Disclaimer for Comprehensive Stroke Center (CSC) Clinical Guidelines

These Guidelines are intended only for informational and/or educational purposes on the latest clinical best practice. They **ARE NOT** to be considered or utilized as a policy, procedure, protocol, or medical order, and are not intended to replace clinical judgment or determine the care of an individual patient. **THE IMPLEMENTATION OF ANY OF THE CLINICAL MEASURES DISCUSSED IN THESE GUIDELINES REQUIRES A SPECIFIC MEDICAL ORDER DOCUMENTED IN THE PATIENT'S MEDICAL RECORD**. These Guidelines were prepared and approved by the inter-disciplinary teams from the University of Texas-Health Science Center Department of Neurology, Mischer Neuroscience Institute, and Memorial Hermann Hospital-Texas Medical Center-Comprehensive Stroke Center.

Coagulopathy Reversal Protocol

Please note Kcentra® orders will not be delayed. However, all orders are reviewed by a clinical pharmacist specialist for appropriateness prior to preparation. You may receive a call regarding its use if there are concerns.

- This protocol is not intended for patients receiving Argatroban, Bivalirudin, Enoxaparin, Fondaparinux, or Unfractionated heparin.

Labs for All Coagulopathic Patients

- Order CBC with differential and platelets.
- Order DIC panel.
  - DIC panel consists of PT/PTT/D dimer/Thrombin time/Fibrinogen.
- Consider TEG

Coagulopathy in Patients Actively Bleeding or Requires Emergent Reversal for a Procedure on Warfarin

- Step 1: Administer **vitamin K** 10 mg IV/NS 50 ml over 30 minutes STAT.
  - Onset of action = 4 – 8 hours and peak effect = 12 – 14 hours.
  - Administer regardless of what was reported to be given at outside facility.
  - Vitamin K will assist in sustaining the effects of Kcentra®
- Step 2: **Kcentra®**
  - Must be ordered by an attending or fellow (with attending approval)
  - Dosing (Use maximum weight of 100 kg if patient > 100 kg)
    - If INR 1.4 – 3.99 = Give 25 units per kg.
    - If INR 4 – 5.99 = Give 35 units per kg.

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- If INR ≥ 6 Give 50 units per kg.
  - Pharmacy will round downward to the nearest vial.
  - Use is restricted to a single dose. Repeat doses do not improve efficacy and increases risk for thromboembolic complications. Hematology consult required if more than 1 dose is needed.
  - Obtain PT/INR/PTT prior to initiating Kcentra® and 2 hours after administration.
- Notes regarding Kcentra® dosing administration
  - Each 500 unit vial contains 400 – 620 units factor IX. Pharmacy will enter the exact dose provide in factor IX units for billing purposes.
  - Kcentra®should be infused through a separate infusion line.
  - It is administered by IV infusion at a maximum 210 units/minute

Coagulopathy in Patients Actively Bleeding or Requiring Emergent Reversal for a Procedure on New Oral Anticoagulants

For off-label use in immediate reversal of **Rivaroxaban (Xarelto®), Apixaban (Eliquis®) and Dabigatran (Pradaxa®)**

- Dabigatran patients: additional removal with hemodialysis may be warranted. Approximately 50% of Dabigatran may be removed at about 2 hour mark.
- Check a TEG (not rapid TEG). If r-time normal Kcentra® is not required.
- First line: **Kcentra®**
  - Must be ordered by an attending.
  - Dose = 35 units per kg and is restricted to a single dose. (Use maximum weight of 100 kg if patient > 100 kg)
    - Maximum cumulative dose = 50 units/kg per day.
  - Use is restricted to a single dose. Repeat doses do not improve efficacy and increases risk for thromboembolic complications. Hematology consult required if more than 1 dose is needed.
  - Vial sizes may vary. Pharmacy will round downward to the nearest vial size.
  - Obtain PT/INR/PTT/TEG prior to initiating Kcentra® and 2 hours after administration.

Coagulopathy in Patients NOT on Warfarin or New Oral Anticoagulants AND Patient is Actively Bleeding

- Maintain fibrinogen > 200 mg/dL in patients actively bleeding.
  - Replace fibrinogen < 200 mg/dL with cryoprecipitate 10 units. If fibrinogen < 100 mg/dl administer 20 units of Cryo.
  - Check fibrinogen level 2 hours after cryoprecipitate. If fibrinogen < 200 mg/dL administer cryoprecipitate 10 units.

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- If PT or PTT is prolonged and fibrinogen > 200 mg/dL administer FFP 10 ml/kg; do not administer cryoprecipitate.
- Maintain platelets > 75,000/mm^3.
- Check CBC and DIC panel every 8 hours X 24 hours, then daily.
- If above measures have been completed and patient is actively bleeding consider rFVIIa 20 micrograms/kg (10 – 40 micrograms/kg) IV push over 2 minutes X 1.
  - For rFVIIa to be most efficacious ensure pH ~ 7.4 and body temperature > 36^0 C.
- Check CBC and DIC panel 1 hour after rFVIIa.
- Calculate DIC score daily.

Emergent Placement of Ventriculostomy NOT on Warfarin or New Oral Anticoagulant

- INR < 1.5 no therapy
- INR > 1.5 – 1.79 administer FFP 2 units + vitamin K 10 mg IV/NS 50 ml over 30 minutes STAT
- INR ≥ 1.8 – 2.9 administer rVIIa 1 mg IV push over 2 minutes X 1 (≤ 50 kg; administer 0.5 mg).
- INR ≥ 3 – 5.9 administer rVIIa 2 mg IV push over 2 minutes X 1 + FFP ~ 10 ml/kg
- INR >6 administer rVIIa 2 mg IV push over 2 minutes X 1 + FFP ~ 20 ml/kg

Emergent Placement of Ventriculostomy ON Warfarin or New Oral Anticoagulant

Warfarin

- INR ≤ 1.5 administer vitamin K 10 mg IV/NS 50 ml over 30 minutes STAT
- INR > 1.5 – 1.99 administer FFP 2 units + vitamin K 10 mg IV/NS 50 ml over 30 minutes STAT
- INR ≥ 2 administer Kcentra® per "Coagulopathy in Patients Actively Bleeding or Requires Emergent Reversal for a Procedure on Warfarin" + vitamin K 10 mg IV/NS 50 ml over 30 minutes STAT

New Oral Anticoagulant

- Administer Kcentra® per "Coagulopathy in Patients Actively Bleeding or Requires Emergent Reversal for a Procedure on New Oral Anticoagulant"

Patients on Aspirin and/or Antiplatelets

- Aspirin
  - Consider one unit single donor platelets
- Plavix (with or without Aspirin)
  - Consider 2 units single donor platelets
- Maintain platelet count > 75,000/mm^3.

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Reversal of Alteplase (tPA)

- Stop tPA.
- Check fibrinogen level immediately and every 6 hours X 24 hrs.
- Goal = fibrinogen > 100 mg/dl
- Type and cross
- Administer cryoprecipitate 10 – 20 units before fibrinogen level returns
  - 1 unit increases fibrinogen by 5 -10 mg/dl
  - Repeat cryoprecipitate if needed
  - May use fresh frozen plasma (FFP) in case of no cryoprecipitate (1 unit of cryoprecipitate is made from 1 bag of FFP)
- Administer platelets if platelet < 100,000/mm^3
- Activated factor 7 is untested in this situation, and should not be used
- Neurosurgery should be called; however, surgery cannot be done until coagulopathy is corrected and is usually not indicated
- MHH Blood Bank: 713-704-3640

Approval of Factor VIIa or Kcentra® Orders

- Kcentra® or rVIIa must be approved by Neuro ICU attending if patient is in the ICU. Place name/cell number in order comments. Must be ordered by Neurosurgery/Stroke Attending if the patient is in the ED or OR.
- The first dose of Kcentra® or rVIIa does not have to be approved by Dr. Miguel Escobar or a clinical pharmacist specialist if the protocol is being followed. All subsequent doses require approval.

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- Preparation of all Kcentra® or rVIIa orders will require approval by Teresa Allison, Pharm.D., Sophie Samuel, Pharm.D., or Kenneth Chong, Pharm.D.

Use with Caution

- In past 6 months: Ischemic stroke (clinical or imaging evidence), myocardial infarction (clinical or EKG evidence), or venous thromboembolism.
- Patients 65 years or older.

Contraindications to Use of Recombinant Factor VIIa or Kcentra®

Consult Dr. Miguel Escobar, Teresa Allison, or Kenneth Chong for approval of rFVIIa or Kcentra® if the patient has one of the following contraindications.

- Patient with secondary ICH related to hemorrhagic infarct or cerebrovenous thrombosis.
- Suspected DIC (per labs) if the patient is coagulopathic or end stage liver disease.
- Kcentra® contains heparin. Do not use in patients with active HIT
- Acute myocardial infarction (MI), acute septicemia, acute crush injury, acute peripheral arterial occlusion, acute thrombotic stroke, acute DVT/PE (within 3 months), or high risk thrombophilia.
  - Lupus anticoagulant/anticardiolipin antibodies.
  - Protein C, Protein S, or Antithrombin deficiency.
  - Homozygous factor V Leiden.
  - Double Heterozygous (Factor V Leiden/ Factor II G20210A Prothrombin mutation).
- Pregnancy.
- In past 30 days: history of TIA, angina pectoris, or limb claudication.
- Known or suspected allergy to the drug.

Contact Information

- Miguel Escobar, MD: 281-622-9887; pager 713-764-0073
- Teresa Allison, Pharm.D.: 713-502-4020 or pager 24293
- Sophie Samuel, Pharm.D.: 954-593-7870
- Kenneth Chong, Pharm.D.: 281-910-8006

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