

Women's Health: Cervical Cancer Screening

Rule: Conceptual Structure

**Contract: VA118-16-D-1008, Task Order
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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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Women's Health: Cervical Cancer Screening 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
June 14, 2018	Published
May 3, 2018	Published
May 3, 2018	Reviewed
March 27, 2018	Created

Table 2. Clinical White Paper Contributors

Name	Role	Affiliation
C. Yvette Williams-Harris, MD MPH	Author	Physician, 1670 Clairmont Rd Atlanta, GA 30033
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Table 3. Artifact Identifier

Domain	Artifact ID	Name
urn:va.gov:kbs:knart:artifact:r1	60a234fb-b0c0-5834-bb76-38ff0c1b46c8	O5

Artifact Applicability

Table 4. Applicability Foci, Description and Codes

Focus	Description	Code System	Code	Value Set	Value Set Version
PatientAgeGroup	Female outpatients 21 years of age or older			N/A	N/A
PatientGender	Female outpatients 21 years of age or older	SNOMED CT	248152002 Female (finding)	N/A	N/A
ClinicalVenue	Primary Care	SNOMED CT	5351000124100 Primary care clinic (environment)	N/A	N/A
ClinicalVenue	Obstetrics/ Gynecology	SNOMED CT	702892004 Obstetrics and gynecology clinic (environment)	N/A	N/A
ClinicalVenue	Women's Health	SNOMED CT	2651000175101 Women's health service (qualifier value)	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. Exclusions

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic
Annotation:
Codes: elm:element[elm:Code]: [116140006 Total hysterectomy (procedure)]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[37687000 Congenital absence of cervix (disorder)]]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[86406008 Human immunodeficiency virus infection (disorder)]]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[38013005 Immunosuppression (finding)]]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[698582007 Fetal or neonatal effect of diethylstilbestrol transmitted via placenta (disorder)]]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[252991009 Cervical intraepithelial neoplasia grade III with severe dysplasia (disorder)]]elm:element[elm:Code]: [[277132007 Therapeutic procedure (procedure)] ->(363702006 Has focus (attribute))->[285838002 Cervical intraepithelial neoplasia grade 2 (disorder)]]elm:element[elm:Code]: [[277132007 Therapeutic procedure (procedure)] ->(363702006 Has focus (attribute))->[92564006 Carcinoma in situ of uterine cervix (disorder)]]

Table 1.2. LifeExpectancyLT10Y

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 Performed (qualifier value)]elm:value[elm:Code]: [729d3508-98ba-4a1d-8334-9e024a0a760e Prognosis of life expectancy (finding)]

Table 1.3. CervicalCytologyExams

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic, dateProperty=timing.lowerBound
Annotation:
Codes: elm:element[elm:Code]: [416107004 Cervical cytology test (procedure)]
dateRange[elm:Interval] low: elm:Add(elm:Today() elm:Quantity(-10 year)) high: elm:Today()

Triggers

Table 1.4. duringOutpatientVisit

Trigger: type=DataEventTrigger, DataElementAccessed
Expression: type=elm:Instance
Annotation:
Codes:

Table 1.5. preventiveScreeningTrigger

Trigger: type=PeriodicEventTrigger, Expression: type=elm:Instance Annotation: 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)]]
--

Table 2.2. PatientFemale

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))->[248152002 Female (finding)]]

Table 2.3. CotestsWithInPast5Years

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic, dateProperty=timing.lowerBound Annotation: Codes: elm:element[elm:Code]: [416107004 Cervical cytology test (procedure)]elm:element[elm:Code]: [700152009 Human papillomavirus screening (procedure)] dateRange[elm:Interval] low: elm:Add(elm:Today() elm:Quantity(-5 year)) high: elm:Today()

Table 2.4. CotestsWithInPast10Years

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic, dateProperty=timing.lowerBound Annotation: Codes: elm:element[elm:Code]: [416107004 Cervical cytology test (procedure)]elm:element[elm:Code]: [416032004 Cervicovaginal cytology normal or benign (finding)] dateRange[elm:Interval] low: elm:Add(elm:Today() elm:Quantity(-10 year)) high: elm:Today()

Table 2.5. CervicalCytologyExam

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic, dateProperty=result.lowerBound Annotation: Codes: elm:element[elm:Code]: [416107004 Cervical cytology test (procedure)] dateRange[elm:Interval] low: elm:Add(elm:Today() elm:Quantity(-3 year)) high: elm:Add(elm:Today() elm:Quantity(60 day))

Table 2.6. NoCervicalCytologyExamWithinPast3Years

Expression: type=elm:Not
 Annotation:
 Codes:

Table 2.7. NoCotestsWithInPast5Years

Expression: type=elm:Not
 Annotation:
 Codes:

Table 2.8. NegativeCytologyResults

Expression: type=elm:Query
 Annotation:
 Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]: [416032004 |Cervicovaginal cytology normal or benign (finding)]

Table 2.9. NegativeCotestResults

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

Table 2.10. MostRecentNegativeCytologyResult

Expression: type=elm:Indexer
 Annotation:
 Codes:

Table 2.11. MostRecentNegativeCotestResult

Expression: type=elm:Indexer
 Annotation:
 Codes:

Table 2.12. historyOfAdequateScreening

Expression: type=elm:AnyTrue
 Annotation:
 Codes:

Table 2.13. cytologyScreeningDueMinus30To60Days

Expression: type=elm:Query
 Annotation:

<p>Codes: elm:value[elm:Code]: [385644000 Requested (qualifier value)]elm:value[elm:Code]: [416107004 Cervical cytology test (procedure)]</p>

Table 2.14. hpvScreeningDueMinus30To60Days

<p>Expression: type=elm:Query</p> <p>Annotation:</p> <p>Codes: elm:value[elm:Code]: [385644000 Requested (qualifier value)]elm:value[elm:Code]: [700152009 Human papillomavirus screening (procedure)]</p>
--

Table 2.15. CytologyScreeningDueIn60Days

<p>Expression: type=elm:Query</p> <p>Annotation:</p> <p>Codes: elm:value[elm:Code]: [385644000 Requested (qualifier value)]elm:value[elm:Code]: [416107004 Cervical cytology test (procedure)]</p>
--

Chapter 3. Actions

Condition: elm:And (elm:GreaterOrEqual(PatientAge elm:Quantity(21 year)) elm:Less(PatientAge elm:Quantity(30 year)))
Condition: elm:Or (NoCervicalCytologyExamWithinPast3Years elm:Exists(CytologyScreeningDueIn60Days))
Cervical Cancer Screening for 21-29 Years of Age: In Person
Cervical Cancer Screening for 21-29 Years of Age: In Person
Open Cervical Cancer Screening Documentation Template actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] <div> statementType: Precoordinated Expression 385644000 Requested (qualifier value) topic: Precoordinated Expression TSR-NoCode </div> # Open Cervical Cancer Screening Order Set actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] <div> statementType: Precoordinated Expression 385644000 Requested (qualifier value) topic: Precoordinated Expression TSR-NoCode </div>
Condition: elm:And (elm:GreaterOrEqual(PatientAge elm:Quantity(30 year)) elm:LessOrEqual(PatientAge elm:Quantity(65 year)))
Condition: elm:Or (NoCervicalCytologyExamWithinPast3Years NoCotestsWithInPast5Years)
Cervical Cancer Screening for 30-65 Years of Age: In Person
Cervical Cancer Screening for 30-65 Years of Age: In Person
Open Cervical Cancer Screening Documentation Template actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] <div> statementType: Precoordinated Expression 385644000 Requested (qualifier value) topic: Precoordinated Expression TSR-NoCode </div> # Open Cervical Cancer Screening Order Set actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] <div> statementType: Precoordinated Expression 385644000 Requested (qualifier value) topic: Precoordinated Expression TSR-NoCode </div>
Condition: elm:GreaterOrEqual (PatientAge elm:Quantity(65 year))
Condition: elm:IsFalse (historyOfAdequateScreening)
Cervical Cancer Screening for over 65 Years of Age: In Person
Cervical Cancer Screening for over 65 Years of Age: In Person
Open Cervical Cancer Screening Documentation Template actionSentence[type=elm:Instance, classType=anf:ClinicalStatement] <div> statementType: Precoordinated Expression 385644000 Requested (qualifier value) topic: Precoordinated Expression TSR-NoCode </div>

Open Cervical Cancer Screening Order Set
actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]
statementType: Precoordinated Expression 385644000 Requested (qualifier value)
topic: Precoordinated Expression TSR-NoCode
Condition: elm:Exists (preventiveScreeningTrigger)
Condition: elm:And (elm:GreaterOrEqual(PatientAge elm:Quantity(21 year)) elm:Less(PatientAge elm:Quantity(30 year)))
Condition: elm:Or (NoCervicalCytologyExamWithinPast3Years NoCotestsWithInPast5Years)
Condition: elm:Or (cytologyScreeningDueMinus30To60Days hpvScreeningDueMinus30To60Days)
Cervical Cancer Screening for 21-29 Years of Age: Reporting
Cervical Cancer Screening for 21-29 Years of Age: Reporting
Send patient cervical cancer screening due notification
actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]
statementType: Precoordinated Expression 385644000 Requested (qualifier value)
topic: Precoordinated Expression TSR-NoCode
Condition: elm:Exists (preventiveScreeningTrigger)
Condition: elm:And (elm:GreaterOrEqual(PatientAge elm:Quantity(30 year)) elm:Less(PatientAge elm:Quantity(65 year)))
Condition: elm:ExpressionRefNoCervicalCytologyExamWithinPast3Years
Condition: elm:Or (cytologyScreeningDueMinus30To60Days hpvScreeningDueMinus30To60Days)
Cervical Cancer Screening for 30-65 Years of Age: Reporting
Cervical Cancer Screening for 30-65 Years of Age: Reporting
Send patient cervical cancer screening "due" notification
actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]
statementType: Precoordinated Expression 385644000 Requested (qualifier value)
topic: Precoordinated Expression TSR-NoCode
Condition: elm:Exists (preventiveScreeningTrigger)
Condition: elm:GreaterOrEqual (PatientAge elm:Quantity(65 year))
Condition: elm:IsFalse (historyOfAdequateScreening)
Condition: elm:Or (NoCervicalCytologyExamWithinPast3Years NoCotestsWithInPast5Years)
Condition: elm:Or (cytologyScreeningDueMinus30To60Days hpvScreeningDueMinus30To60Days)
Cervical Cancer Screening for over 65 Years of Age: Reporting
Cervical Cancer Screening for over 65 Years of Age: Reporting
Send patient cervical cancer screening due notification
actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

	statementType: Precoordinated Expression 385644000 Requested (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	116140006 Total hysterectomy (procedure)	Precoordinated Expression	1
SNOMED CT	248152002 Female (finding)	Female outpatients 21 years of age or older	1
SNOMED CT	2651000175101 Women's health service (qualifier value)	Women's Health	1
SNOMED CT	385644000 Requested (qualifier value)	Precoordinated Expression	12
SNOMED CT	398166005 Performed (qualifier value)	Precoordinated Expression	5
SNOMED CT	416032004 Cervicovaginal cytology normal or benign (finding)	Precoordinated Expression	2
SNOMED CT	416107004 Cervical cytology test (procedure)	Precoordinated Expression	6
SNOMED CT	5351000124100 Primary care clinic (environment)	Primary Care	1
SNOMED CT	700152009 Human papillomavirus screening (procedure)	Precoordinated Expression	2
SNOMED CT	702892004 Obstetrics and gynecology clinic (environment)	Obstetrics/Gynecology	1
SNOMED CT	729d3508-98ba-4a1d-8334-902400d760 Prognosis of life expectancy (finding)	Precoordinated Expression	1
SNOMED CT	TSR-NoCode ^c	Precoordinated Expression	10
SNOMED CT	[277132007 Therapeutic procedure (procedure)] ->(363702006 Has focus (attribute))->[285838002 Cervical intraepithelial neoplasia grade 2 (disorder)]	Postcoordinated Expression	1

System	Code	Display Text ^a	References ^b
SNOMED CT	[277132007 Therapeutic procedure (procedure)] ->(363702006 Has focus (attribute))->[92564006 Carcinoma in situ of uterine cervix (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c077503a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[105726004 Age AND/OR growth finding (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c077503a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[248152002 Female (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c077503a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[252991009 Cervical intraepithelial neoplasia grade III with severe dysplasia (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c077503a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[37687000 Congenital absence of cervix (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c077503a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[38013005 Immunosuppression (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c077503a Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[698582007 Fetal or neonatal effect of diethylstilbestrol transmitted via placenta (disorder)]	Postcoordinated Expression	1

Tabular List

System	Code	Display Text ^a	References ^b
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c77503a0 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[86406008 Human immunodeficiency virus infection (disorder)]	Observed 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

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] *Women's Health: Cervical Cancer Screening Clinical Content White Paper*

[CSD] *Women's Health: Cervical Cancer Screening Rule Conceptual Structure Document*

[KVRpt] *Women's Health: Cervical Cancer Screening Rule KNART Validation Report*

Supporting Evidence

[ACOG 2016] *Practice Bulletin No. 168: Cervical Cancer Screening and Prevention. Committee on Practice Bulletins—Gynecology. Obstet Gynecol. 2016;128(4):e111-e130* (link [<https://doi.org/10.1097/AOG.0000000000001708>])

[VHA 2013] *Provider Fact Sheet: Cervical Cancer Screening. National Center for Health Promotion and Disease Prevention. June 2013* (link [<https://www.prevention.va.gov/docs/CervicalCProvider.pdf>])

[CDC 2017] *Cervical Cancer Screening Guidelines for Average Risk Women. July 2017* (link [<https://www.cdc.gov/cancer/cervical/pdf/guidelines.pdf>])

[ACOG 2012] *Committee Opinion No. 534: Well-Woman Visit. Obstetrics and Gynecology. Committee on Gynecologic Practice. August 2012;120(2 Pt 1):421* (link [<https://doi.org/10.1097/AOG.0b013e3182680517>])

[VHA 2017] *Department of Veteran Affairs National Center for Health Promotion and Disease Prevention, Cervical Cancer Screening. July 2017* (link [https://www.prevention.va.gov/Preventing_Diseases/Screening_for_Cervical_Cancer.asp])

[Massad 2013] *Massad LS, Einstein MH, Huh WK, Katki HA, Kinney WK, Schiffman M, Solomon D, Wentzensen N, Lawson HW. 2012 Updated Consensus Guidelines For The Management Of Abnormal Cervical Cancer Screening Tests And Cancer Precursors. stetrics and Gynecology. April 1, 2013;121(4):829-46* (link [<https://doi.org/10.1097/AOG.0b013e3182883a34>])

[USPTF 2017] *United States Preventive Task Force (USPTF) Cervical Cancer Screening Guidelines. July 2017* (link [<https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/cervical-cancer-screening>])