Cardiology: Inpatient Heparin Anticoagulation Protocol Documentation Template

Documentation Template: Conceptual Structure

Contract: VA118-16-D-1008, Task Order (TO): VA-118-16-F-1008-0007, CLIN0008DA

Department of Veterans Affairs (VA)

Knowledge Based Systems (KBS)
Office of Informatics and Information Governance (OIIG)
Clinical Decision Support (CDS)

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Cardiology: Inpatient Heparin Anticoagulation Protocol Documentation Template: Documentation Template: Conceptual Structure

by Knowledge Based Systems (KBS), Office of Informatics and Information Governance (OIIG), and Clinical Decision Support (CDS)

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Preface

Table 1. Revision History

Date	Life Cycle Event
May 23, 2018	Published
May 23, 2018	Reviewed
April 3, 2018	Pre-published
April 3, 2018	Created

Table 2. Clinical White Paper Contributors

Name	Role	Affiliation
Bruce Bray, MD	Author	Professor, Cardiovascular Medicine, University of Utah School of Medicine; Staff Cardiologist, Salt Lake City
Scott Wall, MD	Author	Assistant Professor, Cardiovascular Medicine, University of Utah School of Medicine; Staff Cardiologist, Electrophysiology, Salt Lake City
Aiden Abidov, MD PhD	Author	Professor of Medicine, Wayne State University; Section Chief, Cardiology John Dingell VA Medical Center (VAMC)
Claibe Yarbrough, MD	Author	National Program Director, North Texas VHCS Pulmonary/Critical Care/Sleep Medicine Dallas, TX
Benjamin Brooke, MD	Author	Attending, SLC VAMC Surgery Services Salt lake City, UT

Table 3. Artifact Identifier

Domain	Artifact ID	Name
urn:va.gov:kbs:knart:artifact:r1	465b92c8-4864-5ef0-bd28-3997ce96c134	O27

Artifact Applicability

Table 4. Applicability Foci, Description and Codes

Focus	Description	Code System	Code	Value Set	Value Set Version
TargetUser	Hospitalists, Residents and other ordering providers involved in managing the patient cohort			N/A	N/A
PatientAgeGroup	Adult patients	SNOMED CT	133936004 |Adult (person)|	N/A	N/A
ClinicalFocus	Routine	SNOMED CT	50811001 |Routine (qualifier value)|	N/A	N/A
ClinicalVenue	Inpatient			N/A	N/A
WorkflowSetting	Surgical and Medical Service			N/A	N/A
WorkflowTask	Adult inpatients requiring therapeutic anticoagulation management			N/A	N/A

Models

Table 5. Model References

Referenced Model	Description
urn:solor.io:anf-model:1.0	VA Analysis Normal Form Model

Chapter 1. External Data Definitions

Definitions

Table 1.1. PatientWeight

Expression: type=elm:SingletonFrom
Annotation:
Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|]elm:value[elm:Code]: [107647005 |Weight finding (finding)|]]

Table 1.2. Dalteparin 10,000 IU solution subcutaneous, daily

Expression: type=elm:Instance
Annotation:
Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)|]elm:value[elm:Code]: [[416118004 |Administration (procedure)|] ->(260686004 |Method (attribute)|)->[129445006 |Administration - action (qualifier value)|] ->(363701004 |Direct substance (attribute)|)->[Rx;978755 1 ML Dalteparin Sodium 10000 UNT/ML Prefilled Syringe] ->(410675002 |Route of administration (attribute)|)->[34206005 |Subcutaneous route (qualifier value)|]]elm:value[elm:Code]: [258703001 |day (qualifier value)|]elm:value[elm:Code]: [258703001 |day (qualifier value)|]

Table 1.3. Dalteparin 12,500 IU solution subcutaneous, daily

Expression: type=elm:Instance
Annotation:
Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)|]elm:value[elm:Code]: [[416118004 |Administration (procedure)|] ->(260686004 |Method (attribute)|)->[129445006 |Administration - action (qualifier value)|] ->(363701004 |Direct substance (attribute)|)->[Rx;978725 0.2 ML Dalteparin Sodium 12500 UNT/ML Prefilled Syringe] ->(410675002 |Route of administration (attribute)|)->[34206005 |Subcutaneous route (qualifier value)|]]elm:value[elm:Code]: [258703001 |day (qualifier value)|]elm:value[elm:Code]: [258703001 |day (qualifier value)|]

Table 1.4. Dalteparin 15,000 IU solution subcutaneous, daily

Expression: type=elm:Instance
Annotation:
Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)|]elm:value[elm:Code]: [[416118004 |Administration (procedure)|] ->(260686004 |Method (attribute)|)->[129445006 |Administration - action (qualifier value)|] ->(363701004 |Direct substance (attribute)|)->[Rx;978744 0.6 ML Dalteparin Sodium 25000 UNT/ML Prefilled Syringe] ->(410675002 |Route of administration (attribute)|)->[34206005 |Subcutaneous route (qualifier value)|]]elm:value[elm:Code]: [258703001 |day (qualifier value)|]elm:value[elm:Code]: [258703001 |day (qualifier value)|]

Table 1.5. Dalteparin 18,000 IU solution subcutaneous, daily

Expression: type=elm:Instance
Annotation:
Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)|]elm:value[elm:Code]: [[416118004 |Administration (procedure)|] ->(260686004 |Method (attribute)|)->[129445006 |Admin-

istration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[Rx;978746 0.72 ML Dalteparin Sodium 25000 UNT/ML Prefilled Syringe] ->(410675002 |Route of administration (attribute))->[34206005 |Subcutaneous route (qualifier value)]]elm:value[elm:Code]: [258703001 |day (qualifier value)|]elm:value[elm:Code]: [258703001 |day (qualifier value)|]

Table 1.6. Enoxaparin 1 mg/kg subcutaneous every 12 hours

Expression: type=elm:Instance

Annotation:

Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)|]elm:value[elm:Code]: [[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[Rx;1162664 Enoxaparin Injectable Product] ->(410675002 |Route of administration (attribute))->[34206005 |Subcutaneous route (qualifier value)]]elm:value[elm:Code]: [396163008 |Milligram/kilogram (qualifier value)|]elm:value[elm:Code]: [258703001 |day (qualifier value)|]elm:value[elm:Code]: [258702006 |hour (qualifier value)|]

Table 1.7. Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

Expression: type=elm:Instance

Annotation:

Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)|]elm:value[elm:Code]: [[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[Rx;1162664 Enoxaparin Injectable Product] ->(410675002 |Route of administration (attribute))->[34206005 |Subcutaneous route (qualifier value)]]elm:value[elm:Code]: [396163008 |Milligram/kilogram (qualifier value)|]elm:value[elm:Code]: [258703001 |day (qualifier value)|]elm:value[elm:Code]: [258702006 |hour (qualifier value)|]

Table 1.8. Fondaparinux 5 mg solution subcutaneous, daily

Expression: type=elm:Instance

Annotation:

Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)|]elm:value[elm:Code]: [[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[Rx;861363 0.4 ML Fondaparinux sodium 12.5 MG/ML Prefilled Syringe] ->(410675002 |Route of administration (attribute))->[34206005 |Subcutaneous route (qualifier value)]]elm:value[elm:Code]: [258703001 |day (qualifier value)|]elm:value[elm:Code]: [258703001 |day (qualifier value)|]

Table 1.9. Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

Expression: type=elm:Instance

Annotation:

Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)|]elm:value[elm:Code]: [[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[Rx;1361574 heparin sodium, porcine 20000 UNT/ML Injectable Solution] ->(410675002 |Route of administration (attribute))->[34206005 |Subcutaneous route (qualifier value)]]elm:value[elm:Code]: [258773002 |Milliliter (qualifier value)|]elm:value[elm:Code]: [258703001 |day (qualifier value)|]elm:value[elm:Code]: [258702006 |hour (qualifier value)|]

Table 1.10. Heparin 80 U/kg body weight intravenous solution 1 time bolus now

Expression: type=elm:Instance
Annotation:
Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)|]elm:value[elm:Code]: [[416118004 |Administration (procedure)\] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)\] ->(363701004 |Direct substance (attribute))->[Rx;1856274 heparin Injectable Product] ->(410675002 |Route of administration (attribute))->[47625008 |Intravenous route (qualifier value)\]]elm:value[elm:Code]: [415785005 |Unit/kilogram (qualifier value)|]elm:value[elm:Code]: [246432004 |Number of occurrences (qualifier value)|]

Table 1.11. Fondaparinux 7.5 mg solution subcutaneous, daily

Expression: type=elm:Instance
Annotation:
Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)|]elm:value[elm:Code]: [[416118004 |Administration (procedure)\] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)\] ->(363701004 |Direct substance (attribute))->[Rx;0.6 ML Fondaparinux sodium 12.5 MG/ML Prefilled Syringe] ->(410675002 |Route of administration (attribute))->[34206005 |Subcutaneous route (qualifier value)\]]elm:value[elm:Code]: [258703001 |day (qualifier value)|]elm:value[elm:Code]: [258703001 |day (qualifier value)|]

Table 1.12. Fondaparinux 10 mg solution subcutaneous, daily

Expression: type=elm:Instance
Annotation:
Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)|]elm:value[elm:Code]: [[416118004 |Administration (procedure)\] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)\] ->(363701004 |Direct substance (attribute))->[Rx;861356 0.8 ML Fondaparinux sodium 12.5 MG/ML Prefilled Syringe] ->(410675002 |Route of administration (attribute))->[34206005 |Subcutaneous route (qualifier value)\]]elm:value[elm:Code]: [258703001 |day (qualifier value)|]elm:value[elm:Code]: [258703001 |day (qualifier value)|]

Triggers

No trigger definitions are present.

Chapter 2. Expression Definitions

No expression definitions are present.

Chapter 3. Medications

- Acute DVT of Leg Treated with Vitamin K Antagonist

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

  ([Kearon 2012]) Antithrombotic therapy for VTE disease: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2301]

  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - **Condition:**elm:LessOrEqual (PatientWeight elm:Quantity(56 kg))

      For patients with body weight equal or less than 56 kg.

      - Dalteparin 10,000 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

        Dalteparin 10,000 IU solution subcutaneous, daily
    - **Condition:**elm:In (PatientWeight elm:Interval())

      For patients with body weight 57-68 kg.

      - Dalteparin 12,500 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

        Dalteparin 12,500 IU solution subcutaneous, daily
    - **Condition:**elm:In (PatientWeight elm:Interval())

      For patients with body weight 69-82 kg.

- ○ Dalteparin 15,000 IU solution subcutaneous, daily
  - actionSentence[type=elm:ExpressionRef, classType=]
    - Dalteparin 15,000 IU solution subcutaneous, daily
  - ○ **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))
    - For patients with body weight greater than 82 kg.
- ○ Dalteparin 18,000 IU solution subcutaneous, daily
  - actionSentence[type=elm:ExpressionRef, classType=]
    - Dalteparin 18,000 IU solution subcutaneous, daily

○ Weight-based Enoxaparin

- ○ Enoxaparin 1 mg/kg subcutaneous every 12 hours
  - actionSentence[type=elm:ExpressionRef, classType=]
    - Enoxaparin 1 mg/kg subcutaneous every 12 hours
- ○ Enoxaparin 1.5 mg/kg subcutaneous every 24 hours
  - actionSentence[type=elm:ExpressionRef, classType=]
    - Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

○ Fondaparinux orders

- ○ **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))
  - For patients with body weight less than 50 kg.
- ○ Fondaparinux 5 mg solution subcutaneous, daily
  - actionSentence[type=elm:ExpressionRef, classType=]
    - Fondaparinux 5 mg solution subcutaneous, daily
  - ○ **Condition:**elm:In (PatientWeight elm:Interval())
    - For patients with body weight 50-100 kg.
- ○ Fondaparinux 7.5 mg solution subcutaneous, daily
  - actionSentence[type=elm:ExpressionRef, classType=]
    - Fondaparinux 7.5 mg solution subcutaneous, daily
  - ○ **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))

For patients with body weight greater than 100 kg.

○ Fondaparinux 10 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 10 mg solution subcutaneous, daily

○ Subcutaneous unfractionated heparin

○ Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

actionSentence[type=elm:ExpressionRef, classType=]

Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

○ Orders for Initiation and Maintenance of IV Heparin infusion:

○ IV Heparin Infusion

○ Select one or both.

◉ Heparin 80 U/kg body weight intravenous solution 1 time bolus now.

actionSentence[type=elm:ExpressionRef, classType=]

Heparin 80 U/kg body weight intravenous solution 1 time bolus now

◉ Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46 and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- High Clinical Suspicion of Acute VTE

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

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  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - **Condition:**elm:LessOrEqual (PatientWeight elm:Quantity(56 kg))

      For patients with body weight equal or less than 56 kg

      - Dalteparin 10,000 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

        Dalteparin 10,000 IU solution subcutaneous, daily
    - **Condition:**elm:In (PatientWeight elm:Interval())

      For patients with body weight 57-68 kg

      - Dalteparin 12,500 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 12,500 IU solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 69-82 kg.

  - Dalteparin 15,000 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 15,000 IU solution subcutaneous, daily
- **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))

  For patients with body weight greater than 82 kg.

  - Dalteparin 18,000 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 18,000 IU solution subcutaneous, daily

- Weight-based Enoxaparin

  - Enoxaparin 1 mg/kg subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Enoxaparin 1 mg/kg subcutaneous every 12 hours
  - Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Enoxaparin 1.5 mg/kg subcutaneous every 24 hours
- Fondaparinux orders

  - **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))

    For patients with body weight less than 50 kg.

    - Fondaparinux 5 mg solution subcutaneous, daily

      actionSentence[type=elm:ExpressionRef, classType=]

      Fondaparinux 5 mg solution subcutaneous, daily
  - **Condition:**elm:In (PatientWeight elm:Interval())

    For patients with body weight 50-100 kg.

    - Fondaparinux 7.5 mg solution subcutaneous, daily

      actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 7.5 mg solution subcutaneous, daily

- **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))

  For patients with body weight greater than 100 kg.

- Fondaparinux 10 mg solution subcutaneous, daily

  actionSentence[type=elm:ExpressionRef, classType=]

  Fondaparinux 10 mg solution subcutaneous, daily

- Subcutaneous unfractionated heparin

  - Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

- Orders for Initiation and Maintenance of IV Heparin infusion:

  - IV Heparin Infusion

    - Select one or both.

      - Heparin 80 U/kg body weight intravenous solution 1 time bolus now

        actionSentence[type=elm:ExpressionRef, classType=]

        Heparin 80 U/kg body weight intravenous solution 1 time bolus now

      - Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46 and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90

sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Intermediate Clinical Suspicion of Acute VTE and Results of Diagnostic Tests Expect to Be Delayed > 4 Hours

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux,subcutaneous unfractionated heparin,intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

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  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg

      ○ Dalteparin 10,000 IU solution subcutaneous, daily

      actionSentence[type=elm:ExpressionRef, classType=]

      Dalteparin 10,000 IU solution subcutaneous, daily
    - **Condition:**elm:In (PatientWeight elm:Interval())

      For patients with body weight 57-68 kg.

      ○ Dalteparin 12,500 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 12,500 IU solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 69-82 kg.

  - Dalteparin 15,000 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 15,000 IU solution subcutaneous, daily

- **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))

  For patients with body weight greater than 82 kg.

  - Dalteparin 18,000 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 18,000 IU solution subcutaneous, daily

- Weight-based Enoxaparin

  - Enoxaparin 1 mg/kg subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Enoxaparin 1 mg/kg subcutaneous every 12 hours

  - Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

- Fondaparinux orders

  - **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))

    For patients with body weight less than 50 kg.

    - Fondaparinux 5 mg solution subcutaneous, daily

      actionSentence[type=elm:ExpressionRef, classType=]

      Fondaparinux 5 mg solution subcutaneous, daily

  - **Condition:**elm:In (PatientWeight elm:Interval())

    For patients with body weight 50-100 kg.

    - Fondaparinux 7.5 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 7.5 mg solution subcutaneous, daily

- **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))

  For patients with body weight greater than 100 kg

- Fondaparinux 10 mg solution subcutaneous, daily

  actionSentence[type=elm:ExpressionRef, classType=]

  Fondaparinux 10 mg solution subcutaneous, daily

- Subcutaneous unfractionated heparin

- Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

  actionSentence[type=elm:ExpressionRef, classType=]

  Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

- Orders for Initiation and Maintenance of IV Heparin infusion:

- IV Heparin Infusion

  - Select one or both.

    - Heparin 80 U/kg body weight intravenous solution 1 time bolus now

      actionSentence[type=elm:ExpressionRef, classType=]

      Heparin 80 U/kg body weight intravenous solution 1 time bolus now

    - Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46 and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/

kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Acute Isolated Distal DVT of Leg and Severe Symptoms or Risk Factors for Extension

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

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  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg

      - Dalteparin 10,000 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

        Dalteparin 10,000 IU solution subcutaneous, daily
      - **Condition:**elm:In (PatientWeight elm:Interval())

        For patients with body weight 57-68 kg

- ○ Dalteparin 12,500 IU solution subcutaneous, daily
  actionSentence[type=elm:ExpressionRef, classType=]
  Dalteparin 12,500 IU solution subcutaneous, daily
  - ○ **Condition:**elm:In (PatientWeight elm:Interval())
    For patients with body weight 69-82 kg
- ○ Dalteparin 15,000 IU solution subcutaneous, daily
  actionSentence[type=elm:ExpressionRef, classType=]
  Dalteparin 15,000 IU solution subcutaneous, daily
  - ○ **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))
    For patients with body weight greater than 82 kg
- ○ Dalteparin 18,000 IU solution subcutaneous, daily
  actionSentence[type=elm:ExpressionRef, classType=]
  Dalteparin 18,000 IU solution subcutaneous, daily

○ Weight-based Enoxaparin

- ○ Enoxaparin 1 mg/kg subcutaneous every 12 hours
  actionSentence[type=elm:ExpressionRef, classType=]
  Enoxaparin 1 mg/kg subcutaneous every 12 hours
- ○ Enoxaparin 1.5 mg/kg subcutaneous every 24 hours
  actionSentence[type=elm:ExpressionRef, classType=]
  Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

○ Fondaparinux orders

- ○ **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))
  For patients with body weight less than 50 kg
- ○ Fondaparinux 5 mg solution subcutaneous, daily
  actionSentence[type=elm:ExpressionRef, classType=]
  Fondaparinux 5 mg solution subcutaneous, daily
  - ○ **Condition:**elm:In (PatientWeight elm:Interval())
    For patients with body weight 50-100 kg

- ○ Fondaparinux 7.5 mg solution subcutaneous, daily
  - actionSentence[type=elm:ExpressionRef, classType=]
    - Fondaparinux 7.5 mg solution subcutaneous, daily
  - ○ **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))
    - For patients with body weight greater than 100 kg
- ○ Fondaparinux 10 mg solution subcutaneous, daily
  - actionSentence[type=elm:ExpressionRef, classType=]
    - Fondaparinux 10 mg solution subcutaneous, daily

○ Subcutaneous unfractionated heparin

- ○ Unfractionated heparin 15,000 U solution subcutaneous every 12 hours
  - actionSentence[type=elm:ExpressionRef, classType=]
    - Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

○ Orders for Initiation and Maintenance of IV Heparin infusion

- ○ IV Heparin Infusion
  - ○ Select one or both
    - ☉ Heparin 80 U/kg body weight intravenous solution 1 time bolus now
      - actionSentence[type=elm:ExpressionRef, classType=]
        - Heparin 80 U/kg body weight intravenous solution 1 time bolus now
    - ☉ Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46 and equal to or less than 70, then draw the next

aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Acute Isolated Distal DVT of Leg if Thrombus Extends within Distal System or into Proximal Veins

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

  ([Kearon 2012]) Antithrombotic therapy for VTE disease: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2301]

  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg
      - Dalteparin 10,000 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

        Dalteparin 10,000 IU solution subcutaneous, daily
      - **Condition:**elm:In (PatientWeight elm:Interval())

For patients with body weight 57-68 kg

○ Dalteparin 12,500 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 12,500 IU solution subcutaneous, daily

○ **Condition:**elm:In (PatientWeight elm:Interval())

For patients with body weight 69-82 kg

○ Dalteparin 15,000 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 15,000 IU solution subcutaneous, daily

○ **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))

For patients with body weight greater than 82 kg

○ Dalteparin 18,000 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 18,000 IU solution subcutaneous, daily

○ Weight-based Enoxaparin

○ Enoxaparin 1 mg/kg subcutaneous every 12 hours

actionSentence[type=elm:ExpressionRef, classType=]

Enoxaparin 1 mg/kg subcutaneous every 12 hours

○ Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

actionSentence[type=elm:ExpressionRef, classType=]

Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

○ Fondaparinux orders

○ **Condition:**elm:Less (PatientWeight elm:Quanti-ty(50 kg))

For patients with body weight less than 50 kg

○ Fondaparinux 5 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 5 mg solution subcutaneous, daily

○ **Condition:**elm:In (PatientWeight elm:Interval())

For patients with body weight 50-100 kg

○ Fondaparinux 7.5 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 7.5 mg solution subcutaneous, daily

○ **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))

For patients with body weight greater than 100 kg

○ Fondaparinux 10 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 10 mg solution subcutaneous, daily

○ Subcutaneous unfractionated heparin

○ Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

actionSentence[type=elm:ExpressionRef, classType=]

Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

○ Orders for Initiation and Maintenance of IV Heparin infusion

○ IV Heparin Infusion

○ Select one or both.

◉ Heparin 80 U/kg body weight intravenous solution 1 time bolus now.

actionSentence[type=elm:ExpressionRef, classType=]

Heparin 80 U/kg body weight intravenous solution 1 time bolus now

◉ Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46

and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Acute Deep Vein Thrombosis of Leg with Thrombosis Removal

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

  ([Kearon 2012]) Antithrombotic therapy for VTE disease: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2301]

  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg
      - Dalteparin 10,000 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

        Dalteparin 10,000 IU solution subcutaneous, daily
      - **Condition:**elm:In (PatientWeight elm:Interval())

For patients with body weight 57-68 kg

○ Dalteparin 12,500 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 12,500 IU solution subcutaneous, daily

○ **Condition:**elm:In (PatientWeight elm:Interval())

For patients with body weight 69-82 kg

○ Dalteparin 15,000 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 15,000 IU solution subcutaneous, daily

○ **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))

For patients with body weight greater than 82 kg

○ Dalteparin 18,000 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 18,000 IU solution subcutaneous, daily

○ Weight-based Enoxaparin

○ Enoxaparin 1 mg/kg subcutaneous every 12 hours

actionSentence[type=elm:ExpressionRef, classType=]

Enoxaparin 1 mg/kg subcutaneous every 12 hours

○ Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

actionSentence[type=elm:ExpressionRef, classType=]

Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

○ Fondaparinux orders

○ **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))

For patients with body weight less than 50 kg

○ Fondaparinux 5 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 5 mg solution subcutaneous, daily

○ **Condition:**elm:In (PatientWeight elm:Interval())

For patients with body weight 50-100 kg

○ Fondaparinux 7.5 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 7.5 mg solution subcutaneous, daily

○ **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))

For patients with body weight greater than 100 kg

○ Fondaparinux 10 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 10 mg solution subcutaneous, daily

○ Subcutaneous unfractionated heparin

○ Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

actionSentence[type=elm:ExpressionRef, classType=]

Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

○ Orders for Initiation and Maintenance of IV Heparin infusion:

○ IV Heparin Infusion

○ Select one or both.

◉ Heparin 80 U/kg body weight intravenous solution 1 time bolus now

actionSentence[type=elm:ExpressionRef, classType=]

Heparin 80 U/kg body weight intravenous solution 1 time bolus now

◉ Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46

and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Acute Proximal Deep Vein Thrombosis of Leg and Inferior Vena Cava Filter if Risk of Bleeding Resolves

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

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  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg
      - Dalteparin 10,000 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

        Dalteparin 10,000 IU solution subcutaneous, daily

- ○ **Condition:** elm:In (PatientWeight elm:Interval())
  For patients with body weight 57-68 kg
  - ○ Dalteparin 12,500 IU solution subcutaneous, daily
    actionSentence[type=elm:ExpressionRef, classType=]
    Dalteparin 12,500 IU solution subcutaneous, daily
- ○ **Condition:** elm:In (PatientWeight elm:Interval())
  For patients with body weight 69-82 kg
  - ○ Dalteparin 15,000 IU solution subcutaneous, daily
    actionSentence[type=elm:ExpressionRef, classType=]
    Dalteparin 15,000 IU solution subcutaneous, daily
- ○ **Condition:** elm:Greater (PatientWeight elm:Quantity(82 kg))
  For patients with body weight greater than 82 kg
  - ○ Dalteparin 18,000 IU solution subcutaneous, daily
    actionSentence[type=elm:ExpressionRef, classType=]
    Dalteparin 18,000 IU solution subcutaneous, daily

○ Weight-based Enoxaparin

- ○ Enoxaparin 1 mg/kg subcutaneous every 12 hours
  actionSentence[type=elm:ExpressionRef, classType=]
  Enoxaparin 1 mg/kg subcutaneous every 12 hours
- ○ Enoxaparin 1.5 mg/kg subcutaneous every 24 hours
  actionSentence[type=elm:ExpressionRef, classType=]
  Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

○ Fondaparinux orders

- ○ **Condition:** elm:Less (PatientWeight elm:Quantity(50 kg))
  For patients with body weight less than 50 kg
  - ○ Fondaparinux 5 mg solution subcutaneous, daily
    actionSentence[type=elm:ExpressionRef, classType=]
    Fondaparinux 5 mg solution subcutaneous, daily

- **Condition:** elm:In (PatientWeight elm:Interval())

  For patients with body weight 50-100 kg

  - Fondaparinux 7.5 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 7.5 mg solution subcutaneous, daily
- **Condition:** elm:Greater (PatientWeight elm:Quantity(100 kg))

  For patients with body weight greater than 100 kg

  - Fondaparinux 10 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 10 mg solution subcutaneous, daily

- Subcutaneous unfractionated heparin

  - Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

- Orders for Initiation and Maintenance of IV Heparin infusion

  - IV Heparin Infusion

    - Select one or both.

      - Heparin 80 U/kg body weight intravenous solution 1 time bolus now

        actionSentence[type=elm:ExpressionRef, classType=]

        Heparin 80 U/kg body weight intravenous solution 1 time bolus now

      - Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in he-

parin infusion rate. If both the current and the previous aPTT value are equal or greater than 46 and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Acute Pulmonary Embolism

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

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  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg
      - Dalteparin 10,000 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 10,000 IU solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 57-68 kg

  - Dalteparin 12,500 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 12,500 IU solution subcutaneous, daily
- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 69-82 kg

  - Dalteparin 15,000 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 15,000 IU solution subcutaneous, daily
- **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))

  For patients with body weight greater than 82 kg

  - Dalteparin 18,000 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 18,000 IU solution subcutaneous, daily

- Weight-based Enoxaparin
  - Enoxaparin 1 mg/kg subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Enoxaparin 1 mg/kg subcutaneous every 12 hours
  - Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Enoxaparin 1.5 mg/kg subcutaneous every 24 hours
- Fondaparinux orders
  - **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))

    For patients with body weight less than 50 kg

    - Fondaparinux 5 mg solution subcutaneous, daily

      actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 5 mg solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 50-100 kg

  - Fondaparinux 7.5 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 7.5 mg solution subcutaneous, daily

- **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))

  For patients with body weight greater than 100 kg

  - Fondaparinux 10 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 10 mg solution subcutaneous, daily

- Subcutaneous unfractionated heparin

  - Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

- Orders for Initiation and Maintenance of IV Heparin infusion

  - IV Heparin Infusion

    - Select one or both.

      - Heparin 80 U/kg body weight intravenous solution 1 time bolus now

        actionSentence[type=elm:ExpressionRef, classType=]

        Heparin 80 U/kg body weight intravenous solution 1 time bolus now

      - Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and

draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46 and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- High Clinical Suspicion of Acute Pulmonary Embolism

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

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  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg
      - Dalteparin 10,000 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 10,000 IU solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 57-68 kg

  - Dalteparin 12,500 IU solution subcutaneous, daily

  actionSentence[type=elm:ExpressionRef, classType=]

  Dalteparin 12,500 IU solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 69-82 kg

  - Dalteparin 15,000 IU solution subcutaneous, daily

  actionSentence[type=elm:ExpressionRef, classType=]

  Dalteparin 15,000 IU solution subcutaneous, daily

- **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))

  For patients with body weight greater than 82 kg

  - Dalteparin 18,000 IU solution subcutaneous, daily

  actionSentence[type=elm:ExpressionRef, classType=]

  Dalteparin 18,000 IU solution subcutaneous, daily

- Weight-based Enoxaparin

  - Enoxaparin 1 mg/kg subcutaneous every 12 hours

  actionSentence[type=elm:ExpressionRef, classType=]

  Enoxaparin 1 mg/kg subcutaneous every 12 hours

  - Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

  actionSentence[type=elm:ExpressionRef, classType=]

  Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

- Fondaparinux orders

  - **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))

    For patients with body weight less than 50 kg

    - Fondaparinux 5 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 5 mg solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 50-100 kg

  - Fondaparinux 7.5 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 7.5 mg solution subcutaneous, daily

- **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))

  For patients with body weight greater than 100 kg

  - Fondaparinux 10 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 10 mg solution subcutaneous, daily

- Subcutaneous unfractionated heparin

  - Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

- Orders for Initiation and Maintenance of IV Heparin infusion

  - IV Heparin Infusion

    - Select one or both.

      - Heparin 80 U/kg body weight intravenous solution 1 time bolus now

      - Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the

previous aPTT value are equal or greater than 46 and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Intermediate Clinical Suspicion of Acute Pulmonary Embolism if Results of Diagnostic Tests Expected to Be Delayed >4 Hours

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

  ([Kearon 2012]) Antithrombotic therapy for VTE disease: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2301]

  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg
      - Dalteparin 10,000 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 10,000 IU solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 57-68 kg

  - Dalteparin 12,500 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 12,500 IU solution subcutaneous, daily
- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 69-82 kg

  - Dalteparin 15,000 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 15,000 IU solution subcutaneous, daily
- **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))

  For patients with body weight greater than 82 kg

  - Dalteparin 18,000 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 18,000 IU solution subcutaneous, daily

- Weight-based Enoxaparin
  - Enoxaparin 1 mg/kg subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Enoxaparin 1 mg/kg subcutaneous every 12 hours
  - Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Enoxaparin 1.5 mg/kg subcutaneous every 24 hours
- Fondaparinux orders
  - **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))

    For patients with body weight less than 50 kg

    - Fondaparinux 5 mg solution subcutaneous, daily

      actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 5 mg solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 50-100 kg

  - Fondaparinux 7.5 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 7.5 mg solution subcutaneous, daily

- **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))

  For patients with body weight greater than 100 kg

  - Fondaparinux 10 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 10 mg solution subcutaneous, daily

- Subcutaneous unfractionated heparin

  - Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

- Orders for Initiation and Maintenance of IV Heparin infusion

  - IV Heparin Infusion

    - Select one or both.

      - Heparin 80 U/kg body weight intravenous solution 1 time bolus now.

      - Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46 and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Other-

wise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Acute Pulmonary Embolism and Inferior Vena Cava Filter if Risk of Bleeding Resolves

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

  ([Kearon 2012]) Antithrombotic therapy for VTE disease: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2301]

  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg

      - Dalteparin 10,000 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

        Dalteparin 10,000 IU solution subcutaneous, daily
    - **Condition:**elm:In (PatientWeight elm:Interval())

For patients with body weight 57-68 kg

○ Dalteparin 12,500 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 12,500 IU solution subcutaneous, daily

○ **Condition:**elm:In (PatientWeight elm:Interval())

For patients with body weight 69-82 kg

○ Dalteparin 15,000 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 15,000 IU solution subcutaneous, daily

○ **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))

For patients with body weight greater than 82 kg

○ Dalteparin 18,000 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 18,000 IU solution subcutaneous, daily

○ Weight-based Enoxaparin

○ Enoxaparin 1 mg/kg subcutaneous every 12 hours

actionSentence[type=elm:ExpressionRef, classType=]

Enoxaparin 1 mg/kg subcutaneous every 12 hours

○ Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

actionSentence[type=elm:ExpressionRef, classType=]

Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

○ Fondaparinux orders

○ **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))

For patients with body weight less than 50 kg

○ Fondaparinux 5 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 5 mg solution subcutaneous, daily

○ **Condition:**elm:In (PatientWeight elm:Interval())

For patients with body weight 50-100 kg

○ Fondaparinux 7.5 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 7.5 mg solution subcutaneous, daily

○ **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))

For patients with body weight greater than 100 kg

○ Fondaparinux 10 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 10 mg solution subcutaneous, daily

○ Subcutaneous unfractionated heparin

○ Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

actionSentence[type=elm:ExpressionRef, classType=]

Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

○ Orders for Initiation and Maintenance of IV Heparin infusion

○ IV Heparin Infusion

○ Select one or both.

◉ Heparin 80 U/kg body weight intravenous solution 1 time bolus now

actionSentence[type=elm:ExpressionRef, classType=]

Heparin 80 U/kg body weight intravenous solution 1 time bolus now

◉ Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46

and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Asymptomatic Pulmonary Embolism

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

  ([Kearon 2012]) Antithrombotic therapy for VTE disease: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2301]

  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg
      - Dalteparin 10,000 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

        Dalteparin 10,000 IU solution subcutaneous, daily
      - **Condition:**elm:In (PatientWeight elm:Interval())

For patients with body weight 57-68 kg

○ Dalteparin 12,500 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 12,500 IU solution subcutaneous, daily

○ **Condition:**elm:In (PatientWeight elm:Interval())

For patients with body weight 69-82 kg

○ Dalteparin 15,000 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 15,000 IU solution subcutaneous, daily

○ **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))

For patients with body weight greater than 82 kg

○ Dalteparin 18,000 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 18,000 IU solution subcutaneous, daily

○ Weight-based Enoxaparin

○ Enoxaparin 1 mg/kg subcutaneous every 12 hours

actionSentence[type=elm:ExpressionRef, classType=]

Enoxaparin 1 mg/kg subcutaneous every 12 hours

○ Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

actionSentence[type=elm:ExpressionRef, classType=]

Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

○ Fondaparinux orders

○ **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))

For patients with body weight less than 50 kg

○ Fondaparinux 5 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 5 mg solution subcutaneous, daily

○ **Condition:**elm:In (PatientWeight elm:Interval())

For patients with body weight 50-100 kg

○ Fondaparinux 7.5 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 7.5 mg solution subcutaneous, daily

○ **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))

For patients with body weight greater than 100 kg

○ Fondaparinux 10 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 10 mg solution subcutaneous, daily

○ Subcutaneous unfractionated heparin

○ Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

actionSentence[type=elm:ExpressionRef, classType=]

Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

○ Orders for Initiation and Maintenance of IV Heparin infusion

○ IV Heparin Infusion

○ Select one or both.

◉ Heparin 80 U/kg body weight intravenous solution 1 time bolus now

actionSentence[type=elm:ExpressionRef, classType=]

Heparin 80 U/kg body weight intravenous solution 1 time bolus now

◉ Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46

and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Acute Upper-Extremity Deep Vein Thrombosis that Involves Axillary or More Proximal Veins

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

  ([Kearon 2012]) Antithrombotic therapy for VTE disease: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2301]

  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg
      - Dalteparin 10,000 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

        Dalteparin 10,000 IU solution subcutaneous, daily

- ○ **Condition:** elm:In (PatientWeight elm:Interval())
  For patients with body weight 57-68 kg
  - ○ Dalteparin 12,500 IU solution subcutaneous, daily
    actionSentence[type=elm:ExpressionRef, classType=]
    Dalteparin 12,500 IU solution subcutaneous, daily
- ○ **Condition:** elm:In (PatientWeight elm:Interval())
  For patients with body weight 69-82 kg
  - ○ Dalteparin 15,000 IU solution subcutaneous, daily
    actionSentence[type=elm:ExpressionRef, classType=]
    Dalteparin 15,000 IU solution subcutaneous, daily
- ○ **Condition:** elm:Greater (PatientWeight elm:Quantity(82 kg))
  For patients with body weight greater than 82 kg
  - ○ Dalteparin 18,000 IU solution subcutaneous, daily
    actionSentence[type=elm:ExpressionRef, classType=]
    Dalteparin 18,000 IU solution subcutaneous, daily

○ Weight-based Enoxaparin

- ○ Enoxaparin 1 mg/kg subcutaneous every 12 hours
  actionSentence[type=elm:ExpressionRef, classType=]
  Enoxaparin 1 mg/kg subcutaneous every 12 hours
- ○ Enoxaparin 1.5 mg/kg subcutaneous every 24 hours
  actionSentence[type=elm:ExpressionRef, classType=]
  Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

○ Fondaparinux orders

- ○ **Condition:** elm:Less (PatientWeight elm:Quantity(50 kg))
  For patients with body weight less than 50 kg
  - ○ Fondaparinux 5 mg solution subcutaneous, daily
    actionSentence[type=elm:ExpressionRef, classType=]
    Fondaparinux 5 mg solution subcutaneous, daily

- **Condition:** elm:In (PatientWeight elm:Interval())
  For patients with body weight 50-100 kg
  - Fondaparinux 7.5 mg solution subcutaneous, daily
    actionSentence[type=elm:ExpressionRef, classType=]
    Fondaparinux 7.5 mg solution subcutaneous, daily
- **Condition:** elm:Greater (PatientWeight elm:Quantity(100 kg))
  For patients with body weight greater than 100 kg
  - Fondaparinux 10 mg solution subcutaneous, daily
    actionSentence[type=elm:ExpressionRef, classType=]
    Fondaparinux 10 mg solution subcutaneous, daily

- Subcutaneous unfractionated heparin
  - Unfractionated heparin 15,000 U solution subcutaneous every 12 hours
    actionSentence[type=elm:ExpressionRef, classType=]
    Unfractionated heparin 15,000 U solution subcutaneous every 12 hours
- Orders for Initiation and Maintenance of IV Heparin infusion
  - IV Heparin Infusion
    - Select one or both.
      - Heparin 80 U/kg body weight intravenous solution 1 time bolus now
        actionSentence[type=elm:ExpressionRef, classType=]
        Heparin 80 U/kg body weight intravenous solution 1 time bolus now
      - Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in he-

parin infusion rate. If both the current and the previous aPTT value are equal or greater than 46 and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Acute Upper-Extremity Deep Vein Thrombosis with Thrombolysis

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

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  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg
      - Dalteparin 10,000 IU solution subcutaneous, daily

        actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 10,000 IU solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 57-68 kg

  - Dalteparin 12,500 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 12,500 IU solution subcutaneous, daily
- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 69-82 kg

  - Dalteparin 15,000 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 15,000 IU solution subcutaneous, daily
- **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))

  For patients with body weight greater than 82 kg

  - Dalteparin 18,000 IU solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Dalteparin 18,000 IU solution subcutaneous, daily

- Weight-based Enoxaparin
  - Enoxaparin 1 mg/kg subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Enoxaparin 1 mg/kg subcutaneous every 12 hours
  - Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Enoxaparin 1.5 mg/kg subcutaneous every 24 hours
- Fondaparinux orders
  - **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))

    For patients with body weight less than 50 kg

    - Fondaparinux 5 mg solution subcutaneous, daily

      actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 5 mg solution subcutaneous, daily

- **Condition:** elm:In (PatientWeight elm:Interval())

  For patients with body weight 50-100 kg

  - Fondaparinux 7.5 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 7.5 mg solution subcutaneous, daily

- **Condition:** elm:Greater (PatientWeight elm:Quantity(100 kg))

  For patients with body weight greater than 100 kg

  - Fondaparinux 10 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 10 mg solution subcutaneous, daily

- Subcutaneous unfractionated heparin

  - Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

- Orders for Initiation and Maintenance of IV Heparin infusion

  - IV Heparin Infusion

    - Select one or both

      - Heparin 80 U/kg body weight intravenous solution 1 time bolus now

        actionSentence[type=elm:ExpressionRef, classType=]

        Heparin 80 U/kg body weight intravenous solution 1 time bolus now

      - Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and

draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46 and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Symptomatic Splanchnic Vein Thrombosis

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux, subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

  ([Kearon 2012]) Antithrombotic therapy for VTE disease: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2301]

  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg
      - Dalteparin 10,000 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 10,000 IU solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 57-68 kg

  - Dalteparin 12,500 IU solution subcutaneous, daily

  actionSentence[type=elm:ExpressionRef, classType=]

  Dalteparin 12,500 IU solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 69-82 kg

  - Dalteparin 15,000 IU solution subcutaneous, daily

  actionSentence[type=elm:ExpressionRef, classType=]

  Dalteparin 15,000 IU solution subcutaneous, daily

- **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))

  For patients with body weight greater than 82 kg

  - Dalteparin 18,000 IU solution subcutaneous, daily

  actionSentence[type=elm:ExpressionRef, classType=]

  Dalteparin 18,000 IU solution subcutaneous, daily

- Weight-based Enoxaparin

  - Enoxaparin 1 mg/kg subcutaneous every 12 hours

  actionSentence[type=elm:ExpressionRef, classType=]

  Enoxaparin 1 mg/kg subcutaneous every 12 hours

  - Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

  actionSentence[type=elm:ExpressionRef, classType=]

  Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

- Fondaparinux orders

  - **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))

    For patients with body weight less than 50 kg

    - Fondaparinux 5 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 5 mg solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 50-100 kg

  - Fondaparinux 7.5 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 7.5 mg solution subcutaneous, daily

- **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))

  For patients with body weight greater than 100 kg

  - Fondaparinux 10 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 10 mg solution subcutaneous, daily

- Subcutaneous unfractionated heparin

  - Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

- Orders for Initiation and Maintenance of IV Heparin infusion

  - IV Heparin Infusion

    - Select one or both

      - Heparin 80 U/kg body weight intravenous solution 1 time bolus now

        actionSentence[type=elm:ExpressionRef, classType=]

        Heparin 80 U/kg body weight intravenous solution 1 time bolus now

      - Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT

35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46 and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

- Symptomatic Hepatic Vein Thrombosis

  Be advised that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred based on individual patient characteristics, clinical co-conditions or co-morbidities, and patient values and preferences. The medication treatment options for this patient subpopulation include the following, but the options cannot be strictly rank-ordered in terms of a universal preference, and individual patient circumstances must be considered in selecting the optimal treatment: dalteparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), enoxaparin (a drug of choice in patients with cancer and in patients with recurrent venous thromboembolism on warfarin, rivaroxaban, apixaban, or edoxaban), fondaparinux,subcutaneous unfractionated heparin, intravenous heparin. These are links to the American College of Chest Physicians VTE treatment guidelines:

  ([Kearon 2012]) Antithrombotic therapy for VTE disease: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2301]

  ([Kearon 2016]) Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. link [https://doi.org/10.1016/j.chest.2015.11.026]

  - Dalteparin orders
    - For patients with body weight equal or less than 56 kg
      - Dalteparin 10,000 IU solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Dalteparin 10,000 IU solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 57-68 kg

  - Dalteparin 12,500 IU solution subcutaneous, daily

  actionSentence[type=elm:ExpressionRef, classType=]

  Dalteparin 12,500 IU solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 69-82 kg

  - Dalteparin 15,000 IU solution subcutaneous, daily

  actionSentence[type=elm:ExpressionRef, classType=]

  Dalteparin 15,000 IU solution subcutaneous, daily

- **Condition:**elm:Greater (PatientWeight elm:Quantity(82 kg))

  For patients with body weight greater than 82 kg.

  - Dalteparin 18,000 IU solution subcutaneous, daily

  actionSentence[type=elm:ExpressionRef, classType=]

  Dalteparin 18,000 IU solution subcutaneous, daily

- Weight-based Enoxaparin

  - Enoxaparin 1 mg/kg subcutaneous every 12 hours

  actionSentence[type=elm:ExpressionRef, classType=]

  Enoxaparin 1 mg/kg subcutaneous every 12 hours

  - Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

  actionSentence[type=elm:ExpressionRef, classType=]

  Enoxaparin 1.5 mg/kg subcutaneous every 24 hours

- Fondaparinux orders

  - **Condition:**elm:Less (PatientWeight elm:Quantity(50 kg))

    For patients with body weight less than 50 kg

    - Fondaparinux 5 mg solution subcutaneous, daily

actionSentence[type=elm:ExpressionRef, classType=]

Fondaparinux 5 mg solution subcutaneous, daily

- **Condition:**elm:In (PatientWeight elm:Interval())

  For patients with body weight 50-100 kg

  - Fondaparinux 7.5 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 7.5 mg solution subcutaneous, daily

- **Condition:**elm:Greater (PatientWeight elm:Quantity(100 kg))

  For patients with body weight greater than 100 kg

  - Fondaparinux 10 mg solution subcutaneous, daily

    actionSentence[type=elm:ExpressionRef, classType=]

    Fondaparinux 10 mg solution subcutaneous, daily

- Subcutaneous unfractionated heparin

  - Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

    actionSentence[type=elm:ExpressionRef, classType=]

    Unfractionated heparin 15,000 U solution subcutaneous every 12 hours

- Orders for Initiation and Maintenance of IV Heparin infusion

  - IV Heparin Infusion

    - Select one or both

      - Heparin 80 U/kg body weight intravenous solution 1 time bolus now

        actionSentence[type=elm:ExpressionRef, classType=]

        Heparin 80 U/kg body weight intravenous solution 1 time bolus now

      - Start Heparin 18 U/kg body weight/hour IV continuous infusion. Draw aPTT lab 6 hours after initiating heparin infusion, and for any aPTT lab result titrate heparin IV infusion per the following protocol: If aPTT is less than 35 sec, give 80 U/kg heparin bolus, then increase heparin infusion rate by 4 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT

			35-45 sec, give 40 U/kg heparin bolus, then increase heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT 46-70 sec, no change in heparin infusion rate. If both the current and the previous aPTT value are equal or greater than 46 and equal to or less than 70, then draw the next aPTT lab with the next morning lab draw. Otherwise, draw aPTT lab in 6 hours. If aPTT 71-90 sec, then decrease heparin infusion rate by 2 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. If aPTT is greater than 90 sec, hold the heparin infusion for 1 hour, then decrease heparin infusion rate by 3 U/kg/h, and draw aPTT lab 6 hours after heparin infusion rate change. actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] statementType: Precoordinated Expression 385644000 |Requested (qualifier value)| topic: Precoordinated Expression TSR-NoCode

Perioperative Anticoagulation with Mechanical Heart Valve, Atrial Fibrillation or Venous Thromboembolism at High Risk for additional (perioperative) Thromboembolism

([Douketis 2012])	Perioperative Management of Antithrombotic Therapy: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2298]
□ prompt:	Perioperative patients with Mechanical Heart Valve, Atrial Fibrillation or Venous Thromboembolism at High Risk for additional (perioperative) Thromboembolism should be managed according to the American College of Chest Physicians perioperative anticoagulation management guidelines, (Douketis, 2012, Section 2.4). Acknowledge?
response:	Boolean (Single)

Perioperative Anticoagulation with Unfractionated Heparin Timing of Pre-surgical Stopping of Unfractionated Heparin

([Douketis 2012])	Perioperative Management of Antithrombotic Therapy: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2298]
□ prompt:	Timing of Pre-surgical stoppage of Unfractionated Heparin should be managed according to the American College of Chest Physicians perioperative anticoagulation management guidelines. , (Douketis, 2012, Section 4.2). Acknowledge?
response:	Boolean (Single)

Pregnancy with Antiphospholipid Antibody Syndrome

([Bates 2012])	VTE, Thrombophilia, Antithrombotic Therapy, and Pregnancy: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physi-

	cians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2300]
□ prompt:	The provider should be advised that pregnant patients with Antiphospholipid Antibody Syndrome should be managed according to the American College of Chest Physicians pregnancy anticoagulation, (Bates, 2012, Section 10.2.3). Acknowledge?
response:	Boolean (Single)
Pregnancy with Mechanical Heart Valve	
([Bates 2012])	VTE, Thrombophilia, Antithrombotic Therapy, and Pregnancy: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. link [https://doi.org/10.1378/chest.11-2300]
□ prompt:	The provider should be advised that the patient should be managed according to the American College of Chest Physicians pregnancy anticoagulation guidelines. (Bates, 2012, Section 12.1.1). Acknowledge?
response:	Boolean (Single)

Chapter 4. Laboratory Tests

□ Complete blood count 1 time now actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] statementType: Precoordinated Expression 385644000 |Requested (qualifier value)| topic: Precoordinated Expression 26604007 |Complete blood count (procedure)| priority: Precoordinated Expression 50811001 |Routine (qualifier value)|
□ Complete blood count 1 time in the morning actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] statementType: Precoordinated Expression 385644000 |Requested (qualifier value)| topic: Precoordinated Expression 26604007 |Complete blood count (procedure)| iming.lowerBound: 1 timing.upperBound: 1 timing.includeLowerBound: TRUE timing.includeUpperBound: TRUE timing.measureSemantic: Precoordinated Expression 73775008 |Morning (qualifier value)|
□ Basic metabolic profile 1 time now actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] statementType: Precoordinated Expression 385644000 |Requested (qualifier value)| topic: Precoordinated Expression 1421000205106 |Basic metabolic panel (procedure)
□ Basic metabolic profile 1 time in the morning actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] statementType: Precoordinated Expression 385644000 |Requested (qualifier value)| topic: Precoordinated Expression 1421000205106 |Basic metabolic panel (procedure) iming.lowerBound: 1 timing.upperBound: 1 timing.includeLowerBound: TRUE timing.includeUpperBound: TRUE timing.measureSemantic: Precoordinated Expression 73775008 |Morning (qualifier value)|
□ Activated partial thromboplastin time every 6 hours routine actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression 42525009 |Partial thromboplastin time, activated (procedure)|

priority: Precoordinated Expression 50811001 |Routine (qualifier value)|

repetition[0].eventFrequency.lowerBound: 6

repetition[0].eventFrequency.upperBound: 6

repetition[0].eventFrequency.includeLowerBound: TRUE

repetition[0].eventFrequency.includeUpperBound: TRUE

repetition[0].eventFrequency.resolution: 6

repetition[0].eventFrequency.measureSemantic: Precoordianted Expression 258702006 |hour (qualifier value)|

□ International normalized ratio daily 1 time routine

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

statementType: Precoordinated Expression 385644000 |Requested (qualifier value)|

topic: Precoordinated Expression 440685005 |Calculation of international normalized ratio (procedure)|

priority: Precoordinated Expression 50811001 |Routine (qualifier value)|

repetition[0].eventFrequency.lowerBound: 1

repetition[0].eventFrequency.upperBound: 1

repetition[0].eventFrequency.includeLowerBound: TRUE

repetition[0].eventFrequency.includeUpperBound: TRUE

repetition[0].eventFrequency.resolution: 1

repetition[0].eventFrequency.measureSemantic: Precoordianted Expression 258703001 |day (qualifier value)|

Chapter 5. Tabular List

Terminology Service Request (TSR) Mappings

Table 5.1. Terminology Versions

Name	Identifer	Version
SNOMED CT	2.16.840.1.113883.6.96	United States Edition 20180301

Table 5.2. Terminology References

System	Code	Display Text[a]	References[b]
SNOMED CT	107647005 |Weight finding (finding)]	Precoordinated Expression	1
SNOMED CT	133936004 |Adult (person)|	Adult patients	1
SNOMED CT	1421000205106 |Basic metabolic panel (procedure)	Precoordinated Expression	2
SNOMED CT	246432004 |Number of occurrences (qualifier value)|	Precoordianted Expression	1
SNOMED CT	258702006 |hour (qualifier value)|	Precoordianted Expression	4
SNOMED CT	258703001 |day (qualifier value)|	Precoordianted Expression	18
SNOMED CT	258773002 |Milliliter (qualifier value)|	Precoordianted Expression	1
SNOMED CT	26604007 |Complete blood count (procedure)|	Precoordinated Expression	2
SNOMED CT	385644000 |Requested (qualifier value)|	Precoordinated Expression	33
SNOMED CT	396163008 |Milligram/kilogram (qualifier value)|	Precoordianted Expression	2
SNOMED CT	398166005 |Performed (qualifier value)|	Precoordinated Expression	1
SNOMED CT	415785005 |Unit/kilogram (qualifier value)|	Precoordianted Expression	1
SNOMED CT	42525009 |Partial thromboplastin time, activated (procedure)|	Precoordinated Expression	1
SNOMED CT	440685005 |Calculation of international normalized ratio (procedure)|	Precoordinated Expression	1
SNOMED CT	50811001 |Routine (qualifier value)|	Precoordinated Expression	4

System	Code	Display Text[a]	References[b]
SNOMED CT	73775008 |Morning (qualifier value)|	Precoordinated Expression	2
SNOMED CT	TSR-NoCode[c]	Precoordinated Expression	16
SNOMED CT	[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[Rx;0.6 ML Fondaparinux sodium 12.5 MG/ML Prefilled Syringe] ->(410675002 |Route of administration (attribute))->[34206005 |Subcutaneous route (qualifier value)]	Postcoordinated Expression	1
SNOMED CT	[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[Rx;1162664 Enoxaparin Injectable Product] ->(410675002 |Route of administration (attribute))->[34206005 |Subcutaneous route (qualifier value)]	Postcoordinated Expression	2
SNOMED CT	[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[Rx;1361574 heparin sodium, porcine 20000 UNT/ML Injectable Solution] ->(410675002 |Route of administration (attribute))->[34206005 |Subcutaneous route (qualifier value)]	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
SNOMED CT	[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 | Direct substance (attribute))->[Rx;1856274 heparin Injectable Product] ->(410675002 |Route of administration (attribute))->[47625008 |Intravenous route (qualifier value)]	Postcoordinated Expression	1
SNOMED CT	[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 | Direct substance (attribute))->[Rx;861356 0.8 ML Fondaparinux sodium 12.5 MG/ML Prefilled Syringe] ->(410675002 | Route of administration (attribute))->[34206005 | Subcutaneous route (qualifier value)]	Postcoordinated Expression	1
SNOMED CT	[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 | Direct substance (attribute))->[Rx;861363 0.4 ML Fondaparinux sodium 12.5 MG/ML Prefilled Syringe] ->(410675002 | Route of administration (attribute))->[34206005 | Subcutaneous route (qualifier value)]	Postcoordinated Expression	1
SNOMED CT	[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
	|Administration - action (qualifier value)] ->(363701004 | Direct substance (attribute))->[Rx;978725 0.2 ML Dalteparin Sodium 12500 UNT/ML Prefilled Syringe] ->(410675002 | Route of administration (attribute))->[34206005 | Subcutaneous route (qualifier value)]		
SNOMED CT	[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 | Direct substance (attribute))->[Rx;978744 0.6 ML Dalteparin Sodium 25000 UNT/ML Prefilled Syringe] ->(410675002 | Route of administration (attribute))->[34206005 | Subcutaneous route (qualifier value)]	Postcoordinated Expression	1
SNOMED CT	[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 | Direct substance (attribute))->[Rx;978746 0.72 ML Dalteparin Sodium 25000 UNT/ML Prefilled Syringe] ->(410675002 | Route of administration (attribute))->[34206005 | Subcutaneous route (qualifier value)]	Postcoordinated Expression	1
SNOMED CT	[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
	Direct substance (attribute))->[Rx;978755 1 ML Dalteparin Sodium 10000 UNT/ML Prefilled Syringe] ->(410675002 | Route of administration (attribute))->[34206005 | Subcutaneous route (qualifier value)]		

[a]If a code is used multiple times in the KNART, only the display text of the first instance is shown.

[b]Count of the number of times the given code system and code pair is used in the KNART.

[c]TSR-NoCode is a placeholder indicating a code was requested, but was not provided.

Chapter 6. Behavior Symbols

Table 6.1. Group Organizational Behavior

Symbol	Name	Definition
▸	Sentence Group	A group of related alternative actions is a sentence group if the item referenced by the action is the same in all the actions, and each action simply constitutes a different variation on how to specify the details for that item. For example, two actions that could be in a SentenceGroup are "aspirin, 500 mg, 2 times per day" and "aspirin, 300 mg, 3 times per day". In both cases, aspirin is the item referenced by the action, and the two actions represent two different options for how aspirin might be ordered for the patient. Note that a SentenceGroup would almost always have an associated selection behavior of "AtMostOne", unless it's a required action, in which case, it would be "ExactlyOne".
▹	Logical Group	A group with this behavior logically groups its sub-elements, and may be shown as a visual group to the end user, but it is not required to do so.
➢	Visual Group	Any group marked with this behavior should be displayed as a visual group to the end user.

Table 6.2. Group Selection Behavior

Symbol	Name	Definition
□	Any	Any number of the items in the group may be chosen, from zero to all.
◉	All	All the items in the group must be selected as a single unit.
◎	AllOrNone	All the items in the group are meant to be chosen as a single unit: either all must be selected by the end user, or none may be selected.
○	ExactlyOne	The end user must choose one and only one of the selectable items in the group. The user may not choose none of the items in the group.
✪	AtMostOne	The end user may choose zero or at most one of the items in the group.
❁	OneOrMore	The end user must choose a minimum of one, and as many additional as desired.

Table 6.3. Required Behavior

Symbol	Name	Definition
✦	Must	An action with this behavior must be included in the actions processed by the end user; the end user may not choose not to include this action.

Symbol	Name	Definition
✧	Could	An action with this behavior may be included in the set of actions processed by the end user.
➢	MustUnlessDocumented	An action with this behavior must be included in the set of actions processed by the end user, unless the end user provides documentation as to why the action was not included.

Table 6.4. Precheck Behavior

Symbol	Name	Definition
▲	Yes	An action with this behavior is one of the most frequent actions that is, or should be, included by an end user, for the particular context in which the action occurs. The system displaying the action to the end user should consider "pre-checking" such an action as a convenience for the user.
▽	No	An action with this behavior is one of the less frequent actions included by the end user, for the particular context in which the action occurs. The system displaying the actions to the end user would typically not "pre-check" such an action.

Table 6.5. Cardinality Behavior

Symbol	Name	Definition
◆	Single	An action with this behavior may only be completed once.
❖	Multiple	An action with this behavior may be repeated multiple times.

Table 6.6. Item Flags

Symbol	Name	Definition
☞	fillIn	This item, in a list entry, allows the user to enter a fill in value that is not present in the set of presented choices.

Table 6.7. Read Only Behavior

Symbol	Name	Definition
☆	true	For a particular action or action group, specifies whether the elements are read only.

Appendix A. References

This appendix contains the list of related resources and supporting documents used in creating this KNART.

List of References

Related Resources

[CCWP] *Cardiology: Inpatient Heparin Anticoagulation Protocol Clinical Content White Paper*

[CSD] *Cardiology: Inpatient Heparin Anticoagulation Protocol Documentation Template Conceptual Structure Document*

[KVRpt] *Cardiology: Inpatient Heparin Anticoagulation Protocol Documentation Template KNART Validation Report*

[Caprini 2018] *Caprini, J. A. (2018). Caprini DVT risk assessment – venous resource center. Retrieved Apr 27, 2018, from https://venousdisease.com/caprini-dvt-risk-assessment/* (link [http://venousdisease.com/caprini-dvt-risk-assessment])

[Barbar 2018] *Barbar, S. (2018). Padua prediction score for risk of VTE. Retrieved Apr 27, 2018, from https://www.mdcalc.com/padua-prediction-score-risk-vte* (link [https://www.mdcalc.com/padua-prediction-score-risk-vte])

Supporting Evidence

[Bates 2012] *Bates SM, Greer IA, Middeldorp S, Veenstra DL, Prabulos A-M, Vandvik PO. VTE, Thrombophilia, Antithrombotic Therapy, and Pregnancy: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest. 2012;;141(2 Suppl):):e691S-e736S* (link [https://doi.org/10.1378/chest.11-2300])

[Douketis 2012] *Douketis JD, Spyropoulos AC, Spencer FA, et al. Perioperative Management of Antithrombotic Therapy: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest. 2012;;141(2 Suppl):):e326S-e350S* (link [https://doi.org/10.1378/chest.11-2298])

[Falck-Ytter 2012] *Falck-Ytter Y, Francis CW, Johanson NA, et al. Prevention of VTE in orthopedic surgery patients: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest. 2012;;141(2 Suppl):):e278S-e325S* (link [https://doi.org/10.1378/chest.11-2404])

[Gould 2012] *Gould MK, Garcia DA, Wren SM, et al. Prevention of VTE in nonorthopedic surgical patients: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest. 2012 Feb;;141(2 Suppl):):e227S-e277S.* (link [https://doi.org/10.1378/chest.11-2297])

[Kahn 2012] *Kahn SR, Lim W, Dunn AS, et al. Prevention of VTE in nonsurgical patients: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest. 2012 Feb;;141(2 Suppl):):e195S-e226S.* (link [https://doi.org/10.1378/chest.11-2296])

[Kearon 2012] *Kearon C, Akl EA, Comerota AJ, et al. Antithrombotic therapy for VTE disease: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based*

Clinical Practice Guidelines. Chest. 2012 Feb;;141(2 Suppl):):e419S-e496S. (link [https://doi.org/10.1378/chest.11-2301])

[Kearon 2016] *Kearon C, Akl EA, Ornelas J, et al. Antithrombotic therapy for VTE disease: CHEST guideline and expert panel report. Chest. 2016. 149. 2. 315-352.* (link [https://doi.org/10.1016/j.chest.2015.11.026])

[NASEM 2015] *National Academies of Sciences, Engineering, and Medicine. Improving Diagnosis in Health Care. Washington, DC: The National Academies Press.2015.* (link [https://doi.org/10.17226/21794])

[Raschke 1993] *Raschke RA, Reilly BM, Guidry JR, Fontana JR, Srinivas S. The weight-based heparin dosing nomogram compared with a "standard care" nomogram. A randomized controlled trial. Ann Intern Med. 1993;;119(9):):874-881.* (link [LocalDocBook])

[Rogers 2007] *Rogers 2007. Multivariable predictors of postoperative venous thromboembolic events after general and vascular surgery: results from the patient safety in surgery study.* (link [https://doi.org/10.1016/j.jamcollsurg.2007.02.072])

[Shehab 2016] *Shehab N, Lovegrove MC, Geller AI, Rose KO, Weidle NJ, Budnitz DS. US Emergency Department Visits for Outpatient Adverse Drug Events, 2013-2014. JAMA. 2016;;316(20):2115-2125.* (link [https://doi.org/10.1001/jama.2016.16201.])

[NLM 2015a] *U.S. National Library of Medicine. ARIXTRA- fondaparinux sodium injection, solution [Mylan Institutional LLC]. Revised October 2015* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=d3b30c68-cf45-4b46-8ba6-72090f7ba01a])

[NLM 2017a] *U.S. National Library of Medicine. ASPIRIN 81 MG- aspirin tablet, coated [DOLGENCORP, LLC]. Revised January 2017.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=b4064039-2345-4227-b83d-54dc13a838d3.])

[NLM 2017b] *U.S. National Library of Medicine. ELIQUIS- apixaban tablet, film coated [Cardinal Health]. Revised March 2017.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=a454cd24-0c6d-46e8-b1e4-197388606175.])

[NLM 2017c] *U.S. National Library of Medicine. ENOXAPARIN SODIUM- enoxaparin sodium injection [Amphastar Pharmaceuticals, Inc.]. Revised June 2017.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ab8118dc-aca8-478b-8290-a468cbe36ae1.])

[NLM 2009] *U.S. National Library of Medicine. FRAGMIN- dalteparin sodium injection, solution [Pfizer, Inc.]. Revised March 2009.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=529711c6-6029-4e50-8ece-c0e59b06ff38.])

[NLM 2016a] *U.S. National Library of Medicine. HEPARIN SODIUM- heparin sodium injection [Pfizer Laboratories Div Pfizer Inc]. Revised August 2016.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=56dc3074-f1c5-45a3-b923-f1d14858e06d.])

[NLM 2017d] *U.S. National Library of Medicine. PRADAXA- dabigatran etexilate mesylate capsule [Boehringer Ingelheim Pharmaceuticals Inc.]. Revised July 2017.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ba74e3cd-b06f-4145-b284-5fd6b84ff3c9.])

[NLM 2016b] *U.S. National Library of Medicine. WARFARIN SODIUM- warfarin tablet [Exelan Pharmaceuticals Inc.]. Revised May 2016.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=c0cc4511-e656-4b6d-96cd-e02e76173b9d.])

[NLM 2015b] *U.S. National Library of Medicine. XARELTO- rivaroxaban tablet, film coated [Avera McKennan Hospital]. Revised December 2015.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=1166231a-b23a-4c86-8cda-45d41b724e57.])