

Endocrinology: Hypoglycemia Rule

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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Endocrinology: Hypoglycemia 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 18, 2018	Published
May 29, 2018	Published
May 29, 2018	Reviewed
April 20, 2018	Pre-published
April 20, 2018	Created

Table 2. Clinical White Paper Contributors

Name	Role	Affiliation
Leonard Pogach, MD	Author	National Director Medicine VACO, 810 Vermont Ave. NW, Room 662 Washington, DC 20420
Paul Conlin, MD	Author	Endocrinologist; Chief of Medicine, Boston VAMC; Chair of the Field Advisory Committee for Diabetes/Endocrinology, 1400 VFW Parkway, Boston, MA 02132

Table 3. Artifact Identifier

Domain	Artifact ID	Name
urn:va.gov:kbs:knart:artifact:r1	47229c7e-522c-59c6-ab26-f8ddc2809e29	B3

Artifact Applicability

Table 4. Applicability Foci, Description and Codes

Focus	Description	Code System	Code	Value Set	Value Set Version
TargetUser	Clinical Providers caring for adult patients			N/A	N/A
PatientAgeGroup	Adult	SNOMED CT	133936004 Adult (person)	N/A	N/A
ClinicalFocus	Adult outpatient with an active problem of either diabetes mellitus, type 1 or type 2			N/A	N/A
ClinicalVenue	Outpatient	SNOMED CT	33022008 Hospital-based outpatient department (environment)	N/A	N/A
ClinicalVenue	Emergency Department (ED)			N/A	N/A
ClinicalVenue	Inpatient hospital			N/A	N/A
ClinicalVenue	Urgent care			N/A	N/A
WorkflowTask	Care and Management of the Diabetic Patient			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. diabetesMellitusDiagnosis

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic, dateProperty=dateTime Annotation: Codes: elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))>[46635009 Diabetes mellitus type 1 (disorder)]]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))>[44054006 Diabetes mellitus type 2 (disorder)]]
--

Table 1.3. lifeExpectancy

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))>[729d3508-98ba-4a1d-8334-9e024a0a760e Prognosis of life expectancy (finding)]]

Table 1.4. hemoglobinA1c

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))>[43396009 Hemoglobin A1c measurement (procedure)]]

Table 1.5. InclusionConditions

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic Annotation: Patient meets at least one of the following conditions Codes: elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))>[386806002 Impaired cognition (finding)]]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))>[52448006 Dementia (disorder)]]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation procedure (procedure)] ->(363702006 Has focus (attribute))>[118940003 Disorder of nervous system (disorder)]]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a Observation
--


```

procedure (procedure)] ->(363702006 |Has focus (attribute))->[370143000 |Major depressive
disorder (disorder)]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |
Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[15167005 |Alcohol
abuse (disorder)]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation
procedure (procedure)] ->(363702006 |Has focus (attribute))->[66214007 |Substance abuse
(disorder)]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation
procedure (procedure)] ->(363702006 |Has focus (attribute))->[49601007 |Disorder of cardiovascular
system (disorder)]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |
Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[709044004 |Chronic
kidney disease (disorder)]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |
Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[129839007 |At
risk for falls (finding)]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |
Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[161898004 |
Falls (finding)]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |
Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[32911000 |Homeless
(finding)]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation
procedure (procedure)] ->(363702006 |Has focus (attribute))->[105529008 |Lives alone
(finding)]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation
procedure (procedure)] ->(363702006 |Has focus (attribute))->[422650009 |Social isolation
(finding)]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation
procedure (procedure)] ->(363702006 |Has focus (attribute))->[598fef10-35e6-4460-a507-
d23cee99c9fa |Patient concerned about quality of life (finding)]elm:element[elm:Code]:
[[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |
Has focus (attribute))->[706875005 |Insufficient food supply (finding)]elm:element[elm:Code]:
[[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has
focus (attribute))->[38334009 |Health management deficit (finding)]]

```

Table 1.6. activeMedications

```

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic
Annotation: Patient is on active medications of insulin or sulfonylurea
Codes: elm:element[elm:Code]: [[416118004 |Administration (procedure)] ->(260686004 |Method
(attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance
(attribute))->[126210001 |Human insulin product (product)]elm:element[elm:Code]: [[416118004
|Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration -
action (qualifier value)] ->(363701004 |Direct substance (attribute))->[34012005 |Product containing
sulfonylurea (medicinal product)]]

```

Table 1.7. SerumCreatinine

```

Expression: type=elm:Query
Annotation: Serum creatinine greater than 1.7 mg/dL within 150 days.
Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)]elm:value[elm:Code]:
[113075003 |Creatinine measurement, serum (procedure)]

```

Table 1.8. activeProblems

```

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic
Annotation: Active problem of cognitive impairment; or Active problem of dementia;
Codes: elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation
procedure (procedure)] ->(363702006 |Has focus (attribute))->[386806002 |Impaired cognition

```

(finding)]elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[52448006 |Dementia (disorder)]]

Triggers

Table 1.9. hypoglycemiaEncounterEvent

Trigger: type=DataEventTrigger, DataElementAccessed
 Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic
 Annotation: ED encounter for hypoglycemia
 Codes: elm:element[elm:Code]: [TSR-NoCode]

Table 1.10. InpatientHospitalDischargeEvent

Trigger: type=DataEventTrigger, DataElementAccessed
 Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement
 Annotation: Inpatient hospital discharge with a discharge diagnosis of hypoglycemia
 Codes: elm:element[elm:Code]: [TSR-NoCode]

Table 1.11. UrgentCareEncounterEvent

Trigger: type=DataEventTrigger, DataElementAccessed
 Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement
 Annotation: Urgent care encounter with a diagnosis of hypoglycemia
 Codes: elm:element[elm:Code]: [TSR-NoCode]

Table 1.12. SelfReportHypoglycemiaEvent

Trigger: type=DataEventTrigger, DataElementAccessed
 Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement
 Annotation: Self-report of hypoglycemia through patient portal (patient health record; PHR) or telemonitoring
 Codes: elm:element[elm:Code]: [TSR-NoCode]

Table 1.13. physicianOfficeVisitForHypoglycemiaEvent

Trigger: type=DataEventTrigger, DataElementAccessed
 Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement
 Annotation: Encounter in physician's office for hypoglycemia
 Codes: elm:element[elm:Code]: [TSR-NoCode]

Table 1.14. documentationOfHypoglycemicEpisodeEvent

Trigger: type=DataEventTrigger, DataElementAccessed
 Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement
 Annotation: Physician documentation of hypoglycemic episode during review of patient's records
 Codes: elm:element[elm:Code]: [TSR-NoCode]

Table 1.15. patientRecordAccess

Trigger: type=DataEventTrigger, DataElementAccessed
Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement
Annotation: Opening the patient's record at time of visit
Codes: elm:element[elm:Code]: [TSR-NoCode]

Table 1.16. PeriodicSystemRunForHypoglycemia

Trigger: type=PeriodicEventTrigger,
Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement
Annotation: Periodic system run of preventive rules Technical Note: Hypoglycemia rule is run every 150 days.
Codes: elm:element[elm:Code]: [TSR-NoCode]

Chapter 2. Expression Definitions

No expression definitions are present.

Chapter 3. Symptomatic Hypoglycemia

Conditions
Condition: elm:AllTrue

Primary Care: Symptomatic Hypoglycemia

Patient Episode of Hypoglycemia Alerts

Send a message to the independent practitioner saying, "Patient has had an episode of hypoglycemia. Assess hypoglycemia awareness, review management plan, and adjust medications and glycemic target range as appropriate."

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

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

topic: Precoordinated Expression TSR-NoCode

Send a message to the pharmacist saying, "Patient has had an episode of hypoglycemia. Review prescriptions and dosing instructions with the patient to help ensure understanding of medication use."

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

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

topic: Precoordinated Expression TSR-NoCode

Send a message to the care manager saying, "Patient has had an episode of hypoglycemia. Assess self-management adherence risks, understanding of action plan, hypoglycemia risk factors, and psychosocial barriers. Refer to services as needed."

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

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

topic: Precoordinated Expression TSR-NoCode

Send a message to the certified diabetes educator saying, "Patient has had an episode of hypoglycemia. Address any identified self-management issues."

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

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

topic: Precoordinated Expression TSR-NoCode

Send a message to the dietitian saying, "Patient has had an episode of hypoglycemia. Address any identified nutritional issues."

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

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

topic: Precoordinated Expression TSR-NoCode

Send a message to the social worker saying, "Patient has had an episode of hypoglycemia. Address any identified psychosocial barriers to care."

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

<p>statementType: Precoordinated Expression 385644000 Requested (qualifier value) </p> <p>topic: Precoordinated Expression TSR-NoCode</p> <p># Send a message to the care coordinator saying, "Patient has had an episode of hypoglycemia. Make sure that an urgent visit with the prescriber of their hypoglycemic medications is scheduled and completed."</p> <p>actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]</p> <p>statementType: Precoordinated Expression 385644000 Requested (qualifier value) </p> <p>topic: Precoordinated Expression TSR-NoCode</p> <p># Send a message to the patient saying, "Review your self-management plan, including what to do if you have low blood sugar. If you have any questions, do not hesitate to contact your care team."</p> <p>actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]</p> <p>statementType: Precoordinated Expression 385644000 Requested (qualifier value) </p> <p>topic: Precoordinated Expression TSR-NoCode</p> <p># Activate Documentation Template: Hypoglycemia KNART</p> <p>actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]</p> <p>statementType: Precoordinated Expression 385644000 Requested (qualifier value) </p> <p>topic: Precoordinated Expression TSR-NoCode</p> <p># Activate Order Set: Hypoglycemia KNART</p> <p>actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]</p> <p>statementType: Precoordinated Expression 385644000 Requested (qualifier value) </p> <p>topic: Precoordinated Expression TSR-NoCode</p> <p>Condition:elm:AllTrue</p> <p>Asymptomatic but at Risk for Hypoglycemia</p>
<p>Hypoglycemia Risk Alerts</p> <p># Send a message to the clinical provider saying, "Patient is at risk for hypoglycemia. Assess hypoglycemia awareness, review management plan, and adjust medications and glycemic target range as appropriate."</p> <p>actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]</p> <p>statementType: Precoordinated Expression 385644000 Requested (qualifier value) </p> <p>topic: Precoordinated Expression TSR-NoCode</p> <p># Send a message to the pharmacist saying, "Patient is at risk for hypoglycemia. Review prescriptions and dosing instructions with the patient to help ensure understanding of medication use."</p> <p>actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]</p> <p>statementType: Precoordinated Expression 385644000 Requested (qualifier value) </p> <p>topic: Precoordinated Expression TSR-NoCode</p>

Send a message to the care manager saying, “Patient is at risk for hypoglycemia. Assess self-management adherence risks, understanding of action plan, hypoglycemia risk factors, psychosocial barriers. Refer to services as needed.”

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

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

topic: Precoordinated Expression TSR-NoCode

Send a message to the certified diabetes educator saying, “Patient is at risk for hypoglycemia. Address any identified self-management issues.”

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

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

topic: Precoordinated Expression TSR-NoCode

Send a message to the dietitian saying, “Patient is at risk for hypoglycemia. Address any identified nutritional issues.”

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

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

topic: Precoordinated Expression TSR-NoCode

Send a message to the social worker saying, “Patient is at risk for hypoglycemia. Address any identified psychosocial barriers to care.”

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

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

topic: Precoordinated Expression TSR-NoCode

Send a message to the care coordinator saying, “Patient is at risk for hypoglycemia. Make sure that a visit with the prescriber of their hypoglycemic medications is scheduled and completed.”

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

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

topic: Precoordinated Expression TSR-NoCode

Send a message to the patient saying, “Review your self-management plan, including what to do if you have low blood sugar. If you have any questions, do not hesitate to contact your care team.”

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

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

topic: Precoordinated Expression TSR-NoCode

Activate Documentation Template: Hypoglycemia KNART

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

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

topic: Precoordinated Expression TSR-NoCode

```
# Activate Order Set: Hypoglycemia KNART
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	113075003 Creatinine measurement, serum (procedure)	Precoordinated Expression	1
SNOMED CT	133936004 Adult (person)	Adult	1
SNOMED CT	33022008 Hospital-based outpatient department (environment)	Outpatient	1
SNOMED CT	385644000 Requested (qualifier value)	Precoordinated Expression	20
SNOMED CT	398166005 Performed (qualifier value)	Precoordinated Expression	4
SNOMED CT	TSR-NoCode ^c	Precoordinated Expression	28
SNOMED CT	[416118004 Administration (procedure)] ->(260686004 Method (attribute))->[129445006 Administration - action (qualifier value)] ->(363701004 Direct substance (attribute))->[126210001 Human insulin product (product)]	Postcoordinated Expression	1
SNOMED CT	[416118004 Administration (procedure)] ->(260686004 Method (attribute))->[129445006 Administration - action (qualifier value)] ->(363701004 Direct substance (attribute))->[34012005 Product containing sulfonylurea (medicinal product)]	Postcoordinated Expression	1

System	Code	Display Text ^a	References ^b
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c775d3a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[105529008 Lives alone (finding)]	Coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c775d3a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[105726004 Age AND/OR growth finding (finding)]	Coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c775d3a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[118940003 Disorder of nervous system (disorder)]	Coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c775d3a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[129839007 At risk for falls (finding)]	Coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c775d3a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[15167005 Alcohol abuse (disorder)]	Coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c775d3a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[161898004 Falls (finding)]	Coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c775d3a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[32911000 Homeless (finding)]	Coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c775d3a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[370143000 Major	Coordinated Expression	1

System	Code	Display Text ^a	References ^b
	depressive disorder (disorder)]		
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c07503a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[38334009 Health management deficit (finding)]	0374c07503a2 Depressed Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c07503a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[386806002 Impaired cognition (finding)]	0374c07503a2 Depressed Expression	2
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c07503a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[422650009 Social isolation (finding)]	0374c07503a2 Depressed Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c07503a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[43396009 Hemoglobin A1c measurement (procedure)]	0374c07503a2 Depressed Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c07503a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[44054006 Diabetes mellitus type 2 (disorder)]	0374c07503a2 Depressed Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c07503a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[46635009 Diabetes mellitus type 1 (disorder)]	0374c07503a2 Depressed Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c07503a2 Observation procedure (procedure)] ->(363702006 Has focus (attribute))->[49601007 Disorder of cardiovascular system (disorder)]	0374c07503a2 Depressed Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-0374c07503a2 Observation procedure	0374c07503a2 Depressed Expression	2

System	Code	Display Text ^a	References ^b
	(procedure)] ->(363702006 Has focus (attribute))- >[52448006 Dementia (disorder)]		
SNOMED CT	[a997cc03-3e99-40eb-833a- Observation procedure (procedure)] ->(363702006 Has focus (attribute))- >[598fef10-35e6-4460- a507-d23cee99c9fa Patient concerned about quality of life (finding)]	0374c77502a Coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a- Observation procedure (procedure)] ->(363702006 Has focus (attribute))- >[66214007 Substance abuse (disorder)]	0374c77502a Coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a- Observation procedure (procedure)] ->(363702006 Has focus (attribute))- >[706875005 Insufficient food supply (finding)]	0374c77502a Coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a- Observation procedure (procedure)] ->(363702006 Has focus (attribute))- >[709044004 Chronic kidney disease (disorder)]	0374c77502a Coordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a- Observation procedure (procedure)] ->(363702006 Has focus (attribute))- >[729d3508-98ba-4a1d-8334- 9e024a0a760e Prognosis of life expectancy (finding)]	0374c77502a Coordinated 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] *Endocrinology: Hypoglycemia Clinical Content White Paper*

[CSD] *Endocrinology: Hypoglycemia Rule Conceptual Structure Document*

[KVRpt] *Endocrinology: Hypoglycemia Rule KNART Validation Report*

Supporting Evidence

[ADA, 2017] American Diabetes Association. *Diabetes Care. Standards of medical care in diabetes-2017* 2017;40(suppl 1):S1-S135 (link [http://care.diabetesjournals.org/content/diacare/suppl/2016/12/15/40.Supplement_1.DC1/DC_40_S1_final.pdf])

[O'Neil 2015] O'Neil G. *V1-High Risk for Hypoglycemia. June 4, 2015 VISN 1 hypoglycemia reminder PowerPoint* (Linda Wedemeyer, MD, email communication, July 10, 2017) (link [V1_HIGH RISK FOR HYPOGLYCEMIA.PowerPoint.ppt.])

[Seaquist 2013] Seaquist ER, Anderson J, Childs B, et al. *Hypoglycemia and diabetes: a report of a workgroup of the American Diabetes Association and the Endocrine Society. Diabetes Care.* 2013;36(5):1384-1395 (link [<https://doi.org/10.2337/dc12-2480>])

[NLM 2015a] U.S. National Library of Medicine. *GLIPIZIDE- glipizide tablet (Actavis Pharma, Inc.). DailyMed Website. Revised June 2015* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ad55dfd7-ffb5-478a-aa84-1009fa921e22>])

[NLM 2017a] U.S. National Library of Medicine. *GLUCAGON- glucagon [Eli Lilly and Company]. DailyMed Website. Revised May 2017* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f143db10-e889-41c3-84ed-603a0ab02f61>])

[NLM 2015b] U.S. National Library of Medicine. *LANTUS- insulin glargine injection, solution, LANTUS SOLOSTAR- insulin glargine injection, solution [sanofi-aventis U.S. LLC]. DailyMed Website Revised August 2015* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=d5e07a0c-7e14-4756-9152-9fea485d654a>])

[NLM 2015c] U.S. National Library of Medicine. *LEVEMIR- insulin detemir injection, solution [Novo Nordisk]. DailyMed Website Revised February 2015* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=d38d65c1-25bf-401d-9c7e-a2c3222da8af>])

[NLM 2017b] U.S. National Library of Medicine. *NOVOLOG- insulin aspart injection, solution [Novo Nordisk]. DailyMed Website. Revised March 2017* (link [<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=3a1e73a2-3009-40d0-876c-b4cb2be56fc5>])

[VA 5.0-2017] U.S. Department of Veterans Affairs and U.S. Department of Defense. *VA/DoD Clinical Practice Guideline for the Management of Type 2 Diabetes Mellitus in Primary Care, version 5.0—2017. VA/*

DoD Clinical Practice Guidelines website (link [<https://www.healthquality.va.gov/guidelines/CD/diabetes/VADoDDMCPGFinal508.pdf>])