

Gastroenterology: Colorectal Cancer Risk 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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Gastroenterology: Colorectal Cancer Risk Rule: Rule: Conceptual Structure

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

Publication date 06/18/2018

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Preface

Table 1. Revision History

Date	Life Cycle Event
June 18, 2018	Published
May 29, 2018	Published
May 29, 2018	Reviewed
April 24, 2018	Created
April 24, 2018	Pre-published

Table 2. Clinical White Paper Contributors

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Table 3. Artifact Identifier

Domain	Artifact ID	Name
urn:va.gov:kbs:knart:artifact:r1	5ef17089-20bd-5358-869c-43d2b1d75dc3	B1

Artifact Applicability

Table 4. Applicability Foci, Description and Codes

Focus	Description	Code System	Code	Value Set	Value Set Version
TargetUser	Primary Care Provider	SNOMED CT	453231000124104 Primary care provider (occupation)	N/A	N/A
PatientAgeGroup	Adult	SNOMED CT	133936004 Adult (person)	N/A	N/A
ClinicalFocus	Routine unless otherwise identified			N/A	N/A
WorkflowSetting	Primary Care	SNOMED CT	5351000124100 Primary care clinic (environment)	N/A	N/A
ClinicalVenue	Outpatient	SNOMED CT	33022008 Hospital-based outpatient department (environment)	N/A	N/A
WorkflowTask	Colorectal Cancer Screening, Diagnostic Evaluation, or Surveillance			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. TimeFrameForRescoping

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

Table 1.2. Outpatient

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

Table 1.3. FirstDegreeRelativeDiagnosedWithColorectalCancer

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))>[363510005 Malignant tumor of large intestine (disorder)]]

Table 1.4. FirstDegreeFamilyMemberWithAdvancedAdenoma

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))>[c27d79c3-544d-418d-92f3-0fe6e1a7f2f5 Advanced adenoma of large intestine (disorder)]]

Table 1.5. PersonalHistoryLynchSyndrome

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))>[716318002 Lynch syndrome (disorder)]]

Table 1.6. FamilyHistoryLynchSyndrome

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))>[716318002 Lynch syndrome (disorder)]]

Table 1.7. PersonalHistoryColorectalCancerTypeX

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))->[b1ad8fa9-668d-4191-930f-eebfdf13a914 Familial Colorectal Cancer Type X (disorder)]]

Table 1.8. FamilyHistoryColorectalCancerTypeX

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))->[b1ad8fa9-668d-4191-930f-eebfdf13a914 Familial Colorectal Cancer Type X (disorder)]]

Table 1.9. PersonalHistoryOfColorectalCancer

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))->[363510005 Malignant tumor of large intestine (disorder)]]

Table 1.10. PersonalHistoryOfAdvancedAdenoma

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))->[c27d79c3-544d-418d-92f3-0fe6e1a7f2f5 Advanced adenoma of large intestine (disorder)]]

Table 1.11. TotalColectomy

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [26390003 Total colectomy (procedure)]

Table 1.12. ReceivingHospice

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [385763009 Hospice care (regime/therapy)]

Table 1.13. ReceivingEndOfLifeCare

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [182964004 Terminal care (regime/therapy)]

Table 1.14. DocumentedDecisionToStopColorectalCancerScreening

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

Table 1.15. FlexibleSigmoidoscopyWithin5Years

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic, dateProperty=dateTime
Annotation:
Codes: elm:element[elm:Code]: [44441009 Flexible fiberoptic sigmoidoscopy (procedure)]
dateRange[elm:Interval] low: elm:Add(elm:Today() elm:Quantity(-5 Year))
high: elm:Today()

Table 1.16. ColonoscopyWithin10Years

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic, dateProperty=dateTime
Annotation:
Codes: elm:element[elm:Code]: [[73761001 Colonoscopy (procedure)]]
dateRange[elm:Interval] low: elm:Add(elm:Today() elm:Quantity(-10 Year))
high: elm:Today()

Table 1.17. DoubleContrastBariumEnemaWithin5Years

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic, dateProperty=dateTime
Annotation:
Codes: elm:element[elm:Code]: [241164003 Double contrast barium enema (procedure)]
dateRange[elm:Interval] low: elm:Add(elm:Today() elm:Quantity(-5 Year))
high: elm:Today()

Table 1.18. ComputedTomographyColonographyWithin5Years

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic, dateProperty=dateTime
Annotation:
Codes: elm:element[elm:Code]: [425666002 Computed tomography of colon (procedure)]

dateRange[elm:Interval] low: elm:Add(elm:Today() elm:Quantity(-5 Year))
high: elm:Today()

Table 1.19. GuaiacBasedFecalOccultBloodTestForCancerWithin1Year

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic,
dateProperty=dateTime
Annotation:
Codes: elm:element[elm:Code]: [442554004 |Guaiac test for occult blood in feces specimen
(procedure)]
dateRange[elm:Interval] low: elm:Add(elm:Today() elm:Quantity(-1 Year))
high: elm:Today()

Table 1.20. FecalImmunochemicalTestForCancerWithin1Year

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic,
dateProperty=dateTime
Annotation:
Codes: elm:element[elm:Code]: [441579003 |Measurement of occult blood in stool specimen using
immunoassay (procedure)]
dateRange[elm:Interval] low: elm:Add(elm:Today() elm:Quantity(-1 Year))
high: elm:Today()

Table 1.21. StoolDeoxyribonucleicAcidWithin3Years

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic,
dateProperty=dateTime
Annotation:
Codes: elm:element[elm:Code]: [163925a8-8c77-4832-8d57-00be4f5764d5 |Stool deoxyribonucleic
acid testing (procedure)]
dateRange[elm:Interval] low: elm:Add(elm:Today() elm:Quantity(-3 Year))
high: elm:Today()

Table 1.22. PersonalHistoryOfColorectalNeoplasia

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))->[126837005 |Neoplasm of large intestine (disorder)]]

Table 1.23. FirstDegreeRelativeWithLynchSyndrome

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))->[716318002 |Lynch syndrome (disorder)]]

Table 1.24. FamilyHistoryOfFamilialColorectalCancerSyndromeTypeX

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))>[b1ad8fa9-668d-4191-930f-eebfdf13a914 Familial Colorectal Cancer Type X (disorder)]]

Table 1.25. PersonalHistoryOfInflammatoryBowelDisease

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))>[24526004 Inflammatory bowel disease (disorder)]]

Table 1.26. AbnormalResultOnDoubleContrastBariumEnema

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [241164003 Double contrast barium enema (procedure)]elm:value[elm:Code]: [263654008 Abnormal (qualifier value)]

Table 1.27. AbnormalResultOnComputedTomographyColonography

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [425666002 Computed tomography of colon (procedure)]elm:value[elm:Code]: [263654008 Abnormal (qualifier value)]

Table 1.28. AbnormalResultOnFlexibleColonoscopyColorectalCancerScreening

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[367535003 Fiberoptic colonoscopy (procedure)] ->(363702006 Has focus (attribute))>[268548003 Screening for malignant neoplasm of large intestine (procedure)]]elm:value[elm:Code]: [263654008 Abnormal (qualifier value)]

Table 1.29. PostiveResultOnGuaiacBasedFecalOccultBloodTest

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [442554004 Guaiac test for occult blood in feces specimen (procedure)]elm:value[elm:Code]: [10828004 Positive (qualifier value)]

Table 1.30. PostiveResultOnFecalImmunochemicalTest

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [441579003 Measurement of occult blood in stool specimen using immunoassay (procedure)]elm:value[elm:Code]: [10828004 Positive (qualifier value)]

Table 1.31. PostiveResultOnStoolDNATest

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [163925a8-8c77-4832-8d57-00be4f5764d5 Stool deoxyribonucleic acid testing (procedure)]elm:value[elm:Code]: [10828004 Positive (qualifier value)]

Table 1.32. HadAColonoscopy

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [[73761001 Colonoscopy (procedure)]]

Table 1.33. HadAFollowUpColonoscopyWithinTimeFrameForRescoping

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic, dateProperty=dateTime
Annotation:
Codes: elm:element[elm:Code]: [[73761001 Colonoscopy (procedure)]]
dateRange[elm:ExpressionRef]() high: ()

Table 1.34. InadequateBowelPrep

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))->[413261003 Inadequate bowel preparation (finding)]]

Table 1.35. FirstDegreeFamilyMemberWithColorectalCancerAfter60

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))->[363510005 Malignant tumor of large intestine (disorder)]]

Table 1.36. FirstDegreeFamilyMemberWithAdvancedAdenomaAfter60

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))->[c27d79c3-544d-418d-92f3-0fe6e1a7f2f5 Advanced adenoma of large intestine (disorder)]]

Triggers

Table 1.37. duringEncounter

Trigger: type=DataEventTrigger, DataElementAccessed
Expression: type=elm:Instance
Annotation: Any access of the patient record
Codes:

Table 1.38. routine

Trigger: type=PeriodicEventTrigger,
Expression: type=elm:Instance
Annotation: System runs on routine frequency
Codes:

Chapter 2. Expression Definitions

Table 2.1. 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)]]

Chapter 3. Actions

Condition:elm:Not (elm:Exists(FlexibleSigmoidoscopyWithin5Years))

Condition:elm:Not (elm:Exists(ColonoscopyWithin10Years))

Condition:elm:Not (elm:Exists(DoubleContrastBariumEnemaWithin5Years))

Condition:elm:Not (elm:Exists(ComputedTomographyColonographyWithin5Years))

Condition:elm:Not (elm:Exists(GuaiacBasedFecalOccultBloodTestForCancerWithin1Year))

Condition:elm:Not (elm:Exists(FecalImmunochemicalTestForCancerWithin1Year))

Condition:elm:Not (elm:Exists(StoolDeoxyribonucleicAcidWithin3Years))

Condition:elm:Not
(elm:Or(elm:Exists(FirstDegreeRelativeDiagnosedWithColorectalCancer)
elm:Exists(FirstDegreeFamilyMemberWithAdvancedAdenoma)))

Condition:elm:Not (elm:Or(elm:Exists(PersonalHistoryOfColorectalCancer)
elm:Exists(PersonalHistoryOfColorectalNeoplasia)))

Condition:elm:Not (elm:Or(elm:Exists(PersonalHistoryLynchSyndrome)
elm:Exists(FirstDegreeRelativeWithLynchSyndrome)))

Condition:elm:Not (elm:Exists(FamilyHistoryOfFamilialColorectalCancerSyndromeTypeX))

Condition:elm:Not (elm:Exists(PersonalHistoryOfInflammatoryBowelDisease))

Condition:elm:Not
(elm:And(elm:Indexer(elm:Union(AbnormalResultOnDoubleContrastBariumEnema
AbnormalResultOnComputedTomographyColonography) elm:Literal()
elm:Not(elm:Exists(HadAFollowUpColonoscopyWithinTimeFrameForRescoping))))

Condition:elm:Not
(elm:And(elm:Exists(AbnormalResultOnFlexibleColonoscopyColorectalCancerScreening)
elm:Not(elm:Exists(HadAFollowUpColonoscopyWithinTimeFrameForRescoping))))

Condition:elm:Not
(elm:And(elm:Indexer(elm:Union(PostiveResultOnGuaiacBasedFecalOccultBloodTest
elm:Union(PostiveResultOnFecalImmunochemicalTest
PostiveResultOnStoolDNATest)) elm:Literal()
elm:Not(elm:Exists(HadAFollowUpColonoscopyWithinTimeFrameForRescoping))))

Condition:elm:Not (elm:Equal(elm:Indexer(HadAColonoscopy elm:Literal()
InadequateBowelPrep))

Identify the patient as a colorectal cancer screening candidate

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

statementType: Precoordinated Expression 398166005 |
Performed (qualifier value)|

topic: Precoordinated Expression 444783004 |Screening
colonoscopy (procedure)

result.status: Precoordinated Expression 410525008 |Needed
(qualifier value)|

Open Documentation Template/Consult Request: Gastroenterology: Colorectal Cancer Risk
KNART

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

statementType: Precoordinated Expression 398166005 |
Performed (qualifier value)|

```

topic: Precoordinated Expression TSR-NoCode
# Open Order Set: Gastroenterology: Colorectal Cancer Risk - Average Risk Screening
KNART
actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]
    statementType: Precoordinated Expression 398166005 |
    Performed (qualifier value)|
    topic: Precoordinated Expression TSR-NoCode
    unstructured[0]: UnknownTerm_OS_ARS
# Make sure guideline recommendations are available to care team
actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]
    statementType: Precoordinated Expression 398166005 |
    Performed (qualifier value)|
    topic: Precoordinated Expression TSR-NoCode
Condition:elm:And
(elm:Equal( elm:Length( elm:Union( FirstDegreeFamilyMemberWithColorectalCancerAfter60
FirstDegreeFamilyMemberWithAdvancedAdenomaAfter60 )) elm:Literal())
elm:Indexer( elm:Union( FirstDegreeFamilyMemberWithColorectalCancerAfter60
FirstDegreeFamilyMemberWithAdvancedAdenomaAfter60 ) elm:Literal()))
Condition:elm:Not (elm:Exists( FlexibleSigmoidoscopyWithin5Years ))
Condition:elm:Not (elm:Exists( ColonoscopyWithin10Years ))
Condition:elm:Not (elm:Exists( DoubleContrastBariumEnemaWithin5Years ))
Condition:elm:Not (elm:Exists( ComputedTomographyColonographyWithin5Years ))
Condition:elm:Not (elm:Exists( GuaiacBasedFecalOccultBloodTestForCancerWithin1Year ))
Condition:elm:Not (elm:Exists( FecalImmunochemicalTestForCancerWithin1Year ))
Condition:elm:Not (elm:Exists( StoolDeoxyribonucleicAcidWithin3Years ))
Condition:elm:Not
(elm:Or( elm:Exists( FirstDegreeRelativeDiagnosedWithColorectalCancer )
elm:Exists( FirstDegreeFamilyMemberWithAdvancedAdenoma )))
Condition:elm:Not (elm:Or( elm:Exists( PersonalHistoryOfColorectalCancer )
elm:Exists( PersonalHistoryOfColorectalNeoplasia )))
Condition:elm:Not (elm:Or( elm:Exists( PersonalHistoryLynchSyndrome )
elm:Exists( FirstDegreeRelativeWithLynchSyndrome )))
Condition:elm:Not (elm:Exists( FamilyHistoryOfFamilialColorectalCancerSyndromeTypeX ))
Condition:elm:Not (elm:Exists( PersonalHistoryOfInflammatoryBowelDisease ))
Condition:elm:Not
(elm:And( elm:Indexer( elm:Union( AbnormalResultOnDoubleContrastBariumEnema
AbnormalResultOnComputedTomographyColonography ) elm:Literal())
elm:Not( elm:Exists( HadAFollowUpColonoscopyWithinTimeFrameForRescoping ))))
Condition:elm:Not
(elm:And( elm:Exists( AbnormalResultOnFlexibleColonoscopyColorectalCancerScreening )
elm:Not( elm:Exists( HadAFollowUpColonoscopyWithinTimeFrameForRescoping ))))
Condition:elm:Not
(elm:And( elm:Indexer( elm:Union( PostiveResultOnGuaiacBasedFecalOccultBloodTest
elm:Union( PostiveResultOnFecalImmunochemicalTest

```

<p>PostiveResultOnStoolDNATest)) elm:Literal() elm:Not(elm:Exists(HadAFollowUpColonoscopyWithinTimeFrameForRescoping))) Condition:elm:Not (elm:Equal(elm:Indexer(HadAColonoscopy elm:Literal() InadequateBowelPrep))</p>	
<p># Identify the patient as a colorectal cancer screening candidate actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] statementType: Precoordinated Expression 398166005 Performed (qualifier value) topic: Precoordinated Expression 444783004 Screening colonoscopy (procedure) result.status: Precoordinated Expression 410525008 Needed (qualifier value) # Open Documentation Template—Consult Request: Gastroenterology: Colorectal Cancer Risk KNART actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] statementType: Precoordinated Expression 398166005 Performed (qualifier value) topic: Precoordinated Expression TSR-NoCode # Open Order Set: Family History of Colon Cancer, Colon Cancer Syndrome or Advanced Adenoma KNART actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] statementType: Precoordinated Expression 398166005 Performed (qualifier value) topic: Precoordinated Expression TSR-NoCode unstructured[0]: UnknownTerm_OS_FH # Open Order Set: Fecal Immunochemical Test (FIT) actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] statementType: Precoordinated Expression 398166005 Performed (qualifier value) topic: Precoordinated Expression TSR-NoCode unstructured[0]: UnknownTerm_OS_FIT # Make sure guideline recommendations are available to care team. actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] statementType: Precoordinated Expression 398166005 Performed (qualifier value) topic: Precoordinated Expression TSR-NoCode</p>	
<p>Condition:elm:And (elm:Exists(InadequateBowelPrep) elm:Or(elm:After(elm:Current() TimeFrameForRescoping) elm:Not(elm:Exists(TimeFrameForRescoping)))</p>	
<p># Identify the patient as a colorectal cancer screening candidate actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] statementType: Precoordinated Expression 398166005 Performed (qualifier value) topic: Precoordinated Expression 444783004 Screening colonoscopy (procedure)</p>	

result.status: Precoordinated Expression 410525008 |Needed
(qualifier value)|

Open Documentation Template—Consult Request: Gastroenterology: Colorectal Cancer Risk KNART

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

statementType: Precoordinated Expression 398166005 |
Performed (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

Open Order Set: Family History of Colon Cancer, Colon Cancer Syndrome or Advanced Adenoma KNART

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

statementType: Precoordinated Expression 398166005 |
Performed (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

unstructured[0]: UnknownTerm_OS_FH

Open Order Set: Fecal Immunochemical Test (FIT)

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

statementType: Precoordinated Expression 398166005 |
Performed (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

unstructured[0]: UnknownTerm_OS_FIT

Make sure guideline recommendations are available to care team.

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

statementType: Precoordinated Expression 398166005 |
Performed (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

Condition:elm:And
(elm:Indexer(elm:Union(AbnormalResultOnDoubleContrastBariumEnema
AbnormalResultOnComputedTomographyColonography) elm:Literal()
elm:Not(elm:Exists(HadAFollowUpColonoscopyWithinTimeFrameForRescoping)))

Condition:elm:And
(elm:Exists(AbnormalResultOnFlexibleColonoscopyColorectalCancerScreening)
elm:Not(elm:Exists(HadAFollowUpColonoscopyWithinTimeFrameForRescoping)))

Identify the patient as a colorectal cancer screening candidate

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

statementType: Precoordinated Expression 398166005 |
Performed (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

Open Documentation Template—Consult Request: Gastroenterology: Colorectal Cancer Risk KNART

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

statementType: Precoordinated Expression 398166005 |
Performed (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

Open Order Set: Family History of Colon Cancer, Colon Cancer Syndrome or Advanced Adenoma KNART

```
actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]
    statementType: Precoordinated Expression 398166005 |
    Performed (qualifier value)|
    topic: Precoordinated Expression TSR-NoCode
    unstructured[0]: UnknownTerm_OS_FH
```

Open Order Set: Fecal Immunochemical Test (FIT)

```
actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]
    statementType: Precoordinated Expression 398166005 |
    Performed (qualifier value)|
    topic: Precoordinated Expression TSR-NoCode
    unstructured[0]: UnknownTerm_OS_FIT
```

Make sure guideline recommendations are available to care team.

```
actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]
    statementType: Precoordinated Expression 398166005 |
    Performed (qualifier value)|
    topic: Precoordinated Expression TSR-NoCode
```

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	10828004 Positive (qualifier value)	Precoordinated Expression	3
SNOMED CT	133936004 Adult (person)	Adult	1
SNOMED CT	163925a8-8c77-4832-8d57-000000000000 Stool deoxyribonucleic acid testing (procedure)	Precoordinated Expression	2
SNOMED CT	182964004 Terminal care (regime/therapy)	Precoordinated Expression	1
SNOMED CT	241164003 Double contrast barium enema (procedure)	Precoordinated Expression	2
SNOMED CT	263654008 Abnormal (qualifier value)	Precoordinated Expression	3
SNOMED CT	26390003 Total colectomy (procedure)	Precoordinated Expression	1
SNOMED CT	33022008 Hospital-based outpatient department (environment)	Outpatient	1
SNOMED CT	385763009 Hospice care (regime/therapy)	Precoordinated Expression	1
SNOMED CT	398166005 Performed (qualifier value)	Precoordinated Expression	48
SNOMED CT	410525008 Needed (qualifier value)	Precoordinated Expression	3
SNOMED CT	425666002 Computed tomography of colon (procedure)	Precoordinated Expression	2
SNOMED CT	441579003 Measurement of occult blood in stool specimen using immunoassay (procedure)	Precoordinated Expression	2
SNOMED CT	442554004 Guaiac test for occult blood in feces specimen (procedure)	Precoordinated Expression	2

System	Code	Display Text ^a	References ^b
SNOMED CT	44441009 Flexible fiberoptic sigmoidoscopy (procedure)	Precoordinated Expression	1
SNOMED CT	444783004 Screening colonoscopy (procedure)	Precoordinated Expression	3
SNOMED CT	453231000124104 Primary care provider (occupation)	Primary Care Provider	1
SNOMED CT	5351000124100 Primary care clinic (environment)	Primary Care	1
SNOMED CT	TSR-NoCode ^c	Precoordinated Expression	19
SNOMED CT	[367535003 Fiberoptic colonoscopy (procedure)] ->(363702006 Has focus (attribute))->[268548003 Screening for malignant neoplasm of large intestine (procedure)]	Postcoordinated Expression	1
SNOMED CT	[73761001 Colonoscopy (procedure)]	Precoordinated Expression	3
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c775d032 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[105726004 Age AND/OR growth finding (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c775d032 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[126837005 Neoplasm of large intestine (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c775d032 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[24526004 Inflammatory bowel disease (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c775d032 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[363510005 Malignant tumor of large intestine (disorder)]	Postcoordinated Expression	3
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c775d032 Observation procedure	Postcoordinated Expression	1

System	Code	Display Text ^a	References ^b
	(procedure)] -(363702006 Has focus (attribute))- ->[413261003 Inadequate bowel preparation (finding)]		
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c775f03d Observation procedure (procedure)] -(363702006 Has focus (attribute))- ->[716318002 Lynch syndrome (disorder)]	Observed Expression TSR-NoCode	3
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c775f03d Observation procedure (procedure)] -(363702006 Has focus (attribute))- ->[b1ad8fa9-668d-4191-930f- eebdfd13a914 Familial Colorectal Cancer Type X (disorder)]	Observed Expression TSR-NoCode	3
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c775f03d Observation procedure (procedure)] -(363702006 Has focus (attribute))- ->[c27d79c3-544d-418d-92f3-0fe6e1a7f2f5 Advanced adenoma of large intestine (disorder)]	Observed Expression TSR-NoCode	3

^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

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] *Gastroenterology: Colorectal Cancer Risk Clinical Content White Paper*

[CSD] *Gastroenterology: Colorectal Cancer Risk Rule Conceptual Structure Document*

[KVRpt] *Gastroenterology: Colorectal Cancer Risk Rule KNART Validation Report*

Supporting Evidence

[Giardiello 2014] Giardiello FM, Allen JJ, Axilbund JE, et al. Guidelines on genetic evaluation and management of Lynch syndrome: a consensus statement by the US Multi-Society Task Force on colorectal cancer. *Am J Gastroenterol*. 2014 Aug;109(8):1159-79. (link [<https://doi.org/10.1038/ajg.2014.186>])

[Johnson 2014] Johnson DA, Barkun AN, Cohen LB, et al; US Multi-Society Task Force on Colorectal Cancer. Optimizing adequacy of bowel cleansing for colonoscopy: recommendations from the US multi-society task force on colorectal cancer. *Gastroenterology*. 2014;147(4):903-924. (link [<https://doi.org/10.1053/j.gastro.2014.07.002>])

[Levin 2008] Levin B, Lieberman DA, McFarland B, et al; American Cancer Society Colorectal Cancer Advisory Group; US Multi-Society Task Force; American College of Radiology Colon Cancer Committee. Screening and surveillance for the early detection of colorectal cancer and adenomatous polyps, 2008: a joint guideline from the American Cancer Society, the US Multi-Society Task Force on Colorectal Cancer, and the American College of Radiology. *CA Cancer J Clin*. 2008;58(3):130-160. (link [<https://doi.org/10.3322/CA.2007.0018>])

[Lieberman 2012] Lieberman DA, Rex DK, Winawer SJ, Giardiello FM, Johnson DA, Levin TR. Guidelines for colonoscopy surveillance after screening and polypectomy: a consensus update by the US Multi-Society Task Force on Colorectal Cancer. *Gastroenterology*. 2012;143(3):844-857. (link [<https://doi.org/10.1053/j.gastro.2012.06.001>])

[NCHPCP 2017a] National Center for Health Promotion and Disease Prevention. Get Recommended Screening Tests and Immunizations for Men. National Center for Health Promotion and Disease Prevention website. https://www.prevention.va.gov/Healthy_Living/Get_Recommended_Screening_Tests_and_Immunizations_for_Men.asp. Accessed August 25, 2017. (link [https://www.prevention.va.gov/Healthy_Living/Get_Recommended_Screening_Tests_and_Immunizations_for_Men.asp])

[NCHPDP 2017b] National Center for Health Promotion and Disease Prevention. Get Recommended Screening Tests and Immunizations for Women. National Center for Health Promotion and Disease Prevention website. https://www.prevention.va.gov/Healthy_Living/Get_Recommended_Screening_Tests_and_Immunizations_for_Women.asp. Accessed August 25, 2017. (link [https://www.prevention.va.gov/Healthy_Living/Get_Recommended_Screening_Tests_and_Immunizations_for_Women.asp])

- [Rex 2017] *Rex DK, Boland CR, Dominitz JA, et al. Colorectal cancer screening: recommendations for physicians and patients from the U.S. Multi-Society Task Force on Colorectal Cancer. Gastroenterology. 2017;153(1):307-323. (link [https://doi.org/10.1053/j.gastro.2017.05.013])*
- [Shaukat 2013] *Shaukat A, Mongin SJ, Geisser MS, et al. Long-term mortality after screening for colorectal cancer. N Engl J Med. 2013;369(12):1106-1114. (link [https://doi.org/10.1056/NEJMoal300720])*
- [VA 2017] *U.S. Department of Veterans Affairs. Colorectal cancer screening/surveillance (CRCS/S): reminder system. CRCS-S CR F2F 20171018 KGALPIN.pptx. PowerPoint (Jason Dominitz, MD, email communication, November 2, 2017). (link [Email Communication])*
- [USPSTF 2016] *U.S. Preventive Services Task Force. Final Recommendation Statement: Colorectal Cancer: Screening. U.S. Preventive Services Task Force website. https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/colorectal-cancer-screening2. Reviewed June 2016. (link [https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/colorectal-cancer-screening2])*