Endocrinology: Hypoglycemia Documentation Template

Documentation Template: Conceptual Structure

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

Table of Contents

List of Tables

Preface

Table 1. Revision History

Date	Life Cycle Event
June 18, 2018	Published
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Table 2. Clinical White Paper Contributors

Name	Role	Affiliation
Leonard Pogach, MD	Author	National Director MedicineVACO, 810 Vermont Ave. NW, Room 662 Washington, DC 20420
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Table 3. Artifact Identifier

Domain	Artifact ID	Name
urn:va.gov:kbs:knart:artifact:r1	a3d8ea14-b1d9-56ec-9774-239ba16e16e4	B45

Artifact Applicability

Table 4. Applicability Foci, Description and Codes

Focus	Description	Code System	Code	Value Set	Value Set Version
TargetUser	Clinical Providers			N/A	N/A
PatientAgeGroup	Adult outpatient with an active problem of either diabetes mellitus, type 1 or type 2	SNOMED CT	133936004 |Adult (person)|	N/A	N/A
WorkflowSetting	Emergency Department (ED), inpatient hospital, urgent care, or ambulatory care clinic			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. creatinine

Expression: type=elm:SingletonFrom
Annotation:
Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|]elm:value[elm:Code]: [70901006 |Creatinine measurement (procedure)|]

Table 1.2. glomerular filtration rate

Expression: type=elm:SingletonFrom
Annotation:
Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|]elm:value[elm:Code]: [167181009 |Measurement of renal clearance of creatinine (procedure)|]

Table 1.3. albumin-to-creatinine ratio

Expression: type=elm:SingletonFrom
Annotation:
Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|]elm:value[elm:Code]: [271075006 |Urine albumin/creatinine ratio measurement (procedure)|]

Triggers

No trigger definitions are present.

Chapter 2. Expression Definitions

No expression definitions are present.

Chapter 3. History of Present Illness

Reason for Evaluation	
prompt:	❖ Select
response:	Code (Single)
response range:	EnumerationConstraint (List)
item:	Recent hypoglycemic episode([a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[317006 |Reactive hypoglycemia (disorder)])
item:	At risk for hypoglycemia without recent episode([a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[b91c7da2-cb27-42e5-8ae9-3b7dacecbb7f |At risk for hypoglycemia (disorder)])
item:	Other reason
prompt:	❖ Provide details of other reason for evaluation
response:	String (Single)

Diabetes Control Status	
# prompt:	Type of Diabetes
response:	Code (Single)
response range:	EnumerationConstraint (List)
item:	Type I Diabetes([a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[46635009 |Diabetes mellitus type 1 (disorder)])
item:	Type II Diabetes([a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[44054006 |Diabetes mellitus type 2 (disorder)])
# prompt:	Glycated Hemoglobin (HbA1c) goal
itemCode:	[225294001 |Identifying goals (procedure)]- ->(363702006 |Has focus (attribute))->[243860001 |Diabetic monitoring status (finding)]- ->(363714003 |Interprets (attribute))->[408591000 |Hemoglobin A1c target (observable entity)]
response:	Real (Single)
#	

	# prompt:	Most recent HbA1c (%)
	itemCode:	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[43396009 |Hemoglobin A1c measurement (procedure)]
	response:	Ratio (Single)
	# prompt:	Date
	response:	Timestamp (Single)

# prompt:	Preprandial blood glucose target range (goal)

itemCode: [225294001 |Identifying goals (procedure)]- ->(363702006 |Has focus (attribute))->[243860001 |Diabetic monitoring status (finding)]- ->(363714003 |Interprets (attribute))->[787bb747-3d69-4383-b69d-68937ad61f24 |Fasting blood glucose target (observable entity)]

response: IntegerInterval (Single)

prompt: Preprandial blood glucose target range (actual)

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[271062006 |Fasting blood glucose measurement (procedure)]

response: IntegerInterval (Single)

❖ Medication Reconciliation: Potential medication interactions with antiglycemic agents and/or medication impact on hypoglycemic awareness

prompt: Description of reaction/interactions

response: String (Single)

◆ Prior Hypoglycemic Episodes?

prompt:

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[317006 |Reactive hypoglycemia (disorder)]

response: Boolean (Single)

response range: EnumerationConstraint (List)

item: No

item: Yes

responseBinding: Property ("hasPriorHypoglycemicEpisodes")

Condition: elm:Property		
Collect details about hypoglycemic episode(s)		
	Episode type(s)	
	# prompt:	Hypoglycemia requiring paramedics, emergency department evaluation, or hospitalization
	itemCode:	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[401082004 |Hypoglycemic attack requiring third party assistance (finding)]- ->(363714003 |Interprets (attribute))->acd5c50a-e40a-47cd-bf34-d02bdb9f0342 |Frequency of emergency department treated hypoglycemia attack (observable entity)];
	itemCode:	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[401082004 |Hypoglycemic attack requiring third party assistance (finding)]- ->(363714003 |Interprets (attribute))->[712660009 |Frequency of hospital-treated hypoglycemia attack (observable entity)];
	response:	Boolean (Single)
	#	
		# prompt: Number of episodes since last visit

response: Integer (Single)

prompt: Number of episodes during past year

response: Integer (Single)

prompt: Hypoglycemia requiring bystander intervention

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[401082004 |Hypoglycemic attack requiring third party assistance (finding)]- ->(363714003 |Interprets (attribute))->[06cf6868-d29b-4586-9e30-fabe9594642e |Frequency of bystander assisted hypoglycemia attack (observable entity)];

response: Boolean (Single)

\#

prompt: Number of episodes since last visit

response: Integer (Single)

prompt: Number of episodes during past year

response: Integer (Single)

prompt: Self-managed hypoglycemic episode

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[317006 | Reactive hypoglycemia (disorder)]- ->(363714003 |Interprets (attribute))->[1b7c2726-74d4-48e7-a5b6-be5992196203 |Frequency of self-managed hypoglycemia attack (observable entity)];

response: Boolean (Single)

\#

prompt: Number of episodes since last visit

response: Integer (Single)

prompt: Number of episodes during past year

response: Integer (Single)

prompt: Typical number of hypoglycemic episodes per week

response: Integer (Single)

Methods Used to Treat Hypoglycemia

prompt: Carbohydrate-rich snacks or drinks

itemCode: [381be1bc-0c9d-4dc2-aa6f-56183c4123bd |Self-administration of substance (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[99ca8d24-6e83-4619-863b-1e2378229ff6 |Carbohydrate-rich snack (substance)]

response: Boolean (Single)

prompt: Glucose tablets, gels, or drinks

itemCode: [225425006 |Self-administration of medication (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[Rx;1165824 Glucose Pill]

itemCode: [225425006 |Self-administration of medication (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier val-

ue)] ->(363701004 |Direct substance (attribute))->[Rx;377980 Glucose Oral Gel]

itemCode: [225425006 |Self-administration of medication (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[Rx;1165822 Glucose Oral Liquid Product]

response: Boolean (Single)

> \#
>
> ---
>
> \# prompt: Glucagon injections
>
> itemCode: [225425006 |Self-administration of medication (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[Rx;1165209 Glucagon Injectable Product]
>
> response: Boolean (Single)
>
> \# prompt: Number of injections since last visit
>
> response: Integer (Single)
>
> \# prompt: Number of injections during past year
>
> response: Integer (Single)

How good is your ability to recognize your hypoglycemia symptoms?

> \# prompt: How good is your ability to recognize your hypoglycemia symptoms?
>
> itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[719732004 |Able to recognize own symptoms (finding)]
>
> response: String (Single)
>
> response range: EnumerationConstraint (List)
>
> > item: None
> >
> > item: Poor
> >
> > item: Good
>
> \# prompt: Hypoglycemic symptoms
>
> response: String (Single)
>
> \# prompt: Most common cause(s)
>
> response: String (Single)

Hypoglycemic Assessment and Risk Factors

\# prompt: Age

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[105726004 |Age AND/OR growth finding (finding)]

response: Integer (Single)

\# prompt: Life Expectancy

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[729d3508-98ba-4a1d-8334-9e024a0a760e | Prognosis of life expectancy (finding)]

response: Integer (Single)

prompt: Cognitive Impairment/Dementia

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[386806002 |Impaired cognition (finding)]

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

response: Boolean (Single)

#

> # prompt: Major neurologic disorder
>
> itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[118940003 |Disorder of nervous system (disorder)]
>
> response: Boolean (Single)
>
> # prompt: Description
>
> response: String (Single)

#

> # prompt: Major Depression
>
> itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[370143000 |Major depressive disorder (disorder)]
>
> response: Boolean (Single)
>
> # prompt: Description
>
> response: String (Single)

#

> # prompt: Cardiovascular Disease
>
> itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[49601007 |Disorder of cardiovascular system (disorder)]
>
> response: Boolean (Single)
>
> # prompt: Description
>
> response: String (Single)

#

> # prompt: Chronic Kidney Disease
>
> itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[709044004 |Chronic kidney disease (disorder)]
>
> response: Boolean (Single)
>
> # prompt: Description
>
> response: String (Single)
>
> > #
> >
> > > # prompt: Most recent creatinine (mg/dL)
> > >
> > > itemCode: 70901006 |Creatinine measurement (procedure)|

response: Tuple (Single)

initalValue: creatinine

  # prompt: Date

  response: Timestamp (Single)

#

  # prompt: Most recent glomerular filtration rate (GFR) (mL/min/1.73 m^2)

  itemCode: 167181009 |Measurement of renal clearance of creatinine (procedure)|

  response: Real (Single)

initalValue: glomerular filtration rate

  # prompt: Date

  response: Timestamp (Single)

#

  # prompt: Most recent urinary albumin-to-creatinine ratio (mg/g)

  itemCode: 271075006 |Urine albumin/creatinine ratio measurement (procedure)|

  response: Ratio (Single)

initalValue: albumin-to-creatinine ratio

  # prompt: Date

  response: Timestamp (Single)

prompt: Fall history or risk

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[161898004 |Falls (finding)]

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[129839007 |At risk for falls (finding)]

response: Boolean (Single)

prompt: Potential Self-Management Difficulties

response: Boolean (Single)

#

  # prompt: Poor manual dexterity

  itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[306741005 |Poor manual dexterity (finding)]

  response: Boolean (Single)

  # prompt: Active mental health diagnosis

  itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[413307004 |Mental health problem (finding)]

  response: Boolean (Single)

  # prompt: Advanced eye disease, including but not limited to visual loss and retinopathy

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[371405004 |Disorder of eye proper (disorder)]

response: Boolean (Single)

prompt: Food insufficiency

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[706875005 |Insufficient food supply (finding)]

response: Boolean (Single)

prompt: Other

response: Boolean (Single)

#

prompt: Description

response: String (Single)

prompt: Social Risk Factors

response: Boolean (Single)

#

#

prompt: Alcoholism/Substance Abuse

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[7200002 |Alcoholism (disorder)]

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[66214007 |Substance abuse (disorder)]

response: Boolean (Single)

prompt: Description

response: String (Single)

prompt: Homelessness

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[32911000 |Homeless (finding)]

response: Boolean (Single)

prompt: Living alone

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[105529008 |Lives alone (finding)]

response: Boolean (Single)

prompt: Social isolation

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[422650009 |Social isolation (finding)]

response: Boolean (Single)

prompt: Other
response: Boolean (Single)
prompt: Description
response: String (Single)

prompt: Patient has fears or concerns regarding their diabetes management

itemCode: [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[247808006 |Anxiety about body function or health (finding)]- ->(363714003 |Interprets (attribute))->[405096004 |Diabetes self-management behavior (observable entity)]

response: Boolean (Single)
prompt: Description
response: String (Single)

prompt: Other
response: Boolean (Single)
prompt: Description
response: String (Single)

Chapter 4. Past Medical History

History of microvascular disease?	
# prompt:	History of microvascular disease
response:	Code (Single)
response range:	EnumerationConstraint (List)
item:	None(TSR-NoCode)
item:	Mild (microalbuminuria, background retinopathy, and/or mild nephropathy)([a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[58729003 |Disorder of capillaries (disorder)]- ->(246112005 |Severity (attribute))->[255604002 |Mild (qualifier value)];)
item:	Moderate (persistent, fixed proteinuria; pre-proliferative retinopathy; and/or peripheral neuropathy with sensory loss)([a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[58729003 |Disorder of capillaries (disorder)]- ->(246112005 |Severity (attribute))->[6736007 |Moderate (severity modifier) (qualifier value)];)
item:	Advanced (renal insufficiency, proliferative retinopathy/prior laser treatment; peripheral neuropathy with insensate extremities, and/or autonomic neuropathy)([a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[58729003 |Disorder of capillaries (disorder)]- ->(246112005 |Severity (attribute))->[24484000 |Severe (severity modifier) (qualifier value)];)
# prompt:	Functional status
response:	String (Single)
# prompt:	Other relevant Past Medical History
response:	String (Single)

Chapter 5. Medications

<table>
<tr><td>#</td><td></td><td></td></tr>
<tr><td></td><td># prompt:</td><td>Insulin</td></tr>
<tr><td></td><td>itemCode:</td><td>[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[126210001 |Human insulin product (product)]</td></tr>
<tr><td></td><td>response:</td><td>Boolean (Single)</td></tr>
<tr><td></td><td># prompt:</td><td>Details of current prescription</td></tr>
<tr><td></td><td>response:</td><td>String (Single)</td></tr>
<tr><td></td><td># prompt:</td><td>Adverse effects to taking medication</td></tr>
<tr><td></td><td>response:</td><td>String (Single)</td></tr>
<tr><td>#</td><td></td><td></td></tr>
<tr><td></td><td># prompt:</td><td>Sulfonylureas</td></tr>
<tr><td></td><td>itemCode:</td><td>[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[34012005 |Product containing sulfonylurea (medicinal product)]</td></tr>
<tr><td></td><td>response:</td><td>Boolean (Single)</td></tr>
<tr><td></td><td># prompt:</td><td>Details of current prescription</td></tr>
<tr><td></td><td>response:</td><td>String (Single)</td></tr>
<tr><td></td><td># prompt:</td><td>Adverse effects to taking medication</td></tr>
<tr><td></td><td>response:</td><td>String (Single)</td></tr>
<tr><td>#</td><td></td><td></td></tr>
<tr><td></td><td># prompt:</td><td>Other glucose-lowering agents</td></tr>
<tr><td></td><td>itemCode:</td><td>[416118004 |Administration (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 |Direct substance (attribute))->[312064005 |Hypoglycemic agent (product)]</td></tr>
<tr><td></td><td>response:</td><td>Boolean (Single)</td></tr>
<tr><td></td><td># prompt:</td><td>Details of current prescription</td></tr>
<tr><td></td><td>response:</td><td>String (Single)</td></tr>
<tr><td></td><td># prompt:</td><td>Adverse effects to taking medication</td></tr>
<tr><td></td><td>response:</td><td>String (Single)</td></tr>
</table>

Chapter 6. Lifestyle

# prompt:	Typical diet
itemCode:	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[36823005 |Normal diet (finding)]
response:	String (Single)
# prompt:	Exercise
itemCode:	226029000 |Exercises (regime/therapy)|
response:	String (Single)

#		
	# prompt:	Tobacco, alcohol, or other substance use
	itemCode:	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[110483000 |Tobacco user (finding)]
	itemCode:	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[219006 |Current drinker of alcohol (finding)]
	response:	String (Single)
	# prompt:	Description
	response:	String (Single)
#		
	# prompt:	Other
	response:	Boolean (Single)
	# prompt:	Description
	response:	String (Single)

Chapter 7. Patient Preferences

Patient preference for glucose-lowering agent assessed

prompt:

re- Boolean (Single)
sponse:

#	
# prompt:	Patient preferences for glucose-lowering agents
response:	String (Single)

Chapter 8. Plan

HbA1c Target Range

    # prompt: 6.0% to 7.0% (Recommended for those with absent or mild microvascular disease, no major comorbidity, and life expectancy greater than 10 years)

    response: Boolean (Single)

    # prompt: 7.0% to 8.0% (Recommended for those with moderate microvascular disease, no major comorbidity, and life expectancy greater than 10 years or with absent or mild microvascular disease, major comorbidity present but manageable, and life expectancy of 5 to 10 years)

    response: Boolean (Single)

    # prompt: 7.5% to 8.5% (Recommended for those with moderate microvascular disease, major comorbidity present but manageable, and life expectancy of 5 to 10 years or with advanced microvascular disease, major comorbidity present and challenging to manage or end-stage, and life expectancy of at least 5 years)

    response: Boolean (Single)

    # prompt: 8.0% to 9.0% (Recommended for those with major comorbidity present and challenging to manage or end-stage and life expectancy less than 5 years)

    response: Boolean (Single)

    # prompt: Other

    response: Boolean (Single)

       #

           # prompt: Description

           response: String (Single)

    # prompt: Preprandial blood glucose target range

    response: IntegerInterval (Single)

❖

    prompt: Self-management plan changes

    response: String (Single)

❖

    prompt: Recommended lifestyle changes

    response: String (Single)

❖

    prompt: Consultations

    response: String (Single)

    prompt: Other

    response: String (Single)

Chapter 9. Tabular List

Terminology Service Request (TSR) Mappings

Table 9.1. Terminology Versions

Name	Identifer	Version
SNOMED CT	2.16.840.1.113883.6.96	United States Edition 20180301

Table 9.2. Terminology References

System	Code	Display Text[a]	References[b]
SNOMED CT	133936004 |Adult (person)|	Adult outpatient with an active problem of either diabetes mellitus, type 1 or type 2	1
SNOMED CT	167181009 |Measurement of renal clearance of creatinine (procedure)|	Precoordinated Expression	2
SNOMED CT	226029000 |Exercises (regime/therapy)|	Postcoordinated Expression	1
SNOMED CT	271075006 |Urine albumin/creatinine ratio measurement (procedure)|	Precoordinated Expression	2
SNOMED CT	398166005 |Performed (qualifier value)|	Precoordinated Expression	3
SNOMED CT	70901006 |Creatinine measurement (procedure)|	Precoordinated Expression	2
SNOMED CT	TSR-NoCode[c]	None	1
SNOMED CT	[225294001 |Identifying goals (procedure)]- ->(363702006 |Has focus (attribute))->[243860001 |Diabetic monitoring status (finding)]- ->(363714003 |Interprets (attribute))->[408591000 |Hemoglobin A1c target (observable entity)]	Postcoordinated Expression	1
SNOMED CT	[225294001 |Identifying goals (procedure)]- ->(363702006 |Has focus (attribute))->[243860001	Diabetic monitoring status (finding)]- ->(363714003 |Interprets (attribute))->[787bb747-3d69-4383-b69d-68937ad61f24 |Fasting blood glucose target (observable entity)]	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
SNOMED CT	[225425006 |Self-administration of medication (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004	Direct substance (attribute))->[Rx;1165209 Glucagon Injectable Product]	Postcoordinated Expression	1
SNOMED CT	[225425006 |Self-administration of medication (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004	Direct substance (attribute))->[Rx;1165822 Glucose Oral Liquid Product]	Postcoordinated Expression	1
SNOMED CT	[225425006 |Self-administration of medication (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004	Direct substance (attribute))->[Rx;1165824 Glucose Pill]	Postcoordinated Expression	1
SNOMED CT	[225425006 |Self-administration of medication (procedure)] ->(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004	Direct substance (attribute))->[Rx;377980 Glucose Oral Gel]	Postcoordinated Expression	1
SNOMED CT	[381be1bc-0c9d-4dc2-aa6f-56183c4123bd |Self-administration of substance (procedure)] -	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
	>(260686004 |Method (attribute))->[129445006 |Administration - action (qualifier value)] ->(363701004 | Direct substance (attribute))->[99ca8d24-6e83-4619-863b-1e2378229ff6 |Carbohydrate-rich snack (substance)]		
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))->[312064005 |Hypoglycemic agent (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
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[105529008 | Lives alone (finding)]	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[105726004 |Age AND/OR growth finding (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[110483000 | Tobacco user (finding)]		1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[118940003 |Disorder of nervous system (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[129839007 | At risk for falls (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[161898004 | Falls (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[219006 | Current drinker of alcohol (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
	(attribute))->[271062006 |Fasting blood glucose measurement (procedure)]		
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[306741005 |Poor manual dexterity (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[317006 |Reactive hypoglycemia (disorder)]	Recent hypoglycemic episode	2
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[32911000 | Homeless (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[36823005 | Normal diet (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[370143000 | Major depressive disorder (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[371405004 |Disorder of eye proper (disorder)]	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[386806002 | Impaired cognition (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[413307004 |Mental health problem (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[422650009 | Social isolation (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[43396009 | Hemoglobin A1c measurement (procedure)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[44054006 | Diabetes mellitus type 2 (disorder)]	Type II Diabetes	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[46635009 | Diabetes mellitus type 1 (disorder)]	Type I Diabetes	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation proce-	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
	dure (procedure)] ->(363702006 |Has focus (attribute))->[49601007	Disorder of cardiovascular system (disorder)]		
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation proce-dure (procedure)] ->(363702006 |Has focus (attribute))->[52448006	Dementia (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation proce-dure (procedure)] ->(363702006 |Has focus (attribute))->[66214007	Substance abuse (disor-der)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation proce-dure (procedure)] ->(363702006 |Has focus (attribute))->[706875005 |Insufficient food supply (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation proce-dure (procedure)] ->(363702006 |Has focus (attribute))->[709044004 |Chronic kidney disease (disorder)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation proce-dure (procedure)] ->(363702006 |Has focus (attribute))->[719732004 |Able to recognize own symptoms (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation proce-dure (procedure)] ->(363702006 |Has focus	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
	(attribute))->[7200002 |Alcoholism (disorder)]		
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[729d3508-98ba-4a1d-8334-9e024a0a760e |Prognosis of life expectancy (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[b91c7da2-cb27-42e5-8ae9-3b7dacecbb7f |At risk for hypoglycemia (disorder)]	At risk for hypoglycemia without recent episode	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[247808006 | Anxiety about body function or health (finding)]- ->(363714003 |Interprets (attribute))->[405096004 | Diabetes self-management behavior (observable entity)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[317006 |Reactive hypoglycemia (disorder)]- ->(363714003 |Interprets (attribute))->[1b7c2726-74d4-48e7-a5b6-be5992196203 |Frequency of self-managed hypoglycemia attack (observable entity)];	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- -	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
	>(363702006 |Has focus (attribute))->[401082004 |Hypoglycemic attack requiring third party assistance (finding)]- ->(363714003 |Interprets (attribute))->[06cf6868-d29b-4586-9e30-fabe9594642e |Frequency of bystander assisted hypoglycemia attack (observable entity)];		
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[401082004 |Hypoglycemic attack requiring third party assistance (finding)]- ->(363714003 |Interprets (attribute))->[712660009 |Frequency of hospital-treated hypoglycemia attack (observable entity)];	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[401082004 |Hypoglycemic attack requiring third party assistance (finding)]- ->(363714003 |Interprets (attribute))->acd5c50a-e40a-47cd-bf34-d02bd-b9f0342 |Frequency of emergency department treated hypoglycemia attack (observable entity)];	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[58729003 |Disorder of capillaries (disorder)]- ->(246112005 |Severity (at-	Advanced (renal insufficiency, proliferative retinopathy/prior laser treatment; peripheral neuropathy with insensate extremities, and/or autonomic neuropathy)	1

System	Code	Display Text[a]	References[b]
	tribute))->[24484000 |Severe (severity modifier) (qualifier value)];		
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[58729003 |Disorder of capillaries (disorder)]- ->(246112005 |Severity (attribute))->[255604002 | Mild (qualifier value)];	Mild (microalbuminuria, background retinopathy, and/or mild nephropathy)	1
SNOMED CT	[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[58729003 |Disorder of capillaries (disorder)]- ->(246112005 |Severity (attribute))->[6736007 |Moderate (severity modifier) (qualifier value)];	Moderate (persistent, fixed proteinuria; pre-proliferative retinopathy; and/or peripheral neuropathy with sensory loss)	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 10. Behavior Symbols

Table 10.1. Group Organizational Behavior

Sym-bol	Name	Definition
#	Sentence Group	A group of related alternative actions is a sentence group if the item referenced by the action is the same in all the actions, and each action simply constitutes a different variation on how to specify the details for that item. For example, two actions that could be in a SentenceGroup are "aspirin, 500 mg, 2 times per day" and "aspirin, 300 mg, 3 times per day". In both cases, aspirin is the item referenced by the action, and the two actions represent two different options for how aspirin might be ordered for the patient. Note that a SentenceGroup would almost always have an associated selection behavior of "AtMostOne", unless it's a required action, in which case, it would be "ExactlyOne".
#	Logical Group	A group with this behavior logically groups its sub-elements, and may be shown as a visual group to the end user, but it is not required to do so.
➤	Visual Group	Any group marked with this behavior should be displayed as a visual group to the end user.

Table 10.2. Group Selection Behavior

Sym-bol	Name	Definition
#	Any	Any number of the items in the group may be chosen, from zero to all.
#	All	All the items in the group must be selected as a single unit.
#	AllOrNone	All the items in the group are meant to be chosen as a single unit: either all must be selected by the end user, or none may be selected.
#	ExactlyOne	The end user must choose one and only one of the selectable items in the group. The user may not choose none of the items in the group.
✪	AtMostOne	The end user may choose zero or at most one of the items in the group.
☀	OneOrMore	The end user must choose a minimum of one, and as many additional as desired.

Table 10.3. Required Behavior

Sym-bol	Name	Definition
◆	Must	An action with this behavior must be included in the actions processed by the end user; the end user may not choose not to include this action.

Sym-bol	Name	Definition
✧	Could	An action with this behavior may be included in the set of actions processed by the end user.
➢	MustUnlessDocumented	An action with this behavior must be included in the set of actions processed by the end user, unless the end user provides documentation as to why the action was not included.

Table 10.4. Precheck Behavior

Sym-bol	Name	Definition
▲	Yes	An action with this behavior is one of the most frequent actions that is, or should be, included by an end user, for the particular context in which the action occurs. The system displaying the action to the end user should consider "pre-checking" such an action as a convenience for the user.
#	No	An action with this behavior is one of the less frequent actions included by the end user, for the particular context in which the action occurs. The system displaying the actions to the end user would typically not "pre-check" such an action.

Table 10.5. Cardinality Behavior

Sym-bol	Name	Definition
◆	Single	An action with this behavior may only be completed once.
❖	Multiple	An action with this behavior may be repeated multiple times.

Table 10.6. Item Flags

Sym-bol	Name	Definition
☞	fillIn	This item, in a list entry, allows the user to enter a fill in value that is not present in the set of presented choices.

Table 10.7. Read Only Behavior

Sym-bol	Name	Definition
#	true	For a particular action or action group, specifies whether the elements are read only.

Appendix A. References

This appendix contains the list of related resources and supporting documents used in creating this KNART.

List of References

Related Resources

[CCWP] *Endocrinology: Hypoglycemia Clinical Content White Paper*

[CSD] *Endocrinology: Hypoglycemia Documentation Template Conceptual Structure Document*

[KVRpt] *Endocrinology: Hypoglycemia Documentation Template KNART Validation Report*

Supporting Evidence

[ADA, 2017] *American Diabetes Association. Diabetes Care. Standards of medical care in diabetes-20172017;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 Libray 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 WebsiteRevised 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])