Leveraging SNOMED CT to Drive Actionable Clinical Insights

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Clinical Insights • Building Blocks • Moving Parts • Making it Work O Q&A

Agenda











Clinical Insights (Clinical Awareness / Inferencing)

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Leveraging SNOMED CT to Drive Actionable Clinical Insights

Assertion: "SNOMED CT based clinical information benefits individual patients and clinicians as well as populations and it supports evidence based care "*

- Enabling guideline and decision support systems to provide real-time advice
- Enhancing audits of care delivery \bigcirc
- Allowing accurate and comprehensive searches that identify patients
- Enhancing audits of care delivery
- Reducing costs of inappropriate and duplicative testing and treatment
- Raising the cost-effectiveness and quality of care

*SNOMED International website





Inferencing

• What: A way of taking structured clinical data and using rules-based, automated reasoning to draw a clinically reasonable conclusion and give feedback to the user

- as to allow it to be reasoned over
- deploy

• Requirement: Ability to collect together all available, relevant information into a clear clinical picture and organise it in such a way

• Objective: To create an environment where Clinical Insights can be built without the need for a software engineer to author, test, and







Clinical Awareness - Real world Examples

- Cohort Clinical Trial Recruitment
- Detection Undocumented DM1, DM2, Gestational DM \bigcirc
- Genomics Clopidogrel Metabolism and CYP2C19 Gene \bigcirc
- Quality Heart Failure Aldosterone Antagonists \bigcirc
- Calculation CAP Pneumonia Severity Index \bigcirc
- Monitoring Diabetes Mellitus HbA1c \bigcirc
- Safety Beers Criteria \bigcirc
- \bigcirc Syndrome
- And Countless Others...



Unnecessary Care - Avoiding CK-MB (heart muscle damage test) Testing for Acute Coronary

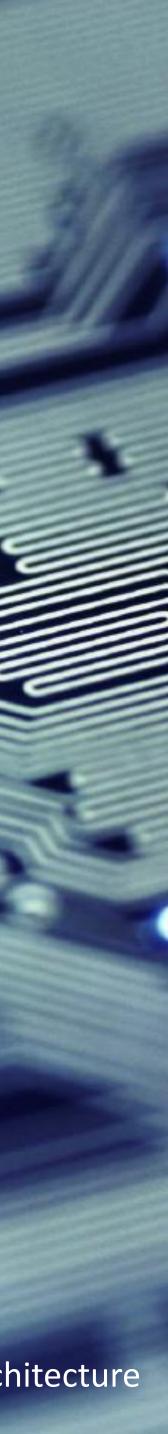




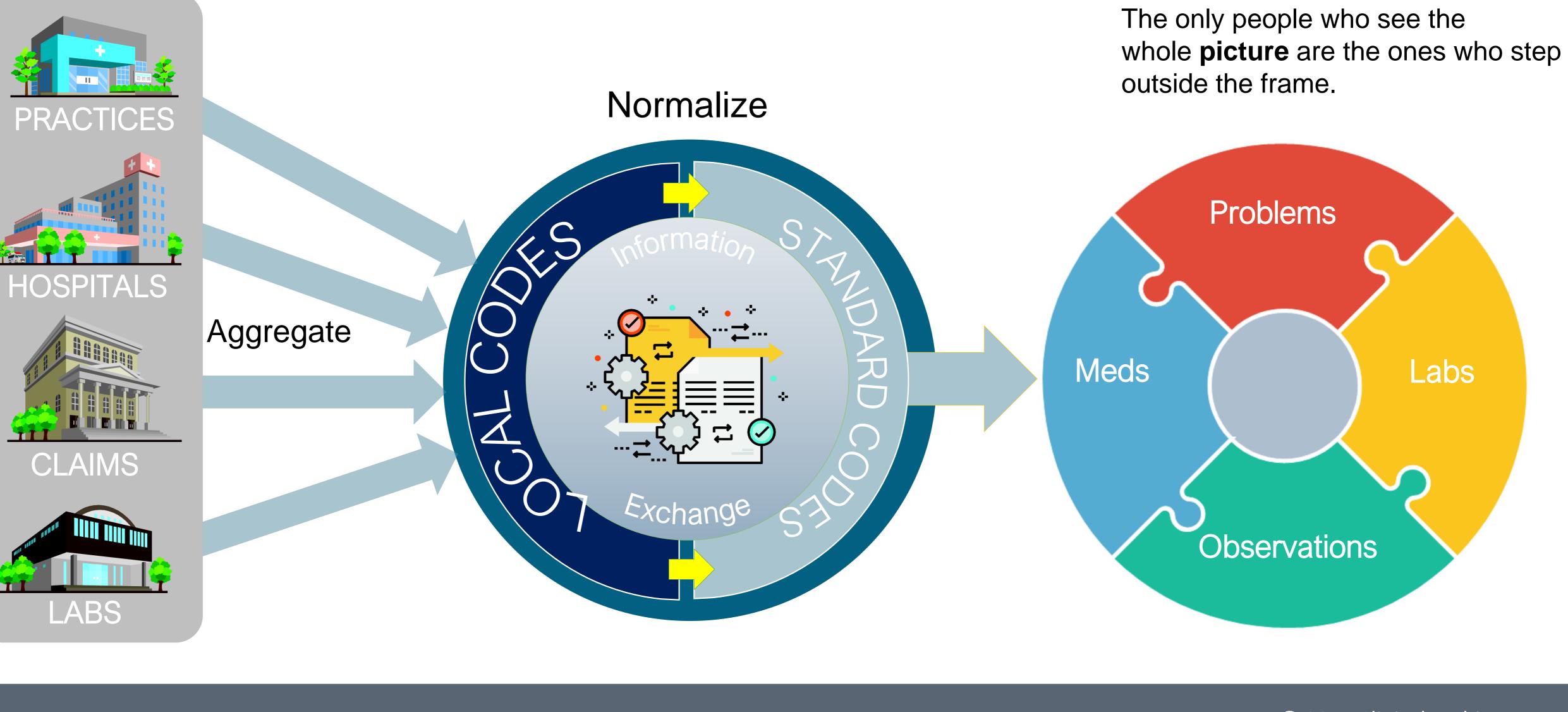
Clinical Insights (Building Blocks)

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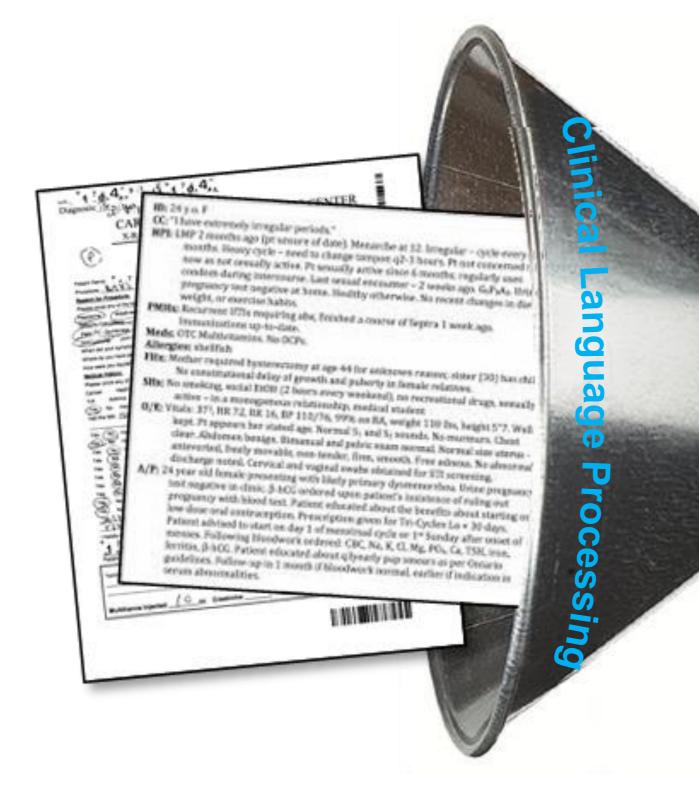


Aggregation and Normalization First, build a solid information foundation



Unstructured Information

Second, See what other information sources you can use



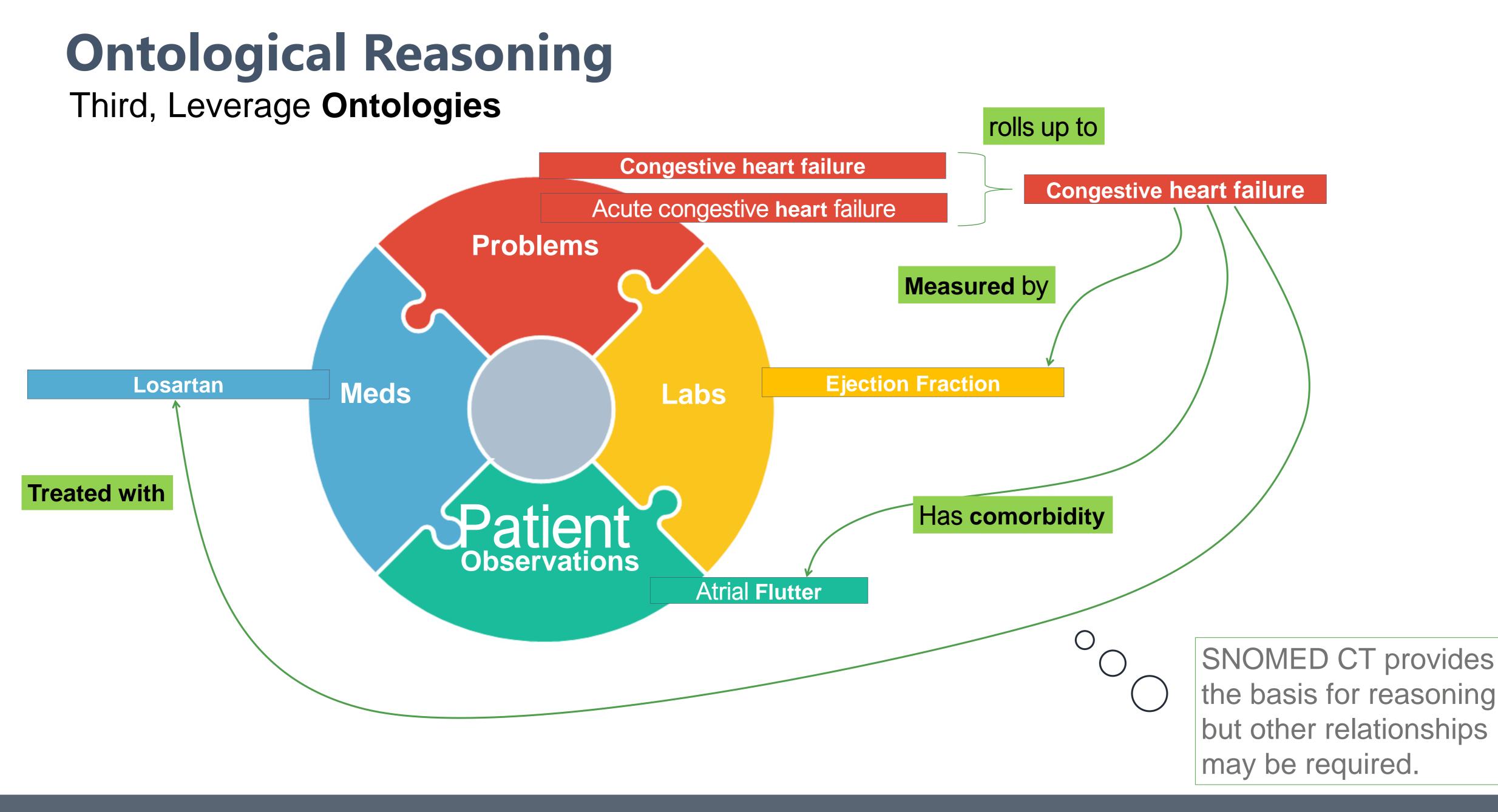


For completeness it may be necessary to identify information stored in free text and turn it into actionable data.

Code System:	SNOMED CT
Code :	250908004
Term:	Left Ventricle Ejection Fraction
Result Value:	55
Result Unit:	%

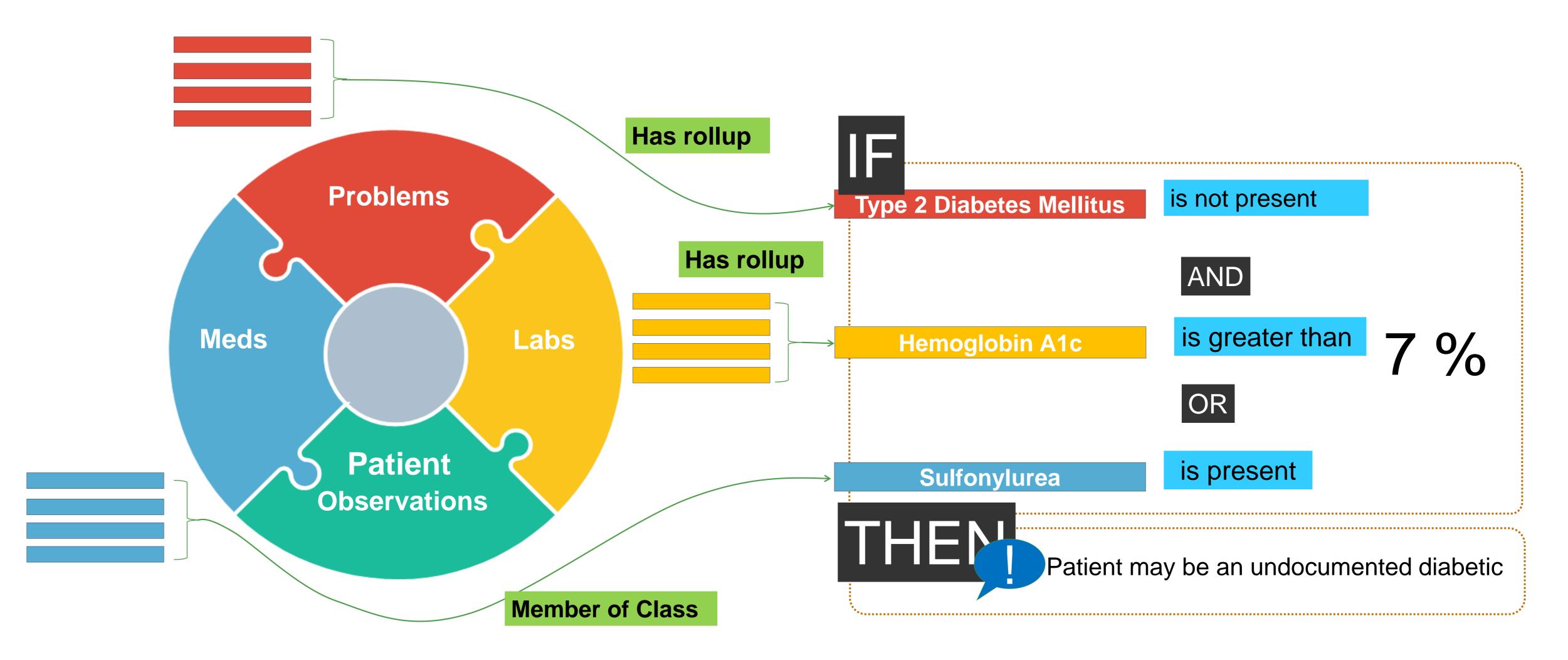




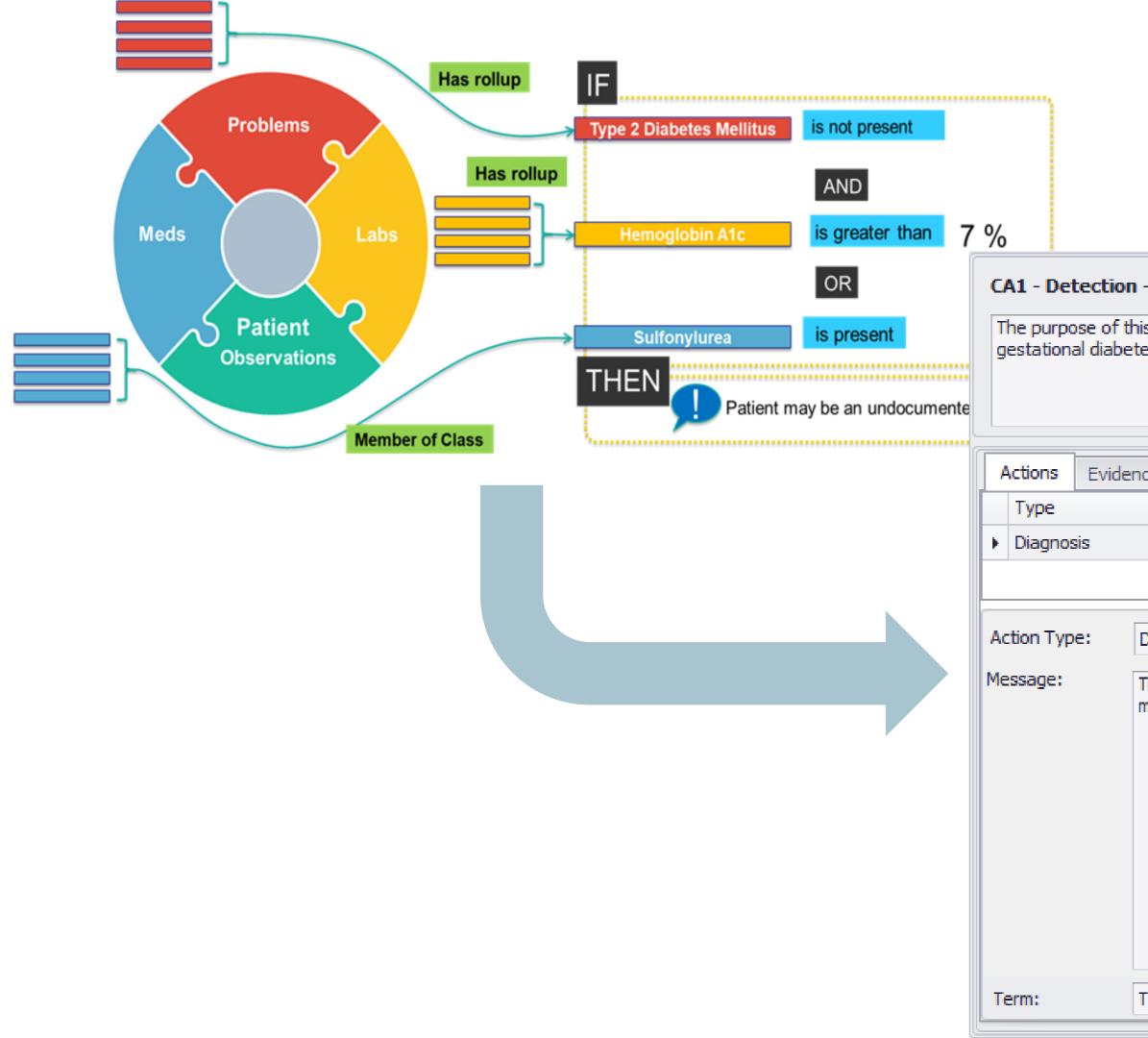




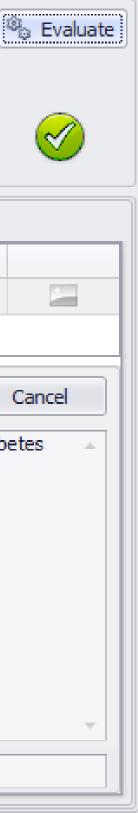
Logical Reasoning Fourth, Build the Rules



Share Results - Action

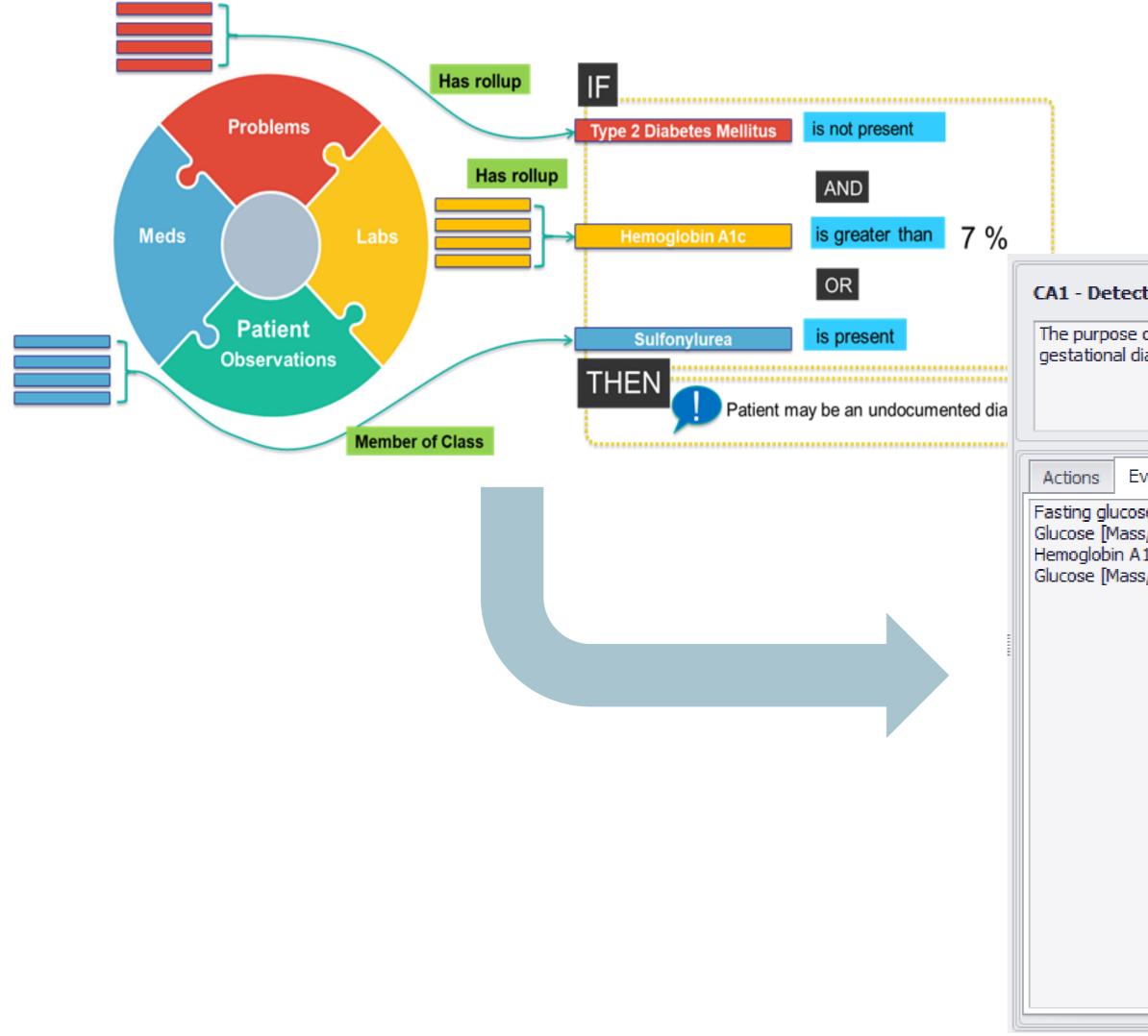


- Un	locumente	d DM1, DM2, or Gestational DM	Trace
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nce	Reference		
	Message		
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Diagn	osis	▼ Confirm	Apply
This p mellitu		idence of elevated blood sugars and absence of autoimmune markers. Consider verification and documentati	on of type 2 diab



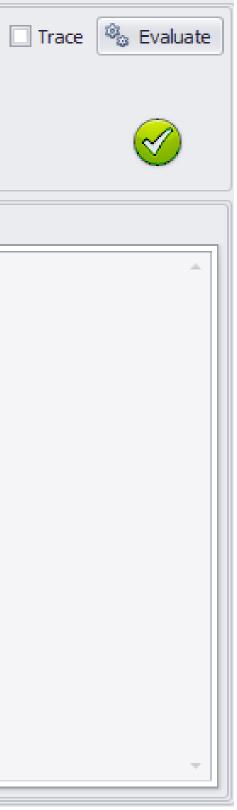


Share Results - Evidence

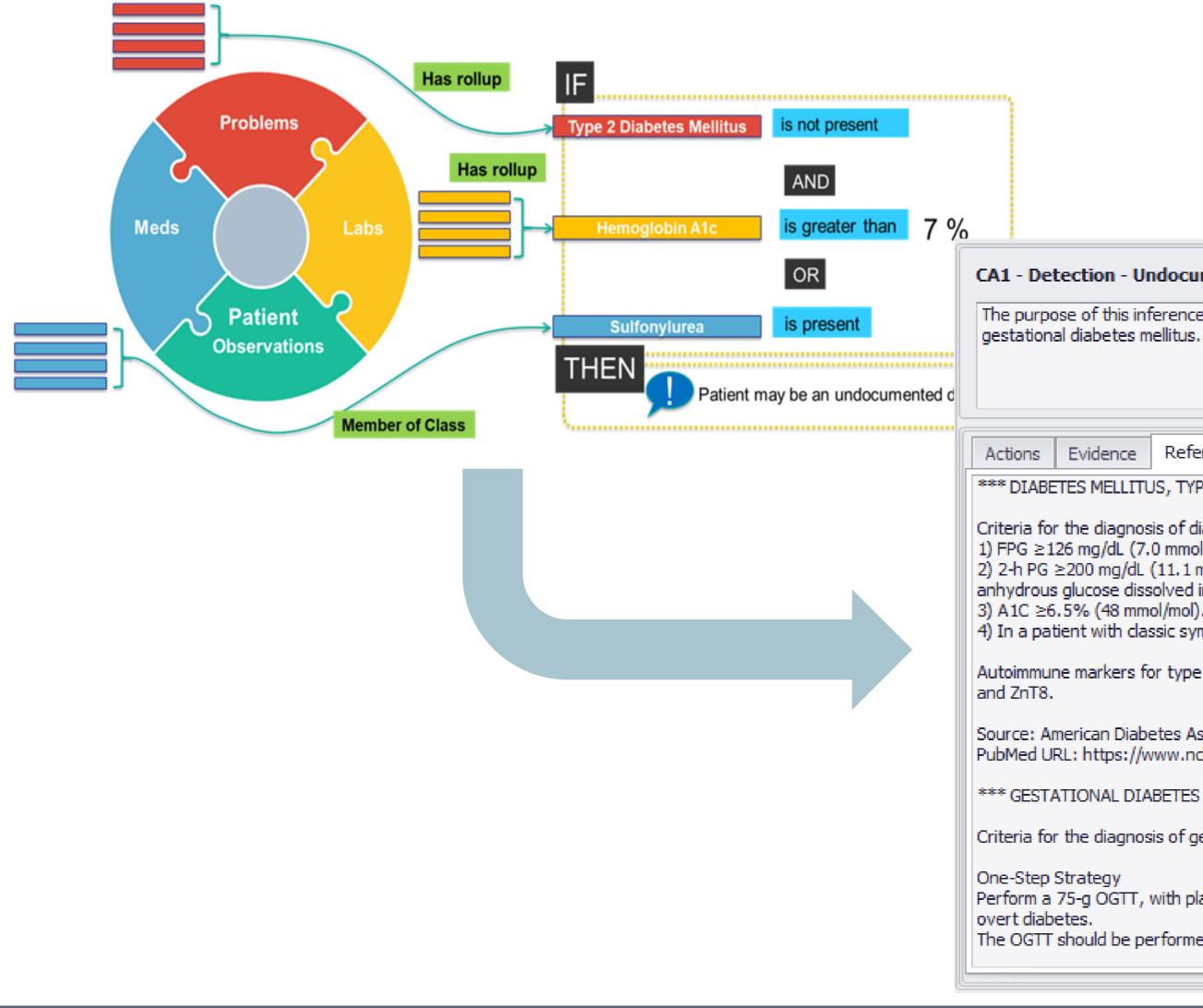


CA1 - Detection - Undocumented DM1, DM2, or Gestational DM The purpose of this inference is to identify previously undocumented adult patients with type 1 diabetes mellitus, type 2 diabetes mellitus, or gestational diabetes mellitus. Evidence Reference

Fasting glucose [Mass/volume] in Serum or Plasma: 135 mg/dL on 27-Mar-2017 Glucose [Mass/volume] in Serum or Plasma -2 hours post 75 g glucose PO: 211 mg/dL on 27-Mar-2017 Hemoglobin A1c/Hemoglobin.total in Blood: 7.7 % on 27-Mar-2017 Glucose [Mass/volume] in Serum or Plasma: 211 mg/dL on 27-Mar-2017



Share Results - Reference



CA1 - Detection - Undocumented DM1, DM2, or Gestational DM

The purpose of this inference is to identify previously undocumented adult patients with type 1 diabetes mellitus, type 2 diabetes mellitus, or

Actions Evidence Reference

*** DIABETES MELLITUS, TYPE 1 & 2 ***

Criteria for the diagnosis of diabetes (any of the following):

1) FPG ≥126 mg/dL (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h.

2) 2-h PG ≥200 mg/dL (11.1 mmol/L) during an OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.

3) A1C \geq 6.5% (48 mmol/mol). The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.

4) In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L).

Autoimmune markers for type 1 diabetes mellitus include islet cell autoantibodies and autoantibodies to GAD (GAD65), insulin, the tyrosine phosphatases IA-2 and IA-2β,

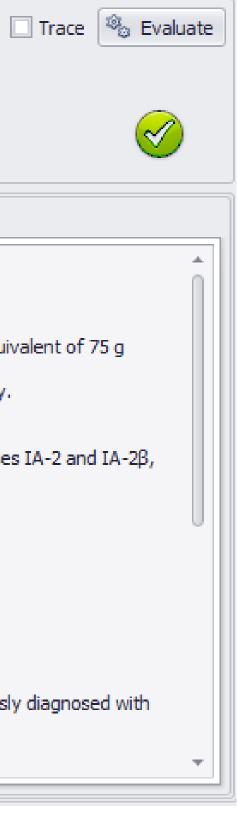
Source: American Diabetes Association. 2. Classification and Diagnosis of Diabetes. Diabetes Care. 2017 Jan;40(Suppl 1):S11-S24. PubMed URL: https://www.ncbi.nlm.nih.gov/pubmed/27979889

*** GESTATIONAL DIABETES MELLITUS ***

Criteria for the diagnosis of gestational diabetes (either of the following):

Perform a 75-g OGTT, with plasma glucose measurement when patient is fasting and at 1 and 2 h, at 24-28 weeks of gestation in women not previously diagnosed with

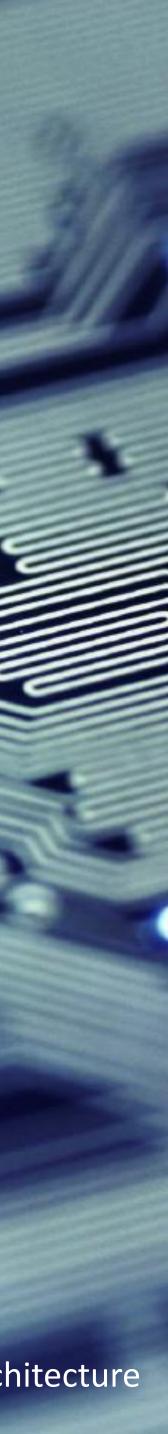
The OGTT should be performed in the morning after an overnight fast of at least 8 h.



Clinical Insights (Moving Parts)

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Inferencing: The Moving Parts

• Patient Data

= Structured input from a patient record

• Terminology

= A specialized Model that defines the concepts (Elements) for one or more Inferences

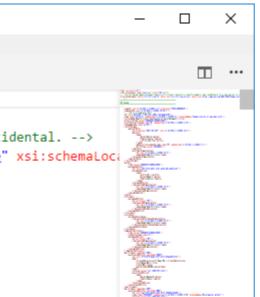
Inference Sequencing

• = The rules and logic that make it all work



Inferencing Component: Patient Data

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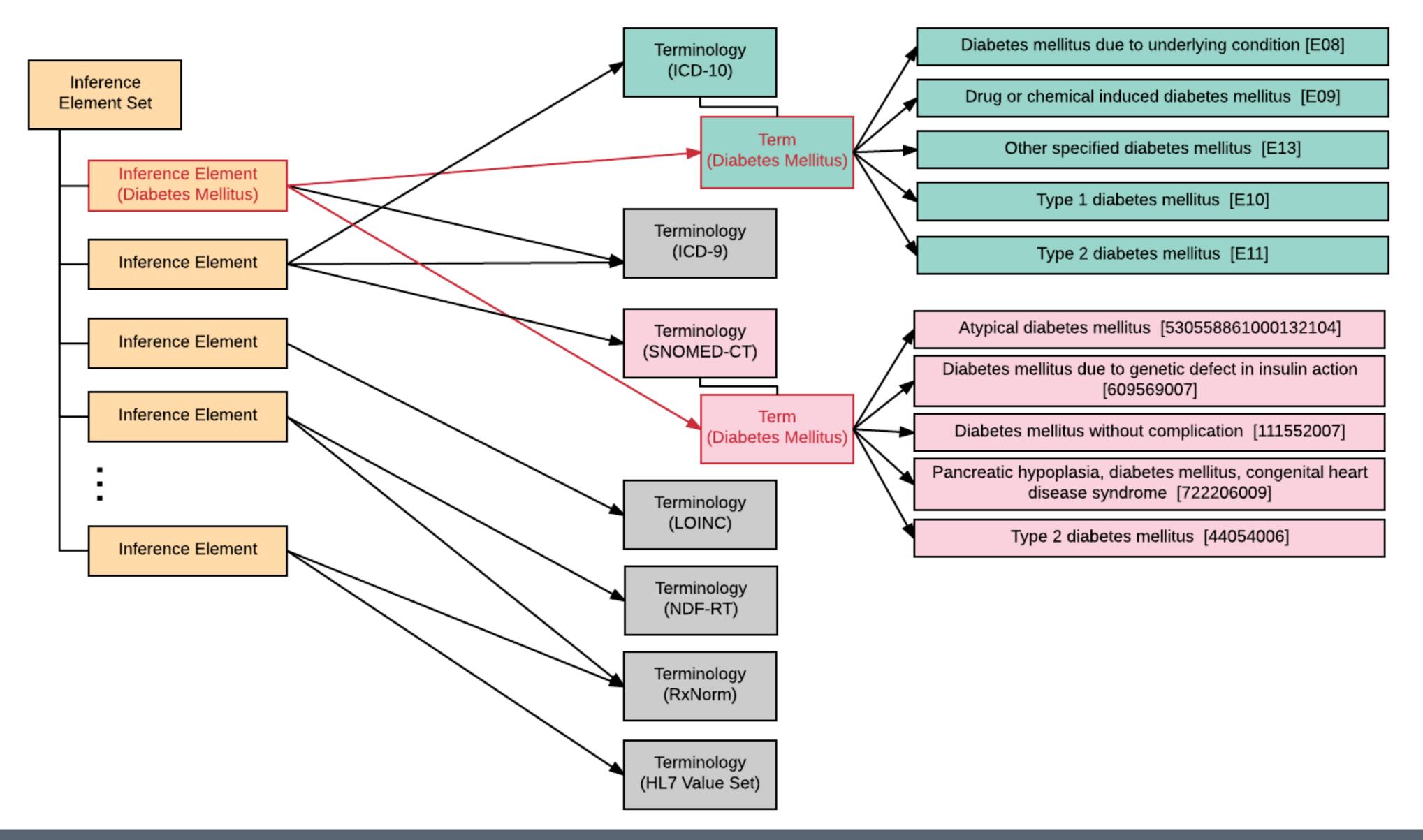
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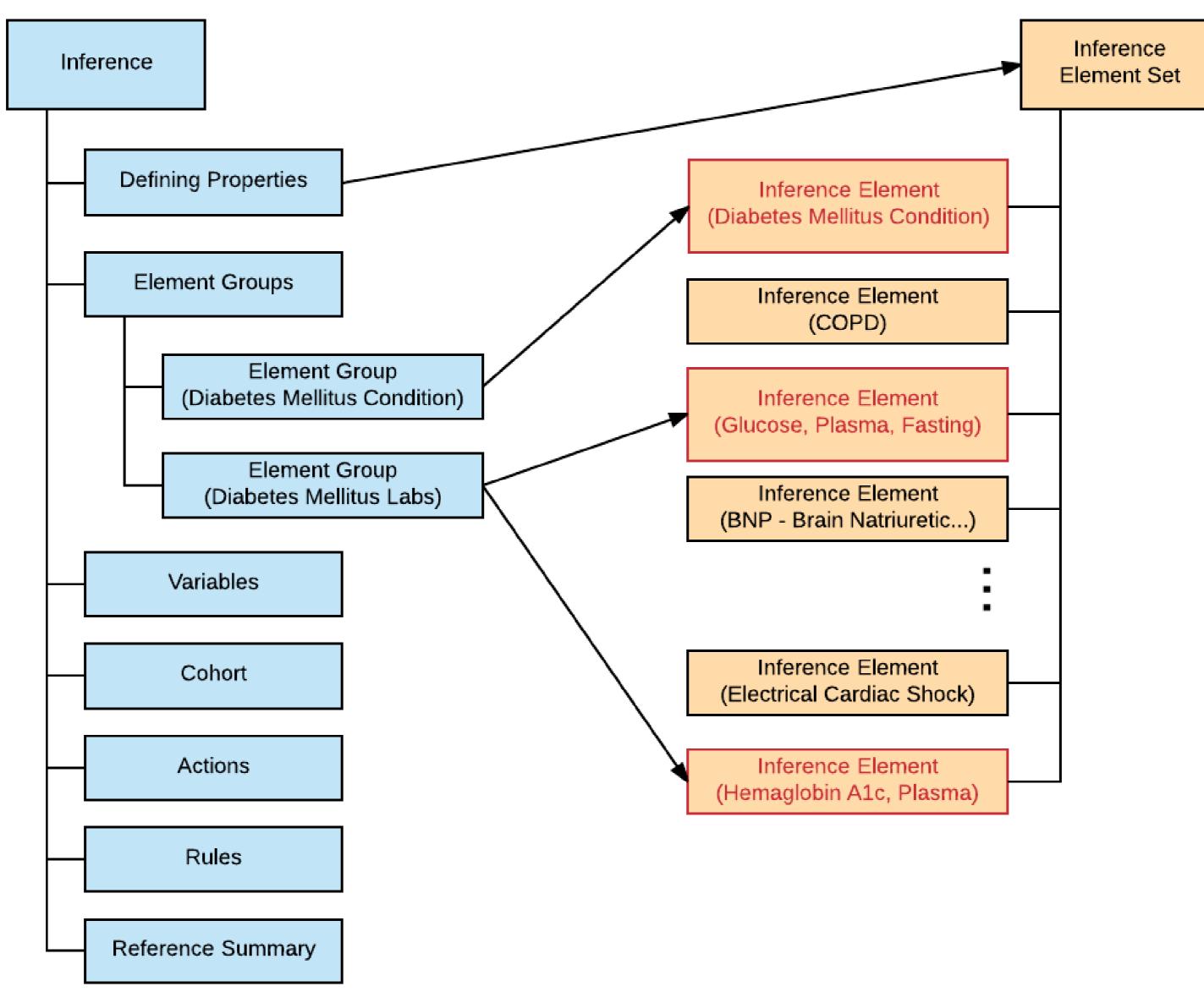
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Terminology: Inference Element Sets





Inferencing Component: The Inference

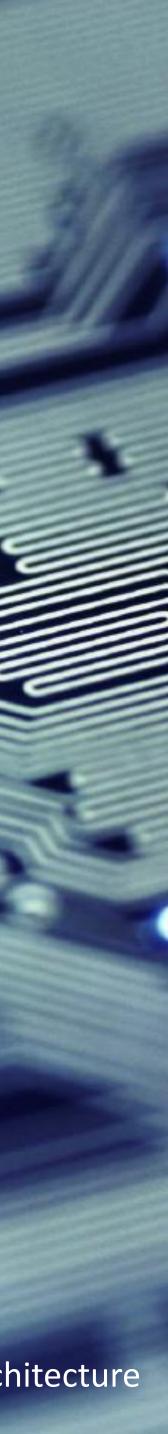


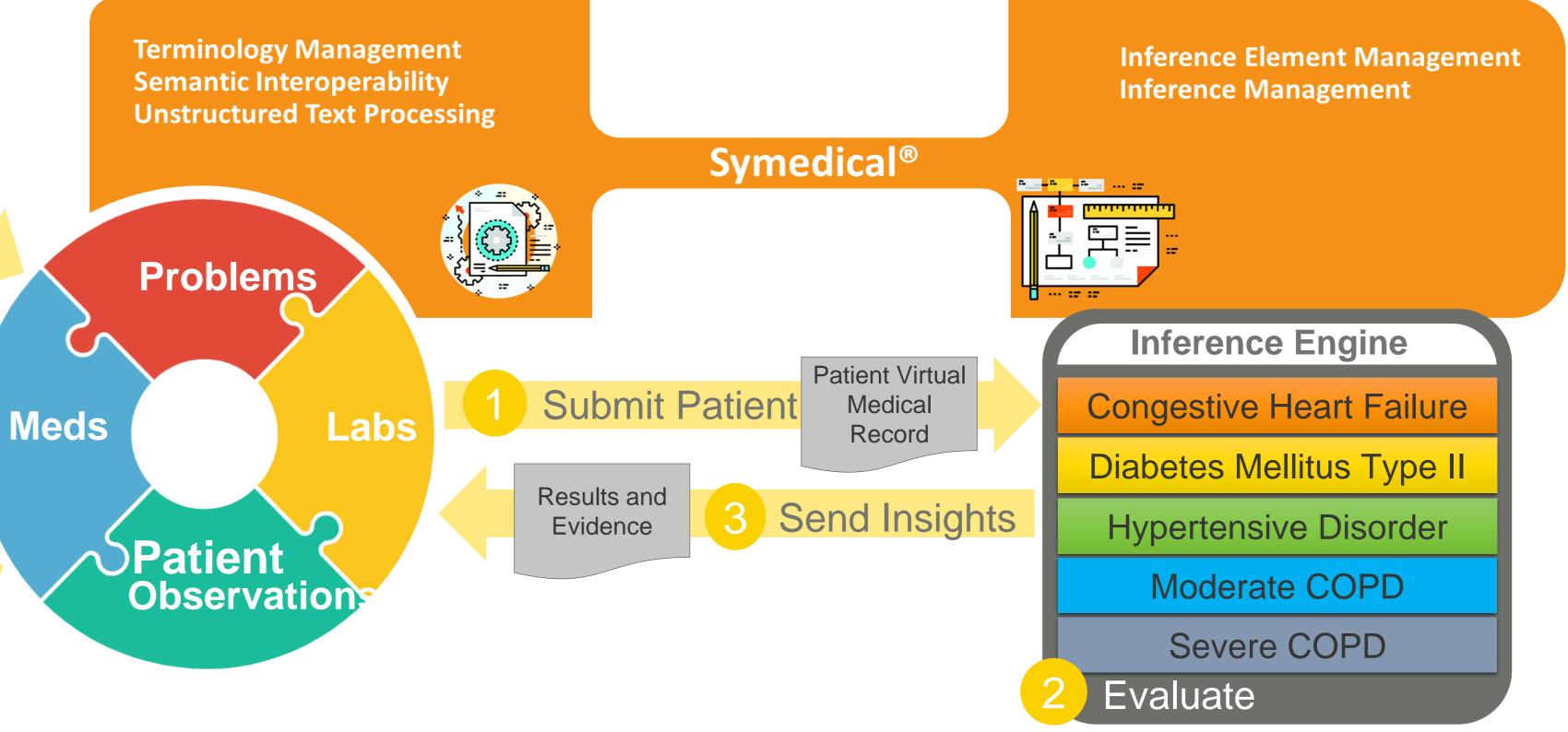


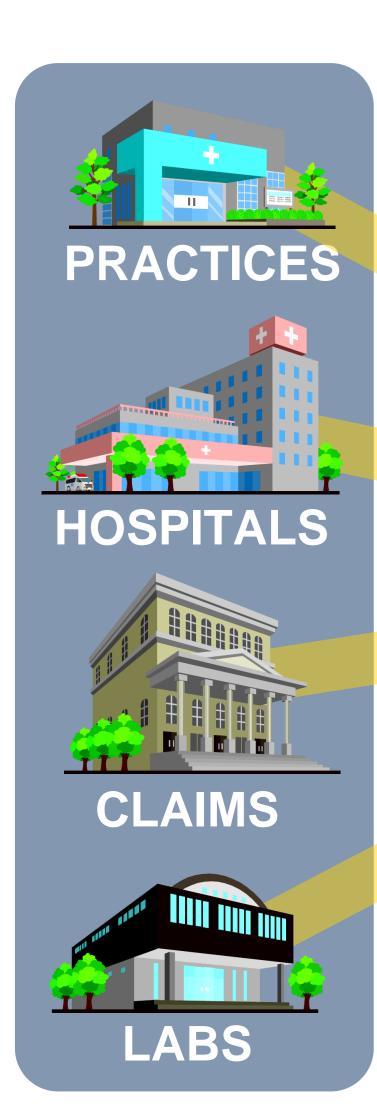
Clinical Insights (Making it Work)

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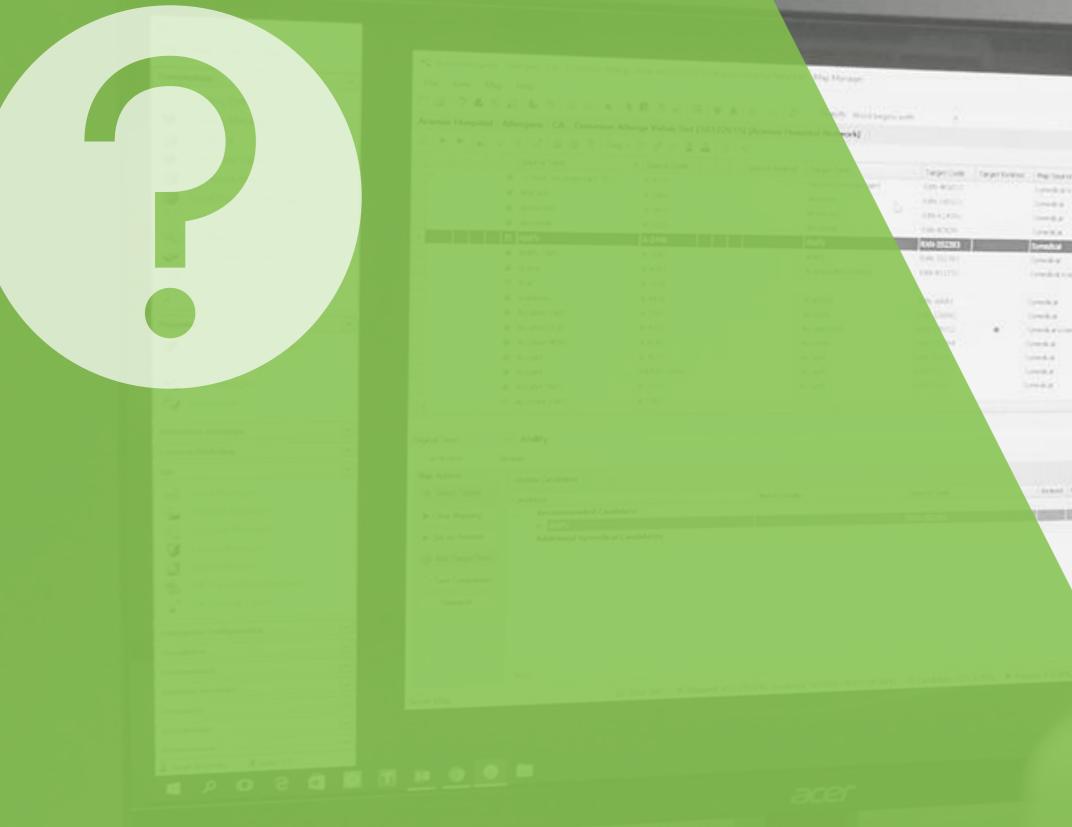
Example Deployment



Leveraging SNOMED CT to Drive Actionable Clinical Insights

- Enabling guideline and decision support systems to provide real-time advice \checkmark
- Enhancing audits of care delivery
- Allowing accurate and comprehensive searches that identify patients
- Enhancing audits of care delivery
- Reducing costs of inappropriate and duplicative testing and treatment Raising the cost-effectiveness and quality of care \checkmark







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