

Perioperative Anticoagulation

Presented by:

Rama abu qdais

Mais sarayreh

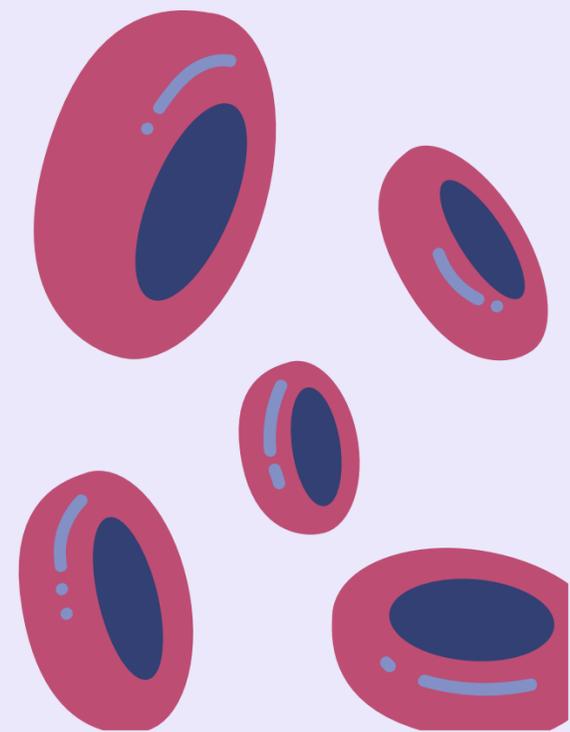
shahd shamaseen

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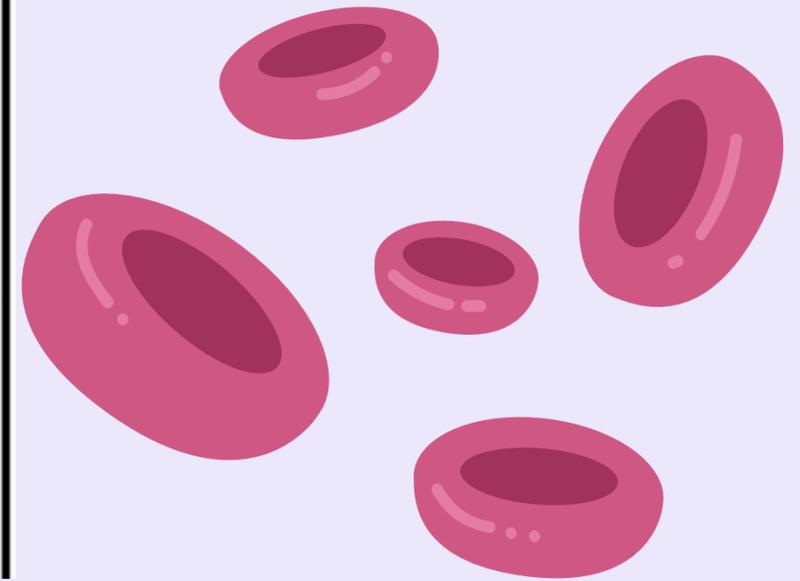
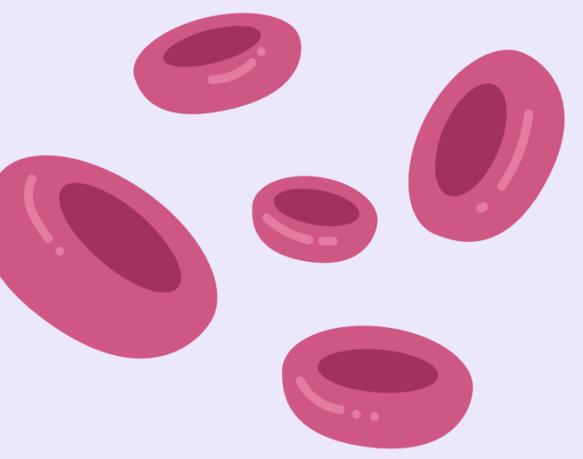
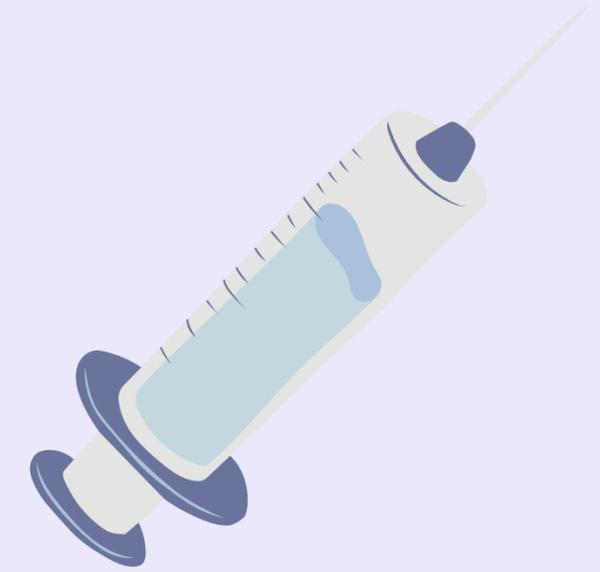
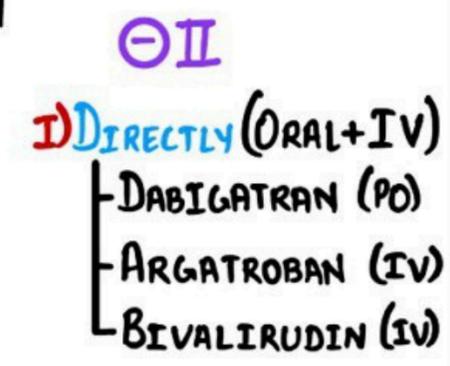
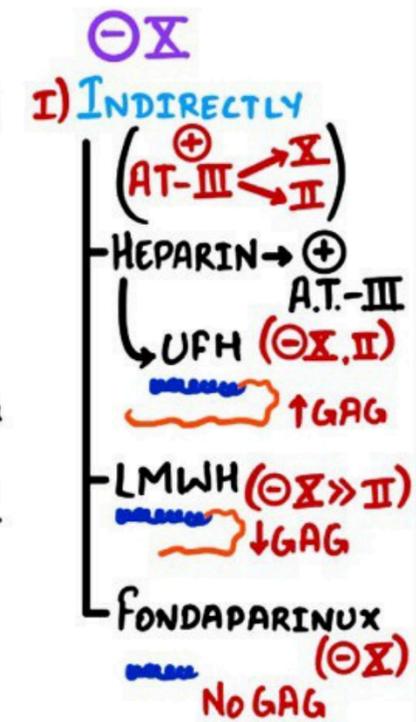
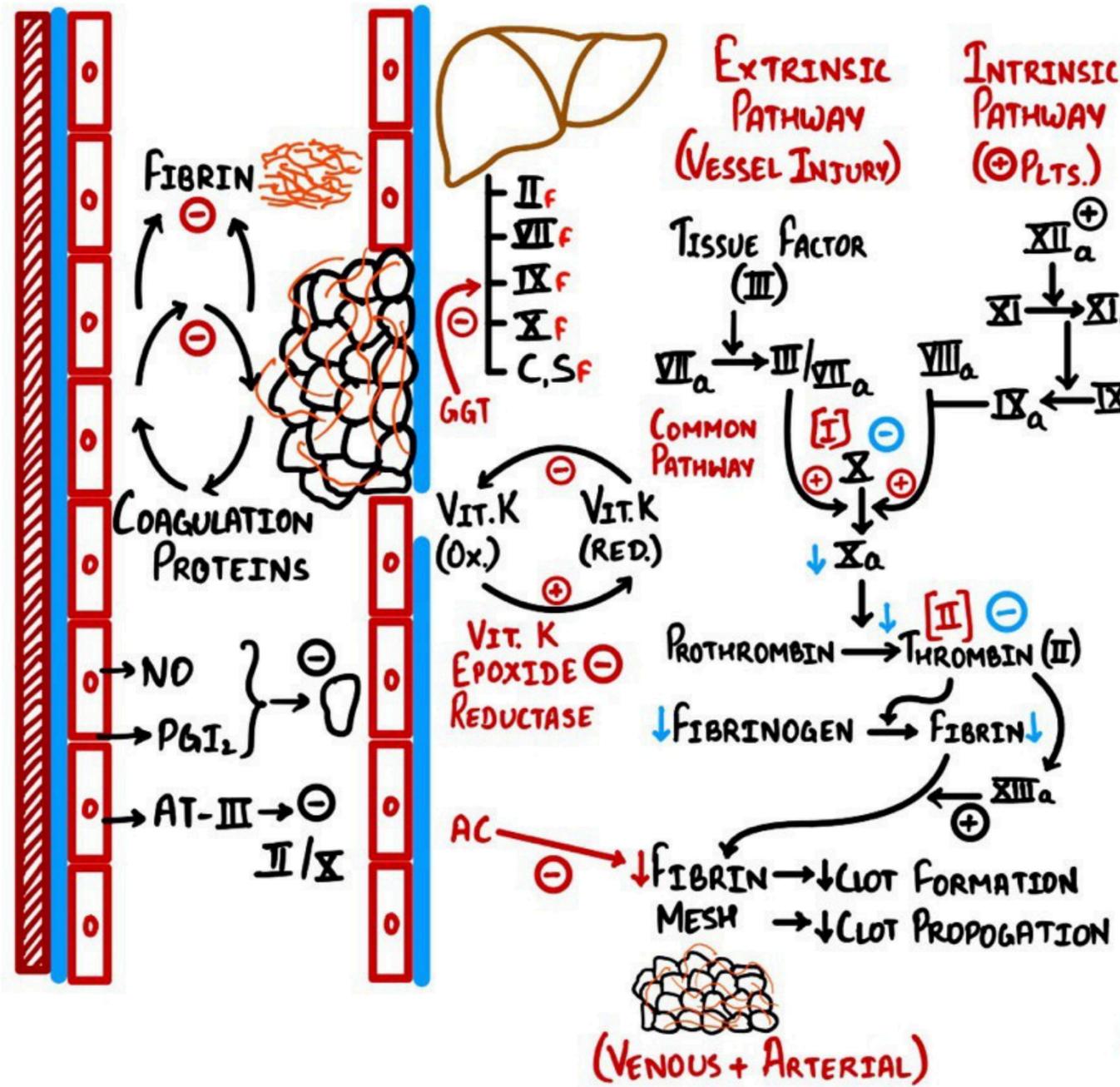


Supervised by:

Dr.Mahmoud Al-Awaysheh

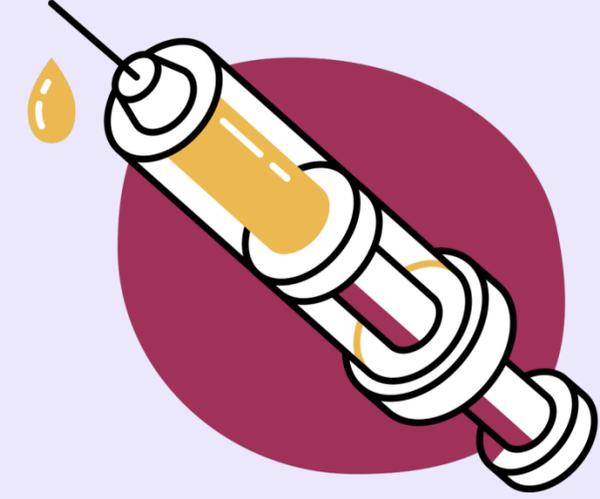


COAGULATION CASCADE



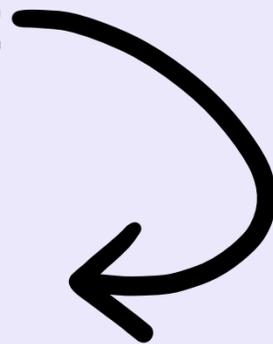


Types of anticoagulants



Oral anticoagulants

- 1) vitamin K antagonist
(warfarin)
- 2) Direct oral anticoagulant
 - Direct oral thrombin inhibitors
(Dabigatran)
 - Direct oral factor Xa inhibitors
(Apixaban, Rivaroxaban, Edoxaban)



parenteral anticoagulants

- 1) Unfractionated heparin (UFH)
- 2) Low molecular weight
heparin (LMWH)
- 3) Synthetic heparin

1) VKA (warfarin)



#Disadvantages: Difficult to manage

1) **Long** half-life

2) Regular monitoring of the **PT/INR** required (as vitamin K antagonists affect the **extrinsic** coagulation pathway)

3) Requires periprocedural **bridging anticoagulation**

4) **Broad range** of interactions

5) Not suited for acute therapy of pulmonary embolism or deep vein thrombosis

→ **(WEPT)**
1972

2) DOAC



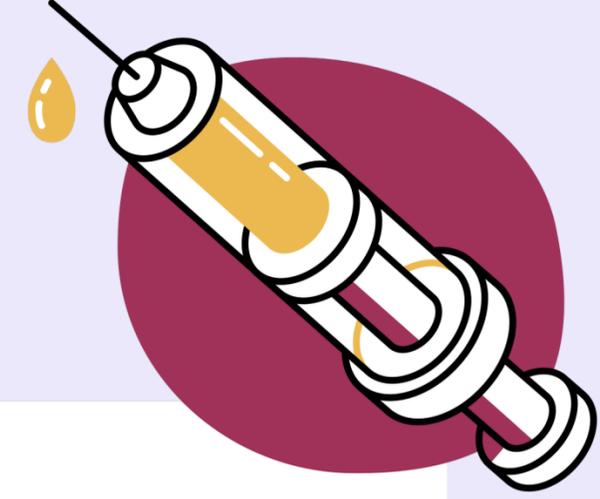
#Advantages: Easily manageable

1) **Short** half-life

2) **Regular monitoring** of coagulation parameters is **not** required

3) Periprocedural bridging anticoagulation is not required

1)UFH



#Drug:heparin

#Administration:

Prophylaxis: subcutaneous

Therapeutic: continuous intravenous infusion

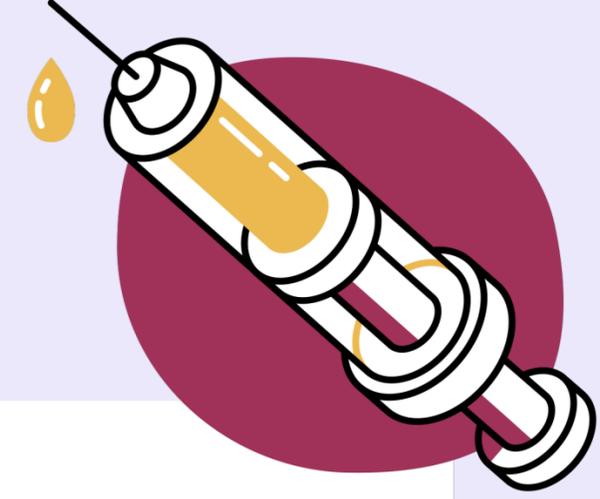
#Monitoring during therapy:

(aPTT) , platelet count (including baseline before treatment is started)

#Clearance:

hepatic (**preferred** agent for patients with **renal insufficiency**)

2) LMWH



#Drug: enoxaparin, dalteparin, tinzaparin, nadroparin, certoparin

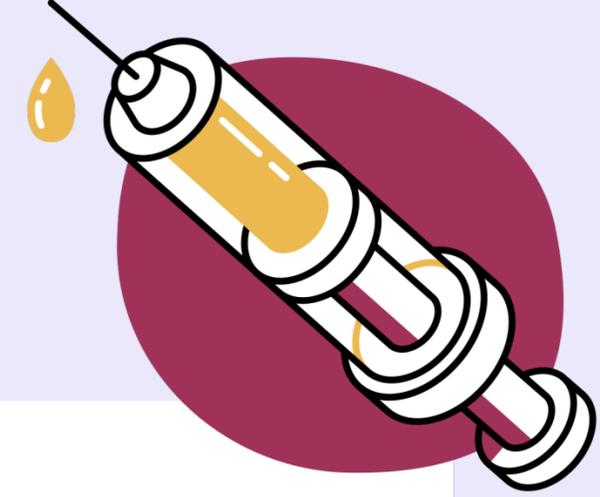
#Administration: subcutaneous

#Monitoring during therapy: Not generally recommended

Anti-factor Xa activity can be assessed in specific cases

#Clearance: renal (**contraindicated** for patients with **renal insufficiency**)

3) Synthetic heparin



#Drug: fondaparinux

#Administration:

subcutaneous

#Monitoring during therapy:

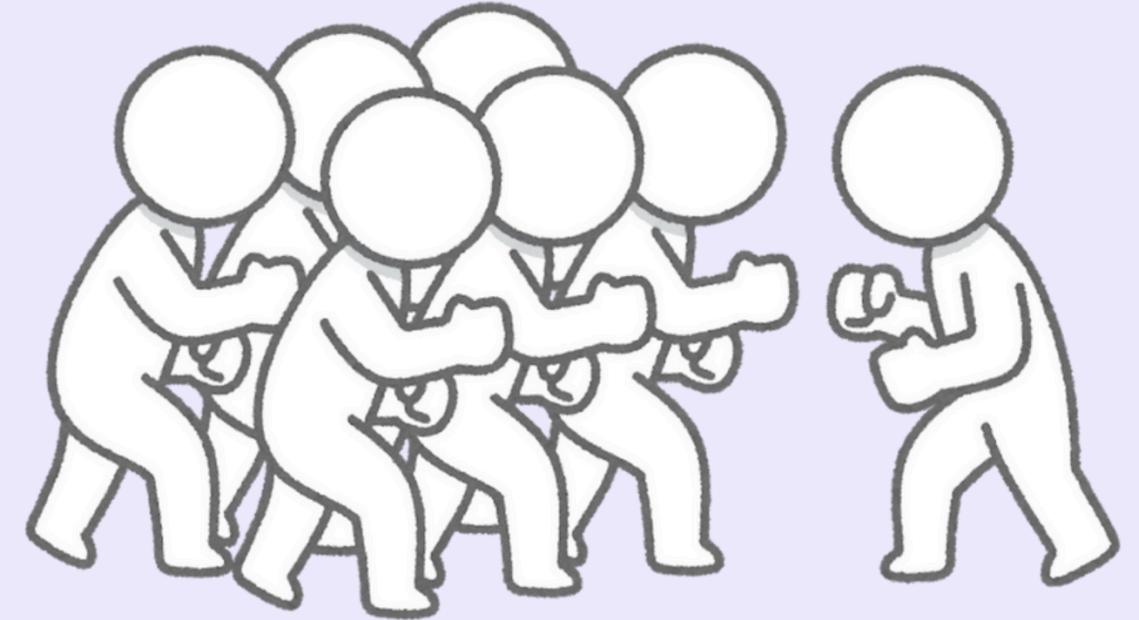
Not generally recommended

Anti-factor Xa activity can be assessed in specific cases

(anticoagulants reversal)



Anticoagulant reversal is a critical step in the management of patients with life-threatening bleeding who are taking an anticoagulant



Anticoagulant reversal

Anticoagulant

1) UFH



protamine sulfate

2) LMWH



Direct reversal by replacement (e.g., with prothrombin complex concentrate, FFP)

3) Warfarin



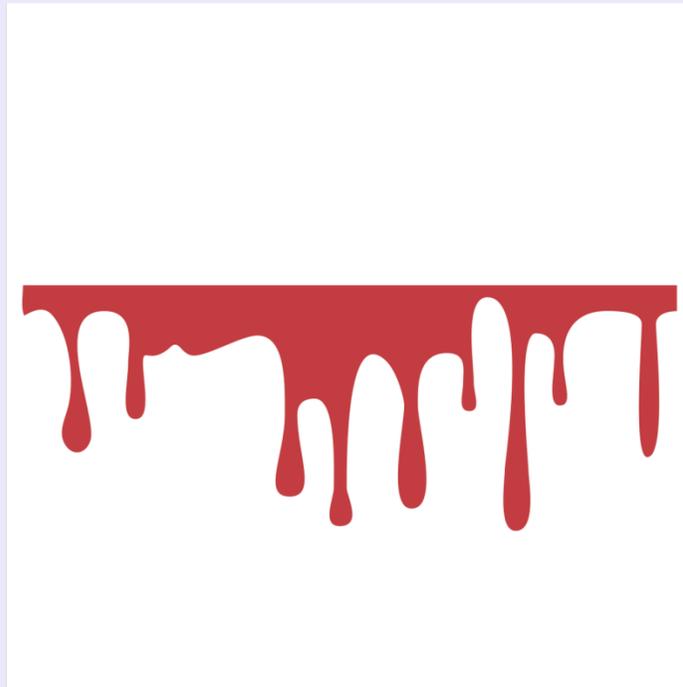
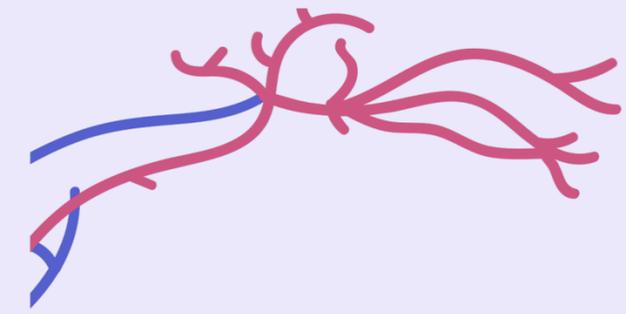
Indirect/delayed reversal by increasing production of coagulation factors (e.g., with vitamin K substitution)

4) synthetic heparin



activated prothrombin complex concentrates (aPCC)

Complications



Hemorrhage

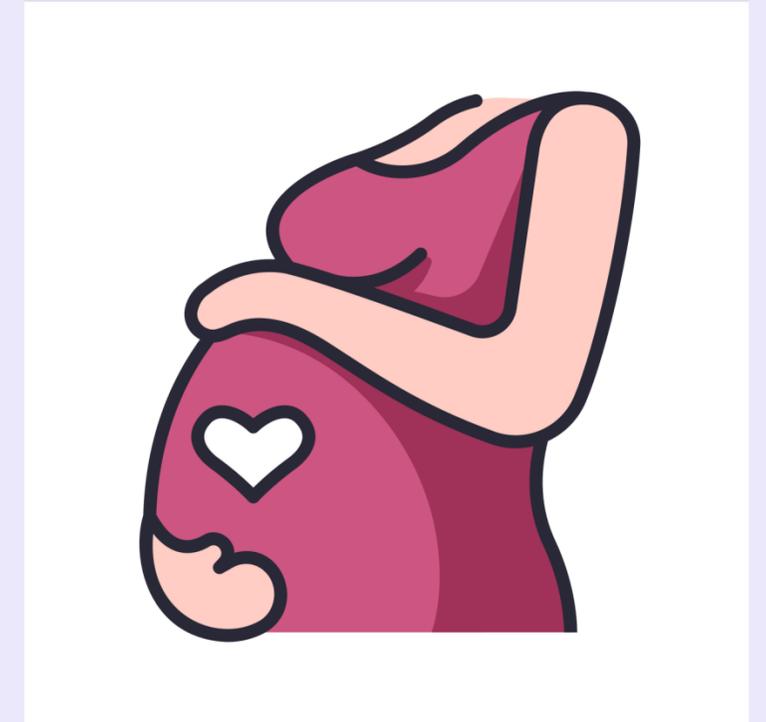
It is the main complication of all anticoagulants



Risk factors for this often-fatal complication include **INR intensity**, **older age**, **cerebrovascular disease**, and **hypertension**



Skin necrosis



birth defects and fetal death

they are specific complications for **warfarin**



Warfarin crosses the placenta and is teratogenic, in contrast to **heparin**, which **does not** cross the placenta

Introduction

01

Periprocedural management of patients on long-term oral anticoagulants (e.g., for the prevention of stroke and systemic thromboembolism) is a field of **ongoing research** and there is currently **no universal validated strategy**

02

Management of anticoagulants in the periprocedural period should be **tailored to the patient and the procedure** in consultation with the **proceduralist and anesthetist**

03

Therefore, anticoagulant therapy should **not be routinely interrupted** periprocedurally, but instead, the decision should be **based on the periprocedural bleeding risk and the periprocedural thrombotic risk**



The risk of periprocedural thrombosis should be weighed against the risk of periprocedural bleeding

There are two major complications of poor management of perioperative anticoagulation

*The first is **bleeding**, which occurs if the provider fails to interrupt anticoagulation therapy in an appropriate timeframe.

*On the other hand, however, patients who have their anticoagulation interrupted too early in the perioperative period are at high risk of **thromboembolic events**, as surgical procedures themselves induce a hypercoagulable state

BALANCE



Elective procedures

7 days before the procedure

- o Assess periprocedural bleeding risk
- o Assess periprocedural thrombotic risk

***Low** bleeding risk: Anticoagulation may be **continued**;
consult the proceduralist and anesthesiologist

***Increased** bleeding risk: **Interrupt** oral anticoagulants

Emergency procedures

- ***Low** bleeding risk: Anticoagulation may be **continued**; consult the proceduralist and anesthesiologist

- ***Increased** bleeding risk: **Interrupt** oral anticoagulants
 - o Consider anticoagulation reversal before performing the procedure

 - o Determine the need for postprocedural bridging anticoagulation based on the periprocedural thrombotic risk

Peri procedural bleeding risk assessment

Patient-related risk factors

⦿1

Age > 65 years

⦿2

Hypertension

⦿3

Active cancer

⦿4

Abnormal renal
function

⦿5

Abnormal liver
function

⦿6

Labile INR or
supratherapeutic
INR

⦿7

History of alcohol
consumption (≥ 8 drinks
per week) or
recreational drug use

⦿8

Chronic bleeding
diathesis

Patient-related risk factors

09

Quantitative or qualitative platelet abnormality

10

Major bleeding or ICH < 3 months before planned procedure

11

History of stroke (i.e., ischemic stroke, spontaneous or traumatic ICH)

12

History of or predisposition to major bleeding

13

History of bleeding due to a similar procedure

14

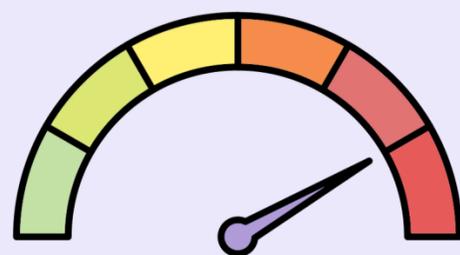
History of bleeding during bridging anticoagulation

15

History of alcohol consumption (≥ 8 drinks per week) or recreational drug use

HAS-BLED

Letter	Clinical Characteristic	Points
H	Hypertension	1
A	Abnormal Liver or Renal Function	1 or 2
S	Stroke	1
B	Bleeding	1
L	Labile INR	1
E	Elderly (age > 65)	1
D	Drugs or Alcohol	1 or 2



zero indicates low risk
1-2 indicates moderate risk
≥3 indicates high risk

Procedure-related risk factors

Low risk	High risk
Diagnostic endoscopy	Major intra-abdominal surgery
Cataract surgery	Major vascular surgery
Oral surgery/dental extraction	Major orthopaedic surgery
Arthrocentesis	Prostatectomy or bladder surgery
Cutaneous surgery	Neurosurgical procedures
Hernia repair	Heart valve replacement
Scrotal surgery	Coronary artery bypass graft surgery
Coronary angiography	Major intrathoracic surgery
	Major cancer surgery
	Pacemaker insertion/implantation
	Biopsy in a non-compressible tissue
	Puncture in a non-compressible artery

Post procedural bleeding risk assessment

⊙1

Patient-related factors
for periprocedural
bleeding

⊙2

Procedure-related factors
for periprocedural
bleeding

⊙3

Intraprocedural findings
and adequacy of
hemostasis (consult the
proceduralist)



hemostasis includes blood vessel constriction, formation of a platelet plug, and blood coagulation through the formation of a fibrin clot

Peri procedural thrombotic risk assessment

Patient-related risk factors

⊙1

Past history of stroke
(especially within the
past 3 months)

⊙2

Atrial fibrillation

⊙3

Past history of VTE
or risk factors for
VTE

⊙4

Rheumatic valvular
heart disease

⊙5

Significant
cardiovascular
disease , especially
within the past year

⊙6

Active cancer

⊙7

Thromboembolism
during prior
interruption of
anticoagulation

Procedure-related risk factors



Procedures associated with high risk of thromboembolism:

01 carotid endarterectomy

02 valve replacement

03 major vascular surgery

Bridging anticoagulation



- Periprocedural bridging anticoagulation involves the temporary administration of a short - acting parenteral anticoagulant after VKA interruption for an invasive procedure

#Agents

- **LMWH:** Administer the last dose 24 hours before the procedure
- **UFH:** Administer the last dose 4-6 hours before the procedure
- **Nonheparin anticoagulants:** indicated for patients with a history of heparin-induced thrombocytopenia

we should know what is
CHA2DS2-VASc Score!



Is a validated scoring system for assessing the risk of stroke in nonvalvular Afib

Risk of stroke:

0 points (male) or 0–1 point (female): low risk

1 point (male) or 2 points (female): intermediate risk

≥ 2 points (male) or ≥ 3 points (female): high risk



CHA₂DS₂-VASCCc Score



1

Congestive
heart failure



Age ≥75
years



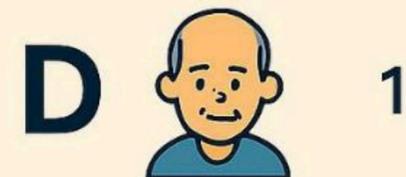
1

Hypertension



2

Stroke / TIA/
Thromboembolism



1

Diabetes mellitus



1

Age 65-74 years



1

Vascular disease



1

Sex category
(female)

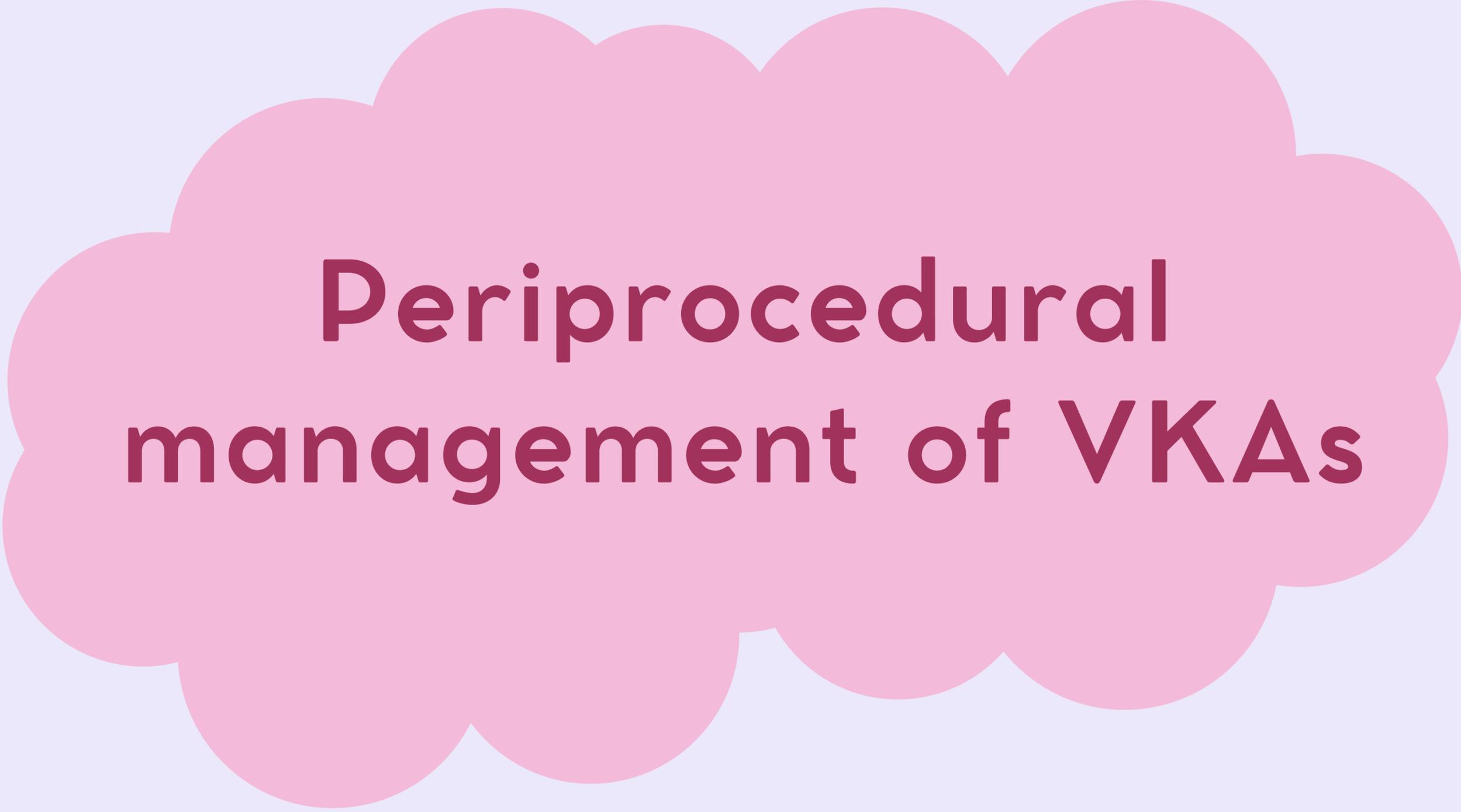
Feature	CHA₂DS₂-VASc Score	HAS-BLED Score
Purpose	Assess stroke risk in atrial fibrillation patients	Assess bleeding risk with anticoagulation
Used for	Who should receive anticoagulation	How risky anticoagulation
Components	CHF, Hypertension, Age ≥75 (2 points), Diabetes, Stroke/TIA (2 points), Vascular disease, Age 65–74, Sex (female)	Hypertension, Abnormal liver/renal function, Stroke, Bleeding history, Labile INR, Elderly (age >55), Drugs/alcohol
Score meaning	Higher score = higher stroke risk	Higher score = caution, consider modifying risk factors
Type	Thrombotic (clotting) risk	Bleeding risk

COMMON CLINICAL SCENARIOS

Atrial fibrillation, mechanical heart valves, and VTE are the most common conditions that require long-term anticoagulation.

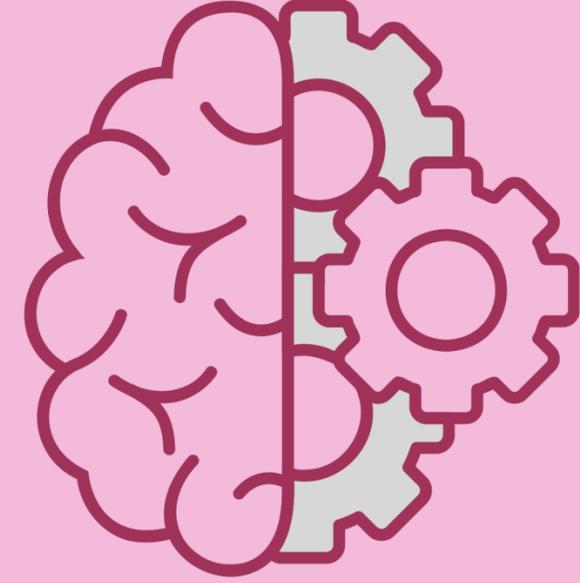
▪ -The following table provides guidance on determining the periprocedural thrombotic risk in patients with these conditions, but the ultimate decision of whether to discontinue anticoagulation should be made on a case-by-case basis, ideally in consultation with relevant specialists.

Periprocedural thrombotic risk ^{[2][3][6]}			
	High thrombotic risk	Moderate thrombotic risk	Low thrombotic risk
<u>Atrial fibrillation</u>	<ul style="list-style-type: none"> CHA₂DS₂-VASc score: ≥ 7 Rheumatic valvular heart disease Stroke or TIA < 3 months before planned procedure 	<ul style="list-style-type: none"> CHA₂DS₂-VASc score: 5 or 6 	<ul style="list-style-type: none"> CHA₂DS₂-VASc score: ≤ 4 (and no prior stroke or TIA)
<u>Mechanical heart valve</u>	<ul style="list-style-type: none"> Mitral valve prosthesis with additional stroke risk factors Caged ball or tilting disc mitral or aortic valve prosthesis Stroke or TIA < 3 months before planned procedure 	<ul style="list-style-type: none"> Mitral valve prosthesis without additional risk factors Bileaflet aortic valve prosthesis with additional stroke risk factors 	<ul style="list-style-type: none"> Bileaflet aortic valve prosthesis without additional stroke risk factors
<u>Venous thromboembolism</u>	<ul style="list-style-type: none"> VTE < 3 months before planned procedure Severe thrombophilia Active malignancy with increased VTE risk 	<ul style="list-style-type: none"> VTE 3-12 months before planned procedure Nonsevere thrombophilia Recurrent VTE Active cancer or recent history of cancer 	<ul style="list-style-type: none"> VTE > 12 months before planned procedure

A large, light pink cloud-like graphic with a scalloped border, centered on the page. Inside the cloud, the text "Periprocedural management of VKAs" is written in a bold, dark pink font.

Periprocedural management of VKAs

Periprocedural management of VKAs



the approach

1 Assess the need to interrupt VKAs based on periprocedural bleeding risk

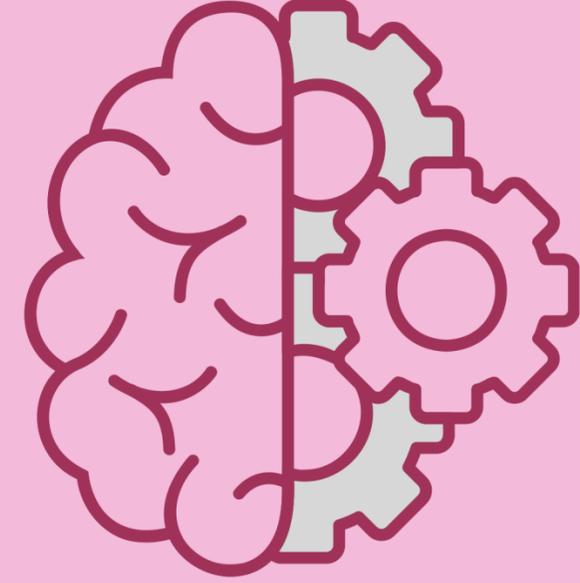
High periprocedural bleeding risk: **Interrupt** VKA

Low periprocedural bleeding risk: VKAs **may be continued**

Patient-related factors for periprocedural bleeding present:
Consider **interruption**

No patient-related factors for bleeding: **Do not interrupt** VKA

Periprocedural management of VKAs



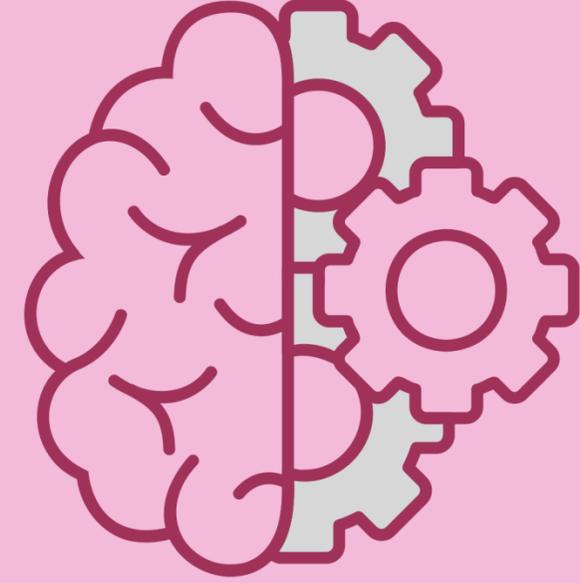
the approach

- ② If VKAs are to be interrupted:
Determine the timing of VKA interruption based on preprocedural INR levels (Assess INR 5–7 days before the procedure)

➤➤➤➤➤ **INR ≤ 3.5**: Interrupt VKA **5 days** before the procedure

➤➤➤➤➤ **INR > 3.5**: Interrupt VKA **≥ 6 days** before the procedure

Periprocedural management of VKAs



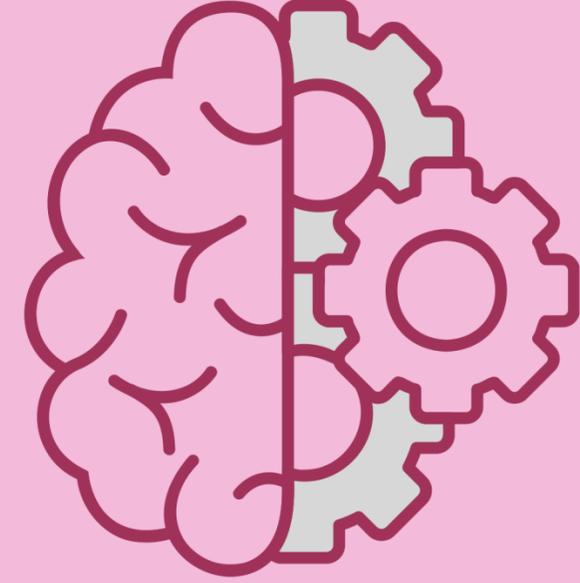
the approach

⊙ 3 If VKAs are to be interrupted:
Determine the need for bridging anticoagulation based on periprocedural thrombotic risk

➡➡➡➡ **High** periprocedural thrombotic risk: Bridging anticoagulation is typically **required**

➡➡➡➡ **Low** periprocedural thrombotic risk: **Do not bridge**

Periprocedural management of VKAs

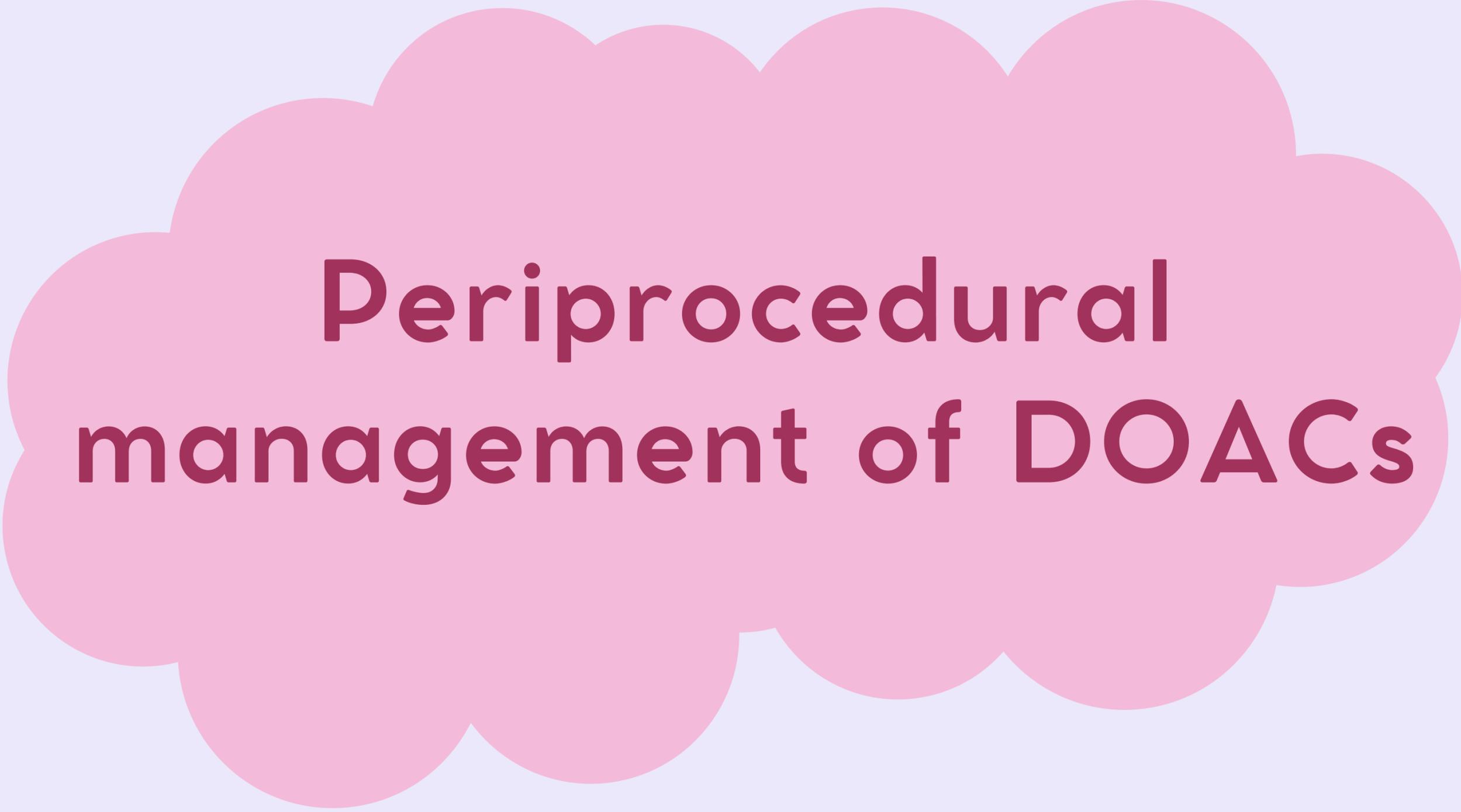


the approach

④ Determine the timing of VKA resumption based on postprocedural bleeding risk

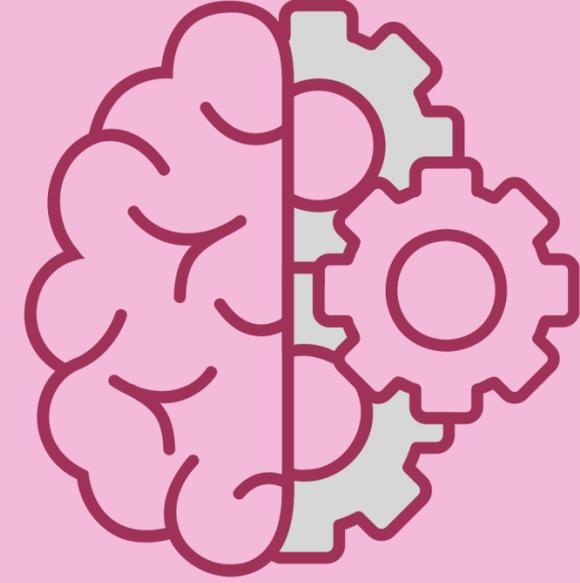
➤➤➤➤ **Low** postprocedural bleeding risk: Resume VKAs **12–24 hours** after the procedure

➤➤➤➤ **High or uncertain** postprocedural bleeding risk: Consider **delaying** VKA resumption



**Periprocedural
management of DOACs**

Periprocedural management of DOACs



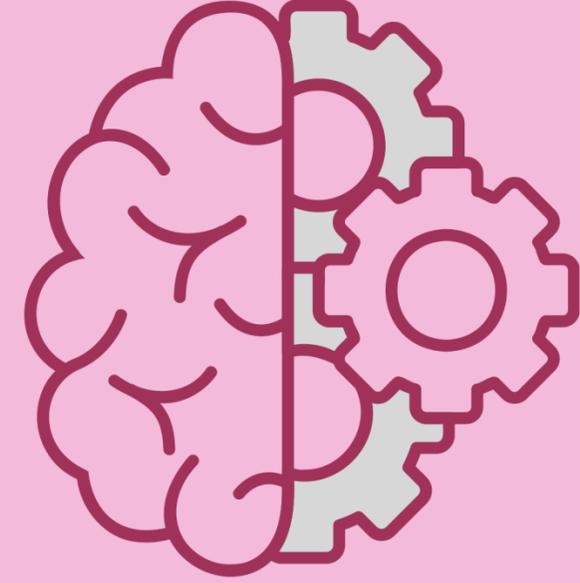
the approach

1 Assess the need to interrupt DOACs based on periprocedural bleeding risk

High periprocedural bleeding risk: **Interrupt** DOACs

Low periprocedural bleeding risk: DOACs **may be continued**

Periprocedural management of DOACs



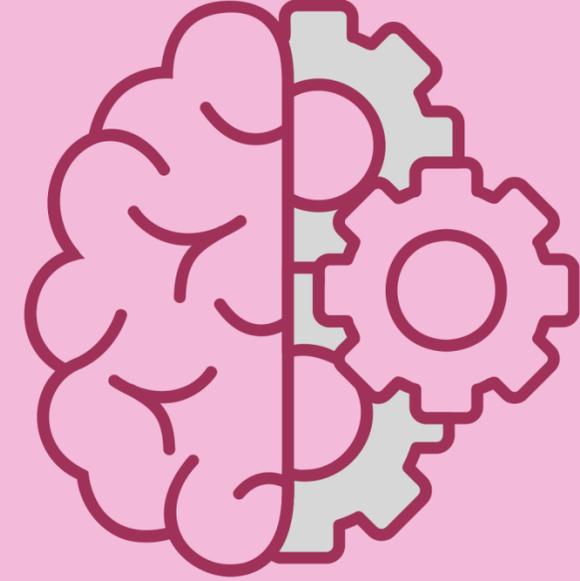
the approach

- 2 If DOACs are to be interrupted:
Determine the timing of DOACs interruption based on periprocedural bleeding risk and creatinine clearance



Timeframe for preprocedural interruption of <u>DOACs</u> [2]				
<u>DOAC</u>		<u>Procedure-related bleeding risk</u>		
		High	Low-to-moderate	Minimal
<u>Factor Xa inhibitors</u>		2 days	1 day	Day of procedure only
<u>Dabigatran</u>	<u>CrCl</u> ≥ 50 mL/min			
	<u>CrCl</u> < 50 mL/min	4 days	2 days	

Periprocedural management of DOACs



the approach

③ Determine the timing of DOACs resumption based on postprocedural bleeding risk and postprocedural creatinine clearance

➡➡➡➡ **Low-to-moderate** bleeding risk: **≥ 24 hours** after the procedure

➡➡➡➡ **High** bleeding risk: **48–72 hours** after the procedure

**If you don't fight for
what you want, don't
cry for what you lost**

