Anticoagulation And Kidney Diseases

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Increased risk for both arterial and venous thromboembolism (VTE), as well as bleeding

Choosing optimal anticoagulant

Anticoagulation in CKD

Anticoagulation in Hemodialysis

Anticoagulation in Kidney Transplantation

Anticoagulation in Nephrotic Syndrome

Anticoagulation Related Nephropathy

Bleeding Management of Anticoagulants

Anticoagulants:

- Vitamin K Antagonists
- UFH (Heparin)
- Low molecular weight heparins (LMWHs)
- Direct Oral Anticoagulants (DOACs)

Evidence for use of anticoagulant class according to renal function

eGFR (mL/min)	UFH	LMWHs	Warfarin	Direct oral anticoagulants
>90	Yes	Yes	Yes	Yes
60-89	Yes	Yes	Yes	Yes
30-59	Yes	Yes	Yes	Rivaroxaban dose adjustment
15-29	Yes	Dose adjustments may be needed; bioaccumulation possible Enoxaparin use with caution	Yes	Rivaroxaban and dabigatran contraindicated Apixaban use with caution
<15	Yes	Use contraindicated outside selected patients with appropriate monitoring	Yes	Rivaroxaban and dabigatran contraindicated; see text for discussion of apixaban

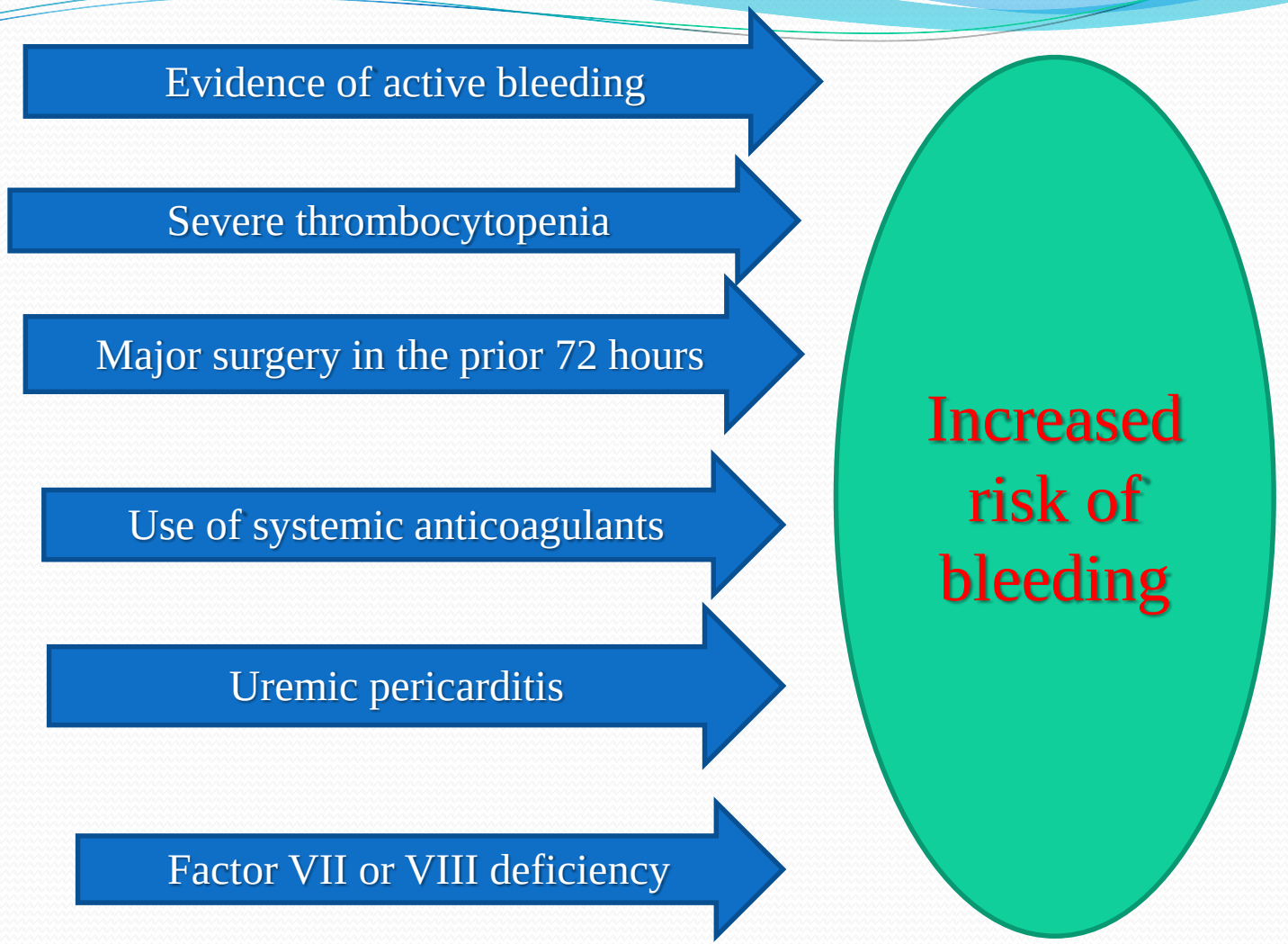
Yes indicates there is evidence for use without dose adjustment.

Potential advantages and disadvantages of DOACs

Potential advantages	Potential disadvantages
Lower rates of intracranial bleed and hemorrhagic strokes than warfarin	Higher drug cost; may require prior insurance approval
No need for routine lab monitoring	Lack of availability of a reversal agent
Fewer drug or food interactions than warfarin	Increased risk of gastrointestinal bleeding
	Higher rebound rate of VTE events in patients with poor adherence
	No clear efficacy data in certain patient populations (e.g., patients with malignancy)

Heparin dose in Hemodialysis

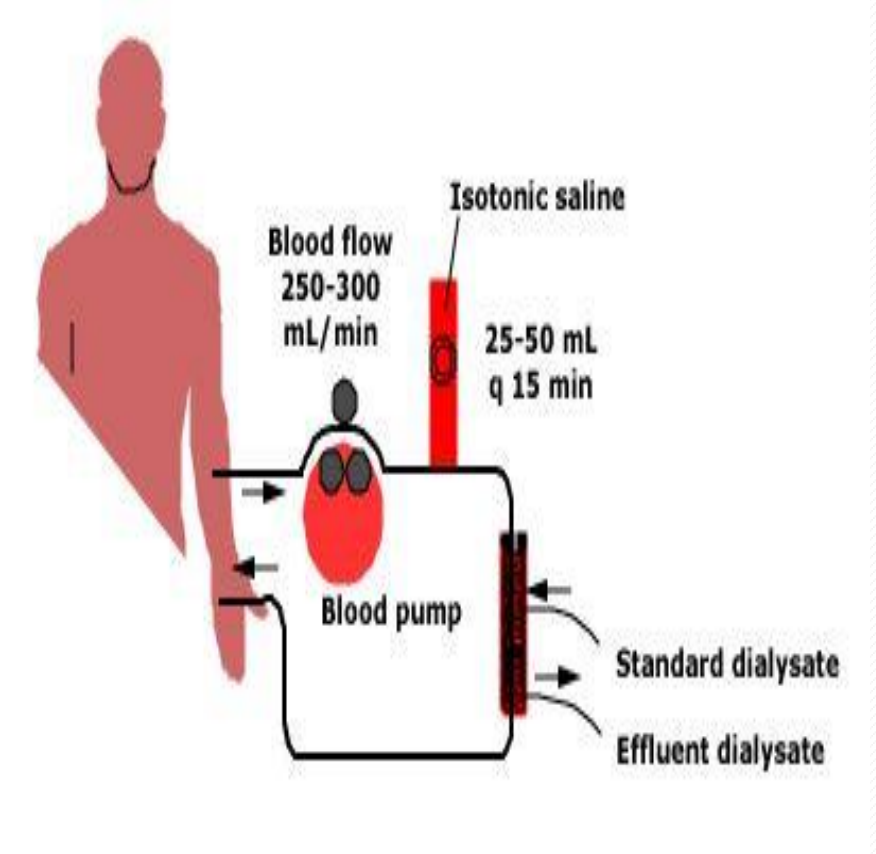
- UFH**:** 1000 to 2000 units at beginning then infusion of 500 units per hour, turned off 60, if clotting develops 30 minutes before the end
- Enoxaparin: 20 mg for a four-hour dialysis session.
- If clotting detected: increase the UFH or LMWH bolus or UFH infusion and evaluate the dialysis access
- Bleeding from needle sites longer than 7 minutes: stop infusion earlier, lower the bolus dose for the following dialysis session, evaluation of HD access



Use of antiplatelet agents alone is not bleeding risk factor

Methods for High bleeding risk

- No-heparin method
- Heparinized solution rinse
- Heparin-bonded dialyzer



Anticuagulant in nephrotic syndrome

- NS carry clinically significant risk of arterial and venous thromboembolic events especially in patients with membranous nephropathy.
- Anticoagulation should be considered in the setting of hypoalbuminemia.
- Must be balanced with the patient's risk of bleeding.
- It should be commenced as soon as it is safe as the risk of thrombosis is highest in the first 6 months of diagnosis.

Considered due to

Etiology of NS

Serum Albumin level

Risk of bleeding

Other VTE risk factors: immobility, obesity, malignancy, recent surgery, pregnancy, medications, central venous catheters, or genetic

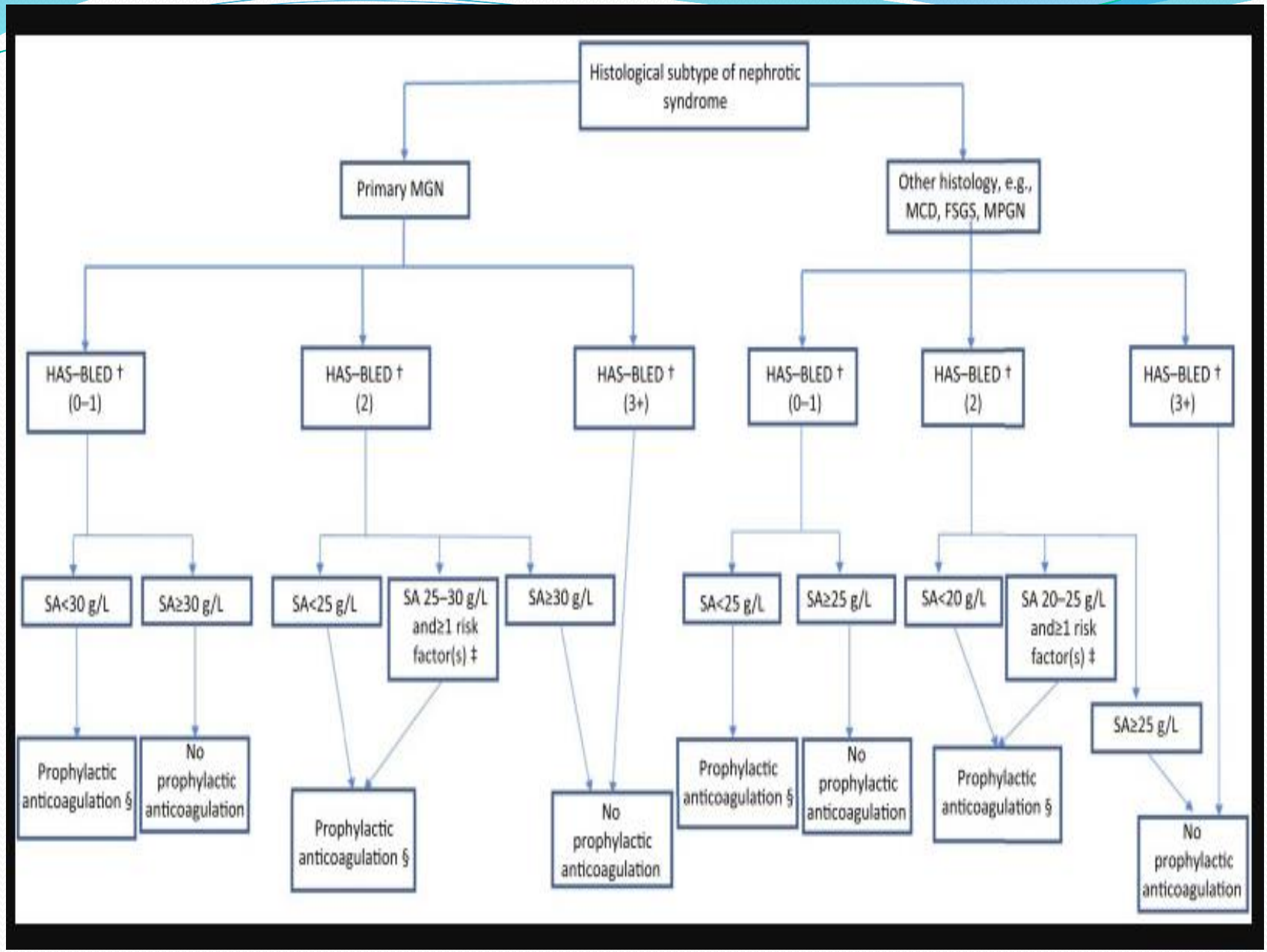
Anticoagulation is not beneficial for patients with high bleeding risk scores, regardless of serum albumin

Clinical characteristics comprising the HAS-BLED bleeding risk score

Letter	Clinical characteristic*	Points
H	Hypertension (ie, uncontrolled blood pressure)	1
A	Abnormal renal and liver function (1 point each)	1 or 2
S	Stroke	1
B	Bleeding tendency or predisposition	1
L	Labile INRs (for patients taking warfarin)	1
E	Elderly (age greater than 65 years)	1
D	Drugs (concomitant aspirin or NSAIDs) or excess alcohol use (1 point each)	1 or 2
		Maximum 9 points

HAS-BLED score (total points)	Bleeds per 100 patient-years¶
0	1.13
1	1.02
2	1.88
3	3.74
4	8.70
5 to 9	Insufficient data

The HAS-BLED bleeding risk score has only been validated in patients with atrial fibrillation receiving warfarin. Refer to UpToDate topics on anticoagulation in patients with atrial fibrillation


Histological subtype of nephrotic syndrome
Primary MGN
Other histology, e.g., MCD, FSGS, MPGN
HAS-BLED † (0–1)
HAS-BLED † (2)
HAS-BLED † (3+)
HAS-BLED † (0–1)
HAS-BLED † (2)
HAS-BLED † (3+)
SA<30 g/L
SA≥30 g/L
SA<25 g/L
SA 25–30 g/L and≥1 risk factor(s) ‡
SA≥30 g/L
SA<25 g/L
SA≥25 g/L
SA<20 g/L
SA 20–25 g/L and≥1 risk factor(s) ‡
SA≥25 g/L
Prophylactic anticoagulation §
No prophylactic anticoagulation
Prophylactic anticoagulation §
No prophylactic anticoagulation
Prophylactic anticoagulation §
No prophylactic anticoagulation
Prophylactic anticoagulation §
No prophylactic anticoagulation

Choice of agent due to patient and clinical factors: ease of use and access, patient preference, and feasibility of monitoring requirements

DOACs: not first-line for prophylaxis and treatment of ATE/VTE in NS

- Aspirin: higher albumin levels, high risk of ATE/VTE with high bleeding risk, Other (non MN) high-risk GNs

The KDIGO guidelines suggest continuation of prophylaxis while the patient remains nephrotic (serum albumin <30 g/l)