



**LOS ANGELES COUNTY DEPARTMENT OF HEALTH SERVICES
HARBOR-UCLA MEDICAL CENTER**

SUBJECT: HEPARIN CONTINUOUS INFUSION

POLICY NO. 371

CATEGORY: Provision of Care	EFFECTIVE DATE: 12/08
POLICY CONTACT: Jennie Ung, PharmD	UPDATE/REVISION DATE: 4/22
REVIEWED BY COMMITTEE(S): Pharmacy and Therapeutics	

PURPOSE:

To provide guidelines for administration, monitoring, adjusting unfractionated heparin continuous infusion for adult and pediatric patients.

ABBREVIATIONS:

- | | |
|--|---|
| Acute coronary syndrome (ACS) | Harbor-UCLA Medical Center (HUMC) |
| Activated partial-thromboplastin time (aPTT) | International Normalized Ratio (INR) |
| Complete blood count (CBC) | Intravenous (IV) |
| Direct oral anticoagulant (DOAC) | Low molecular weight heparin (LMWH) |
| Deep venous thrombosis (DVT) | Non-ST-Elevation Myocardial Infarction (NSTEMI) |
| Emergency Department (ED) | Pulmonary embolism (PE) |
| Electronic Health Record (eHR) | Prothrombin time (PT) |
| Heparin-induced thrombocytopenia (HIT) | Registered Nurse (RN) |
| Heparin-induced thrombocytopenia and thrombosis (HITT) | Tissue Plasminogen Activator (tPA) |
| | Unfractionated heparin (UFH) |

NOTE—unless otherwise specified:

Anti-Xa = Anti-Xa, UFH (**not** the same as Anti-Xa for LMWH)

“Heparin” = unfractionated heparin


BACKGROUND:

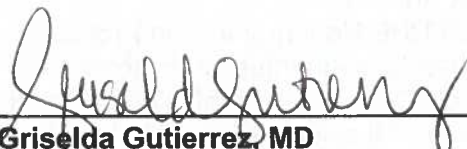
Heparin is a parenteral anticoagulant that is effective in the prevention and treatment of venous thrombosis and pulmonary embolism, in the prevention of mural thrombosis after myocardial infarction, in the treatment of patients with unstable angina and acute myocardial infarction, and in the prevention of coronary-artery thrombosis after thrombolysis.

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The anticoagulant effect of UFH can vary widely between different patients or even in the same patient in different clinical situations. By contrast, LMWH can be dosed based on weight and rarely require monitoring or dose adjustments. Therefore, use of LMWH or a DOAC is recommended in most clinical scenarios.

UFH is the preferred agent when:

- Patient's renal function precludes use of LMWH and DOACs
- It is desirable to be able to rapidly discontinue anticoagulation (such as patients with unusually high bleeding risk or upcoming procedures)
- The indication for anticoagulation is ACS

When UFH is the preferred agent, safety and efficacy is enhanced when an institutional dosing nomogram is utilized by trained nurses. The aPTT has been widely used to measure the anticoagulant effect of UFH, but the accuracy and reproducibility of this test is highly variable. Therefore, many institutions have transitioned to monitoring UFH using a nomogram based on anti-Xa levels, which are less likely to be affected by patient or pre-analytic variables. Severe hyperbilirubinemia, lipemia, and hemolysis can interfere with the test results, so anti-Xa levels should not be used in those situations.

Several studies have evaluated the use of anti-Xa vs aPTT monitoring for UFH and have found more rapid achievement of target levels, fewer dosing adjustments and fewer monitoring tests when anti-Xa is used.

Patients receiving anticoagulation with heparin are at elevated risk for bleeding, which can occur even when the drug is in the therapeutic range. A baseline CBC and coagulation assays can help determine a patient's risk for bleeding on heparin.

Heparin is also associated with a life-threatening reaction called HIT, which is usually characterized by a $\geq 50\%$ drop in the platelet count during the first 2 weeks of administration. Patients may develop new arterial and/or venous blood clots. Immediate cessation of heparin therapy is required in addition to use of an alternative anticoagulant, argatroban.

POLICY:

RNs at HUMC will administer a continuous heparin infusion to adult and pediatric patients according to this policy. Pharmacists will monitor and adjust UFH continuous infusion for adult patients.

ADULT PATIENTS:

1. DHS-approved heparin protocols, using anti-Xa, UFH (**Appendix B**) or aPTT (**Appendix C**) are available. The protocols vary by the magnitude of heparin bolus, the initial rate of infusion, and the target Anti-Xa.
 - a. DVT/PE Heparin Infusion Protocol
 - b. ACS Heparin Infusion Protocol
 - c. Low Dose Heparin Infusion Protocol
2. Provider will select appropriate heparin infusion protocol and specify the clinical indication
 - a. DVT/PE Heparin Infusion Protocol may be used for:
 - 1) Acute DVT or PE
 - 2) Arterial thrombosis
 - b. ACS Heparin Infusion Protocol may be used for:
 - 1) Unstable angina/NSTEMI
 - 2) Bridging for A Fib/A flutter



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- 3) Cardiac valve replacement
- 4) STEMI with tPA
- 5) Intraaortic balloon pump
- 6) Perioperative bridging
- c. Low Dose Heparin Infusion Protocol is intended for high bleeding-risk surgical patients in whom there is concern for vascular thrombosis. This protocol may be considered for patients on CRRT requiring systemic heparin.
3. Exclusion criteria from heparin infusion:
 - a. Active major bleeding
 - b. Presence of an epidural catheter
 - c. Hypersensitivity to heparin or pork/beef products
 - d. Suspected or proven HITT
 - e. Platelets less than 50,000 mm³ (relative contraindication)
4. Relative contraindications to heparin infusion:
 - a. Baseline coagulopathy (prolonged aPTT or PT/INR)
 - b. Recent administration (within the past 8 hours) of another rapid-onset therapeutic anticoagulant. In this case, attending approval is required prior to administering heparin bolus or infusion.
5. In certain clinical situations, Anti-Xa-based monitoring is precluded. In these situations, aPTT-based protocols are available for use (**Appendix C**).
 - a. Exclusions from Anti-Xa-based monitoring include:
 - 1) Patients with indirect bilirubin > 13mg/dL
 - 2) Patients with known or suspected antithrombin deficiency
 - 3) Baseline abnormal Anti-Xa (0.30 IU/mL or greater)
6. Pharmacist will calculate and order, according to protocol:
 - a. Initial heparin bolus
 - b. Initial heparin infusion
 - c. Subsequent adjustments to heparin infusion based on Anti-Xa lab results
7. Patient monitoring:
 - a. It is the responsibility of all team members caring for the patient to monitor for signs of bleeding, thrombosis, HITT, or other complications and to notify the provider immediately if they should occur.
 - b. The provider is responsible for monitoring the clinical response to therapy and for considering transition to oral anticoagulation or LMWH as soon as appropriate.
 - c. Pharmacist will notify the provider if there is a significant decrease in the patient's platelet count or hemoglobin
8. If a custom titration scale is used instead of an approved heparin protocol, the ordering provider is responsible for laboratory monitoring and subsequent titration orders.
9. It is the provider's responsibility to determine when a continuous heparin infusion is no longer indicated and to discontinue the order in eHR.
10. Pharmacists will **NOT** perform "Heparin Per Pharmacy Protocol" for the following indications/patient population:
 - a. CRRT or other non-standard indications (see **Appendix I** for physician order form)
 - b. Pediatric patients (see **Appendices J and K** for physician order form)

The paper form must be completed and submitted to the pharmacy for heparin bags to be dispensed.



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PROCEDURE:

ADULT PATIENTS:

Provider Procedures

1. Provider orders one of the approved heparin protocols (**Appendices B or C**) and documents the indication for therapy in the appropriate field. In certain clinical situations, Anti-Xa-based monitoring is precluded. In these situations, aPTT-based protocols are available for use (**Appendix C**).
 - a. Provider enters contact information in the appropriate field, to be available for nursing or pharmacy clarification.
2. Provider orders initial heparin bolus (suggested dose will be pre-populated in Power Plan based on clinical indication). Pharmacist will calculate and enter bolus dose in eHR.
3. Provider orders heparin infusion. Initial rate to be determined by pharmacist.
4. Provider orders "heparin dosing per pharmacy".
5. Provider orders baseline tests (unless tests performed within 24 hours prior to heparin infusion initiation), including:
 - a. "Dosing weight change"
 - b. CBC – to be ordered before starting heparin infusion and once daily while the heparin infusion is continued
 - c. PT, INR, anti-Xa, UFH, and aPTT
 - d. BMP
 - e. LFT
 - f. Heparin infusion may be initiated **before** baseline tests are resulted.
6. Provider and pharmacist are responsible to review the results of the baseline labs (CBC, PT/INR, PTT, Anti-Xa) when available.
7. Provider discontinues all other prophylactic or therapeutic anticoagulants except oral antiplatelet agents and warfarin overlap therapy.
8. Heparin infusion (to initiate, interrupt, or discontinued) may NOT be ordered via "Communication" orders.

Pharmacy Procedures – Initiation of Heparin

1. Pharmacist reviews order for appropriateness.
 - a. Pharmacist reviews the clinical indication for heparin (entered by ordering provider) to verify that the correct heparin protocol was selected.
 - b. If pharmacist has questions or concerns, contact ordering provider for clarification.
2. Pharmacist may order any baseline blood tests that are missing, including:
 - a. CBC – prior to starting heparin infusion and once daily while the heparin infusion is continued.
 - b. PT, INR, and Anti-Xa, UFH, and aPTT
 - c. BMP
 - d. LFT
3. Pharmacist may discontinue a duplicate anti-Xa, UFH or aPTT order placed by provider.
4. Review of laboratory results:
 - a. Prior to dispensing initial heparin bolus and infusion, pharmacist will review any *available* results for CBC, PT/INR, aPTT, and Anti-Xa. Pharmacist will notify provider if:
 - 1) INR > 2.0
 - 2) Platelet count drops by > 50% or platelet count < 100,000 mm³



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- 3) PT or aPTT > 1.5 x upper level of normal
- 4) Anti-Xa > 0.30 IU/mL
- b. While heparin infusion is ongoing, pharmacist will review available values for CBC and INR on a daily basis. Notify provider if:
 - 1) INR > 2.0
 - 2) Platelet count drops by > 50% or platelet count < 100,000 mm³
2. Pharmacist reviews the dosing weight according to **Appendix D**.
3. Pharmacist uses "dosing weight" to calculate the initial heparin bolus (in units), round to the nearest 500 units, ensure it does not exceed the maximum, and enter the order in eHR.
4. Pharmacist uses "dosing weight" to calculate the initial heparin infusion rate (in units/hr), round to the nearest 50 units, ensure it does not exceed the maximum, and enter the order in eHR.
5. Pharmacist will discontinue other parenteral and oral anticoagulants if not discontinued by the provider, with the exception of antiplatelet agents and warfarin for bridge therapy. Pharmacist will notify provider of the change.
6. Pharmacist orders "Anti-Xa, UFH" level to be drawn 6 hours after starting the heparin infusion.
7. Pharmacist may order aPTT in addition to anti-Xa, UFH if indicated.
8. Pharmacist may consult internal medicine or hematology for assistance if needed, at any time during the heparin infusion.
9. Pharmacist calls nurse to sign out initial bolus and infusion instructions.
10. Heparin will be dispensed from pharmacy or released from automated dispensing machines.
11. Details of initial bolus and infusion rate are automatically captured in the order information.

Pharmacy Procedures – Adjustment and Monitoring of Heparin

1. Pharmacist will titrate the heparin infusion, order additional boluses, and order Anti-Xa (or aPTT in special situations) according to protocol (**Appendices B or C**).
2. Order entry and communication details are outlined in **Appendix E**.
3. Documentation is required when the heparin infusion is titrated (**Appendix G**).
4. Details of Anti-Xa timing can be found in **Appendix H**.

Nursing Procedures

1. Obtain patient weight:
 - a. Weigh patient as soon as possible after receiving order.
 - b. Enter weight in "measured weight" field in eHR and also in the "dosing weight" field.
 - c. If patient can't be weighed, nurse will enter reported or estimated patient weight instead.
 - d. Patient weight details can be found in **Appendix D**.
2. Review of laboratory results:
 - a. Prior to administering initial heparin bolus and infusion, nurse will review any *available* results for CBC, INR, aPTT, and Anti-Xa. Nurse will notify provider if:
 - 1) INR > 2.0
 - 2) Platelet count drops by > 50% or platelet count < 100,000 mm³
 - 3) PT or aPTT > 1.5 x upper level of normal
 - 4) Anti-Xa > 0.30 IU/mL
 - b. While heparin infusion is ongoing, nurse will review available values for CBC and INR on a daily basis. Nurse will notify provider if:
 - 1) INR > 2.0
 - 2) Platelet count drops by > 50% or platelet count < 100,000 mm³
3. Critical Anti-Xa and aPTT results:



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Critically high Anti-Xa and aPTT values will be reported according to **HUMC Policy 393B** (Notification of Critical Diagnostic Results) for notification of critical results.

- c. Anti factor-Xa for patients on Heparin per Pharmacy Protocol:
 - 1) Lab will notify RN and RN will notify provider.
 - 2) Lab will notify pharmacist (see **Appendix A** for Inpatient Pharmacy Anticoagulation Service hours and contact numbers)
4. Administration of heparin:
 - a. Heparin is a high alert medication. RNs will follow HUMC policy (Hospital Policy 396: Handling High-alert Medications) for administering high alert medications.
 - b. The nurse will administer initial and subsequent bolus doses of heparin using a single dose injection vial dispensed from pharmacy. Bolus doses are never to be administered from the infusion bag.
5. Start heparin infusion immediately after the baseline labs (anti-Xa or aPTT) drawn. Heparin infusion will be delivered via continuous infusion pump according to HUMC policy (Hospital Policy 331: Smart Pump).
6. The nurse will draw any "stat" or "timed-stat" orders related to the heparin infusion.
7. Required documentation:
 - a. Nurse will document heparin bolus in the MAR.
 - b. Nurse will document initiation of continuous infusion and any subsequent rate changes in the MAR.

Laboratory Procedures

1. Anti-Xa samples must be processed within 1 hour of collection.
2. Therapeutic range for aPTT will be reviewed annually according to existing laboratory protocols, and the aPTT-based nomograms will be updated as needed.
3. The laboratory will check validity of Anti-Xa results and report to the ordering provider any abnormalities per laboratory protocols.
 - a. Specimens will be reviewed and rejected for severe hyperbilirubinemia, lipemia (with milky appearance), or hemolysis. According to laboratory SOP.
 - b. In the event that an acceptable specimen cannot be obtained, provider will be contacted to consider a hematology consultation and use of a aPTT-based heparin protocol.
4. Critical Anti-Xa and aPTT results—see Nursing Procedures #3.

Phlebotomy vs Nurse blood draws

1. Any "stat" blood draws (including "Timed-stat") related to the heparin infusion should be drawn by the primary nurse. These should be designated:
 - a. Collection priority: "Stat" or "Timed Stat" and
 - b. Collection type: "nurse draw"
2. Routine blood draws related to the heparin infusion may be drawn by phlebotomy. These should be designated:
 - a. Collection priority: "AM draw" or "Routine"
 - b. Collection type: "lab draw"
3. In special situations, the primary nurse or pharmacist may request phlebotomy (rather than primary nurse) to draw "stat" blood draws related to heparin infusion
 - a. Patient with unusually difficult venous access
 - b. Phlebotomist already present at nursing unit and able to assist
4. If an order needs to be changed from nurse-draw to phlebotomy-draw, the primary RN and the pharmacist may modify the order in ORCHID



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Special Situations

1. If reliable Anti-Xa values cannot be obtained, the laboratory staff must contact the provider to consider switching to an aPTT-based protocol (**Appendix C**). Specific situations include:
 - a. Unreliable lab specimens due to severe hyperbilirubinemia, lipemia, or hemolysis
 - b. Baseline abnormal Anti-Xa (0.30 IU/mL or greater). In this situation, aPTT-based protocol should be used for the first 24 hours of the heparin infusion. After 24 hours, pharmacist may discuss with provider whether to continue aPTT-based protocol or switch to anti-Xa-based protocol.
2. When **short-term** discontinuation of heparin is required (e.g., for procedures)
 - a. To discontinue infusion:
 - 1) To immediately stop heparin infusion: Provider selects "Cancel/Discontinue" on heparin infusion orderable and indicates the immediate end-time.
 - 2) To stop heparin infusion at a specific future time: Provider selects "Cancel/Discontinue" on heparin infusion orderable and indicates the desired future end-time.
 - 3) Once Cancel/Discontinue required fields are completed, the pharmacist will be notified electronically of the modification.
 - 4) Provider will not discontinue or change the "heparin dosing per pharmacy" orderable.
 - 5) Provider will contact nurse to verbally communicate plan to discontinue heparin infusion.
 - b. To resume infusion:
 - 1) Provider will order a new heparin order set, including:
 - a) A new heparin bolus, if desired
 - b) A new heparin infusion
 - 2) Pharmacist selects new infusion rate based on patient's previous Anti-Xa levels and previous infusion rate.
 - 3) Pharmacist orders or modifies anti-Xa or aPTT levels and other pertinent labs according to protocol.
3. Deviation from protocol:

The pharmacist shall NOT accept any deviation from the approved protocols. If the provider determines, according to clinical judgement, that it would be beneficial to deviate from the approved protocols, the pharmacist must sign off.

 - a. Pharmacist must communicate to provider prior to signing off and document the name of provider along with reason for deviation.
 - b. After communicating to the provider, the pharmacist shall discontinue the "Heparin Per Pharmacy" entry.
 - c. Pharmacist must verbally notify the nurse to obtain further heparin titration orders from the provider.
4. Discontinuation of heparin:
 - a. When the provider determines that heparin infusion is no longer clinically indicated, provider will discontinue the infusion order.
 - b. Provider will discontinue "heparin dosing per pharmacy" orderable.
 - c. Pharmacist must verbally communicate with nurse to ensure heparin drip is discontinued.

Heparin resistance or antithrombin deficiency

1. Heparin resistance or antithrombin deficiency should be considered when Anti-Xa levels are very low even though the patient is receiving an appropriate dose of heparin.
2. For ACS and DVT/PE protocols:



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- a. If Anti-Xa < 0.10 (undetectable) at the first Anti-Xa check (after 6 hrs on heparin), then pharmacist should order both Anti-Xa and aPTT to be drawn at the next scheduled lab check (in 6 hours).
 - b. If Anti < 0.10 at the second lab check, pharmacist will:
 - 1) Discuss with ordering provider
 - 2) Recommend hematology consultation for possible antithrombin deficiency, and
 - 3) Switch to aPTT algorithm
 - c. This workflow does NOT apply to the low dose heparin protocol
3. For all heparin protocols:
- a. If heparin infusion is 2,500 units/hr or greater
 - 1) Calculate weight-based rate of infusion. If it is greater than 25 units/kg/hr then
 - 2) Notify ordering provider
 - 3) Consult hematology for possible antithrombin deficiency

Appendix I: Custom Low Dose Heparin Continuous Infusion (Adults) for CRRT or other Non-Standard Indication

- Fixed rate does not require continuous monitoring or dose adjustment by nurses.
- If titration is desired, provider must specify indication, goal aPTT, bolus dose, and initial infusion rate. RN will adjust the heparin infusion based on subsequent aPTT results according to the most recent heparin order form/protocol. A written order for adjusting heparin dose is not required.

PEDIATRIC PATIENTS:

1. The prescriber must use a hospital approved Heparin Order Form/protocol (see **Appendices J and K**) to initiate an order for continuous heparin infusion for pediatric patients.
2. Order form must be printed/completed/affixed with patient information label and scanned to the pharmacy for processing. The order forms are posted on Harbor UCLA Intranet website under Pre-Printed Forms.
3. In addition to completing and scanning the order form to the pharmacy, the provider must also enter the Heparin order into the electronic health record.
4. Upon receiving the heparin order via scanner and electronic health record, the pharmacist will verify the heparin order.

Appendix J: Heparin Continuous Infusion Protocol (Pediatrics): Heparin infusion may be administered to pediatric patients in the 6EICU (PICU), 6ENICU, PACU, or Adult/Pediatric Emergency Departments. RN will adjust the heparin infusion based on subsequent aPTT results according to the most recent heparin order form/protocol. A written order for adjusting heparin dose is not required. If a standard concentration for heparin is not clinically appropriate for a pediatric patient requiring a continuous heparin infusion, the prescriber must hand write an order which shall include the heparin concentration, diluent type, dose in units/kg/hour and corresponding rate in mL/hr. Subsequent dosing adjustments shall also include the new dose in units/kg/hour and the corresponding rate in mL/hr. Laboratory studies shall be ordered based on the most recent pediatric heparin order form/protocol.

Appendix K: Low Intensity Heparin Continuous Infusion Protocol (Pediatrics): RN will adjust the heparin infusion based on subsequent aPTT results according to the most recent heparin order form/protocol. A written order for adjusting heparin dose is not required.

1. RN is to start heparin drip immediately after the baseline aPTT is drawn unless instructed by prescriber.



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2. The prescriber will be notified if the aPTT was not drawn at the prescribed time after a rate change or if an RN is unable to adjust the infusion rate based on the aPTT result.
3. The heparin infusion order will be documented on the Medication Administration Record (MAR). The bolus dose(s) will be documented in the MAR. The rate of infusion will be documented hourly and at the time of any rate change on the appropriate section of the electronic flow sheet.
4. The laboratory will process aPTT requests as STAT orders.

WHO MAY PERFORM:

Any RNs who have completed instruction in the use of the hospital's heparin protocol can perform this function.

CONTRAINDICATIONS:

- Active bleeding
- Thrombocytopenia with a positive test for anti-platelet antibody
- History of heparin induced thrombocytopenia (HIT)
- Hypersensitivity to heparin, pork or beef products

LABORATORY EVALUATION:

- Baseline anti-Xa and aPTT should be obtained prior to intravenous heparin therapy and every 6 hours (adult patients) or every 4 hours (pediatric patients) post rate change until a value in the therapeutic range is achieved.
- Thereafter, a daily anti-Xa (adult patients) or a daily aPTT (pediatric patients or adult patients on aPTT heparin protocols) and CBC are sufficient in a clinically stable patient.

SIDE EFFECTS OF HEPARIN:

- Bleeding in GI, CNS, skin, wound, etc.
- Tissue irritation and pain at the infusion site.

Rare - thrombocytopenia (less than 50K/mm³), White Clot Syndrome (arterial thrombosis), hypersensitivity reaction (fever, pruritis, rhinitis), arthralgia, urticaria, skin necrosis.

Long Term (greater than 6 months of treatment) - osteoporosis, decrease in renal function, hyperkalemia, rebound hyperlipidemia, hypoaldosteronism.

REVERSAL OF HEPARIN ANTICOAGULANT EFFECT:

- Protamines (proteins of low molecular weight rich in arginine and are strongly basic)—they bind to the highly anionic heparin molecules and form an inactive complex.
- Protamine sulfate can be administered to rapidly neutralize heparin. Each milligram of protamine neutralizes approximately 90-115 units of heparin (an average dose of protamine sulfate for a patient receiving 1,000 units per hours would be 10 mg).
- Use caution in administering protamine to diabetic patients previously treated with protamine insulin as a hypersensitivity reaction can occur.



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List of Appendices

Appendix A – Inpatient Pharmacy Anticoagulation Service hours and contact numbers

Appendix B – Approved heparin protocols using Anti-Xa

Appendix C – Approved heparin protocols using aPTT

Appendix D – Dosing Weight

Appendix E – Pharmacist order entry details

Appendix F – Required communication between pharmacist and nurse

Appendix G – Pharmacist documentation

Appendix H – Anti-Xa timing

Appendix I – Low Dose Heparin Continuous Infusion (Adult) CRRT and other Non-Standard Indication (Nurse Driven) Physician Order Form

Appendix J – Pediatric Heparin Continuous Infusion Protocol (Nurse Driven) Physician Order Form

Appendix K – Pediatric Heparin Continuous Infusion Protocol (Nurse Driven) **Low Intensity** Physician Order Form

Reviewed and approved by:

Medical Executive Committee 04/2022

Beverley A. Petrie, M.D.

President, Professional Staff Association

Appendix A: Inpatient Pharmacy Anticoagulation Service Contact Numbers

7am to 1100pm: (424) 306-7456, 7458, or 7499

1100pm to 7am: (424) 306-7477, 7479, 7481, or 7483



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Appendix B: Approved Heparin Protocols using Anti-Xa—for Pharmacy Use ONLY

1. DVT/PE Heparin Infusion

Approved clinical indications:

1. Acute DVT or PE
2. Arterial thrombosis

DVT/PE Heparin Infusion (Target Anti-Xa 0.30 – 0.70)

Initial UFH infusion and bolus

- Initial bolus 80 units/kg (not to exceed 10,000 units)*
- Initial rate of infusion 18 units/kg/hr (not to exceed 2,000 units/hr)**

Laboratory monitoring

- Check anti- Xa 6 hours after initiating heparin infusion and 6 hours after any rate change.
- If the infusion is interrupted and restarted according to protocol, the 6-hour period begins when the infusion is restarted.
- Once Anti-Xa is therapeutic on two consecutive measurements, recheck daily.

UFH infusion adjustment

Anti-Xa (IU)	Action
Less than 0.2	Bolus 30 units/kg. Max 10,000 units* Increase rate of infusion by 3 units/kg/hr**
0.20 – 0.29	Increase rate of infusion by 2 units/kg/hr**
0.30 – 0.70	Continue current infusion rate. Recheck Anti-Xa in 6 hours. Once Anti-Xa is therapeutic on two consecutive measurements, recheck daily.
0.71 – 0.80	Decrease infusion by 1 unit/kg/hr**
0.81 – 1.10	Stop infusion for 60 min, then restart at 2 units/kg/hr less than previous rate**
1.11 – 1.70	Stop infusion for 60 min, then restart at 3 units/kg/hr less than previous rate**
Greater than 1.70	Stop infusion for 60 min, then recheck Anti-Xa. - If Anti-Xa is 1.1 or lower, restart infusion at 3 units/kg/hr less than previous rate** - If Anti-Xa > 1.1, contact provider for instructions

* Round to the nearest 500 units

** Round to the nearest 50 units



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2. ACS Heparin Infusion

Approved clinical indications:

1. Unstable angina/NSTEMI
2. Bridging for AFib/flutter
3. Cardiac valve replacement
4. STEMI with TPA
5. Intraaortic balloon pump
6. Perioperative bridging

ACS Heparin Infusion (Target Anti-Xa 0.30 – 0.70)	
Initial UFH infusion and bolus	
<ul style="list-style-type: none"> • Initial bolus 60 units/kg (not to exceed 4,000 units)* • Initial rate of infusion 12 units/kg/hr (not to exceed 1,000 units/hr)** 	
Laboratory monitoring	
<ul style="list-style-type: none"> • Check anti- Xa 6 hours after initiating heparin infusion <u>and</u> 6 hours after any rate change. • If the infusion is interrupted and restarted according to protocol, the 6-hour period begins when the infusion is restarted. • Once Anti-Xa is therapeutic on two consecutive measurements, recheck daily. 	
UFH infusion adjustment	
Anti-Xa (IU)	Action
Less than 0.2	Bolus 30 units/kg. Max 4,000 units* Increase rate of infusion by 3 units/kg/hr**
0.20 – 0.29	Increase rate of infusion by 2 units/kg/hr**
0.30 – 0.70	Continue current infusion rate. Recheck Anti-Xa in 6 hours. Once Anti-Xa is therapeutic on two consecutive measurements, recheck daily.
0.71 – 0.80	Decrease infusion by 1 unit/kg/hr**
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1.11 – 1.70	Stop infusion for 60 min, then restart at 3 units/kg/hr less than previous rate**
Greater than 1.70	Stop infusion for 60 min, then recheck Anti-Xa. <ul style="list-style-type: none"> - If Anti-Xa is 1.1 or lower, restart infusion at 3 units/kg/hr less than previous rate** - If Anti-Xa > 1.1, contact provider for instructions
* Round to the nearest 500 units	
** Round to the nearest 50 units	



**LOS ANGELES COUNTY DEPARTMENT OF HEALTH SERVICES
HARBOR-UCLA MEDICAL CENTER**

SUBJECT: HEPARIN CONTINUOUS INFUSION

POLICY NO. 371

3. Low Dose Heparin Infusion

Approved Clinical Indication:

Low Dose Heparin Infusion Protocol targets a prophylactic level of anticoagulation and is intended for high bleeding-risk surgical patients in whom there is concern for vascular thrombosis. This protocol may be considered for patients on CRRT requiring systemic heparin.

Low Dose Heparin Infusion (Target Anti-Xa 0.10 – 0.30)

Initial UFH infusion and bolus

- No initial bolus
- Initial rate of infusion 7 units/kg/hr (not to exceed 1,000 units/hr). Round to the nearest 50 units.

Laboratory monitoring

- Check anti- Xa 6 hours after initiating heparin infusion and 6 hours after any rate change.
- If the infusion is interrupted and restarted according to protocol, the 6-hour period begins when the infusion is restarted.
- Once Anti-Xa is therapeutic on two consecutive measurements, recheck daily.

UFH infusion adjustment

Anti-Xa (IU)	Action
Less than 0.1	Increase rate of infusion by 2 units/kg/hr**
0.10 – 0.30	Continue current infusion rate. Recheck Anti-Xa in 6 hours. Once Anti-Xa is therapeutic on two consecutive measurements, recheck daily.
0.31 – 0.70	Decrease infusion by 1 unit/kg/hr**
0.71 – 1.10	Stop infusion for 60 min, then restart at 2 units/kg/hr less than previous rate**
Greater than 1.10	Stop infusion for 60 min, then recheck Anti-Xa. - If Anti-Xa is 0.70 or lower, restart infusion at 3 units/kg/hr less than previous rate** - If Anti-Xa > 0.70, contact provider for instructions

* Round to the nearest 500 units

** Round to the nearest 50 units



**LOS ANGELES COUNTY DEPARTMENT OF HEALTH SERVICES
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SUBJECT: HEPARIN CONTINUOUS INFUSION

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Appendix C: Approved Heparin Protocols using aPTT-- for Pharmacy Use ONLY

1. DVT/PE Heparin Infusion

Approved clinical indications:

1. Acute DVT or PE
2. Arterial thrombosis

DVT/PE Heparin Infusion (Target aPTT 75-100)	
Initial UFH infusion and bolus	
<ul style="list-style-type: none"> • Initial bolus 80 units/kg (not to exceed 10,000 units)* • Initial rate of infusion 18 units/kg/hr (not to exceed 2,000 units/hr)** 	
Laboratory monitoring	
<ul style="list-style-type: none"> • Check aPTT 6 hours after initiating heparin infusion <u>and</u> 6 hours after any rate change. • If the infusion is interrupted and restarted according to protocol, the 6-hour period begins when the infusion is restarted. • Once aPTT is therapeutic on two consecutive measurements, recheck daily. 	
UFH infusion adjustment	
aPTT (sec)	Action
Less than 65	Bolus 30 units/kg. Max 10,000 units* Increase rate of infusion by 3 units/kg/hr**
65 – 74.9	Increase rate of infusion by 2 units/kg/hr**
75-100 (GOAL)	Continue current infusion rate. Recheck aPTT in 6 hours. Once aPTT is therapeutic on two consecutive measurements, recheck daily.
100.1 – 111	Decrease infusion by 1 unit/kg/hr**
111.1 – 132	Stop infusion for 60 min, then restart at 2 units/kg/hr less than previous rate**
132.1 – 180	Stop infusion for 60 min, then restart at 3 units/kg/hr less than previous rate**
Greater than 180	Stop infusion for 60 min, then recheck aPTT. <ul style="list-style-type: none"> - If aPTT is 132 or lower, restart infusion at 3 units/kg/hr less than previous rate** - If aPTT > 132, contact provider for instructions
* Round to the nearest 500 units	
** Round to the nearest 50 units	



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2. ACS Heparin Infusion

Approved clinical indications:

1. Unstable angina/NSTEMI
2. Bridging for AFib/flutter
3. Cardiac valve replacement
4. STEMI with TPA
5. Intraaortic balloon pump
6. Perioperative bridging

ACS Heparin Infusion (Target aPTT 75-100)	
Initial UFH infusion and bolus	
<ul style="list-style-type: none"> • Initial bolus 60 units/kg (not to exceed 4,000 units)* • Initial rate of infusion 12 units/kg/hr (not to exceed 1,000 units/hr).** 	
Laboratory monitoring	
<ul style="list-style-type: none"> • Check aPTT 6 hours after initiating heparin infusion <u>and</u> 6 hours after any rate change. • If the infusion is interrupted and restarted according to protocol, the 6-hour period begins when the infusion is restarted. • Once aPTT is therapeutic on two consecutive measurements, recheck daily. 	
UFH infusion adjustment	
aPTT (sec)	Action
Less than 65	Bolus 30 units/kg. Max 4,000 units* Increase rate of infusion by 3 units/kg/hr**
65 – 74.9	Increase rate of infusion by 2 units/kg/hr**
75-100 (GOAL)	Continue current infusion rate. Recheck aPTT in 6 hours. Once aPTT is therapeutic on two consecutive measurements, recheck daily.
100.1 – 111	Decrease infusion by 1 unit/kg/hr**
111.1 – 132	Stop infusion for 60 min, then restart at 2 units/kg/hr less than previous rate**
132.1 – 180	Stop infusion for 60 min, then restart at 3 units/kg/hr less than previous rate**
Greater than 180	Stop infusion for 60 min, then recheck aPTT. <ul style="list-style-type: none"> - If aPTT is 132 or lower, restart infusion at 3 units/kg/hr less than previous rate** - If aPTT > 132, contact provider for instructions
* Round to the nearest 500 units	
** Round to the nearest 50 units	



**LOS ANGELES COUNTY DEPARTMENT OF HEALTH SERVICES
HARBOR-UCLA MEDICAL CENTER**

SUBJECT: HEPARIN CONTINUOUS INFUSION

POLICY NO. 371

3. Low Dose Heparin Infusion

Approved Clinical Indication:

Low Dose Heparin Infusion Protocol targets a prophylactic (subtherapeutic) level of anticoagulation and is intended for high bleeding-risk surgical patients in whom there is concern for vascular thrombosis

Low Dose Heparin Infusion (Target aPTT 57 –74.9)	
Initial UFH infusion and bolus	
<ul style="list-style-type: none"> No initial bolus Initial rate of infusion 7 units/kg/hr (not to exceed 1,000 units/hr). Round to the nearest 50 units. 	
Laboratory monitoring	
<ul style="list-style-type: none"> Check aPTT 6 hours after initiating heparin infusion <u>and</u> 6 hours after any rate change. If the infusion is interrupted and restarted according to protocol, the 6-hour period begins when the infusion is restarted. Once aPTT is therapeutic on two consecutive measurements, recheck daily. 	
UFH infusion adjustment	
aPTT (sec)	Action
Less than 57	Increase rate of infusion by 2 units/kg/hr
57 – 74.9	Continue current infusion rate. Recheck aPTT in 6 hours. If aPTT is therapeutic on two consecutive measurements, recheck daily.
75 – 100	Decrease infusion by 1 unit/kg/hr
100.1 – 132	Stop infusion for 60 min, then restart at 2 units/kg/hr less than previous rate.
Greater than 132	Stop infusion for 60 min, then recheck aPTT. <ul style="list-style-type: none"> If aPTT is 100 or lower, restart infusion at 3 units/kg/hr less than previous rate. If aPTT > 100, contact provider for instructions
* Round to the nearest 500 units ** Round to the nearest 50 units	



LOS ANGELES COUNTY DEPARTMENT OF HEALTH SERVICES
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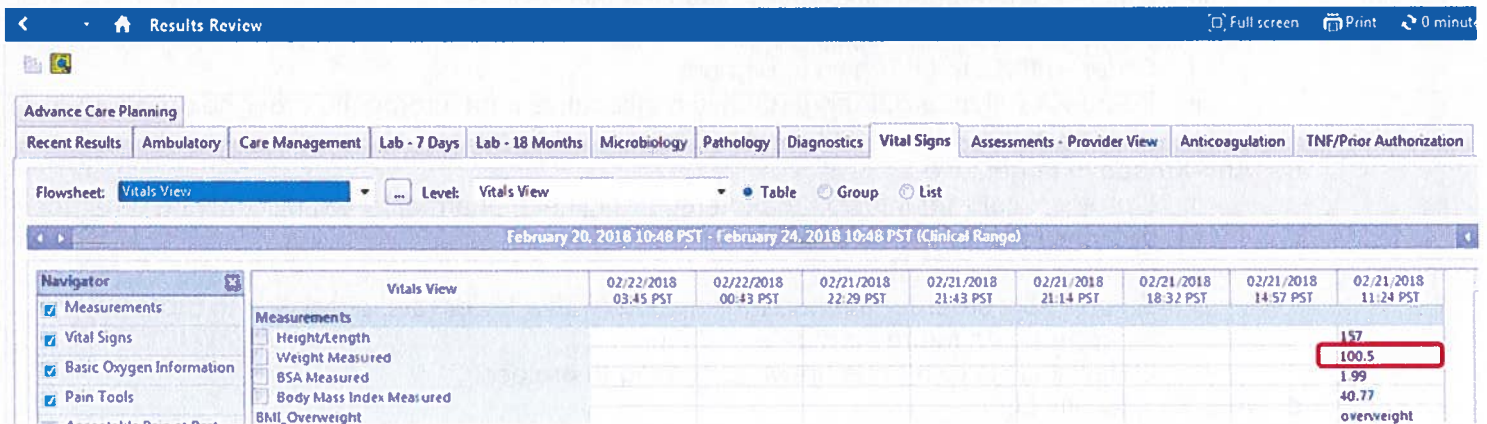
Appendix D: Dosing Weight

Definitions:

“Dosing weight” The value contained within the “Dosing Weight” field in the eHR, located in the banner bar of the patient’s chart.



“Measured weight” The value contained within the “Weight Measured” field in eHR, located in the results section of the patient’s chart



How to identify correct weight for heparin infusion protocol:

1. Heparin order set includes an order for nurse to weigh patient and update dosing weight
2. Nurse weighs patient and updates the “measured weight” and the “dosing weight”
3. If measured weight is unavailable:
 - a. Pharmacist will contact nurse to measure patient’s current weight and enter the value as the “measured weight.”
 - b. If weight cannot be measured, nurse will obtain patient’s stated or estimated weight, which will be entered as the “dosing weight”
 - c. In any situation in which measuring the patient’s weight will significantly delay the administration of the heparin infusion, it is acceptable to use the patient’s stated or estimated weight.



LOS ANGELES COUNTY DEPARTMENT OF HEALTH SERVICES
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Appendix E: Pharmacist order entry details

1. General instructions:
 - a. Supplemental heparin boluses, when indicated, will be ordered via Pharmnet
 - b. Adjustments to the rate of heparin infusion will be ordered via Pharmnet
 - c. Anti-Xa levels will be ordered in eHR
 - i. "Anti-Xa, UFH" order can be found in the second phase of the heparin order set
 - ii. Collection priority for future orders is "Timed Stat"
 - iii. Collection type is "nurse draw"
 - d. Pharmacist may modify the collection priority and collection type and time as needed.
2. Specific procedure based on Anti-Xa value:
 - a. Anti-Xa value below target level
 - i. Order supplemental bolus, if indicated
 - ii. Modify order for heparin infusion and enter new rate
 - iii. Order Anti-Xa to be drawn in 6 hours
 - iv. Call nurse to communicate bolus/infusion instructions
 - b. Anti-Xa value within target range
 - i. Order Anti-Xa to be drawn in 6 hours
 - ii. If Anti-Xa within target range on two consecutive measurements, order next Anti-Xa to be drawn daily thereafter (see **Appendix H** for details)
 - c. Anti-Xa above target level
 - i. If protocol calls for infusion to be temporarily held, pharmacist will discontinue order for heparin infusion
 - ii. Call nurse to stop infusion
 - iii. Enter a new order for the heparin infusion (with a lower rate, according to protocol) with an appropriate future start date and time
 - iv. Order next Anti-Xa to be drawn according to protocol
 - d. Anti-Xa critically high
 - i. If Anti-Xa is critically high (value depends on nomogram) on two consecutive measurements, protocol requires provider notification
 - ii. Place order to discontinue heparin infusion
 - iii. Call nurse to stop infusion
 - iv. Contact provider for new instructions



LOS ANGELES COUNTY DEPARTMENT OF HEALTH SERVICES
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Appendix F: Required communication between pharmacist and nurse

In the following situations, the nurse must give verbal report to the pharmacist:

1. Patient's weight cannot be measured
2. Patient shows signs of bleeding, thrombosis, or other clinical complications (nurse must also notify provider)
3. Patient has an upcoming procedure that might require discontinuation of heparin infusion

In the following situations, the pharmacist must give verbal report to the nurse. If the primary nurse is not available, the instructions may be given to the charge nurse or another RN on the patient's unit. Initial infusion, infusion rate changes, and boluses should occur within 15 minutes of notification.

1. Initial bolus and heparin infusion have been made available by pharmacy
2. Heparin infusion needs to be discontinued or temporarily held
3. Rate of heparin infusion needs to be changed
4. Supplemental heparin bolus is required

Appendix G: Pharmacy documentation

1. Pharmacist will document using "Notes" for required written documentation.
2. Pharmacist documentation is required in the following situations:
 - a. Initiation of heparin infusion therapy.
 - b. Any time the heparin infusion rate is modified
 - c. Any time protocol requires provider notification
 - 1) Required information includes:
 - a) Name of provider
 - b) Reason for notification

Appendix H: Anti-Xa Timing

Pharmacist will order Anti-Xa 6 hours after any change to rate of heparin infusion.

If the heparin infusion is interrupted and restarted according to protocol, the 6-hour period begins when the heparin infusion is restarted.

If the Anti-Xa is at goal on two consecutive measurements, recheck Anti-Xa daily as long as the value remains therapeutic. The next Anti-Xa (after two consecutive therapeutic values) should be checked no sooner than 6 hours and no later than 24 hours after the second consecutive therapeutic value.

Appendix I: Low Dose Heparin Continuous Infusion (Adults)

For CRRT and Other Non-Standard Indication



**LOS ANGELES COUNTY DEPARTMENT OF HEALTH SERVICES
HARBOR-UCLA MEDICAL CENTER**

SUBJECT: HEPARIN CONTINUOUS INFUSION

POLICY NO. 371

COUNTY OF LOS ANGELES

Appendix I

DEPARTMENT OF HEALTH SERVICES

**HARBOR-UCLA MEDICAL CENTER
CUSTOM LOW DOSE HEPARIN CONTINUOUS INFUSION (ADULT)
CRRT and Other Non-Standard Indication
PHYSICIAN ORDER FORM**

<i>Exclusion Criteria: Do not initiate protocol if one of the following criteria is present</i>	Yes	No
1. Candidate for Low Molecular Weight Heparin (LMWH) per guidelines	<input type="checkbox"/>	<input type="checkbox"/>
2. Active bleeding	<input type="checkbox"/>	<input type="checkbox"/>
3. Thrombocytopenia with a positive test of antiplatelet antibody	<input type="checkbox"/>	<input type="checkbox"/>
4. History of heparin induced thrombocytopenia (HIT)	<input type="checkbox"/>	<input type="checkbox"/>
5. Hypersensitivity to heparin or pork/beef products	<input type="checkbox"/>	<input type="checkbox"/>

Order Status: New Order Ongoing Therapy Heparin concentration: 50 units/mL

CHOOSE ONE: A), B), or C) AND Sub-Components 1) and 2)

A) Continuous Renal Replacement Therapy (CRRT) - Goal aPTT = Less than 90 seconds

1) <input type="checkbox"/> Initial IV Drip = 500 units/hour FIXED RATE <input type="checkbox"/> Initial IV Drip = _____ units/hour FIXED RATE (Initial infusion rate should not exceed 600 units/hour)	2) <input checked="" type="checkbox"/> No bolus	
aPTT Result (seconds)	Action	Next aPTT (STAT)
Less than or equal to 90	Continue the same infusion rate	Daily morning lab
Greater than 90	Stop infusion & contact physician	Repeat aPTT STAT

B) LOW DOSE - GOAL Anti-Xa = 0.1 – 0.3 IU/mL

1) <input type="checkbox"/> Initial IV Drip = 500 units/hour <input type="checkbox"/> Initial IV Drip = _____ units/hour (Initial infusion rate should not exceed 12 units/kg/hr)	2) <input type="checkbox"/> No bolus <input type="checkbox"/> Bolus Dose = _____ units IV x1 dose (Maximum bolus dose = 5,000 units)	
Anti-Xa Result (IU/mL)	Action	Next anti-Xa
Less than 0.1	Increase infusion rate by 100 units/hour (2 mL/hour)	6 hours (post rate change)
0.1-0.29	No change	Daily (Morning Lab)
Greater than 0.29	Stop infusion & contact physician STAT	Per Provider Order

C) VERY LOW DOSE - GOAL Anti-Xa = < 0.1 IU/mL

1) <input checked="" type="checkbox"/> Initial IV Drip = 500 units/hour FIXED RATE	2) <input checked="" type="checkbox"/> No bolus	
Anti-Xa Result (IU/mL)	Action	Next anti-Xa
Less than 0.1	No change	Daily (Morning Lab)
Greater than or equal to 0.1	Stop infusion & contact physician STAT	Per Provider Order

- Discontinue previous subcutaneous heparin, dalteparin, enoxaparin or fondaparinux orders.
- Start heparin drip immediately after baseline Anti-Xa / aPTT is drawn.

Laboratory Monitoring: (Process all Anti-Xa / aPTT as STAT labs)

- Baseline Anti-Xa / aPTT (prior to heparin infusion)
- Daily CBC and anti-Xa / aPTT for clinically stable patients

Provider Printed Last Name:	
Provider Signature:	ID: _____
Date: ____ - ____ - ____	Time: ____ : ____
RN Printed Last Name:	
RN Signature:	
Date: ____ - ____ - ____	Time: ____ : ____
Clerk/LVN Signature:	
Date: ____ - ____ - ____	Time: ____ : ____

HEPARIN CONTINUOUS INFUSION Protocol (ADULT)/PHYSICIAN ORDER FORM
FILE IN MEDICAL RECORD



**LOS ANGELES COUNTY DEPARTMENT OF HEALTH SERVICES
HARBOR-UCLA MEDICAL CENTER**

SUBJECT: HEPARIN CONTINUOUS INFUSION

POLICY NO. 371

Appendix J

COUNTY OF LOS ANGELES

DEPARTMENT OF HEALTH SERVICES

**HARBOR-UCLA MEDICAL CENTER
HEPARIN CONTINUOUS INFUSION PROTOCOL (PEDIATRIC)
PHYSICIAN ORDER FORM**

Diagnosis:	Location:
Allergies:	Weight:

<i>Exclusion Criteria: Do not initiate protocol if one of the following criteria is present</i>	Yes	No
1. Active bleeding	<input type="checkbox"/>	<input type="checkbox"/>
2. Thrombocytopenia with a positive test of antiplatelet antibody	<input type="checkbox"/>	<input type="checkbox"/>
3. History of heparin induced thrombocytopenia (HIT)	<input type="checkbox"/>	<input type="checkbox"/>
4. Hypersensitivity to heparin or pork/beef products	<input type="checkbox"/>	<input type="checkbox"/>
<i>Recommended Dosage</i>		
<input type="checkbox"/> Younger than 1 year	75 units/kg IV bolus over 10 minutes, then 28 units/kg/hour continuous infusion	
<input type="checkbox"/> 1 to 12 year	75 units/kg IV bolus (Max 5000 units) over 10 minutes, then 20 units/kg/hour continuous infusion	
<input type="checkbox"/> Older than 12 years	80 units/kg IV bolus (maximum dose 10,000 units) over 10 minutes, then 18 units/kg/hour continuous infusion (maximum 2000 unit/hour)	

- Discontinue previous subcutaneous heparin, dalteparin, enoxaparin, or fondaparinux orders.
 Start heparin drip immediately after baseline aPTT drawn

Heparin concentration: 50 units/mL

Heparin Dosage:

New Order Ongoing Therapy
 IV bolus _____ units/kg X _____ kg = _____ units
 Infusion rate _____ units/kg/hour X _____ kg = _____ units/hour

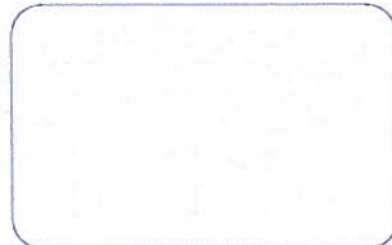
Laboratory Monitoring: (Process all aPTT as STAT labs and indicate patient is on heparin.)

- Baseline aPTT (prior to heparin infusion)
 aPTT 4 hours after initiation of infusion and aPTT 4 hours after any infusion rate change (patients younger than 12 years of age)
 aPTT 6 hours after initiation of infusion and aPTT 6 hours after any infusion rate change (patients older than 12 years of age)
 Daily CBC and aPTT (when aPTT values are therapeutic for 2 consecutive samples) or BID aPTT if this box is checked

aPTT (seconds)	For patients younger than 12 years of age		For patients older than 12 years of age	
	ACTION	Next aPTT (STAT)	ACTION	Next aPTT (STAT)
<65	IV rebolus 50 units/kg X _____ kg = _____ units (Max 4000 units) and INCREASE infusion rate by 2 units/kg/hr (nurse to call pharmacy when needed)	4 hrs (post rate change)	IV rebolus 60 units/kg X _____ kg = _____ units (max 4000 units) and INCREASE infusion rate by 250 units/hr	6 hrs (post rate change)
65-74.9	INCREASE infusion rate by 2 units/kg/hr	4 hrs (post rate change)	INCREASE infusion rate by 100 units/hr	6 hrs (post rate change)
75-100 (Goal)	No change	Daily (AM Lab) or as ordered	No change	Daily (AM Lab) or as ordered
100.1-111	DECREASE infusion rate by 1 unit/kg/hr	4 hrs after restarting infusion at lower rate	DECREASE infusion rate by 100 unit/hr	6 hrs after restarting infusion at lower rate
111.1-132	Stop infusion for 30 minutes and DECREASE infusion rate by 2 units/kg/hr	4 hrs after restarting infusion at lower rate	Stop infusion for 60 minutes then restart infusion and DECREASE infusion rate by 100 units/hr	6 hrs after restarting infusion at lower rate
132.1-180	Stop infusion for 60 minutes and DECREASE infusion rate by 3 units/kg/hr	4 hrs after restarting infusion at lower rate	Stop infusion for 60 minutes then restart infusion and DECREASE infusion rate by 250 units/hr	6 hrs after restarting infusion at lower rate
> 180	Stop infusion for 120 minutes and DECREASE infusion rate by 4 units/kg/hr	4 hrs after restarting infusion at lower rate	Stop infusion for 120 minutes then restart infusion and DECREASE infusion rate by 250 units/hr	6 hrs after restarting infusion at lower rate

**HEPARIN CONTINUOUS INFUSION PROTOCOL (PEDIATRIC)/PHYSICIAN ORDER FORM
FILE IN MEDICAL RECORD**

Provider Printed Last Name:									
Provider Signature								ID:	
Date: - - / /					Time: : :				
RN Last Name:									
RN Signature:									
Date: - - / /					Time: : :				
Clerk/LVN Signature:									
Date: - - / /					Time: : :				



HEPARIN CONTINUOUS INFUSION PROTOCOL

**PHYSICIAN ORDER FORM
Form # P128 v.2022.7.22**



FILE IN MEDICAL RECORD



**LOS ANGELES COUNTY DEPARTMENT OF HEALTH SERVICES
HARBOR-UCLA MEDICAL CENTER**

SUBJECT: HEPARIN CONTINUOUS INFUSION

POLICY NO. 371

Appendix K

COUNTY OF LOS ANGELES

DEPARTMENT OF HEALTH SERVICES

HARBOR-UCLA MEDICAL CENTER

HEPARIN CONTINUOUS INFUSION PROTOCOL (PEDIATRIC) ORDER FORM

LOW INTENSITY for Patients with High Bleed Risk*

<i>Exclusion Criteria: Do not initiate protocol if one of the following criteria is present</i>		Yes	No
1. Active bleeding		<input type="checkbox"/>	<input type="checkbox"/>
2. Thrombocytopenia with a positive test of antiplatelet antibody		<input type="checkbox"/>	<input type="checkbox"/>
3. History of heparin induced thrombocytopenia (HIT)		<input type="checkbox"/>	<input type="checkbox"/>
4. Hypersensitivity to heparin or pork/beef products		<input type="checkbox"/>	<input type="checkbox"/>
Age	Recommended Initial Dosage for LOW INTENSITY Protocol		
<input type="checkbox"/> Less than 1 year	25 units/kg/hour continuous infusion		
<input type="checkbox"/> 1 to 12 year	17 units/kg/hour continuous infusion		
<input type="checkbox"/> Greater than 12 years	12-15 units/kg/hour continuous infusion		

*LOW INTENSITY = high bleed risk, lower aPTT goal than STANDARD HEPARIN CONTINUOUS INFUSION PROTOCOL (PEDIATRIC) ORDER FORM

NOTE: For acute thromboembolism, recommend use of STANDARD HEPARIN CONTINUOUS INFUSION PROTOCOL (PEDIATRIC) ORDER FORM unless high bleed risk.

- Discontinue previous subcutaneous heparin or low molecular weight heparin orders
- Start heparin drip immediately after baseline aPTT drawn

Heparin concentration: 50 units/mL

Heparin Dosage:

- New Order Ongoing Therapy

I.V. bolus: NONE

Infusion rate: _____ unit/kg/hour X _____ kg = _____ units/hour

Laboratory Monitoring: (Process all aPTT as STAT labs and indicate patient is on heparin.)

- Baseline aPTT (prior to heparin infusion)
- Baseline CBC (if not obtained within 12 hours prior to heparin infusion)
- aPTT 4 hours after initiation of infusion and aPTT 4 hours after any infusion rate change (patient: younger than 12 years of age)
- aPTT 6 hours after initiation of infusion and aPTT 6 hours after any infusion rate change (patient: 12 years of age and older)
- Daily CBC and aPTT (when aPTT values are therapeutic for 2 consecutive samples) or BID aPTT if this box is checked

aPTT (sec)	For patients younger than 12 years of age		For patients older than 12 years of age	
	ACTION	Next aPTT (STAT)	ACTION	Next aPTT (STAT)
<59	INCREASE infusion rate 2 units/kg/hr	4 hrs (post rate change)	INCREASE infusion rate by 200 units/hr	6 hrs (post rate change)
59-69.9	INCREASE infusion rate 1 unit/kg/hr	4 hrs (post rate change)	INCREASE infusion rate by 100 units/hr	6 hrs (post rate change)
70-89.9 (Goal)	No change	Daily or BID (as ordered above)	No change	Daily or BID (as ordered above)
90-107	Stop infusion for 30 minutes and DECREASE infusion rate 2 units/kg/hr	4 hrs after restarting infusion at lower rate	Stop infusion for 60 minutes then restart infusion and DECREASE infusion rate by 100 units/hr	6 hrs after restarting infusion at lower rate
> 107	Stop infusion for 60 minutes and DECREASE infusion rate 3 units/kg/hr	4 hrs after restarting infusion at lower rate	Stop infusion for 60 minutes then restart infusion and DECREASE infusion rate by 250 units/hr	6 hrs after restarting infusion at lower rate

**HEPARIN CONTINUOUS INFUSION PROTOCOL (PEDIATRIC) PHYSICIAN ORDER FORM
FILE IN MEDICAL RECORD**

Provider Printed Last Name:	
Provider Signature	ID: _____
Date: _____	Time: _____
RN Last Name:	
RN Signature:	
Date: _____	Time: _____
Clerk/LVN Signature:	
Date: _____	Time: _____



**HEPARIN CONTINUOUS INFUSION PROTOCOL: HI-RISK (PEDIATRIC) PHYSICIAN ORDER FORM
FILE IN MEDICAL RECORD**



Form #P291 v.2022.07.22

Appendix J

COUNTY OF LOS ANGELES

DEPARTMENT OF HEALTH SERVICES

HARBOR-UCLA MEDICAL CENTER HEPARIN CONTINUOUS INFUSION PROTOCOL (PEDIATRIC) PHYSICIAN ORDER FORM

Diagnosis:	Location:
Allergies:	Weight:

<i>Exclusion Criteria: Do not initiate protocol if one of the following criteria is present</i>		Yes	No
1. Active bleeding		<input type="checkbox"/>	<input type="checkbox"/>
2. Thrombocytopenia with a positive test of antiplatelet antibody		<input type="checkbox"/>	<input type="checkbox"/>
3. History of heparin induced thrombocytopenia (HIT)		<input type="checkbox"/>	<input type="checkbox"/>
4. Hypersensitivity to heparin or pork/beef products		<input type="checkbox"/>	<input type="checkbox"/>
Age	Recommended Dosage		
<input type="checkbox"/> Younger than 1 year	75 units/kg IV bolus over 10 minutes, then 28 units/kg/hour continuous infusion		
<input type="checkbox"/> 1 to 12 year	75 units/kg IV bolus (Max 5000 units) over 10 minutes, then 20 units/kg/hour continuous infusion		
<input type="checkbox"/> Older than 12 years	80 units/kg IV bolus (maximum dose 10,000 units) over 10 minutes, then 18 units/kg/hour continuous infusion (maximum 2000 units/hour)		

- Discontinue previous subcutaneous heparin, dalteparin, enoxaparin, or fondaparinux orders.
- Start heparin drip immediately after baseline aPTT drawn

Heparin concentration: 50 units/mL

Heparin Dosage:

New Order Ongoing Therapy
 IV bolus _____ units/kg X _____ kg = _____ units
 Infusion rate _____ units/kg/hour X _____ kg = _____ units/hour

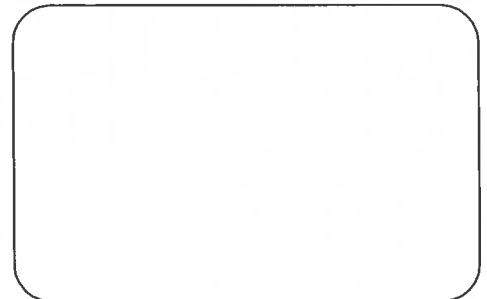
Laboratory Monitoring: (Process all aPTT as STAT labs and indicate patient is on heparin.)

- Baseline aPTT (prior to heparin infusion)
- aPTT 4 hours after initiation of infusion and aPTT 4 hours after any infusion rate change (patients younger than 12 years of age)
- aPTT 6 hours after initiation of infusion and aPTT 6 hours after any infusion rate change (patients older than 12 years of age)
- Daily CBC and aPTT (when aPTT values are therapeutic for 2 consecutive samples) or BID aPTT if this box is checked

aPTT (seconds)	For patients younger than 12 years of age		For patients older than 12 years of age	
	ACTION	Next aPTT (STAT)	ACTION	Next aPTT (STAT)
<65	IV rebolus 50 units/kg X _____ kg = _____ units (Max 4000 units) <u>and</u> INCREASE infusion rate by 2 units/kg/hr (nurse to call pharmacy when needed)	4 hrs (post rate change)	IV rebolus 60 units/kg X _____ kg = _____ units (max 4000 units) <u>and</u> INCREASE infusion rate by 250 units/hr	6 hrs (post rate change)
65-74.9	INCREASE infusion rate by 2 units/kg/hr	4 hrs (post rate change)	INCREASE infusion rate by 100 units/hr	6 hrs (post rate change)
75-100 (Goal)	No change	Daily (AM Lab) or as ordered	No change	Daily (AM Lab) or as ordered
100.1-111	DECREASE infusion rate by 1 unit/kg/hr	4 hrs after restarting infusion at lower rate	DECREASE infusion rate by 100 unit/hr	6 hrs after restarting infusion at lower rate
111.1-132	Stop infusion for 30 minutes and DECREASE infusion rate by 2 units/kg/hr	4 hrs after restarting infusion at lower rate	Stop infusion for 60 minutes then restart infusion and DECREASE infusion rate by 100 units/hr	6 hrs after restarting infusion at lower rate
132.1-180	Stop infusion for 60 minutes and DECREASE infusion rate by 3 units/kg/hr	4 hrs after restarting infusion at lower rate	Stop infusion for 60 minutes then restart infusion and DECREASE infusion rate by 250 units/hr	6 hrs after restarting infusion at lower rate
> 180	Stop infusion for 120 minutes and DECREASE infusion rate by 4 units/kg/hr	4 hrs after restarting infusion at lower rate	Stop infusion for 120 minutes then restart infusion and DECREASE infusion rate by 250 units/hr	6 hrs after restarting infusion at lower rate

HEPARIN CONTINUOUS INFUSION PROTOCOL (PEDIATRIC)/PHYSICIAN ORDER FORM FILE IN MEDICAL RECORD

Provider Printed Last Name:	
Provider Signature	ID:
Date: - - : :	Time: : :
RN Last Name:	
RN Signature:	
Date: - - : :	Time: : :
Clerk/LVN Signature:	
Date: - - : :	Time: : :



HEPARIN CONTINUOUS INFUSION PROTOCOL FILE IN MEDICAL RECORD

PHYSICIAN ORDER FORM
Form # P128 v.2022.7.22



Appendix K

COUNTY OF LOS ANGELES

DEPARTMENT OF HEALTH SERVICES

HARBOR-UCLA MEDICAL CENTER HEPARIN CONTINUOUS INFUSION PROTOCOL (PEDIATRIC) ORDER FORM *LOW INTENSITY for Patients with High Bleed Risk**

<i>Exclusion Criteria: Do not initiate protocol if one of the following criteria is present</i>		Yes	No
1. Active bleeding		<input type="checkbox"/>	<input type="checkbox"/>
2. Thrombocytopenia with a positive test of antiplatelet antibody		<input type="checkbox"/>	<input type="checkbox"/>
3. History of heparin induced thrombocytopenia (HIT)		<input type="checkbox"/>	<input type="checkbox"/>
4. Hypersensitivity to heparin or pork/beef products		<input type="checkbox"/>	<input type="checkbox"/>
<i>Age</i>	<i>Recommended Initial Dosage for LOW INTENSITY Protocol</i>		
<input type="checkbox"/> Less than 1 year	25 units/kg/hour continuous infusion		
<input type="checkbox"/> 1 to 12 year	17 units/kg/hour continuous infusion		
<input type="checkbox"/> Greater than 12 years	12-15 units/kg/hour continuous infusion		

*LOW INTENSITY = high bleed risk; lower aPTT goal than STANDARD HEPARIN CONTINUOUS INFUSION PROTOCOL (PEDIATRIC) ORDER FORM.

NOTE: For acute thromboembolism, recommend use of STANDARD HEPARIN CONTINUOUS INFUSION PROTOCOL (PEDIATRIC) ORDER FORM, unless high bleed risk.

- Discontinue previous subcutaneous heparin or low molecular weight heparin orders.
- Start heparin drip immediately after baseline aPTT drawn

Heparin concentration: 50 units /mL

Heparin Dosage:

- New Order Ongoing Therapy

I.V. bolus: NONE

Infusion rate: _____ units/kg/hour X _____ kg = _____ units/hour

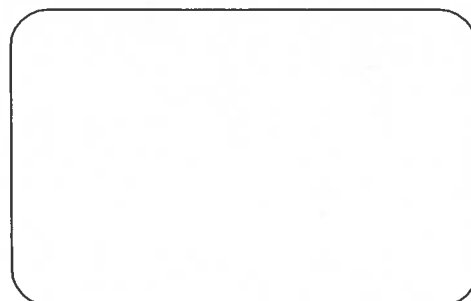
Laboratory Monitoring: (Process all aPTT as STAT labs and indicate patient is on heparin.)

- Baseline aPTT (prior to heparin infusion)
- Baseline CBC (if not obtained within 12 hours prior to heparin infusion)
- aPTT 4 hours after initiation of infusion and aPTT 4 hours after any infusion rate change (patients younger than 12 years of age)
- aPTT 6 hours after initiation of infusion and aPTT 6 hours after any infusion rate change (patients 12 years of age and older)
- Daily CBC and aPTT (when aPTT values are therapeutic for 2 consecutive samples) or BID aPTT if this box is checked

aPTT (sec)	For patients younger than 12 years of age		For patients older than 12 years of age	
	ACTION	Next aPTT (STAT)	ACTION	Next aPTT(STAT)
<58	INCREASE infusion rate 2 units/kg/hr	4 hrs (post rate change)	INCREASE infusion rate by 200 units/hr	6 hrs (post rate change)
58-69.9	INCREASE infusion rate 1 unit/kg/hr	4 hrs (post rate change)	INCREASE infusion rate by 100 units/hr	6 hrs (post rate change)
70-89.9 (Goal)	No change	Daily or BID (as ordered above)	No change	Daily or BID (as ordered above)
90-107	Stop infusion for 30 minutes and DECREASE infusion rate 2 units/kg/hr	4 hrs after restarting infusion at lower rate	Stop infusion for 60 minutes then restart infusion and DECREASE infusion rate by 100 units/hr	6 hrs after restarting infusion at lower rate
> 107	Stop infusion for 60 minutes and DECREASE infusion rate 3 units/kg/hr	4 hrs after restarting infusion at lower rate	Stop infusion for 60 minutes then restart infusion and DECREASE infusion rate by 250 units/hr	6 hrs after restarting infusion at lower rate

**HEPARIN CONTINUOUS INFUSION PROTOCOL (PEDIATRIC)/PHYSICIAN ORDER FORM
FILE IN MEDICAL RECORD**

Provider Printed Last Name:											
Provider Signature								ID:			
Date:				Time:							
RN Last Name:											
RN Signature:											
Date:				Time:							
Clerk/LVN Signature:											
Date:				Time:							



**HEPARIN CONTINUOUS INFUSION PROTOCOL: HI-RISK (PEDIATRIC) PHYSICIAN ORDER FORM
FILE IN MEDICAL RECORD**

Form #P291 v.2022.07.22

