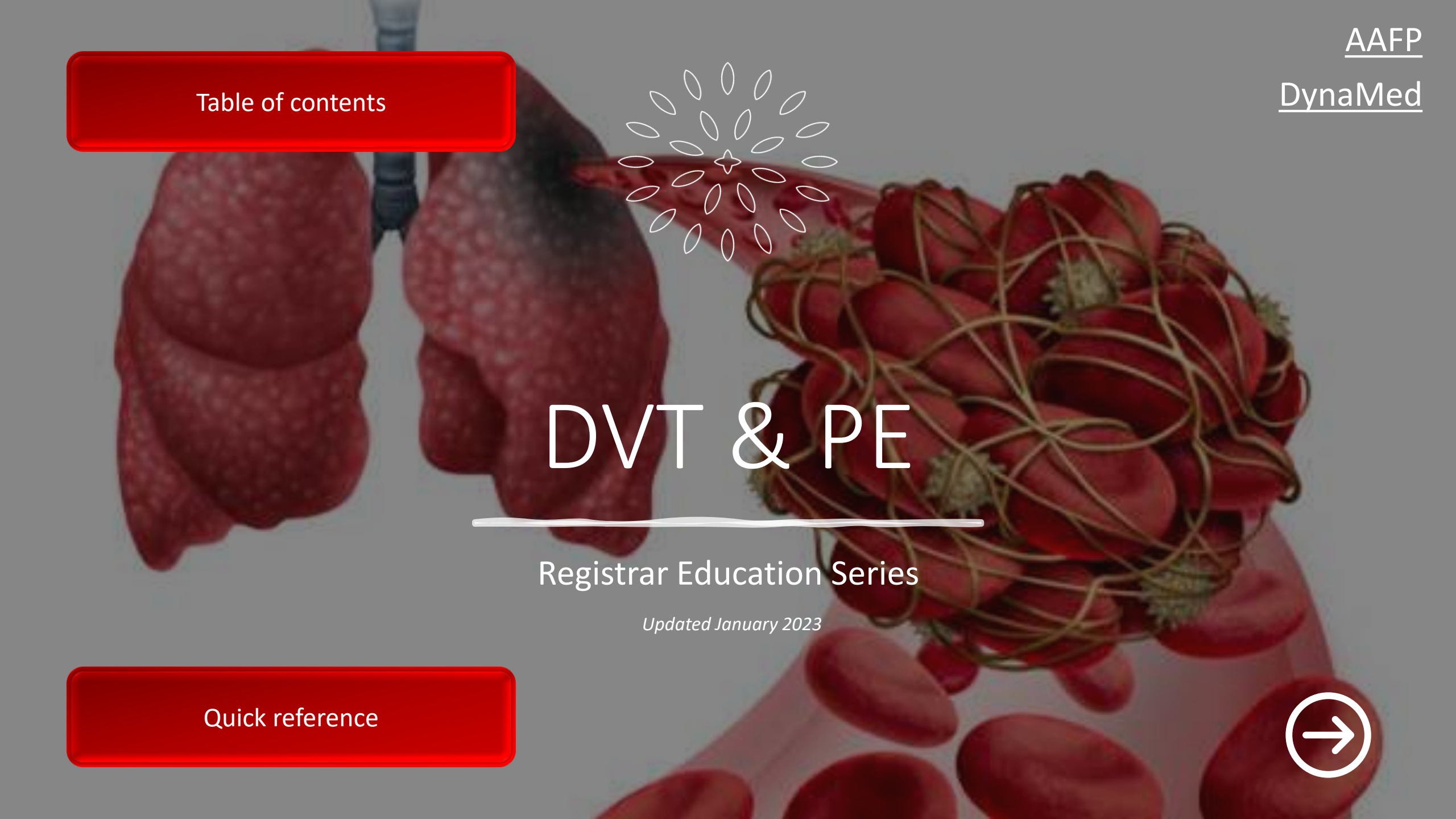

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AAFP

DynaMed

DVT & PE

Registrar Education Series

Updated January 2023

Quick reference

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Quick reference

Anticoagulation doses

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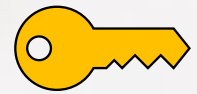
Vocabulary

What is considered a:

- Provoked DVT
- Unprovoked DVT
- Distal DVT
- Proximal DVT
- Iliofemoral DVT
- PE
- Initial phase
- Extended phase



Vocabulary

Provoked: recent surgery or trauma, hospitalization with prolonged bed rest, or use of oral contraceptives

Unprovoked: may be idiopathic or result from inherited or acquired hypercoagulable states such as cancer and pregnancy

Distal DVT: isolated to the deep veins below the knee

Proximal DVT: extends into the popliteal vein or more proximally

Iliofemoral DVT: involves partial or complete thrombosis of iliac or common femoral veins

PE: mechanical obstruction of 1 or more branches of the pulmonary vasculature, usually due to a blood clot

Initial phase: first week after diagnosis

Extended phase: Extended phase: >3 months

Presentation

- How do DVTs and PEs present?
- What percentage of people who have a proximal DVT also have a PE?
- What portion of people with a PE have a DVT?
- How can VTE be ruled out?
- What is the preferred work up for diagnosis of DVT and PE?

Presentation

DVT

- Warm, swollen and painful extremity
- Diagnosed with compression *ultrasound*

PE

- Dyspnea, tachypnea, tachycardia, pleuritic chest pain, cough, and/or fever
- Diagnosed by CT angiogram or bedside echocardiogram

40% of patients with proximal DVT have a PE

30% of patients with a PE do not have a DVT

VTE can be ruled out with D-dimer

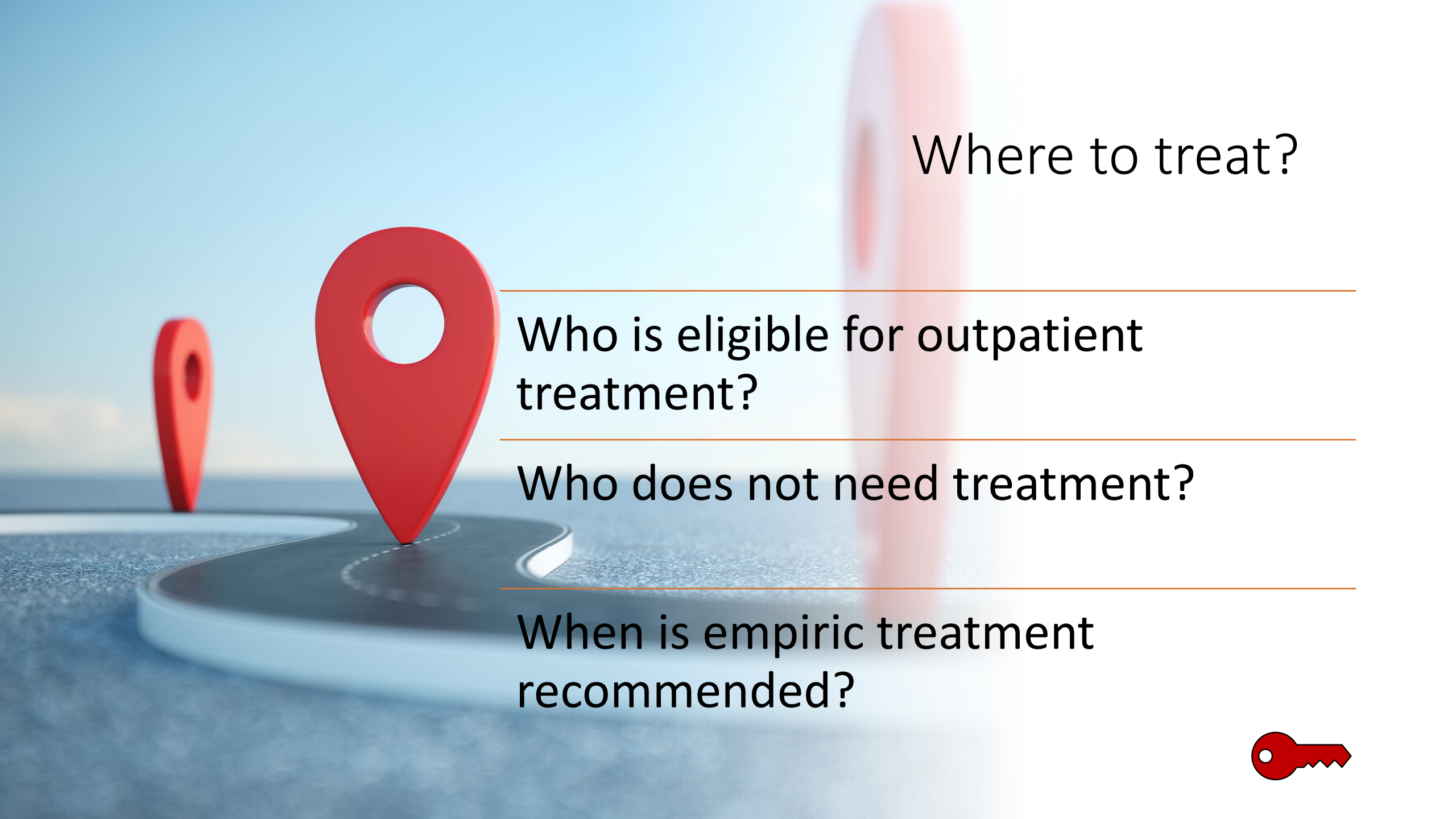
Risk factors

What are the three components of Vichow's triad?

What are examples that fall under each component?

Risk factors

- **Vascular wall**: major surgery, trauma/fracture, and central venous catheter placement
- **Venous stasis:** obesity, bed rest, neurologic disease with leg paresis, long air travel (> 4-6 hours), venous thoracic outlet syndrome (Paget-Schroetter syndrome), and May-Thurner syndrome
- **Hypercoagulability**: old age, active cancer, family history of venous thromboembolism (VTE), pregnancy, oral contraceptives, hormone therapy, inflammatory conditions, heparin-induced thrombocytopenia, disseminated intravascular coagulation, and inherited thrombophilia



Where to treat?

Who is eligible for outpatient treatment?

Who does not need treatment?

When is empiric treatment recommended?

Where to treat

- Most patients with DVT and selected patients with PE can be treated in the outpatient setting
  - DVT: in the absence of limb ischemia, significant comorbidities (e.g., end-stage renal disease), functional limitations, high bleeding risk, or nonadherence concerns
  - PE: if nonadherence is low and the patient is clinically stable; has no contraindications to anticoagulation, such as recent bleeding, severe renal or liver disease, or platelet count of less than 70×10^3 per mm^3 (70×10^9 per L); and feels capable of managing the disease at home
- Anticoagulation is not recommended for low-risk subsegmental PE without proximal DVT or asymptomatic isolated distal DVT confined to calf veins
  - unless there are risk factors for extension (unprovoked DVT, prior DVT) or develops extension on serial imaging for two weeks
- Empiric treatment during evaluation is controversial and not evidence based consider in the hemodynamically unstable patient with a high probability of VTE

Duration?

- How long should anticoagulation treatment be given for the typical patient with DVT or PE?
- When is extended treatment considered?
- When is indefinite treatment considered?

3

Duration of treatment

Treat for 3 months if it is the 1st VTE in the setting of a major transient risk factor

Extended coagulation (>3 months) is recommended with unprovoked VTE with a low risk of bleeding

Indefinite anticoagulation is recommended in patients with a second VTE and low or moderate risk of bleeding

Warfarin

What are advantages and disadvantages of warfarin?

How is warfarin started in the setting of a DVT/PE?

How are adjustments made during initiation?

Warfarin

- Cheap, can be reversed
- Requires monitoring and dose adjustments, dietary restrictions, many drug-drug interactions
- Bridge with LMWH (enoxaparin/klexane) at 1mg/kg/dose sq 12 hours for at least 5 days
- Start warfarin at 5mg
- Check INR on day 3 - 5
- Adjust dose based on INR
- Target INR 2.0-3.0
- Maintenance dosing adjustments are based on weekly dose and INR

Adjusting warfarin during initiation

Day 3

- <1.5 increase to 10mg
- 1.5-1.9 continue 5mg
- 2.0-3.0 decrease to 2.5mg
- >3.0 decrease to 0

Day 4

- <1.5 increase to 10mg
- 1.5-1.9 continue 7.5mg
- 2.0-3.0 decrease to 5mg
- >3.0 decrease to 0

Day 5

- <2 increase to 10mg
- 2.0-3.0 continue 5mg
- >3.0 decrease to 0mg

Maintenance warfarin adjustment

INR RANGE 2.0 - 3.0							
Weekly Dose *(mg)*	**1.0 - 1.4**	**1.5 - 1.9**	**2.0 - 3.0**	***3.1 - 3.5**		**3.6 - 4.0**	**4.1 - 6.0**
7 mg	1	1	0	0	-1	-1	-1
10 mg	2	2	0	0	-1	-2	-2
12 mg	2	2	0	0	-1	-2	-2
14 mg	3	2	0	0	-1	-2	-3
16 mg	3	3	0	0	-2	-3	-3
18 mg	4	3	0	0	-2	-3	-4
20 mg	4	3	0	0	-2	-3	-4
22 mg	5	4	0	0	-3	-4	-5
24 mg	5	4	0	0	-3	-4	-5
26 mg	5	4	0	0	-4	-4	-5
28 mg	6	5	0	0	-4	-5	-6
30 mg	6	5	0	0	-4	-5	-6
35 mg	8	6	0	0	-5	-5	-8
40 mg	8	6	0	0	-5	-6	-8
45 mg	8	6	0	0	-5	-6	-8
50 mg	10	8	0	0	-6	-8	-10
55 mg	12	8	0	0	-6	-8	-12
60 mg	12	8	0	0	-6	-8	-12
65 mg	12	10	0	0	-8	-10	-12
70 mg	14	10	0	0	-8	-10	-14

If changes made, recheck the INR in 1 week.

*The split column for 3.1 - 3.5 indicates watch for 2 weeks with no change then use the second recommendation after two weeks

Direct acting oral anticoagulants

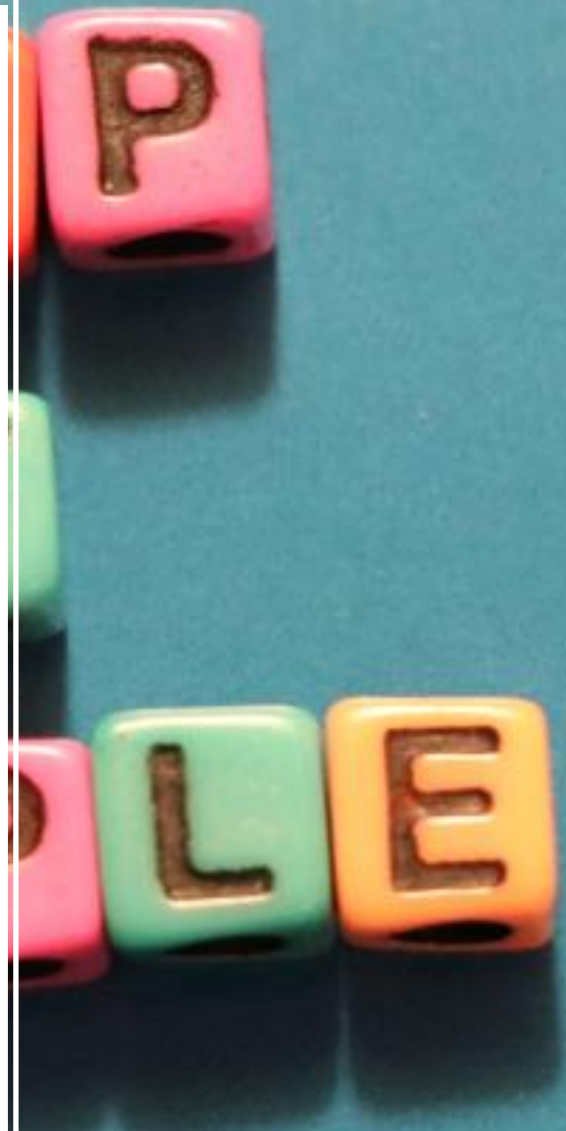
What are advantages and disadvantages of using a DOAC?

Which DOACs do and do not require LMWH during initiation?

What can be done in the setting of a major bleed while on a DOAC?

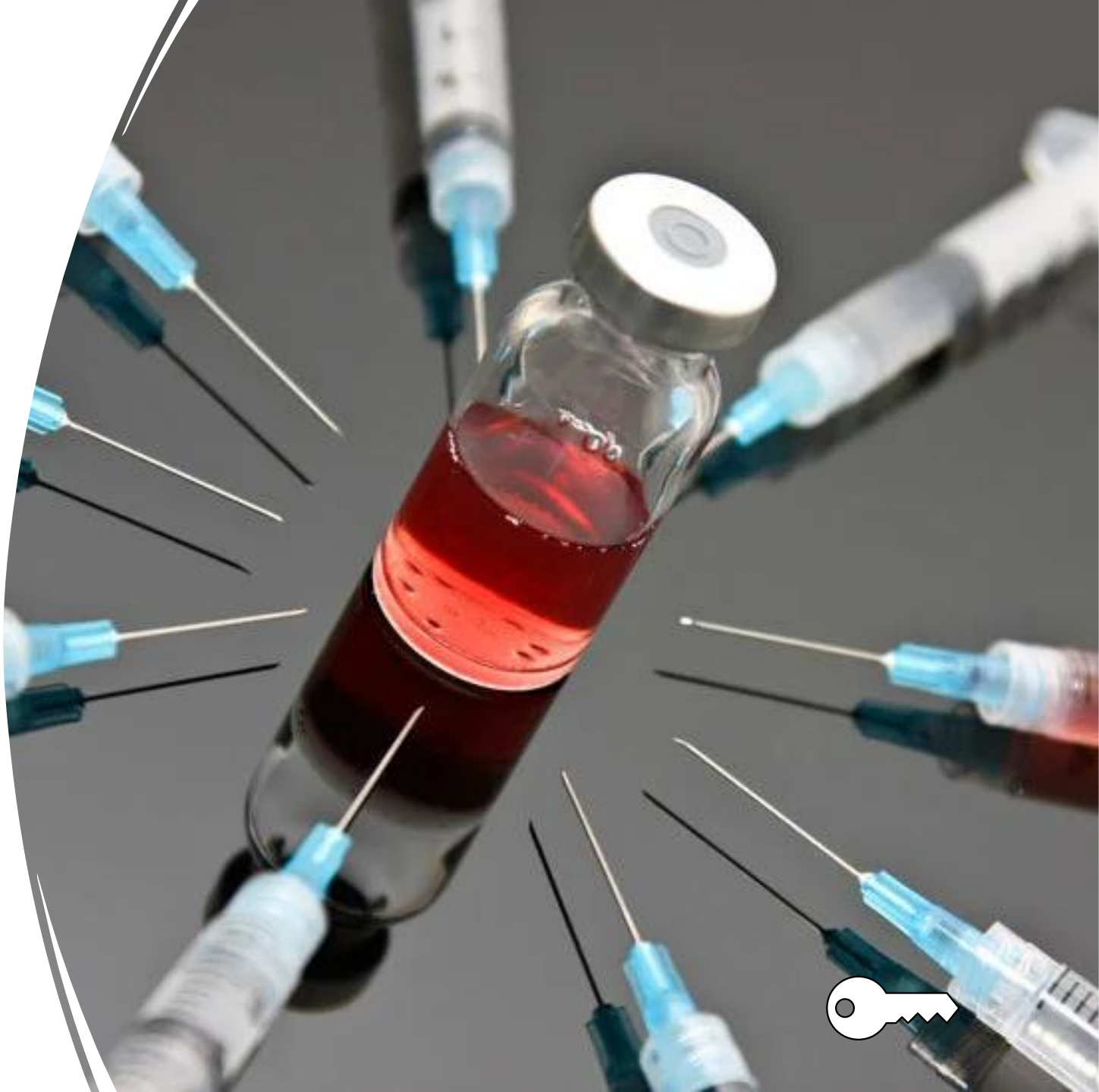
Direct acting oral anticoagulants

- No regular monitoring, fewer dietary restrictions, fewer drug interactions and relatively fixed dosing, reversal agents are available
- Cost, shorter half life so non-adherence leads to higher risk of thrombotic events, dose adjustment may be required for patients with chronic kidney disease
- Apixaban (Eliquis) and rivaroxaban (Xarelto) do not require concomitant use of heparin at initiation
- Dabigatran (Pradaxa) or edoxaban (Savaysa) should be initiated after five to 10 days of initial therapy with a parenteral anticoagulant
- Major bleeding: give reversal agent if available or stop the direct-acting anticoagulant; initiate supportive therapy; and administer activated charcoal, antifibrinolytic agents, and prothrombin complex concentrate. HD if on dabigatran.
- *DOAC doses*
- *Converting to other anticoagulants*



LMWH and thrombolytics

- When is LMWH indicated in the treatment of DVT/PE?
- When are systemic thrombolytics indicated in the treatment of DVT/PE?



LMWH and thrombolytics

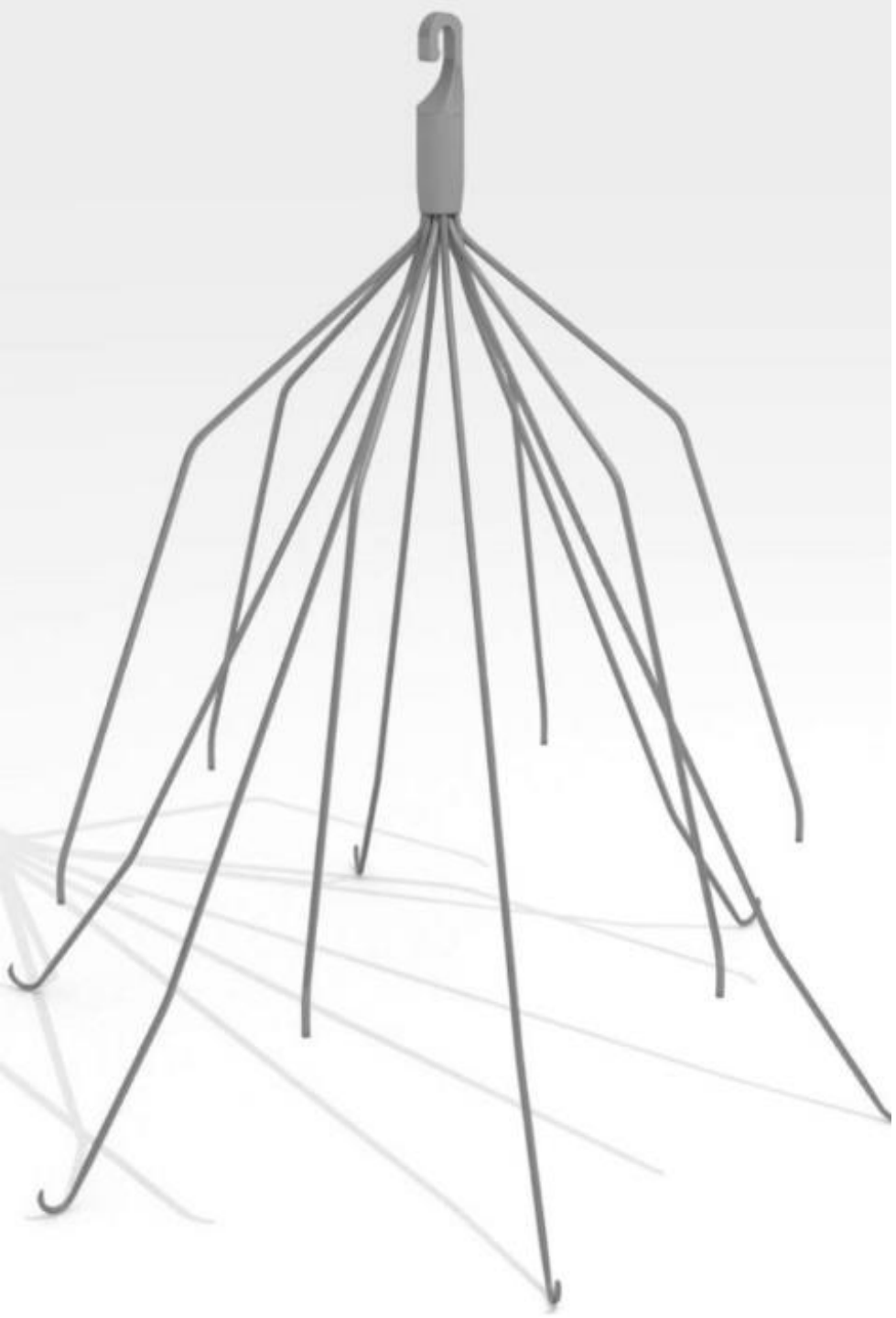
Bridge with LMWH over unfractionated heparin unless there is severe renal insufficiency, high bleeding risk, hemodynamic instability, or morbid obesity

- Enoxaparin/(Lovenox/klexane) at 1mg/kg/dose sq 12 hours for at least 5 days

Indicated for therapy if there is a recurrent VTE who are already taking an oral anticoagulant

Systemic thrombolytics

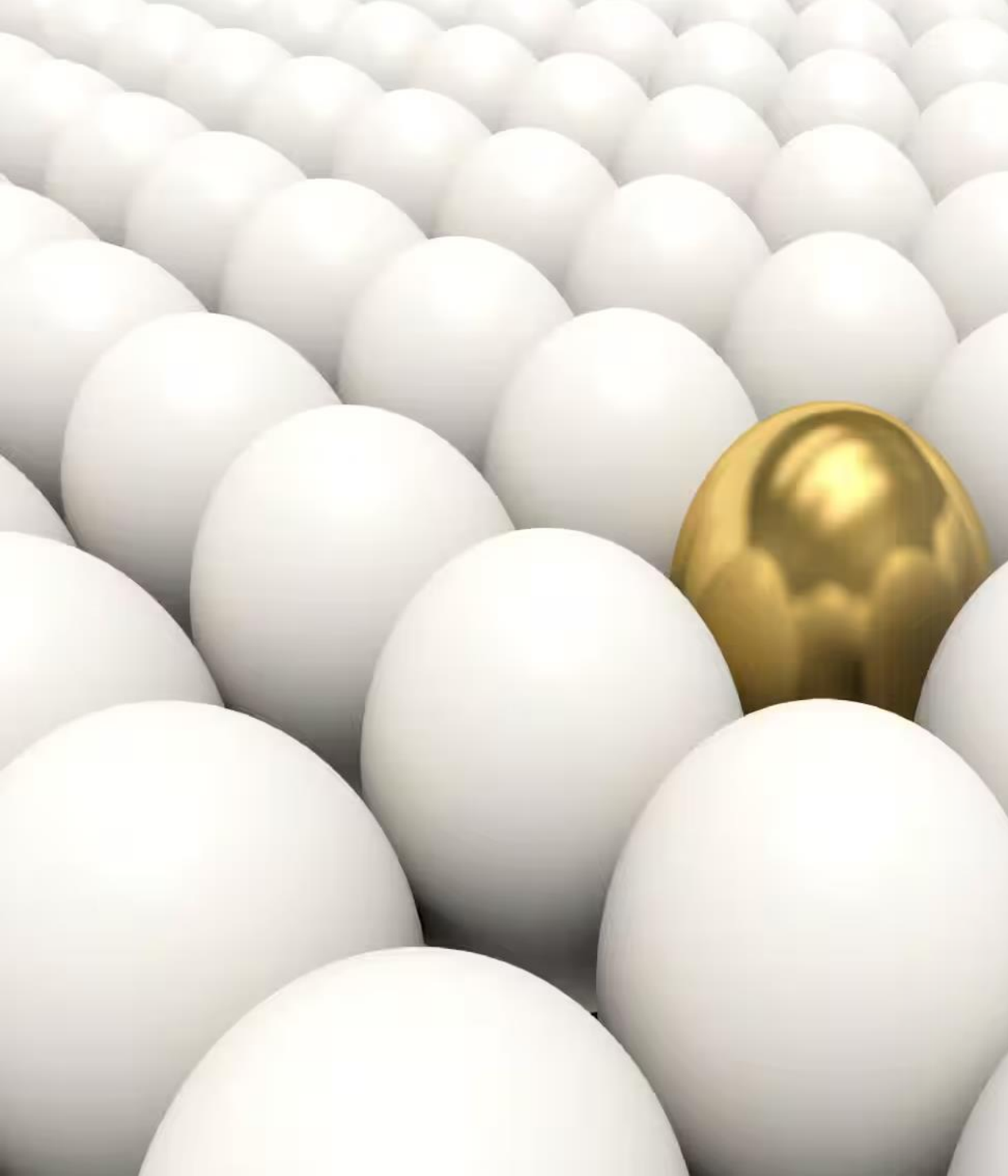
- Patients with persistent hypotension or shock secondary to acute PE
- Acute PE who are on anticoagulation deteriorate but are not yet hypotensive if bleeding risk is low
- Massive proximal lower extremity thrombosis or ilio-femoral thrombosis associated with severe symptoms
- Limb-threatening ischemia for less than 14 days



Inferior Vena Cava filter?

When should an IVC filter be considered?

When should an IVC filter not be used?

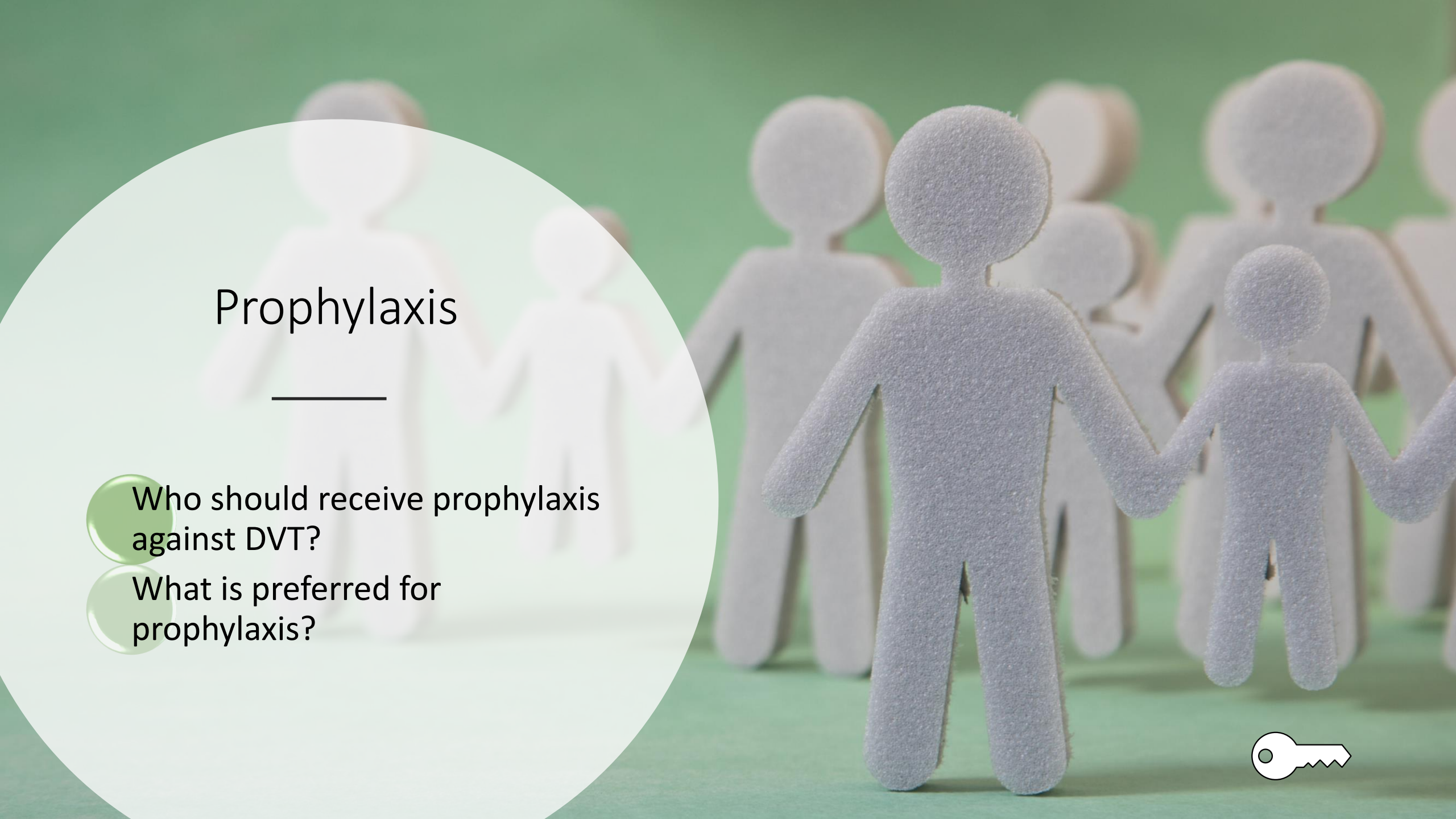


IVC filter

- Rarely indicated
- If there is an absolute contraindication to therapeutic anticoagulation, complications from anticoagulation, or failure of anticoagulation in a patient with acute proximal DVT, an inferior vena cava filter may be indicated
- Do not use in patients on anticoagulation as it does not reduce mortality
- *Bleeding risk*

Prophylaxis

- Who should receive prophylaxis against DVT?
- What is preferred for prophylaxis?



Prophylaxis

- Consider in hospitalized patients with reduced mobility
  - *Pauda predication score* for risk of VTE
  - *IMPROVE combine risk calculator*
- *LMWH* is preferred
- i.e. enoxaparin 40mg sq daily
  - if BMI >40 give 40mg sq every 12 hours or 0.5mg/kg/dose q12-24 hours

Converting anticoagulants

Warfarin *DOACS*

	Conversions	
DOAC	**Switching to/from Warfarin**	**Switching to/from DOACs**
Apixaban (Eliquis) 10mg twice per day x 7d, then 5mg twice per day	From warfarin → apixaban • *d/c warfarin/start apixaban when INR < 2.0*	From oral/parenteral → apixaban • *d/c anticoagulant/start apixaban when next dose of anticoagulant is due*
	From apixaban → warfarin • *d/c apixaban/start BOTH parenteral anticoagulant + warfarin when next dose of apixaban is due* • *d/c parenteral agent when INR reaches target range*	From apixaban → oral/parenteral • *d/c apixaban/start new agent when next dose of apixaban is due*
Dabigatran (Pradaxa) 150mg twice per day after 5-10d of parenteral anticoagulation	From warfarin → dabigatran • *d/c warfarin/start dabigatran when INR < 2.0*	From parenteral → dabigatran • *Start dabigatran ≤ 2 hours before next dose of parentarel is due OR at time of d/c for a continuously administered parenteral drug* • *d/c parenteral @ time of dabigatran initiation*
	From dabigatran → warfarin based on CrCl • *CrCl ≥ 50mL/min: Start warfarin 3d before d/c of dabigatran* • *CrCl 30-50mL/min: Start warfarin 2d before d/c of dabigatran* • *CrCl 15-30mL/min: Start warfarin 1d before d/c of dabigatran* • *CrCl <15mL/min: NOT RECOMMENDED*	From dabigatran → parenteral • *CrCl ≥ 30mL/min: Wait 12 hours after last dose of dabigatran before starting parenteral* • *CrCl < 30mL/min: Wait 24 hours after last dose of dabigatran before starting parenteral*
Edoxaban (Savaysa) 60mg q24 hours after 5-10d of parenteral anticoagulation	From warfarin → edoxaban • *d/c warfarin/start edoxaban when INR < 2.5*	From continuous infusion unfractionated heparin → edoxaban • *d/c heparin/start edoxaban 4 hours later*
	From edoxaban → warfarin • *If taking 60mg: ↓ to 30mg and begin warfarin concomitantly* • *If taking 30mg: ↓ to 15mg and begin warfarin concomitantly* • *Measure INR at least weekly and just before daily dose of edoxaban* • *d/c edoxaban/continue warfarin once stable INR > 2 achieved* • *Parenteral option: d/c edoxaban & start parenteral + warfarin when next dose of edoxaban is due; once stable INR > 2.0, d/c parenteral, continue warfarin*	From LMWH → edoxaban • *d/c LMWH/start edoxaban when next dose of LMWH is due*
		From oral anticoagulant → edoxaban • *d/c current oral/start edoxaban when next dose of initial oral is due*
		From edoxaban → oral/parenteral • *d/c edoxaban/start other oral when next dose of edoxaban is due*
Rivaroxaban (Xarelto) 15mg twice per day x 21d, then 20mg once per day *Should be taken with food*	From warfarin → rivaroxaban • *d/c warfarin/start rivaroxaban as soon as INR < 3.0*	From continuous infusion unfractionated heparin → rivaroxaban • *Start rivaroxaban @ time of heparin d/c*
	From rivaroxaban → warfarin • *d/c rivaroxaban/start BOTH warfarin + parenteral when next dose of rivaroxaban is due*	From other anticoagulant (not UFH) → rivaroxaban • *d/c current/start rivaroxaban ≤ 2 hours before next evening dose of the d/c anticoagulant is due*
		From rivaroxaban → other oral (not warfarin) • *d/c rivaroxaban/start oral when next dose of rivaroxaban is due*

Bleeding risk while taking anticoagulants

Risk factors for major bleeding while taking anticoagulants

Risk: Low: 0 Moderate: 1 High ≥ 2

- Age >65 years
- Age > 75 years (2)
- Alcohol abuse
- Anemia
- Antiplatelet therapy
- Cancer
- Comorbidity/reduced functional capacity
- Diabetes
- Frequent falls
- Liver failure
- Metastatic cancer
- Poor anticoagulant control
- Previous bleeding problems
- Previous stroke
- Recent surgery
- Renal failure
- Thrombocytopenia

Tx Duration *IVC Filter*

Anticoagulation table

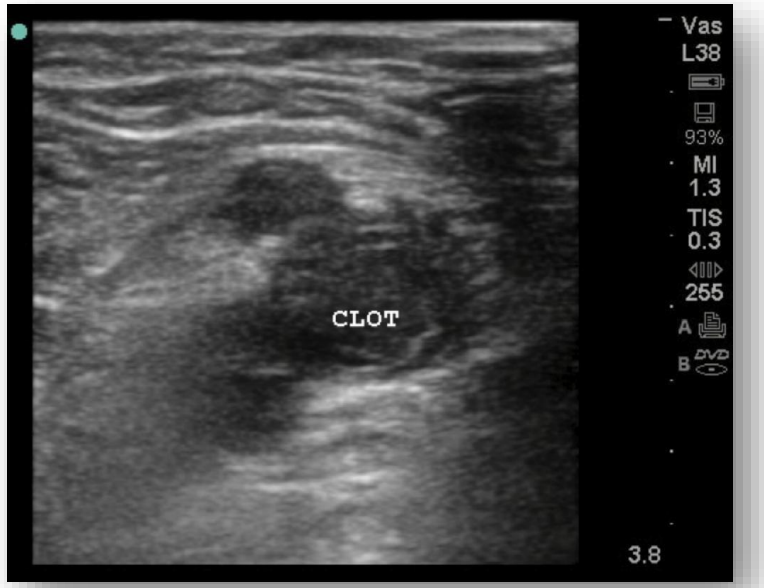
Warfarin *DOACS* *Prophylaxis*

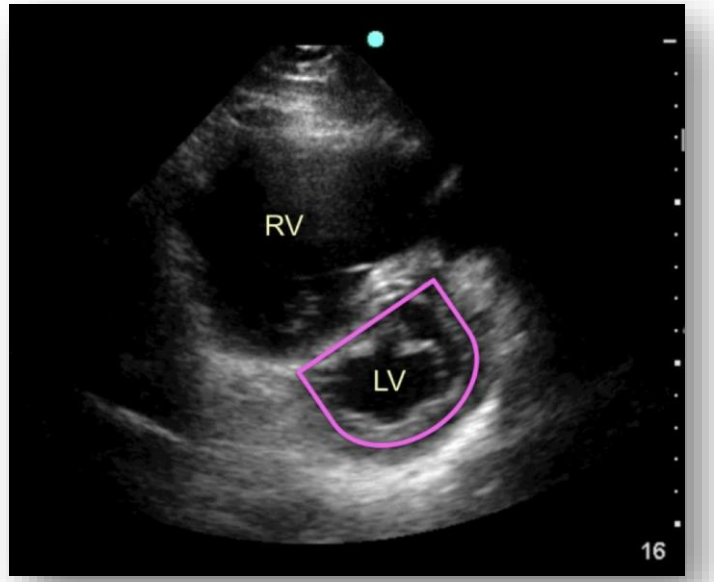
Class	Drug	Dosage	Half-life	Renal dosing *(CrCl in mL/min)*
Direct factor Xa inhibitors	**Apixaban** (Eliquis)	10mg po twice daily x 7d, then 5mg po twice daily	12 hours	27% renal clearance 2.5mg po twice daily if at least 1 criterion: • *Cr ≥ 1.5mg/dL (133umol/L)* • *Age ≥ 80yo* • *Weight ≤ 60kg*
	Edoxaban (Savaysa)	Adults > 60kg: 60mg po Adults ≤ 60kg 30mg po once daily following 5-10d initial parenteral therapy	10-14 hours	50% renal clearance • *CrCl 15-30: 30mg once daily* • *CrCl < 15: AVOID USE* • *CrCl > 95: AVOID USE*
	Rivaroxaban (Xarelto)	15mg po twice daily x 21d, then 20mg po once daily *With food*	5-9 hours	66% renal clearance • *CrCl 15-80: avoid use in pts receiving combined P-glycoprotein + moderate CYP450 3A4 inhibitor unless benefit justifies risk* • *CrCl ≤ 30: AVOID USE*
Direct thrombin inhibitors	**Dabigatran** (Pradaxa)	150mg po twice daily following 5-10d initial parenteral therapy	12-17 hours	80% renal clearance • *CrCl ≤ 30: recommendations not provided* • *CrCl < 50: Avoid use in pts taking P-glycoprotein inhibitor*
Indirect factor Xa inhibitors	**Fondaparinux** (Arixtra)	Initiate concomitant Tx with warfarin as soon as possible Adults < 50kg: 5mg SubQ once daily Adults 50-100kg: 7.5mg SubQ once daily Adults > 100kg: 10mg SubQ once daily	17-21 hours	100% renal clearance • *CrCl 30-50: use with caution, consider 50% dose ↓* • *CrCl < 30: AVOID USE*
Low-molecular-weight heparin	**Dalteparin** (Fragmin)	100u/kg SubQ q12 hours, or 200u/kg SubQ once daily	3-5 hours	Primarily renally eliminated • *CrCl < 30: Monitor anti-Xa levels*
	Enoxaparin (Lovenox/Klexane)	1mg/kg SubQ q12 hours, or 1.5mg/kg SubQ q24 hours	4.5-7 hours	Primarily renally eliminated • *CrCl < 30: ↓ dose to 1mg/kg once daily*
Fibrinolytics	**Alteplase** (Activase)	100mg IV infusion over 2 hours	30-45 minutes	~ 80% renal clearance No dose adjustments needed
	Unfractionated heparin	80u/kg IV bolus, then maintenance infusion of 18u/kg/hr of IV continuous infusion; further adjustments per nonogram *Or* 8,000-10,000u SubQ q8 hours, or 15,000-20,000u SubQ q12 hours	1-5 hours	Primarily cleared and metabolized by the reticuloendothelial system Adjust dosage based on aPTT
Vitamin K antagonists	**Warfarin** (Coumadin)	Start 5mg once daily, check INR on day 3-5 and adjust Bridge with heparin, LMWH, or fondaparinux for ≥5d and until INR is ≥ 2 for at least 24 hours	21-89 hours	Up to 92% of po dose is recovered in urine, primarily as metabolites No adjustments, continue to dose based on INR

POCUS findings

DVT

- Linear probe
- Compress at 1cm increments
- Common femoral/greater saphenous to at least mid-thigh
- Popliteal vein in the fossa down as far as you can follow





PE

- Dilation of the right ventricle
  - D-sign with bowing of the septum into the left ventricle
  - McConnell's sign with right ventricular free wall akinesis and sparing of the apex
- Plethoric IVC