



# **EMR DATA QUALITY**

---

## **EVALUATION GUIDE**

Version 1.0  
Michael Bowen  
April 2012

## Purpose

The following document outlines a general method and a collection of tactics that can be used to investigate data quality in EMRs.



## CONTENTS

1. Designing and Executing a Data Quality Evaluation.....	5
2. Data Quality Observation & Interview Guide.....	6
A. Understanding the Activity .....	6
B. Assessing EMR Adoption and Levels of Use.....	7
3. Data Fitness Dimensions.....	8
4. Data Interrogation Readiness Checklist.....	10
5. Data Quality Probes .....	11
1) Population Pyramid .....	11
2) Consistency of Form .....	11
C. Problem List Entries .....	11
D. Medication List Entries.....	12
3) Consistency of Capture .....	13
A. Problem List .....	13
B. Medications.....	14
C. Allergies.....	15
4) Concordance.....	16
A. Problem List Prevalence - Diabetes.....	16
5) Correctness.....	17
A. Demographics vs. Lab Data – Patient Gender.....	18
6) Completeness.....	18
A. Problem List vs. Medication - Hypothyroidism .....	18
B. Problem List vs. Billing Fee Codes - Diabetes.....	20
C. Problem List vs. Medication - Diabetes .....	22
D. Problem List vs. Medication - Chronic Obstructive Pulmonary Disease .....	24
E. Problem List vs. Billing Fee Code - Chronic Obstructive Pulmonary Disease .....	25
F. Problem List vs. Medication - Gout.....	26
G. Allergies vs. Medications – Anaphylaxis.....	28
H. Social History vs. Medication – Smoking Status .....	29
7) Granularity.....	30
A. Encounter Diagnosis.....	30
B. Billing Codes.....	32



6. Data Quality Calculation Method..... 34



# 1. DESIGNING AND EXECUTING A DATA QUALITY EVALUATION

Data collected by primary care providers in electronic medical record (EMR) systems can be used to support a variety of actions including provision of day to day care, decision support, practice reflection, research and public health surveillance. The extent to which EMR data can be relied upon to support such actions is dependent on the *quality* of the held data. As data quality is a relative concept, researchers at the eHealth Observatory have designed the following method for constructing a context sensitive EMR data quality evaluation.

**Table 1: Method for designing and executing a context sensitive data quality evaluation**

1. Identify an activity that relies on the use of EMR data.
2. Through observation and interview become familiar with the context in which the activity is carried out. Determine its intent, identify the EMR data which are most critical and become familiar with the tools and people involved in the activity's performance.
3. Determine what tool(s) or resources are available to interrogate the EMR quality data. Reconcile that the data elements used by the tool are the same as those identified as important for the activity – i.e. ensure alignment between important data, documented data, and tool-accessible data.
4. Determine what fitness dimensions are most important for each data element to exhibit (see Table 4). Provide a sense of the desired or acceptable level of fitness in relation to the intent of the activity.
5. Select an associated measurement technique for the selected fitness dimensions (see Table 4).
6. Customize each measurement technique according to the findings of Step 2. If necessary, use one or more *data quality probes* (See Section 5) to further inform the design of case selection or query construction.
7. Apply the techniques using the tools and/or resources identified in Step 3.
8. Report the fitness of each data element independently according to the measures defined in Table 4.
9. Describe how the overall fitness of each important data element combined enhances or impairs the ability to perform the activity of interest. This is data quality *in context*.
10. Present the data quality findings. Attempt to provide feedback on how data quality and utility of each contributing data element might be improved.



## 2. DATA QUALITY OBSERVATION & INTERVIEW GUIDE

In order to evaluate the degree to which a data set is “fit for purpose” it is necessary to first understand, in detail the purpose (i.e. activity) in which the data is to be utilized. This knowledge will help inform identification of key data elements as well as the selection of data quality fitness dimensions. Additionally, insight into how the EMR is typically used will assist in selection of data quality measurement tests and their eventual design.

### A. UNDERSTANDING THE ACTIVITY

The following questions, to be answered through observation and/or interview, will help the data quality evaluator understand the context of data usage.

**Table 2: A guide for determining context of the data enabled EMR activity**

Questions	Answers
What is the EMR activity that necessitates the data quality evaluation?	
How often is the activity performed?	
Why is the activity important? Who benefits and how?	
What are the major steps in the activity?	
Who performs each step?	
What tools are used at each step?	
What data is necessary at each step?	
How is the necessary data captured?	



Who collects the necessary data used in each step?	
Is the necessary data captured in the same manner by each individual data collector?	
What qualities comprise ‘good’ data? Conversely, what does ‘poor’ data look like?	

*B. ASSESSING EMR ADOPTION AND LEVELS OF USE*

To assist in the design of data quality evaluation tactics it may be helpful to understand the degree of sophistication with which the EMR is used. The eHealth Observatory’s EMR Adoption Survey provides a means to accomplish this. The survey covers all major functions of the EMR and will provide the data quality evaluator with a sense of what data are frequently captured, in what form and for what purposes.

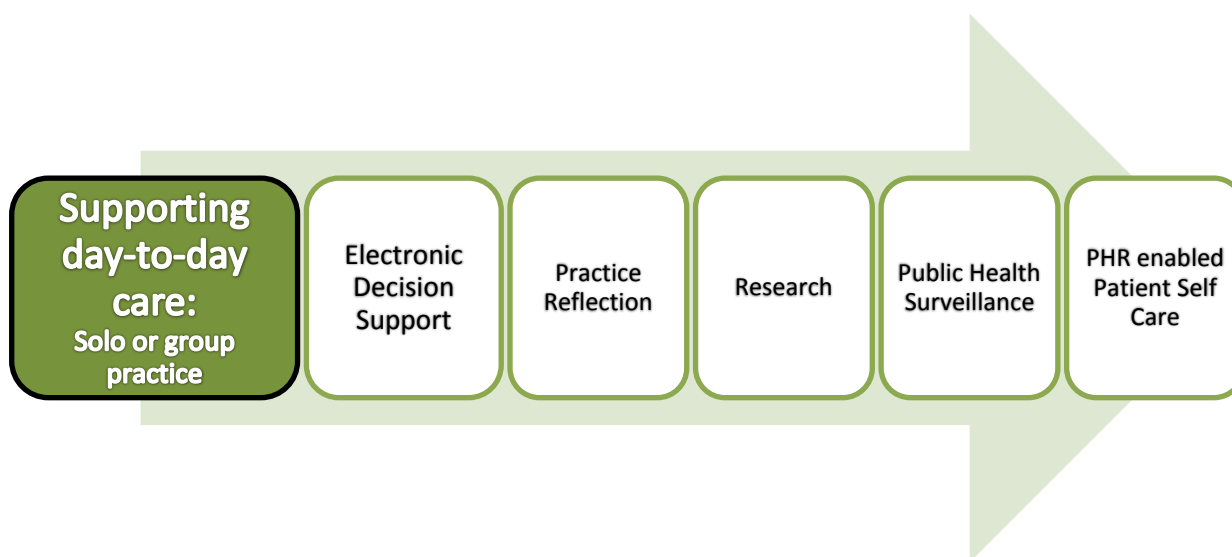
See <http://ehealth.uvic.ca/resources/tools/emradoption/EMRAoption.php> for the most up to date version of the EMR Adoption Survey.



### 3. DATA FITNESS DIMENSIONS

EMR data can be used to support a variety of purposes (see Figure 1). The definition of high quality data will vary from activity to activity. Once the data-driven EMR activity is well understood, evaluators can select which facets, or dimensions, of data quality are most critical to the success of the given activity. Table 4 provides the eHealth Observatory list of data quality dimensions as well as a suggested measurement technique and metric.

**Figure 1: Broad categories of EMR data usage**



**Table 4: eHealth Observatory EMR Data Quality Dimensions**

Data Quality Fitness Dimension	Evaluation Intent	Measurement Technique	Metric
<b>Completeness</b>	Is the data free from significant gaps in coverage that may otherwise limit its ability to represent the true state of affairs?	Data extraction & analysis	Sensitivity (%)
<b>Correctness</b>	Does the data accurately describe the true state of affairs it is intended to represent?	Data extraction & analysis	Positive Predictive Value (%)
<b>Concordance</b>	Is the data in relative agreement with other relevant reputable sources?	Data extraction & comparison of findings against reputable reference	Data in relative agreement with cited reputable source (Y/N)
<b>Comprehensibility</b>	Is the average intended reviewer able to understand the data so as	Clinical Panel Review	% of records where a majority of reviewers





	to be able to attempt to infer the author’s intended interpretation of the true state of affairs?		were able to understand the recorded data
<b>Informative sufficiency</b>	Does the body of available data adequately support <i>an inference</i> of the true state of affairs by an average intended reviewer irrespective of any objective level of completeness, correctness or consistency?	Clinical Panel Review	% of records where the majority of reviewers were successfully able to infer all important clinical elements
<b>Consistency of Capture</b>	Are the desirable data elements consistently recorded?	Observation, Interview, and/or Data extraction	% of eligible records, or representative sample, that contain the data item of interest
<b>Consistency of Form</b>	Are the data elements consistently captured in the desirable form?	Observation, Interview, and/or Data extraction & analysis	% of eligible records, or representative sample, that contain the data item(s) of interest in the desired format



## 4. DATA INTERROGATION READINESS CHECKLIST

The following table provides a list of items that should be addressed in advance of any data quality extraction and analysis activity.

**Table 3: Readiness Checklist**

Question	Answer (Y/N)
Are all data elements critical to the activity of interest identified?	
Have the critical data quality dimensions for each data element of interest been selected?	
Is the location and format(s) of all critical data elements known? That is, is the data structure of the EMR understood?	
Has a tool been selected or designed for executing the various data element extraction queries?	
Has it been confirmed that the data interrogation tool has access to the critical data elements?	
<p>Are the proper procedures in place to ensure that privacy and confidentiality of patient data will be protected? For example:</p> <ul style="list-style-type: none"> <li>• Are there trusted local personnel available to perform data extraction and de-identification?</li> <li>• Are data sharing and confidentiality agreements signed by all parties to permit for data extraction and analysis?</li> <li>• Have mechanisms been setup to provide supervising clinicians with the ability to audit data activities associated with the pending data interrogation?</li> </ul>	
Are the data extractors fully trained and capable of using the data extraction tool?	
Are the data extraction queries fully specified and translated into a format that is executable within the target EMR?	
Have any necessary DQPs (See Section 5) been executed to verify that the design of the data extraction queries account for local documentation practices?	
For each data element of interest, has a reference, or gold, standard been identified?	
For each reference standard, has a method been devised so that the reference can be ascertained?	



## 5. DATA QUALITY PROBES

The following queries can be used to supplement insight gleaned about data set quality in the interview and observation stage. Moreover, these queries may help inform design of further queries to measure completeness and correctness

### 1) POPULATION PYRAMID

Query Set	PP01
<b>Query Set Focus</b>	Practice age and sex distribution
<b>Description</b>	Deviations in practice population may lead to deviations in normal disease prevalence and the requirement to document certain data elements. Understanding how the local population differs from a standard population may provide insight into other data quality assessments, especially those related to disease prevalence.
<b>Data Quality Metric</b>	n/a
<b>Data Quality Goal</b>	n/a

<b>Query ID</b>	PP01a
<b>Query Name</b>	Practice Population Pyramid
<b>Output</b>	PATIENT_ID, AGE, GENDER
<b>Date Range</b>	Last 12 months
<b>SEARCH CLAUSE 1</b>	
<b>Target data</b>	Patients
<b>Target data details</b>	Use the age/gender information to create a population pyramid grouped by gender and then by 5 year age bands.

### 2) CONSISTENCY OF FORM

The following queries probe the data to determine to what extent standardized, coded forms of data are used to populate key data elements. A minimum level of consistency is necessary to support the design of queries to test other facets of data quality.

#### *C. PROBLEM LIST ENTRIES*

Query Set	CF01
<b>Query Set Focus</b>	Problem List – Consistency of coded ICD-9 entries
<b>Description</b>	EMRs routinely offer the ability for the provider to document patient problems using ICD-9 codes. Providers would be expected to use such codes for the majority of Problem List documentation so as to take advantage of available EMR reports which depend on



	such codes. Excessive use of free text impairs this ability.
<b>Data Quality Metric</b>	Count(CF01b)/Count(CF01a) * 100%
<b>Data Quality Goal</b>	100%

<b>Query ID</b>	CF01a
<b>Query Name</b>	Problem List entries
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, PROBLEM LIST ENTRY
<b>Date Range</b>	Last 12 months
<b>SEARCH CLAUSE 1</b>	
<b>Target data</b>	Problem List
<b>Target data details</b>	Return all Problem List entries

<b>Query ID</b>	CF01b		
<b>Query Name</b>	Coded Problem List entries		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, PROBLEM LIST ENTRY		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Problem List		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Matching Code/Text</b>	<b>Description</b>
	ICD-9	<ul style="list-style-type: none"> <li>Any valid ICD-9 code</li> </ul>	<ul style="list-style-type: none"> <li>n/a</li> </ul>

#### D. MEDICATION LIST ENTRIES

<b>Query Set</b>	CF02
<b>Query Set Focus</b>	Medication List – Consistency of coded medications
<b>Description</b>	<p>EMRs routinely offer the ability for the provider to document medications using standardized Canadian medication formularies. Providers would be expected to document medications using these standardized formularies. Medications captured with free text reduce the extent to which standard EMR reports can be used to determine medication usage.</p> <p><b>NOTE:</b> The assumption in this query set is that it is possible to distinguish a standardized formulary medication from a free text medication by looking for the presence of additional medication data (e.g. DIN number, ATC Class, or formulary ID) that would be expected to accompany a standardized formulary medication selection.</p>
<b>Data Quality Metric</b>	Count(CF02b)/Count(CF02a) * 100%



<b>Data Quality Goal</b>	100%
--------------------------	------

<b>Query ID</b>	CF02a
<b>Query Name</b>	Medication entries
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, MEDICATION
<b>Date Range</b>	Last 12 months
<b>SEARCH CLAUSE 1</b>	
<b>Target data</b>	Medications
<b>Target data details</b>	Return all documented medications

<b>Query ID</b>	CF02b						
<b>Query Name</b>	Standardized formulary medication entries						
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, MEDICATION						
<b>Date Range</b>	Last 12 months						
<b>SEARCH CLAUSE 1</b>							
<b>Target data</b>	Medications						
<b>Target data details</b>	<table border="1"> <thead> <tr> <th>Code Scheme</th> <th>Matching Code/Text</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>DIN/ATC Class/Formulary ID</td> <td> <ul style="list-style-type: none"> <li>Any valid code which confirms that the medication entry was selected from a standardized formulary</li> </ul> </td> <td> <ul style="list-style-type: none"> <li>n/a</li> </ul> </td> </tr> </tbody> </table>	Code Scheme	Matching Code/Text	Description	DIN/ATC Class/Formulary ID	<ul style="list-style-type: none"> <li>Any valid code which confirms that the medication entry was selected from a standardized formulary</li> </ul>	<ul style="list-style-type: none"> <li>n/a</li> </ul>
	Code Scheme	Matching Code/Text	Description				
DIN/ATC Class/Formulary ID	<ul style="list-style-type: none"> <li>Any valid code which confirms that the medication entry was selected from a standardized formulary</li> </ul>	<ul style="list-style-type: none"> <li>n/a</li> </ul>					

### 3) CONSISTENCY OF CAPTURE

The following queries probe the data to determine to how consistently certain data elements are captured. Before the data set can be probed to answer other data quality or research questions, it is necessary to understand the extent to which the data set features key items of interest.

#### A. PROBLEM LIST

<b>Query Set</b>	CE01
<b>Query Set Focus</b>	Problem List – Consistency of Problem List entry
<b>Description</b>	EMRs routinely offer the ability for the provider to document ongoing or important patient problems within a patient level (as opposed to encounter level) Problem List. Providers would be expected to document a problem within the Problem List for the majority of patients.
<b>Data Quality</b>	$(1 - (\text{Count}(\text{CE01b})/\text{Count}(\text{CE01a}))) * 100\%$



<b>Metric</b>	
<b>Data Quality Goal</b>	90-100%

<b>Query ID</b>	CE01a
<b>Query Name</b>	Patients seen in last 12 months
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER
<b>Date Range</b>	Last 12 months
<b>SEARCH CLAUSE 1</b>	
<b>Target data</b>	Patients
<b>Target data details</b>	Return all patients seen in last 12 months

<b>Query ID</b>	CE01b
<b>Query Name</b>	Patients seen in last 12 months without Problem List Entry
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER
<b>Date Range</b>	Last 12 months
<b>SEARCH CLAUSE 1</b>	
<b>Target data</b>	Problem List
<b>Target data details</b>	Return all patients seen in last 12 months where no Problem List entry has been documented

## B. MEDICATIONS

<b>Query Set</b>	CE02
<b>Query Set Focus</b>	Medications – Consistency of medication entry
<b>Description</b>	EMRs routinely offer the ability for the provider to document medication histories and prescribed medications. As medication prescribing represents a core clinical activity, it would be expected that a majority of patient records would contain a medication entry.
<b>Data Quality Metric</b>	$(1 - (\text{Count}(\text{CE02b})/\text{Count}(\text{CE02a}))) * 100\%$
<b>Data Quality Goal</b>	>60%

<b>Query ID</b>	CE02a
<b>Query Name</b>	Patients seen in last 12 months
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER
<b>Date Range</b>	Last 12 months



SEARCH CLAUSE 1	
<b>Target data</b>	Patients
<b>Target data details</b>	Return all patients seen in last 12 months

<b>Query ID</b>	CE02b
<b>Query Name</b>	Patients seen in last 12 months without a medication entry
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER
<b>Date Range</b>	Last 12 months

SEARCH CLAUSE 1	
<b>Target data</b>	Medications
<b>Target data details</b>	Return all patients seen in last 12 months where no medication entry has been documented

### C. ALLERGIES

Query Set	CE03
<b>Query Set Focus</b>	Allergies – Consistency of Entry
<b>Description</b>	EMRs routinely offer the ability for the provider to document patient allergies. Knowledge of allergies is important to the prevention of adverse events, especially in connection with medications. Provider records ought to contain some degree of allergy documentation for a majority of patients, even if it is only to document that the patient has no known allergies.
<b>Data Quality Metric</b>	$\text{Count(CE03b) + Count(CE03c) / Count(CE03a) * 100\%}$
<b>Data Quality Goal</b>	>60% (?)

<b>Query ID</b>	CE03a
<b>Query Name</b>	Patients seen in last 12 months
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER
<b>Date Range</b>	Last 12 months
SEARCH CLAUSE 1	
<b>Target data</b>	Patients
<b>Target data details</b>	Return all patients seen in last 12 months

<b>Query ID</b>	CE03b
<b>Query Name</b>	Patients seen in last 12 months with a documented allergy



<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER
<b>Date Range</b>	Last 12 months
<b>SEARCH CLAUSE 1</b>	
<b>Target data</b>	Allergies
<b>Target data details</b>	Return all patient seen in last 12 months that have a documented allergy in an any form (i.e. free text, formulary medication, etc)

<b>Query ID</b>	CE03c
<b>Query Name</b>	Patients seen in last 12 months with a No Known Allergies documented
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER
<b>Date Range</b>	Last 12 months
<b>SEARCH CLAUSE 1</b>	
<b>Target data</b>	Allergies
<b>Target data details</b>	Return all patients seen in last 12 months where the <i>NO Known Allergies</i> – sometimes referred to as <i>NO Adverse Reactions</i> - checkbox or flag has been selected.

#### 4) CONCORDANCE

The following queries use the data set to produce measures of local disease prevalence. Local prevalence measures are compared against expected prevalence measures; significant deviation from reliable values may indicate issues of data unreliability.

##### A. PROBLEM LIST PREVALENCE - DIABETES

<b>Query Set</b>	R01
<b>Query Set Focus</b>	Indicator of Concordance – Diabetes
<b>Description</b>	Diabetes is one of the most common chronic diseases in Canada. In 2008/09, close to 2.4 million Canadians aged one year and older were living with diagnosed diabetes (either type 1 or type 2), according to the Canadian Chronic Disease Surveillance System. This represented approximately 6.8% of the population, or 6.4% of all females aged one year and older and 7.2% of all males aged one year and older. When looking only at the adult population aged 20 and older, the prevalence rate was 8.7% (95% CI: 8.72-8.74%), representing one in 11 Canadians. Prevalence in BC is 5.4%. If local prevalence varies widely from these figures, then the reliability of the data set may be questioned.
<b>Data Quality Metric</b>	$\text{Count}(R01b)/\text{Count}(R01a) * 100\%$
<b>Data Quality Goal</b>	~5.4 - 6.8%

<b>Query ID</b>	R01a
<b>Query Name</b>	Patients seen in last 12 months





<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER
<b>Date Range</b>	Last 12 months
<b>SEARCH CLAUSE 1</b>	
<b>Target data</b>	Patients
<b>Target data details</b>	Return all patients seen in last 12 months

<b>Query ID</b>	R01b		
<b>Query Name</b>	Patients seen in last 12 months AND diagnosed with Diabetes		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, PROBLEM LIST ENTRY		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Patients		
<b>Target data details</b>	Return all patients seen in last 12 months		
<b>SEARCH CLAUSE 2</b>			
<b>Target data</b>	Problem List		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ICD-9	<ul style="list-style-type: none"> <li>250%</li> </ul>	<ul style="list-style-type: none"> <li>250 DIABETES MELLITUS</li> <li>250.0 DIABETES MELLITUS WITHOUT MENTION OF COMPLICATION</li> <li>250.1 DIABETES WITH KETOACIDOSIS</li> <li>250.2 DIABETES WITH COMA</li> <li>250.3 DIABETES WITH RENAL MANIFESTATIONS</li> <li>250.4 DIABETES WITH OPHTHALMIC MANIFESTATIONS</li> <li>250.5 DIABETES WITH NEUROLOGICAL MANIFESTATIONS</li> <li>250.50 DIABETES WITH OCULAR INVOLVMENT, ADULT</li> <li>250.51 DIABETES WITH OCULAR INVOLVMENT, JUVENILE</li> <li>250.6 DIABETES WITH PERIPHERAL CIRCULATORY DISORDERS</li> <li>250.7 DIABETES WITH OTHER SPECIFIED MANIFESTATIONS</li> <li>250.9 DIABETES WITH UNSPECIFIED COMPLICATIONS</li> </ul>

## 5) CORRECTNESS

The following queries use the data set to assess correctness (i.e. accuracy) of various data elements that would not be expected to deviate from certain values.



*A. DEMOGRAPHICS VS. LAB DATA – PATIENT GENDER*

<b>Query Set</b>	<b>A01</b>
<b>Query Set Focus</b>	Indicator of Accuracy – Patient Gender
<b>Description</b>	PSA tests are frequently ordered as a screening and monitoring test for prostate cancer and thus should only appear for male patients. PSA results for female patients would indicate an error, most likely in the demographic data.
<b>Data Quality Metric</b>	$(1 - \text{Count}(A01b)/\text{Count}(A01a)) * 100\%$
<b>Data Quality Goal</b>	100%

<b>Query ID</b>	A01a
<b>Query Name</b>	Patients seen in last 12 months with a PSA result
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, PSA RESULT
<b>Date Range</b>	Last 12 months
<b>SEARCH CLAUSE 1</b>	
<b>Target data</b>	Lab Data
<b>Target data details</b>	Return all patients seen in last 12 months where a Prostate Specific Antigen test result was issued

<b>Query ID</b>	A01b		
<b>Query Name</b>	Patients seen in last 12 months with a PSA result AND Female Gender		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, PSA RESULT		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Lab Data		
<b>Target data details</b>	Return all patients seen in last 12 months where a Prostate Specific Antigen test result was issued		
<b>SEARCH CLAUSE 2</b>			
<b>Target data</b>	Patient Demographics		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	Gender	• Female	N/A

6) COMPLETENESS

*A. PROBLEM LIST VS. MEDICATION - HYPOTHYROIDISM*

<b>Query Set</b>	<b>C01</b>
<b>Query Set</b>	Indicator of Completeness of Problem List - Hypothyroidism



<b>Focus</b>	
<b>Description</b>	Levothyroxine (thyroxine) is used solely in the treatment of hypothyroidism (an underactive thyroid gland). Clinicians prescribing levothyroxine would be expected to record a diagnosis of hypothyroidism.
<b>Data Quality Metric</b>	Count(C01b)/Count(C01a) * 100%
<b>Data Quality Goal</b>	100%

<b>Query ID</b>	C01a		
<b>Query Name</b>	Patients on Levothyroxine		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Prescribed Medications		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ATC Class	• H03AA01	• H03AA01 LEVOTHYROXINE SODIUM
	<b>AND/OR</b>		
	Brand Name	• ELTROXIN% • SYNTHROID% • EUTHYROX%	N/A
	<b>AND/OR</b>		
Free Text	• LEVOTHYROXINE • LEVOTHYROXINE SODIUM	N/A	

<b>Query ID</b>	C01b		
<b>Query Name</b>	Patients on Levothyroxine AND diagnosed with Hypothyroidism		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, PROBLEM LIST ENTRY		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Prescribed Medications		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ATC Class	• H03AA01	• H03AA01 LEVOTHYROXINE SODIUM
	<b>AND/OR</b>		
	Brand Name	• ELTROXIN% • SYNTHROID% • EUTHYROX%	N/A
	<b>AND/OR</b>		
Free Text	• LEVOTHYROXINE • LEVOTHYROXINE SODIUM	N/A	



SEARCH CLAUSE 2			
Target data	Problem List		
Target data details	Code Scheme	Target Code/Text	Description
	ICD-9	<ul style="list-style-type: none"> <li>• 243,</li> <li>• 244%</li> </ul>	<ul style="list-style-type: none"> <li>• 243 CONGENITAL HYPOTHYROIDISM</li> <li>• 244 ACQUIRED HYPOTHYROIDISM</li> <li>• 244.0 POSTSURGICAL HYPOTHYROIDISM</li> <li>• 244.1 OTHER POSTABLATIVE HYPOTHYROIDISM</li> <li>• 244.2 IODINE HYPOTHYROIDISM</li> <li>• 244.3 OTHER IATROGENIC HYPOTHYROIDISM</li> <li>• 244.8 OTHER</li> <li>• 244.9 UNSPECIFIED HYPOTHYROIDISM</li> </ul>

*B. PROBLEM LIST VS. BILLING FEE CODES - DIABETES*

Query Set	C02
Query Set Focus	Indicator of Completeness of Problem List - Diabetes
Description	Certain fee codes are reserved for care provided to diabetics. Clinicians submitting fee codes for such care would be expected to record a diagnosis of diabetes.
Data Quality Metric	Count(C02b)/Count(C02a) * 100%
Data Quality Goal	100%

Query ID	C02a		
Query Name	Patients billed for diabetic service		
Output	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER		
Date Range	Last 12 months		
SEARCH CLAUSE 1			
Target data	Billing		
Target data details	Code Scheme	Target Code/Text	Description
	MSP Fee Code	<ul style="list-style-type: none"> <li>• 14050</li> <li>• N250</li> <li>• R250</li> <li>• I250</li> <li>• H250</li> <li>• D430</li> <li>• D585</li> <li>• D573</li> </ul>	<ul style="list-style-type: none"> <li>• 14050 GP ANNUAL CHRONIC CARE BONUS (DIABETES MELLITUS)</li> <li>• N250 DIABETES &amp; CHRONIC NEURODEGENERATIVE DISORDER</li> <li>• R250 DIABETES &amp; CHRONIC RESPIRATORY CONDITION</li> <li>• I250 DIABETES &amp; ISCHEMIC HEART DISEASE</li> <li>• H250 DIABETES &amp; CONGESTIVE HEART FAILURE</li> <li>• D430 DIABETES &amp; CEREBROVASCULAR DISEASE</li> <li>• D585 DIABETES &amp; CHRONIC KIDNEY DISEASE (RENAL FAILURE)</li> </ul>



			<ul style="list-style-type: none"> <li>D573 DIABETES &amp; CHRONIC LIVER DISEASE (HEPATIC FAILURE)</li> </ul>
--	--	--	---

<b>Query ID</b>	C02b
<b>Query Name</b>	Patients billed for diabetic service AND diagnosed with Diabetes
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, PROBLEM LIST ENTRY
<b>Date Range</b>	Last 12 months

**SEARCH CLAUSE 1**

<b>Target data</b>	Billing		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	MSP Fee Code	<ul style="list-style-type: none"> <li>14050</li> <li>N250</li> <li>R250</li> <li>I250</li> <li>H250</li> <li>D430</li> <li>D585</li> <li>D573</li> </ul>	<ul style="list-style-type: none"> <li>14050 GP ANNUAL CHRONIC CARE BONUS (DIABETES MELLITUS)</li> <li>N250 DIABETES &amp; CHRONIC NEURODEGENERATIVE DISORDER</li> <li>R250 DIABETES &amp; CHRONIC RESPIRATORY CONDITION</li> <li>I250 DIABETES &amp; ISCHEMIC HEART DISEASE</li> <li>H250 DIABETES &amp; CONGESTIVE HEART FAILURE</li> <li>D430 DIABETES &amp; CEREBROVASCULAR DISEASE</li> <li>D585 DIABETES &amp; CHRONIC KIDNEY DISEASE (RENAL FAILURE)</li> <li>D573 DIABETES &amp; CHRONIC LIVER DISEASE (HEPATIC FAILURE)</li> </ul>

**SEARCH CLAUSE 2**

<b>Target data</b>	Problem List		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ICD-9	<ul style="list-style-type: none"> <li>250%</li> </ul>	<ul style="list-style-type: none"> <li>250 DIABETES MELLITUS</li> <li>250.0 DIABETES MELLITUS WITHOUT MENTION OF COMPLICATION</li> <li>250.1 DIABETES WITH KETOACIDOSIS</li> <li>250.2 DIABETES WITH COMA</li> <li>250.3 DIABETES WITH RENAL MANIFESTATIONS</li> <li>250.4 DIABETES WITH OPHTHALMIC MANIFESTATIONS</li> <li>250.5 DIABETES WITH NEUROLOGICAL MANIFESTATIONS</li> <li>250.50 DIABETES WITH OCULAR INVOLVMENT, ADULT</li> <li>250.51 DIABETES WITH OCULAR INVOLVMENT, JUVENILE</li> <li>250.6 DIABETES WITH PERIPHERAL CIRCULATORY DISORDERS</li> <li>250.7 DIABETES WITH OTHER SPECIFIED MANIFESTATIONS</li> <li>250.9 DIABETES WITH UNSPECIFIED</li> </ul>



			COMPLICATIONS
--	--	--	---------------

### C. PROBLEM LIST VS. MEDICATION - DIABETES

Query Set	C03
<b>Query Set Focus</b>	Completeness of Problem List - Diabetes
<b>Description</b>	The medications included here are those drugs (oral & injectable hypoglycaemics other than metformin) that do not have a role outside of diabetes. Clinicians would be expected to record a diagnosis of diabetes (predominantly Type 1 but not exclusively) for everyone prescribed insulin.
<b>Data Quality Metric</b>	Count(C03b)/Count(C03a) * 100%
<b>Data Quality Goal</b>	100%

<b>Query ID</b>	C03a		
<b>Query Name</b>	Subset of patients on Insulins & other anti-diabetics excluding Metformin		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Medications Prescribed		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ATC Class	<ul style="list-style-type: none"> <li>• A10AB01</li> <li>• A10AC01</li> <li>• A10AD01</li> <li>• A10AB04</li> <li>• A10AD04</li> <li>• A10AB05</li> <li>• A10AD05</li> <li>• A10AB06</li> <li>• A10AE04</li> <li>• A10AE05</li> <li>• A10BG02</li> <li>• A10BG03</li> <li>• A10BB01</li> <li>• A10BB09</li> <li>• A10BB12</li> <li>• A10BX02</li> <li>• A10BX03</li> <li>• A10BF01</li> <li>• A10BH01</li> <li>• A10BX04</li> <li>• A10BX07</li> <li>• D03AX06</li> </ul>	<ul style="list-style-type: none"> <li>• A10AB01 INSULIN (HUMAN)</li> <li>• A10AC01 INSULIN (HUMAN)</li> <li>• A10AD01 INSULIN (HUMAN)</li> <li>• A10AB04 INSULIN LISPRO</li> <li>• A10AD04 INSULIN LISPRO</li> <li>• A10AB05 INSULIN ASPART</li> <li>• A10AD05 INSULIN ASPART</li> <li>• A10AB06 INSULIN GLULISINE</li> <li>• A10AE04 INSULIN GLARGINE</li> <li>• A10AE05 INSULIN DETEMIR</li> <li>• A10BG02 ROSIGLITAZONE</li> <li>• A10BG03 PIOGLITAZONE</li> <li>• A10BB01 GLIBENCLAMIDE</li> <li>• A10BB09 GLICLAZIDE</li> <li>• A10BB12 GLIMEPIRIDE</li> <li>• A10BX02 REPAGLINIDE</li> <li>• A10BX03 NATEGLINIDE</li> <li>• A10BF01 ACARBOSE</li> <li>• A10BH01 SITAGLIPTIN</li> <li>• A10BX04 EXENATIDE</li> <li>• A10BX07 LIRAGLUTIDE</li> <li>• D03AX06 BECAPLERMIN</li> </ul>



	AHFS Class	<ul style="list-style-type: none"> <li>• 68:20.02</li> <li>• 68:20.05</li> <li>• 68:20.06</li> <li>• 68:20.08</li> <li>• 68:20.16</li> <li>• 68:20.20</li> <li>• 68:20.28</li> </ul>	<ul style="list-style-type: none"> <li>• 68:20.02 ALPHA-GLUCOSIDASE INHIBITORS</li> <li>• 68:20.05 DIPEPTIDYL PEPTIDASE-4 (DPP-4) INHIBITORS</li> <li>• 68:20.06 INCRETIN MIMETICS</li> <li>• 68:20.08 INSULINS</li> <li>• 68:20.16 MEGLITINIDES</li> <li>• 68:20.20 SULFONYLUREAS</li> <li>• 68:20.28 THIAZOLIDINEDIONES</li> </ul>
--	------------	--	--

<b>Query ID</b>	C03b		
<b>Query Name</b>	Subset of patients on Insulins & other anti-diabetics excluding Metformin AND diagnosed with Diabetes		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, PROBLEM LIST ENTRY		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Medications Prescribed		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ATC Class	<ul style="list-style-type: none"> <li>• A10AB01</li> <li>• A10AC01</li> <li>• A10AD01</li> <li>• A10AB04</li> <li>• A10AD04</li> <li>• A10AB05</li> <li>• A10AD05</li> <li>• A10AB06</li> <li>• A10AE04</li> <li>• A10AE05</li> <li>• A10BG02</li> <li>• A10BG03</li> <li>• A10BB01</li> <li>• A10BB09</li> <li>• A10BB12</li> <li>• A10BX02</li> <li>• A10BX03</li> <li>• A10BF01</li> <li>• A10BH01</li> <li>• A10BX04</li> <li>• A10BX07</li> <li>• D03AX06</li> </ul>	<ul style="list-style-type: none"> <li>• A10AB01 INSULIN (HUMAN)</li> <li>• A10AC01 INSULIN (HUMAN)</li> <li>• A10AD01 INSULIN (HUMAN)</li> <li>• A10AB04 INSULIN LISPRO</li> <li>• A10AD04 INSULIN LISPRO</li> <li>• A10AB05 INSULIN ASPART</li> <li>• A10AD05 INSULIN ASPART</li> <li>• A10AB06 INSULIN GLULISINE</li> <li>• A10AE04 INSULIN GLARGINE</li> <li>• A10AE05 INSULIN DETEMIR</li> <li>• A10BG02 ROSIGLITAZONE</li> <li>• A10BG03 PIOGLITAZONE</li> <li>• A10BB01 GLIBENCLAMIDE</li> <li>• A10BB09 GLICLAZIDE</li> <li>• A10BB12 GLIMEPIRIDE</li> <li>• A10BX02 REPAGLINIDE</li> <li>• A10BX03 NATEGLINIDE</li> <li>• A10BF01 ACARBOSE</li> <li>• A10BH01 SITAGLIPTIN</li> <li>• A10BX04 EXENATIDE</li> <li>• A10BX07 LIRAGLUTIDE</li> <li>• D03AX06 BECAPLERMIN</li> </ul>
	<b>OR</b>		
AHFS Class	<ul style="list-style-type: none"> <li>• 68:20.02</li> <li>• 68:20.05</li> <li>• 68:20.06</li> <li>• 68:20.08</li> <li>• 68:20.16</li> <li>• 68:20.20</li> <li>• 68:20.28</li> </ul>	<ul style="list-style-type: none"> <li>• 68:20.02 ALPHA-GLUCOSIDASE INHIBITORS</li> <li>• 68:20.05 DIPEPTIDYL PEPTIDASE-4 (DPP-4) INHIBITORS</li> <li>• 68:20.06 INCRETIN MIMETICS</li> <li>• 68:20.08 INSULINS</li> <li>• 68:20.16 MEGLITINIDES</li> <li>• 68:20.20 SULFONYLUREAS</li> <li>• 68:20.28 THIAZOLIDINEDIONES</li> </ul>	



SEARCH CLAUSE 2			
Target data	Problem List		
Target data details	Code Scheme	Target Code/Text	Description
	ICD-9	<ul style="list-style-type: none"> <li>250%</li> </ul>	<ul style="list-style-type: none"> <li>250 DIABETES MELLITUS</li> <li>250.0 DIABETES MELLITUS WITHOUT MENTION OF COMPLICATION</li> <li>250.1 DIABETES WITH KETOACIDOSIS</li> <li>250.2 DIABETES WITH COMA</li> <li>250.3 DIABETES WITH RENAL MANIFESTATIONS</li> <li>250.4 DIABETES WITH OPHTHALMIC MANIFESTATIONS</li> <li>250.5 DIABETES WITH NEUROLOGICAL MANIFESTATIONS</li> <li>250.50 DIABETES WITH OCULAR INVOLVMENT, ADULT</li> <li>250.51 DIABETES WITH OCULAR INVOLVMENT, JUVENILE</li> <li>250.6 DIABETES WITH PERIPHERAL CIRCULATORY DISORDERS</li> <li>250.7 DIABETES WITH OTHER SPECIFIED MANIFESTATIONS</li> <li>250.9 DIABETES WITH UNSPECIFIED COMPLICATIONS</li> </ul>

*D. PROBLEM LIST VS. MEDICATION - CHRONIC OBSTRUCTIVE PULMONARY DISEASE*

Query Set	C04
Query Set Focus	Completeness of Problem List - COPD
Description	Tiotropium is a long acting antimuscarinic bronchodilator licensed for maintenance treatment of chronic obstructive pulmonary disease (COPD). Tiotropium is used solely in the management of COPD, so a clinician prescribing this medication would be expected to document a COPD diagnosis.
Data Quality Metric	Count(C04b)/Count(C04a) * 100%
Data Quality Goal	100%

Query ID	C04a		
Query Name	Patients on Tiotropium		
Output	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER		
Date Range	Last 12 months		
SEARCH CLAUSE 1			
Target data	Prescribed Medications		
Target data	Code Scheme	Target Code/Text	Description





<b>details</b>	ATC Class	• R03BB04	• R03BB04 TIOTROPIUM BROMIDE
	<b>AND/OR</b>		
	Brand Name	• SPIRIVA	N/A
	<b>AND/OR</b>		
	Free Text	• TIOTROPIUM	N/A

<b>Query ID</b>	C04b		
<b>Query Name</b>	Patients on Tiotropium AND diagnosed with COPD		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, PROBLEM LIST ENTRY		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Prescribed Medications		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ATC Class	• R03BB04	• R03BB04 TIOTROPIUM BROMIDE
	<b>AND/OR</b>		
	Brand Name	• SPIRIVA	N/A
	<b>AND/OR</b>		
	Free Text	• TIOTROPIUM	N/A
<b>SEARCH CLAUSE 2</b>			
<b>Target data</b>	Problem List		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ICD-9	<ul style="list-style-type: none"> <li>• 491%</li> <li>• 492</li> <li>• 494</li> <li>• 496</li> </ul>	<ul style="list-style-type: none"> <li>• 491 CHRONIC BRONCHITIS</li> <li>• 491.0 SIMPLE CHRONIC BRONCHITIS</li> <li>• 491.1 MUCOPURULENT CHRONIC BRONCHITIS</li> <li>• 491.2 OBSTRUCTIVE CHRONIC BRONCHITIS</li> <li>• 491.8 OTHER CHRONIC BRONCHITIS</li> <li>• 491.9 UNSPECIFIED</li> <li>• 492 EMPHYSEMA</li> <li>• 494 BRONCHIECTASIS</li> <li>• 496 CHRONIC AIRWAYS OBSTRUCTION, NOT ELSEWHERE CLASSIFIED</li> </ul>

*E. PROBLEM LIST VS. BILLING FEE CODE - CHRONIC OBSTRUCTIVE PULMONARY DISEASE*

<b>Query Set</b>	C05
<b>Query Set Focus</b>	Completeness of Problem List - COPD
<b>Description</b>	Certain fee codes are reserved for care provided to COPD patients. Clinicians submitting fee codes for such care would be expected to record a diagnosis of COPD.
<b>Data Quality Metric</b>	Count(C05b)/Count(C05a) * 100%



<b>Data Quality Goal</b>	100%
--------------------------	------

<b>Query ID</b>	C05a		
<b>Query Name</b>	Patients billed for COPD service		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Billing		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	MSP Fee Code	<ul style="list-style-type: none"> <li>14053</li> </ul>	<ul style="list-style-type: none"> <li>14053 GP ANNUAL CHRONIC CARE BONUS (CHRONIC OBSTRUCTIVE PULMONARY DISEASE - COPD)</li> </ul>

<b>Query ID</b>	C05b		
<b>Query Name</b>	Patients billed for COPD service AND diagnosed with COPD		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, PROBLEM LIST ENTRY		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Billing		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	MSP Fee Code	<ul style="list-style-type: none"> <li>14053</li> </ul>	<ul style="list-style-type: none"> <li>14053 GP ANNUAL CHRONIC CARE BONUS (CHRONIC OBSTRUCTIVE PULMONARY DISEASE - COPD)</li> </ul>
<b>SEARCH CLAUSE 2</b>			
<b>Target data</b>	Problem List		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ICD-9	<ul style="list-style-type: none"> <li>491%</li> <li>492</li> <li>494</li> <li>496</li> </ul>	<ul style="list-style-type: none"> <li>491 CHRONIC BRONCHITIS</li> <li>491.0 SIMPLE CHRONIC BRONCHITIS</li> <li>491.1 MUCOPURULENT CHRONIC BRONCHITIS</li> <li>491.2 OBSTRUCTIVE CHRONIC BRONCHITIS</li> <li>491.8 OTHER CHRONIC BRONCHITIS</li> <li>491.9 UNSPECIFIED</li> <li>492 EMPHYSEMA</li> <li>494 BRONCHIECTASIS</li> <li>496 CHRONIC AIRWAYS OBSTRUCTION, NOT ELSEWHERE CLASSIFIED</li> </ul>

*F. PROBLEM LIST VS. MEDICATION - GOUT*

<b>Query Set</b>	C06
------------------	-----



<b>Query Set Focus</b>	Completeness of Problem List - Gout
<b>Description</b>	Allopurinol is used to reduce the level of urate (uric acid) in the body with the aim of preventing gout. It is used occasionally in other circumstances when there is a potential build-up of urate in the blood (hyperuricaemia) due to cancer chemotherapy. Allopurinol is usually started after several attacks of acute painful gout in order to prevent further attacks. Not everyone with a diagnosis of gout will be taking allopurinol.
<b>Data Quality Metric</b>	Count(C06b)/Count(C06a) * 100%
<b>Data Quality Goal</b>	100%

<b>Query ID</b>	C06a		
<b>Query Name</b>	Patients on Allopurinol		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Prescribed Medications		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ATC Class	• M04AA01	• M04AA01 ALLOPURINOL
	<b>AND/OR</b>		
	Brand Name	• ALLOPURINOL% • NOVO-PUROL% • ZYLOPRIM • ALLOPRIN	N/A
	<b>AND/OR</b>		
Free Text	• ALLOPURINOL	N/A	

<b>Query ID</b>	C06b		
<b>Query Name</b>	Patients on Allopurinol AND diagnosed with Gout		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, PROBLEM LIST ENTRY		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Prescribed Medications		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ATC Class	• M04AA01	• M04AA01 ALLOPURINOL
	<b>AND/OR</b>		
	Brand Name	• ALLOPURINOL% • NOVO-PUROL% • ZYLOPRIM • ALLOPRIN	N/A
	<b>AND/OR</b>		



	Free Text	• ALLOPURINOL	N/A
<b>SEARCH CLAUSE 2</b>			
<b>Target data</b>	Problem List		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ICD-9	• 274%	<ul style="list-style-type: none"> <li>• 274 GOUT</li> <li>• 274.0 GOUTY ARTHROPATHY</li> <li>• 274.1 GOUTY NEPHROPATHY</li> <li>• 274.8 GOUT WITH OTHER MANIFESTATIONS</li> <li>• 274.9 UNSPECIFIED</li> </ul>

*G. ALLERGIES VS. MEDICATIONS – ANAPHYLAXIS*

<b>Query Set</b>	C07
<b>Query Set Focus</b>	Completeness of Allergy Documentation - Anaphylaxis
<b>Description</b>	Epinephrine auto-injector devices are solely used for treating anaphylaxis. Any patient prescribed this medication should have a documented allergy with a severity level of anaphylaxis.
<b>Data Quality Metric</b>	Count(C07b)/Count(C07a) * 100%
<b>Data Quality Goal</b>	100%

<b>Query ID</b>	C07a		
<b>Query Name</b>	Patients prescribed Epinephrine auto-injector		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, MEDICATION		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Prescribed Medications		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ATC Class	• C01CA24	• C01CA24 EPINEPHRINE
	<b>AND/OR</b>		
	Brand Name	<ul style="list-style-type: none"> <li>• EPIPEN</li> <li>• EPIPEN JR</li> <li>• EPINEPHRINE INJ%</li> <li>• TWINJECT%</li> <li>• ANAPEN</li> <li>• ANAPEN JUNIOR</li> </ul>	N/A
	<b>AND/OR</b>		
Free Text	<ul style="list-style-type: none"> <li>• EPIPEN</li> <li>• TWINJECT</li> </ul>	N/A	



		• ANAPEN	
<b>Query ID</b>	C07b		
<b>Query Name</b>	Patients prescribed Epinephrine auto-injector AND documented with an allergy with Anaphylaxis level severity		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, ALLERGEN, ALLERGY SEVERITY		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Prescribed Medications		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ATC Class	• C01CA24	• C01CA24 EPINEPHRINE
	<b>AND/OR</b>		
	Brand Name	<ul style="list-style-type: none"> <li>• EPIPEN</li> <li>• EPIPEN JR</li> <li>• EPINEPHRINE INJ%</li> <li>• TWINJECT%</li> <li>• ANAPEN</li> <li>• ANAPEN JUNIOR</li> </ul>	N/A
	<b>AND/OR</b>		
	Free Text	<ul style="list-style-type: none"> <li>• EPIPEN</li> <li>• TWINJECT</li> <li>• ANAPEN</li> </ul>	N/A
<b>SEARCH CLAUSE 2</b>			
<b>Target data</b>	Allergies		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	Allergy Severity	• Anaphylaxis	N/A

*H. SOCIAL HISTORY VS. MEDICATION – SMOKING STATUS*

<b>Query Set</b>	<b>C08</b>
<b>Query Set Focus</b>	Completeness of Social History – Smoking Status
<b>Description</b>	Champix is a medication specifically targeted to smoking cessation. Any patient prescribed Champix ought to have a smoking status documented.
<b>Data Quality Metric</b>	Count(C08b)/Count(C08a) * 100%
<b>Data Quality Goal</b>	100%

<b>Query ID</b>	C08a
-----------------	------



<b>Query Name</b>	Patients prescribed Champix		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, MEDICATION		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Prescribed Medications		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ATC Class	• N07BA03	• N07BA03 VARENICLINE
	<b>AND/OR</b>		
	Brand Name	• CHAMPIX	N/A
	<b>AND/OR</b>		
Free Text	• CHAMPIX	N/A	

<b>Query ID</b>	C08b		
<b>Query Name</b>	Patients prescribed Champix AND with a non-null smoking status		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, MEDICATION		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Prescribed Medications		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ATC Class	• N07BA03	• N07BA03 VARENICLINE
	<b>AND/OR</b>		
	Brand Name	• CHAMPIX	N/A
	<b>AND/OR</b>		
Free Text	• CHAMPIX	N/A	
<b>SEARCH CLAUSE 2</b>			
<b>Target data</b>	Social History		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	Smoking status	• Not null	N/A

## 7) GRANULARITY

### A. ENCOUNTER DIAGNOSIS

<b>Query Set</b>	G01
<b>Query Set Focus</b>	Granularity of Encounter Diagnoses
<b>Description</b>	Certain ICD-9 codes exist that refer to general symptoms in a given body system. While valid in some cases, overuse of these codes may indicate a documentation practice that is unnecessarily non-specific. Comparison of these values between practice physicians may provide further insight into potential for improved granularity.



<b>Data Quality Metric</b>	Count(G01a)/Count(G01b) * 100%
<b>Data Quality Goal</b>	A lower value may indicate a higher granularity in coding practice

<b>Query ID</b>	G01a		
<b>Query Name</b>	Patients coded with high level symptom code		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, ENCOUNTER DIAGNOSIS		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Encounter Diagnosis		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ICD-9	<ul style="list-style-type: none"> <li>• 780</li> <li>• 781</li> <li>• 782</li> <li>• 783</li> <li>• 784</li> <li>• 785</li> <li>• 786</li> <li>• 787</li> <li>• 788</li> <li>• 789</li> <li>• 796</li> <li>• 799</li> </ul>	<ul style="list-style-type: none"> <li>• 780 GENERAL SYMPTOMS</li> <li>• 781 SYMPTOMS INVOLVING NERVOUS AND MUSCULOSKELETAL SYSTEMS</li> <li>• 782 SYMPTOMS INVOLVING SKIN AND OTHER INTEGUMENTARY TISSUE</li> <li>• 783 SYMPTOMS CONCERNING NUTRITION, METABOLISM AND DEVELOPMENT</li> <li>• 784 SYMPTOMS INVOLVING HEAD AND NECK</li> <li>• 785 SYMPTOMS INVOLVING CARDIOVASCULAR SYSTEM</li> <li>• 786 SYMPTOMS INVOLVING RESPIRATORY SYSTEM AND OTHER CHEST SYMPTOMS</li> <li>• 787 SYMPTOMS INVOLVING DIGESTIVE SYSTEM</li> <li>• 788 SYMPTOMS INVOLVING URINARY SYSTEM</li> <li>• 789 OTHER SYMPTOMS INVOLVING ABDOMEN AND PELVIS</li> <li>• 796 OTHER NONSPECIFIC ABNORMAL FINDINGS</li> <li>• 799 OTHER ILL-DEFINED AND UNKNOWN CAUSES OF MORBIDITY AND MORTALITY</li> </ul>

<b>Query ID</b>	G01b		
<b>Query Name</b>	Patients seen in past 12 months		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Patients		
<b>Target data details</b>	Return all patients seen in last 12 months		



*B. BILLING CODES*

Query Set	G02
<b>Query Set Focus</b>	Granularity of Diagnostic Billing Codes
<b>Description</b>	Certain ICD-9 codes exist that refer to general symptoms in a given body system. While valid in some cases, overuse of these codes may indicate a documentation practice that is unnecessarily non-specific. Comparison of these values between practice physicians may provide further insight into potential for improved granularity.
<b>Data Quality Metric</b>	Count(G02a)/Count(G02b) * 100%
<b>Data Quality Goal</b>	A lower value may indicate a higher granularity in coding practice

<b>Query ID</b>	G02a		
<b>Query Name</b>	Patients coded with high level symptom code		
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER, BILLING CODE		
<b>Date Range</b>	Last 12 months		
<b>SEARCH CLAUSE 1</b>			
<b>Target data</b>	Billing Codes		
<b>Target data details</b>	<b>Code Scheme</b>	<b>Target Code/Text</b>	<b>Description</b>
	ICD-9	<ul style="list-style-type: none"> <li>• 780</li> <li>• 781</li> <li>• 782</li> <li>• 783</li> <li>• 784</li> <li>• 785</li> <li>• 786</li> <li>• 787</li> <li>• 788</li> <li>• 789</li> <li>• 796</li> <li>• 799</li> </ul>	<ul style="list-style-type: none"> <li>• 780 GENERAL SYMPTOMS</li> <li>• 781 SYMPTOMS INVOLVING NERVOUS AND MUSCULOSKELETAL SYSTEMS</li> <li>• 782 SYMPTOMS INVOLVING SKIN AND OTHER INTEGUMENTARY TISSUE</li> <li>• 783 SYMPTOMS CONCERNING NUTRITION, METABOLISM AND DEVELOPMENT</li> <li>• 784 SYMPTOMS INVOLVING HEAD AND NECK</li> <li>• 785 SYMPTOMS INVOLVING CARDIOVASCULAR SYSTEM</li> <li>• 786 SYMPTOMS INVOLVING RESPIRATORY SYSTEM AND OTHER CHEST SYMPTOMS</li> <li>• 787 SYMPTOMS INVOLVING DIGESTIVE SYSTEM</li> <li>• 788 SYMPTOMS INVOLVING URINARY SYSTEM</li> <li>• 789 OTHER SYMPTOMS INVOLVING ABDOMEN AND PELVIS</li> <li>• 796 OTHER NONSPECIFIC ABNORMAL FINDINGS</li> <li>• 799 OTHER ILL-DEFINED AND UNKNOWN CAUSES OF MORBIDITY AND MORTALITY</li> </ul>





<b>Query ID</b>	G02b
<b>Query Name</b>	Patients seen in past 12 months
<b>Output</b>	PHYSICIAN_ID, PATIENT_ID, AGE, GENDER
<b>Date Range</b>	Last 12 months
<b>SEARCH CLAUSE 1</b>	
<b>Target data</b>	Patients
<b>Target data details</b>	Return all patients seen in last 12 months



## 6. DATA QUALITY CALCULATION METHOD

Table 4 provides a set of suggested metrics to use when describing data quality. Sensitivity and Positive Predictive Value (PPV) provide metrics for Completeness and Correctness, respectively. As these are frequently utilized data quality dimensions, the following table has been provided to help evaluators consistently calculate the corresponding metrics.

**Table 5: Calculating Completeness and Correctness using Sensitivity and Positive Predictive Value**

		Reference Standard Data		
		Condition <i>is</i> Present	Condition <i>is</i> Absent	
Data under evaluation	Condition <i>appears</i> present	A: True Positive	B: False Positive	<b>Correctness (PPV) = A / (A+B)</b>
	Condition <i>appears</i> absent	C: False Negative	D: True Negative	
		<b>Completeness (Sensitivity) = A / (A+ C)</b>		

