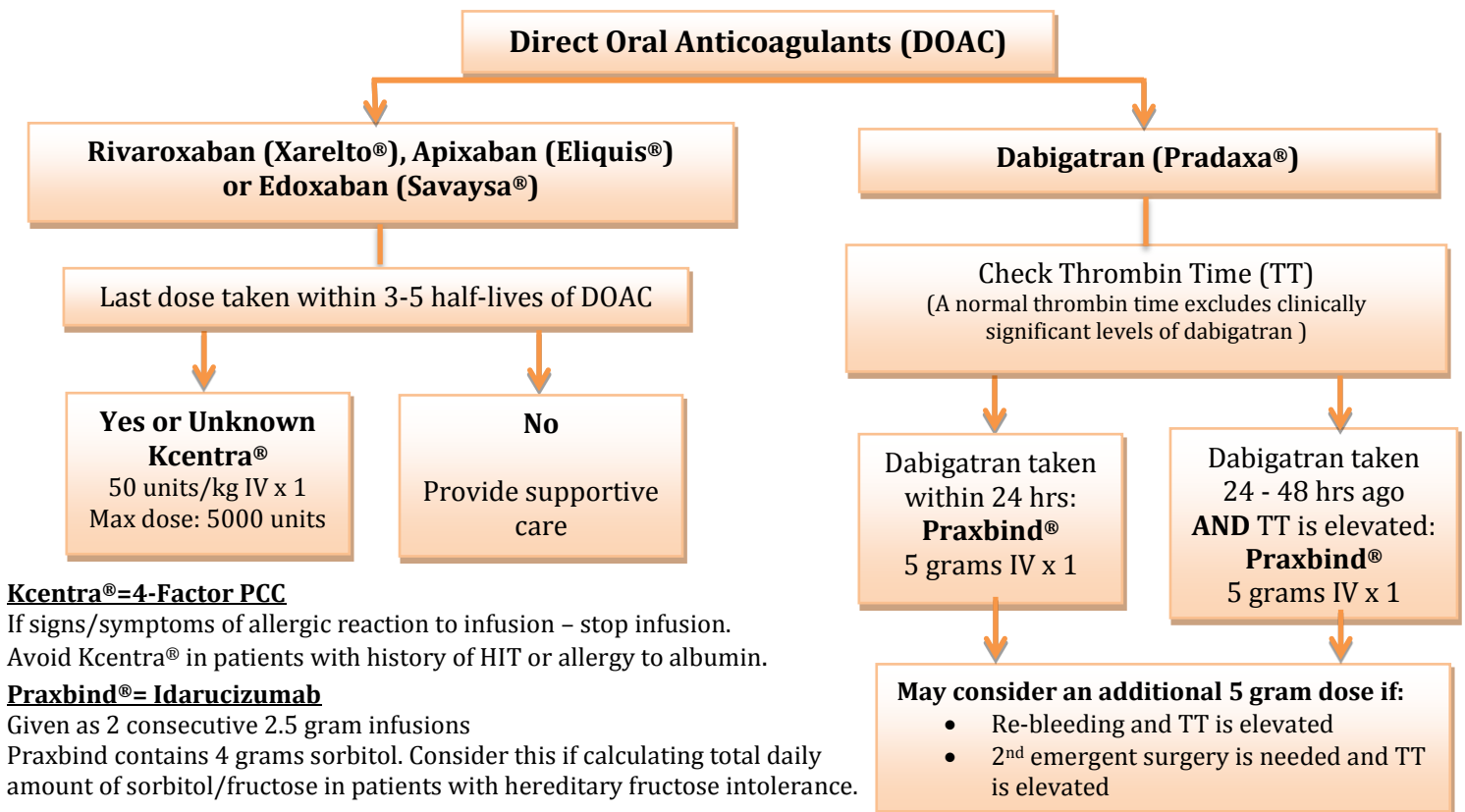
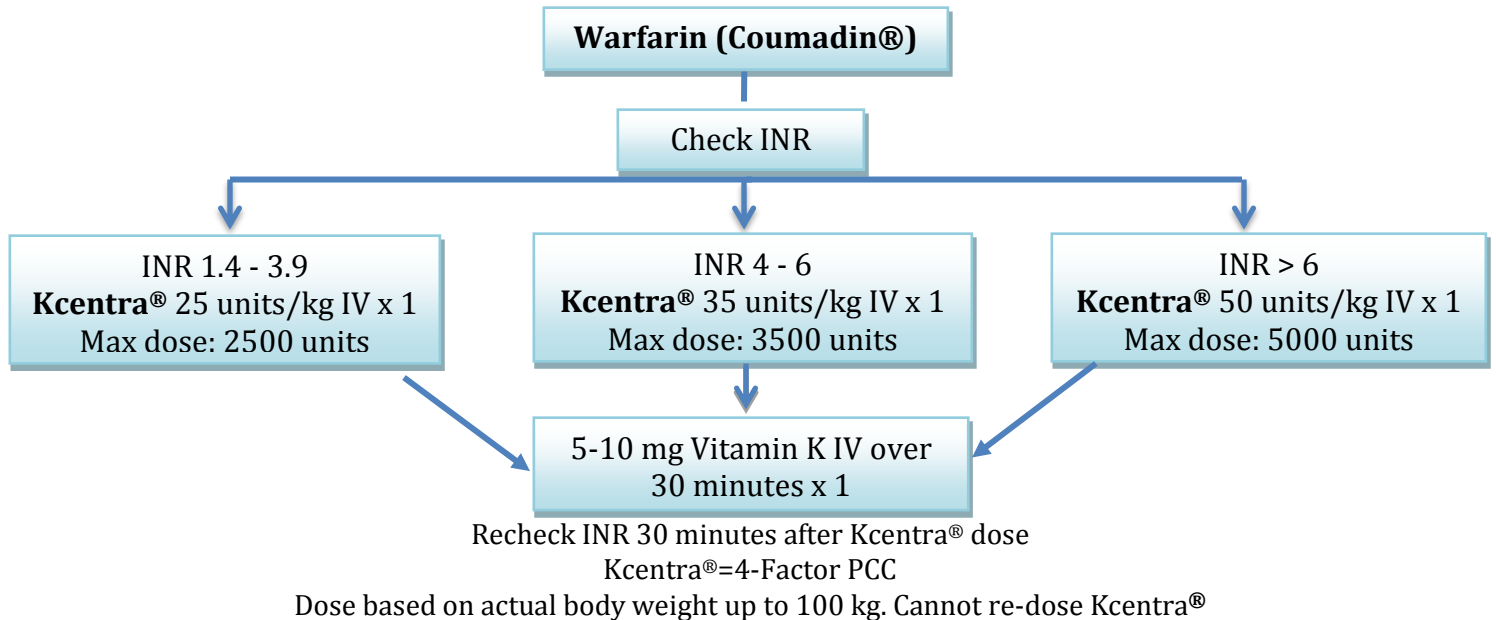


**Reversal of Anticoagulants and Management of Bleeding Guideline**  
 Patients with trauma and/or life-threatening hemorrhage  
 (ICH, intra-abdominal, intra-thoracic) or needs emergent operative intervention



**Kcentra®=4-Factor PCC**

If signs/symptoms of allergic reaction to infusion – stop infusion.  
 Avoid Kcentra® in patients with history of HIT or allergy to albumin.

**Praxbind®= Idarucizumab**

Given as 2 consecutive 2.5 gram infusions  
 Praxbind contains 4 grams sorbitol. Consider this if calculating total daily amount of sorbitol/fructose in patients with hereditary fructose intolerance.

## Unfractionated Heparin (UFH)

Time since UFH last given

Time elapsed: Immediate

**Protamine 1-1.5 mg slow IV for every 100 units of UFH the patient has received\***

Max dose: 50 mg in a 10 minute period

Time elapsed: 30 - 60 minutes

**Protamine 0.5-0.75 mg slow IV for every 100 units of UFH the patient has received \***

Max dose: 50 mg in a 10 minute period

Time elapsed: >2 hours

**Protamine 0.25- 0.375 mg slow IV for every 100 units of UFH the patient has received \***

Max dose: 50 mg in a 10 minute period

\* If patient was on a continuous infusion, only consider heparin given in the preceding 2 - 3 hours

Additional protamine dose should be guided by clinical bleeding. May repeat dose x 1 ( $\leq 0.5$  mg of protamine for every 100 units of heparin) if bleeding continues and if the heparin assay (AntiXa level) remains elevated

Repeat dosing of protamine can elevate the aPTT and ACT. A normal thrombin time is useful to confirm reversal of heparin

## Enoxaparin (Lovenox®)

Time since enoxaparin last given

Time elapsed: < 8 hours

**1 mg of Protamine per 1 mg of enoxaparin the patient has received**

Max dose: 50 mg in a 10 minute period

Time elapsed: 8 -12 hours  
or  
a 2<sup>nd</sup> dose of Protamine needed\*

**0.5 mg Protamine per 1 mg of enoxaparin the patient has received**

Max dose: 50 mg in a 10 minute

Time elapsed: >12 hours

**Protamine likely not needed if 3 - 5 half-lives have elapsed**

\* Additional protamine dose should be guided by clinical bleeding. May repeat dose x 1 if bleeding continues and if the LMW heparin assay (AntiXa level) remains elevated.

Protamine neutralizes 60% - 75% of anti-Xa activity of enoxaparin

## Fondaparinux (Arixtra®)

- There is no FDA-approved reversal agent for Fondaparinux
- Reversal agent is likely not needed if 3 - 5 half-lives have elapsed (half-life 17 - 21 hours)
- **Recombinant factor VIIa (NovoSeven®) 90 mcg/kg** has been shown to partially normalize a prolonged aPTT, endogenous thrombin potential, and prothrombin activation in vivo.

## Argatroban and Bivalirudin (Angiomax®)

- There is no FDA-approved reversal agent for Argatroban or Bivalirudin
- Reversal agent is likely not needed if 3 - 5 half-lives have elapsed
  - Argatroban half-life 40 - 50 minutes
  - Bivalirudin half-life 25 minutes, extended up to 3.5 hour in patients on dialysis
  - **Recombinant factor VIIa (NovoSeven®) 90 mcg/kg** has been shown to reverse the anticoagulation effect of direct thrombin inhibitors

## Management of Bleeding

Name of Anticoagulant	Dialysis	Management	Reversal Agent
<b>Warfarin (Coumadin ®)</b>	Not dialyzable	- Hold warfarin - Supportive measures*	Kcentra ® and Vitamin K
<b>Rivaroxaban (Xarelto ®)</b>	Not dialyzable	- Discontinue anticoagulant - Supportive measures* - Overdose: Charcoal by mouth if ingested within 1 – 2 hours	Kcentra ®
<b>Apixaban (Eliquis ®)</b>			
<b>Edoxaban (Savaysa®)</b>			
<b>Dabigatran (Pradaxa ®)</b>	Hemodialysis removes ~57% over 4 hours	- Discontinue anticoagulant - Supportive measures* - Overdose: Charcoal by mouth if ingested within 1 – 2 hours	Praxbind ®
<b>Unfractionated Heparin (UFH)</b>	Not dialyzable	- Discontinue anticoagulant - Supportive measures*	Protamine
<b>Enoxaparin (Lovenox ®)</b>	Not dialyzable	- Discontinue anticoagulant - Supportive measures*	Protamine
<b>Fondaparinux (Arixtra ®)</b>	Clearance increased by 20%	- Discontinue anticoagulant - Supportive measures*	NovoSeven ®
<b>Argatroban</b>	Hemodialysis removes ~20% over 4 hours	- Discontinue anticoagulant - Supportive measures*	NovoSeven ®
<b>Bivalirudin (Angiomax ®)</b>	Hemodialysis removes ~25% over 4 hours	- Discontinue anticoagulant - Supportive measures*	NovoSeven ®

\* Supportive measures include management of airway, breathing, circulation, transfusions, compression, surgical hemostasis

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