

Integrating the Healthcare Enterprise



5

**IHE IT Infrastructure  
Technical Framework Supplement**

10

**Patient Demographics Query for Mobile  
(PDQm)**

15

**Draft for Public Comment**

20

Date: June 6, 2014  
Author: IHE ITI Technical Committee  
Email: iti@ihe.net

25

**Please verify you have the most recent version of this document. See [here](#) for Trial Implementation and Final Text versions and [here](#) for Public Comment versions.**

## Foreword

30 This is a supplement to the IHE IT Infrastructure Technical Framework V10.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on June 6, 2014 for public comment. Comments are invited and can be submitted at [http://www.ihe.net/ITI\\_Public\\_Comments](http://www.ihe.net/ITI_Public_Comments). In order to be considered in development of the trial implementation version of the supplement, comments must be received 35 by July 5, 2014.

This supplement describes changes to the existing technical framework documents.

“Boxed” instructions like the sample below indicate to the Volume Editor how to integrate the relevant section(s) into the relevant Technical Framework volume.

<i>Amend Section X.X by the following:</i>
--

40 Where the amendment adds text, make the added text **bold underline**. Where the amendment removes text, make the removed text ~~**bold strikethrough**~~. When entire new sections are added, introduce with editor’s instructions to “add new text” or similar, which for readability are not bolded or underlined.

45 General information about IHE can be found at: <http://ihe.net>.

Information about the IHE IT Infrastructure domain can be found at: [http://ihe.net/IHE\\_Domains](http://ihe.net/IHE_Domains).

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at: [http://ihe.net/IHE\\_Process](http://ihe.net/IHE_Process) and 50 <http://ihe.net/Profiles>.

The current version of the IHE IT Infrastructure Technical Framework can be found at: [http://ihe.net/Resources/Technical\\_Frameworks](http://ihe.net/Resources/Technical_Frameworks).

55 **CONTENTS**

	Introduction to this Supplement.....	6
	Open Issues and Questions .....	6
	Closed Issues .....	7
60	General Introduction .....	12
	Appendix A - Actor Summary Definitions .....	12
	Appendix B - Transaction Summary Definitions .....	12
	Glossary .....	12
	<b>Volume 1 – Profiles .....</b>	<b>13</b>
65	Copyright Licenses.....	13
	X1 PDQm –Patient Demographics Query for Mobile.....	13
	X1.1 PDQm Actors, Transactions, and Content Modules .....	13
	X1.1.1 Patient Demographics Data Fields .....	14
	X1.1.2 Patient Demographics Query Criteria .....	15
70	X1.2 PDQm Actor Options .....	16
	X1.2.1 Continuation Option .....	16
	X1.2.1 Pediatric Demographics.....	16
	X1.3 PDQm Required Actor Groupings .....	17
	X1.4 PDQm Overview .....	18
75	X1.4.1 Concepts .....	18
	X1.4.2 Use Cases .....	18
	X1.4.2.1 Use Case #1: Patient Information Entering at Bedside .....	18
	X1.4.2.1.1 Patient Information Entering at Bedside Use Case Description .....	19
	X1.4.2.2 Use Case #2: Patient Identity Information Entering in Physician Offices .....	19
80	X1.4.2.2.1 Patient Identity Information Entering in Physician Offices Use Case Description.....	19
	X1.4.2.3 Use Case #3: Patient Demographics Query in an Enterprise with Multiple Patient ID Domains .....	19
	X1.4.2.3.1 Patient Demographics Query in an Enterprise with Multiple Patient ID Domains Use Case Description .....	19
85	X1.4.3 Basic Process Flow in Patient Demographics Query for Mobile Profile .....	20
	X1.5 PDQm Security Considerations .....	20
	X1.6 PDQm Cross Profile Considerations.....	21
	<b>Volume 2 – Transactions .....</b>	<b>23</b>
90	3.Y1 Mobile Patient Demographics Query [ITI-Y1] .....	23
	3.Y1.1 Scope .....	23
	3.Y1.2 Actor Roles .....	23
	3.Y1.3 Referenced Standards .....	24
	3.Y1.4 Interaction Diagram.....	25
95	3.Y1.4.1 Query Patient Resource .....	25
	3.Y1.4.1.1 Trigger Events.....	25
	3.Y1.4.1.2 Message Semantics .....	25

	3.Y1.4.1.2.1 Query Search Parameters .....	27
	3.Y1.4.1.2.2 Pediatrics Demographics Query Search Parameters .....	28
100	3.Y1.4.1.2.3 Parameter Modifiers .....	28
	3.Y1.4.1.2.4 Populating Which Domains are Returned.....	28
	3.Y1.4.1.2.5 Populating Expected Response Format.....	29
	3.Y1.4.1.3 Expected Actions .....	29
	3.Y1.4.1.3.1 Query Patient Resource Response .....	29
105	3.Y1.4.1.3.2 Query Parameter Processing .....	30
	3.Y1.4.1.3.2.1 Date Parameter Processing.....	30
	3.Y1.4.1.3.3 Incremental Response Processing.....	30
	3.Y1.4.2 Query Patient Resource Response .....	31
	3.Y1.4.2.1 Trigger Events.....	31
110	3.Y1.4.2.2 Message Semantics .....	31
	3.Y1.4.2.2.1 Patient Resource Definition in the Context of Query Patient Resource Response .....	32
	3.Y1.4.2.2.2 Resource Bundling .....	34
	3.Y1.4.2.2.3 Quality of Match .....	34
115	3.Y1.4.2.3 Expected Actions .....	35
	3.Y1.4.2.4 Profile Resource.....	37
	3.Y1.4.2.5 Conformance Resource.....	38
	3.Y1.4.3 Retrieve Patient Resource.....	38
	3.Y1.4.3.1 Trigger Events.....	38
120	3.Y1.4.3.2 Message Semantics .....	38
	3.Y1.4.3.3 Expected Actions .....	39
	3.Y1.4.4 Retrieve Patient Resource Response .....	39
	3.Y1.4.4.1 Trigger Events.....	39
	3.Y1.4.4.2 Message Semantics .....	39
125	3.Y1.4.4.2.1 Patient Resource Definition in the Context of Retrieve Patient Resource Response .....	40
	3.Y1.4.4.3 Expected Actions .....	40
	3.Y1.5 Security Considerations.....	41
	3.Y1.5.1 Security Audit Considerations.....	41
130	3.Y1.5.1.1 Patient Demographics Consumer audit message:.....	41
	3.Y1.5.1.2 Patient Demographics Supplier audit message:.....	43
	Appendices.....	45
	Appendix ZZZ – FHIR Implementation Material .....	45
	ZZZ.1 Resource Bundles .....	45
135	ZZZ.1.1 Resource Bundle “self” Link .....	46
	ZZZ.1.2 Resource Bundle Pagination .....	46
	ZZZ.2 Query Parameters.....	47
	ZZZ.2.1 Query Parameter Modifiers.....	47
	ZZZ.2.2 Token Parameters.....	48
140	ZZZ.2.3 String Parameters .....	48
	ZZZ.3 Conformance Resource Profile.....	49

	ZZZ.4 Profile Resource Profile.....	49
	ZZZ.5 Resource Reference URIs In FHIR .....	50
	Appendix E .....	51
145	E.X FHIR Identifier Type .....	51
	Appendix P.....	53
	P.1 ITI-Y1 PDQm – Implementation Materials.....	53
	Volume 2 Namespace Additions .....	64

150

## Introduction to this Supplement

The Patient Demographics Query for Mobile (PDQm) Profile defines a lightweight RESTful interface to a patient demographics supplier leveraging technologies readily available to mobile applications and lightweight browser based applications.

155 The functionality is identical to the PDQ Profile described in the ITI TF-1:8. The differences are transport and messaging format of messages and queries. The profile leverages HTTP transport, and the JavaScript Object Notation (JSON), Simple-XML, and Representational State Transfer (REST). The payload format is defined by the HL7 Fast Health Interoperable Resources (FHIR) draft standard.

160 Using these patterns, the PDQm Profile exposes the functionality of a patient demographics supplier to mobile applications and lightweight browser applications.

The following list provides a few examples of how PDQm might be leveraged by implementers:

- A health portal securely exposing demographics data to browser based plugins
- Medical devices which need to access patient demographic information
- 165 • Mobile devices used by physicians (example bedside eCharts) which need to establish patient context by scanning a bracelet
- Web based EHR/EMR applications which wish to provide dynamic updates of patient demographic information such as a non-postback search, additional demographic detail, etc.
- 170 • Any low resource application which exposes patient demographic search functionality
- Any application using the MHD Profile to access documents may use PDQm to find an appropriate patient identifier

## Open Issues and Questions

- 175 • PDQ\_024: FHIR mandates that server implementers support the `_id` parameter in the search operation. During the PDQm review of query parameters there was some discussion as to the relevance of `_id` in the context of PDQm. Currently the `_id` query parameter is minimal in its description as there are no known use cases for including it, and it may not be possible for implementers acting as a single proxy to implement or guarantee that they can fulfill such a parameter. The question is: Do we want to remove
- 180 the `_id` search parameter?
  - JM: Leave `_id` in the profile
- PDQm\_025: How does FHIR expect to mitigate potential collisions of profile resources that are stated on a particular URL?
  - This is something that we should discuss with FHIR and incorporate the guidance
  - 185 in this document.

- PDQm\_026: This profile is our first effort in profiling HL7 FHIR. We are anticipating two types of comments. The first regarding HL7 FHIR, the second regarding our profiling of HL7 FHIR.

- Please note that comments regarding HL7 FHIR itself should be submitted to HL7 by registering for an HL7 gforge account and using the form at [http://gforge.hl7.org/gf/project/fhir/tracker/?action=TrackerItemAdd&tracker\\_id=677](http://gforge.hl7.org/gf/project/fhir/tracker/?action=TrackerItemAdd&tracker_id=677)
- Comments to our profiling of FHIR should be submitted to us via IHE public comment.

## 195 **Closed Issues**

- PDQm\_002: Should Patient Visit Query be included in scope? Being a RESTful transaction, wouldn't a visit be considered a separate resource? Would we want to include this in scope for this work item?

- Exclude until asked to include. Perhaps as a different profile.

- PDQm\_003: Are there alternate standards and technologies for mobile devices besides HL7 FHIR? We should discuss potential candidate standards (other than FHIR) prior to development of Vol. 2.

- hDATA – HL7 Defined Standard currently in DSTU, perhaps specifying a PDQ HCP based on the PDQv3 models is an alternative? What are the pros/cons of this?

- HL7v2 over HTTP – Now in ballot for formalization

- See the Excel file which describes the analysis

- Discussed in Vienna : Felt that FHIR does what we need for this profile

- PDQm\_004: Regarding Pediatrics Option, I see that PDQv3 includes the same pediatric fields as PDQ even though the field names don't match the standard. Should this be the same, or should the field names be adapted to support the concepts found in our chosen standard?

- Volume 1 – Should be technology agnostic

- PDQm\_005: Should the operation of querying for a patient and “getting” a patient be listed as separate transactions or would they simply be treated as the same transaction with different search criteria?

- This should be placed as a separate interaction in the volume 2 text as it is the same transaction at the profile level.

- PDQm\_006: Should we include use cases verbatim in the supplement? Should they be identical to the use cases listed in PDQ or should they be supplemented with mobile specific use cases?

- Use cases have been incorporated into this Volume 1 text.
- 225 • PDQm\_008: Should the patient demographics meta-data elements include the minimum set of demographics data for PDQ or should it include demographic data that is common to all PDQ Profiles? Currently it contains demographics fields common to all PDQ Profiles. Additionally where should this section “live” in Volume 1?
  - The demographics field table has been updated to only include minimum set of fields in PDQ and a note has been added below the table to indicate this.
- 230 • PDQm\_001: How to do query (discussion for standards selection). Post a query document vs. query parameters?
  - GET parameters are a lower burden for implementers.
- PDQm\_007: Place vanilla PDQ abstract data model in the text for this supplement.
  - The “value” column needs to be reworked and filled in, could use some ideas for this and/or suggestions.
  - 235 ○ Value has been removed and replaced with simply data elements and description as the value is often illustrated in the description
- PDQm\_010: Potentially add ability to query based on multiple birth indicator/order for pediatric demographics option. Volume 2 discussion with reflection in Volume 1.
  - Should the profile use multipleBirthBoolean or multipleBirthInteger?
  - 240 ○ Have chosen multipleBirthInteger as it can be used as an indicator field as well and mimics the multipleBirthOrder fields.
- PDQm\_011: Cross profile considerations -> Move diagrams illustrating how PDQm may be implemented from the detailed proposal.
  - Done
- 245 • PDQm\_012: Are we limiting the profile to JSON or will we be using the XML representation of FHIR?
  - JSON was initially the only format supported to reduce scope but XML wouldn't be very difficult to include.
  - Perhaps leave as an open issue; infrastructure implementers wouldn't be burdened by supporting both, and it is better to give PDC an option. Captured in Volume 2
  - 250 text.
- PDQm\_016: Regarding the search on birth date. There may be additional guidance coming from FHIR re: dates and date searches.
  - Keep it simple/compatible with PDQ/PDQv3 for now (interval only date
  - 255 searches).
- PDQm\_018: Regarding careProvider on Patient resource: This is primarily intended for circle of care management, is this something we want to profile out of FHIR?



- This is extra functionality that we don't really 'need ' in PDQm
  - Add a note stating that additional features may be leveraged that are simply not profiled. It is acceptable behavior for clients to ignore elements that are not in the PDQM Profile.
- 260
- PDQm\_020: Is there any desire to include standardized URL schemes in the appendices, or guidance on how implementers should serve their resources when implementing multiple profiles using FHIR?
    - Continue to evolve this over time rather than trying to predict future requirements
- 265
- PDQm\_009: What fields should be listed in the common PDQ query parameters table? Required only, Required and Optional (including not commonly used fields (internationally)), or all fields?
    - Rework this table to reflect the fields captured in PDQm , illustrate the delta / difference from other PDQ Profiles.
    - Table has been rewritten to only reflect those parameters in PDQm. Many key parameters are common between PDQ and v3
- 270
- PDQm\_014: Pediatrics Option: Mother's maiden name. Would it be applicable to simply allow any "relationship" with a parent or guardian and still fulfill the use cases within the pediatrics option? Furthermore which pattern to choose in FHIR:
    - Pose this question to the FHIR team.
    - Create an extension called "mothersMaidenName", however this is single use extension.
    - Use the "contact" relationship. The purpose of the pediatrics option is to distinguish between a record that changes frequently, and/or to track contact details for adults related to the child.
    - Use the "RelatedPerson" resource. This is a little trickier as it will require the profiling of another resource, and it will also introduce an awkward query as Patient does not "have a" RelatedPerson, rather RelatedPerson "has a" Patient.
- 275
- Using the contact relationship as it seems to support the intended use case for PDO, this has been described in the Volume 2 text
- 280
- PDQm\_021: Should PDS support both JSON and XML or should PDS have the option to support either. PDC may support either.
    - If PDS has a choice then the server would need named options for XML / JSON.
- 285
- Writing Timeline Note: For now have written verbiage indicating server supports both and client supports one. See what feedback is from public comment to modify this.
- 290
- PDQm\_017: Security requirements: The PDC in a lightweight environment may be overburdened on implementing the requirements of secure node/application however the

- 295 PDS (being more robust) should be able to generate, at minimum, audits and  
communicate via, at minimum, a secure channel (even if it can't be mutually  
authenticated). I've put some verbiage to this effect the security considerations and just  
wanted opinions on this. Currently the Security Considerations section makes auditing  
optional on the PDC and mandatory on the PDS (even though not mirrored audits, IMO it  
300 is better than nothing).
- Adding to this thought, I wasn't sure what reliable mechanism there is for  
capturing the "source" of an audit. From my experience with audits from PDQv3  
systems most source UserID just end up being the anonymous address and the  
NetworkAccessPointID is really the identifying piece of information.
  - 305 ○ The audit specification in Security Considerations of ITI-Y1 has been adapted  
from ITI-47 in this supplement. The only piece of data which might be difficult to  
ascertain is the source User ID (in PDQ this is MSH, and in PDQv3 this is the  
<wsa:replyTo/> element).
  - Resolution: Have made auditing optional on PDC and mandatory on PDS. Where  
310 wsa:replyTo was mentioned, the guidance has been set as not specialized.
  - PDQm\_023: RE: 3.Y1.4.2.3 : Should this text be normative or informative, currently  
worded as expected behavior (with shall language) i.e., should this behavior become part  
of testing behaviors? Do we want to keep this in the document?
    - JM: I think all of these are done or we have made a choice. So no need to leave  
315 these in Open. (exceptions have specific comment).
  - PDQm\_013: We should coordinate the specification of common attributes in the  
appendix. This would include things like:
    - Currently in Appendix ZZZ
  - PDQm\_015: What is the appropriate behavior when a PDC wishes to perform a  
320 continuation (pagination) where the PDS does not support this option? This behavior is  
described in PDQ and PDQv3.
    - Nail down expected behaviors, esp. with continuation. Communicate that this is in  
the hands of the server. Perhaps better to over constrain and see what feedback is  
provided.
    - 325 ○ Has been described in expected behaviors
  - PDQm\_019: The Profile resource for PDQm is currently not specified in the document.  
The plan is to keep it external (similar to an XSD or WSDL). Should the profile resource  
for PDQm be included inline in this document or would it be better suited as an external  
resource (or both)?
    - Both – This is useful as an implementation artifact
    - 330

- Is this is another transaction that would be common to all IHE profiles which will be using Profiles, and Conformance resources? Perhaps just explain this in the appendices.
  - Resolution: Place in Appendix W
- 335 • PDQm\_022: RE: Complex date matching, are there any use cases where interval date matching is not sufficient for the purposes of a PDQ query?
  - Keep it compatible with PDQ and if there are any additional use cases from PDQ we can include them.

## General Introduction

340 *Update the following Appendices to the General Introduction as indicated below. Note that these are not appendices to Volume 1.*

### Appendix A - Actor Summary Definitions

No change to Appendix A as no new actors.

### 345 Appendix B - Transaction Summary Definitions

*Add the following transactions to the IHE Technical Frameworks General Introduction list of Transactions:*

Transaction	Definition
Mobile Patient Demographics Query	Performs a query against a patient demographics supplier using HTTP, REST, and JSON/XML message encoding.

## Glossary

350 *Add the following glossary terms to the IHE Technical Frameworks General Introduction Glossary:*

Glossary Term	Definition
FHIR	Fast Health Interoperable Resources – A resource based draft standard currently being developed by HL7
JSON	JavaScript Object Notation – A textual representation of a serialized object from the JavaScript language.
REST	Representational State Transfer – An integration paradigm whereby data is exchanged with remote hosts by operating on HTTP resources using HTTP verbs such as GET, PUT, POST, etc.

# Volume 1 – Profiles

## Copyright Licenses

355 Add the following to the IHE Technical Frameworks General Introduction Copyright Section:

The FHIR License can be found at <http://hl7.org/implement/standards/fhir/license.html>.

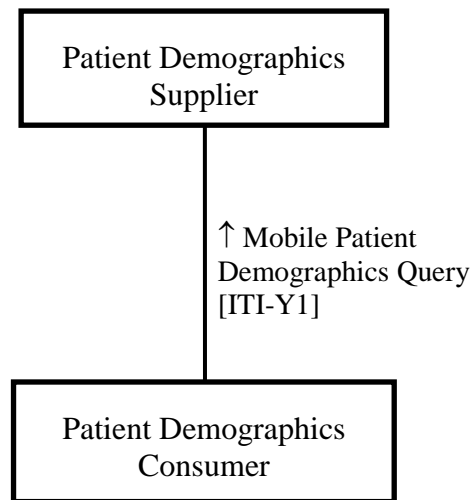
Add to new section X1

## X1 PDQm –Patient Demographics Query for Mobile

360 The *Patient Demographics for Mobile (PDQm) profile* provides a transaction for mobile and lightweight browser based applications to query a patient demographics supplier for a list of patients based on user-defined search criteria and retrieve a patient’s demographic information into the application.

### X1.1 PDQm Actors, Transactions, and Content Modules

365 Figure X1.1-1 shows the actors directly involved in the Patient Demographics Query for Mobile profile and the relevant transactions between them. Note that the actors in this profile are the same as the actors defined in the PDQ Profile (ITI TF-1: 8.1).



370

**Figure X1.1-1: PDQm Actor Diagram**

Table X1.1-1 lists the transactions for each actor directly involved in the Patient Demographics Query for Mobile Profile. To claim compliance with this profile, an actor shall support all required transactions (labeled “R”) and may support the optional transactions (labeled “O”).

375

**Table X1.1-1: PDQm Profile - Actors and Transactions**

Actors	Transactions	Optionality	Reference
Patient Demographics Supplier	Mobile Patient Demographics Query	R	ITI TF-2b: 3.Y1
Patient Demographics Consumer	Mobile Patient Demographics Query	R	ITI TF-2b: 3.Y1

The transaction defined in this profile corresponds to one of the transactions used in the PDQ Profile (ITI TF-1: 8) and provides similar functionality. Table X1:1-2 describes this relationship. Note that there is no transaction which corresponds to the Patient Demographics and Visit Query.

380

**Table X1.1-2: PDQm Profile – Actors and Transactions**

Transaction in PDQ	Reference	Transaction in MPD	Reference
Patient Demographics Query (ITI-21)	ITI TF-2c: 3.21	Mobile Patient Demographics Query (ITI-Y1)	ITI TF-2b: 3.Y1

**X1.1.1 Patient Demographics Data Fields**

385 The PDQ, PDQ HL7v3 and PDQm Profiles provide mechanisms to obtain patient demographics data fields from a Patient Demographics Supplier Actor leveraging different underlying communications standards. Although the format of each demographic field is defined by the standards, there exists a common set of demographics meta-data capture in each of these profiles.

Table X1.1.1-1 outlines demographics fields which are captured by Patient Demographics Suppliers implementing the PDQm Profile.

390

**Table X1.1.1-1: Patient Demographics Data Elements**

Field	Reason for Inclusion
Identifier List	Provides one or more identifiers that can be used to uniquely identify the patient within a software system.
Name(s)	Identifies the patient’s preferred, legal, or alias names.
Date / Time of Birth	Identifies the date on which the patient was born.
Gender	Identifies the patient’s gender used for administrative purposes.
Address(es)	Identifies the patient’s places of residence (home, work, etc.)

Field	Reason for Inclusion
Telecommunications Address(es)	Identifies the patient’s phone number, fax number, email addresses and other means of telecommunicating with the patient.
Language(s) of communication	Identifies languages which can be used when communicating with the patient.
Marital Status	Identifies the patient’s marital status at time of last update (married, divorced, etc.)
Non-Medical Identifiers	Identifies additional identifiers associated with the patient which are not used for medical purposes (ex: driver’s license, social insurance number, etc.)
Death Date/Time	Identifies the time at which the patient died.

**X1.1.2 Patient Demographics Query Criteria**

395 The PDQ, PDQ HL7v3 and PDQm Profiles provide query transactions which allow a Patient Demographics Consumer to filter candidate patients using a series of demographics criteria. Table X1.1.2-1 outlines the demographics query criteria which are supported by Patient Demographics Suppliers implementing the PDQm Profile.

400

**Table X1.1.2-1: Patient Demographics Query Criteria**

Field	Reason for Inclusion	Value
Identifier List	Filters the result set to a list of patients whose identifiers match the provided identifiers.	Allows a Patient Demographics Consumer actor to retrieve demographics from a known identifier.
Name	Filters the result set to a list of patients whose name (legal, maiden, alias, etc.) matches the provided value. The mechanisms for match are not specified but can include: exact match, pattern match, phonetic match, variant match, etc.	Allows a Patient Demographics Consumer actor to “search by name”.
Date / Time of Birth	Filters the result set to patients whose date/time of birth match the provided value.	Allows for more positive matching
Gender	Filters the result set to patients whose administrative gender matches the provided value.	Allows for more positive matching
Address	Filters the result set to patients whose address (home, business, etc.) matches the provided value.	Allows for more positive matching
Domains to be Returned	Filters the result set to include only identifiers which have been assigned by the specified domains.	Restricts identifiers in the result set to those in which Patient Demographics Consumer is interested.

## X1.2 PDQm Actor Options

Options that may be selected for each actor in this profile, if any, are listed in Table X1.2-1. Dependencies between options when applicable are specified in notes.

405

**Table X.2-1: Patient Demographics Query for Mobile - Actors and Options**

Actor	Option Name	Reference
Patient Demographics Consumer	Continuation option Pediatric Demographics option	ITI TF-2c:3.Y1.4
Patient Demographics Supplier	Continuation option Pediatric Demographics option	ITI TF-2c:3.Y1.4

### X1.2.1 Continuation Option

The Continuation Option allows the Patient Demographics Consumer to get the full set of responses in several increments, as opposed to in one single response.

410

### X1.2.1 Pediatric Demographics

The experience of immunization registries and other public health population databases has shown that retrieving patient records for an individual person in environments with large proportions of pediatric records requires additional demographic data.

415

Information about the mother of the patient or a household telephone number is helpful in retrieving records in large population databases where data quality may be uneven.

Certain other demographics fields are important to include in the query response as they may be used by the Patient Demographics Consumer in verifying the identity of the patient; in particular, they aid in distinguishing records for twins, triplets, and so forth.

420

Pediatric Demographics makes use of the following six additional demographic fields to aid record matching in databases with many pediatric records.

Field	Reason for Inclusion	Value
Mother's Maiden Name	Any information about the mother is helpful in making a match	Helps create true positive matches
Patient Home Telephone	A telecom helps match into the right household	Helps create true positive matches
Patient Multiple Birth Indicator	Indicates this person is a multiple – twin, triplet, etc.	Helps avoid false positive matches of multiples
Patient Birth Order	Distinguishes among those multiples.	Helps avoid false positive matches of multiples



Field	Reason for Inclusion	Value
Last Update Date/Time, Last Update Facility	These fields, although not strictly demographic, can effectively substitute when multiple birth indicator and birth order are not collected. They indirectly provide visit information. Provider visits on the same day may likely indicate two children brought to a doctor together.	Helps avoid false positive matches of multiples

425 Patient Demographics Consumer Actors which support the Pediatric Demographics Option will be able to provide Pediatric Demographics query parameter fields in the Patient Demographics Query transaction [ITI-Y1], and shall be able to receive and process any values returned for the fields identified as Pediatric Demographics.

430 Patient Demographics Supplier Actors which support the Pediatrics Demographics Option will be able to match on values provided for any Pediatric Demographics fields in the Patient Demographics Query transaction [ITI-Y1] and shall return values, when available, for the fields identified as Pediatric Demographics.

Pediatric Demographics query parameter fields are:

- Mother’s Maiden Name
- Patient Home Telephone

Pediatric Demographics fields are defined as all of the following:

- 435
- Mother’s Maiden Name
  - Patient Home Telephone
  - Patient Multiple Birth Indicator
  - Patient Birth Order
  - Last Update Date/Time
- 440
- Last Update Facility

### X1.3 PDQm Required Actor Groupings

An actor from this profile (column 1) shall implement all of the required transactions and/or content modules in this profile *in addition to* all of the transactions required for the grouped actor (column 2).

445 Section X1.5 describes some optional groupings that may be of interest for security considerations and Section X1.6 describes some optional groupings in other related profiles.

**Table X1.3-1: Patient Demographics Query for Mobile - Required Actor Groupings**

PDQm Actor	Actor to be grouped with	Reference	Content Bindings Reference
Patient Demographics Supplier	None		
Patient Demographics Consumer	None		

450 **X1.4 PDQm Overview**

**X1.4.1 Concepts**

The PDQm Profile supports all of the use cases of PDQ while keeping the technology as lightweight as possible. Example uses include:

- 455 • Mobile devices used by physicians (for example: a mobile app for electronic patient charts) which need to establish patient context by scanning a bracelet,
- Web based EHR/EMR applications which wish to provide dynamic updates of patient demographic information such as a non-postback search, additional demographic detail, etc.
- 460 • A document source/consumer wishing to perform an MHD operation where patient ID in the appropriate patient ID domain needs to be resolved by the source/consumer,
- A health portal securely exposing demographics data to browser based plugins,
- Medical devices which need to access patient demographic information.

465 Each of these specific use cases is generalized into two general use cases. The first is one where a system must obtain patient demographics to populate a user interface via a known demographic field (such as bracelet ID) or search parameters provided by a user. The second is as a prerequisite step whereby an application must obtain an identifier from another patient ID domain in order to complete another workflow.

470 This profile is applicable for use by any application which requires access to patient demographics where lightweight REST/JSON or REST/XML is a more suitable technology than traditional PDQ or PDQv3 Profiles.

**X1.4.2 Use Cases**

**X1.4.2.1 Use Case #1: Patient Information Entering at Bedside**

In this use case an admitted patient is assigned a bed, and may not be able to provide positive ID information. The nurse uses the PDQm Profile to establish patient context.

475 **X1.4.2.1.1 Patient Information Entering at Bedside Use Case Description**

An admitted patient is assigned to a bed. The patient may or may not be able to provide positive ID information. The nurse needs to enter patient identity information into some bedside equipment to establish the relationship of the assigned bed to the patient. The equipment issues a query for a patient pick list to a patient demographics supplier that provides data for a patient pick list. Search criteria entered by the nurse might include one or more of the following:

- Partial or complete patient name (printed on the patient record or told by the patient)
- Patient ID (this may be obtained from printed barcode, a bed-side chart, etc.)
- Partial ID entry or scan.
- Date of birth / age range

485 The system returns a list of patients showing Patient ID, full name, age, sex and displays the list to the nurse. The nurse then selects the appropriate record to enter the patient identity information into the bedside equipment application.

**X1.4.2.2 Use Case #2: Patient Identity Information Entering in Physician Offices**

490 In this use case a patient visits a physician for the first time. The physician system will use the PDQm Profile to import demographics information into the local application.

**X1.4.2.2.1 Patient Identity Information Entering in Physician Offices Use Case Description**

495 A patient visits a physician office for the first time. The nurse needs to register the patient; in doing so, it is desired to record the patient's demographic data in the practice management information system (PMIS). The physician office is connected to a hospital enterprise's central patient registry. The nurse issues a patient query request to the central patient registry acting as a Patient Demographics Supplier, with some basic patient demographics data as search criteria. In the returned patient list, she picks an appropriate record for the patient, including the hospital's Patient ID, to enter into the PMIS. (Note the PMIS uses a different Patient ID domain than that of the central patient registry.)

**X1.4.2.3 Use Case #3: Patient Demographics Query in an Enterprise with Multiple Patient ID Domains**

In this use case a lab system obtains identities from multiple Patient ID domains for the purpose of reporting results.

505 **X1.4.2.3.1 Patient Demographics Query in an Enterprise with Multiple Patient ID Domains Use Case Description**

A lab technician enters some basic demographics data (e.g., patient name) into a lab application to query a patient demographics supplier to identify a patient for his lab exams. As the application also needs the patient identifier in another Patient ID Domain in the enterprise for

510 results delivery, the application is configured to query for Patient IDs from other domains in the query response.

### X1.4.3 Basic Process Flow in Patient Demographics Query for Mobile Profile

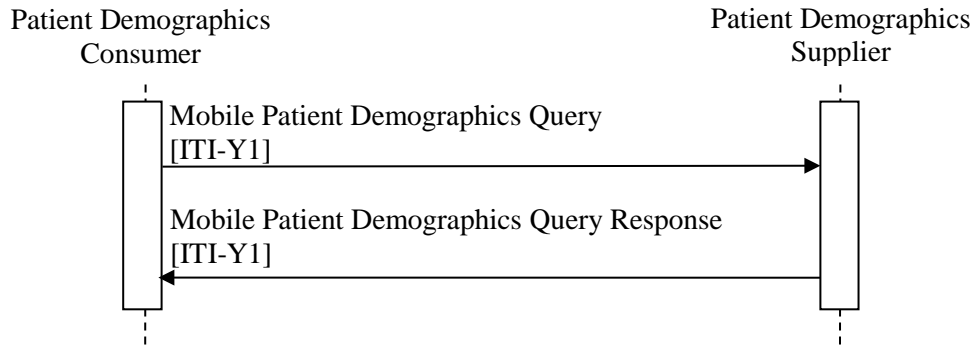


Figure X1.4.3-1: Basic Process Flow in PDQm Profile

## 515 X1.5 PDQm Security Considerations

The challenges of security and privacy controls within a mobile environment are unique, simply because the devices are harder to physically control. In other uses of the HTTP/REST pattern, applications are accessing far less sensitive information than patient demographics. The PDQm Profile provides access to the demographics managed in healthcare. These factors present a unique and difficult challenge for the security model. It is recommended that application developers utilize a Risk Assessment in the design of the applications, and that the operational environment utilize a Risk Assessment in the design and deployment of the operational environment.

520 There are many reasonable methods of security for interoperability transactions which can be implemented without modifying the characteristics of the PDQm Profile transactions. The use of TLS is encouraged, specifically the use of the ATNA Profile (see ITI TF-1:9).

User authentication on mobile devices is typically handled by more lightweight authentication schemes such as HTTP Authentication, OAuth, or OpenID Connect. IHE has a set of profiles for user authentication including: Enterprise User Authentication (EUA) on HTTP-based devices, with bridging to Cross-Enterprise User Assertion (XUA) for the backend, and Internet User Authentication (IUA) for REST-based authentication. In all of these cases, the network communication security, and user authentication are layered in the HTTP transport layer and do not modify the interoperability characteristics defined in the PDQm Profile.

530 The Security Audit logging (ATNA) Profile is recommended. Support for ATNA-based audit logging on mobile devices and lightweight browser applications may be beyond the ability of the constrained environment. This would mean that the operational environment must choose how to mitigate the risk of relying only on the service side audit logging.

540 The Resource URL pattern defined in this profile means many requests will include Patient ID and/or additional demographics parameters for query. The advantage of this pattern is ease of implementation and clear distinction of a patient’s identity. The URL pattern does present a risk when using typical web server audit logging of URL requests and browser history. In both of these cases the URL with the Patient ID and/or demographic query parameters is clearly visible. These risks need to be mitigated in system or operational design.

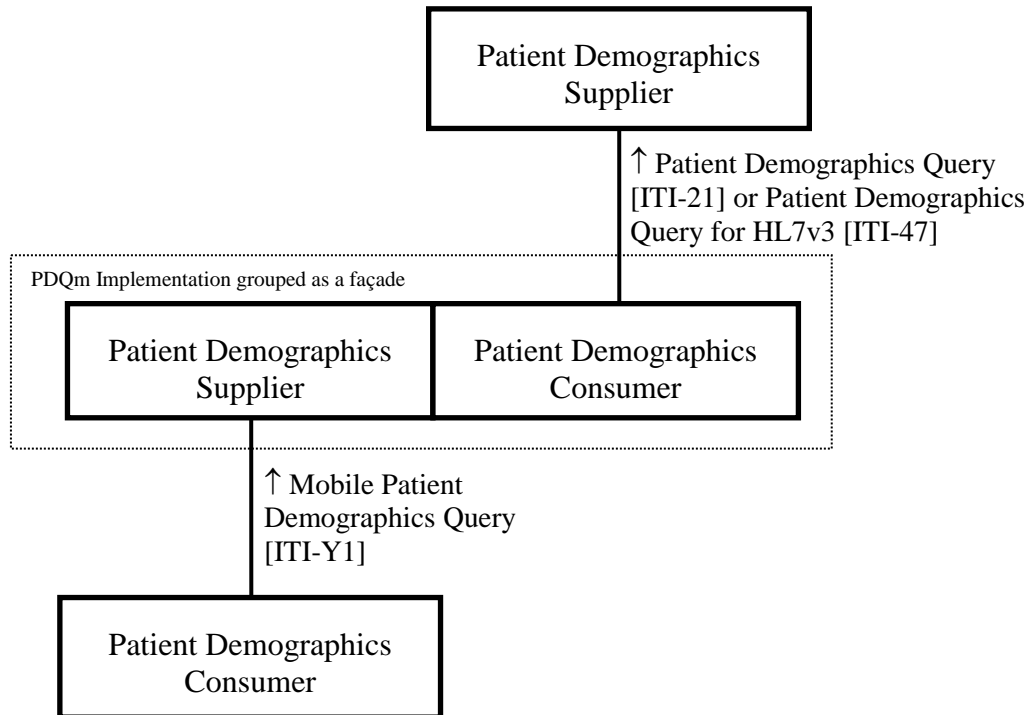
### X1.6 PDQm Cross Profile Considerations

545 When the Patient Demographics Supplier Actor is grouped with actors in other IHE profiles that perform patient information reconciliation activities (e.g., the ADT actor in the IHE Radiology PIR Profile), the Patient Demographics Supplier Actor may use the updated information to respond to PDQm Queries. In addition the Patient Demographics Query for Mobile Profile may play an integral workflow role in conjunction with other IHE profiles.

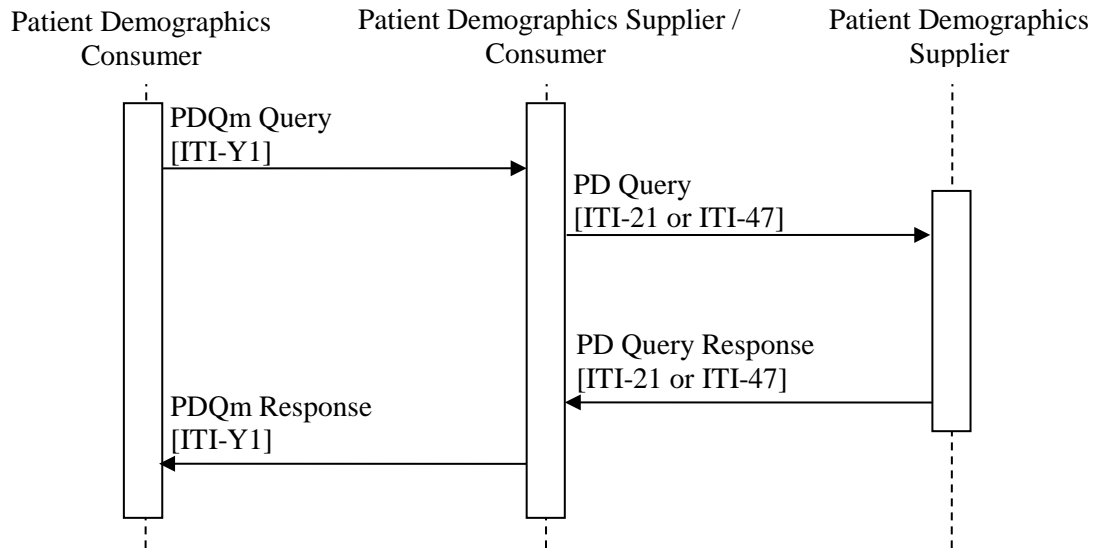
550 Those systems that manage patient demographics could implement the Patient Demographics Supplier Actor in all three profiles: PDQ, PDQv3, and PDQm. In this way the Patient Demographics Consumer can choose the technology stack that fits best.

The Patient Demographics Supplier Actor may act as a proxy to an existing PDQ or PDQv3 environment as shown in figures X1.6-1 and X1.6-2.

555



**Figure X1.6-1: Implementing PDQm as a gateway**



560

**Figure X1.6-2: Sample PDQm gateway process flow**

## Volume 2 – Transactions

Add Section 3.Y1

### 565 3.Y1 Mobile Patient Demographics Query [ITI-Y1]

This section corresponds to Transaction ITI-Y1 of the IHE IT Infrastructure Technical Framework. Transaction ITI-Y1 is used by the Patient Demographics Consumer and Patient Demographics Supplier Actors.

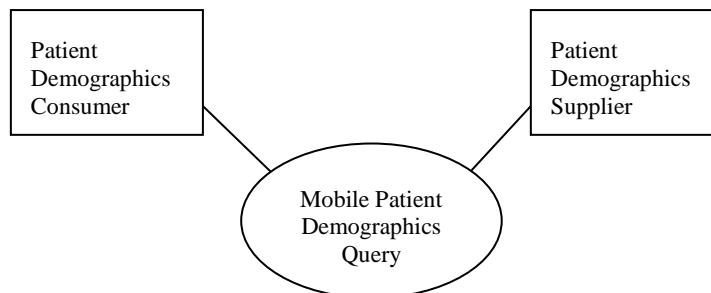
#### 3.Y1.1 Scope

570 This transaction is used by the Patient Demographics Consumer Actor to solicit information about patients whose demographics data match data provided in the query parameters on the request message. The request is received by the Patient Demographics Supplier Actor. The Patient Demographics Supplier Actor processes the request and returns a response in the form of demographics information for the matching patients.

575 This transaction is intended to be fully compliant with the HL7 FHIR specification, providing only use-case driven constraints to aid with interoperability, deterministic results, and compatibility with existing PDQ and PDQv3 Profiles.

580 Currently the HL7 FHIR standard is in “Draft Standard for Test Use” (DSTU) and may experience a large amount of change during this phase. Readers are advised that, while the profiled components in this transaction may not accurately reflect the most recent version of the FHIR standard, implementations of PDQm will be tested as specified in this supplement. Changes to the FHIR DSTU will be integrated into this supplement via the formal IHE Change Proposal (CP) process.

#### 3.Y1.2 Actor Roles



585

Figure 3.Y1.2-1: Use Case Diagram

Table 3.Y.2-1: Actor Roles

<b>Actor:</b>	Patient Demographics Consumer
---------------	-------------------------------

<b>Role:</b>	Requests a list of patients matching the supplied set of demographics criteria (example: ID or Name) from the Patient Demographics Supplier Actor. The Patient Demographics Consumer populates its attributes with demographic information received from the Patient Demographics Supplier actor.
<b>Actor:</b>	Patient Demographics Supplier
<b>Role:</b>	Returns demographic information for all patients matching the demographics criteria provided by the Patient Demographics Consumer.

590 **3.Y1.3 Referenced Standards**

*HL7: Fast Health Interoperability Resources (FHIR) DSTU v0.80*

- 1.12.5.1 – XML Representation
- 1.12.5.2 – JSON Representation
- 2.1 – RESTful API

595 **RFC 2616:** IETF Hypertext Transfer Protocol – HTTP/1.1

**RFC 4287:** The Atom Syndication Format

**RFC 4627:** The application/json Media Type for JavaScript Object Notation

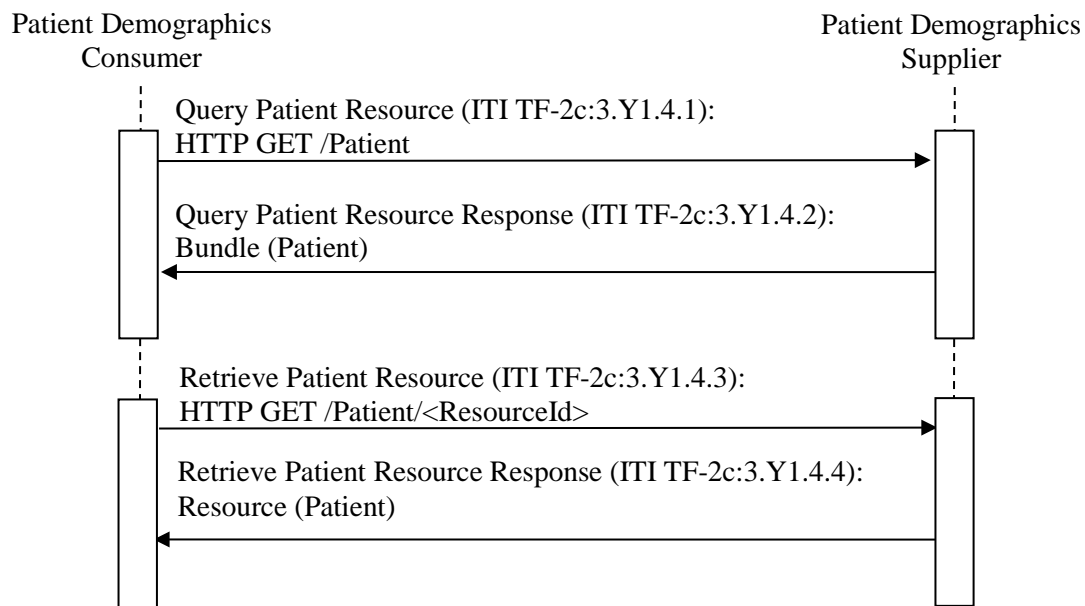
**RFC 5005:** Feed Paging and Archiving

**RFC 3968:** Uniform Resource Identifier (URI) Generic Syntax

600 **OpenSearch Relevance 1.0 Draft 1**



### 3.Y1.4 Interaction Diagram



#### 3.Y1.4.1 Query Patient Resource

This message represents an HTTP GET parameterized query from the Patient Demographics Consumer to the Patient Demographics Supplier.

##### 3.Y1.4.1.1 Trigger Events

When a Patient Demographics Consumer needs to select a patient based on demographic information about patients whose information matches a minimal set of known data, it issues a Query Patient Resource.

##### 3.Y1.4.1.2 Message Semantics

The Query Patient Resource is conducted by the Patient Demographics Consumer by executing an HTTP GET against the Patient Demographics Supplier's Patient Resource URL. The search target is formatted as:

***`http://<location>/<basePath>/Patient?<queryParameters>`***

The <authority> of the URL is configurable by the Patient Demographics Supplier and is subject to the following constraints.

- The <location> shall be represented as a host (either DNS name or IP address) followed optionally by a port.
- The Patient Demographics Supplier's implementation of PDQm may use the <basePath> to segregate the PDQm Profile implementation from other REST based services.

- The <basePath>, if present, represents the path from which all resources related to a PDQm implementation are located (Conformance, Profile and Patient resources) and shall not contain a ‘?’.
- The <queryParameters> represents a series of encoded name-value pairs representing the filter for the query specified in ITI TF-2c: 3.Y1.4.1.2.1.

625

More specifically, using the definitions from RFC 3986, <location> shall match the production for authority, <basePath> shall match the production for path from the figure below:

630

```

authority = host [ ":" port ]
host      = IP-literal / IPv4address / reg-name
IP-literal = "[" ( IPv6address / IPvFuture  ) "]"
IPvFuture  = "v" 1*HEXDIG "." 1*( unreserved / sub-delims / ":" )
IPv6address =
    / [ h16 ":" ] ls32
    / [ h16 ":" h16 ] ":" 4( h16 ":" ) ls32
    / [ *1( h16 ":" ) h16 ] ":" 3( h16 ":" ) ls32
    / [ *2( h16 ":" ) h16 ] ":" 2( h16 ":" ) ls32
    / [ *3( h16 ":" ) h16 ] ":"   h16 ":"   ls32
    / [ *4( h16 ":" ) h16 ] ":"           ls32
    / [ *5( h16 ":" ) h16 ] ":"           h16
    / [ *6( h16 ":" ) h16 ] ":"
ls32      = ( h16 ":" h16 ) / IPv4address
           ; least-significant 32 bits of address
h16       = 1*4HEXDIG
           ; 16 bits of address represented in hexadecimal
IPv4address = dec-octet "." dec-octet "." dec-octet "." dec-octet
dec-octet  = DIGIT
           ; 0-9
           / %x31-39 DIGIT ; 10-99
           / "1" 2DIGIT   ; 100-199
           / "2" %x30-34 DIGIT ; 200-249
           / "25" %x30-35   ; 250-255
reg-name   = *( unreserved / pct-encoded / sub-delims )
port       = *DIGIT
path       = path-abempty    ; begins with "/" or is empty
           / path-absolute  ; begins with "/" but not "/"
           / path-noscheme  ; begins with a non-colon segment
           / path-rootless  ; begins with a segment
           / path-empty     ; zero characters
path-abempty = *( "/" segment )
path-absolute = "/" [ segment-nz *( "/" segment ) ]
path-noscheme = segment-nz-nc *( "/" segment )
path-rootless = segment-nz *( "/" segment )
path-empty   = 0<pchar>
segment      = *pchar
segment-nz   = 1*pchar
segment-nz-nc = 1*( unreserved / pct-encoded / sub-delims / "@" )
              ; non-zero-length segment without any colon ":"
pchar        = unreserved / pct-encoded / sub-delims / ":" / "@"
query        = *( pchar / "/" / "?" )

```

655

660

665

670

The Patient Demographics Supplier shall respond to this query by sending a bundle of matching Patient resources to the Patient Demographics Consumer.

A Patient Demographics Supplier shall support at least one patient identifier domain and may support multiple identifier domains. ITI TF-2c: 3.Y1.4.1.2.3 describes how the Patient Demographics Consumer may filter results based on identifiers from one or more patient

675

identifier domains. Query responses may return patient identifiers from 1 or multiple patient identifier domains.

### 3.Y1.4.1.2.1 Query Search Parameters

680 The Patient Demographics Consumer may supply and the Patient Demographics Supplier shall be capable of processing all query parameters listed below. All query parameter values shall be appropriately encoded per RFC 3986 “percent” encoding rules.

Patient Demographics Supplier Actors may choose to support additional query parameters than the subset listed below. Such parameters are considered out of scope for this transaction.

#### \_id Search Parameter

685 This parameter of type `token`, when supplied, represents the resource identifier for the Patient Resource being queried.

#### **identifier Search Parameter**

690 This repeating parameter of type `token`, when supplied, specifies an identifier associated with the patient whose information is being queried (e.g., a local identifier, account identifier, etc.). If multiple instances of this parameter are provided in the query, all of the associated identifiers must match. The identifier specified in this parameter is expressed using the `token` search parameter type. Please see ITI TF-2x: Appendix *ZZZ.3* for use of the `token` data type for patient identifiers.

#### **family and given Search Parameters**

695 These parameters of type `string`, when supplied, specify the name of the person whose information is being queried. For this parameter the Patient Demographics Consumer may use either family name, given name or a combination of both names to filter by family, given or family and given names respectively.

700 Matching on these parameters is performed on a single name. Repetitions of each of the `family` or `given` parameters are interpreted to mean multiple parts of the same name. For example, a query for John Jacob Jingleheimer Schmidt would be represented as:

**?family=Jingleheimer&family=Schmidt&given=John&given=Jacob**

#### **birthdate Search Parameter**

705 This parameter of type `date`, when supplied, specifies the birth date and time of the person whose information is being queried. This parameter can convey an exact moment (e.g., January 1, 1960 @ 03:00:00 EST), or an approximate date (e.g., January 1960).

The mechanism for date matching performed by the Patient Demographics Supplier is specified in ITI TF-2c:3.Y1.4.1.3.2.1.

### **address Search Parameter**

- 710 This parameter of type *string*, when supplied, specifies one or more address parts associated with the person whose information is being queried. As with any parameter of type *string* the filter is case-insensitive and may represent a partial match.

### **gender Search Parameter**

- 715 This parameter of type *token*, when supplied, specifies the administrative gender of the person whose information is being queried. For this parameter item, a single administrative gender code from value set <http://hl7.org/fhir/vs/administrative-gender> shall be specified as the only value of the token. This value set represents the current binding for the Patient Resource on the FHIR DSTU, and is marked as incomplete. This value set may be extended in future releases of FHIR.

### **3.Y1.4.1.2.2 Pediatrics Demographics Query Search Parameters**

- 720 Patient Demographics Suppliers and Patient Demographics Consumers supporting the Pediatric Demographic option shall support all query parameters listed.

### **contact.given / contact.family Search Parameter**

- 725 These parameters of type *string*, when supplied, specify the name of a contact person with whom the patient is associated. The semantics of these parameters are identical to those listed in ITI TF-2c: 3.Y1.4.1.2.1.

### **telecom Search Parameter**

This parameter of type *string*, when supplied, specifies the telecommunications address for the person whose information is being queried. The telecom value shall match the telecommunications address' value irrespective of its intended use.

- 730 **multipleBirthInteger Search Parameter**

This parameter of type *integer*, when supplied, filters results on the order of birth if the birth was part of a multiple.

### **3.Y1.4.1.2.3 Parameter Modifiers**

- 735 Patient Demographics Suppliers shall support the “:exact” parameter modifier on all query parameters of type *string*. When supplied by the Patient Demographics Consumer, the “:exact” parameter modifier instructs the Patient Demographics Supplier that exact matching should be performed.

- 740 The Patient Demographics Consumer should not use and Patient Demographics Supplier may ignore any additional parameter modifiers listed in the FHIR standard, which are considered out of scope in the context of PDQm.

### **3.Y1.4.1.2.4 Populating Which Domains are Returned**

The Patient Demographics Consumer may constrain the domains from which patient identifiers are returned from Patient Demographics Supplier in the resulting bundle. The Patient

Demographics Consumer shall convey this by specifying the patient identity domains in the namespace component of repeating *identifier* parameters using this format:

**&identifier=<patient ID domain>|**

For example, a Patient Demographics Consumer wishing to filter for patients with a last name of SMITH having identifiers from an identity domain with OID 1.2.3.4.5 would convey this search as:

?family=SMITH&identifier=urn:oid:1.2.3.4.5|

The Patient Demographics Supplier shall populate the patient identity domain portion of the token with values described in ITI TF-2x: Appendix E.1.

### 3.Y1.4.1.2.5 Populating Expected Response Format

The FHIR standard provides encodings for responses as either XML or JSON. Patient Demographics Supplier Actors shall support both message encodings, whilst Patient Demographics Consumer Actors must support one and may optionally support both.

The Patient Demographics Consumer Actor shall indicate the desired response format via the *\_format* query parameter.

Patient Demographics Consumers shall provide a *\_format* parameter carrying at least one of the values indicated in Table 3.Y1.4.1.2.5-1. Multiple values in the *\_format* parameter indicate the Patient Demographics Consumer is capable of processing responses in either response encoding.

**Table 3.Y1.4.1.2.5-1: Desired response encoding**

Response Encoding	<i>_format</i> Value
JSON	<i>_format=json</i> <i>or</i> <i>_format=application/json+fhir</i>
XML	<i>_format=xml</i> <i>or</i> <i>_format=application/xml+fhir</i>

### 3.Y1.4.1.3 Expected Actions

#### 3.Y1.4.1.3.1 Query Patient Resource Response

The Patient Demographics Supplier shall return demographic records that reflect the best match to all of the search criteria provided by the Patient Demographics Consumer. The Patient Demographics Supplier shall respond to a Query Patient Resource Response on the same HTTP session as was used to initiate the request.

The response message encoding will differ based on the `_format` query parameter used in the request, however both XML and JSON encoding utilize the FHIR Resource Bundle as specified in ITI TF-2x: Appendix ZZZ.1.

**3.Y1.4.1.3.2 Query Parameter Processing**

775 The Patient Demographics supplier shall be capable of accepting, searching on and responding with attributes in the Query Patient Resource request as specified in ITI TF-2c: 3.Y1.4.1.2.1.

The handling of phonetic issues, alternate spellings, upper and lower case, partial matching and accented characters, etc. if deemed appropriate shall be supported by the Patient Demographics Supplier rather than by the Patient Demographics Consumer. At minimum, the Patient

780 Demographics Supplier shall return all exact matches to the query parameters sent by the Consumer; IHE does not further specify matching requirements. If the Patient Demographics Supplier is unable to perform, case insensitive, partial matches, it shall indicate this in its Conformance Resource (see ITI TF-2x: Appendix ZZZ.4).

**3.Y1.4.1.3.2.1 Date Parameter Processing**

785 To maintain compatibility with PDQ and PDQ HL7v3 suppliers, the Patient Demographics Suppliers are not required to support the date parameter operators specified in chapter 2.2.2.3 of HL7 FHIR.

For approximate matches, the Patient Demographics Supplier shall use the interval mechanism described in HL7 FHIR, and return persons whose date of birth lies within the range specified by

790 the parameter. Table 3.Y1.4.1.3.2.1-1 provides examples of this interval mechanism.

**Table 3.Y1.4.1.3.2.1-1: PDQm Profile – Approximate date matching**

birthdate Parameter	Filter Applied
1960	Born anytime in 1960
1960-01	Born during the month of January 1960
1960-01-01	Born at any time on January 1, 1960
1960-01-01T03:00:00	Born at exactly 3:00 AM on January 1, 1960

**3.Y1.4.1.3.3 Incremental Response Processing**

795 A Patient Demographics Supplier supporting the Continuation Option shall accept two additional query parameters controlling the number of patients returned in the result set and shall implement the paging mechanism as described in ITI TF-2x: Appendix ZZZ.1.2.

The paging mechanism utilized by this transaction may be stateless; therefore, Patient Demographics Consumers are advised that results may change reflecting more recent matches

800 between paging requests.

**count Parameter**

805 The `count` parameter controls the number of results which should be contained in the resulting bundle. If the supplier enforces a default count of results it shall make this known to the consumer by appending the default count to the actual query parameters used (see ITI TF-2c: 3.Y1.4.2.2.4).

**page Parameter**

The `page` parameter represents a number which controls the current page number within the complete result set which should be returned. The base of this number is to be determined by the Patient Demographics Supplier Actor.

810 **3.Y1.4.2 Query Patient Resource Response**

The Patient Demographics Supplier’s response to the Query Patient Resource Operation shall be an HTTP status code of 200 and a FHIR bundle containing Patient resources if successful, or an appropriate HTTP error code as defined below with an `OperationOutcome` Resource describing the cause of the error.

815 **3.Y1.4.2.1 Trigger Events**

The Patient Demographics Supplier found patient demographics matching the query parameters specified by the Patient Demographics Consumer as a result of an ITI-Y1 transaction.

**3.Y1.4.2.2 Message Semantics**

820 The Query Patient Resource response is sent from the Patient Demographics Supplier Actor to the Patient Demographics Consumer Actor as a bundle of Patient resources.

The components of the Patient Resource with cardinality greater than 0 (as shown below) are required, and the detailed description of the message is provided here. All other attributes of the response are optional.

825 The “content-type” of the response will depend upon the requested response format indicated by the Patient Demographics Consumer Actor via the `_format` parameter.

Table 3.Y1.4.2.2-1 outlines the format of a response based on the values specified in the format parameter.

**Table 3.Y1.4.2.2-1: Response message format**

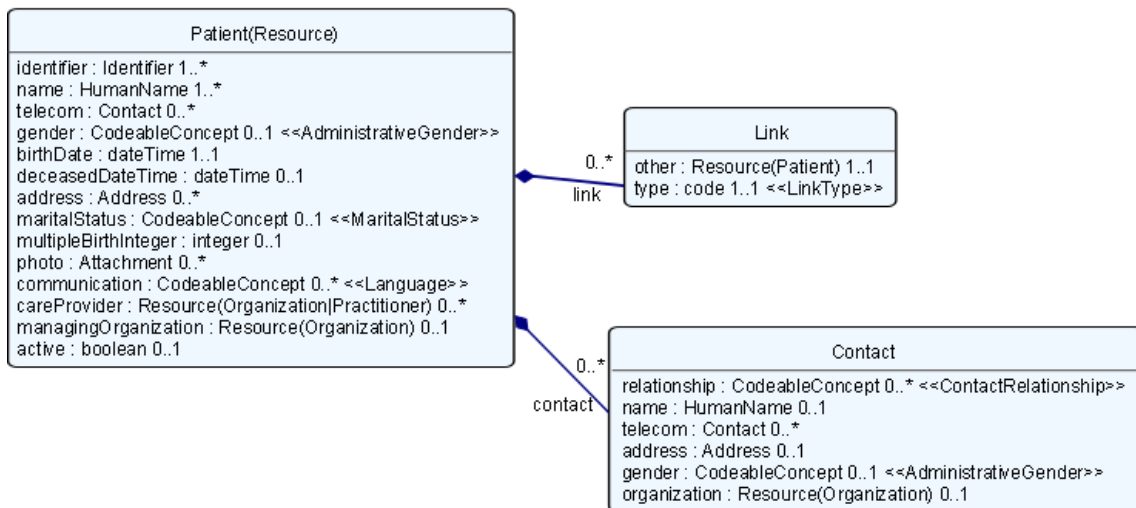
<b>_format Parameter</b>	<b>Content Type</b>	<b>Bundle Format</b>
json <i>or</i> application/json+fhir	application/json+fhir; charset=UTF-8	FHIR JSON Bundle
xml <i>or</i> application/xml+fhir	application/atom+xml; charset=UTF-8	ATOM Feed (RFC 4287)

830 Response messages shall use a character encoding of UTF-8. Both XML and JSON encodings of the response shall adhere to the FHIR bundle constraints profiled in ITI TF-2x: Appendix ZZZ.1.

835 If the Patient Demographics Supplier is unable to produce a response in any of the requested formats, it shall respond with an HTTP 400 error indicating that it was unable to fulfill the request. The Patient Demographics Supplier may be capable of servicing requests for response formats not listed, but shall, at minimum, be capable of producing XML and JSON encodings. If the Patient Demographics Consumer provided multiple values in the `_format` parameter, the Patient Demographics Supplier may choose any of the response formats for the encoding of the response message.

840 **3.Y1.4.2.2.1 Patient Resource Definition in the Context of Query Patient Resource Response**

Below is the definition for the Patient Resource contained within the Query Patient Resource response message. The purpose of the definition is to describe the data elements relevant for this transaction. It is a restriction of the Patient Resource found in chapter 5.1.2 of the FHIR standard. For the complete FHIR definition of this Resource please see ITI TF-2x: Appendix W.



845 **Figure 3.Y1.4.2.2-1: Patient Resource definition**

The attributes of this definition are described in the following table.

850 **Table 3.Y1.4.2.2.1-1: Patient Resource attributes**

Resource Definition	Description
Patient	The primary record for a matching patient result in a Patient Demographics Supplier.



Resource Definition	Description
identifier [1..*] Identifier	An identifier that applies to this person as a patient. Identifiers from different Identity Domains shall be represented here. At least one patient identifier shall be present in this attribute. See ITI TF-2x: Appendix E.1 for details on populating the Identifier type.  <b>Note:</b> This has a different cardinality than FHIR
name [1..*] HumanName	The name(s) associated with the individual. At least one name shall be represented here.  <b>Note:</b> This has a different cardinality than FHIR
telecom [0..*] Contact	A contact detail (e.g., a telephone number or email address) by which the individual may be contacted.
gender [0..1] CodeableConcept {http://hl7.org/fhir/vs/administrative-gender}	A value representing the gender (sex) of this person. Note: this attribute should not include terms related to clinical gender, rather this is the administrative gender of the patient.
birthdate [0..1] dateTime	The date / time when the patient was born.
deceasedDate [0..1] dateTime	Indicates the date that the patient died.
address [0..*] Address	Address(es) for the individual.
maritalStatus [0..1] CodeableConcept {http://hl7.org/fhir/vs/marital-status}	This field contains a patient’s most recent marital status (civil).
multipleBirthInteger [0..1] integer	Indicates the birth order when the patient is born as part of a multiple birth (e.g., twins).
photo [0..*] Attachment	Contains an image of the patient.
communication [0..*] CodeableConcept	Languages which may be used to communicate with the patient about their health.
careProvider [0..*] Resource(Organization Practitioner)	Patient’s nominated care provider.
managingOrganization [0..1] Resource(Organization)	Organization that is the custodian of the patient record.
active [0..1] boolean	Indicates whether the patient record is currently in active use.
<b>Link</b>	Links this patient record to another patient record. This may be used for conveying merged patient records.
other [1..1] Resource(Patient)	The other patient resource that the link refers to.
type [1..1] code {http://hl7.org/fhir/link-type}	Indicates the type of link between the patient resources.
<b>Contact</b>	A contact party (e.g., parent, spouse, friend) for the patient. Suppliers implementing the Pediatrics option shall support this relationship.

Resource Definition	Description
relationship [0..*] CodeableConcept {http://hl7.org/fhir/vs/patient-contact-relationship}	Indicates the nature(s) of the relationship between the patient and the contact person.
name [0..1] HumanName	A name associated with this person.
telecom [0..*] Contact	Contact detail(s) for the person (e.g., telephone number or email address).
address [0..1] Address	Address for the contact person.
gender [0..1] CodeableConcept {http://hl7.org/fhir/vs/administrative-gender}	Gender of the contact person.

Note: These constraints represent a minimum set of functionality; the PDQm Profile does not prevent the Patient Demographics Supplier from sending additional FHIR attribute such as extensions, text, etc. The Patient Demographics Consumer shall ignore additional attributes if not understood. The “animal” relationship for the Patient Resource is not profiled in the PDQm Profile.

855 **3.Y1.4.2.2.2 Resource Bundling**

Please see ITI TF-2x: Appendix ZZZ.1 for details on the IHE guidelines for implementing FHIR bundles.

**3.Y1.4.2.2.3 Quality of Match**

860 The Patient Demographics Supplier Actor may convey the quality of each match based on strength of the particular result to the supplied query parameters. The mechanism for determining the confidence of match is considered a product specific feature, and is not specified in this technical framework.

865 If the Patient Demographics Supplier Actor wishes to convey the quality of match, it shall represent the confidence of a particular match within the bundle as a `score` attribute carrying a decimal number between 0 and 1, inclusive having no more than 9 significant digits. The score attribute shall be contained in the entry attribute of the bundle.

In JSON this is carried via “score”:

```

870 "entry" : [{
      "title" : "Smith, John",
      "link" : [{
        "rel" : "self",
        "href" : "http://example.com/pdqm/patient/1/_history/1"
      }],
875 "id" : "http://example.com/pdqm/patient/1",
      "score" : 0.8
      ...
    }
  ]
  
```

In the XML format bundles, score is represented as an OpenSearch element in the namespace “http://a9.com/-/opensearch/extensions/relevance/1.0/”, for example:

```

880 <entry>
      <title>Smith, John</title>
      <link rel="self" href="http://example.com/pdqm/patient/1/_history/1"/>
      <id>http://example.com/pdqm/patient/1</id>
885 <os:score xmlns:os="http://a9.com/-/opensearch/extensions/relevance/1.0">0.8</os:score>
    </entry>

```

### 3.Y1.4.2.3 Expected Actions

The Patient Demographics Supplier shall perform the matching of patient data based on the query parameter values it receives. The information provided by the Patient Demographics Supplier Actor to the Patient Demographics Consumer Actors is a list of possible matching patients from the supplier's information source.

If the Patient Demographics Consumer supplied a query parameter, or used a query parameter modifier which the Patient Demographics Supplier is not capable of utilizing, then the Patient Demographics Supplier shall respond with an HTTP 400 status code and an OperationOutcome resource indicating the parameters in error.

If domains are specified per ITI TF-2c:3.Y1.4.1.2.3 and are configured on the Patient Demographics Supplier, the response will also, for each patient, contain any Patient Identifier values found only in the specified domains.

The mechanics of the matching algorithms used are internal to the Patient Demographics Supplier actor and are outside the scope of this framework.

The Patient Demographics Supplier Actor shall respond to the query request as described by the following cases:

**Case 1:** The Patient Demographics Supplier finds in its information source, at least one patient record matching the criteria sent as HTTP query parameters. No patient identifier domains are requested via the mechanism specified as ITI TF-2c:3.Y1.4.1.2.3

**HTTP 200 (OK)** is returned as the HTTP status code.

A Resource Bundle is returned representing the result set. The supplier populates the `totalResults` property of the bundle with the total number of matching results. One `entry` is returned from the Patient Demographics Supplier actor for each patient record found. If the Patient Demographics Supplier actor returns data for multiple patients, it shall return these data in successive entries in the bundle.

If no patients matched the provided query parameters the response bundle will contain no entries and `totalResults` will be valued 0.

Within each entry, a link shall be provided which may be used by the consumer to perform the Retrieve Patient Resource operation. Each entry shall contain content with one Patient Resource. If the Patient Resource's `identifier` property contains one or more identifiers from the Patient ID Domains known by the Patient Demographics Supplier, then these shall be represented within one Patient Resource entry.

If an incremental number of records were specified via the `count` query parameter, and the number of records to be sent exceeds that count, the Supplier returns only the incremental

920 number of records. If the Supplier supports the Continuation Option, it will correctly append links in the bundle which will allow the Consumer to retrieve the next, and previous (if applicable) set of results.

If the Supplier does not support the Continuation Option, in addition to returning only up to the incremental number of records request, it shall not include the next/previous navigation links.

925 The consumer may subsequently send another query with count and page number parameters to the Supplier to request another window of results. If the supplier does not support the Continuation Option it shall respond with 400 as the HTTP status code and an OperationOutcome Resource indicating continuation is not supported.

930 **Case 2:** The Patient Demographics Supplier finds at least one patient record matching the criteria sent in the query parameters. One or more patient identifier domains are requested via the mechanism specified as ITI TF-2c:3.Y1.4.1.2.3.

**HTTP 200** (Ok) is returned as the HTTP status code.

A JSON bundle is returned representing the result set. The Patient Demographics Supplier populates the `totalResults` property of the bundle with the total number of matching results.

935 One `entry` is returned from the Patient Demographics Supplier actor for each patient record found. If the Patient Demographics Supplier actor returns data for multiple patients, it shall return these data in successive entries in the bundle.

Within each entry, a link shall be provided which may be used by the consumer to perform the Retrieve Patient Resource operation. Each entry shall contain content with one Patient Resource.

940 If an identifier does not exist for a domain that was specified per ITI TF-2c:3.Y1.4.1.2.3 (domains to be returned) in the query parameter list, that identifier is not included in the result. If all entries in the list of patient identifiers are eliminated, which would leave the patient identifiers empty, then the entry shall not be present in the bundle at all.

945 If an incremental number of records are specified via the `count` query parameter, and the number of records to be sent exceeds that count, the Supplier returns only the incremental number of records. If the Patient Demographics Supplier supports the Continuation Option, it will correctly append links in the bundle which will allow the Consumer to retrieve the next (and previous, if applicable) set of results.

950 If the Patient Demographics Supplier does not support the Continuation Option, in addition to returning only up to the incremental number of records request, it shall not include the next/previous navigation links.

955 The Patient Demographics Consumer may subsequently send another query with count and page number parameters to the Supplier to request another window of results. If the Patient Demographics Supplier does not support the Continuation Option it shall respond with 400 as the HTTP status code and an OperationOutcome Resource indicating continuation is not supported.

**Case 3:** The Patient Demographics Supplier actor does not recognize one or more of the domains filtered as specified in ITI TF-2c:3.Y1.4.1.2.3.

**HTTP 500** (Internal Server Error) is returned as the HTTP status code.

960 An OperationOutcome Resource is returned indicating that the patient identity domain is not recognized in an issue having:

Attribute	Value
severity	Error
type	{http://hl7.org/fhir/vs/issue-type}value

965 The OperationOutcome Resource shall indicate the query parameter used and the domain in error within the details attribute. For example: A search for “?identifier=urn:oid:1.2.3.4.5.6]” would yield:

```

970 {
    ...
    "issue": [
      {
        "severity": "error",
        "type": {
          "system": "http://hl7.org/fhir/vs/issue-type",
          "code": "value",
          "display": "Invalid Value"
        },
        "details": [
          "urn:oid:1.2.3.4.5.6 is not a recognized identity domain"
        ]
      }
    ]
  }
  ]
}
    
```

Or, encoded as XML:

```

985 <OperationOutcome>
    <issue>
      <severity value="error"/>
      <type>
990        <system value="http://hl7.org/fhir/vs/issue-type"/>
        <code value="value"/>
        <display value="Invalid Value"/>
      </type>
      <details value="urn:oid:1.2.3.4.5.6 is not a recognized identity domain"/>
    </issue>
995 </OperationOutcome>
    
```

The Patient Demographics Supplier may return other HTTP status codes to represent specific error conditions. When HTTP error status codes are returned by the Patient Demographics Supplier, they shall conform to the HTTP standard RFC 2616. Their use is not further constrained or specified by this transaction.

1000 **3.Y1.4.2.4 Profile Resource**

Patient Demographics Supplier actors implementing the PDQm Profile shall provide a Profile Resource describing the implementation at:

*http://<location>/<basePath>/Profile/pdqm*

1005 <location> and <basePath> are specified in ITI TF-2c:3.Y1.4.1.2. Patient Demographics Consumer actors may consult this Resource to determine if a remote host is a Patient Demographics Supplier implementing the PDQm Profile, and any options implemented by the server.

An example of a Profile Resource for ITI-Y1 is located in ITI TF-2x: Appendix W.

### **3.Y1.4.2.5 Conformance Resource**

1010 Patient Demographics Supplier actors implementing the PDQm Profile shall provide a service conformance statement accessible via an HTTP GET operation on:

*http://<location>/<basePath>/Conformance*

or an HTTP OPTIONS operation against:

*http://<location>/<basePath>/*

1015 ITI TF-2x: Appendix ZZZ.4 for an example of a Conformance Resource.

### **3.Y1.4.3 Retrieve Patient Resource**

This message represents an HTTP GET from the Patient Demographics Consumer to the Patient Demographics Supplier and provides a mechanism for retrieving a single Patient Resource with a known resource identifier.

#### **3.Y1.4.3.1 Trigger Events**

1020 When the Patient Demographics Consumer obtains a resource identifier for a patient for which it requires additional information.

#### **3.Y1.4.3.2 Message Semantics**

1025 The Retrieve Patient Resource is conducted by executing an HTTP GET against the Patient Demographics supplier's Patient Resource URL, providing the resource id of the patient being retrieved. The target is formatted as:

*http://<location>/<basePath>/Patient/<resourceId>?\_format=[json/xml]*

The Patient Demographics Supplier shall respond to this query by sending a single Patient Resource instance. The specification for <location> is identified in ITI TF-2c:3.Y1.4.1.2.

1030 The resource identifier included in the request always represents the unique identifier for the Resource within the scope of the url. For example, while <http://example1.org/ihe/Patient/1> <http://example2.com/ihe/Patient/1> both contain the same “resource id” they reference two different resource instances.

The values permitted for the `_format` parameter are identified in ITI TF-2c: 3.Y1.4.1.2.4.

1035 **3.Y1.4.3.3 Expected Actions**

**3.Y1.4.3.3.1 Response**

The Patient Demographics Supplier Actor shall respond to the Patient Demographics Consumer Actor with the Retrieve Patient Resource Response as specified in ITI TF-2c: 3.Y1.4.4.

**3.Y1.4.4 Retrieve Patient Resource Response**

1040 The Patient Demographics Supplier’s response to a successful Retrieve Patient Resource message shall be an HTTP Status code 200 with a FHIR Patient Resource, or an appropriate error code as defined below.

**3.Y1.4.4.1 Trigger Events**

1045 The Patient Demographics Supplier found patient demographic record matching the Resource identifier specified by the Patient Demographics Consumer.

**3.Y1.4.4.2 Message Semantics**

The Retrieve Patient Resource response is sent from the Patient Demographics Supplier Actor to the Patient Demographics Consumer Actor as a single Patient Resource encoded per Table 3.Y1.4.4.2-1.

1050

**Table 3.Y1.4.4.2-1: Response message format**

<b>_format Parameter</b>	<b>Content Type</b>	<b>Resource Format</b>
json <i>or</i> application/json+fhir	application/json+fhir	JSON (per FHIR 1.12.5.2)
xml <i>or</i> application/xml+fhir	application/xml+fhir	XML (per FHIR 1.12.5.1)

The Patient Demographics Supplier shall use a character encoding of UTF-8.

1055 If the Patient Demographics Supplier is unable to produce a response in the requested format, it shall respond with an HTTP 400 error indicating that it was unable to fulfill the request. The Patient Demographics Supplier may be capable of servicing requests for response formats not listed, but shall, at minimum, be capable of producing XML and JSON encodings. If the Patient Demographics Consumer provided multiple values in the `_format` parameter, the Patient Demographics Supplier may choose any of the response formats for the encoding of the response message.

1060

**3.Y1.4.4.2.1 Patient Resource Definition in the Context of Retrieve Patient Resource Response**

The Patient Resource definition in the context of a retrieve operation is identical to the constraints placed on the Patient Resource for a search (see ITI TF-2c: 3.Y1.4.2.2.1)

1065 For the complete FHIR definition of this Resource please see ITI TF-2x: Appendix W.

**3.Y1.4.4.3 Expected Actions**

The Patient Demographics Supplier Actor shall retrieve the demographic record indicated by the Resource identifier on the GET query. The Patient Demographics Supplier actor shall respond to the query request as described by the following cases:

1070 **Case 1:** The Patient Demographics Supplier finds in its information source, at the specified patient demographics record matching the Resource identifier sent in the HTTP request.

**HTTP 200** (OK) is returned as the HTTP status code.

A Patient Resource is returned representing the result.

1075 **Case 2:** The Patient Demographics Supplier fails to find the specified patient demographics record matching the resource identifier sent in the HTTP request in its information source.

**HTTP 404** (Not Found) is returned as the HTTP status code

An OperationOutcome Resource is returned indicating that the Patient Resource could not be found:

Attribute	Value
severity	error
type	{http://hl7.org/fhir/vs/issue-type}not-found

1080

The OperationOutcome should indicate the resource id used by the Patient Demographics Consumer which could not be located. For example: A not-found for <http://example.com/pdqm/Patient/2> would yield:



```

1085 {
    ...
    "issue": [
1090     {
        "severity": "error",
        "type": {
            "system": "http://hl7.org/fhir/vs/issue-type",
            "code": "not-found",
            "display": "Not Found"
1095         },
        "details": [
            "Patient resource '2' not found"
        ]
    }
  ]
}

```

1100 If the Patient Demographics Supplier is capable of determining if a record was deleted, or did exist and is no longer available, it shall produce an HTTP 410 (Gone) error in lieu of the generic 404 error.

The Patient Demographics Supplier may return other HTTP status codes to represent specific error conditions. When HTTP error status codes are returned by the Patient Demographics  
 1105 Supplier, they shall conform to the HTTP standard RFC 2616. Their use is not further constrained or specified by this transaction.

**3.Y1.5 Security Considerations**

See the general Security Consideration in ITI TF-1:X1.5

**3.Y1.5.1 Security Audit Considerations**

1110 The Security audit criteria are similar to those for the Patient Demographics Query [ITI-21] as this transaction discloses the same type of demographic information. Grouping the Patient Demographics Consumer Actor with an ATNA Secure Node or Secure Application is recommended but not required.

1115 Additionally, it is recommended that Patient Demographics Consumer and Patient Demographics Supplier Actors implement the Internet User Authentication (IUA) Profile, incorporating the subject of the IUA token in audits.

The Mobile Patient Demographics Query is a Query Information event as defined in Table 3.20.6-1 (see ITI TF-2a:3.20.6). The Patient Demographics Supplier shall record audit events according to the following:

1120 **3.Y1.5.1.1 Patient Demographics Consumer audit message:**

	Field Name	Opt	Value Constraints
<b>Event</b>	EventID	M	EV(110112, DCM, "Query")

# IHE ITI Technical Framework Supplement – Patient Demographic Query for Mobile (PDQm)

	EventActionCode	M	“E” (Execute)
	EventDateTime	M	not specialized
	EventOutcomeIndicator	M	not specialized
	EventTypeCode	M	EV(“ITI-Y1”, “IHE Transactions”, “Mobile Patient Demographics Query”)
<b>Source (Patient Demographics Consumer) (1)</b>			
<b>Human Requestor (0..n)</b>			
<b>Destination (Patient Demographics Suppler) (1)</b>			
Audit Source (Patient Demographics Consumer) (1)			
<b>Patient (0..n)</b>			
<b>Query Parameters(1)</b>			

Where:

<b>Source</b> AuditMessage/ ActiveParticipant	UserID	M	not specialized
	AlternativeUserID	M	The process ID as used within the local operating system logs.
	UserName	U	not specialized
	UserIsRequestor	U	not specialized
	RoleIDCode	M	EV(110153, DCM, “Source”)
	NetworkAccessPointTypeCode	M	“1” for machine (DNS) name, “2” for IP address
	NetworkAccessPointID	M	The machine name or IP address, as specified in RFC 3881.
<b>Human Requestor (if known)</b> AuditMessage/ ActiveParticipant	UserID	M	Identity of the human that initiated the transaction
	AlternativeUserID	U	The process ID as used within the local operating system logs.
	UserName	U	not specialized
	UserIsRequestor	M	“true”
	RoleIDCode	M	Access Control role(s) the user holds that allows this transaction
	NetworkAccessPointTypeCode	NA	
	NetworkAccessPointID	NA	

<b>Destination</b> AuditMessage/ ActiveParticipant	UserID	M	HTTP endpoint of the request excluding query string.
	AlternativeUserID	U	not specialized
	UserName	U	not specialized
	UserIsRequestor	M	“false”
	RoleIDCode	M	EV(110152, DCM, “Destination”)
	NetworkAccessPointTypeCode	M	“1” for machine (DNS) name, “2” for IP address, “5” for URI
	NetworkAccessPointID	M	The HTTP endpoint of the request, the machine name or IP address, as specified in RFC 3881.

<b>Audit Source</b> AuditMessage/ AuditSourceIdentification	AuditSourceID	U	not specialized.
	AuditEnterpriseSiteID	U	not specialized
	AuditSourceTypeCode	U	not specialized

<b>Query</b>	ParticipantObjectTypeCode	M	“2” (system object)
	ParticipantObjectTypeCodeRole	M	“24” (query)

<b>Parameters</b> (AuditMessage/ ParticipantObjectIdent entification)	ParticipantObjectDataLifeCycle	<i>U</i>	<i>not specialized</i>
	ParticipantObjectIDTypeCode	<b>M</b>	EV(“ITI-Y1”, “IHE Transactions”, “Mobile Patient Demographics Query”)
	ParticipantObjectSensitivity	<i>U</i>	<i>not specialized</i>
	ParticipantObjectID	<b>M</b>	“MobilePatientDemographicsQuery”
	ParticipantObjectName	<i>U</i>	<i>not specialized</i>
	ParticipantObjectQuery	<b>M</b>	Request query string
	ParticipantObjectDetail	<b>M</b>	HTTP Request Headers contained in the query

1125

### 3.Y1.5.1.2 Patient Demographics Supplier audit message:

	Field Name	Opt	Value Constraints
<b>Event</b> AuditMessage/ EventIdentification	EventID	<b>M</b>	EV(110112, DCM, “Query”)
	EventActionCode	<b>M</b>	“E” (Execute)
	<i>EventDateTime</i>	<i>M</i>	<i>not specialized</i>
	<i>EventOutcomeIndicator</i>	<i>M</i>	<i>not specialized</i>
	EventTypeCode	<b>M</b>	EV(“ITI-Y1”, “IHE Transactions”, “Mobile Patient Demographics Query”)
<b>Source (Patient Demographics Consumer) (1)</b>			
<b>Destination (Patient Demographics Supplier) (1)</b>			
<b>Audit Source (Patient Demographics Supplier) (1)</b>			
<b>Patient (0..n)</b>			
<b>Query Parameters(1)</b>			

Where:

<b>Source</b> AuditMessage/ ActiveParticipant	UserID	<i>M</i>	<i>not specialized</i>
	AlternativeUserID	<i>U</i>	<i>not specialized</i>
	<i>UserName</i>	<i>U</i>	<i>not specialized</i>
	UserIsRequestor	<b>M</b>	“true”
	RoleIDCode	<b>M</b>	EV(110153, DCM, “Source”)
	NetworkAccessPointTypeCode	<b>M</b>	“1” for machine (DNS) name, “2” for IP address
	NetworkAccessPointID	<b>M</b>	The machine name or IP address, as specified in RFC 3881.

<b>Destination</b> AuditMessage/ ActiveParticipant	UserID	<b>M</b>	HTTP endpoint of the request excluding query string.
	<i>AlternativeUserID</i>	<b>M</b>	The process ID as used within the local operating system in the local system logs.
	<i>UserName</i>	<i>U</i>	<i>not specialized</i>
	UserIsRequestor	<b>M</b>	“false”
	RoleIDCode	<b>M</b>	EV(110152, DCM, “Destination”)
	NetworkAccessPointTypeCode	<b>M</b>	“1” for machine (DNS) name, “2” for IP address, “5” for URI
	NetworkAccessPointID	<b>M</b>	The HTTP endpoint of the request, the machine name or IP address, as specified in RFC 3881.

<b>Audit Source</b> AuditMessage/ AuditSourceIdentification	<i>AuditSourceID</i>	<i>U</i>	<i>not specialized.</i>
	<i>AuditEnterpriseSiteID</i>	<i>U</i>	<i>not specialized</i>
	<i>AuditSourceTypeCode</i>	<i>U</i>	<i>not specialized</i>

1130

<b>Query Parameters</b> (AuditMessage/ ParticipantObjectIdentification)	ParticipantObjectTypeCode	M	“2” (system object)
	ParticipantObjectTypeCodeRole	M	“24” (query)
	ParticipantObjectDataLifeCycle	<i>U</i>	<i>not specialized</i>
	ParticipantObjectIDTypeCode	M	EV(“ITI-Y1”, “IHE Transactions”, “Mobile Patient Demographics Query”)
	ParticipantObjectSensitivity	<i>U</i>	<i>not specialized</i>
	ParticipantObjectID	M	“MobilePatientDemographicsQuery”
	ParticipantObjectName	<i>U</i>	<i>not specialized</i>
	ParticipantObjectQuery	M	Request query string
ParticipantObjectDetail	M	HTTP Request Headers contained in the query (Accept)	

## Appendices

*Add the following Appendix to the Volume 2 Appendices*

### Appendix ZZZ – FHIR Implementation Material

1135 HL7 FHIR has several overarching concepts which should be profiled consistently throughout any mobile/lightweight IHE transaction using FHIR. IHE profiles FHIR, like any other standard, in ways that narrow the standard for specific use-cases. IHE profiles are intended to be proper subsets of the standard and are not intended to be incompatible. The following are common concepts used by IHE from within FHIR:

1. Resource Bundles
- 1140 2. Transport mechanism
3. Query parameter representation
4. FHIR conformance statements

#### ZZZ.1 Resource Bundles

1145 Any operation which results in, or requires submission of a collection of resources is done via a Resource Bundle mechanism. A FHIR Bundle represents a collection of resources which are related in some way, for example: the result of a search operation, or a collection of historical versions of a particular resource.

Bundles are represented using either the RFC 4287 (Atom) feeds in XML, or a JSON representation of ATOM defined in 1.12.5.2.5 of the HL7 FHIR standard.

1150 We discuss here how IHE profiles the use of the Resource Bundles to express the results of a query. Within the text of this section, all requirements for the Resource Bundle are specified solely in the context of query responses.

- The Resource Bundle shall carry a `link` attribute with `rel="self"` and `href` equal to a resolvable URL which may be used by the consumer to re-perform the query.
- 1155 • A Resource Bundle shall carry the `totalResults` attribute indicating the total number of results matching the search parameters provided.
  - a. In the JSON bundle format `totalResults` shall appear as a property of the bundle,
  - b. In the XML/ATOM format, `totalResults` shall appear as an element named `totalResults` in the OpenSearch namespace `http://a9.com/-/spec/opensearch/1.1/`
- 1160 • Each entry within the Resource Bundle shall carry a `link` attribute with `rel="self"` and `href` equal to a resolvable URL which may be used by the consumer to retrieve the resource.

- 1165
- Each entry within the Resource Bundle shall carry a `content` attribute with one conformant resource representing a single result of the query. If no content exists for the entry, the entry shall not be included in the bundle.

### 1170 ZZZ.1.1 Resource Bundle “self” Link

When a Resource Bundle is generated in response to a query, the actor shall convey the actual parameters used for the query as the `self` link on the returned bundle. For example, if a Patient Demographics Supplier Actor processed a search for “John Smith”, the “self” link within the bundle would be represented as:

1175

```
{
  "link" : [{
    "rel": "self",
    "href": "http://example.com/pdqm/patient?family=Smith&given=John"
  }],
  ...
}
```

1180 Or in XML

```
...
  <link rel="self" href="http://example.com/pdqm/patient?family=Smith&given=John" />
  ...
```

### 1185 ZZZ.1.2 Resource Bundle Pagination

When pagination is supported, and a Resource Bundle represents a partial result set, the Resource Bundle shall include the following navigation links. The behavior specified within FHIR (see FHIR Section 2.1.19) leverages RFC 5005 (Feed Paging and Archiving).

In this section, we discuss how IHE profiles the behavior of this paging mechanism.

- 1190
- If the current bundle represents the first page of results, then the “previous” and “first” links may be excluded from the bundle’s list of links.
  - If the current bundle represents the last page of results, then the “next” and “last” links may be excluded from the bundle’s list of links.
  - The first, previous, next, and last links shall carry all parameters that were used to perform the query (see ITI TF-2x: Appendix ZZZ.1.1)
  - If the actor enforces a default count of results per page it shall append a count parameter to each of the first, previous, next, and last links indicating this default count.
- 1195

For example: A response bundle containing the third page of result for a query which resulted in 100 matching demographics, would convey the following navigation links to the consumer:

```

1200 {
      "totalResults" : 100,
      "link" : [
1205     {
          "rel": "self",
          "href": "http://example.com/pdqm/patient?family:exact=SM&count=10&page=3"
        },
        {
1210     "rel" : "first",
          "href": "http://example.com/pdqm/patient?family:exact=SM&count=10&page=1"
        },
        {
1215     "rel": "previous",
          "href": "http://example.com/pdqm/patient?family:exact=SM&count=10&page=2"
        },
        {
          "rel": "next",
          "href": "http://example.com/pdqm/patient?family:exact=SM&count=10&page=4"
1220     },
        {
          "rel": "list",
          "href": "http://example.com/pdqm/patient?family:exact=SM&count=10&page=5"
        }
      ],
1225   ...
}

```

Or, in an XML/ATOM encoded bundle:

```

1230 ...
      <os:totalResults xmlns:os="http://a9.com/-/spec/opensearch/1.1/">100</os:totalResults>
      <link rel="self"
href="http://example.com/pdqm/patient?family:exact=SM&count=10&page=3" />
      <link rel="first"
1235 href="http://example.com/pdqm/patient?family:exact=SM&count=10&page=1" />
      <link rel="previous"
href="http://example.com/pdqm/patient?family:exact=SM&count=10&page=2" />
      <link rel="next"
1240 href="http://example.com/pdqm/patient?family:exact=SM&count=10&page=4" />
      <link rel="last"
href="http://example.com/pdqm/patient?family:exact=SM&count=10&page=5" />
      ...

```

## ZZZ.2 Query Parameters

FHIR specifies a series of query parameter types which may be used when querying for a particular resource on a server. The representation of these query parameters within the HTTP request URL are intended to support a broad set of use cases and in some cases the behavior is unclear.

In this section we discuss query parameters in the context of RESTful HTTP queries represented in the request URL within IHE profiles.

### ZZZ.2.1 Query Parameter Modifiers

1250 Per HL7 FHIR specification, implementers shall make the support for query parameter modifiers known in their Conformance Resource (see ITI TF-2x: Appendix ZZZ.4), and shall indicate the

Resource for which the modifier is supported. For example, if a Patient Demographics Supplier actor implementing the PDQm Profile supports the “:missing” modifier it would state support within the Patient Resource as:

1255

```
"searchParam" : [
  ...
  {
    "name" : "gender:missing",
    "type" : "token"
  },

```

1260

Or in an XML conformance statement as:

1265

```
<searchParam>
  <name value="gender:missing"/>
  <type value="token"/>
</searchParam>
```

### ZZZ.2.2 Token Parameters

1270

Query parameters of type `token` are intended to represent complex identifiers qualified by a namespace (see FHIR Section 2.2.2.5). This includes codes, identifiers, flags, etc. The token identifier is represented as an identifier and namespace. IHE places the following additional constraints on the behavior of matching parameters of type `token`:

1275

- When the token is used to express a query parameter which filters on an attribute of type `Boolean` (such as `active`, the `:missing` modifier, etc.) only a code shall be present and shall have a value of `true` or `false`. For example: `?active=true`.

1280

- When the token is used to express a query parameter which filters on an attribute of type `Code`, `CodeableConcept` or `Coding`, where the codification namespace is stated in the IHE profile (such as `gender`, `document status`, etc.) the token shall carry a code, and may carry a namespace URI as defined in RFC 3986. For example: `?gender=M` or `?gender=http://hl7.org/fhir/v2/0001|M`.

1285

- When the token is used to express a query parameter which filters on an attribute of type `CodeableConcept` or `Coding`, where the codification namespace is not stated in the IHE profile (such as `document classification code`, etc.) the token shall carry a code and namespace URI as defined in RFC 3986.
- When the token is used to express a query parameter which filters on an attribute of type `Identifier` the value shall carry a namespace URI as defined in RFC 3986, and may include an identifier. For example: `?identifier=urn:oid:1.2.3.4.5|` or `?identifier=urn:oid:1.2.3.4.5|123-203-FJ`.

1290

### ZZZ.2.3 String Parameters



HL7 FHIR defines matching semantics for query parameters of type `string` as case and accent insensitive, wildcard matches (see FHIR Section 2.2.2). Under these matching rules a query parameter value of “mAle” would match “males” and “MALE” as both contain the string “male”.

1295 It may not be possible for implementers to perform this style of matching (for example: acting as  
a simple relay to an HL7v2 system) therefore, for the purposes of IHE profile implementation,  
implementers may perform exact matching on query parameters of type `string` and shall  
indicate the preference to use the “:exact” modifier in the conformance statement. For example,  
an implementation wishing to indicate the parameter “family” only supports exact matches may  
1300 indicate this via:

```
1305 "searchParam" : [  
    ...  
    {  
      "name": "family:exact",  
      "type": "string"  
    },  
  ],
```

### ZZZ.3 Conformance Resource Profile

1310 HL7 FHIR allows service implementers to publish a Conformance Resource describing the  
resources, transport, formats, and operations that can be performed on a series of resources for  
the service instance (See FHIR Section 6.12). This information may be used by consumer actors  
to determine the IHE profiles supported by a supplier instance.

- 1315 • All servers (implementers exposing FHIR resources on a URL) shall expose one  
Conformance Resource per application endpoint containing a comprehensive list of all  
resources, operations, formats, and query parameters supported on that endpoint.
- 1320 • Each resource stated in the Conformance Resource shall contain a link to the Profile  
Resource which describes the IHE constraints on the FHIR Resource. For example, a  
conformance statement containing a description of the Patient resource (for PDQm)  
would contain a link to the PDQm Profile resource.

### ZZZ.4 Profile Resource Profile

1325 HL7 FHIR allows service implementers to publish a Profile Resource (See FHIR Section 6.14)  
describing the constraints, terminology bindings, extensions and search parameters supported for  
a particular resource. This Profile Resource expresses constraints to FHIR resources identified in  
the technical framework in a computable manner.

- All servers (implementers which support one or more IHE profiles) shall expose one  
Profile Resource for each FHIR based IHE profile the server supports,
- Servers shall identify each profile resource implementing a particular IHE profile by its  
profile short name and expose the Profile Resource at a URL matching

1330            `http://<location>/<basePath>/Profile/<name>`. For example, for PDQm, the profile resource shall be identified as PDQm, an HTTP GET at `http://<authority>/<basePath>/Profile/pdqm`.

### **ZZZ.5 Resource Reference URIs In FHIR**

1335            FHIR Resources are related to one another via the use of a resource reference (See FHIR Section 1.12.3). In IHE transactions contained within the technical framework, these references appear as `Resource(Type)` types where (Type) references the type of resource being referenced. These resource references are expressed using a reference URL which points to the specified instance of the resource.

1340            In this section we discuss how the IT Infrastructure profiles the referencing of resources in FHIR base profiles.

- The resource URL contained in the `reference` property shall represent a location where a consumer of the resource could identify and de-reference the intended resource being referenced.

## Appendix E

1345 *Add the following section to the end of Appendix E:*

### E.X FHIR Identifier Type

1350 The Health Level 7 Fast Health Interoperable Resources (HL7 FHIR) standard uses the data type Identifier to express an identifier that uniquely identifies a thing or object (see HL7 FHIR 1.13.0.11) including medical record number or patient identifiers. This concept is different than the resource identifier which is an assigned identifier for a particular resource appearing in a request URL (a resource identifier may also be represented as an Identifier instance however).

We discuss here how HE profiles the use of the Identifier data type to express patient identifiers in FHIR resources. Within the text of this section, all requirements for the Identifier data type are specified solely in the context of patient identifier expression.

1355 Since IHE adds additional constraints to the Identifier data type, requirements for populating its elements vary slightly depending on what actor is originating a transaction, in which Patient ID is expressed. If a Patient Demographics Supplier is the source of the Patient ID in a message, the requirements are more rigorous than otherwise.

1360 The FHIR Identifier type introduces a new mechanism for conveying the originating system of a particular identifier. Whereas HL7 Version 2 and Version 3 messages identify an assigning organization as a HD or an OID in the “root” attribute respectively, HL7 FHIR permits the use of a URI. This may require some configuration on the part of infrastructure actors to correctly map a URL to an OID or HD to maintain consistency with other infrastructure actors which are not implementing the FHIR specification.

1365 IHE imposes the following restrictions on the Identifier type:

- Infrastructure actors may expose the `assigningAuthorityName` (the name of the organization which assigned the identifier) via the `assigner` attribute of the Identifier data type. When provided, the actor shall at minimum, populate the `display` attribute.
- Identity domains shall always be qualified by an identified `system` attribute. The use of the value “urn:ietf:rfc:3986” in `system` (which specifies the value of the identifier is already globally unique) is prohibited in the scope of patient identities. The `system` attribute shall be represented as one of the following choices:
  - a. A uniquely identifying URL which identifies the identity domain, or assigner, for example: “http://example.com/patientIds”
  - 1370 b. An OID which identifies the identity domain represented as a URI with scheme “urn:oid:”, for example: “urn:oid:1.2.3.4.5.6”
  - 1375 c. A URI containing the CX.4.1 (assigning authority name) value prefixed with a valid URN.

1380

This constraint also applies to the `token` query parameter type, whereby the `system` portion of the `token` is a string representation of one of the above schemes.

## Appendix P

*Add the following section to the end of Appendix P:*

### P.1 ITI-Y1 PDQm – Implementation Materials

- Query Patient Resource message (JSON):  
1385 ftp://ftp.ihe.net/TF\_Implementation\_Material/ITI/examples/PDQm/01\_QueryRequestHttp.txt

*Do not move the following text to Final Text*

1390 GET http://pdq-sample:8080/iti-y1/patient?given=Smith&family=John&gender=M&\_format=json HTTP/1.1  
Host: pdq-sample:8080

- Query Patient Resource Response message (JSON):  
ftp://ftp.ihe.net/TF\_Implementation\_Material/ITI/examples/PDQm/02\_QueryResponseHttp.txt

1395 *Do not move the following text to Final Text*

HTTP/1.1 200 OK  
Connection: close  
1400 Content-Type: application/json+fhir; charset=UTF-8  
Content-Length: 2683  
Date: Sun, 06 Apr 2014 20:38:23 GMT  
Expires: Sat, 05 Apr 2014 20:38:20 GMT

```
1405 {
  "resourceType" : "Bundle",
  "title" : "Search results for resource type Patient",
  "id" : "urn:uuid:c179d5bd-e81e-4fe0-981a-46f6c6588f",
  "link" : [
1410   {
     "href" : "http://pdm-sample:8080/iti-y1/Patient?_format=application/json+fhir&gender=M&family=Smith&given=John&count=10",
     "rel" : "self"
1415   },
  ],
  "updated" : "2014-04-06T20:38:23Z",
  "totalResults" : "1",
  "entry" : [
1420   {
     "title" : "Patient \"1\"",
     "id" : "http://pdm-sample:8080/iti-y1/Patient/1",
     "link" : [
       {
         "href" : "http://pdm-sample:8080/iti-y1/Patient/1",
```

```
1425         "rel" : "self"
           }
         ],
         "updated" : "2014-03-11T20:34:55Z",
         "content" : {
1430           "resourceType" : "Patient",
           "text" : {
             "status" : "generated",
             "div" : "<?xml version=\"1.0\" encoding=\"UTF-8\"?>\r\n<div
1435 xmlns=\"http://www.w3.org/1999/xhtml\">John Smith (Male) - 1974-12-25</div>"
           },
           "identifier" : [
             {
1440               "use" : "usual",
               "system" : "urn:oid:1.2.36.146.595.217.0.1",
               "value" : "12345",
               "assigner" : {
                 "display" : "Acme Healthcare"
               }
             }
           ],
1445         "name" : [
           {
             "use" : "official",
             "family" : [
1450               "Smith"
             ],
             "given" : [
               "John",
1455               "James"
             ]
           },
           {
             "use" : "usual",
             "given" : [
1460               "James"
             ]
           }
         ],
         "telecom" : [
1465           {
             "use" : "home"
           },
           {
             "system" : "phone",
1470             "value" : "+1(202)555-6474",
             "use" : "work"
           }
         ],
1475         "gender" : {
           "coding" : [
             {
               "system" : "http://hl7.org/fhir/v3/AdministrativeGender",
               "code" : "M",
```

```

1480         "display" : "Male"
           }
         ]
       },
       "birthDate" : "1974-12-25",
1485       "deceasedDateTime" : null,
       "address" : [
         {
           "use" : "home",
           "line" : [
1490             "123 Main St. West Unit 33"
           ],
           "city" : "Chicago",
           "state" : "IL",
           "zip" : "00000"
         }
1495       ],
       "managingOrganization" : {
         "display" : "ACME Medical Centres"
       },
       "active" : true
1500     },
     "summary" : "<?xml version=\"1.0\" encoding=\"UTF-8\"?>\r\n<div
xmlns=\"http://www.w3.org/1999/xhtml\">John Smith (Male) - 1974-12-25</div>"
   }
 }
1505 }

```

- Retrieve Patient Resource message (JSON):  
ftp://ftp.ihe.net/TF\_Implementation\_Material/ITI/examples/PDQm/03\_RetrieveRequestHttp.txt

*Do not move the following text to Final Text*

```

1510 GET http://pdm-sample:8080/iti-y1/Patient/1?_format=json HTTP/1.1
Host: pdq-sample:8080

```

- Retrieve Patient Resource Response message (JSON):  
ftp://ftp.ihe.net/TF\_Implementation\_Material/ITI/examples/PDQm/04\_RetrieveResponseHttp.txt

*Do not move the following text to Final Text*

```

1515 HTTP/1.1 200 OK
Connection: close
Content-Type: application/json+fhir; charset=UTF-8
1520 Content-Length: 1547
Date: Sun, 06 Apr 2014 20:38:23 GMT
Expires: Sat, 05 Apr 2014 20:38:20 GMT

1525 {
  "resourceType": "Patient",
  "text": {
    "status": "generated",

```

```
    "div": "<?xml version=\"1.0\" encoding=\"UTF-8\"?>\r\n<div
1530 xmlns=\"http://www.w3.org/1999/xhtml\">John Smith (Male) - 1974-12-25</div>"
    },
    "identifier": [
      {
        "use": "usual",
        "system": "urn:oid:1.2.36.146.595.217.0.1",
1535 "value": "12345",
        "assigner": {
          "display": "Acme Healthcare"
        }
      }
    ],
1540 "name": [
    {
      "use": "official",
      "family": [
1545 "Smith"
      ],
      "given": [
        "John",
        "James"
1550 ]
    },
    {
      "use": "usual",
      "given": [
1555 "James"
      ]
    }
  ],
  "telecom": [
1560 {
    "use": "home"
  },
  {
    "system": "phone",
1565 "value": "+1(202)555-6474",
    "use": "work"
  }
  ],
  "gender": {
1570 "coding": [
    {
      "system": "http://hl7.org/fhir/v3/AdministrativeGender",
      "code": "M",
      "display": "Male"
1575 }
    ]
  },
  "birthDate": "1974-12-25",
  "deceasedDateTime": null,
1580 "address": [
    {
```



```

1585     "use": "home",
        "line": [
            "123 Main St. West Unit 33"
1590     ],
        "city": "Chicago",
        "state": "IL",
        "zip": "00000"
    }
    ],
    "managingOrganization": {
        "display": "ACME Medical Centres"
    },
1595 }
    "active": true
}

```

- Sample Conformance resource (JSON):  
[ftp://ftp.ihe.net/TF\\_Implementation\\_Material/ITI/examples/PDQm/BasicConformanceResource.txt](ftp://ftp.ihe.net/TF_Implementation_Material/ITI/examples/PDQm/BasicConformanceResource.txt)

<i>Do not move the following text to Final Text</i>
---

```

1600 {
    "resourceType": "Conformance",
    "identifier": "68D043B5-9ECF-4559-A57A-396E0D452311",
    "version": "13.0",
1605 "name": "Example.com IHE Conformance Statement - PDQm",
    "publisher": "IHE",
    "date": "2014-01-04",
    "fhirVersion": "0.80",
    "format": [
1610     "xml",
     "json"
    ],
    "rest" : [
1615     {
        "mode" : "server",
        "resource" : [
            {
1620         "type" : "Patient",
            "profile" : {
                "reference" : "http://example.com/pdqm/profile/pdqm",
            }
            "readHistory" : false,
            "updateCreate" : false,
1625         "operation" : [
                {
                    "code": "read"
                },
                {
1630         "code" : "search-type"
                }
            ]
        },
        "searchParam" : [

```

```

1635         {
            "name" : "_id",
            "type" : "token"
        },
1640         {
            "name" : "identifier",
            "type" : "token"
        },
1645         {
            "name" : "family",
            "type" : "string"
        },
1650         {
            "name" : "given",
            "type" : "string"
        },
1655         {
            "name" : "birthdate",
            "type" : "date"
        },
1660         {
            "name" : "address",
            "type" : "string"
        },
1665         {
            "name" : "gender",
            "type" : "token"
        }
    ]
}

```

- Sample Profile resource (XML):  
[ftp://ftp.ihe.net/TF\\_Implementation\\_Material/ITI/examples/PDQm/BasicProfileResource.xml](ftp://ftp.ihe.net/TF_Implementation_Material/ITI/examples/PDQm/BasicProfileResource.xml)

1670 *Do not move the following text to Final Text*

```

1675 <Profile xmlns="http://hl7.org/fhir"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema">
    <identifier value="pdqm"/>
    <name value="Sample PDQm Profile"/>
    <structure>
      <type value="Patient"/>
      <element>
1680        <path value="Patient"/>
        <definition>
          <min value="1"/>
          <max value="1"/>

```

```

1685     <type>
        <code value="Resource"/>
    </type>
</definition>
</element>
<element>
1690     <path value="Patient.identifier"/>
    <definition>
        <min value="1"/>
        <max value="*" />
        <type>
1695             <code value="Identifier"/>
        </type>
    </definition>
</element>
<element>
1700     <path value="Patient.name"/>
    <definition>
        <min value="1"/>
        <max value="*" />
        <type>
1705             <code value="HumanName"/>
        </type>
    </definition>
</element>
<element>
1710     <path value="Patient.telecom"/>
    <definition>
        <min value="0"/>
        <max value="*" />
        <type>
1715             <code value="Contact"/>
        </type>
    </definition>
</element>
<element>
1720     <path value="Patient.gender"/>
    <definition>
        <min value="0"/>
        <max value="1"/>
        <type>
1725             <code value="CodeableConcept"/>
        </type>
        <binding>
            <name value="administrative-gender"/>
            <isExtensible value="false"/>
1730             <referenceUri value="http://hl7.org/fhir/vs/administrative-
gender"/>
        </binding>
    </definition>
</element>
1735     <element>
        <path value="Patient.birthDate"/>
        <definition>

```

```
1740     <min value="0"/>
        <max value="1"/>
        <type>
          <code value="dateTime"/>
        </type>
      </definition>
    </element>
1745 <element>
  <path value="Patient.deceasedDate"/>
  <definition>
    <min value="0"/>
    <max value="1"/>
1750    <type>
      <code value="dateTime"/>
    </type>
  </definition>
</element>
1755 <element>
  <path value="Patient.address"/>
  <definition>
    <min value="0"/>
    <max value="*/>
1760    <type>
      <code value="Address"/>
    </type>
  </definition>
</element>
1765 <element>
  <path value="Patient.maritalStatus"/>
  <definition>
    <min value="0"/>
    <max value="1"/>
1770    <type>
      <code value="CodeableConcept"/>
    </type>
    <binding>
      <name value="marital-status"/>
      <isExtensible value="false"/>
      <referenceUri value="http://hl7.org/fhir/vs/marital-status"/>
    </binding>
  </definition>
</element>
1780 <element>
  <path value="Patient.multipleBirthInteger"/>
  <definition>
    <min value="0"/>
    <max value="1"/>
1785    <type>
      <code value="integer"/>
    </type>
  </definition>
</element>
1790 <element>
  <path value="Patient.photo"/>
```

```
1795     <definition>
        <min value="0"/>
        <max value="*" />
        <type>
          <code value="Attachment" />
        </type>
      </definition>
    </element>
1800  <element>
    <path value="Patient.contact" />
    <definition>
      <min value="0"/>
      <max value="*" />
1805    <type>
      <code value="ContactInfo" />
    </type>
    </definition>
  </element>
1810  <element>
    <path value="Patient.contact.relationship" />
    <definition>
      <min value="0"/>
      <max value="*" />
1815    <type>
      <code value="CodeableConcept" />
    </type>
    <binding>
      <name value="patient-contact-relationship" />
      <isExtensible value="false" />
      <referenceUri value="http://hl7.org/fhir/vs/patient-contact-
1820 relationship" />
    </binding>
    </definition>
  </element>
1825  <element>
    <path value="Patient.contact.name" />
    <definition>
      <min value="0"/>
      <max value="*" />
1830    <type>
      <code value="HumanName" />
    </type>
    </definition>
  </element>
1835  <element>
    <path value="Patient.contact.telecom" />
    <definition>
      <min value="0"/>
      <max value="*" />
1840    <type>
      <code value="Contact" />
    </type>
    </definition>
  </element>
1845  </element>
```

```
<element>
  <path value="Patient.contact.gender"/>
  <definition>
    <min value="0"/>
1850    <max value="1"/>
    <type>
      <code value="CodeableConcept"/>
    </type>
    <binding>
1855    <name value="administrative-gender"/>
      <isExtensible value="false"/>
      <referenceUri value="http://hl7.org/fhir/vs/administrative-
gender"/>
    </binding>
1860  </definition>
</element>
<element>
  <path value="Patient.contact.address"/>
  <definition>
1865    <min value="0"/>
    <max value="*/>
    <type>
      <code value="Address"/>
    </type>
1870  </definition>
</element>
<element>
  <path value="Patient.contact.organization"/>
  <definition>
1875    <min value="0"/>
    <max value="0"/>
    <type>
      <code value="Resource(Organization)"/>
    </type>
1880  </definition>
</element>
<element>
  <path value="Patient.communication"/>
  <definition>
1885    <min value="0"/>
    <max value="1"/>
    <type>
      <code value="CodeableConcept"/>
    </type>
1890    <binding>
      <!-- TODO: How to represent a binding to bcp45 -->
      <name value="bcp47"/>
      <isExtensible value="true"/>
      <referenceUri value="http://tools.ietf.org/html/bcp47"/>
1895    </binding>
    </definition>
  </element>
<element>
  <path value="Patient.provider"/>
```

```
1900     <definition>
          <min value="0"/>
          <max value="1"/>
          <type>
1905     <code value="Resource(Organization)"/>
          </type>
        </definition>
      </element>
    <element>
1910     <path value="Patient.link"/>
        <definition>
          <min value="0"/>
          <max value="*/>
          <type>
1915     <code value="Link"/>
          </type>
        </definition>
      </element>
    <element>
1920     <path value="Patient.link.other"/>
        <definition>
          <min value="1"/>
          <max value="1"/>
          <type>
1925     <code value="Resource(Patient)"/>
          </type>
        </definition>
      </element>
    <element>
1930     <path value="Patient.link.type"/>
        <definition>
          <min value="1"/>
          <max value="1"/>
          <type>
1935     <code value="code"/>
          </type>
        <binding>
          <name value="link-type"/>
          <isExtensible value="true"/>
          <referenceUri value="http://hl7.org/fhir/link-type"/>
1940     </binding>
        </definition>
      </element>
    <element>
1945     <path value="Patient.active"/>
        <definition>
          <min value="0"/>
          <max value="1"/>
          <type>
1950     <code value="boolean"/>
          </type>
        </definition>
      </element>
    <searchParam>
```

```
1955     <name value="identifier"/>
         <type value="token"/>
</searchParam>
<searchParam>
1960     <name value="birthdate"/>
         <type value="date"/>
</searchParam>
<searchParam>
1965     <name value="_id"/>
         <type value="token"/>
</searchParam>
<searchParam>
1970     <name value="gender"/>
         <type value="token"/>
</searchParam>
<searchParam>
1975     <name value="family"/>
         <type value="string"/>
</searchParam>
<searchParam>
1980     <name value="given"/>
         <type value="string"/>
</searchParam>
<searchParam>
1985     <name value="address"/>
         <type value="string"/>
</searchParam>
<searchParam>
1990     <name value="page"/>
         <type value="integer"/>
</searchParam>
<searchParam>
         <name value="count"/>
         <type value="integer"/>
</searchParam>
</structure>
</Profile>
```

## Volume 2 Namespace Additions

No new terms needed.