Cardiology: Inpatient Heparin Anticoagulation Protocol Rule

Rule: Conceptual Structure

Contract: VA118-16-D-1008, Task Order (TO): VA-118-16-F-1008-0007, CLIN0007CA

Department of Veterans Affairs (VA)

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

Publication date 06/18/2018

Version: 1.0

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)

B3 Group, Inc.

Cognitive Medical Systems, Inc.

Table of Contents

List of Tables

Preface

Table 1. Revision History

Date	Life Cycle Event
June 18, 2018	Published
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 VAMC
Scott Wall, MD	Author	Assistant Professor, Cardiovascular Medicine, University of Utah School of Medicine; Staff Cardiologist, Electrophysiology, Salt Lake City VAMC
Aiden Abidov, MD PhD	Author	Professor of Medicine, Wayne State University; Section Chief, Cardiology John Dingell VA Medical Center
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	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)]]

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)];]

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 | Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[87233003 |Low molecular 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 | Administration - 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 | Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[96382006 | Unfractionated 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 | Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[96382006 | Unfractionated heparin (substance)] ->(410675002 |Route of administration (attribute))->[34206005 | Subcutaneous 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 (disorder)]]

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

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: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

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: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

 # 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: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

 # 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: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

 # 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:ExpressionRefAcuteDVTLeg

Condition:elm:ExpressionRefPlannedThrombectomy

Condition:elm:ExpressionRefNotPregnant

Acute DVT of Leg with Thrombectomy

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 intensity and duration of anticoagulation therapy irrespective of the thrombosis removal.

actionSentence[type=elm:ExpressionRef, classType=]

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

Generate the Inpatient Heparin Anticoagulation Order Set KNART.

actionSentence[type=elm:ExpressionRef, classType=]

> Generate the Inpatient Heparin Anticoagulation Order Set KNART

Condition:elm:ExpressionRefAcuteProximalDVTLeg

Condition:elm:ExpressionRefHasIVCFilter

Condition:elm:ExpressionRefNoCurrentActiveBleedingRisk

Condition:elm:ExpressionRefNotReceivingAnticoagulant

Condition:elm:ExpressionRefNotPregnant

Acute Proximal DVT of Leg 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:ExpressionRefAcutePE

Condition:elm:ExpressionRefNotReceivingLMWHeparin

Condition:elm:ExpressionRefNotReceivingFondaparinux

Condition:elm:ExpressionRefNotReceivingIVHeparin

Condition:elm:ExpressionRefNotReceivingSQHeparin

Condition:elm:ExpressionRefNotPregnant

Acute Pulmonary Embolism (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.

 # Generate the Inpatient Heparin Anticoagulation Order Set KNART.

actionSentence[type=elm:ExpressionRef, classType=]

> Generate the Inpatient Heparin Anticoagulation Order Set KNART

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

 # 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_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=]

	Generate the Inpatient Heparin Anticoagulation Order Set KNART

Condition:elm:Or (AcuteDVTAxillary AcuteDVTProximalUE)

Condition:elm:ExpressionRefNotReceivingLMWHeparin

Condition:elm:ExpressionRefNotReceivingFondaparinux

Condition:elm:ExpressionRefNotReceivingIVHeparin

Condition:elm:ExpressionRefNotReceivingSQHeparin

Condition:elm:ExpressionRefNotPregnant

Acute Upper-Extremity DVT That Involves Axillary or More Proximal Veins

 # 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:ExpressionRefAcuteUEDVT

Condition:elm:ExpressionRefReceivingThrombolytic

Condition:elm:ExpressionRefNotPregnant

Acute Upper-Extremity DVT with Thrombolysis

 # 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 intensity and duration of anticoagulation therapy irrespective of the thrombolysis.

actionSentence[type=elm:ExpressionRef, classType=]

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

 # Generate the Inpatient Heparin Anticoagulation Order Set KNART.

actionSentence[type=elm:ExpressionRef, classType=]

	Generate the Inpatient Heparin Anticoagulation Order Set KNART

Condition:elm:ExpressionRefSymptomaticSplanchnicVeinThrombosis

Condition:elm:ExpressionRefNotReceivingAnticoagulant

Condition:elm:ExpressionRefNotPregnant

Symptomatic Splanchnic Vein Thrombosis

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:ExpressionRefSymptomaticHepaticVeinThrombosis

Condition:elm:ExpressionRefNotReceivingAnticoagulant

Condition:elm:ExpressionRefNotPregnant

Symptomatic Hepatic Vein Thrombosis

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:ExpressionRefPlannedElectiveSurgery

Condition:elm:ExpressionRefReceivingVitaminKAntagonist

Condition:elm:AnyTrue

Condition:elm:ExpressionRefHighRiskForThromboembolism

Condition:elm:ExpressionRefNotReceivingBridgingAnticoagulationTx

Perioperative Anticoagulation with Mechanical Heart Valve, Atrial Fibrillation, or VTE at High Risk for Additional Thromboembolism

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:ExpressionRefPlannedElectiveSurgery

Condition:elm:ExpressionRefReceivingBridgingAnticoagulationTx

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:ExpressionRefIsPregnant

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:ExpressionRefIsPregnant

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	Identifer	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	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 (attribute))->[737675000 |Product containing fondaparinux sodium (medicinal product)]	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))->[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-0374c7751ba3 |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))-	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
	>[105726004 |Age AND/ OR growth finding (finding)]		
SNOMED CT	[a997cc03-3e99-40eb-833a- |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))- >[216051000119102 | Inferior vena cava filter in situ (finding)]	Post-coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a- |Observation procedure (procedure)] - >(363702006 |Has focus (attribute))->[26843008 |Antiphospholipid syndrome (disorder)]	Post-coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a- |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))- >[38739001 |Hepatic vein thrombosis (disorder)]	Post-coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a- |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))- >[429098002 | Thromboembolism of vein (disorder)]	Post-coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a- |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))- >[49436004 |Atrial fibrillation (disorder)]	Post-coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a- |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))- >[59282003 |Pulmonary embolism (disorder)]	Post-coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a- |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))- >[699347000 |Mechanical heart valve replacement (procedure)]	Post-coordinated Expression	1

System	Code	Display Text[a]	References[b]
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7715032 |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[704348005 |At risk of hemorrhage (finding)]	Post-coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7715032 |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[706870000 |Acute pulmonary embolism (disorder)]	Post-coordinated Expression	3
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7715032 |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[711328005 |At high risk of venous thromboembolism (finding)]	Post-coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7715032 |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[77386006 |Pregnant (finding)]	Post-coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7715032 |Observation procedure (procedure)]- ->(363702006 |Ha+F2s focus (attribute))->[17+F15369002 |Miscarriage (disorder)]- ->(363714003 |Interprets (attribute))->[248989003 |Number of miscarriages (observable entity)];	Post-coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7715032 |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[132321000119103 |Acute deep venous thrombosis of upper extremity (disorder)]	Post-coordinated Expression	3
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7715032 |Observation procedure (procedure)]- -	Post-coordinated Expression	1

System	Code	Display Text[a]	References[b]
	>(363702006 |Has focus (attribute))->[162470006 |Symptom severe (finding)]- ->(42752001 |Due to (attribute))->[128053003 |Deep venous thrombosis (disorder)]		
SNOMED CT	[a997cc03-3e99-40eb-833a-0374ac7750n3 |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[404223003 | Deep venous thrombosis of lower extremity (disorder)]	TSR-Coordinated Expression[c]	2
SNOMED CT	[a997cc03-3e99-40eb-833a-0374ac7750n3 |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[429098002 |Thromboembolism of vein (disorder)]- ->(263502005 |Clinical course (attribute))->[373933003 |Acute onset (qualifier value)];	TSR-Coordinated Expression[c]	2
SNOMED CT	[a997cc03-3e99-40eb-833a-0374ac7750n3 |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[651000119108 |Acute deep vein thrombosis of lower limb (disorder)]	TSR-Coordinated Expression[c]	3
SNOMED CT	[a997cc03-3e99-40eb-833a-0374ac7750n3 |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[7f601aca-6a66-4922-9a72-7e86a67b36e7 |Thrombosis of splanchnic vein (disorder)]	TSR-Coordinated Expression[c]	1

[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 5. Behavior Symbols

Table 5.1. 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 5.2. 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 5.3. 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.
◇	Could	An action with this behavior may be included in the set of actions processed by the end user.

Symbol	Name	Definition
➢	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

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 5.5. 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 5.6. 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 5.7. 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] *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, Karanicolas PJ, Arcelus JI, 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=efcdb321-832b-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])