Integrating the Healthcare Enterprise

IHE IT Infrastructure Technical Framework Supplement

Patient Identifier Cross-reference for Mobile (PIXm)

HL7® FHIR® STU 3

Using Resources at FMM Level 5

Rev. 1.4 – Trial Implementation

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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

This is a supplement to the IHE IT Infrastructure Technical Framework V15.0. 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 July 24, 2018 for trial implementation and may be available for testing at subsequent IHE Connectathons. The supplement may be amended based on the results of testing. Following successful testing it will be incorporated into the IT Infrastructure Technical Framework. Comments are invited and may be submitted at http://www.ihe.net/ITI_Public_Comments.

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.

Amend Section X.X by the following:

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.

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.

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 and http://ihe.net/Profiles.

The current version of the IHE IT Infrastructure Technical Framework can be found at http://ihe.net/Technical_Frameworks.

CONTENTS

Introduction to this Supplement

Whenever possible, IHE profiles are based on established and stable underlying standards. However, if an IHE committee determines that an emerging standard offers significant benefits for the use cases it is attempting to address and has a high likelihood of industry adoption, it may develop IHE profiles and related specifications based on such a standard.

The IHE committee will take care to update and republish the IHE profile in question as the underlying standard evolves. Updates to the profile or its underlying standards may necessitate changes to product implementations and site deployments in order for them to remain interoperable and conformant with the profile in question.

This PIXm Profile uses the emerging HL7®[1] FHIR®[2] specification. The FHIR release profiled in this supplement is STU 3. HL7 describes the STU (Standard for Trial Use) standardization state at https://www.hl7.org/fhir/versions.html.

In addition, HL7 provides a rating of the maturity of FHIR content based on the FHIR Maturity Model (FMM): level 0 (draft) through 5 (normative ballot ready).The FHIR Maturity Model is described at http://hl7.org/fhir/versions.html#maturity.

Key FHIR STU 3 content, such as Resources or ValueSets, used in this profile, and their FMM levels are:

FHIR Resource Name	FMM Level
Bundle	5
Patient	5
Parameters	5
OperationOutcome	5

105 The Patient Identifier Cross-reference for Mobile (PIXm) Profile defines a lightweight RESTful interface to a Patient Identifier Cross-reference Manager, leveraging technologies readily available to mobile applications and lightweight browser based applications.

[1] HL7 is the registered trademark of Health Level Seven International.

[2] FHIR is the registered trademark of Health Level Seven International.

The functionality is based on the PIX Profile described in the ITI TF-1:5. The primary 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 FHIR standard. Unlike the PIX Profile, this PIXm Profile does not describe the transmission of patient identity information from a Patient Identity Source to the Patient Identifier Cross-reference Manager.

The PIXm Profile exposes the functionality of a Patient Identifier Cross-reference Manager to mobile applications and lightweight browser applications.

This supplement 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 PIX and PIXV3 Profiles.

Open Issues and Questions

PIXm_007

Mobile Patient Identifier Cross-reference Query response <assigner> resource will be required, for cases where the Assigning authority is not an OID or UUID or URI

Do we want to use Assigner as an alternative field?

PIXm_10

Is using FHIR operations the right approach for this profile? If it is correct, did we document it properly?

Closed Issues

PIXm_001: Should we include the Pediatric options?

A: No, as for the moment the feed is not supported and no pediatric demographics are involved in PIX query. This should be revisited when / if we add support for REST Patient Identity Feed.

PIXm_002: We will not include Update Notification for the moment

PIXm_003: We will not include RESTful Patient Identity feed for the moment

PIXm_005: Do we want the Server to filter by assigning authority as in HL7V3 or the HL7V2 functionality? Use the HL7V2 style of functionality.

We have decided to include filtering optional parameter this in the profile.

PIXm_006: How will we distinguish the type of query we are attempting on the FHIR servers?

- Use of parameter to distinguish between PDQm and PIXm; this method is not well supported by FHIR. FHIR does not specify how to manage additional parameters, unless

FHIR explicitly dictates behavior, this is not a reliable method. We would have to rely on correct IHE profile implementation.

- Use a new FHIR Resource (such PIXID) to query

We solved this by using a FHIR operation.

PIXm_004: There are several viable query messages:

- Profile and constrain the FHIR Patient Resource
- Use of FHIR operations to constrain returned values
- Create an IHE resource modeled on the FHIR patient Resource

We will look at which one is preferred by FHIR experts and which is feasible for existing PIX Managers

Section 3.83.4 is the detailed approach using operations, we invite comment to help describe it correctly or describe a better alternative.

We are trying to accomplish the same functionality as specified in ITI TF-2a: 3.9.4.1

PIXm_008

Should Query response use http accept header as well as `_format` parameter?

Yes, the _format parameter is optional

PIXm_09

Should we document inherited FHIR behaviors (such as paging capacity)?

Do not support paging. A well behaved PIX query should have a small response. If paging is needed there is a serious problem. An error is appropriate if there is too much response.

Not applicable

PIXm_11

We should provide an (informative?) Conformance, StructureDefinition, or OperationDefinition Resource on the web-site, or in the profile

We could eventually include informative OperationDefinition on the ftp site.

PIXm 12

This profile is based on, and requires use of, FHIR STU3.

This was addressed with ITI CP Ballot 32

PIXm_13

FHIR Patient Matching using an MPI service (http://hl7.org/fhir/STU3/operation-patient-match.html) Match operation provides mpi query capacities natively in FHIR, could it be used to accomplish our use case?

- It would need to be further constraining this Match operation to accomplish PIX functionality.
- This Match operation returns full FHIR Resources and would need to be limited to not expose unnecessary PHI disclosure to accomplish our use case
- This Match operation requires a full FHIR server backend. Existing PIX managers could not be retrofitted to use this Match operation.
- This Match operation is in Ballot Status: Informative (I.e., this portion of the specification is provided for implementer assistance and does not make rules that implementers are required to follow. Typical examples of this content in the FHIR specification are tables of contents, registries, examples, and implementer advice.) and is not a good candidate for normative use.

General Introduction

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 (no new actors)

Appendix B – Transaction Summary Definitions

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

Transaction	Definition
Mobile Patient Identifier Cross-reference Query [ITI-83]	Performs a query against a patient identifier cross-reference manager using HTTP, REST, and JSON/XML message encoding.

Glossary

No updates to the Glossary.

Volume 1 – Profiles

Copyright Licenses

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 the following new Section 5.5

5.5 Cross Profile Considerations

There are two other profiles, PIXV3 (Patient Identifier Cross-reference HL7 V3) and PIXm (Patient Identifier Cross-reference for Mobile), which provide similar functionality to the Patient Identifier Cross-reference Query [ITI-9] transaction.

A PIX Patient Identifier Cross-reference Manager may choose to group with the PIXm Patient Identifier Cross-reference Manager to provide an HTTP RESTful query method.

Add the following new Section 23.7

23.7 Cross Profile Considerations

There are two other profiles, PIX (Patient Identifier Cross-reference) and PIXm (Patient Identifier Cross-reference for Mobile), which provide similar functionality to the PIXV3 Query [ITI-45] transaction.

A PIXV3 Patient Identifier Cross-reference Manager may choose to group with the PIXm Patient Identifier Cross-reference Manager to provide an HTTP RESTful query method.

Add Section 41

41 Patient Identifier Cross-reference for Mobile Profile (PIXm)

The **Patient Identifier Cross-reference for Mobile Integration Profile** provides a transaction for mobile and lightweight browser based applications to query a Patient Identifier Cross-reference Manager for a list of patient identifiers based on the patient identifier in a different domain and retrieve a patient's cross-domain identifiers information into the application.

This profile provides a lightweight alternative to PIX Query [ITI-9] or PIXV3 Query [ITI-45] transactions, using a HTTP RESTful Query. This profile depends upon the implementation of the PIX or PIXV3 Profile or equivalent for the patient identity feed and update notifications. Two example groupings are shown in TF-1: 41.6.

This profile does not assume Patient Identifier Cross-reference Manager has the ability to act as a full-fledged HL7 FHIR standard server, other than for the profiled transaction. The profile can be used to provide a RESTful interface to a PIX or PIXV3 Patient Identifier Cross-reference Manager without providing other FHIR services.

41.1 PIXm Actors, Transactions, and Content Modules

Figure 41.1-1 shows the actors directly involved in the Patient Identifier Cross-reference for Mobile (PIXm) Profile relevant transactions between them.

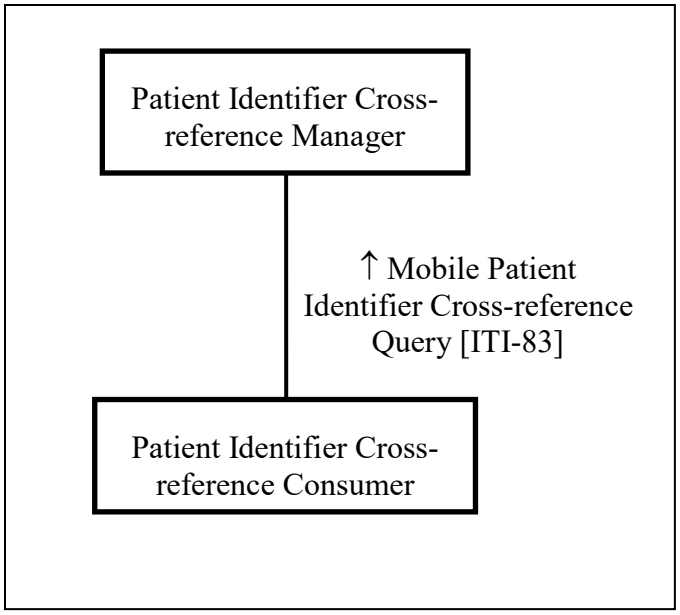


Figure 41.1-1: PIXm Actor Diagram

Table 41.1-1 lists the transactions for each actor directly involved in the PIXm Profile. To claim compliance with this profile, an actor shall support all required transactions (labeled "R") and may support the optional transactions (labeled "O").

Table 41.1-1: PIXm Profile - Actors and Transactions

Actors	Transactions	Optionality	Reference
Patient Identifier Cross-reference Consumer	Mobile Patient Identifier Cross-Reference Query [ITI-83]	R	ITI TF-2c: 3.83
Patient Identifier Cross-reference Manager	Mobile Patient Identifier Cross-Reference Query [ITI-83]	R	ITI TF-2c: 3.83

The transaction defined in this profile corresponds to one of the transactions used in the PIX and PIXV3 Profiles (ITI TF-1: 5 and 23) and provides similar functionality. Note that equivalent transactions to the PIX Update Notification ([ITI-10] and [ITI-46]) or Patient Identity Feed ([ITI-8] or [ITI-44]) transactions in the PIX and PIXV3 Profiles are outside the scope of this profile.

41.1.1 Actor Descriptions and Actor Profile Requirements

There are no additional requirements above those in Volume 2 for the [ITI-83] transaction.

41.2 PIXm Actor Options

Options that may be selected for each actor in this profile, if any, are listed in the Table 41.2-1. Dependencies between options when applicable are specified in notes.

Table 41.2-1: PIXm Actors and Options

Actor	Option Name	Reference
Patient Identifier Cross-reference Consumer	No options defined	--
Patient Identifier Cross-reference Manager	No options defined	--

41.3 PIXm Required Actor Groupings

Table 41.3-1: PIXm - Required Actor Groupings

PIXm Actor	Actor to be grouped with	Reference	Content Bindings Reference
Patient Identifier Cross-reference Consumer	None		
Patient Identifier Cross-reference Manager	None		

41.4 PIXm Overview

The ***Patient Identifier Cross-reference for Mobile Profile*** is intended to be used by lightweight applications and mobile devices present in a broad range of healthcare enterprises (hospital, a clinic, a physician office, etc.). It supports the cross-reference query of patient identifiers from multiple Patient Identifier Domains via the following interaction:

- The ability to access the list(s) of cross-referenced patient identifiers via a query/response.

The following use case and descriptions assume familiarity with the profiles in ITI TF-1:5 and ITI TF-1:23, and only describe the RESTful actors and transaction alternatives.

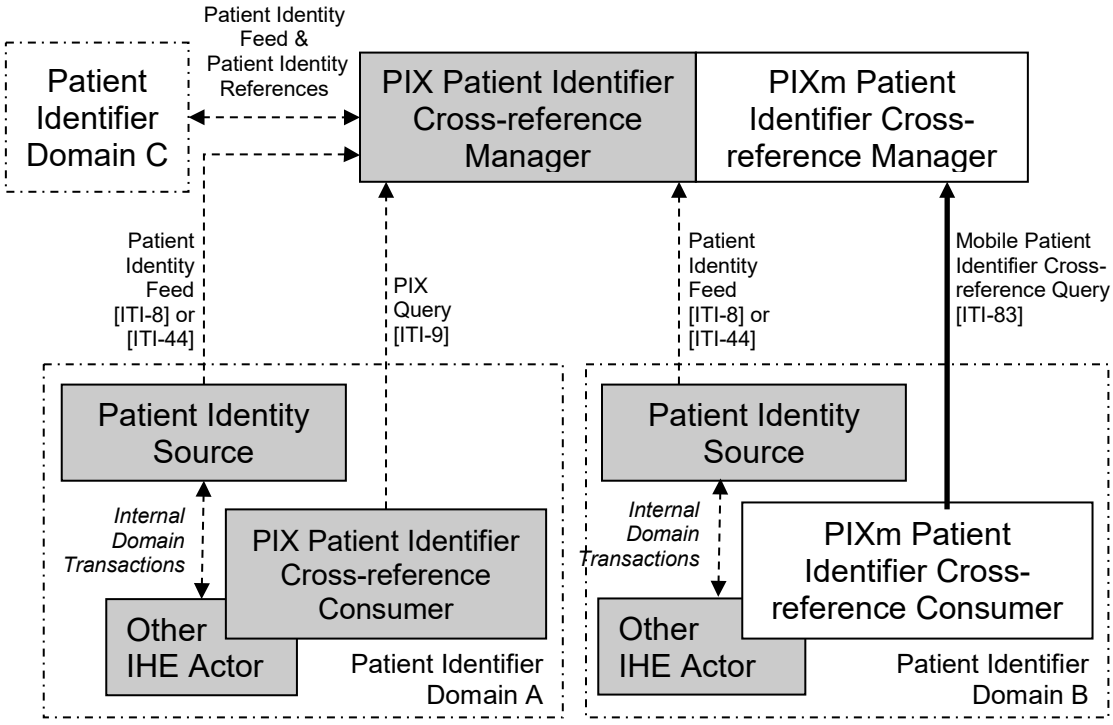


Figure 41.4-1: Process Flow with PIXm

This diagram shows how PIXm actors (in solid outlined, white boxes) can integrate into a PIX environment (gray boxes; described in ITI TF-1: 5.2). For a discussion of the relationship between this Integration Profile and an enterprise master patient index (eMPI) see ITI TF-1: 5.4.

41.4.1 Concepts

The Patient Identifier Cross-reference Consumer fits into the combination of actors and transactions defined for PIX, see ITI TF-1:5. It adds the alternative of using the Mobile Patient

Identifier Cross-reference Query [ITI-83] instead of the PIX Query [ITI-9], or PIXV3 Query [ITI-45] transactions.

The PIXm Patient Identifier Cross-reference Consumer uses a query for sets of cross-referenced patient identifiers.

41.4.2 Use Cases

41.4.2.1 Use Case: Multiple Identifier Domains within a Single Facility/Enterprise

41.4.2.1.1 Multiple Identifier Domains with a Single Facility/Enterprise Use Case Description

A patient is in an ambulance on his way to the hospital after an accident. The mobile Care system in the ambulance wants to get allergy information (e.g., using the MHD Profile) for the patient. The mobile Care system uses the patient's driver's license number 'E-123' as their patient ID. Before requesting the allergy information from the hospital, it must translate the known patient identity (driver's license) to the patient's identity known by the hospital (MRN). To achieve this correlation, the mobile Care system issues a Mobile Patient Identifier Cross-reference Query to the Patient Identifier Cross-reference Manager and retrieves the corresponding patient identity. It requests a list of patient ID aliases corresponding to patient ID = 'E-123' (within the "mobile Care domain") from the Patient Identifier Cross-reference Manager. Having linked this patient with a patient known by medical record number = '007' in the 'ADT Domain', the Patient Identifier Cross-reference Manager returns this list to the mobile Care system so that it may retrieve the allergies information for the desired patient.

The mobile Care system can now request the allergy information from the hospital allergy system using the allergy system's own patient ID (MRN-007) including the domain identifier/assigning authority.

In this scenario, the hospital's main ADT system (acting as a Patient Identity Source) would provide a Patient Identity Feed (using the patient's MRN as the identifier) to the Patient Identifier Cross-reference Manager. Similarly, the mobile Care system or the external assigning authority would also provide a Patient Identity Feed to the Patient Identifier Cross-reference Manager using the patient driver's license as the patient identifier and providing its own unique identifier domain identifier.

41.4.2.1.2 Multiple Identifier Domains with a Single Facility/Enterprise Process Flow

The PIXm Profile is intended to provide a different transport mechanism for the cross-identifier Query functionality described in the PIX Profile. Hence, the Mobile Patient Identifier Cross-reference Query [ITI-83] transaction can be used where the PIX Query [ITI-9] (or equivalent) transaction is used. The following diagram describes only Patient Cross-Identity for Mobile Process Flow.

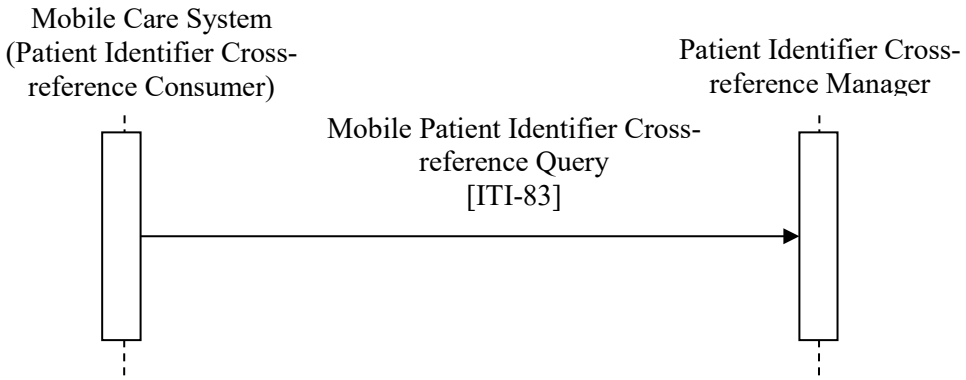


Figure 41.4.2.1.2-1: Basic Process Flow in Multiple ID Domains in a Single Facility Process Flow in PIXm Profile

41.5 Security Considerations

See ITI TF-2X: Appendix Z.8 "Mobile Security Considerations"

41.6 PIXm Cross Profile Considerations

41.6.1 Proxy Model

The Patient Identifier Cross-reference Manager from PIXm can be grouped with either PIX or PIXV3 Patient Identifier Cross-reference Consumer to proxy the Mobile Patient Identifier Cross-reference Query [ITI-83] to the more traditional PIX Query [ITI-9] and PIXV3 Query [ITI-45] transactions, thus acting as a proxy to the Patient Identifier Cross-reference Manager that wants to enable RESTful query to its data.

41.6.2 Manager group

The Patient Identifier Cross-reference Manager from PIXm does not implement any Patient Identity Feed transactions. A grouping with Patient Identifier Cross-reference Manager from PIX or PIXV3 enables the traditional IHE mechanism to obtain patient demographics for cross-referencing via Patient Identity Feed transactions [ITI-8] and/or [ITI-44]. Grouping of the PIXm Manager with the PIX or PIXV3 Consumer or Manager is not required if the implementation is able to obtain cross-reference information in another manner. For example, a PIXm Manager could be grouped with an enterprise's main FHIR server.

Volume 2 – Transactions

Add Section 3.83

3.83 Mobile Patient Identifier Cross-reference Query [ITI-83]

This section corresponds to Transaction ITI-83 of the IHE IT Infrastructure Technical Framework. Transaction ITI-83 is used by the Patient Identifier Cross-reference Consumer and Patient Identifier Cross-reference Manager Actors in the Patient Identifier Cross-reference for mobile (PIXm) Profile.

3.83.1 Scope

This transaction is used by the Patient Identifier Cross-reference Consumer to solicit information about patients whose Patient Identifiers cross-match with Patient Identifiers provided in the query parameters of the request message. The request is received by the Patient Identifier Cross-reference Manager. The Patient Identifier Cross-reference Manager processes the request and returns a response in the form of zero or more Patient Identifiers for the matching patient.

3.83.2 Actor Roles

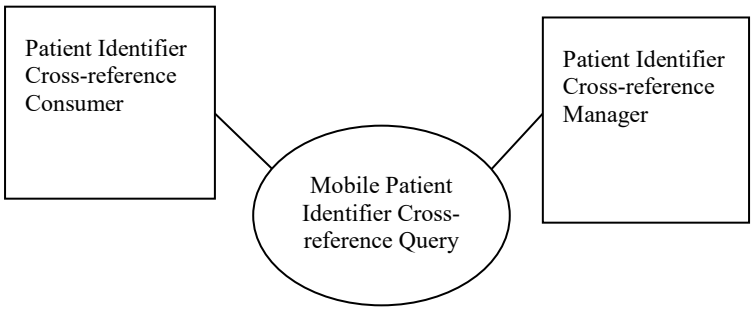


Figure 3.83.2-1: Use Case Diagram

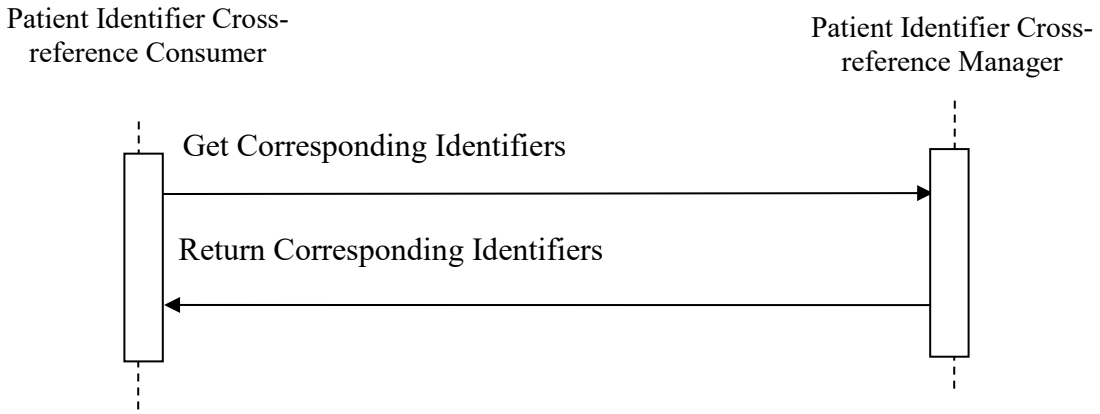
Table 3.83.2-1: Actor Roles

Actor:	Patient Identifier Cross-reference Consumer
Role:	Requests, from the Patient Identifier Cross-reference Manager, a list of patient identifiers matching the supplied Patient Identifier.
Actor:	Patient Identifier Cross-reference Manager
Role:	Returns Cross-referenced Patient Identifiers for the patient that cross-matches the Patient Identifier criteria provided by the Patient Identifier Cross-reference Consumer.

3.83.3 Referenced Standards

HL7 FHIR	HL7 FHIR standard STU3 http://hl7.org/fhir/STU3/index.html
RFC2616	Hypertext Transfer Protocol – HTTP/1.1
RFC7540	Hypertext Transfer Protocol – HTTP/2
RFC3986	Uniform Resource Identifier (URI): Generic Syntax
RFC4627	The application/json Media Type for JavaScript Object Notation (JSON)
RFC6585	Additional HTTP Status Codes

3.83.4 Interaction Diagram



3.83.4.1 Get Corresponding Identifiers message

This message is implemented as an HTTP GET operation from the Patient Identifier Cross-reference Consumer to the Patient Identifier Cross-reference Manager using the FHIR `$ihe-pix` operation described in Section 3.83.4.1.2 Message Semantics.

3.83.4.1.1 Trigger Events

A Patient Identifier Cross-reference Consumer needs to obtain, or determine the existence of, alternate patient identifiers.

3.83.4.1.2 Message Semantics

The Get Corresponding Identifiers message is a FHIR operation request as defined in FHIR STU3 (http://hl7.org/fhir/STU3/operations.html) with the input parameters shown in Table 3.83.4.1.2-1. Given that the parameters are not complex types, the HTTP GET operation shall be used as defined in FHIR STU3 (http://hl7.org/fhir/STU3/operations.html#request).

The name of the operation is `$ihe-pix`, and it is applied to FHIR `Patient` Resource type.

The Get Corresponding Identifiers message is conducted by the Patient Identifier Cross-reference Consumer by executing an HTTP GET against the Patient Identifier Cross-reference Manager's `Patient` Resource URL.

The URL for this operation is: `[base]/Patient/$ihe-pix`

Where **[base]** is the URL of Patient Identifier Cross-reference Manager Service provider.

The Get Corresponding Identifiers message is performed by an HTTP GET command shown below:

```
GET [base]/Patient/$ihe-pix?sourceIdentifier=[token]{&targetSystem=[uri]}{&_format=[mime-type]}
```

Table 3.83.4.1.2-1: $ihe-pix Message HTTP query Parameters

Query parameter Name	Cardinality	Data Type	Description
Input Parameters			
`sourceIdentifier`	1..1	Token	The Patient `identifier` search parameter that will be used by the Patient Identifier Cross-reference Manager to find cross matching identifiers associated with the `Patient` Resource. See Section 3.83.4.1.2.1.
`targetSystem`	0..1	uri	The target Patient Identifier Assigning Authority from which the returned identifiers should be selected. See Section 3.83.4.1.2.2.
`_format`	0..1	mime-type	The requested format of the response. See ITI TF-2x: Appendix Z.6

3.83.4.1.2.1 Source Patient Identifier Parameter

The required HTTP query parameter `sourceIdentifier` is a `token` that specifies a patient identifier associated with the patient whose information is being queried (e.g., a local identifier, account identifier, etc.). Its value shall include both the Assigning Authority and identifier value, separated by a "|".

See ITI TF-2x: Appendix Z.2.2 for use of the `token` search parameter type for patient identifiers.

Exactly one (1) instance of this parameter shall be provided in the query.

For example, a query searching for all patient Identifiers, for a patient with identifier NA5404 assigned by authority "1.3.6.1.4.1.21367.2010.1.2.300&ISO" would be represented as:

```
sourceIdentifier=urn:oid:1.3.6.1.4.1.21367.2010.1.2.300|NA5404
```

3.83.4.1.2.2 Populating Which Patient Identity Domain is Returned

The Patient Identifier Cross-reference Consumer may specify the Patient Identity Domain from which the patient identifier is returned from the Patient Identifier Cross-reference Manager in the

resulting response. The Patient Identifier Cross-reference Consumer shall convey this by specifying the patient identity domain in the `targetSystem` parameter using this format:

```
targetSystem=<patient ID Assigning Authority domain>
```

This optional parameter specifies the Assigning Authority of the Patient Identity Domain whose identifier need to be returned.

Examples:

```
targetSystem=urn:oid:1.3.6.1.4.1.21367.2010.1.2.100
```

```
targetSystem=http://fhir.mydomain.com
```

When included, the Identifier Cross-reference Consumer shall populate the `targetSystem` search parameter with values as described in FHIR `Identifier` datatype (http://hl7.org/fhir/STU3/datatypes.html#Identifier).

3.83.4.1.3 Expected Actions

The Patient Identifier Cross-reference Manager returns Patient Identifiers and can optionally also return Patient Resource References that are associated with the identifier provided by the Patient Identifier Cross-reference Consumer only when the Patient Identifier Cross-reference Manager recognizes the specified Patient Identification Domain and Patient ID and an identifier exists for the specified patient in at least one other domain.

The `targetSystem` parameter specifies the Assigning Authority of the Patient Identity Domain whose identifiers need to be returned. If the `targetSystem` parameter is supplied, the Patient Identifier Cross-reference Manager shall return all identifiers from that Patient Identity Domain except for the one identified by the `sourceIdentifier` parameter. Otherwise the Patient Identifier Cross-reference Manager shall return all known Patient Identifiers and `Patient` Resource References except for the one identified by the `sourceIdentifier` parameter.

The information provided by the Patient Identifier Cross-reference Manager to Patient Identifier Cross-reference Consumers is a list of cross-referenced identifiers and `Patient` Resource References in two or more of the domains managed by the cross-referencing actor. The list of cross-references is not made available until the set of policies and processes for managing the cross-reference function have been completed. The policies for administering identities adopted by the cooperating domains are completely internal to the Patient Identifier Cross-reference Manager and are outside of the scope of this transaction. Possible matches should not be communicated until the healthcare institution policies and processes embodied in the Patient Identifier Cross-reference Manager reach a positive matching decision.

For guidance on handling Access Denied, see ITI TF-2x: Appendix Z.7.

The Patient Identifier Cross-reference Manager shall respond to the query request as described by the cases listed below:

Case 1: The Patient Identifier Cross-reference Manager recognizes the specified `sourceIdentifier` sent by the Patient Identifier Cross-reference Consumer and corresponding identifiers exist in at least one other domain.

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

A `Parameters` Resource is returned representing the result set described in Section 3.83.4.2.2.

Case 2: The Patient Identifier Cross-reference Manager recognizes the specified `sourceIdentifier` sent by the Patient Identifier Cross-reference Consumer, but no identifier exists for that patient in any of the other domains.

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

A `Parameters` Resource is returned representing the result set with the empty search set.

Case 3: The Patient Identifier Cross-reference Manager recognizes the specified assigning authority domain in the `sourceIdentifier` sent by the Patient Identifier Cross-reference Consumer, but the identifier sent in `sourceIdentifier` for that patient does not exist.

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

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

Attribute	Value
severity	error
code	{ http://hl7.org/fhir/STU3/valueset-issue-type.html } not-found
diagnostics	“sourceIdentifier Patient Identifier not found”

Case 4: The Patient Identifier Cross-reference Manager does not recognize the specified Patient Assigning Authority domain in the `sourceIdentifier` sent by the Patient Identifier Cross-reference Consumer.

HTTP 400 (Bad Request) is returned as the HTTP status code.

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

Attribute	Value
severity	error
code	{ http://hl7.org/fhir/STU3/valueset-issue-type.html } code-invalid
diagnostics	“sourceIdentifier Assigning Authority not found”

Case 5: The Patient Identifier Cross-reference Manager does not recognize the specified Patient Assigning Authority domain in the `targetSystem` sent by the Patient Identifier Cross-reference Consumer.

HTTP 403 (Forbidden) is returned as the HTTP status code.

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

Attribute	Value
severity	error
code	{ http://hl7.org/fhir/STU3/valueset-issue-type.html } "code-invalid"
diagnostics	"targetSystem not found"

Case 6: The Patient Identifier Cross-reference Manager recognizes the specified `sourceIdentifier` and `targetSystem` sent by the Patient Identifier Cross-reference Consumer and at least one patient with the `sourceIdentifier`, and an identifier in the `targetSystem` exists.

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

A `Parameters` Resource is returned representing the result set as described in Section 3.83.4.2.2.

3.83.4.2 Query Return Corresponding Identifiers message

3.83.4.2.1 Trigger Events

The Patient Identifier Cross-reference Manager received a Get Corresponding Identifiers message from the Patient Identifier Cross-reference Consumer.

3.83.4.2.2 Message Semantics

See ITI TF-2x: Appendix Z.6 for more details on response format handling.

On Success, the response message is a FHIR operation response as defined in FHIR STU3 (http://hl7.org/fhir/STU3/operations.html#response) with a single `Parameters` Resource as shown in Table 3.83.4.2.2-1.

For each matching identifier, the `Parameters` Resource shall include one `parameter` element with `name="targetIdentifier"`. For each matching `Patient` Resource, the `Parameters` resource shall include one `parameter` element with `name="targetId"`. The values may be returned in any order.

Table 3.83.4.2.2-1: $ihe-pix Message Response

Parameter	Card.	Data Type	Description
FHIR Parameters Resource			
targetIdentifier	0..*	Identifier	The identifier found. Constraints to include the assigning authority as specified in ITI TF-2x: Appendix E.3
targetId	0..*	Reference(Patient)	The URL of the Patient Resource

```
<Parameters xmlns="http://hl7.org/fhir">
  <parameter>
        <name value="targetIdentifier"/>
        <valueIdentifier>
                <use value="official" />
                <system value="urn:oid:2.16.840.1.113883.16.4.3.2.5" />
                <value value="123" />
        </valueIdentifier>
  </parameter>
  <parameter>
        <name value="targetIdentifier"/>
        <valueIdentifier>
                <use value="official" />
                <system value="urn:oid:1.16.7435.2.315381.13.4.1.2.3" />
                <value value="474" />
        </valueIdentifier>
  </parameter>
  <parameter>
        <name value="targetId"/>
        <valueReference value="http://xyz-server/xxx/Patient/7536642">
        </valueReference>
  </parameter>
  <parameter>
        <name value="targetIdentifier"/>
        <valueIdentifier>
                <use value="official"/>
                <system value="http://www.acmehosp.com/patients"/>
                <value value="44552"/>
                <period>
                        <start value="2003-05-03"/>
                </period>
        </valueIdentifier>
  </parameter>
  <parameter>
        <name value="targetId"/>
        <valueReference value="http://pas-server/xxx/Patient/443556">
        </valueReference>
  </parameter>
</Parameters>
```


3.83.5 Security Considerations

Audit messages may not be feasible on low resource mobile devices. As such, it may be desirable to use server side auditing in these situations. Mobile devices should send audit messages if possible.

3.83.5.1 Security Audit Considerations

The Security audit criteria are similar to those for the PIX Query [ITI-9] as this transaction discloses the same type of patient information. The Mobile Patient Identifier Cross-reference Query is a Query Information event as defined in ITI TF-2a: Table 3.20.4.1.1.1-1. The audit message shall comply with the requirements in ITI TF-2a: 3.9.5.1, with the following differences:

- EventTypeCode = EV("ITI-83", "IHE Transactions", "Mobile Patient Identifier Cross-reference Query")
- Query Parameters (AuditMessage/ParticipantObjectIdentification)
  - ParticipantObjectIdTypeCode = EV("ITI-83", "IHE Transactions", "Mobile Patient Identifier Cross-reference Query")
  - ParticipantObjectQuery = Requested URL including query parameters
  - ParticipantObjectDetail = HTTP Request Headers contained in the query (e.g., Accept header)

