

Integrating the Healthcare Enterprise



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IHE Quality, Research and Public Health Technical Committee White Paper 2010

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Knowledge Representation in Chronic Care Management: Example of Diabetes Care Management

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1 Introduction

60 The **Diabetes Mellitus Care Management** is selected as representative example of the chronic disease care management domain because of its high prevalence. From 1980 through 2005, the number of Americans with diabetes increased from 5.6 million to 15.8 million. People aged 65 years or older account for approximately 38% of the population with diabetes.[1]

65 Diabetes care consists of multiple components including routine primary care, laboratory testing (Hemoglobin A1c (HbA1c) test), referrals to specialists (cardiologists, ophthalmologists, podiatrists, dentists, etc.) and many others as listed in the Diabetes Care Management Guidelines.[2]

In the United States (US), diabetes care quality indicators are included in the healthcare delivery quality measurements.[2,6]

Public health agencies at the local, state and federal levels are involved in population-based surveillance of diabetes incidences and diabetes prevention interventions.

70 Data generated across the continuum of diabetes care and population-based surveillance is of interest to patients, their caregivers, healthcare providers and public health agencies.

75 Today, there is no integration across various information systems (Electronic Health Record Systems (EHR-S), Laboratory Information Management Systems (LIMS), public health registries, and quality measurements registries, just to name a few, that are involved in the health information exchanges related to diabetes care.

Due to the lack of integration with EHR systems, public health agencies use non-clinical data sources such as in state and national surveys for diabetes disease surveillance.

There is no consensus on the common content for information exchange across clinical and public health information systems (registries).

80 This White Paper describes an approach for generating a common content for information exchanges across clinical and public health information systems using the example of diabetes care. Based on the clinical guidelines in diabetes care management, and diabetes population surveillance reports we identified common queries and specified responses to these queries, and extracted
85 common content for the information exchange in clinical care, quality reporting and population-based surveillance in this domain. The final result would be representing the guidelines in a standard, coded format so that they can be used within both the care management applications, and also in the clinical data source, as indicated by the Care Management (CM) profile. The QRPH Quality Report Sharing profile complements the other two by specifically describing the Public
90 Health data exchange.

1.1 Open Issues and Questions

None

95 1.2 Closed Issues

1. What is the specific relationship of the concepts defined in this White Paper to the IHE PCC Care Management profile, the IHE QRPH Chronic Care Management profile, and the IHE QRPH Quality Report Sharing profile (in progress). The Care Management profile interactions are now defined in this paper. The Chronic Care Management profile is a pending change proposal to CM. The QRPH quality Report Sharing Profile is still in progress so no relationship defined at this time.

100 1.3 Future Considerations

None

105 1.4 Legal Constraints and Consideration

110 In the US, various states use jurisdiction-specific diabetes care guidelines. We used the example of the Wisconsin's guidelines because the Wisconsin Department of Health and Family Services' Diabetes Control Program participated in the project with the Public Health Data Standards Consortium (PHDSC) to develop functional requirements for electronic data exchanges between EHR-S and Wisconsin diabetes public health information system.[7] This project served as a basis for this White Paper.

2 Scope

115 2.1 In Scope

We used the Wisconsin Diabetes Mellitus Care Management Clinical Guidelines [3] (Appendix 1) as an example of care guidelines. We also used the Wisconsin Diabetes Surveillance Report as an example of population-based surveillance reports.[4] Appendix 2 contains the examples of population-based queries and corresponding data content for population-based information exchange content. Lastly, we used the Wisconsin Collaborative Diabetes Quality Improvement Project Report [5] and Take Care New York (TCNY) [6] Project’s quality measures related diabetes care as examples of quality measure indicators.

We focused on the *Glycemic Control* use case and the *Cardiology Care’s Cholesterol Level Control* use cases for type 2 diabetes patients in this White Paper.

125 2.2 Out of Scope

Other components of diabetes care, except the two described in the use cases above, are out of scope. Type 1 diabetes, gestational diabetes and pre-diabetic patients are out of scope. Also out of scope are the specific stored queries supporting Chronic Care Management, though these may be opportunities for future QRPH profiling efforts.

130 2.2.1 Mapping

Mapping to local terms is not in scope for value sets specifically but an implementation issue for incorporation of quality measures within EHR-S. It is expected that mapping of local terms to a reference terminology will be accomplished either locally at the EHR-S level, within a larger health system, or regionally at the level of a regional health information organization (RHIO) or a health information exchange (HIE).

3 Stakeholders

Healthcare Provider

- 140 Healthcare Facility
- Clinician (Primary Care Provider, Specialist (Cardiologist), etc)
 - Nurse (Specimen Collector)
 - Clerk (Administrative Staff)

145 **Laboratory Staff**

- Laboratory (contract laboratory, hospital laboratory, etc.).
- Laboratory Technician
 - Laboratory Data Manager

150 **Public Health Staff**

- Public Health Diabetes Care Management/Control Program
- Program Staff (Data Manager, Case Manager, etc.)

Consumer

- 155 • Type 2 Diabetes Patient

The following systems and technical actors are involved in Chronic Care Management:

- Guideline Manager (may be part of EHR-S or Public Health System)
- 160 • Care Manager (may be part of EHR-S or other system)
- Chronic Care Stored Query Repository (may be part of EHR-S or Public Health System)
- Healthcare Facility's Electronic Health Record System (**EHR-S**) (Care Manager Data Source)
- Specialist's Electronic Health Record System (**EHR-S**) (Care Manager Data Source)
- 165 • Laboratory Information Management System (**LIMS**) (Care Manager Data Source)
- Health Information Exchange (**HIE**) (Care Manager Data Source)
- Public Health Diabetes Information System (**PHD-IS**) (Guideline Manager, Care Manager, Value Set Repository, Chronic Care Stored Query Repository, Quality Analyzer/Aggregator)
- 170 • Personal Health Record System (**PHR-S**) (OUT OF SCOPE) (Care Manager Data Source)

4 Actor Definitions

Actors are information systems or components of information systems that produce, manage, or act on information associated with operational activities in the enterprise.

Content Creator

175 The Content Creator actor is responsible for the creation of content and transmission to a Content Consumer.

Content Consumer

A Content Consumer actor is responsible for viewing, import, or other processing of content created by a Content Creator Actor.

180 Clinical Data Consumer

A Clinical Data Consumer actor makes use of clinical patient data.

Clinical Data Source

185 A Clinical Data Sources actor maintains patient information about vital signs, problem and allergies, results from diagnostic tests (e.g., Lab, Imaging, or other test results), medications, immunizations or historical or planned visits and procedures.

Guideline Manager

The Guideline Manager actor is responsible for managing the guidelines used to create care plans, and for communicating those guidelines to other systems.

Care Manager

190 The Care Manager actor is responsible for supporting the management of the care of patients with respect to a specific health condition. It gathers information about the care provided and current health status of the patient. A Care Manager actor may be designed for management of a single condition, such as management of Diabetes, or may be a general purpose system supporting management of multiple conditions.

195 Chronic Care Stored Query Repository (Query Bank)

The Chronic Care Stored Query Repository (Query Bank) is a new actor introduced in this White Paper that is responsible for stories standardized queries.

Chronic Disease Management (CDM) Query Consumer

200 The Chronic Disease Management (CDM) Query Consumer actor is responsible for requesting standardized stored queries from the Stored Query Bank.

Quality Analyzer/Aggregator

205 The Quality Analyzer/Aggregator actor is a system that assembles quality measurement data from patient clinical records in accordance with measurement definitions, and provides reports of quality measures to the Monitoring Agent / Destination Agency.

Value Set Consumer

The Value Set Consumer actor retrieves Resolved Value Sets based on its OID and possibly its version if the latter is available.

Value Set Repository

210 The Value Set Repository actor provides Resolved Value Sets.

5 Transaction Definitions

Query Existing Data

215 Request information about recent patient information, used to obtain vital signs measurements, problems and allergies, diagnostic results, medications, immunizations, or procedures or visits relevant for a patient. The query may request information about some or all of the above topics, or may request information on a specific topic, or one entered for a specific encounter or date range.

Guideline Notification

220 The Guideline Notification transaction reports a the content of new and/or updated guidelines to interested parties. The purpose of this transaction is to alert systems that need to act on clinical guidelines of the availability of new guidelines.

Request Guideline Data

225 The Request Guideline Data transaction supports the capability of systems to query for the contents of an identified guideline.

Request Stored Query (QRPH-xx)

The Request Stored Query transaction retrieves Chronic Disease Management queries from the Stored Databank. Care Management Data Query

230 The Care Management Data Query transaction supports the capability for systems responsible for monitoring the health status and care provided to one or more patients to request that information from systems that may have it.

V3 Care Management Update

235 The V3 Care Management Update transaction supports the capability for systems that have information about the health status and care provided to one or more patients to share that information with external systems that need to monitor that information using profiles of HL7 V3 Care Record standard messages.

V2 Care Management Update

240 The Care Management Updagte transaction supports the capability for systems that have information about the health status and care provided to one or more patients to share that information with external systems that need to monitor that information using specific profiles of HL7 V2 standard messages.

6 Use Cases

The following two Use Cases are included as examples:

- Glycemic Control
- Cholesterol Level Control

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Table 6-1 presents a detailed description of the work processes, information exchange requirements and data requirements for the Glycemic Control Use Case.

Table 6-1 Glycemic Control Use Case

Use Case Name	Glycemic Control	
Business Actors (Stakeholders)	A. Healthcare Provider <u>Healthcare Facility</u> <ul style="list-style-type: none"> ♦ Clinician (Primary Care Provider, Specialist (Cardiologist), etc) ♦ ♦ Nurse (Specimen Collector) ♦ Clerk (Administrative Staff) 	
	B. Laboratory Staff <u>Laboratory</u> (Contract Laboratory, Hospital Laboratory, etc.). <ul style="list-style-type: none"> ♦ Laboratory Technician ♦ Laboratory Data Manager 	
	C. Public Health Staff Public Health Diabetes Care Management/Control Program <ul style="list-style-type: none"> ♦ Program Staff (Data Manager, Case Manager, etc.) 	
	D. Consumer (Patient) Consumer <ul style="list-style-type: none"> ♦ Type 2 Diabetes Patient 	
Technical Actors (Information Systems)	<ul style="list-style-type: none"> ♦ Guideline Manager (may be part of EHR-S or Public Health Diabetes Information System (PHD-IS)) ♦ Care Manager (may be part of EHR-S or other system) ♦ Chronic Care Stored Query Repository (Query Bank) (may be part of EHR-S or PHD-IS) ♦ Care Manager Data Source (may be part of the Healthcare Facility's EHR-S, Specialist's EHR-S or, LIMS or HIE) or PHR-S (OUT OF SCOPE) ♦ Value Set Repository (may be part of EHR-S or PHD-IS) ♦ Value Set Consumer (may be part of EHR-S or PHD-IS) ♦ Quality Analyzer/Aggregator (may be part of PHD-IS or HIE) 	
Flow of Events		Data Categories by Events
1. Healthcare Facility		
1.1 Patient visits Healthcare Provider	Encounter header (facility information)	
1.2. Clerk conducts registration, obtains patient consent(s), and starts the encounter in EHR-S	Patient Demographics Consents: 1.Consent for Procedure 2.Consent for Information Sharing	
1.3. Nurse obtains vital signs and enters data into EHR-S	Vital signs	

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1.4. Physician conducts exam and enters exam data into EHR-S	Exam data
1.5. Care Manager communicates with Guideline Manager to retrieve the care guidelines for the chronic disease (diabetes) and Queries the database determining that the Patient is due for HbA1c test, and to generate reminder?	Task List HbA1c Test Reminder
1.6. Physician orders HbA1c test via EHR-S	Lab Order
1.7. Nurse receives order via EHR-S , draws blood specimen, completes that order in EHR-S , sends specimen to the Laboratory	
1.8 EHR-S sends <u>Order</u> transaction to LIMS	
1.9. EHR-S receives <u>Order Completion Notification</u> from LIMS using the IHE Lab messaging technical framework, NAV, or DSUB.	Lab Order=Lab Result: 1.Order Completion Notification 2.HbA1c Test Result
1.10. EHR-S receives <u>HcA1c Test Results</u> from LIMS which may be conducted using either messaging or document sharing. NOTE: EHR-S may download <u>HcA1c Test Results</u> from HIE	
1.11. If <u>Order Completion Notification</u> indicates abnormal results , EHR-S notifies appropriate Physician to review results NOTE: This may use a forthcoming IHE Alert Profile which will communicate the abnormal results and support confirmation of receipt of the abnormal results by the physician.	Lab Order=Lab Result: 3. Alerts & Task Lists, if Abnormal Results
1.12. Physician communicates <u>HcA1c Test Results</u> to Patient.	Lab Order=Lab Result: 2.HbA1c Test Result
1.13. Care Manager generates Care Plan based on the HbA1c Test Results	Care Plan
1.14. Physician reviews <u>Care Plan</u>	
1.15. EHR-S generates <u>Care Quality Reports</u> based on the HbA1c Test Results	Care Quality Reports
1.16 EHR-S receives <u>Notification</u> that <u>Diabetes Surveillance Reports</u> are available in HIE	Diabetes Surveillance: 1. Diabetes Surveillance Report Notification 2. Diabetes Surveillance Reports
1.17 Healthcare Facility Staff downloads <u>Diabetes Surveillance Reports</u> from HIE into EHR-S	
2. Laboratory	
2.1. Laboratory LIMS receives HbA1c Test Order from EHR-S	Lab Order 1.Lab Order
2.2. Laboratory Personnel processes the specimen (receives/logs-in/analyze) and enters HbA1c <u>Test Results</u> into LIMS	Lab Order=Lab Result: 1.Order Completion Notification 2.HbA1C Test Result
2.3 LIMS send <u>Order Completion Notification</u> and HbA1c <u>Test Results</u> into EHR-S NOTE: LIMS publishes <u>Order Completion Notification</u>	
2.4 LIMS send <u>HbA1c Test Results</u> into EHR-S NOTE: LIMS publishes <u>HbA1c Test Results</u> into HIE	

3. Public Health Diabetes Information System	
3.1. PHD-IS receives <u>Order Completion Notification</u> from HIE	Lab Order=Lab Result: 1.Order Completion Notification 2.HbA1C Test Result
3.2. PHD-IS downloads pseudonymized HbA1c Test Results from HIE	
3.3 PHD Program Staff (Data Manager, Case Manager, etc.) runs <u>Diabetes Surveillance Reports in PHD-IS</u> periodically as required by jurisdiction	Diabetes Surveillance Reports 1. Surveillance Report Notification 2. Surveillance Report
3.4 PHD-IS publishes <u>Diabetes Surveillance Reports</u> into HIE	
Entry Condition	Patient visits Provider ; Guideline Manager generates reminder for HbA1c test
Exit Condition	Provider receives diabetes surveillance reports

250 Because work processes, information exchange requirements and data requirement for the *Cholesterol Level Control Use Case* are similar to those in *Glycemic Control Use Case*, we did not include the detailed description of the Cholesterol Level Control Use Case in this document.

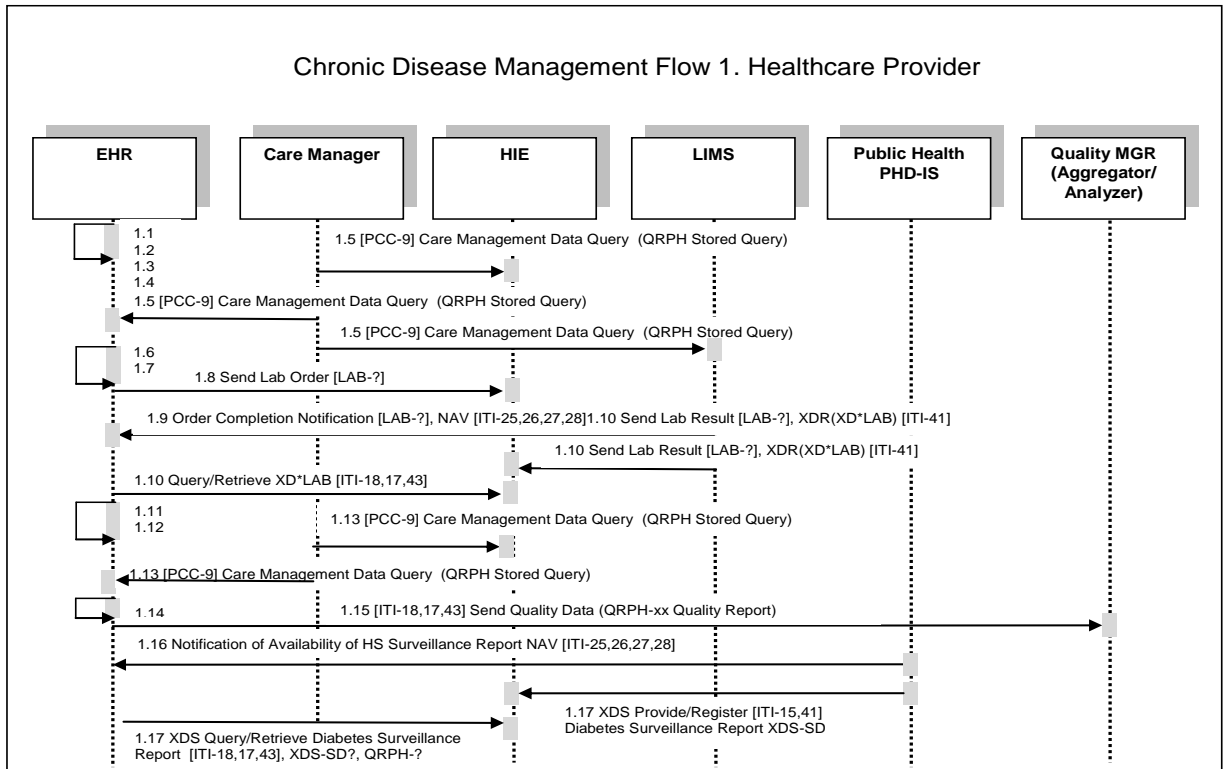
6.1 Workflow

255 Figures 6.1-1 through 6.1-3 provide workflow/activity diagrams of Chronic Care Management described in the Use Case from each of the three perspectives, and correspondent IHE profiles by event of care.

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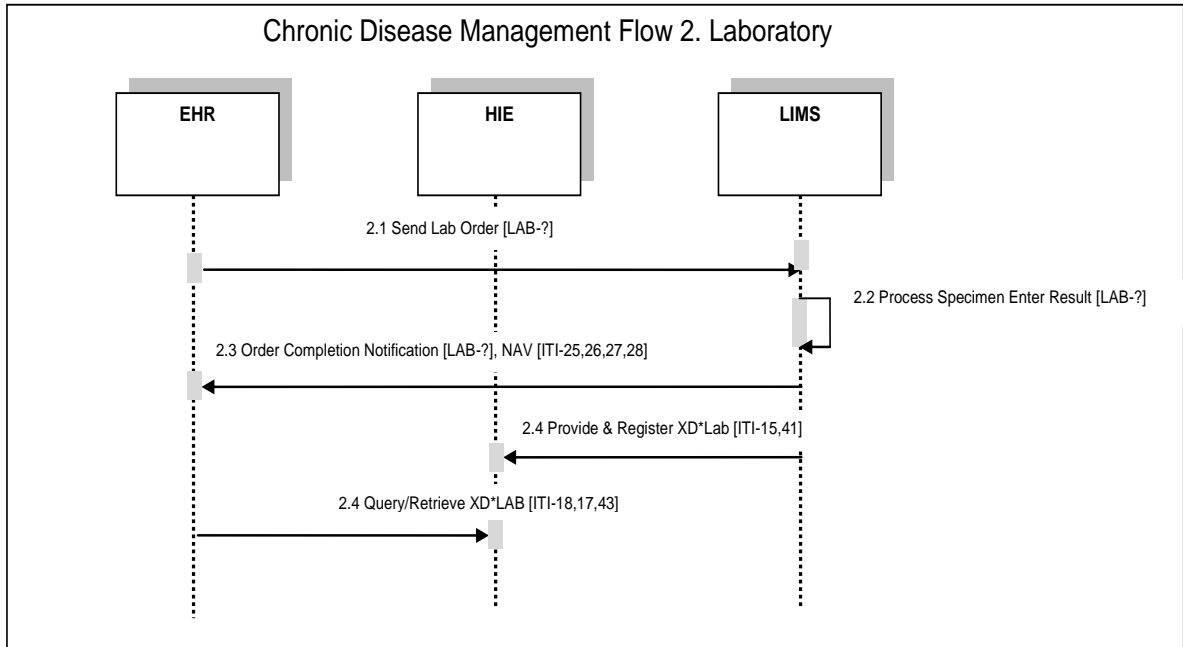
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Figure 6.1-1 – Chronic Care Management Flow 1: Healthcare Provider

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Figure 6.1-2 – Chronic Disease Management Flow 2. Laboratory

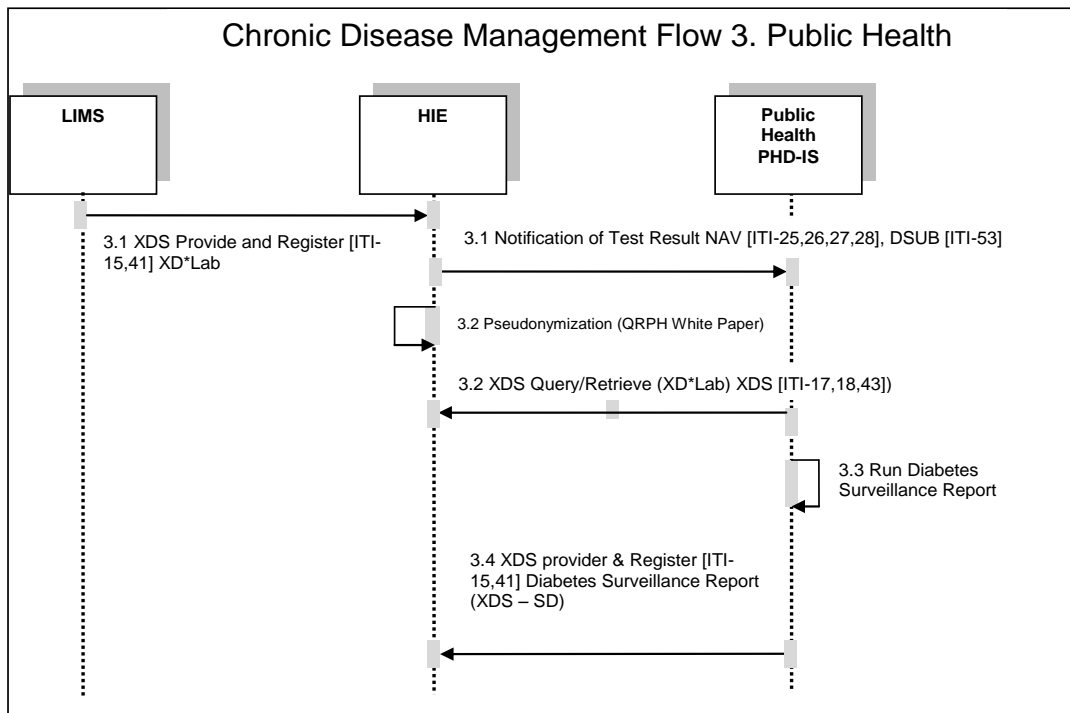


Figure 6.1-3 – Chronic Disease Management Flow 3. Public Health

6.2 Data Categories

300 The following data categories were identified for the Chronic Care Management Glycemic Control Use Case (Table 6-1).

1. *Chronic Care Management Reminder*: Clinical Decision Support Data, Task Lists
2. *Lab Order*: Chronic Care Management Order Data
3. *Lab Order - Lab Result*:
305 1. Order Completion Notification Data
 2. Test Result Report Data
4. *Chronic Care Management Surveillance*:
 1. Surveillance Report Notification Data
 2. Surveillance Reports Data
310

Note: We believe that similar data categories will apply to the Cardiology Care’s Cholesterol Level Control Use Case.

Note: surveillance reports on HbA1c and LDL (Tables 7.1-1 and 7.1-2) may also serve as quality measure reports.

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7 Technical Approach

The proposed technical approach leverages IHE Patient Care Coordination (PCC) Domain Technical Framework on Chronic Care Management [8] (Fig. 7-1).

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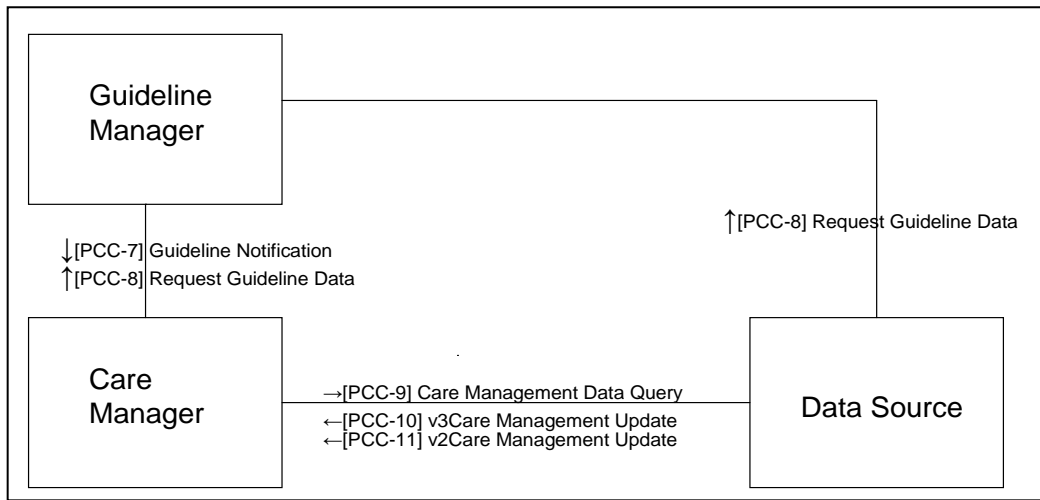


Figure 7-1 Care Management Technical Actor Diagram

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We will generate the list of standardized queries from the Guideline Manager for use with PCC-9 Care Management Data Query transaction and store these queries in the Query Bank. The query bank will be optionally available to the Care manager and to the Data Source using a newly defined QRPH transaction [QRPH-xx]. These stored queries can be generalized for re-use as indicated by the two use cases provided in this white paper. While the specific stored queries supporting Chronic Care Management is outside of the scope of this white paper, this does represent potential future profiling opportunity. These stored queries may reference value sets that may be retrieved using IHE SVS [ITI-48] Retrieve Value Set. There may be future QRPH work to generate standard value sets supporting care management that could be supplied by the Value Set Repository. Responses to the PCC-9 query are available to the Care Manager for analysis against the guidelines provided by the Guideline Manager using transactions [PCC-7 and PCC-8]. The proposed technical approach is presented on Fig. 7-2.

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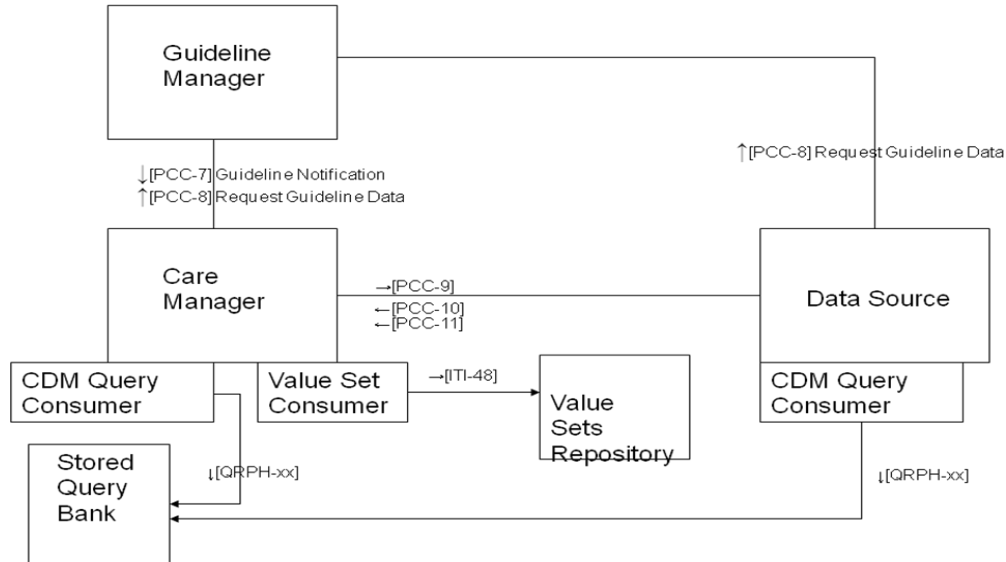


Figure 7-2 Proposed Chronic Care Management Technical Actor Diagram

365 7.1 Generating Standardized Queries

To populate Query Bank, the Care Manager will analyze the guideline document and automatically generate queries for a particular component of care (use case) using the Diabetes Care Management Stored Query and Value Set Repository. The proposed queries for the *Glycemic Control* Use Case by stakeholder (healthcare provider, healthcare facility and public health program) are presented in Table 7.1-1. Please note that for the *Cholesterol Level Control* Use Case we could use the same queries by changing the test name from <HbA1c> to <LDL>, test frequency from <3mos> to <12mos>, test readings from <7.0%> to <100mg/dL> as specified by the guidelines for cholesterol level control (Table 7.1-2). Please note that we used color highlights in Tables 7.1-1 and 7.1-2 to indicate the changing portion of the queries, i.e., red for **test name**, blue for **test frequency** and green for **test reading**.

To populate Value Set Registry, the Care Manager will collect possible responses to the queries and store these responses in the Value Set Registry. The proposed value sets for the for the *Glycemic Control* Use Case and *Cholesterol Level Control* Use Case by stakeholder (healthcare provider, healthcare facility and public health program) are presented in Tables 7.1-1 and 7.1-2, respectively.

385 It should be noted, that examples of queries and value sets in Tables 7.1-1 and 7.1-2, also serve as quality measures for those two components of care (glycemic control and cholesterol level control) from provider, facility, and population-based perspectives.

CLINICAL GUIDELINES			CLINICAL CARE		QUALITY MEASURES												
Concern (Component of Care)	Care/Test	Test Frequency	Query	Value Set	Provider Perspectives		Provider/Healthcare Facility Perspectives				Public Health Program Perspectives						
					Query	Value Set	Numerator Query	Numerator Value Set	Denominator Query	Denominator Value Set	Numerator Query	Numerator Value Set	Denominator Query	Denominator Value Set			
Glycemic Control	Check HbA1C; Goal < 7.0% (ADA**) Goal <= 6.5% (AACE***)	Type 2 Diabetes Every 3-6 months (mos)	Did patient have <HbA1C> test?	Test name No			How many patients did not have <HbA1C> test by <age>, <gender>, <provider>?	Test name # of Pts Pt age Pt gender Provider ID	How many patients were seen by <provider>, <practice> within a <date range> period?	# of Pts Date range Provider ID	How many patients did not have <HbA1C> test by <age>, <gender>, <practice>, <jurisdiction>?	Test name # of Pts Pt age Pt gender Practice ID Jurisdiction	How many patients were seen in <data range> period within <jurisdiction>?	# of Pts Date range Jurisdiction			
				Test name Yes		How many patients did have <HbA1C> test by <age>, <gender>, <provider>?	Same as above		How many patients did have <HbA1C> test by <age>, <gender>, <practice>, <jurisdiction>?		Same as above	Same as above					
			When did patient have <HbA1C> test?	Test name Test date													
				Did patient have <HbA1C> > in the past 3 mos?	No	How many patients did not have <HbA1C> test in the past 3 mos by <age>, <gender>, <provider>?	Test name # of Pts Pt age Pt gender Provider ID Date range	How many patients were seen in <date range> period by <provider>, <practice>?	Same as above	How many patients did not have <HbA1C> test in the past 3 mos by <age>, <gender>, <practice>, <jurisdiction>?	Test name # of Pts Pt age Pt gender Practice ID Jurisdiction Date range	Same as above	# of Pts Date range Jurisdiction				
	Yes	How many patients did have <HbA1C>	Same as above	How many patients did have <HbA1C> test	Same as above												

				test in the past 3 mos by <age>, <gender>, <provider>?				in the past 3 mos by <age>, <gender>, <practice>, <jurisdiction>?				
		What was the <HbA1C> reading?	Test name Reading									
			Was the <HbA1C> >below <7.0 or 6.5>%?	No	How many patients had <HbA1C> test reading below <7.0 or 6.5>% by <age>, <gender>, <provider>?	Test name # of Pts Pt age Pt gender Provider ID Reading	Same as above	Same as above	How many patients had <HbA1C> test reading below <7.0 or 6.5>% by <age>, <gender>, <practice>, <jurisdiction>?	Test name # of Pts Pt age Pt gender Practice ID Jurisdiction Reading	Same as above	# of Pts Date range Jurisdiction
			Was the <HbA1C> >above <9>%?	Yes	How many patients had <HbA1C> test reading above <9.0>% by <age>, <gender>, <provider>?		Same as above		How many patients had <HbA1C> test reading above <9.0>% by <age>, <gender>, <practice>, <jurisdiction>?		Same as above	

*Based on Wisconsin Essential Diabetes Mellitus Care Guidelines. 2008. URL: <http://dhs.wisconsin.gov/health/diabetes/PDFs/GLIntro.pdf>

**ADA - American Diabetes Association. URL: http://care.diabetesjournals.org/content/32/Supplement_1

***ACE - American Association of Clinical Endocrinologists. URL: <http://www.ace.com/pub/guidelines/>

Table 7.1-2. Cholesterol Level Control Use Case: Proposed Queries and Value Sets*

CLINICAL GUIDELINES			CLINICAL CARE		QUALITY MEASURES									
Concern (Component of Care)	Care/Test	Test Frequency	Query	Value Set	Provider Perspectives		Provider/Healthcare Facility Perspectives				Public Health Program Perspectives			
					Query	Value Set	Numerator Query	Numerator Value Set	Denominator Query	Denominator Value Set	Numerator Query	Numerator Value Set	Denominator Query	Denominator Value Set
Cholesterol Level Control	Check LDL; Goal < 100mg/dL	Type 2 Diabetes Annually (12mos)	Did patient have <LDL> test?	Test name No		How many patients did not have <LDL> test by <age>, <gender>, <provider>?	Test name # of Pts Pt age Pt gender Provider ID	How many patients were seen by <provider>, <practice> within a <date range> period?	# of Pts Date range Provider ID	How many patients did not have <LDL> test by <age>, <gender>, <practice>, <jurisdiction>?	Test name # of Pts Pt age Pt gender Practice ID Jurisdiction	How many patients were seen in <data range> period within <jurisdiction>?	# of Pts Date range Jurisdiction	
				Test name Yes		How many patients did have <LDL> test by <age>, <gender>, <provider>?		Same as above		How many patients did have <LDL> test by <age>, <gender>, <practice>, <jurisdiction>?		Same as above		
			When did patient have <LDL> test?	Test name Test date	Did patient have <LDL> in the past 12 mos?	No	How many patients did not have <HbA1C> test in the past 12 mos by <age>, <gender>, <provider>?	Test name # of Pts Pt age Pt gender Provider ID Date range	How many patients were seen in <data range> period by <provider>, <practice>?	Same as above	How many patients did not have <LDL> test in the past 12 mos by <age>, <gender>, <practice>, <jurisdiction>?	Test name # of Pts Pt age Pt gender Practice ID Jurisdiction Date range	Same as above	# of Pts Date range Jurisdiction

				Yes	How many patients <u>did</u> have <LDL> test in the <u>past 12 mos</u> by <age>, <gender>, <provider>?		Same as above		How many patients <u>did</u> have <LDL> test in the <u>past 12 mos</u> by <age>, <gender>, <practice>, <jurisdiction>?		Same as above	
		What was the <LDL> test reading?	Test name Reading									
			Was the <LDL> test reading below <100mg/dL>?	No	How many patients had <LDL> test reading <u>below</u> <100>mg/dL by <age>, <gender>, <provider>?	Test name # of Pts Pt age Pt gender Provider ID Reading	Same as above	Same as above	How many patients had <LDL> test reading <u>below</u> <100>mg/dL by <age>, <gender>, <practice>, <jurisdiction>?	Test name # of Pts Pt age Pt gender Practice ID Jurisdiction Reading	Same as above	# of Pts Date range Jurisdiction
			Was the <LDL> test reading above <100mg/dL>?	Yes	How many patients had <LDL> test reading <u>above</u> <100mg/dL> by <age>, <gender>, <provider>?		Same as above		How many patients had <LDL> test reading <u>above</u> <100mg/dL> by <age>, <gender>, <practice>, <jurisdiction>?		Same as above	

*Based on Wisconsin Essential Diabetes Mellitus Care Guidelines. 2008. URL: <http://dhs.wisconsin.gov/health/diabetes/PDFs/GLIntro.pdf>

8 Information Domain (e.g. volume 3 considerations)

390 8.1 Diabetes Guidelines

8.1.1 Diabetes Guidelines Reference List

We will use the diabetes care management guidelines as the master use case. Appendix 1 presents the Wisconsin Diabetes Mellitus Care Management Clinical Guidelines as an example.

8.1.2 Diabetes Guidelines Care Management Model Guideline

See Appendix 1.

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8.2 Diabetes Measures

8.2.1 Diabetes Measures Reference List

Quality Measures are often based upon care management guidelines. While there are many quality measures related to diabetes management, the following example measures more directly support the use cases used in this white paper:

- 402 1. **Diabetes Mellitus: average HbA1c value for diabetic patients in the clinical information system:** This measure, published by the US Agency for Healthcare Research and Quality (AHRQ), is used to assess the average HbA1c value for diabetic patients, with a goal of <7%, and is based upon current American Diabetes Association (ADA) guidelines for individual patients. [2].
- 408 2. **Adult diabetes: percentage of patients with most recent LDL-C less than 130 mg/dL:** This measure, published by the US Agency for Healthcare Research and Quality (AHRQ), assesses the percentage of adult diabetes patients aged 18-75 years with most recent low-density lipoprotein-cholesterol (LDL-C) less than 130 mg/dL, and is supportive of recommendations from both the American Association of Clinical Endocrinologists/American College of Endocrinology (AAACE/ACE) and American Diabetes Association (ADA).[2] The Wisconsin Essential Diabetes Mellitus Guidelines [3] and the Take Care New York quality measures assess patients with LDL below 100
- 414 mg/dL. [6]

8.2.2 Diabetes Measure Quality Performance Measure Model Guideline

This white paper does not specify the specific eMeasure and patient-level quality data reporting details for these measures. However, pending work in the IHE QRPH will be providing further profiling of the HL7 QRDA. It is the intent of this white paper to be fully consistent with this profiling effort, and it is expected that the identified measures will be re-tooled to support

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electronic data capture from the EHR-S. Once these are re-tooled, they should be incorporated into this specification along with an instantiation of these using the QRPH Performance Quality Report.

8.3 Defined Care

8.3.1 Using the Care Management Profile for Chronic Care Management

426 This White Paper leverages the PCC Care Management (CM) profile to support the care guidelines identified by the use case. The intent is to generalize the types of Chronic Care Management queries for reuse through standard stored queries.

8.3.2 Care Management Data Query Data Constraints

As indicated by tables in section 5.1.1, the queries required for the use case guidelines can be generalized for reuse.

Key Care Management parameters:

- 432
- patientID
 - careRecordTimePeriod
 - clinicalStatementTimePeriod
 - careProvisionCodes:
 - LABCAT
 - PROBLIST

438 Value Sets supporting these use cases may be constrained by jurisdiction: in the US would be:

- HbA1C and LDL-C using codeSystem LOINC
- Diabetic Patients using codeSystem SNOMED-CT

Using these care management parameters and value sets, generalized queries would then include

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- Diagnostic Results (LABCAT) from ValueSet (HbA1C/LDL-C) using CodeSystem LOINC
 - Time Period (3months/6months)
 - For patientID of patients with Diabetes (PROBLIST) from ValueSet (Diabetes) using CodeSystem SNOMED-CT

9 Existing IHE Profiles Supporting Chronic Care Management

There are several existing IHE profiles that have been identified in this White Paper supporting Chronic Care Management described in the Glycemic Control Use Case (Table 6-1) and depicted on the activity diagrams (Fig. 6.1-1) above. These profiles are listed in Table 9-1 below.

450 **Table 9-1 IHE Profiles Supporting Chronic Care Management: Glycemic Control Use Case**

IHE Domain	IHE Profile	Use Case Information Flows	Comments
IT Infrastructure	PIX/PDQ	1.2, 1.10, 1.17, 2.4, 3.1	XDS-Related Demographic steps
IT Infrastructure	XDS/XDR	1.2, 1.10, 1.17, 2.4, 3.1	For Document Sharing
Patient Care Coordination	Care Management (CM)	1.5, 1.13	For communication of guideline results
IHE Lab	LAB-? (Order	1.8, 2.1	For communication of test orders
IHE Lab	XD*Lab	1.10, 2.4, 3.2	For communication of test results
ITI	BPPC	1.2	For Consents
ITI	SVS	1.5, 1.13, 1.15	For Value Sets supporting Chronic Care Management Guidelines
ITI	XDS-SD	1.16, 1.17, 3.4	Use as interim for patient-level biosurveillance reports
ITI	NAV	1.9, 1.16, 1.17, 2.3, 3.1	For Notification of Document Availability
ITI	DSUB	1.9, 1.16, 1.17, 2.3	For Subscription to published documents
ITI	MPQ	1.9, 1.16, 1.17, 2.3	Alternate surveillance data retrieval method
PCC	XDS-MS/XPHR/APR	NA	May be used for use cases beyond Glycemic Control and Cardiology Care's Cholesterol Level Control

10 In-Process IHE Profiles Supporting Chronic Care Management

There are some IHE profiles that are in progress that have been identified in this White Paper supporting Chronic Care Management. These profiles are listed in Table 10-1 below. Completion of these profiles will be important for support of Chronic Care Management as described in this White Paper.

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Table 10-1 In Progress IHE Profiles supporting Chronic Care Management: Glycemic Control Use Case

IHE Domain	IHE Profile	Use Case Information Flows	Comments
QRPH	Performance Quality Report	1.15	Support communicatin of Quality Measure data
QRPH	Aggregate reports (Specified within the EHDI Profile)	1.17, 3.4	Support chronic care management aggregate surveillance reports
IT Infrastructure	Pseudonymize (White Paper)	3.2	Support privacy for surveillance activites supporting chronic care management (See QRPH Pseudonymization White Paper)
QRPH	RPE	1.5	Further analysis needed

11 New IHE Profile Work to Support Chronic Care Management

The following IHE profiles have been identified that should be established to support Chronic Care Management as described in this White Paper. These profiles are listed in Table 11-1 below.

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Table 11-1 IHE Profiles supporting Chronic Care Management: Glycemic Control Use Case

IHE Domain	IHE Profile	Use Case Information Flows	Comments
IT Infrastructure/ QRPH	Alert	1.11	XDS-Related Demographic steps

12 Available Standards for Pending Work

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- HL7 Care Record
- HL7 Infobutton
- HL7 Health Quality Measures Format (HQMF)
- HL7 Quality Reporting Document Architecture (QRDA)
- ISO TS25237 Health Informatics - Pseudonymisation
- OASIS EDXL
- PDF

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14 Summary

498 This White Paper may enhance the IHE strategy on specifying data content in health information exchanges by exploring a new way of defining the content through standardizing the query language. In comparison, today IHE defines the data content for information exchanges via individual disease (domain) Content profiles and modules. This is time consuming and requires content profile modifications for inclusion of new data elements that may emerge over time.

The Diabetes domain involves information exchanges between clinical care and public health. The proposed White Paper will help building electronic connectivity between EHR systems and public health information systems (registries) to lay the foundation for coordinated care between two sectors and to enable population-based surveillance and quality reporting.

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Appendix A – Wisconsin Essential Diabetes Mellitus Care Guidelines 2008 [3]

Wisconsin Diabetes Mellitus Guidelines, 2008		
Concerns	Care/Test	Frequency
General Recommendations for Care	◆ Perform diabetes – focused visit	Type 1: Every 3 months* Type 2: Every 3 – 6 months* * consider more often if A1c ≥ 7.0% and/or complications exist
	◆ Review management plan; assess barriers and goals	Each focused visit; revise as needed
	◆ Assess physical activity level	Each focused visit
	◆ Assess nutrition/weight/BMI/growth	Each focused visit
Self – Management Education	◆ Refer to diabetes educator, preferably a CDE in an ADA Recognized Program; curriculum to include the ten key areas of the national standards	At diagnosis, then every 6 – 12 months, or more as needed
Medical Nutrition Therapy	◆ Refer for medical nutrition therapy (MNT) provided by a registered dietitian (RD), preferably one who is also a CDE	At diagnosis or first referral to RD: 3 to 4 visits, completed in 3 to 6 months; then, annually. RD determines additional visits based needs/goals.
Glycemic Control	◆ Check A1c; goal: < 7.0% (always individualize) (ADA recognizes goal of < 7.0%) (AACE recognizes goal of ≤ 6.5%)	Type 1: Every 3 months* Type 2: Every 3 – 6 months* *consider more often if A1c ≥ 7.0% and/or complications exist
	◆ Review goals, medications, side effects, and frequency of hypoglycemia	Each focused visit
	◆ Assess self-blood glucose monitoring schedule	Each focused visit, 2 – 4 times/day, or as recommended
Cardiovascular Care	◆ Check fasting lipid profile	
	<u>Adult goals:</u>	
	Total Cholesterol < 200 mg/dL	<u>Children:</u> After age 2 but before age 10. Repeat annually if abnormal, repeat in 3 – 5 years if normal <u>Adults:</u> Annually. If abnormal, follow NCEP III guidelines.
	Triglycerides < 150 mg/dL	
	HDL ≥ 40 mg/dL (men)	
	HDL ≥ 50 mg/dL (women)	
	Non – HDL (Cholesterol) < 130 mg/dL	
	LDL < 100 mg/dL (optimal goal)	
LDL < 70 mg/dL (for very high risk)		
◆ Start statin with ongoing lifestyle changes	Adults with CVD; Age > 40 yrs with one or more risk factors for CVD	

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	◆ Check blood pressure	Children: Each focused visit; follow National High Blood Pressure Education Program recommendations for Children and Adolescents
	◆ Check blood pressure Adult goal: < 130/80 mmHg	Adults: Each focused visit
	◆ Assess smoking/tobacco use status	Each visit; (5As: Ask, Advise, Assess, Assist, Arrange)
	◆ Start aspirin prophylaxis (unless contraindicated)	Age > 40 yrs with diabetes; Age ≤ 40 yrs, individualize based on risk
Kidney Care	◆ Check albumin/creatinine ratio using a random urine sample, also called urine microalbumin/creatinine ratio	Type 1: At puberty or after 5 years duration, then annually Type 2: At diagnosis, then annually
	◆ Check serum creatinine and estimated GFR	At diagnosis, then annually
	◆ Perform routine urinalysis	At diagnosis, then as intended
Eye Care	◆ Dilated eye exam by an ophthalmologist or optometrist	Type 1: If age ≥ 10, within 3 – 5 years of onset, then annually Type 2: At diagnosis, then annually; two exceptions exist
Neuropathies and Foot Care	◆ Assess/screen for neuropathy (autonomic/DPN)	Type 1: Five years after diagnosis, then annually Type 2: At diagnosis, then annually
	◆ Visual inspection of feet with shoes and socks off	Each focused visit; stress daily self-exam
	◆ Perform comprehensive lower extremity/foot exam (use monofilament and tuning fork)	At diagnosis , then annually
	Screen for PVD (consider ABI)	At diagnosis , then annually
Oral Care	◆ Inspect gums and teeth for signs of periodontal disease	At diagnosis, then each focused visit
	◆ Dental exam by general dentist or periodontal specialist	At diagnosis, then every 6 months (if dentate) and every 12 months (if edentate)
Emotional/Sexual Health Care	◆ Assess emotional health; screen for depression	Each focused visit
	◆ Assess sexual health concerns	Each focused visit
Immunizations	◆ Provide influenza vaccine	Annually, if age ≥ 6 months
	◆ Provide pneumococcal vaccine	Once; then per Advisory Committee on Immunization Practices
Preconception and Pregnancy Care	◆ Provide preconception counseling/assessment	3 – 4 months prior to conception
	◆ Assess contraception/discuss family planning	At diagnosis and each focused visit

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	◆ Assess risk for gestational diabetes mellitus (GDM)	At first prenatal visit (if high risk, screen immediately for GDM)
	◆ Screen for GDM	At 24 – 28 weeks gestation or earlier if high risk
	◆ Screen for Type 2 diabetes post-GDM	At 6 – 12 weeks postpartum, then annually • consider referring to provider experienced in care of women with diabetes during pregnancy
Identification and Diagnosis of Pre-diabetes and Type 2 Diabetes	◆ Perform fasting plasma glucose test or oral glucose tolerance test	Test all adults ≥ age 45 yrs (see full <i>Guidelines</i> for testing of Type 2 diabetes in children and adolescents); if normal and person has no risk factors, retest in 3 years