

Emergency Department Guide to Anticoagulation Reversal

ERcast.org - adopted from Tom Deloughery, MD (OHSU) and Australasian Society of Thrombosis and Haemostasis

WARFARIN

If your patient IS NOT Bleeding: Goal is INR in 2-3 range

<u>INR</u>	<u>Action</u>
3-4.5	Hold dose until INR decreased
4.5-10	1 - 2.5 mg Vitamin K PO and hold dose until INR decreased
>10	2.5 - 5 mg Vitamin K PO hold dose until INR decreased OR If high bleeding risk, Give 1mg IV Vitamin K and consider FFP

If your patient IS bleeding but not about to die: Goal is INR under 2

Should see INR back in therapeutic range in 24 hours

<u>INR</u>	<u>Action</u>
2-4.5	2.5 mg Vitamin K ± FFP (15 ml/kg)
4.5-10	5 mg Vitamin K ± FFP (15 ml/kg)
>10	5-10 mg Vitamin K ±FFP (15 ml/kg)

Whether to give FFP or PCC in this scenario is based on clinician judgment. There is no hard data to show superiority or inferiority of either product. PCC will reverse faster and with less volume.

FFP=fresh frozen plasma PCC= Prothrombin complex concentrate

If your patient has LIFE THREATENING OR BRAIN BLEEDING:

For Immediate reversal: there are several choices:

1. Prothrombin complex concentrate (3 factor) 4,000 units IV + 1mg rVIIa IV
2. Prothrombin complex concentrate (3 factor) 4,000 units IV + 1 unit of FFP
3. 4 units of FFP if PCC is not available

For Long term reversal:

10mg IV Vitamin K over 1 hour

ANTI-PLATELET AGENTS

Aspirin

Minor – desmopressin 0.3 mcg/kg x 1 Major - platelet transfusion (1 unit or 6pack)

Clopidogrel (Plavix®)

Minor – desmopressin 0.3 mcg/kg x 1 Major - platelet transfusion – consider two units if life or brain threatening bleeding

Prasugrel (Effient®)

Minor – desmopressin 0.3 mcg/kg x 1 Major - platelet transfusion – consider two units if life or brain threatening bleeding

Ticagrelor (Brilinta®)

Minor – desmopressin 0.3 mcg/kg x 1 Major - platelet transfusion – consider two units if life or brain threatening bleeding

Sustained Release Aspirin/Dipyridamole (Aggrenox®)

Minor – desmopressin 0.3 mcg/kg x 1 Major - platelet transfusion (1 unit or 6pack)

Abciximab (Reopro®)

Major - platelet transfusion

Eptifibatide (Integrilin®)

Minor – desmopressin 0.3 mcg/kg x 1 Major: platelet transfusions plus infusion of 10 units of cryoprecipitate

Tirofiban (Aggrastat®)

Minor – desmopressin 0.3 mcg/kg x 1 Major: platelet transfusions plus infusion of 10 units of cryoprecipitate

HEPARIN AND HEPARIN LIKE AGENTS

Reversal Agent = Protamine. Protamine infusion rate should not exceed 5 mg/min. Maximum dose is 50 mg per dose.

Unfractionated (standard) Heparin

Time since last heparin dose	Dose of Protamine
< 30 minutes	1 unit/100 units of heparin
30-60 minutes	0.5 - 0.75 units/100 units of heparin
60-120 minutes	0.375 - 0.5 units/100 units of heparin
> 120 minutes	0.25 - 0.375 units/100 units of heparin

Low Molecular Weight Heparin

Reversal of Bleeding: Protamine will give partial reversal of LMWH (probably about 70%, which is less than protamine reverses unfractionated heparin, but still better than nothing) . If protamine is given within 4 hours of LMWH dose, give 1 mg of protamine for each 1 mg of enoxaparin or 100 units of dalteparin and tinzaparin. Repeat one-half dose of protamine in 4 hours. If 4-8 hours after dose, give 0.5 mg for each 1 mg of enoxaparin or 100 units of dalteparin and tinzaparin

Fondaparinux (Arixtra®)

Major Bleeding Reversal - Protamine ineffective - rVIIa (90 mcg/kg) may be of use

Dabigatran (Pradaxa®)

Reverse if patient shows signs of bleeding and had an elevated aPTT > 40 seconds

Profilnine (Factor IX complex) 4000 units (50 units/kg for patients under 80 kg) plus 1 mg of rFVIIa

Rivaroxaban (Xarelto®)

Reverse if patient shows signs of bleeding and has an INR > 1.5

Profilnine (Factor IX complex) 4000 units (50 units/kg for patients under 80 kg) plus 1 mg of rFVIIa

THROMBOLYTICS

The goal is to *rebuild the entire clotting system*

1 unit of pheresis platelets

2 units of FFP

10 units of cryoprecipitate

Definition of Bleeding

Minor bleeding – Any clinically overt sign of hemorrhage (including imaging) that is associated with a <5 g/dl decrease in the hemoglobin concentration or < 15% decrease in the hematocrit felt by the clinician to be related to anticoagulation

Major bleeding – Intracranial hemorrhage or a ≥ 5 g/dl decrease in the hemoglobin concentration or a $\geq 15\%$ absolute decrease in the hematocrit resulting in hemodynamic compromise or compression of a vital structure and felt by the clinician to be related to anticoagulation