# Considerations for the Anticoagulated Trauma Patient

**Disclaimer:**

These guidelines are not intended as a directive or to present a definitive statement of the applicable standard of patient care. They are offered as an approach for quality assurance and risk management and are subject to (1) revision as warranted by the continuing evaluation of technology and practice; (2) the overall individual professional discretion and judgment of the treating provider in a given patient circumstance; and (3) the patient's willingness to follow the recommended treatment.

Anticoagulants should be reversed immediately if TBI or significant bleeding is suspected or even POSSIBLE. Consideration should be given to activation of the trauma team for patients receiving anticoagulants to provide prompt treatment and diagnostics and timely access to reversal agents.

The frequent use of anticoagulants in the elderly puts them at higher risk for significant bleeding events, even in the context of minor injury. Warfarin and novel oral anticoagulants (NOACs) have been shown to increase the severity of head injury and increase mortality rate. Mortality of trauma patients with head injury while on warfarin ranges from 33% to 50%. Furthermore, it has been reported that the head injured patients on warfarin have an increased risk of mortality from 2-fold to 4-fold, when compared with non-anti-coagulated patients with similar degrees of head injury.

As part of the trauma workup, one should always obtain an adequate history, which includes a list of current home medications. Early identification of warfarin use has been shown to reduce mortality on patients with intracranial hemorrhage from 48% to 9%.

Another important aspect of the anti-coagulated patient is the decreased reliability of their neurological exam. It has been shown that GCS of 15 and no loss of consciousness does not reliably rule out intracranial pathology after trauma. Therefore, all patients with known warfarin or NOAC use should have a CT scan of the head as part of their trauma workup regardless of their mental status.

If ICH is known or strongly suspected OR significant bleeding is suspected at any site, use reversal guideline incorporating aPCCs' to achieve rapid effect. If active bleeding is not suspected based upon exam, mechanism is not significant AND neuro exam is satisfactory, reversal of warfarin may be initiated by administration of FFP (15-30cc/kg). In all patients receiving reversal therapy for warfarin, vitamin K is indicated. Repeat head CT is indicated at some point prior to discharge in all patients using systemic anticoagulants on admission.
The following labs should be drawn STAT and repeated as clinically indicated. While these labs may help to identify the presence or absence of oral anticoagulants the results of these studies should not delay the anticoagulation reversal treatment if a history of oral anticoagulant use is present or known.

1. CBC
2. PT/INR
3. BMP
4. aPTT
5. consider TEG or ROTEM

In patients taking anticoagulants on admission for afib and/or prior DVT/PE, consider having patient remain off of therapeutic anticoagulation until at least 2 weeks after injury, to be determined on follow-up with PCP, cardiologist, or trauma surgeon using input from Neurosurgery.

In patients on anticoagulants for cardiac valvular disease, stroke or life threatening thrombotic/thromboembolic disease, consider consulting PCP or cardiologist to determine optimal timing and dose of anticoagulation, with input from Neurosurgery.

If therapeutic anticoagulants are restarted [including warfarin, therapeutic LMWH, therapeutic enoxaparin, and novel oral anticoagulants such as the direct thrombin inhibitor (Pradaxa) and factor Xa inhibitors], patients should undergo repeat head CT immediately prior to starting and should be monitored in the hospital for 48-72 hours after anticoagulants are therapeutic. Depending on extent of injury and fall risk, it may be recommended that the patient remain off of anticoagulants indefinitely.

In 2016, the Neurocritical Care Society published antithrombotic reversal guidelines. The recommendations for reversal of antiplatelet agents for any type of ICH are as follows:

| Recommendation | Quality of Evidence |
|---|---|
| Recommend discontinuing antiplatelet agents when intracranial hemorrhage is suspected | Good practice statement |
| Suggest against platelet transfusion for patients with antiplatelet-associated intracranial hemorrhage who will not undergo a neurosurgical procedure, regardless of the type of platelet inhibitor, platelet function testing, hemorrhage volume, or neurological exam | Conditional recommendation<br>Low quality evidence. |
| Suggest platelet transfusion for patients with aspirin or ADP inhibitor associated intracranial hemorrhage who will undergo a neurosurgical procedure | Conditional recommendation<br>Moderate quality evidence |
| Recommend platelet function testing prior to platelet transfusion if possible | Strong recommendation<br>Moderate quality evidence |
| When platelet function testing is not readily available, empiric platelet transfusion may be reasonable. | Conditional recommendation<br>Low-quality evidence |
| Recommend against platelet transfusion for patients with laboratory documented platelet function within normal limits or documented antiplatelet resistance. | Strong recommendation<br>Moderate quality evidence |

Adapted from Frontera JA, et.al. Neurocrit Care. 2016:24:6-46.

Reversal for aspirin and anti-platelet use: Consider Platelets per hospital policy.

| Indication | Drug | Dose | Max Dose |
|---|---|---|---|
| **Known Drug Exposure** | | | |
| Direct Thrombin Inhibitors<br>Dabigatran (Pradaxa) | Praxbind | 5 grams | 5 grams |
| Bivalirudin<br>Argatroban | FEIBA (aPCC) | 12.5 – 25 units/kg | 100 units/kg |
| Factor Xa Inhibitors<br>Apixaban(Eliquis)<br>Rivaroxaban (Xarelto)<br>Edoxaban (Savaysa)<br>Fondaparinux (Arixtra) | Kcentra (4PCC) | 25-50 units/kg | 5000 units |
| Vitamin K Antagonist<br>Warfarin (Coumadin) | Kcentra (4PCC)* | INR 2 – 4: Dose 25 units/kg<br>INR 4 – 6: Dose 35 units/kg<br>INR > 6: Dose 50 units/kg | INR 2 – 4: Dose 2500 units<br>INR 4 – 6: Dose 3500 units<br>INR > 6: Dose 5000 units |
| **Anticoagulant Exposure Suspected** | | | |
| Specific Agent Unknown | FEIBA (aPCC) | 12.5 – 25 units/kg | 100 units/kg |
| **No Anticoagulant Exposure Suspected** | | | |
| No Drug Contribution | rFVIIa | 30 mcg/kg | 90 mcg/kg |

* Assuming vitamin K 10 mg IV has already been administered
KCentra: Administer at 0.12 mL/kg/min (~3 units/kg/min), max rate of 8.4 mL/min (~210 units/min)
FEIBA: Infusion rate must not exceed 2 unit/kg/min (range of 2.5-7.5ml/min)
Obtain INR 30 minutes after administration complete when reversing warfarin

## Agent Review and Coagulation Evaluation

| Drug | MoA | Half-Life | PT/INR | aPTT |
|---|---|---|---|---|
| **Dabigatran (Pradaxa)** | Direct Thrombin Inhibitor | 12 – 14 hours (Prolonged in renal dysfunction and elderly) | Not elevated at therapeutic levels, moderately elevated at supra-therapeutic levels | Elevation indicative of presence but not degree of anticoagulation |
| **Rivaroxaban (Xarelto)** | Factor Xa Inhibitor | 5 – 9 hours (Prolonged in renal dysfunction and elderly) | Elevated levels consistent with ingestion at higher doses | No significant effect |
| **Apixaban (Eliquis)** | Factor Xa Inhibitor | 8 – 15 hours (Prolonged in renal dysfunction and elderly) | Elevated levels consistent with ingestion at higher doses | No significant effect |
| **Edoxaban (Savaysa)** | Factor Xa inhibitor | 10-14 hours (Prolonged in renal dysfunction and elderly) | Elevated levels consistent with ingestion at higher doses | No significant effect |
| **Warfarin (Coumadin)** | Vitamin K Antagonist | INR Reversal<br>6 – 24 hrs w/ vit K<br>2 – 8 hrs w/ FFP<br>Minutes w/ FEIBA | Elevation in relation to dose | No significant effect |

- In 2018, the FDA approved the use of AndexXa for the reversal of apixaban and rivaroxaban. Dosing is based on when the patient last took the medication and ranges from 400-800mg initially followed by 4-8 mg/min for up to 120 min. Max dose is 480-960 mg. Follow hospital policy for dosing and administration.

- For NOACs, consider activated charcoal if ingestion within 3 hours. For dabigatran reversal, can also consider charcoal if less than 1 hour since ingestion or immediate dialysis.


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