

Cardiology: Inpatient Heparin Anticoagulation Protocol Rule

Rule: Conceptual Structure

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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 Rule: Rule: 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 24, 2018	Published
May 24, 2018	Reviewed
May 1, 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 VA Medical Center (VAMC)
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Table 3. Artifact Identifier

Domain	Artifact ID	Name
urn:va.gov:kbs:knart:artifact:rl	d56a4d73-6ff6-529c-b51c-af9d1f8db2f7	O11

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
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. PatientAge

Expression: type=elm:SingletonFrom Annotation: Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[105726004 Age AND/OR growth finding (finding)]elm:value[elm:Code]: [258707000 year (qualifier value)]]
--

Table 1.2. IsPregnant

Expression: type=elm:Query Annotation: Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[77386006 Pregnant (finding)]]
--

Table 1.3. SpontaneousAbortionCount

Expression: type=elm:Query Annotation: Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Ha+F2s focus (attribute))->[17+F15369002 Miscarriage (disorder)] ->(363714003 Interprets (attribute))->[248989003 Number of miscarriages (observable entity)];elm:value[elm:Code]: [246432004 Number of occurrences (qualifier value)]]
--

Table 1.4. ReceivingVitaminKAntagonist

Expression: type=elm:Query Annotation: Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[722045009 Warfarin therapy (procedure)]]
--

Table 1.5. ReceivingLMWHeparin

Expression: type=elm:Query Annotation: Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[416118004 Administration (procedure)] ->(260686004 Method (attribute))->[129445006 Adminis- tration - action (qualifier value)] ->(363701004 Direct substance (attribute))->[87233003 Low molec- ular weight heparin (product)]]
--

Table 1.6. ReceivingFondaparinux

Expression: type=elm:Query

Annotation:

Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|elm:value[elm:Code]:
[[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Adminis-
tration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[737675000 |Product
containing fondaparinux sodium (medicinal product)]]

Table 1.7. ReceivingIVHeparin

Expression: type=elm:Query

Annotation:

Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|elm:value[elm:Code]:
[[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Adminis-
tration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[96382006 |Unfrac-
tionated heparin (substance)] ->(410675002 |Route of administration (attribute))->[47625008 |Intravenous
route (qualifier value)]]

Table 1.8. ReceivingSQHeparin

Expression: type=elm:Query

Annotation:

Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|elm:value[elm:Code]:
[[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Adminis-
tration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[96382006 |Unfrac-
tionated heparin (substance)] ->(410675002 |Route of administration (attribute))->[34206005 |Subcuta-
neous route (qualifier value)]]

Table 1.9. ReceivingAnticoagulant

Expression: type=elm:Query

Annotation:

Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|elm:value[elm:Code]:
[182764009 |Anticoagulant therapy (procedure)]]

Table 1.10. ReceivingThrombolytic

Expression: type=elm:Query

Annotation:

Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|elm:value[elm:Code]:
[426347000 |Thrombolytic therapy (procedure)]]

Table 1.11. ReceivingBridgingAnticoagulationTx

Expression: type=elm:Query

Annotation:

Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|elm:value[elm:Code]:
[707309004 |Bridging anticoagulant therapy with low molecular weight heparin (procedure)]]

Table 1.12. MechanicalHeartValve

Expression: type=elm:Query

Annotation:

Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]:
[[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has
focus (attribute))>[699347000 |Mechanical heart valve replacement (procedure)]]

Table 1.13. AtrialFibrillation

Expression: type=elm:Query

Annotation:

Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]:
[[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has
focus (attribute))>[49436004 |Atrial fibrillation (disorder)]]

Table 1.14. VenousThromboembolism

Expression: type=elm:Query

Annotation:

Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]:
[[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has
focus (attribute))>[429098002 |Thromboembolism of vein (disorder)]]

Table 1.15. AcutePE_HighSuspicion

Expression: type=elm:Query

Annotation:

Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]:
[[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |
Has focus (attribute))>[706870000 |Acute pulmonary embolism (disorder)]]elm:value[elm:Code]:
[415684004 |Suspected (qualifier value)]

Table 1.16. AcutePE_IntermediateSuspicion

Expression: type=elm:Query

Annotation:

Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]:
[[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |
Has focus (attribute))>[706870000 |Acute pulmonary embolism (disorder)]]elm:value[elm:Code]:
[415684004 |Suspected (qualifier value)]

Table 1.17. AcuteVenousThromboembolism_HighSuspicion

Expression: type=elm:Query

Annotation:

Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]:
[[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has
focus (attribute))>[429098002 |Thromboembolism of vein (disorder)] ->(263502005 |Clinical course
(attribute))>[373933003 |Acute onset (qualifier value)];elm:value[elm:Code]: [415684004 |Suspected
(qualifier value)]

Table 1.18. AcuteVenousThromboembolism_IntermediateSuspicion

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- -(363702006 Has focus (attribute))->[429098002 Thromboembolism of vein (disorder)]- -(263502005 Clinical course (attribute))->[373933003 Acute onset (qualifier value)];elm:value[elm:Code]: [415684004 Suspected (qualifier value)]

Table 1.19. AcutePE

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- -(363702006 Has focus (attribute))->[706870000 Acute pulmonary embolism (disorder)]]

Table 1.20. AsymptomaticPE

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- -(363702006 Has focus (attribute))->[59282003 Pulmonary embolism (disorder)]]

Table 1.21. AcuteUEDVT

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- -(363702006 Has focus (attribute))->[132321000119103 Acute deep venous thrombosis of upper extremity (disorder)]]

Table 1.22. AcuteIsolatedDistalDVTLeg

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- -(363702006 Has focus (attribute))->[651000119108 Acute deep vein thrombosis of lower limb (disorder)]]

Table 1.23. AcuteProximalDVTLeg

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- -(363702006 Has focus (attribute))->[651000119108 Acute deep vein thrombosis of lower limb (disorder)]]

Table 1.24. AcuteDVTLeg

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- -(363702006 Has focus (attribute))>[651000119108 Acute deep vein thrombosis of lower limb (disorder)]]

Table 1.25. SymptomaticSplanchnicVeinThrombosis

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- -(363702006 Has focus (attribute))>[7f601aca-6a66-4922-9a72-7e86a67b36e7 Thrombosis of splanchnic vein (disor- der)]]

Table 1.26. AcuteDVTaxillary

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- -(363702006 Has focus (attribute))>[132321000119103 Acute deep venous thrombosis of upper extremity (disorder)]]

Table 1.27. AcuteDVTProximalUE

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- -(363702006 Has focus (attribute))>[132321000119103 Acute deep venous thrombosis of upper extremity (disorder)]]

Table 1.28. ThrombusExtensionDistal

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- -(363702006 Has focus (attribute))>[404223003 Deep venous thrombosis of lower extremity (disorder)]]

Table 1.29. ThrombusExtensionProximal

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- -(363702006 Has focus (attribute))>[404223003 Deep venous thrombosis of lower extremity (disorder)]]

Table 1.30. SymptomaticHepaticVeinThrombosis

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))>[38739001 Hepatic vein thrombosis (disorder)]]

Table 1.31. HasRiskFactorsForExtension

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [TSR-NoCode]

Table 1.32. HighRiskForThromboembolism

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))>[711328005 At high risk of venous thromboembolism (finding)]]

Table 1.33. CurrentActiveBleedingRisk

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))>[704348005 At risk of hemorrhage (finding)]]

Table 1.34. SevereDVTSymptoms

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)]- ->(363702006 Has focus (attribute))>[162470006 Symptom severe (finding)]- ->(42752001 Due to (attribute))>[128053003 Deep venous thrombosis (disorder)]]

Table 1.35. DiagnosticTestResults

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [TSR-NoCode]

Table 1.36. PlannedThrombectomy

Expression: type=elm:Query

Annotation:
 Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]:
 [43810009 |Removal of thrombus (procedure)]

Table 1.37. PlannedElectiveSurgery

Expression: type=elm:Query
 Annotation:
 Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]:
 [274075007 |Optional surgery (procedure)]

Table 1.38. HasIVCFilter

Expression: type=elm:Query
 Annotation:
 Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]:
 [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has
 focus (attribute))->[216051000119102 |Inferior vena cava filter in situ (finding)]]

Table 1.39. APLASyndrome

Expression: type=elm:Query
 Annotation:
 Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]:
 [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has
 focus (attribute))->[26843008 |Antiphospholipid syndrome (disorder)]]

Triggers

Table 1.40. InpatientAdmission

Trigger: type=DataEventTrigger, DataElementAdded
 Expression: type=elm:Query
 Annotation:
 Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]:
 [32485007 |Hospital admission (procedure)]

Chapter 2. Expression Definitions

Table 2.1. AdultPatient

Expression: type=elm:GreaterOrEqual
Annotation:
Codes:

Table 2.2. NotPregnant

Expression: type=elm:Not
Annotation:
Codes:

Table 2.3. SpontaneousAbortionGE3

Expression: type=elm:GreaterOrEqual
Annotation:
Codes:

Table 2.4. NotReceivingLMWHeparin

Expression: type=elm:Not
Annotation:
Codes:

Table 2.5. NotReceivingFondaparinux

Expression: type=elm:Not
Annotation:
Codes:

Table 2.6. NotReceivingIVHeparin

Expression: type=elm:Not
Annotation:
Codes:

Table 2.7. NotReceivingSQHeparin

Expression: type=elm:Not
Annotation:
Codes:

Table 2.8. NotReceivingAnticoagulant

Expression: type=elm:Not
Annotation:

Codes:

Table 2.9. NotReceivingBridgingAnticoagulationTx

Expression: type=elm:Not

Annotation:

Codes:

Table 2.10. NoDiagnosticTestResults

Expression: type=elm:Not

Annotation:

Codes:

Table 2.11. NoCurrentActiveBleedingRisk

Expression: type=elm:Not

Annotation:

Codes:

Table 2.12. NoDiagnosticTestResultsWithin4Hours

Expression: type=elm:Quantity

Annotation:

Codes:

Table 2.13. Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred

Expression: type=elm:Instance

Annotation:

Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)]elm:value[elm:Code]: [TSR-NoCode]

Table 2.14. Generate the Inpatient Heparin Anticoagulation Order Set KNART

Expression: type=elm:Instance

Annotation:

Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)]elm:value[elm:Code]: [TSR-NoCode]

Table 2.15. Notify the provider that the patient should be considered for the same anticoagulation therapy irrespective of the absence of symptoms related to the pulmonary embolism

Expression: type=elm:Instance

Annotation:

Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)]elm:value[elm:Code]: [TSR-NoCode]

Table 2.16. Notify the provider that the patient should be considered for the same intensity and duration of anticoagulation therapy irrespective of the thrombolysis

Expression: type=elm:Instance
 Annotation:
 Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)]elm:value[elm:Code]: [TSR-NoCode]

Table 2.17. Notify the provider that the patient should be considered for the same intensity and duration of anticoagulation therapy irrespective of the thrombosis removal

Expression: type=elm:Instance
 Annotation:
 Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)]elm:value[elm:Code]: [TSR-NoCode]

Table 2.18. Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.

Expression: type=elm:Instance
 Annotation:
 Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)]elm:value[elm:Code]: [TSR-NoCode]

Table 2.19. Notify the provider that the patient should be managed according to the American College of Chest Physicians perioperative anticoagulation management guidelines (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278059/>)

Expression: type=elm:Instance
 Annotation:
 Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)]elm:value[elm:Code]: [TSR-NoCode]

Table 2.20. Notify the provider that the patient should be managed according to the American College of Chest Physicians pregnancy anticoagulation guidelines (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278054/>)

Expression: type=elm:Instance
 Annotation:
 Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)]elm:value[elm:Code]: [TSR-NoCode]

Table 2.21. Notify the provider that the patient should be managed according to the American College of Chest Physicians pregnancy anticoagulation guidelines (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278054/>).

Expression: type=elm:Instance

Annotation:

Codes: elm:value[elm:Code]: [385644000 |Requested (qualifier value)]elm:value[elm:Code]: [TSR-NoCode]

Chapter 3. Actions

Condition: elm:ExpressionRefAcuteDVTLeg
Condition: elm:ExpressionRefReceivingVitaminKAntagonist
Condition: elm:ExpressionRefNotReceivingLMWHeparin
Condition: elm:ExpressionRefNotReceivingFondaparinux
Condition: elm:ExpressionRefNotReceivingIVHeparin
Condition: elm:ExpressionRefNotReceivingSQHeparin
Condition: elm:ExpressionRefNotPregnant
Acute DVT of Leg Treated with Vitamin K Antagonist
<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred</p> <p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Generate the Inpatient Heparin Anticoagulation Order Set KNART</p>
Condition: elm:ExpressionRefAcuteVenousThromboembolism_HighSuspicion
Condition: elm:ExpressionRefNoDiagnosticTestResults
Condition: elm:ExpressionRefNotReceivingLMWHeparin
Condition: elm:ExpressionRefNotReceivingFondaparinux
Condition: elm:ExpressionRefNotReceivingIVHeparin
Condition: elm:ExpressionRefNotReceivingSQHeparin
Condition: elm:ExpressionRefNotPregnant
High Clinical Suspicion of Acute VTE
<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred</p> <p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Generate the Inpatient Heparin Anticoagulation Order Set KNART</p>
Condition: elm:ExpressionRefAcuteVenousThromboembolism_IntermediateSuspicion
Condition: elm:ExpressionRefNoDiagnosticTestResults
Condition: elm:ExpressionRefNoDiagnosticTestResultsWithin4Hours
Condition: elm:ExpressionRefNotReceivingLMWHeparin

Condition: elm:ExpressionRefNotReceivingFondaparinux Condition: elm:ExpressionRefNotReceivingIVHeparin Condition: elm:ExpressionRefNotReceivingSQHeparin Condition: elm:ExpressionRefNotPregnant
Intermediate Clinical Suspicion of Acute VTE and Results of Diagnostic Tests Expected to Be Delayed > 4 Hours
<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p style="padding-left: 40px;">Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred</p> <p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p style="padding-left: 40px;">Generate the Inpatient Heparin Anticoagulation Order Set KNART</p>
Condition: elm:ExpressionRefAcuteIsolatedDistalDVTLeg Condition: elm:Or (SevereDVTSymptoms HasRiskFactorsForExtension) Condition: elm:ExpressionRefNotReceivingAnticoagulant Condition: elm:ExpressionRefNotPregnant
Acute Isolated Distal DVT of Leg and Severe Symptoms or Risk Factors for Extension
<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p style="padding-left: 40px;">Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred</p> <p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p style="padding-left: 40px;">Generate the Inpatient Heparin Anticoagulation Order Set KNART</p>
Condition: elm:ExpressionRefAcuteIsolatedDistalDVTLeg Condition: elm:Or (ThrombusExtensionDistal ThrombusExtensionProximal) Condition: elm:ExpressionRefNotReceivingAnticoagulant Condition: elm:ExpressionRefNotPregnant
Acute Isolated Distal DVT of Leg if Thrombus Extends within Distal System or into Proximal Veins
<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p style="padding-left: 40px;">Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred</p>

<p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Generate the Inpatient Heparin Anticoagulation Order Set KNART</p> <p>Condition:elm:ExpressionRefAcuteDVTLeg</p> <p>Condition:elm:ExpressionRefPlannedThrombectomy</p> <p>Condition:elm:ExpressionRefNotPregnant</p>
Acute DVT of Leg with Thrombectomy
<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred</p> <p>☆ Notify the provider that the patient should be considered for the same intensity and duration of anticoagulation therapy irrespective of the thrombosis removal.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Notify the provider that the patient should be considered for the same intensity and duration of anticoagulation therapy irrespective of the thrombosis removal</p> <p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Generate the Inpatient Heparin Anticoagulation Order Set KNART</p> <p>Condition:elm:ExpressionRefAcuteProximalDVTLeg</p> <p>Condition:elm:ExpressionRefHasIVCFilter</p> <p>Condition:elm:ExpressionRefNoCurrentActiveBleedingRisk</p> <p>Condition:elm:ExpressionRefNotReceivingAnticoagulant</p> <p>Condition:elm:ExpressionRefNotPregnant</p>
Acute Proximal DVT of Leg and IVC Filter If Risk of Bleeding Resolves
<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred</p> <p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Generate the Inpatient Heparin Anticoagulation Order Set KNART</p> <p>Condition:elm:ExpressionRefAcutePE</p> <p>Condition:elm:ExpressionRefNotReceivingLMWHeparin</p> <p>Condition:elm:ExpressionRefNotReceivingFondaparinux</p>

Condition: elm:ExpressionRefNotReceivingIVHeparin
Condition: elm:ExpressionRefNotReceivingSQHeparin
Condition: elm:ExpressionRefNotPregnant
Acute Pulmonary Embolism (PE)
<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p style="padding-left: 40px;">Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p style="padding-left: 40px;">Generate the Inpatient Heparin Anticoagulation Order Set KNART</p>
Condition: elm:ExpressionRefAcutePE_HighSuspicion
Condition: elm:ExpressionRefNoDiagnosticTestResults
Condition: elm:ExpressionRefNotReceivingLMWHeparin
Condition: elm:ExpressionRefNotReceivingFondaparinux
Condition: elm:ExpressionRefNotReceivingIVHeparin
Condition: elm:ExpressionRefNotReceivingSQHeparin
Condition: elm:ExpressionRefNotPregnant
High Clinical Suspicion of Acute PE
<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p style="padding-left: 40px;">Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred</p> <p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p style="padding-left: 40px;">Generate the Inpatient Heparin Anticoagulation Order Set KNART</p>
Condition: elm:ExpressionRefAcutePE_IntermediateSuspicion
Condition: elm:ExpressionRefNoDiagnosticTestResults
Condition: elm:ExpressionRefNoDiagnosticTestResultsWithin4Hours
Condition: elm:ExpressionRefNotReceivingLMWHeparin
Condition: elm:ExpressionRefNotReceivingFondaparinux
Condition: elm:ExpressionRefNotReceivingIVHeparin
Condition: elm:ExpressionRefNotReceivingSQHeparin
Condition: elm:ExpressionRefNotPregnant
Intermediate Clinical Suspicion of Acute PE if Results of Diagnostic Tests Expected to Be Delayed > 4 Hours

☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.

actionSentence[type=elm:ExpressionRef, classType=]

Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred

☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.

actionSentence[type=elm:ExpressionRef, classType=]

Generate the Inpatient Heparin Anticoagulation Order Set KNART

Condition:elm:ExpressionRefAcutePE

Condition:elm:ExpressionRefHasIVCFilter

Condition:elm:ExpressionRefNoCurrentActiveBleedingRisk

Condition:elm:ExpressionRefNotReceivingAnticoagulant

Condition:elm:ExpressionRefNotPregnant

Acute PE and IVC Filter if Risk of Bleeding Resolves

☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.

actionSentence[type=elm:ExpressionRef, classType=]

Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred

☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.

actionSentence[type=elm:ExpressionRef, classType=]

Generate the Inpatient Heparin Anticoagulation Order Set KNART

Condition:elm:ExpressionRefAsymptomaticPE

Condition:elm:ExpressionRefNotPregnant

Asymptomatic PE

☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.

actionSentence[type=elm:ExpressionRef, classType=]

Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred

☆ Notify the provider that the patient should be considered for the same anticoagulation therapy irrespective of the absence of symptoms related to the pulmonary embolism.

actionSentence[type=elm:ExpressionRef, classType=]

Notify the provider that the patient should be considered for the same anticoagulation therapy irrespective of the absence of symptoms related to the pulmonary embolism

☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.

actionSentence[type=elm:ExpressionRef, classType=]

<p>Generate the Inpatient Heparin Anticoagulation Order Set KNART</p> <p>Condition:elm:Or (AcuteDVTaxillary AcuteDVTproximalUE)</p> <p>Condition:elm:ExpressionRefNotReceivingLMWHeparin</p> <p>Condition:elm:ExpressionRefNotReceivingFondaparinux</p> <p>Condition:elm:ExpressionRefNotReceivingIVHeparin</p> <p>Condition:elm:ExpressionRefNotReceivingSQHeparin</p> <p>Condition:elm:ExpressionRefNotPregnant</p>
<p>Acute Upper-Extremity DVT That Involves Axillary or More Proximal Veins</p>
<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred</p> <p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Generate the Inpatient Heparin Anticoagulation Order Set KNART</p> <p>Condition:elm:ExpressionRefAcuteUEDVT</p> <p>Condition:elm:ExpressionRefReceivingThrombolytic</p> <p>Condition:elm:ExpressionRefNotPregnant</p>
<p>Acute Upper-Extremity DVT with Thrombolysis</p>
<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred</p> <p>☆ Notify the provider that the patient should be considered for the same intensity and duration of anticoagulation therapy irrespective of the thrombolysis.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Notify the provider that the patient should be considered for the same intensity and duration of anticoagulation therapy irrespective of the thrombolysis</p> <p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Generate the Inpatient Heparin Anticoagulation Order Set KNART</p> <p>Condition:elm:ExpressionRefSymptomaticSplanchnicVeinThrombosis</p> <p>Condition:elm:ExpressionRefNotReceivingAnticoagulant</p> <p>Condition:elm:ExpressionRefNotPregnant</p>
<p>Symptomatic Splanchnic Vein Thrombosis</p>

<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred</p> <p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Generate the Inpatient Heparin Anticoagulation Order Set KNART</p> <p>Condition:elm:ExpressionRefSymptomaticHepaticVeinThrombosis</p> <p>Condition:elm:ExpressionRefNotReceivingAnticoagulant</p> <p>Condition:elm:ExpressionRefNotPregnant</p>	<p>Symptomatic Hepatic Vein Thrombosis</p>
<p>☆ Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Notify the provider that the patient is a candidate for intravenous unfractionated heparin, although other options may be preferred</p> <p>☆ Generate the Inpatient Heparin Anticoagulation Order Set KNART.</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Generate the Inpatient Heparin Anticoagulation Order Set KNART</p> <p>Condition:elm:ExpressionRefPlannedElectiveSurgery</p> <p>Condition:elm:ExpressionRefReceivingVitaminKAntagonist</p> <p>Condition:elm:AnyTrue</p> <p>Condition:elm:ExpressionRefHighRiskForThromboembolism</p> <p>Condition:elm:ExpressionRefNotReceivingBridgingAnticoagulationTx</p>	<p>Perioperative Anticoagulation with Mechanical Heart Valve, Atrial Fibrillation, or VTE at High Risk for Additional Thromboembolism</p>
<p>☆ Notify the provider that the patient should be managed according to the American College of Chest Physicians perioperative anticoagulation management guidelines (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278059/).</p> <p>actionSentence[type=elm:ExpressionRef, classType=]</p> <p>Notify the provider that the patient should be managed according to the American College of Chest Physicians perioperative anticoagulation management guidelines (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278059/)</p> <p>([Douketis 2012 Douketis 2012 Douketis 2012])</p> <p>Perioperative management of antithrombotic therapy: Antithrombotic Therapy and Prevention of Thrombosis link [https://doi.org/10.1378/chest.11-2298]</p> <p>Condition:elm:ExpressionRefPlannedElectiveSurgery</p> <p>Condition:elm:ExpressionRefReceivingBridgingAnticoagulationTx</p>	

Perioperative Anticoagulation with UFH - Timing of Pre-surgical Stopping of UFH

☆ Notify the provider that the patient should be managed according to the American College of Chest Physicians perioperative anticoagulation management guidelines (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278059/>).

actionSentence[type=elm:ExpressionRef, classType=]

Notify the provider that the patient should be managed according to the American College of Chest Physicians perioperative anticoagulation management guidelines (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278059/>)

([Douketis 2012 Douketis 2012 Douketis 2012]) Perioperative management of antithrombotic therapy: Antithrombotic Therapy and Prevention of Thrombosis link [<https://doi.org/10.1378/chest.11-2298>]

Condition:elm:ExpressionRefsPregnant

Condition:elm:ExpressionRefAPLASyndrome

Condition:elm:ExpressionRefSpontaneousAbortionGE3

Pregnancy with Antiphospholipid Antibodies (APLA) Syndrome

☆ Notify the provider that the patient should be managed according to the American College of Chest Physicians pregnancy anticoagulation guidelines (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278054/>).

actionSentence[type=elm:ExpressionRef, classType=]

Notify the provider that the patient should be managed according to the American College of Chest Physicians pregnancy anticoagulation guidelines (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278054/>)

([Bates 2012 Bates 2012 Bates 2012]) VTE, Thrombophilia, Antithrombotic Therapy, and Pregnancy: Antithrombotic Therapy and Prevention of Thrombosis link [<https://doi.org/10.1378/chest.11-2300>]

Condition:elm:ExpressionRefsPregnant

Condition:elm:ExpressionRefMechanicalHeartValve

Pregnancy with Mechanical Heart Valve

☆ Notify the provider that the patient should be managed according to the American College of Chest Physicians pregnancy anticoagulation guidelines (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278054/>).

actionSentence[type=elm:ExpressionRef, classType=]

Notify the provider that the patient should be managed according to the American College of Chest Physicians pregnancy anticoagulation guidelines (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278054/>).

([Bates 2012 Bates 2012 Bates 2012]) VTE, Thrombophilia, Antithrombotic Therapy, and Pregnancy: Antithrombotic Therapy and Prevention of Thrombosis link [<https://doi.org/10.1378/chest.11-2300>]

Chapter 4. Tabular List

Terminology Service Request (TSR) Mappings

Table 4.1. Terminology Versions

Name	Identifier	Version
SNOMED CT	2.16.840.1.113883.6.96	United States Edition 20180301

Table 4.2. Terminology References

System	Code	Display Text ^a	References ^b
SNOMED CT	133936004 Adult (person)	Adult patients	1
SNOMED CT	182764009 Anticoagulant therapy (procedure)	Precoordinated Expression	1
SNOMED CT	246432004 Number of occurrences (qualifier value)	Precoordinated Expression	1
SNOMED CT	258707000 year (qualifier value)	Precoordinated Expression	1
SNOMED CT	274075007 Optional surgery (procedure)	Precoordinated Expression	1
SNOMED CT	32485007 Hospital admission (procedure)	Precoordinated Expression	1
SNOMED CT	385644000 Requested (qualifier value)	Precoordinated Expression	9
SNOMED CT	398166005 Performed (qualifier value)	Precoordinated Expression	40
SNOMED CT	415684004 Suspected (qualifier value)	Precoordinated Expression	4
SNOMED CT	426347000 Thrombolytic therapy (procedure)	Precoordinated Expression	1
SNOMED CT	43810009 Removal of thrombus (procedure)	Precoordinated Expression	1
SNOMED CT	707309004 Bridging anticoagulant therapy with low molecular weight heparin (procedure)	Precoordinated Expression	1
SNOMED CT	TSR-NoCode ^c	Precoordinated Expression	11
SNOMED CT	[416118004 Administration (procedure)] ->(260686004 Method (attribute))>[129445006 Administration - action (qualifier value)] ->(363701004 Direct substance (at-	Postcoordinated Expression	1

System	Code	Display Text ^a	References ^b
	tribute))->[737675000 Product containing fonda-parinux sodium (medicinal product)]		
SNOMED CT	[416118004 Administration (procedure)] ->(260686004 Method (attribute))->[129445006 Administration - action (qualifier value)] ->(363701004 Direct substance (attribute))->[87233003 Low molecular weight heparin (product)]	Postcoordinated Expression	1
SNOMED CT	[416118004 Administration (procedure)] ->(260686004 Method (attribute))->[129445006 Administration - action (qualifier value)] ->(363701004 Direct substance (attribute))->[96382006 Unfractionated heparin (substance)] ->(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))->[96382006 Unfractionated heparin (substance)] ->(410675002 Route of administration (attribute))->[47625008 Intravenous route (qualifier value)]	Postcoordinated Expression	1
SNOMED CT	[722045009 Warfarin therapy (procedure)]	Precoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7750a3a Observation proce-	Postcoordinated Expression	1

System	Code	Display Text ^a	References ^b
	dure (procedure)] - >(363702006 Has focus (attribute))->[105726004 Age AND/OR growth finding (finding)]		
SNOMED CT	[a997cc03-3e99-40e- b-833a-6374c7750a3a Ob- servation procedure (pro- cedure)] ->(363702006 Has focus (at- tribute))->[216051000119102 Inferior vena cava filter in situ (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e- b-833a-6374c7750a3a Observation proce- dure (procedure)] - >(363702006 Has focus (attribute))->[26843008 Antiphospholipid syn- drome (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e- b-833a-6374c7750a3a Observation proce- dure (procedure)] - >(363702006 Has focus (attribute))->[38739001 Hepatic vein thrombosis (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e- b-833a-6374c7750a3a Observation proce- dure (procedure)] - >(363702006 Has focus (attribute))->[429098002 Thromboembolism of vein (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e- b-833a-6374c7750a3a Observation proce- dure (procedure)] - >(363702006 Has focus (attribute))->[49436004 Atrial fibrillation (disor- der)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e- b-833a-6374c7750a3a Observation proce- dure (procedure)] - >(363702006 Has focus (attribute))->[49436004 Atrial fibrillation (disor- der)]	Postcoordinated Expression	1

System	Code	Display Text ^a	References ^b
	(attribute))->[59282003 Pulmonary embolism (disorder)]		
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a Observation procedure (procedure)] - >(363702006 Has focus (attribute))->[699347000 Mechanical heart valve replacement (procedure)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a Observation procedure (procedure)] - >(363702006 Has focus (attribute))->[704348005 At risk of hemorrhage (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a Observation procedure (procedure)] - >(363702006 Has focus (attribute))->[706870000 Acute pulmonary embolism (disorder)]	Postcoordinated Expression	3
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a Observation procedure (procedure)] - >(363702006 Has focus (attribute))->[711328005 At high risk of venous thromboembolism (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a Observation procedure (procedure)] - >(363702006 Has focus (attribute))->[77386006 Pregnant (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a Observation procedure (procedure)] - >(363702006 Ha+F2s focus (attribute))->[17+F15369002 Miscarriage (disorder)]-	Postcoordinated Expression	1

System	Code	Display Text ^a	References ^b
	->(363714003 Interprets (attribute))->[248989003 Number of miscarriages (observable entity)];		
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a Observation procedure (procedure)]- ->(363702006 Has focus (attribute))->[132321000119103 Acute deep venous thrombosis of upper extremity (disorder)]	Postcoordinated Expression	3
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a Observation procedure (procedure)]- ->(363702006 Has focus (attribute))->[162470006 Symptom severe (finding)]- ->(42752001 Due to (attribute))->[128053003 Deep venous thrombosis (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a Observation procedure (procedure)]- ->(363702006 Has focus (attribute))->[404223003 Deep venous thrombosis of lower extremity (disorder)]	Postcoordinated Expression	2
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a Observation procedure (procedure)]- ->(363702006 Has focus (attribute))->[429098002 Thromboembolism of vein (disorder)]- ->(263502005 Clinical course (attribute))->[373933003 Acute onset (qualifier value)];	Postcoordinated Expression	2
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a Observation procedure (procedure)]- ->(363702006 Has focus (attribute))->[651000119108	Postcoordinated Expression	3

Tabular List

System	Code	Display Text ^a	References ^b
	[Acute deep vein thrombosis of lower limb (disorder)]		
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a Observation procedure (procedure)]- - >(363702006 Has focus (attribute))->[7f601a-ca-6a66-4922-9a72-7e86a67b36e7 Thrombosis of splanchnic vein (disorder)]	Postcoordinated Expression	1

^aIf a code is used multiple times in the KNART, only the display text of the first instance is shown.

^bCount of the number of times the given code system and code pair is used in the KNART.

^cTSR-NoCode is a placeholder indicating a code was requested, but was not provided.

Chapter 5. Behavior Symbols

Table 5.1. Group Organizational Behavior

Sym- bol	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 5.2. Group Selection Behavior

Sym- bol	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 5.3. Required Behavior

Sym- bol	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.

Sym- bol	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 5.4. Precheck Behavior

Sym- bol	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 5.5. Cardinality Behavior

Sym- bol	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 5.6. Item Flags

Sym- bol	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 5.7. Read Only Behavior

Sym- bol	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] *Inpatient Heparin Anticoagulation Protocol Clinical Content White Paper*

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

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

[CapriniScoreDVT] *Caprini score: DVT risk assessment. Venous Resource Center website. Accessed August 8, 2017 (link [<http://venousdisease.com/caprini-dvt-risk-assessment/>])*

[PaduaPredScore] *Padua Prediction Score for Risk of VTE. MDCalc website. Accessed August 8, 2017 (link [<https://www.mdcalc.com/padua-prediction-score-risk-vte/>])*

Supporting Evidence

[Bates 2012] Bates SM, Greer IA, Middeldorp S, Veenstra DL, Prabulos AM, 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 Feb;141(2 Suppl):e691S-e736S (link [<https://doi.org/10.1378/chest.11-2300>])*

[Douketis 2012] Douketis JD, Spyropoulos AC, Spencer FA, Mayr M, Jaffer AK, Eckman MH, Dunn AS, Kunz R. *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 Feb;141(2 Suppl):e326S-e350S (link [<https://doi.org/10.1378/chest.11-2298>])*

[Falck-Ytter 2012] Falck-Ytter Y, Francis CW, Johanson NA, Curley C, Dahl OE, Schulman S, Ortel TL, Pauker SG, Colwell CW Jr. *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 Feb;141(2 Suppl):e278S-e325S (link [<https://doi.org/10.1378/chest.11-2404>])*

[Gould 2012] Gould MK, Garcia DA, Wren SM, Karanickolas PJ, Arcelus JJ, Heit JA, Samama CM. *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, Cushman M, Dentali F, Akl EA, Cook DJ, Balekian AA, Klein RC, Le H, Schulman S, Murad MH. *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, Prandoni P, Bounameaux H, Goldhaber SZ, Nelson ME, Wells PS, Gould MK, Dentali F, Crowther M, Kahn SR. *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, Blaivas A, Jimenez D, Bounameaux H, Huisman M, King CS, Morris TA, Sood N, Stevens SM, Vintch JRE, Wells P, Woller SC, Moores L. *Antithrombotic Therapy for VTE Disease: CHEST Guideline and Expert Panel Report. Chest. 2016 Feb;149(2):315-352* (link [<https://doi.org/10.1016/j.chest.2015.11.026>])
- [Balogh 2015] Balogh EP, Miller BT, Ball JR. *Improving Diagnosis in Health Care. Washington (DC): National Academies Press (US); 2015 Dec* (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 Nov 1;119(9):874-81* (link [<http://annals.org/aim/article-abstract/706814/weight-based-heparin-dosing-nomogram-compared-standard-care-nomogram-randomized?volume=119&issue=9&page=874>])
- [Rogers 2007] Rogers SO Jr, Kilaru RK, Hosokawa P, Henderson WG, Zinner MJ, Khuri SF. *Multivariable predictors of postoperative venous thromboembolic events after general and vascular surgery: results from the patient safety in surgery study. J Am Coll Surg. 2007 Jun;204(6):1211-21* (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 Nov 22;316(20):2115-2125* (link [<https://doi.org/10.1001/jama.2016.16201>])
- [DailyMed Arixtra] U.S. National Library of Medicine. *ARIXTRA- fondaparinux sodium injection, solution [Mylan Institutional LLC]. DailyMed website. Revised October 2015* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=d3b30c68-cf45-4b46-8ba6-72090f7ba01a>])
- [DailyMed Aspirin] U.S. National Library of Medicine. *ASPIRIN 81 MG- aspirin tablet, coated [DOLGENCORP, LLC]. DailyMed website. Revised January 2017* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=b4064039-2345-4227-b83d-54dc13a838d3>])
- [DailyMed Eliquis] U.S. National Library of Medicine. *ELIQUIS- apixaban tablet, film coated [Cardinal Health]. DailyMed website. Revised March 2017* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=a454cd24-0c6d-46e8-b1e4-197388606175>])
- [DailyMed Enoxaparin] U.S. National Library of Medicine. *ENOXAPARIN SODIUM- enoxaparin sodium injection [Amphastar Pharmaceuticals, Inc.]. DailyMed website. Revised June 2017* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ab8118dc-aca8-478b-8290-a468cbe36ae1>])
- [DailyMedFond] U.S. National Library of Medicine. *FONDAPARINUX SODIUM- fondaparinux sodium injection [Dr. Reddy's Laboratories Inc.]. DailyMed website. Revised September 2016* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=8a27f341-f612-de72-8c1f-3fd977905de0>])
- [DailyMed Fragmin] U.S. National Library of Medicine. *FRAGMIN- dalteparin sodium injection, solution [Pfizer, Inc.]. DailyMed website. Revised March 2009* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=529711c6-6029-4e50-8ece-c0e59b06ff38>])
- [DailyMed Heparin1] U.S. National Library of Medicine. *HEPARIN SODIUM- heparin sodium injection [Pfizer Laboratories Div Pfizer Inc]. DailyMed website. Revised August 2016* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=56dc3074-f1c5-45a3-b923-f1d14858e06d>])
- [DailyMed Heparin2] U.S. National Library of Medicine. *HEPARIN SODIUM- heparin sodium injection, solution. DailyMed website. Revised April 2016* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=e-fcdb321-832b-4554-8049-dbbb33b48334>])

- [DailyMed Pradaxa] *U.S. National Library of Medicine. PRADAXA- dabigatran etexilate mesylate capsule [Boehringer Ingelheim Pharmaceuticals Inc.]. DailyMed website. Revised July 2017* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ba74e3cd-b06f-4145-b284-5fd6b84ff3c9>])
- [DailyMed Warfarin] *U.S. National Library of Medicine. WARFARIN SODIUM- warfarin tablet [Exelan Pharmaceuticals Inc.]. DailyMed website. Revised May 2016* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=c0cc4511-e656-4b6d-96cd-e02e76173b9d>])
- [DailyMed Xarelto] *U.S. National Library of Medicine. XARELTO- rivaroxaban tablet, film coated [Avera McKennan Hospital]. DailyMed website. Revised December 2015* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=1166231a-b23a-4c86-8cda-45d41b724e57>])