

Integrating the Healthcare Enterprise



IHE IT Infrastructure
Technical Framework Supplement

Patient Identifier Cross-reference for Mobile
(PIXm)

HL7® FHIR® Release 4

Using Resources at Normative Level

Rev. 2.0 – Draft for Public Comment

Deleted: STU 3

Deleted: FMM Level 5

Deleted: 1.4

Deleted: 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

35 This is a supplement to the IHE IT Infrastructure Technical Framework V16.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

40 [This supplement is published on August 15, 2019 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 by September 14, 2019.](#)

[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.

45 *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.

50

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>.

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

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Deleted: 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.

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Introduction to this Supplement

Whenever possible, IHE profiles are based on established and stable underlying standards. However, if an IHE domain determines that an emerging standard has high likelihood of industry adoption, and the standard offers significant benefits for the use cases it is attempting to address, the domain may develop IHE profiles based on such a standard. During Trial Implementation, the IHE domain will update and republish the IHE profile as the underlying standard evolves.

Product implementations and site deployments may need to be updated in order for them to remain interoperable and conformant with an updated IHE profile.

This PIXm Profile is based on Release 4 of the emerging HL7^{®1} FHIR^{®2} standard. HL7 describes FHIR Change Management and Versioning at <https://www.hl7.org/fhir/versions.html>.

HL7 provides a rating of the maturity of FHIR content based on the FHIR Maturity Model (FMM): level 0 (draft) through N (Normative). See <http://hl7.org/fhir/versions.html#maturity>.

The FMM levels for FHIR content used in this profile are:

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

Given that this profile uses all Normative Resources from R4, the reference to the HL7[®] FHIR[®] standard will be to the version independent <http://hl7.org/fhir>, rather than the R4 specific <http://hl7.org/fhir/R4>.

Deleted: 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^{®3} FHIR^{®4} specification. The FHIR R4 is release profiled in this supplement is STU 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 Release 43 content, such as Resources or ValueSets, used in this profile, and their FMM levels are:¶

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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.

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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® standard](#), providing only use-case driven constraints to aid with interoperability, deterministic results, and compatibility with existing PIX and PIXV3 Profiles.

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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?

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PIXm 010

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

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PIXm 014

Should IHE have just used the \$match operator defined in the FHIR standard? It seems to be very similar function. BUT \$match uses Patient resources and not just identifiers/Reference. That is to say that PIXm operation will expose identifiers but not other demographics about the patient, whereas \$match exposes the full content of the Patient resource on query and on returned result. -- <http://hl7.org/fhir/R4/patient-operation-match.html>

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Thus should \$match be an alternative, or another transaction, or ignored by IHE?

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PIXm 015

Should we simplify the Parameters given that a Reference datatype can now carry a Reference.identifier or a Reference.reference?

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PIXm 016

Should we enhance the Parameters returned so that each business identifier (Identifier) referenced by each Patient can be enumerated. This will result in each business identifier being listed multiple times, both at the root and also once for each Patient resource containing the value in the .identifier element. This seems useful to the client, but also seems to be beyond the intended use-case for PIX, and could more appropriately be handled with PDQm, or a secondary

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195 query of the Patient. Concern is that PIXm security model covers identifiers (reference to Patient is an identifier in FHIR), but by expanding as proposed this would be returning part of the Patient resource content.

Closed Issues

200 CP-ITI-1118 - asks if the return behavior is well aligned with PDQm. Seems they both should handle similar conditions similarly. → The return codes were reviewed in PIXm, and found to be appropriate for PIXm as originally documented.

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Commented [JM1]: I removed the previous close issues because they were not relevant this time around, and leaving them in would not be helpful to current Public Comment or future lifecycle of this profile.

Deleted: 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_009 ¶
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 website, 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? ¶

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General Introduction

330 *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

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

No new actors

335 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 <i>for a cross-reference of a Patient Identity.</i>

Deleted: No change to Appendix A (no new actors)¶

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Deleted: against a patient identifier cross-reference manager using HTTP, REST, and JSON/XML message encoding

Glossary

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

No new Glossary items or updates.

Deleted: No updates to the Glossary.¶

350

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>.

355

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.

360

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

365

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.

370

Add Section 41

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

375 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.

380 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 [PRIM](#), [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®](#) server, other than for the profiled transaction. [PIXm](#) can be used to provide a RESTful interface to a PIX or PIXV3 Patient Identifier Cross-reference Manager without providing other FHIR services.

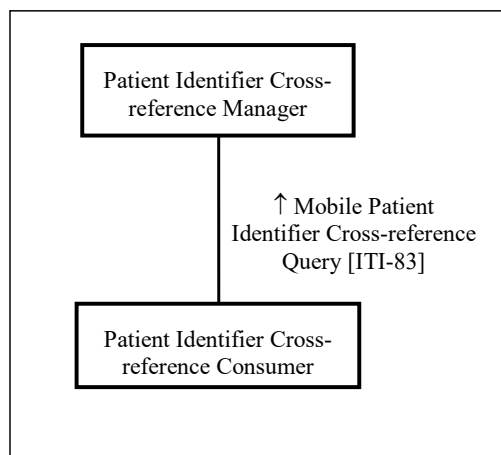
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385 41.1 PIXm Actors, Transactions, and Content Modules

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



390 **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

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400 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, and can be found in the Patient Resource Identity Management (PRIM) Profile.

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41.1.1 Actor Descriptions and Actor Profile Requirements

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

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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	--

410

41.3 PIXm Required Actor Groupings

Table 41.3-1: PIXm - Required Actor Groupings

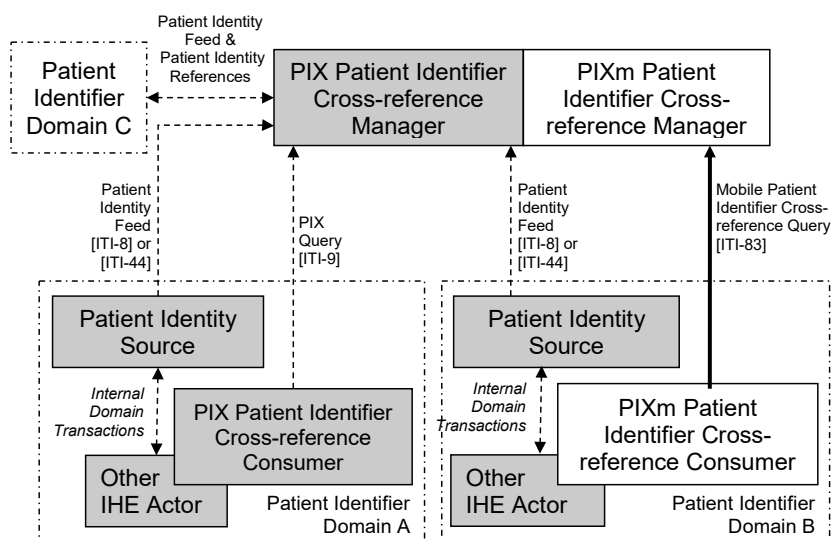
PIXm Actor	Actor to be grouped with	Reference	Content Bindings Reference
Patient Identifier Cross-reference Consumer	None		
Patient Identifier Cross-reference Manager	None		

41.4 PIXm Overview

420 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.

425 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.



430 **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

435 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.

440 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

445 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).

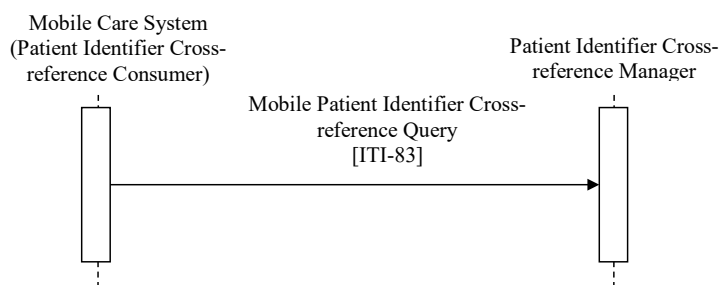
450 To achieve this correlation, the mobile Care system issues a Mobile Patient Identifier Cross-reference Query to the Patient Identifier Cross-reference Manager and retrieves the corresponding patient identity. It requests a list of patient ID aliases corresponding to patient ID = 'E-123' (within the "mobile Care domain") from the Patient Identifier Cross-reference Manager. Having linked this patient with a patient known by medical record number = '007' in
455 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.

460 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
465 identifier domain identifier.

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

470 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.



475

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. [See the Patient Reference Identity Manager \(PRIM\) Profile for more details on this configuration.](#)

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Volume 2c – Transactions (cont.)

500 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.

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Deleted: Transaction ITI-83 is used by the Patient Identifier Cross-reference Consumer Consumer and Patient Identifier Cross-reference Manager Manager Actors in the Patient Identifier Cross-reference for mobile (PIXm) Profile.

3.83.1 Scope

505 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.

510 3.83.2 Actor Roles

[The roles in this transaction are defined in the following table and may be played by the actors shown here:](#)

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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.

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Deleted: Figure 3.83.2-1: Use Case Diagram

3.83.3 Referenced Standards

HL7 FHIR	HL7® FHIR® standard http://hl7.org/fhir/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

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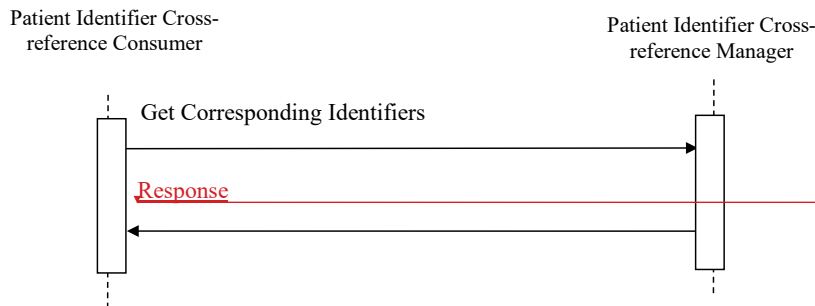
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3.83.4 Messages

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3.83.4.1 Get Corresponding Identifiers message

530 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

535 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 (<http://hl7.org/fhir/operations.html>) with the input parameters shown in Table 3.83.4.1.2-1.

540 Given that the parameters are not complex types, the HTTP GET operation shall be used as defined in FHIR (<http://hl7.org/fhir/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.

545 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:

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```
GET [base]/Patient/$ihe-pix?sourceIdentifier=[token](&targetSystem=[uri])(&_format=[token])
```

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

Query parameter Name	Cardinality	Search 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..*	uri	The Assigning Authorities for the Patient Identity Domains from which the returned identifiers shall be selected. See Section 3.83.4.1.2.2.
_format	0..1	token	The requested format of the response from the mime-type value set. See ITI TF-2x: Appendix Z.6

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3.83.4.1.2.1 Source Patient Identifier Parameter

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

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

The Patient Identifier Cross-reference Consumer shall provide exactly one (1) instance of this parameter in the query.

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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:

570

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

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3.83.4.1.2.2 Requesting Patient Identity Domains to be Returned

If the Patient Identifier Cross-reference Consumer wishes to select the Patient Identity Domain(s) from to receive Patient Identifiers, it does so by populating the `targetSystem` parameter with as many domains for which it wants to receive Patient Identifiers. The Patient Identifier Cross-reference Manager shall return the Patient Identifiers for each requested domain if a value is known.

Deleted: 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 Ppatient Identity Ddomain in

The `targetSystem` parameter uses this format:

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

580

Examples:

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

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

targetSystem=http://fhir.mydomain.com

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

3.83.4.1.3 Expected Actions

620 The Patient Identifier Cross-reference Manager shall use the sourceIdentifier and the targetSystem(s) to determine the Patient Identities that match, where Patient Identities include business Identifier(s) and FHIR Patient Resource(s).

The Patient Identities returned may be a subset based on policies that might restrict access to some Patient Identities. For guidance on handling Access Denied, see ITI TF-2x: Appendix Z.7.

3.83.4.1.3.1 Source Identifier not found

625 When the Patient Identifier Cross-reference Manager recognizes the Patient Identity Domain in the sourceIdentifier but the identifier is not found, then the following failure shall be returned:

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

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

630

Attribute	Value
severity	error
code	http://hl7.org/fhir/issue-type#not-found
diagnostics	"sourceIdentifier Patient Identifier not found"

3.83.4.1.3.2 Source Domain not recognized

635 When the Patient Identifier Cross-reference Manager does not recognize the Patient Identity Domain in the sourceIdentifier, then the following failure shall be returned:

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

An OperationOutcome Resource is returned indicating that the Patient Assigning Authority domain is not recognized in an issue having:

Attribute	Value
severity	error

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<http://hl7.org/fhir/R4/datatypes.html#Identifier>

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Deleted: When the Manager recognizes the specified Patient Identity Domain and Patient ID and an identifier exists for the specified patient in at least one other domain, tThe 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 Manager .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 query contained the targetSystem parameter is supplied, the Patient Identifier Cross-reference Manager shall return all identifiers from that Patient Identity Domain except for the one ...

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Attribute	Value
code	http://hl7.org/fhir/issue-type#code-invalid
diagnostics	"sourceIdentifier Assigning Authority not found"

3.83.4.1.3.3 Target Domain not recognized

When the Patient Identifier Cross-reference Manager does not recognize the Patient Identity Domain in the targetSystem, then the following failure shall be returned:

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

820 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/issue-type#code-invalid
diagnostics	"targetSystem not found"

3.83.4.2 Response message

825 3.83.4.2.1 Trigger Events

The Patient Identifier Cross-reference Manager needs to return failure, or success with zero to many results to 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.

830 The response message is a FHIR operation response (<http://hl7.org/fhir/operations.html#response>).

On Failure, the response message is an HTTP status code of 4xx or 5xx indicates an error, and an OperationOutcome Resource shall be returned with details.

835 On Success, the response message is an HTTP status code of 200 with a single Parameters Resource as shown in Table 3.83.4.2.2-1. For each matching business 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. The identifier value given in sourceIdentifier shall not be included in the returned Response.

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- Deleted: Case 6: The Patient Identifier Cross-reference Manager recognizes the specified sourceIdentifier and targetSystem sent by the Patient Identifier Cross-reference Consumer and corresponding identifiers exist for the specified
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- Deleted: On Success, the
- Deleted: as defined in FHIR
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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

Deleted:

```

940 <Parameters xmlns="http://hl7.org/fhir">
    <parameter>
      <name value="targetIdentifier"/>
      <valueIdentifier>
945         <use value="official" />
         <system value="urn:oid:2.16.840.1.113883.16.4.3.2.5" />
         <value value="123" />
      </valueIdentifier>
    </parameter>
    <parameter>
950       <name value="targetIdentifier"/>
      <valueIdentifier>
         <use value="official" />
         <system value="urn:oid:1.16.7435.2.315381.13.4.1.2.3" />
955         <value value="474" />
      </valueIdentifier>
    </parameter>
    <parameter>
960       <name value="targetId"/>
      <valueReference value="http://xyz-server/xxx/Patient/7536642">
        </valueReference>
      </parameter>
    <parameter>
965       <name value="targetIdentifier"/>
      <valueIdentifier>
         <use value="official"/>
         <system value="http://www.acmehosp.com/patients"/>
         <value value="44552"/>
         <period>
970           <start value="2003-05-03"/>
         </period>
      </valueIdentifier>
    </parameter>
    <parameter>
975       <name value="targetId"/>
      <valueReference value="http://pas-server/xxx/Patient/443556">
        </valueReference>
      </parameter>
  </Parameters>
980
  
```

3.83.5 Security Considerations

[See the general Security Consideration in ITI TF-1: 38.5](#)

885 **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:

990

- 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)

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Deleted: 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.†