IREDELL HEALTH SYSTEM

IV Heparin Administration	
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Nurse Management Team P&T Committee	Date: 05/2019 Date: 12/2021

(For treatment of DVT / PE, or ACS patients who have or have not received thrombolytic or glycoprotein inhibitor therapy this admission)

Policy:

IV Heparin is administered upon provider's order. The provider may order specific infusion rates and frequencies of lab monitoring, or he/she may order Heparin Administration Protocol. The standard concentration of Heparin is 25,000 Units of Heparin in D5W 250 mL (100 units/mL). The standard concentration is dispensed unless specified by the provider.

Note: Patients who have history of heparin induced thrombocytopenia should NOT receive heparin. This should be documented in the patient's allergy field.

Procedure:

A. When the IV Heparin Administration Protocol is ordered by the provider:

1. The RN/LPN will complete the following tasks:
   a. Determine if patient received a thrombolytic or glycoprotein IIb/IIIa inhibitor if they are diagnosed with Acute Coronary Syndrome (ACS). Examples of thrombolytics and glycoprotein inhibitors are listed below:

Thrombolytic	Glycoprotein IIb/IIIa inhibitors
Alteplase (Activase) Tenectaplase (TNKase)	Abciximab (ReoPro) Tirofiban (Aggrastat) Eptifibatide (Integrilin)

   b. Notify the provider if the patient has received an anticoagulant within the past 24 hours, or if the patient has an indwelling epidural or intrathecal catheter.
   Notify pharmacy if the patient has received an oral Factor Xa inhibitor (such as apixaban, edoxaban, rivaroxaban) within the past 48 hours. In this case, monitoring and dosing orders for these patients shall be managed as outlined in section E ("Patients who have received oral Factor Xa inhibitors in the past 48 hours") of this policy.
   c. Weigh patient and document in patient's electronic medical record.
   d. Obtain a Stat baseline CBC, PTT, and anti-Xa level prior to **any** heparin administration.
2. Pharmacy will enter the bolus dose, if indicated, with the initial maintenance infusion rate.
3. The RN/LPN will complete the additional tasks outlined below:
   a. Administer the bolus dose of Heparin IV (weight based), unless provider has requested no bolus dose. *Must be verified by two (2) Licensed Personnel.
   b. Start the infusion drip (weight based) via programmable pump - *Must be verified by two (2) Licensed Personnel

c. Document the bolus, if indicated, and the infusion rate in the electronic medical record.

4. Pharmaicst shall order an anti-Xa level 6 hours following administration of bolus dose and start of infusion.

PLEASE NOTE: Two (2) licensed personnel are required to independently verify dosage and labeling and assess whether the patient has received any other anticoagulant product within the last 24 hours before administering heparin. If another anticoagulant has been given within 24 hours, the provider should determine the appropriate start time of heparin.

Example of Licensed Personnel Verification:

- Initial Loading dose = *Must be verified by two (2) licensed personnel (with the exception of the Cath Lab, may be a RRT).
- Initial Infusion Rate = *Must be verified by two (2) licensed personnel (with the exception of the Cath Lab, may be a RRT).
- Any anti-Xa level that comes back requiring a bolus dose and/or rate change should be adjusted based on the corresponding charts and/or Heparin Drip Calculator. The new rate and any bolus dose are to be verified by two (2) licensed personnel.

B. Upon result of the anti-Xa level, the value will be evaluated using the protocol and the following two (2) rules:

Rule 1: If the dose needs to be adjusted:

a. The pharmacist shall enter the bolus dose, if indicated, according to protocol and modify the infusion order to change the rate. The anti-Xa level and dosage changes shall be documented in the "Order Comments" section of the modified order.
b. The RN/LPN shall administer the bolus dose, if indicated, and adjust the rate on the programmable pump per the modified order. *The rate change must be verified by two (2) Licensed Personnel.
c. The changes shall be documented in the electronic medical record with the second Licensed Personnel utilized in the verification process.
d. The pharmacist shall order an anti-Xa level to be drawn in 6 hours.

Rule 2: If the dose does not need to be adjusted:

a. The pharmacist shall modify the infusion order by documenting the anti-Xa level and "no change in Heparin dose" in the "Order Comments" section of the modified order.
b. The pharmacist shall order an anti-Xa level for next AM.

EXCEPTION: When an anti-Xa level that requires no change in Heparin dose is resulted from 2400 until 0500, an anti-Xa level will be ordered for 6 hours from the previously drawn level. This exception will prevent a patient from going longer than 24 hours between anti-Xa levels.

Example: A therapeutic anti-Xa level is resulted 0200. No adjustment in dosage is necessary. If the results requires Rule 2 with an anti-Xa level for the next AM, the patient will go from 0200 on one day until 0500 of next day between anti-Xa levels (a total of 27 hours). Using the exception, an anti-Xa level would be ordered for 0800. When the 0800 anti-Xa level is resulted, if the value requires no adjustment in

dose, Rule 2 would be used to order an anti-Xa level for the next AM (a total of 21 hours).

Note: Every time an anti-Xa level is reported, another anti-Xa level must be ordered by pharmacy personnel --- in six (6) hours or for next AM.

Anti-Xa levels may be drawn from Port-a-Caths, using the process described in the "Use and Maintenance of the Port-A-Cath" policy.

C. Monitoring Parameters:

1. CBC will be ordered by pharmacy daily for first three (3) days then every other day while patient is receiving heparin.
2. Anti-Xa level 6 hours after initial bolus and 6 hours after any dosage adjustment.
3. Daily anti-Xa levels after anti-Xa level is within therapeutic range.
4. Pharmacists may modify and/or schedule additional laboratory tests if deemed clinically necessary.
5. **Notify provider if:**
    a. Platelet count drops below 100,000 or decreases by more than 30% from baseline.
    b. Hemoglobin drops 3 grams from baseline
    c. Visible signs or suspicion of bleeding: neurological changes, joint pain, abdominal/flank pain, etc.
    d. Stool positive for blood
    e. Two consecutive anti-Xa levels are out of desired range after making appropriate rate adjustments.
    f. The patient has an indwelling epidural or intrathecal catheter.
    g. The patient has received an anticoagulant within the past 24 hours.

D. Dosing: Weight Based **Initial Bolus and Initial Infusion Rate AND Maintenance Weight Based Dose Adjustments** (See corresponding tables for appropriate indications)

1. The heparin dosing weight will be based on **actual body weight**.
2. The initial bolus of heparin will be **units per kilogram based on target range/indication.** This calculation will be rounded off to the nearest **hundred (100) units**. A bolus dose should not be ordered in a possible stroke or other patient at high risk for bleeding.
3. The initial infusion rate of heparin will be **units per kilogram per hour based on target range/indication**. This calculation will be rounded to the nearest multiple of **fifty (50) units**.

Deep Vein Thrombosis/Pulmonary Embolism			
Initial Bolus: 80 units/kg Maximum dose: 8000 units (Round to the nearest 100 units)		**Initial Rate:** 18 units/kg/hr Maximum rate: 1800 units/hr (Round to the nearest 50 units)	
6 hr Anti-Xa level	**Action** (Round bolus to nearest 100 units)	**Rate Change** (Round to the nearest 50 units)	**Repeat anti-Xa level**
< 0.2	Bolus 30 units/kg	↑ by 3 units/kg/hr	6 hrs after rate change
0.2 – 0.29	Bolus 15 units/kg	↑ by 2 units/kg/hr	6 hrs after rate change
0.3 – 0.7	Therapeutic Range	No change	Next AM labs
0.71 – 0.8	------	↓ by 1 unit/kg/hr	6 hrs after rate change
0.81 – 0.99	------	↓ by 2 units/kg/hr	6 hrs after rate change
≥ 1	Hold for 1 hr and ↓ by 3 units/kg/hr. If 2 consecutive levels ≥ 1, hold infusion for 2 hrs and ↓ rate by 3 units/kg/hr. Call results to MD and verify accurate peripheral lab draw.		6 hrs after rate restart

Acute Coronary Syndrome (ACS)			
Initial Bolus: 60 units/kg Maximum dose: 4000 units (Round to the nearest 100 units)		**Initial Rate:** 12 units/kg/hr Maximum rate: 1000 units/hr (Round to the nearest 50 units)	
6 hr Anti-Xa level	**Action** (Round bolus to nearest 100 units)	**Rate Change** (Round to the nearest 50 units)	**Repeat anti-Xa level**
< 0.2	Bolus 30 units/kg	↑ by 3 units/kg/hr	6 hrs after rate change
0.2 – 0.3	Bolus 15 units/kg	↑ by 2 units/kg/hr	6 hrs after rate change
0.31 – 0.6	Therapeutic Range	No change	Next AM labs
0.61 – 0.7	------	↓ by 1 unit/kg/hr	6 hrs after rate change
0.71 – 0.89	------	↓ by 2 units/kg/hr	6 hrs after rate change
≥ 0.9	Hold for 1 hr and ↓ by 3 units/kg/hr. If 2 consecutive levels ≥ 1, stop infusion for 2 hrs and ↓ rate by 3 units/kg/hr. Call results to MD and verify accurate peripheral lab draw.		6 hrs after rate restart

Acute Coronary Syndrome (ACS) with Thrombolytics or GP IIb/IIIa Inhibitors *The therapeutic range the first 48 hours should be 0.3 – 0.49 units/ml; return to ACS guidelines after 48 hrs.			
Initial Bolus: 60 units/kg Maximum dose: 4000 units (Round to the nearest 100 units)		**Initial Rate:** 12 units/kg/hr Maximum rate: 1000 units/hr (Round to the nearest 50 units)	
6 hr Anti-Xa level	**Action**	**Rate Change**	**Repeat anti-Xa level**
< 0.1	------	↑ by 2 units/kg/hr	6 hrs after rate change
0.1 – 0.3	------	↑ by 1 unit/kg/hr	6 hrs after rate change
0.31 – 0.49	Goal Range for 1st 48 hrs	No change	Next AM labs
0.5 – 0.69	------	↓ by 1 unit/kg/hr	6 hrs after rate change
≥ 0.7	Hold infusion for 1 hr	↓ by 2 units/kg/hr	6 hrs after rate change

E. **Patients who have received oral Factor Xa inhibitors (such as apixaban, edoxaban, rivaroxaban) in the past 48 hours**.

1. Published evidence reports that oral Factor Xa inhibitors may result in unreliable anti-Xa levels when transitioning to heparin infusions. Pharmacists will use aPTT levels to monitor and dose/adjust IV heparin treatment during the transition period from these oral Factor Xa inhibitors to IV heparin therapy. (These agents have little to no effect on aPTT levels). When these levels correlate, pharmacists will switch patients to anti-Xa monitoring and dosing according to the policy above.
2. Pharmacists will determine the last administration time of the oral factor Xa inhibitor.
3. Pharmacists will enter the initial maintenance infusion rate, starting the infusion **without** a bolus approximately 2 hours prior to the time the next scheduled dose of the oral factor Xa inhibitor would have been given. If the expected administration time of the oral agent has passed, the drip will begin once lab results are available.
4. Pharmacists will monitor aPTT and anti-Xa levels every 6 hours and/or next morning and dose heparin according to the current heparin response curve. This will be done for the first 48 hours after initiation of heparin and may be extended to 72 hours if correlation with anti-Xa levels has not been accomplished at 48 hours.
5. After the first 48-72 hours of heparin infusion, anti-Xa assays may be used for monitoring and dosing according to the preceding protocol. However, if two consecutive anti-Xa values above 1.1 IU/ml are obtained, pharmacists may revert to monitoring and dosing with aPTT assays, see **Appendix A** for outlined aPTT protocol.
6. The RN/LPN will complete the following tasks:
    a. Weigh patient and document in electronic medical record.
    b. Obtain a Stat baseline CBC, PTT, and anti-Xa level prior to **any** heparin administration.
    c. Start the infusion drip with verification by two (2) Licensed Personnel as described above.
    d. Document the infusion rate in the electronic medical record.
7. When the aPTT and anti-Xa levels are reported, the value will be evaluated by the pharmacist using the protocol. If the dose needs to be adjusted, the pharmacist will:
    a. Enter bolus dose if indicated, according to protocol and modify the infusion order to change the rate. Document the aPTT and anti-Xa levels and dosage changes in the "Order Comments" section of the modified order.
    b. Order an aPTT and anti-Xa level to be drawn in 6 hours.
    c. The RN/LPN will give bolus dose, if indicated and adjust the rate on the programmable pump. The rate change must be verified by two (2) Licensed Personnel. The changes and the second Licensed Personnel utilized in the verification process shall be documented in the electronic health record.

Monitoring parameters, physician notifications, and weight-based dosing principles will follow those outlined above.

INITIAL EFFECTIVE DATE:
DATES REVISIONS EFFECTIVE: 02/2017, 05/2019, 12/2021, 04/2024
DATES REVIEWED (no changes):

Appendix A:

Heparin Adjustment Protocol for patients who have received a Factor Xa inhibitor within the last 48 hours

The chart provided below is only for adjusting heparin infusions in patients transitioning from Factor Xa inhibitors. Until PTT and anti-Xa levels correlate, **both** PTT and anti-Xa levels should be followed in these patients. When levels correlate (usually after several days), PTT levels should be stopped and only anti-Xa levels should be used for monitoring and adjusting heparin.

*Pharmacy will provide orders for monitoring and adjusting the heparin infusion until both PTT and anti-Xa levels correlate. Nursing will be notified when they will resume responsibility of Anti-Xa monitoring and heparin infusion adjustments.

Note: For patients who have not received a Factor Xa inhibitor, see *Heparin IV Adjustment protocol.*

HEPARIN ADJUSTMENT PROTOCOL For patients transitioning from Factor Xa inhibitors	
PTT ≤ 38	5000 Unit bolus, then increase by 200 units/hour for a total rate of _____ units/hour
PTT 39 - 45	2500 Unit bolus, then increase by 100 units/hour for a total rate of _____ units/hour
PTT 46 - 74	No change. Keep rate @ _____ units/hour
PTT 75 - 82	Decrease rate by 100 units/hour for a total rate of _____ units/hour
PTT 83 - 96	HOLD infusion 1 hour, then decrease rate by 200 units/hour for a total rate of _____ units/hour
PTT ≥ 97	HOLD infusion. Re-draw PTT 1 hour after infusion stops and call results to prescriber for rate adjustment

PTT ORDERS
■ Order first PTT for 6 hours after the infusion started
■ When PTT value reported, use the above chart to determine if Heparin dosage needs to be adjusted
■ Rule # 1: If the Heparin is adjusted, order a PTT to be done in 6 hours
■ Rule # 2: If the Heparin is not adjusted, order a PTT for the next a.m.
■ Exception: If PTT value of 72-102 (no change in Heparin) is reported between 2400 and 0600, order a PTT in 6 hours.
EVERY TIME A PTT IS REPORTED, ANOTHER PTT MUST BE ORDERED FOR 6 HOURS LATER OR FOR NEXT A.M @ 0700

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