

Kingdom of Saudi Arabia



National Health Information Center (NHIC)

Enabling Standards-Based eHealth Interoperability

IS0001

Saudi eHealth Core Interoperability Specification for
KSA-Wide Patient Demographic Query

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1.0	April 21, 2016	First Release	National Health Information Center

1. INTRODUCTION

1.1 DOCUMENT PURPOSE

The purpose of this document is to address the Saudi eHealth Core Interoperability Specifications for the KSA-Wide Patient Demographic Query Use Case. It forms a set of requirements that complements the IHE - Patient Demographics Query HL7 V3 (PDQv3) Profile with Saudi eHealth specific constraints. It also aligns with the Saudi e-Government Interoperability Standards (YEFI) to expedite national adoption.

This Core Interoperability Specification is applicable to existing and new information systems. The systems will be connected to the national Saudi eHealth Exchange (SeHE) System.

1.2 DESCRIPTION

This Core Interoperability Specification describes the capability to match a patient with its identity. This capability is accessible to various “edge” applications including point of care systems and business applications.

It uses a set of patient demographics attributes (name, birth date, gender, etc.) and a unique nation-wide identifier called a Health ID. A Health ID is registered for Saudi citizens, residents, displaced people, Cooperation Council for the Arab States of the Gulf (GCC) nationals and visitors/pilgrims. It is used for the unique identification of a patient and its health records. This Health ID and associated demographic attributes are managed centrally by a Patient Demographics Supplier Use Case Actor (i.e., in SeHE often called the “client registry” system) so that the information may be widely accessed via queries against such a Use Case Actor.

The Health ID is generated by the Patient Demographics Supplier for all the categories of individuals in the KSA and is linked to the national ID(s) of the individual.

It is recognized that the Patient Demographics Supplier needs to be populated, maintained and updated. Among the use cases supported by such a system, this Core Interoperability Specification focuses only on the services that need to be standardized at the national level to support the ability to match the patient identifying information by the various “edge applications” connected to the Saudi eHealth Exchange (SeHE) System.

This Health ID is linked, for each patient, to the relevant type of national ID for:

1. Saudi Citizens: based on the “Saudi Citizen ID”, which is managed by the Ministry of Interior - National Information Center and used for various eGovernmental services (bank accounts, fines, etc.).
2. Displaced People: based on the “Displaced ID”, which is managed by the Ministry of Interior - National Information Center and used for various eGovernmental services (bank accounts, fines, etc.).
3. Permanent Residents: based on the “Iqama number”, which is managed by the Ministry of Interior - National Information Center and used for various eGovernmental services (bank accounts, fines, etc.).

4. Visitors and Pilgrims: based on the “Border ID”, which is managed by the Ministry of Interior - National Information Center. The Visa Number/Passport Number with its associated nationality may also be used for visitors/pilgrims.
5. GCC Citizens: based upon the Cooperation Council for the Arab States of the Gulf National ID with its associated nationality.

1.3 SCOPE

In Scope:

The scope of this document is the specification of how various Health IT systems within the KSA are able to obtain a patient’s unique Health ID and key identifying patient demographic data via a health information standards-based query. This Health ID is used for unique identification of a patient and its health records when sharing information through SeHE and supports the Saudi eHealth KSA-Wide Patient Demographic Query Use Case.

The following topics are in scope for this Interoperability Specification:

- Use of the IHE Patient Demographics Query HL7 V3 (PDQV3) Profile to perform the standards based query.
- Five types of patients are identified for the purpose of obtaining the Health ID and key identifying demographic data, they are:
 - Citizens,
 - Permanent Residents,
 - Displaced People,
 - GCC Nationals and
 - Visitors/Pilgrims.
- The ability to query with a Mother’s National ID with associated demographic data to obtain a new born baby’s Health ID.

Out of Scope:

The following is a list of content and specifications that are specifically out of scope for this Interoperability Specification:

- The National Information Center (NIC) is used as the registry of record for the demographic information and national identifiers of all individuals in the KSA. How the identifiers and demographic information is populated is outside the scope of this specification.
- How the Patient Demographics Supplier Use Case Actor populates its database and how it maintains information consistency with the NIC system is outside the scope of this specification.
- For exceptions, such as patient not found (i.e., new born babies), an exception process supported by a registration web application is used. How this registration web application is implemented is outside the scope of this specification.
- Whether Health IT systems use the Health ID to manage their local records or a local ID is outside the scope of this specification.

- Specifics of “fuzzy” matching algorithms are not standardized by this Core Interoperability Specification and determined by the Patient Demographics Supplier implementation

1.4 METHODOLOGY

This Interoperability Specification has been developed with input from various Saudi stakeholders collected during several months through workshops and teleconferences.

The development of a Core Interoperability Specification es on the high-level requirements set by the associated use case. These high-level requirements are not restated in this specification and readers may consider reviewing the related Use Case document.

1.5 HOW TO READ THIS DOCUMENT

1.5.1 Where to Find Information

This document contains four normative sections, as well as informative appendices for your convenience. The document is structured as follows:

Section 1: Contains an introduction to the Interoperability Specification (IS). This section contains a summary of the IS purpose and scope, as well as other content to help orient the first time reader to the topic of the IS and how it relates to other specifications in the SeHE System.

Section 2: Describes the use case, including design constraints and assumptions and the flows of information that will be specified in this IS. Section 2 also introduces scenarios that describe how the specified flows may be used in the Saudi eHealth context.

Section 3: Establishes the Core Interoperability Requirements for the Interoperability Specification.

Section 4: Establishes the Conformance Requirements for the Interoperability Specification.

Section 5: Establishes the Saudi eHealth Constraints on the IHE Patient Demographics Query HL7 V3 (PDQV3) Profile.

Section 6: Lists the Saudi eHealth reference documents, as well as the international standards which underpin the Interoperability Specification.

Appendix A: Provides sample HL7 V3 messages for a patient demographic query request and a query response.

1.5.2 Related Documents

The Saudi eHealth Core Interoperability Specification (IS) is the sole entry point for the technology developers, the compliance assessment testing and certification, and the purchaser of IT systems in terms of technical requirements.

It references number of supporting Interoperability Specifications:

- IS0101 *Saudi eHealth Security and Privacy Interoperability Specification*
- IS0200 *Saudi Health Information Exchange Data Dictionary*.

The above Saudi eHealth Interoperability Specifications include precise references to internationally adopted profiles and standards as well as Saudi specific constraints.

This document fits into an overall specification framework described in Figure 1.5-1 KSA-Wide Patient Demographic Query Document Organization. Further descriptions and references for the documents identified below are provided in Section 6 Referenced Documents and Standards.

Implementations are required to conform to the requirements within this Core Interoperability Specification; all Saudi eHealth referenced Interoperability Specifications, and the standards and profiles they specify.

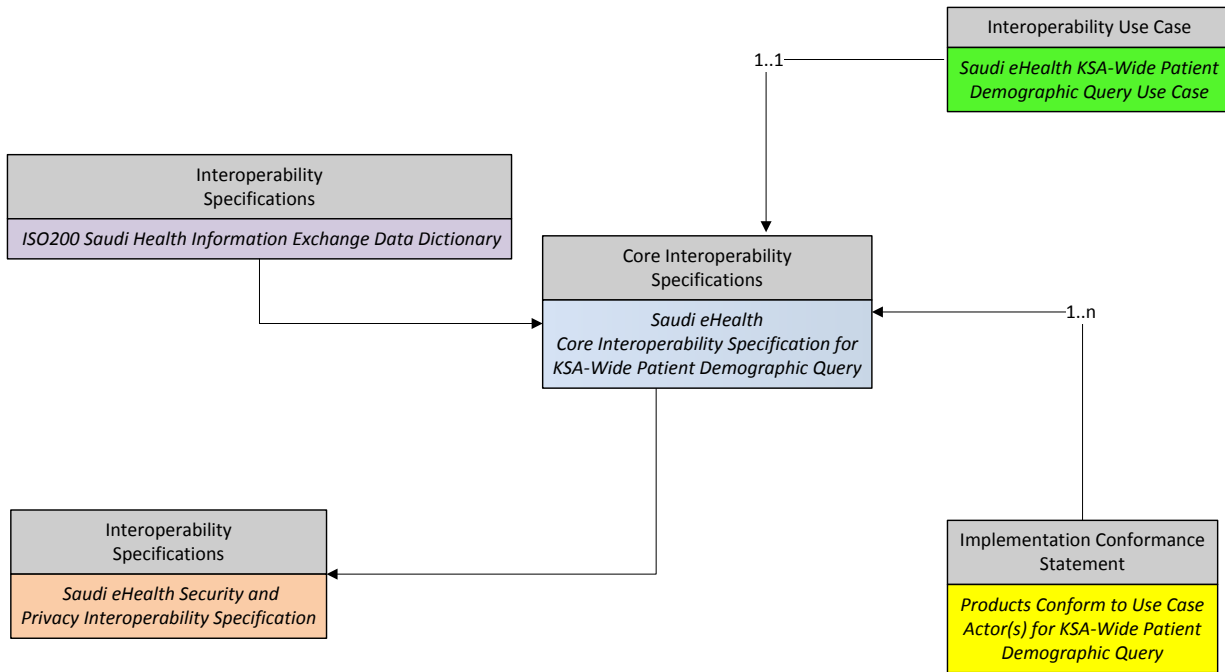


FIGURE 1.5-1 KSA-WIDE PATIENT DEMOGRAPHIC QUERY DOCUMENT ORGANIZATION

1.5.3 Document Conventions

1.5.3.1 REQUIREMENTS NUMBERING CONVENTIONS:

All Saudi eHealth Interoperability Specifications contain numbered requirements that follow this format:

- [ABCD-###], where ABCD is a three or four letter acronym unique to that Interoperability Specification for convenient purposes, and ### is the unique number for that requirement within the Interoperability Specification.
- Where a specific value set or code is required to be used, it can be found in the “IS0200 Saudi Health Information Exchange Data Dictionary”. The location and process to access the Health Information Data Dictionary will be specified in mechanisms external to this document.

Saudi eHealth numbered requirements are the elements of the Interoperability Specification that the system conforms to. In other words, in order to implement a system that fully supports the Use Case and Interoperability Specification, the system shall be able to demonstrate that it conforms to every numbered requirement for the system actors to which it is claiming conformance.

Please note that all Saudi eHealth numbered requirements are numbered uniquely, however numbered requirements are not always sequential.

1.5.3.2 REQUIREMENTS LANGUAGE

Throughout this document the following conventions¹ are used to specify requirement levels:

SHALL: the definition is an absolute requirement of the specification. (Note: “SHALL IF KNOWN” means that the tag must be sent. However, if there were no information, then this tag should be sent with a <nullflavor>)

SHALL NOT: the definition is an absolute prohibition of the specification.

SHOULD: there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.

SHOULD NOT: there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.

MAY or OPTIONAL: means that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item.

¹ Definitions based upon RFC 2119

2. USE CASE

2.1 USE CASE ACTORS AND SERVICES

The Use Case Actors and the Services that are used by this Core Interoperability Specification are described at a functional level in the Saudi eHealth Interoperability Use Case document. Readers that wish to understand the mapping to real world products are recommended to read this Saudi eHealth Interoperability Use Case document. A summary is provided in the following tables.

TABLE 2.1-1 USE CASE ACTORS

USE CASE ACTOR NAME	DESCRIPTION
Patient Demographics Supplier	Patient Demographics Supplier receives the query for a patient matching request that includes patient demographics attributes and sends back one or more corresponding patient matches with the associated demographic attributes to the Patient Demographics Consumer.
Patient Demographics Consumer	Patient Demographics Consumer queries the Patient Demographics Supplier with patient demographics attributes as query keys. If any match, it receives one or more matching patients with their demographic attributes from the Patient Demographics Supplier.

TABLE 2.1-2 USE CASE SERVICES

USE CASE SERVICE NAME	DESCRIPTION
Patient Demographics Query	A service initiated by the Patient Demographics Consumer requesting a list of patients matching a set of patient's demographic attributes (minimal set of demographic data such as Citizen ID, name, birth date, etc.) from the Patient Demographics Supplier. The Patient Demographics Supplier responds with patient demographics attributes for one or more patients matching the criteria provided by the specific query initiated by the Patient Demographics Consumer.

2.2 DESIGN CONSTRAINTS AND ASSUMPTIONS

The following design principles underlie this interoperability specification:

- It is expected that all services initiated or provided by these Actors operate in accordance to the Saudi Health Information Exchange Policies.
- The National Information Center (NIC) is used as the registry of record for the demographic information and national identifiers of all individuals in the KSA. Each type of individual has a different identification scheme using national identifiers, such as Citizen ID, Iqama Number, Displaced ID, GCC National ID and Border ID.
- Identifiers issued by the NIC for Citizens and Permanent Residents (Iqama number) are never reassigned to another individual, even after death or termination of residence.

- For visitors/pilgrims the various combination of attributes can be used, Visa Number, Passport Number, Date of Birth and Nationality.
- For GCC citizens the foreign GCC National ID with the associated country code is used.
- The service provided by this Core Interoperability Specification allows Health IT systems to match their patients to a single Health ID based on a set of demographics attributes and personal identifiers widely used in the KSA. This Health ID is used for unique identification of a patient and its health records when sharing information through SeHE. The systems connected to SeHE may or may not use the Health ID to manage their local health records.
- The Use Case Flow of Events and the additional scenarios provided in Section 2.3 provide workflow assumptions.
- For exceptions, such as patient not found or new born babies, an exception process supported by a registration web application is used to offer KSA-wide search/registrations of special case patients as specified in Section 5.2.1.
- When providing healthcare to a patient, the Patient Demographics Consumer is expected to query (or re-query) the Patient Demographics Supplier for the patient's Health ID. The behavior and frequency of these queries and the management of locally cached patient demographic attributes are specified in Section 5.2.3.
- If the operator was unable to successfully obtain the Health ID (for example, due to a network outage), the edge system generates and uses a local ID to internally manage the patient's records. This local ID may or may not be reconciled in the future. For example, illegal visitors most likely will not be reconciled; however newborn patients and new residents will be reconciled. If the local ID is not reconciled, the health record is not shared in SeHE.

2.3 USE CASE FLOW OF EVENTS

The Saudi eHealth Interoperability Use Case document describes the key workflows that are supported by this Core Interoperability Specification. A brief summary of the Use Case flows are provided below. For an in-depth understanding of the Use Case flows, it is recommended to read the Use Case document.

- **Main Flow:** the most common method to match a patient with its identity is to “Query by ID” (i.e. Citizen ID, Iqama Number or Border ID). A successful query results in a single patient match. The Health ID is returned along with demographics information and the Health ID is used for the unique identification of a patient and its shared health records in SeHE.
- **Alternative Flows:** When a valid ID is not available, the operator uses the “Query by Patient Attributes” method (e.g. Name, Birth Date, Mother's Name, etc.). A successful “query by patient attributes” query will return either no match or one or more corresponding patient matches with the associated Health ID and patient demographics attributes. The operator will select the patient from this list and the patient demographics information registered in the

local system. This Health ID is used for the unique identification of a patient and its shared health records in the SeHE System.

- **Exception Flows:** When an operator's query fails (i.e. patient not found), the operator may use the registration web application to reconcile the failure. Typical examples would be a newborn patients, unidentifiable patients, illegal residents or incorrect/insufficient entry of demographic attributes.

The web application would allow for creation of a newborn identifier by the birth details (date of birth, gender, nationality and birth order) and the Mother's Health ID.

The web application would also allow for the creation of a temporary identifier for use in cases of emergency care or natural disaster.

- If the operator was able to successfully obtain the Health ID via the registration web application the operator performs a "Query by ID" (using the Health ID returned by the web application). The Patient Demographics Supplier processes the query and returns a match on the Health ID and other basic demographic attributes such as patient's name, gender, date of birth, etc. This Health ID is used for the unique identification of a patient and its shared health records in SeHE.
- If the operator was unable to successfully obtain the Health ID via the web application, the operator generates and uses a local ID to manage the patient's records. This local ID may or may not be reconciled in the future. For example, Illegal Visitors most likely will not be reconciled; however newborn patients and new residents will be reconciled. If the local ID is not reconciled, the health record is not shared in SeHE.

2.3.1 Specific Workflow Scenarios

The following sections provide various scenarios that complement the use case flow of events by using the defined transactions in a specific way. Some of these scenarios highlight variants to the use case flow of events while others describe local workflow situations that are beyond the scope of the use case but consistent with it. These workflow scenarios are not intended to be an exhaustive list.

2.3.1.1 SCENARIO 1: AN UNIDENTIFIED EMERGENCY PATIENT NEEDS PATIENT CARE

For the situation where the patient is unable to provide basic patient demographic information, such as an unconscious patient receiving emergency care, the operator may use the registration web application to generate a temporary ID. This ID is used to manage the patient's records within the Patient Demographics Consumer. Sharing can proceed then as it would with a Health ID. If they choose not to generate a temporary ID, data cannot be shared, and the operator must wait until the patient is identified or a temporary ID is later assigned.

After the patient's condition has stabilized and the patient is able to provide basic demographic information (e.g. Citizen ID, name, birth date, etc.), the operator is able to obtain the Health ID via the query methods previously discussed. The registration web application can be used to link the temporary Health ID to permanent Health ID. Any information already shared with the temporary Health ID will then be registered by SeHE under the patient's permanent Health ID

and will be accessible from the registry using the patient's Health ID. Once the national Health ID is identified this scenario follows the use case main flow of event.

2.3.1.2 SCENARIO 2: A NEW BORN BABY IS TRANSFERRED AFTER REGISTRATION FOR A NATIONAL HEALTH ID

A new born baby is born in a Healthcare Organization A and Healthcare Organization A applies for a Health ID using the registration web application. A Health ID is assigned to the baby by the Registration Application. Healthcare Organization B acting as a Patient Demographics Consumer can perform a query using attributes such as the Date of Birth, Nationality, Gender, Birth Order and the Mothers National ID (Citizen ID, GCC ID, Iqama Number, etc.). The Patient Demographics Supplier provides a Health ID. This Health ID is used for the baby's health records in the SeHE System.

Once the baby has been assigned a National ID, this will be linked to the baby's Health ID and queries can be issued using the baby's National ID.

3. INTEROPERABILITY SPECIFICATION REQUIREMENTS

A system conforming to this Core Interoperability Specification shall claim conformance at the level of a Use Case Actor. A system may claim conformance to one or more Use Case Actors. Multiple systems may fulfill a Use Case Actor.

The Use Case Actors and the Services they support are described at a functional level in the Saudi eHealth Interoperability Use Case document. Services may be required, conditional or optional. The Use Case Actor, Service(s) and Optionality are conveyed in the first three columns of Table 2.3-1 Interoperability Conformance Requirements.

The second part of the table (columns 4-7) provides the mapping for the Use Case Actor to the detailed specifications (such as IHE Profiles, Technical Actors, Optionality) that systems shall implement to exchange healthcare information in the context of this Use Case.

For a selected Use Case Actor (a single row in the table), all the requirements listed in the second part of the table (columns 4-7) shall be implemented. This includes the referenced healthcare profiles, the standards specified and terminology standards. For each Technical Actor (whether required or optional), the last column references the detailed specification that constrain and extend of the implementation of this profile for Saudi specific requirements. These specifications may be found in Appendices to this core specification or in other referenced Saudi eHealth Interoperability Specifications (e.g. IS0101 *Saudi eHealth Security and Privacy Interoperability Specification*, etc.).

Readers that wish to understand the mapping of Use Case Actors to real world products are recommended to read the Saudi eHealth Interoperability Use Case document.

TABLE 2.3-1 INTEROPERABILITY CONFORMANCE REQUIREMENTS

KSA-WIDE PATIENT DEMOGRAPHIC QUERY			MAPPING TO TECHNICAL DOCUMENTS OF SAUDI EHEALTH INTEROPERABILITY SPECIFICATIONS			
USE CASE ACTOR	SERVICE SUPPORTED	OPT	TECHNICAL ACTOR	OPT	PROFILE/ STANDARD	REFERENCED SPECIFICATION AND COMMENTS
Patient Demographics Consumer	Patient Demographics Query	R	Patient Demographics Consumer	R	IHE - Patient Demographics Query HL7 V3 (PDQv3)	IS0001 Saudi eHealth Core Interoperability Specification for KSA-Wide Patient Demographic Query - Sections 5.1 and 5.2
			Secure Node	R	IHE Audit Trail and Node Authentication (ATNA)	IS0200 Saudi Health Information Exchange Data Dictionary
						IS0101 Saudi eHealth Security and Privacy Interoperability Specification – Sections 3.2.1, 3.2.2 and 3.3.2

			Time Client	R	IHE Consistent Time (CT)	IS0101 Saudi eHealth Security and Privacy Interoperability Specification- Section 3.1.2
Patient Demographics Supplier	Patient Demographics Query	R	Patient Demographics Supplier	R	IHE - Patient Demographics Query HL7 V3 (PDQv3)	IS0001 Saudi eHealth Core Interoperability Specification for KSA-Wide Patient Demographic Query Sections 5.3 and 5.4 IS0200 Saudi Health Information Exchange Data Dictionary
			Secure Node	R	IHE Audit Trail and Node Authentication (ATNA)	IS0101 Saudi eHealth Security and Privacy Interoperability Specification – Sections 3.2.1, 3.2.2 and 3.3.1
			Time Client	R	IHE Consistent Time (CT)	IS0101 Saudi eHealth Security and Privacy Interoperability Specification - Section 3.1.2

R=Required, O = Optional, C= Conditional

3.1 INTEROPERABILITY SEQUENCE DIAGRAMS

The following Sequence Diagrams provide an overview of the combined flow of transactions resulting from the above selected profiles and standards. The Main Flow Sequence Diagram illustrates a very common (i.e., typical) workflow and other sequence diagrams are shown to provide an alternative to the main flow. Other sequence diagrams are possible but they cover the same key transactions with only slight variants of information exchange between the Use Case Actors, therefore, may be omitted. Reference the appropriate sections of Section 2.3 for more information of possible workflow scenarios. Examples are provided below.

3.1.1 Main Flow – Sequence Diagram

The most common methods to match a patient with its identity are to “query by ID” (e.g. citizen Id, Iqama number, etc.) or “query by patient demographics” (name, birthdate, etc.).

A successful “query by ID” query will always return a single match for the patient. A successful “query by patient attributes” query will return one or more corresponding patient matches with the associated Health ID and patient demographics attributes. The operator will select the patient from this list.

Figure 3.1-1 KSA Patient Demographic Query Sequence Diagram provides a high level sequence of events for the exchange of information when matching a patient with its identity along with the typical security exchanges for authorized network communications and audit trail

of patient information access. This figure depicts a number of transactions between IHE Profile Actors specified in Table 2.3-1 Interoperability Conformance Requirements:

1. Time synchronization occurs independently. These transactions may take place at any time and are shown at the beginning of the sequence diagram [IHE CT Profile: Maintain Time ITI-1].
2. The operator registers a patient and needs to query the Patient Demographics Supplier to match the patient to its identity. Before the query transaction can take place, an authentication process and the establishment of an encrypted channel between the Patient Demographics Consumer/Secure Node actor and the Patient Demographics Supplier/Secure Node actor takes place [IHE ATNA Profile: Authenticate Node ITI-19].
3. Following node authentication, the Patient Demographics Consumer initiates the query transaction [HE PDQV3 Profile: Patient Demographics Query HL7V3 ITI-47].
4. The Patient Demographics Consumer generates a local audit record of the access to patient health information [using the data content as defined by IHE ATNA Profile and IHE PDQV3 Profile].
5. The Patient Demographics Supplier processes the query request (i.e. query by ID or query by patient demographics) and responds with one or more patient candidates [IHE PDQV3 Profile: Patient Demographics Query HL7V3 ITI-47].
6. The Patient Demographics Supplier generates an audit record of the access to patient health information [IHE ATNA Profile: Record Audit Event ITI-20].

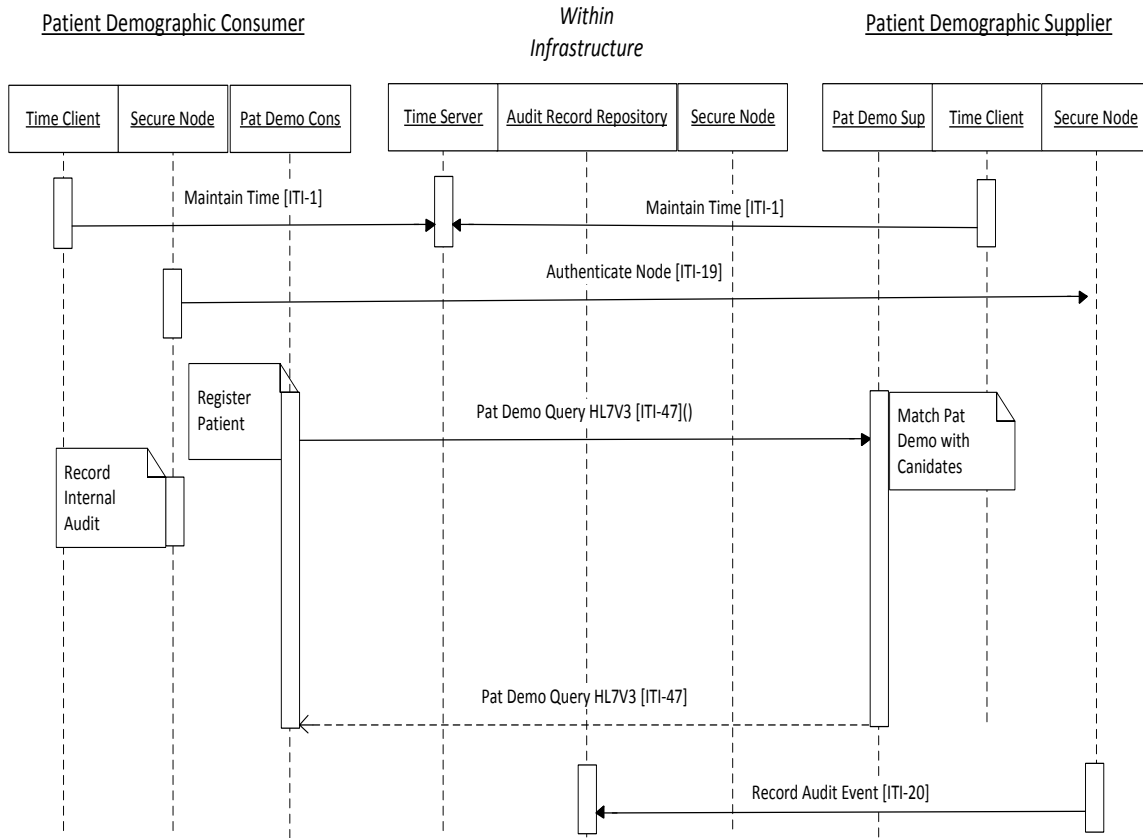


FIGURE 3.1-1 KSA PATIENT DEMOGRAPHIC QUERY SEQUENCE DIAGRAM

3.1.2 Patient Not Found – Sequence Diagram

When an operator’s query to the Patient Demographics Supplier fails, such as the patient was not found, the operator uses a registration web application to reconcile the failure. Typical real world examples would be newborn patients, unidentifiable patients, illegal residents or incorrect/insufficient entry of demographic attributes.

After the patient’s identification is reconciled via the registration web application, the operator re-queries the Patient Demographics Supplier and captures the patient’s demographics and identifiers into its information system.

Figure 3.1-2 Patient Not Found Sequence Diagram provides a high level sequence diagram for the reconciling of an unknown patient along with the typical security exchanges for authorized network communications and audit trail of patient information access. This figure depicts a

number of transactions between IHE Profile Actors specified in Table 2.3-1 Interoperability Conformance Requirements:

1. Time synchronization occurs independently. These transactions may take place at any time and are shown at the beginning of the sequence diagram [IHE CT Profile: Maintain Time ITI-1].
2. The operator registers a patient and wants to query the Patient Demographics Supplier to match the patient to its identity. Before the query transaction can take place, an authentication process and the establishment of an encrypted channel between the Patient Demographics Consumer/Secure Node actor and the Patient Demographics Supplier/Secure Node actor takes place [IHE ATNA Profile: Authenticate Node ITI-19].
3. Following node authentication, the Patient Demographics Consumer initiates the query transaction [IHE PDQV3 Profile: Patient Demographics Query HL7V3 ITI-47].
4. The Patient Demographics Consumer generates a local audit record of the access to patient health information [using the data content as defined by the IHE ATNA Profile and IHE PDQV3 Profile].
5. The Patient Demographics Supplier does not find any possible matches and returns an error response (i.e., no matches found).
6. The operator accesses the registration web application that is integrated with the Patient Demographics Supplier and reconciles the patient with its proper identification.
7. The operator uses the Patient Demographics Consumer to re-query the Patient Demographics Supplier with the correct patient identifiers (Health ID) obtained via the registration web application.
8. The Patient Demographics Supplier processes the query request and responds with correct patient demographics [IHE PDQV3 Profile: Patient Demographics Query HL7V3 ITI-47].
9. The Patient Demographics Supplier generates an audit record of the access to patient health information [IHE ATNA Profile: Record Audit Event ITI-20].

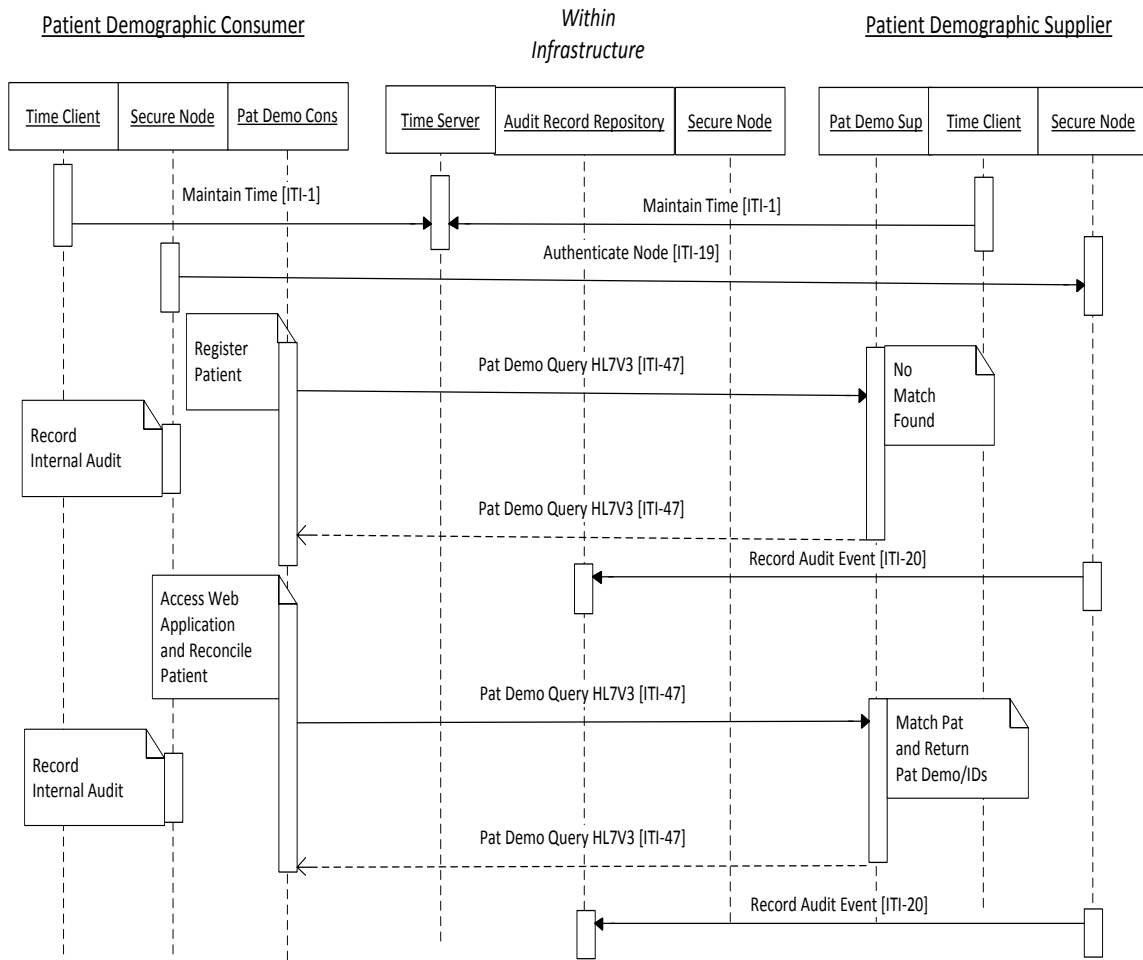


FIGURE 3.1-2 PATIENT NOT FOUND SEQUENCE DIAGRAM

4. CONFORMANCE TO THE KSA-WIDE PATIENT DEMOGRAPHIC QUERY INTEROPERABILITY SPECIFICATION

4.1.1 Patient Demographics Consumer Conformance

Systems may claim conformance to the KSA-Wide Patient Demographic Query Interoperability Specification as a Patient Demographics Consumer as follows:

“KSA-Wide Patient Demographic Query as a Patient Demographics Consumer Use Case Actor”

This requires:

- [KPDQ-001] IHE Patient Demographics Query HL7V3 (PDQV3) Integration Profile as a Patient Demographics Consumer Actor with the additional constraints specified in:
 - IS0001 *Saudi eHealth Core Interoperability Specification for KSA-Wide Patient Demographic Query* –Sections 5.1 and 5.2
 - IS0200 *Saudi Health Information Exchange Data Dictionary*
- [KPDQ-002]- IHE Audit Trail and Node Authentication (ATNA) Integration Profile as a Secure Node Actor with the additional constraints specified in:
 - IS0101 *Saudi eHealth Security and Privacy Interoperability Specification* – Sections 3.2 and 3.3.2
- [KPDQ-003]– IHE Consistent Time (CT) Integration Profile as a Time Client Actor with the additional constraints specified in:
 - IS0101 *Saudi eHealth Security and Privacy Interoperability Specification* - Section 3.1.2

4.1.2 Patient Demographics Supplier Conformance

Systems may claim conformance to the KSA-Wide Patient Demographic Query Interoperability Specification as a Patient Demographics Supplier as follows:

“KSA-Wide Patient Demographic Query as a Patient Demographics Supplier Use Case Actor”

This requires:

- [KPDQ-004]– IHE Patient Demographics Query HL7V3 (PDQV3) Integration Profile as a Patient Demographics Supplier Actor with the additional constraints specified in:
 - IS0001 *Saudi eHealth Core Interoperability Specification for KSA-Wide Patient Demographics Query* – Sections 5.3 and 5.4
 - IS0200 *Saudi Health Information Exchange Data Dictionary*

- [KPDQ-005] – IHE Audit Trail and Node Authentication (ATNA) Integration Profile as a Secure Node Actor with the additional constraints specified in:
 - IS0101 *Saudi eHealth Security and Privacy Interoperability Specification* – Sections 3.2 and 3.3.1
- [KPDQ-006] – IHE Consistent Time (CT) Integration Profile as a Time Client Actor with the additional constraints specified in:
 - IS0101 *Saudi eHealth Security and Privacy Interoperability Specification* – Sections 3.1.2

4.2 KSA-WIDE PATIENT DEMOGRAPHICS DATA ELEMENTS OVERVIEW

The following table provides a high-level overview of the data elements for KSA-Wide Patient Demographics Query Request and Response.

In addition to providing information on the data elements, this table also provides information on whether the data element includes terminology constraints. Some of these data elements are used only for queries while other are only returned and other are used both in queries and returned in responses. Other PDQ attributes not referenced below are constrained as per the underlying IHE PDQ profile.

In case of inconsistency between this table and the constraints specified in Section 5, the later prevails. In particular the optionality for these data elements is specified in details in this Section 5.

ATTRIBUTE NAME	ATTRIBUTE DEFINITION	FOR-MAT	CONSTRAINT SUMMARY*	GENERAL TERMINOLOGY
Health ID	The Unique ID for the individual client entry that will be used to communicate health information	Text	Populated with the unique Health Identification using SHC as the issuing authority: SHC:ID (see [KPDQ-008])	N/A
National ID	National identifier that uniquely identifies an individual.	Text	Reflects The national ID of the client using one of the National ID Issuing Authorities from the set of (Citizen's ID, Iqama ID, Displaced ID, Border Control ID) (see [KPDQ-009], [KPDQ-010], [KPDQ-011], [KPDQ-012])	N/A
GCC ID	National identifier issued by the corresponding GCC country to uniquely identify a GCC citizen.	Text	Reflects the GCC national ID of the client using corresponding country as the issuing authority (see [KPDQ-013])	Country
Visa Number	Visa number generated by the Saudi Embassies to authorize the individual to visit Saudi Arabia.	Text	Reflects the Visa Number of the visitor client using MOI as the issuing authority: MOI:ID (see [KPDQ-014])	N/A

ATTRIBUTE NAME	ATTRIBUTE DEFINITION	FOR-MAT	CONSTRAINT SUMMARY*	GENERAL TERMINOLOGY
Passport Number	Passport number of the visitor/pilgrim used to visit Saudi Arabia.	Text	Reflects the Passport Number of the visitor client using corresponding country as the issuing authority (see [KPDQ-015])	Country
Date of Birth	The date of birth of the client	Date	Reflects the date of birth of the client. (see [KPDQ-019])	N/A
Client Name	Given name(s) of the client	Text	Includes names in both Arabic and English, if known, for all nationalities (see [KPDQ-017])	N/A
Mother Name	Given name(s) of the client's mother	Text	Includes names in both Arabic and English, if known, for all nationalities (see [KPDQ-020])	N/A
Mother National ID	National identifier that uniquely identifies the mother of the individual.	Text	Reflects The national ID of the client's mother using one of the National ID Issuing Authorities from the set of (Citizen's ID, Iqama ID, Displaced ID, Border Control ID) (see [KPDQ-040])	N/A
Birth Order	For the cases of multiple birth cases, this attribute specifies the birth order of the client	Text	includes the birth order of the client (see [KHPD-041])	N/A
Gender	The gender of the client	Coded	Populated using the Gender Value Set (see [KPDQ-018])	Gender
<u>Blood Group (Observation)</u>	The blood group of the client	Coded	Populated with code value "882-1, ABO+Rh group, LOINC" and using KSA Blood Group Value Set (See [KPDQ-046])	KSA Blood Group

5. SAUDI EHEALTH CONSTRAINTS ON THE IHE PATIENT DEMOGRAPHICS QUERY HL7 V3 (PDQV3) PROFILE

This Section specifies Saudi eHealth extensions and constraints to the IHE Patient Demographics Query HL7 V3 (PDQV3) Profile. The reader not familiar with the IHE PDQV3 integration profile and transactions should review IHE ITI TF-1: Section 24.

5.1 REQUIREMENTS FOR PDQ QUERY REQUEST ATTRIBUTES – PATIENT DEMOGRAPHICS CONSUMER ACTOR

- [KPDQ-007] LivingSubjectId - Specifies an identifier associated with the patient whose information is being queried. Multiple instances of the attribute are required to be supported. The Patient Demographics Consumer Actor is required to support the capture of this attribute, and if captured, sending it in the query transaction.

The following types of identifiers shall be supported.

- a) [KPDQ-008] Health ID: The health identifier used for shared patient records stored in the SeHE System. The <value root> identifies the SHC as the Health ID assigning authority and the <extension> identifies the Health ID. The <value root> **SHALL** be set to <value root="2.16.840.1.113883.3.3731.1.1.100.1">.
- b) [KPDQ-009] Citizen ID: The identifier is generated by the National Information Center (NIC) for Saudi citizens. The <value root> identifies the NIC as the Citizen ID assigning authority and the <extension> identifies the Citizen ID. The <value root> **SHALL** be set to <value root="2.16.840.1.113883.3.3731.1.1.100.2">.
- c) [KPDQ-010] Iqama Number: The identifier generated by the NIC for Saudi permanent residents. The <value root> identifies the NIC as the Iqama Number assigning authority and the <extension> identifies the Iqama Number. The <value root> **SHALL** be set to <value root="2.16.840.1.113883.3.3731.1.1.100.3">.
- d) [KPDQ-011] Displaced ID: The identifier generated by the NIC for displaced people. The <value root> identifies the NIC as the Displaced ID assigning authority and the <extension> identifies the Displaced ID. The <value root> **SHALL** be set to <value root="2.16.840.1.113883.3.3731.1.1.100.4">.
- e) [KPDQ-012] Border ID: The identifier generated by the NIC for visitors/pilgrims. The <value root> identifies the NIC as the Border ID assigning authority and the <extension> identifies the Border ID. The <value root> **SHALL** be set to <value root="2.16.840.1.113883.3.3731.1.1.100.5">.
- f) [KPDQ-013] GCC National ID: The identifier generated by the various national issuing authorities for their citizen that come to KSA as GCC national. The <value root> identifies the Nation who is the issuing authority of the GCC National ID and the <extension> identifies the GCC National ID. The <value root> **SHALL** be set to <value root="2.16.840.1.113883.3.3731.1.1.100.6.<ISO 3166-1 alpha-3 Standard (3-character alphabetic codes) for Country codes">.

- g) [KPDQ-014] Visa Number: The identifier generated by the NIC for visitors/pilgrims. The <value root> identifies the NIC as the Visa Number assigning authority and the <extension> identifies the Visa Number. The <value root> **SHALL** be set to <value root="2.16.840.1.113883.3.3731.1.1.100.7">.
- h) [KPDQ-015] Passport Number: The identifier generated by the various national passport issuing authorities for their citizen that come to KSA as visitors/pilgrims. The <value root> identifies the Nation who is the issuing authority of the passport number and the <extension> identifies the Passport Number. The <value root> **SHALL** be set to <value root="2.16.840.1.113883.3.3731.1.1.100.8.< ISO 3166-1 alpha-3 Standard (3-character alphabetic codes) for Country codes">".
- [KPDQ-040] When querying new born babies based upon the Mother's National ID, the attribute LivingSubjectId **SHALL** be used and carry the value of the Mother's National ID. The "Parent.id" **SHALL** be conveyed in the semanticsText field (identifying the semantics being used to search for the new baby's ID is based upon the Mother's National ID). All ID types supported for the attribute LivingSubjectId shall be supported for the Mother's National ID (i.e., such as Citizen ID, Iqama ID, Border ID, etc.). See [KPDQ-007]. The <value root> is dependent on the type of ID being used in the query and **SHALL** follow the specifications for each type of ID specified for the LivingSubjectId.
- [KPDQ-016] The OtherIdScopingOrganization attribute **MAY** be present without the LivingSubjectId to indicate that a specific patient is known to have the corresponding type of identifier (e.g. be a Saudi Citizen), although the identifier's value (e.g. Citizen Id) is not known. The corresponding type of identifier **SHALL** follow the specifications for each type of ID specified for the LivingSubjectId. See [KPDQ-007].
- [KPDQ-017] - LivingSubjectName–Specifies the name of the person whose information is being queried. The Patient Demographics Consumer Actor **SHALL** support the capture of this attribute, and if captured, sending it in the query transaction.
- If patients are known by multiple names or have had a name change, anyone of the alternative names may be captured in a single instance of LivingSubjectName. Multiple Patient Demographics Queries may be needed for each one of these alternative names until a match is found.
 - Both "family" and "given" name elements **SHALL** be sent if captured. The order of given names in the given name list reflects the sequence in which they are known – first, second, third. The first name is specified in the first "given" element in the list. Any middle name(s) are specified in the second and third "given" element in the list.
 - The implementation **SHALL** offer the choice to capture and convey the family and given elements of the LivingSubjectName either all in Arabic or all in Western languages.
 - The query **SHALL** indicate that the name elements specified are not limited to an exact match (i.e. often called "fuzzy" matching). The *use* attribute of the *value* element **SHALL** be set to "SRCH". The Matching Algorithm **SHALL** be set either to "Fuzzy Western Name" or "Fuzzy Arabic Name" (i.e. Fuzzy Arabic Name for the Arabic language, Fuzzy Western Name for the Western Language).

- [KPDQ-018] LivingSubjectAdministrativeGender - Specifies the administrative gender of the person whose information is being queried. The Patient Demographics Consumer Actor **SHALL** support the capture of this attribute, and if captured, sending it in the query transaction.

The supported code values **SHALL** be one of the codes defined in the "Gender" Value Set .

- [KPDQ-019] LivingSubjectBirthTime - Specifies the birth date and time of the person in the Gregorian calendar whose information is being queried. The Patient Demographics Consumer Actor **SHALL** support the capture of this attribute, and if captured, sending it in the query transaction.

The contents **SHALL NOT** contain time but contain the greatest degree of detail among year, month, and day as is available.

Note: If a local User Interface needs to support Hijri formatted entries, then it needs to support Hijri/Gregorian conversion.

- [KPDQ-020] MothersMaidenName - Specifies the name of the mother (birth name of the mother) of the person (placed in Living SubjectName) whose information is being queried. The Patient Demographics Consumer Actor **SHALL** support the capture of the MothersMaidenName attribute, and if captured, sending it in the query transaction.

The ability to convey the MothersMaidenName in both Arabic and Western languages and the required use of “fuzzy” matching is identical to the LivingSubjectName.

- [KPDQ-021] PatientAddress and PatientTelecom **SHALL** not be sent.
- [KPDQ-022] The Patient Demographics Consumer Actor **SHALL** support all combinations of the required and optional (if supported by the Patient Demographics Consumer Actor) query attributes listed in this Section 5.1.
- [KPDQ-041] The multipleBirthOrderNumber - Specifies the order in which a person was born if part of multiple birth. The Patient Demographics Consumer Actor **SHALL** support the capture of the multipleBirthOrderNumber attribute, and if captured, sending it in the query transaction.

Note: It is expected that national practice rules may be defined and place constraints on certain required combinations of attributes (i.e., Citizen ID and Birth Date). These rules are beyond the scope of this Interoperability Specification.

5.2 BEHAVIOR RULES FOR THE PATIENT DEMOGRAPHICS CONSUMER ACTOR

5.2.1 Health ID Format Validation

[KPDQ-052] The Patient Demographic Consumer Actor **SHALL** verify that the patient's national IDs (i.e., Citizen ID, Iqama ID, Displaced ID, Border ID, Visa Number, and Passport Number) are formatted according to the rules defined by Appendix B - *National Identification Format Rules*.

5.2.2 Patient Not Found

When a Patient Demographics Consumer's query to the Patient Demographics Supplier fails (i.e. patient not found), the system supporting the Patient Demographics Consumer actor may use the registration web application to reconcile the failure.

Patient Demographic Consumers are expected to reduce human errors by applying the control according the formatting rules specified Appendix B - *National Identification Format Rules*. Despite such user interface checking some human entry errors may prevent finding a match. Typical examples would be newborn patients, unidentifiable patients, illegal residents or incorrect/insufficient entry of demographic attributes. The behaviors are as follows:

- a. **[KPDQ-023] Newborn Patient:**
 - a. Use the registration web application to register the newborn patient into the Patient Demographics Supplier.
 - b. The Health ID is used as the identifier for the patient's records.
 - c. The patient's records are now available to be shared within SeHE.

- b. **[KPDQ-024] Valid Citizen, Resident or Visitor:**
 - a. Use the registration web application to search for the patient and eventually identify the Health ID for the patient.
 - b. Assuming the Health ID is found (as these are valid patients with identifiers), the Patient Demographics Consumer **SHALL** perform another query to obtain the associated patient demographics. This information is consumed by the system.
 - c. The Health ID is used as the identifier for the patient's records.
 - d. The patient's records are now available to be shared within SeHE.

- c. **[KPDQ-025] Emergency Case: patient is unable to provide basic patient demographic information, or is an Illegal Visitor (or other non-matching cases)**
 - a. Create a temporary Health ID to identify the patient using the registration web application. Use this temporary Health ID to manage the patient's health record and share data using this identifier in the system.
 - b. Upon being able to obtain the patient's demographics (i.e. the patient has stabilized), the Patient Demographics Consumer **SHALL** perform a query to obtain the Health ID and associated patient demographics. This information is consumed by the system.
 - c. The registration web application is used to link the temporary identifier assigned to the patient to their permanent Health ID. SeHE will share

existing records associated with that temporary Health ID to the permanent Health ID.

- d. The Health ID is used as the identifier for the patient’s subsequent records.
- e. The patient’s records are now available to be shared within SeHE.

d. [KPDQ-026] Retired

5.2.3 Maintenance of Cached Health Id and Associated Demographics in Local Edge Systems

- a. [KPDQ-027] Attributes **SHALL** be stored in system upon receipt of the query response
 - a. LivingSubjectName (Arabic and/or Western languages)
 - b. LivingSubjectID which contains the Health ID
 - c. LivingSubjectAdministrativeGender
 - d. LivingSubjectBirthTime
 - e. National IDs, such as the Citizen ID, Iqama Number, Displaced ID, GCC National ID, Border ID
 - f. MothersMaidenName (Arabic and/or Western languages)
 - g. Other attributes not listed may be stored

- b. [KPDQ-028] – A record of the date and time when a query for the patient’s identity is received and a successful match performed **SHALL** be made. This facilitates the ability to generate new queries (i.e. refresh the data). The frequency required for these “refresh” queries are defined as part of the configuration information provided to the Point of Services systems when connected to the SeHE System.

5.2.4 Continuation Option

The Patient Demographics Consumer **MAY** support the Continuation Option defined in the IHE PDQV3 Profile.

[KPDQ-037] - The Patient Demographics Consumer **SHALL** support the receipt in one query response of at least 50 matching patients.

5.2.4 Transaction Content Validation

[KPDQ-038] In addition to the error return specified in Table 0.1.3-2 of IHE ITI TF:2x, the Patient Demographics Consumer Technical Actor **SHALL** support the following error(s) in the **AcknowledgementDetails** attributes:

MCCI_HD000200IHE Send Accept Acknowledgement	This HMD extract defines the transmission wrapper used to send HL7 V3 Accept Acknowledgement. Derived from Figure O.1.2-1 (MCCI_RM000200IHE)
AcknowledgementDetail	Describes the error(s) contained in the target message
typeCode [0..1] AcknowledgementDetail (CS)	Optional detail type indicating if the problem was an error (E), a warning (W), or informational (I).

{CNE:AcknowledgementDetailType}	
code [0..1] AcknowledgementDetail (CE) {CWE:AcknowledgementDetailCode}	An optional coded value, representing the acknowledgement detail being transmitted.
text [0..1] AcknowledgementDetail (ED)	Optional description of the acknowledgement detail being transmitted
location [0..*] AcknowledgementDetail (SET<ST>)	The location within the message where the problem occurred. It is recommended that this is represented via an XPath expression.

These **AcknowledgementDetails** **SHALL** contain the following information about each validation error found:

- typeCode: E or W
- code: a specific value to, with the value: KSAContentValidation”
- text: the textual representation of the error, which includes three concatenated attributes (separated by an underscore delimiter):
 - a. **Sub-error code:** An optional value that represents the exact validation error code (produced by the content validation: e.g. assertion IF that failed the test
 - b. **Location:** The location is the tag at which the error took place
 - c. **Text Message:** The text message returned by the Health Information Exchange (HIE)
- location: N/A

5.3 REQUIREMENTS FOR THE PDQ QUERY RESPONSE – PATIENT DEMOGRAPHICS SUPPLIER ACTOR

[KPDQ-030] – id containing the Health ID **SHALL** be returned. The <value root> identifies the SHC as the Health ID assigning authority and the <extension> identifies the Health ID. The <value root> **SHALL** be set to <value root=“2.16.840.1.113883.3.3731.1.100.1”>.

[KPDQ-031] – Other IDs such as Citizen ID, Iqama number, Border ID, Displaced ID, and GCC National ID, if applicable, **SHALL** be sent using the id attribute. Visa and/or Passport number may be sent using the id attribute. See section 5.1 [KPDQ-007] for the associated assigning authority OIDs for each ID type.

[KPDQ-042] The Patient Demographics Supplier **SHALL** support queries for new born babies based upon the Mother’s National ID being placed in the attribute LivingSubjectId. This is known when the query contains the “Parent.id” value in the semanticsText field (thus identifying the semantics being used to search for the new baby’s ID is based upon the Mother’s National ID). All ID types supported for the attribute LivingSubjectId **SHALL** be supported for the Mother’s National ID (i.e., such as Citizen ID, Iqama ID, Displaced ID, Border ID, and GCC National ID). Upon receipt of such a new born baby query, the match of the Mother’s National ID (and other baby attributes such as birth date, sex, birth order, etc.) to the new born baby is either:

- i. Successful, but the baby’s health ID has not yet been awarded. The id attribute **SHALL** contain a null value for the Health ID for the new born baby. In this

case, the registration application can be used to assign the newborn a Health ID as described in item a under section 5.2.1 Patient Not Found.

- ii. Successful and the baby's health ID has been awarded. The id attribute **SHALL** contain the Health ID for the new born baby.
- iii. Unsuccessful. The returned response **SHALL** indicate 0 matches.

The <value root> identifies the SHC as the Health ID assigning authority and the <extension> identifies the Health ID. The <value root> **SHALL** be set to <value root="2.16.840.1.113883.3.3731.1.1.100.1">.

[KPDQ-032] name containing the name of the person whose information was queried **SHALL** be returned (i.e. may be Arabic and/or Western language). If the name is known in both Arabic and Western languages, two instances of the name **SHALL** be returned.

Both "family" and "given" name element(s) **SHALL** be sent. The order of given names in the given name list reflects the sequence in which they are known – first, second, third. The first name is specified in the first "given" element in the list. Any middle name(s) are specified in the second and third "given" element in the list.

The implementation **SHALL** have ability to convey the family and given elements of the name both all in Arabic and all in Western languages.

The Patient Demographics Supplier Actor **SHALL** support not only an exact match but also "fuzzy" matching. The specifics of these "fuzzy" matching algorithms are not standardized by this Core Interoperability Specification and determined by the Patient Demographics Supplier implementation.

[KPDQ-033] administrativeGenderCode **SHALL** be returned. The returned value **SHALL** be one of the codes defined in the "Gender" Value Set.

[KPDQ-034] birthTime **SHALL** be returned **IF KNOWN**. The contents **SHALL NOT** contain time but **SHALL** contain the greatest degree of detail among year, month, and day as is available. The Gregorian calendar **SHALL** be used.

[KPDQ-035] MothersMaidenName conveys the birth name of the mother of the person whose information is queried. It **SHALL** be processed by the Patient Demographics Supplier Actor both with an exact match but also "fuzzy" matching. The specifics of these "fuzzy" matching algorithms are not standardized by this Core Interoperability Specification and determined by the Patient Demographics Supplier implementation.

[KPDQ-036] addr and telecom **SHALL** not be returned.

[KPDQ-045] The multipleBirthOrderNumber specifies the order in which a person was born if part of multiple birth and **SHALL** be returned **IF KNOWN** and if the person was part of a multiple birth.

[KPDQ-046] The Blood Group specifies the blood group of the client and is conveyed in an <observation> element. The attribute **SHALL** be returned. The <code> identifies the observation is for a blood group and **SHALL** be set to:

```
<code code= '882-1'  
  displayName='ABO+Rh group'  
  codeSystem='1.3.6.1.4.1.12009.10.2.3'  
  codeSystemName='LOINC'
```

The returned <value> **SHALL** be one of the codes defined in the "KSA Blood Group" Value Set. If the <value> is unknown it will be conveyed as not available and **SHALL** be set to <value nullFlavor='NAV'>.

5.4 BEHAVIOR RULES FOR THE PATIENT DEMOGRAPHICS SUPPLIER ACTOR

5.4.1 Health ID Format and Management Rules

The format and management of the Health ID is not constrained by this Interoperability Specification beyond the format of the Health ID defined in [KPDQ-007], see Section 1.

The value placed in the <extension> of the Health ID **SHALL** be unique (i.e., never reassigned for other patients, and no person **SHALL** have two health IDs). This Core Interoperability Specification does not constrain the relationship of this Health ID <extension> with the patient's corresponding national ID(s). This includes both current and prior IDs (i.e., Citizen ID, Iqama Number, Displaced ID, Border ID and GCC National ID). It is the implementation of the Patient Demographics Supplier Actor responsibility to ensure persons that undergo change in their national IDs (e.g. a permanent resident with an Iqama Number receives a Citizen ID when becoming a Saudi Citizen) does not change their Health ID.

[KPDQ-050] Retired.

5.4.2 Patient Not Found Expected Actions

The section defines additional expected actions for the case when the Patient Demographics Supplier Actor finds no patients matching the criteria sent in the query parameters.

[KPDQ-047] The Patient Demographics Supplier **SHALL** respond to the query request when no patient is found as described by the following case:

AA (application accept) is returned in Acknowledgement.typeCode (transmission wrapper).

NF (data found, no errors) is returned in QueryAck.queryResponseCode (control act wrapper)

There is no RegistrationEvent returned in the response. The Patient Demographics Consumer **SHOULD** assume the Patient Demographics Supplier was unable to find any matches for this query request.

5.4.3 Continuation Option

The Patient Demographics Supplier **MAY** support the Continuation Option defined in the IHE PDQV3 Profile. It **SHALL** support the sending in one query response with at least 20 matching patients.

[KPDQ-048] - The Patient Demographics Supplier **SHALL** be configurable to limit the number of returned matching patient to a specific maximum value ranging between 1 and 50.

5.4.4 Problems in Handling Query Requests

[KPDQ-049] The Patient Demographics Supplier **SHALL** inform the Patient Demographics Consumer when it encounters problems handling the Query request.

The Patient Demographics Supplier **MAY** code a DetectedIssueEvent within the controlActProcess element, where the code in the detectedIssueManagement element references one of the coded elements described in Table 5.4-1 Coded values for codeSystem=1.3.6.1.4.1.19376.1.2.27.3.

Note: This level of error handling is absent from IHE PDQ, however is defined in IHE Cross-Community Patient Discovery (XCPD). It is applicable to PDQ, therefore is specified in this Interoperability Specification.

TABLE 5.4-1 CODED VALUES FOR CODESYSTEM=1.3.6.1.4.1.19376.1.2.27.3

VALUE FOR CODE	MEANING OF CODE
ResponderBusy	The responder was not able to process the request because it is currently overloaded.
AnswerNotAvailable	The answer is not available. Human intervention may be needed.
InternalError	The responder was not able to respond due to an internal error or inconsistency.

The following example shows part of a response specifying that the responder is busy.

```
<detectedIssueEvent classCode="ALRT" moodCode="EVN">
  <code code="ActAdministrativeDetectedIssueCode"
    codeSystem="2.16.840.1.113883.5.4"/>
  <mitigatedBy typeCode="MITGT">
    <detectedIssueManagement classCode="ACT" moodCode="EVN">
      <code code="ResponderBusy"
        codeSystem="1.3.6.1.4.1.19376.1.2.27.3"/>
    </detectedIssueManagement>
  </mitigatedBy>
</detectedIssueEvent>
```


5.4.5 Transaction Content Validation

[KPDQ-051] The Patient Demographics Supplier Technical Actor **MAY** validate transaction content. To report such attribute content validation errors, it **SHALL** support the return of error(s) as specified in Table 0.1.3-2 of IHE ITI TF:2x, in the **AcknowledgementDetails** attributes:

MCCI_HD000200IHE Send Accept Acknowledgement	This HMD extract defines the transmission wrapper used to send HL7 V3 Accept Acknowledgement. Derived from Figure O.1.2-1 (MCCI_RM000200IHE)
AcknowledgementDetail	Describes the error(s) contained in the target message
typeCode [0..1] AcknowledgementDetail (CS) {CNE:AcknowledgementDetailType}	Optional detail type indicating if the problem was an error (E), a warning (W), or informational (I).
code [0..1] AcknowledgementDetail (CE) {CWE:AcknowledgementDetailCode}	An optional coded value, representing the acknowledgement detail being transmitted.
text [0..1] AcknowledgementDetail (ED)	Optional description of the acknowledgement detail being transmitted
location [0..*] AcknowledgementDetail (SET<ST>)	The location within the message where the problem occurred. It is recommended that this is represented via an XPath expression.

These **AcknowledgementDetails** **SHALL** contain the following information about each validation error found:

- typeCode: E or W
- code: a specific value to, with the value: "KSAContentValidation"
- text: the textual representation of the error, which includes three concatenated attributes (separated by an underscore delimiter):
 - d. **Sub-error code:** An optional value that represents the exact validation error code (produced by the content validation: e.g. assertion IF that failed the test
 - e. **Location:** The location is the tag at which the error took place
 - f. **Text Message:** The text message returned by the Health Information Exchange (HIE)
- location: N/A

6. REFERENCED DOCUMENTS AND STANDARDS

The following Saudi eHealth documents are referenced by this interoperability specification.

TABLE 6-1 INTERNAL REFERENCES

DOCUMENT OR STANDARDS	DESCRIPTION
IS0101 Saudi eHealth Security and Privacy Interoperability Specification	Specifies the interoperability standards and profiles along with the Saudi specific constraints that are required to provide the technical security measures, data protection, and privacy management that will facilitate the implementation of the Saudi eHealth Policies for Health Information Exchange in the Kingdom of Saudi Arabia among communicating IT systems.
IS0200 Saudi Health Information Exchange Data Dictionary	Specifies the terminology concepts and associated coded value sets for data elements used throughout the Saudi eHealth Interoperability Specifications.
UC0001 Saudi eHealth Patient Identification Interoperability Use Case	This Use Case describes the capability to match a patient with his/her identity. This capability is accessible to various "edge" applications including point of care systems and business applications. It uses a set of patient demographic attributes (name, birth date, gender, etc.) and a unique nation-wide identifier called a Health ID. A Health ID is registered for Saudi citizens, residents, displaced people, GCC nationals and visitors/pilgrims. This Health ID is used for the unique identification of a patient and his/her health records. This Health ID and associated demographic attributes are managed centrally by a "patient client registry" system so that the information may be widely accessed via queries against such a registry.
UC0003 Saudi eHealth Laboratory Interoperability Use Case	The Laboratory Use Case describes the capability to share laboratory test results and to initiate a coded laboratory order, and making them accessible via the national Saudi Health Information Exchange (HIE) platform.
UC0005 Saudi eHealth Imaging Interoperability Use Case	The Imaging Use Case describes the capability to share imaging reports and images and also supports the submission of a tele-radiology order to a remote tele-radiology service via the national Saudi Health Information Exchange (HIE) platform.
IS0106 Saudi eHealth Clinical Documents Constrains Interoperability Specifications	Specifies common constraints for clinical documents such as data elements of document headers that are common across the Saudi eHealth Project.

TABLE 6-2 EXTERNAL REFERENCES

DOCUMENT OR STANDARD	DESCRIPTION
IHE IT Infrastructure (ITI) Technical Framework – Volume 1 (ITI TF-1) Integrations Profiles - Patient Demographics Query HL7 V3 (PDQV3) – Section 24	Provides ways for multiple distributed applications to query a patient information server for a list of patients, based on user-defined search criteria, and retrieve a patient's demographic information directly into the application. This profile uses HL7 V3 as the message format, and SOAP-based web services for transport. May be obtained at http://www.ihe.net/Technical_Frameworks/#iti

DOCUMENT OR STANDARD	DESCRIPTION
IHE IT Infrastructure Technical Framework Supplement – Cross-Community Patient Discovery (XCPD) -- Trial Implementation	Complements the XCA profile by supporting the ability to locate communities which hold a patient's relevant health data and the translation of patient identifiers across communities holding the same patient's data. May be obtained at http://www.ihe.net/Technical_Frameworks/#iti

7. APPENDIX A – SAMPLE MESSAGES

7.1 SAMPLE PATIENT DEMOGRAPHICS QUERY REQUEST

This example provides a sample query request in the case of a generic IHE PDQ example. It will be customized for KSA specifics in a future update to this specification.

```
<?xml version="1.0" encoding="UTF-8"?>
<PRPA_IN201305UV02 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="urn:hl7-org:v3" xsi:schemaLocation="urn:hl7-org:v3
../../schema/HL7V3/NE2008/multicacheschemas/PRPA_IN201305UV02.xsd"
ITSVersion="XML_1.0">
  <id root="1.2.840.114350.1.13.0.1.7.1.1" extension="35423"/>
  <creationTime value="20070428150301"/>
  <interactionId root="2.16.840.1.113883.1.6" extension="PRPA_IN201305UV02"/>
  <processingCode code="T"/>
  <processingModeCode code="I"/>
  <acceptAckCode code="AL"/>
  <receiver typeCode="RCV">
    <device classCode="DEV" determinerCode="INSTANCE">
      <id root="1.2.840.114350.1.13.999.234"/>
      <telecom value="http://servicelocation/PDQuery"/>
    </device>
  </receiver>
  <sender typeCode="SND">
    <device classCode="DEV" determinerCode="INSTANCE">
      <id root="1.2.840.114350.1.13.999.567"/>
    </device>
  </sender>
  <controlActProcess classCode="CACT" moodCode="EVN">
    <code code="PRPA_TE201305UV02" codeSystem="2.16.840.1.113883.1.6"/>
    <queryByParameter>
      <queryId root="1.2.840.114350.1.13.28.1.18.5.999" extension="18204"/>
      <statusCode code="new"/>
      <initialQuantity value="2"/>
      <matchCriterionList>
        <minimumDegreeMatch>
          <value xsi:type="INT" value="75"/>
          <semanticsText>Degree of match requested</semanticsText>
        </minimumDegreeMatch>
      </matchCriterionList>
      <parameterList>
        <livingSubjectAdministrativeGender>
          <value code="M"/>
          <semanticsText>LivingSubject.administrativeGender</semanticsText>
        </livingSubjectAdministrativeGender>
        <livingSubjectBirthTime>
          <value value="19630804"/>
          <semanticsText>LivingSubject..birthTime</semanticsText>
        </livingSubjectBirthTime>
        <livingSubjectName>
          <value>
            <given>Jimmy</given>
            <family>Jones</family>
          </value>
          <semanticsText>LivingSubject.name</semanticsText>
        </livingSubjectName>
      </parameterList>
    </queryByParameter>
  </controlActProcess>
</PRPA_IN201305UV02>
```

```

</livingSubjectName>
<otherIDsScopingOrganization>
  <value root="1.2.840.114350.1.13.99997.2.3412"/>
  <semanticsText>OtherIDs.scopingOrganization.id</semanticsText>
</otherIDsScopingOrganization>
<otherIDsScopingOrganization>
  <value root="2.16.840.1.113883.4.1"/>
  <semanticsText>OtherIDs.scopingOrganization.id</semanticsText>
</otherIDsScopingOrganization>
<otherIDsScopingOrganization>
  <value root="1.2.840.114350.1.13.99998.8734"/>
  <semanticsText>OtherIDs.scopingOrganization.id</semanticsText>
</otherIDsScopingOrganization>
</parameterList>
</queryByParameter>
</controlActProcess>
</PRPA_IN201305UV02>

```

7.2 SAMPLE PATIENT DEMOGRAPHICS QUERY RESPONSE

This example provides a sample query response in the case of a generic IHE PDQ example. It will be customized for KSA specifics in a future update to this specification.

```

<?xml version="1.0" encoding="UTF-8"?>
<PRPA_IN201306UV02 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="urn:hl7-org:v3" xsi:schemaLocation="urn:hl7-org:v3
../../schema/HL7V3/NE2008/multicacheschemas/PRPA_IN201306UV02.xsd"
ITSVersion="XML_1.0">
  <id root="1.2.840.114350.1.13.999.238" extension="55789"/>
  <creationTime value="20070428150302"/>
  <interactionId root="2.16.840.1.113883.1.6" extension="PRPA_IN201306UV02"/>
  <processingCode code="T"/>
  <processingModeCode code="I"/>
  <acceptAckCode code="NE"/>
  <receiver typeCode="RCV">
    <device classCode="DEV" determinerCode="INSTANCE">
      <id root="1.2.840.114350.1.13.999.567"/>
    </device>
  </receiver>
  <sender typeCode="SND">
    <device classCode="DEV" determinerCode="INSTANCE">
      <id root="1.2.840.114350.1.13.999.234"/>
      <telecom value="http://servicelocation/PDQuery"/>
    </device>
  </sender>
  <acknowledgement>
    <typeCode code="AA"/>
    <targetMessage>
      <id root="1.2.840.114350.1.13.0.1.7.1.1" extension="35423"/>
    </targetMessage>
  </acknowledgement>
  <controlActProcess classCode="CACT" moodCode="EVN">
    <code code="PRPA_TE201306UV02" codeSystem="2.16.840.1.113883.1.6"/>
    <subject typeCode="SUBJ">
      <registrationEvent classCode="REG" moodCode="EVN">
        <id nullFlavor="NA"/>
        <statusCode code="active"/>
      </registrationEvent>
    </subject>
  </controlActProcess>

```

```

<subject1 typeCode="SBJ">
  <patient classCode="PAT">
    <id root="1.2.840.114350.1.13.99998.8734" extension="34827K410"/>
    <statusCode code="active"/>
    <patientPerson>
      <name>
        <given>James</given>
        <family>Jones</family>
      </name>
      <telecom value="tel:+1-481-555-7684;ext=2342" use="WP"/>
      <telecom value="tel:+1-765-555-4352" use="HP"/>
      <administrativeGenderCode code="M"/>
      <birthTime value="19630804"/>
      <addr>
        <streetAddressLine>3443 North Arctic
Avenue</streetAddressLine>
        <city>Some City</city>
        <state>IL</state>
      </addr>
      <asOtherIDs classCode="PAT">
        <id root="1.2.840.114350.1.13.99997.2.3412"
extension="38273D433"/>
        <scopingOrganization classCode="ORG"
determinerCode="INSTANCE">
          <id root="1.2.840.114350.1.13.99997.2.3412"/>
        </scopingOrganization>
      </asOtherIDs>
      <asOtherIDs classCode="CIT">
        <id root="2.16.840.1.113883.4.1" extension="999-88-6345"/>
        <scopingOrganization classCode="ORG"
determinerCode="INSTANCE">
          <id root="2.16.840.1.113883.4.1"/>
        </scopingOrganization>
      </asOtherIDs>
    </patientPerson>
    <providerOrganization classCode="ORG" determinerCode="INSTANCE">
      <id root="1.2.840.114350.1.13.99998.8734"/>
      <name>Good Health Clinic</name>
      <contactParty classCode="CON">
        <telecom value="tel:+1-342-555-8394"/>
      </contactParty>
    </providerOrganization>
    <subjectOf1>
      <queryMatchObservation classCode="COND" moodCode="EVN">
        <code code="IHE_PDQ"/>
        <value xsi:type="INT" value="92"/>
      </queryMatchObservation>
    </subjectOf1>
  </patient>
</subject1>
<custodian typeCode="CST">
  <assignedEntity classCode="ASSIGNED">
    <id root="1.2.840.114350.1.13.99998.8734"/>
  </assignedEntity>
</custodian>
</registrationEvent>
</subject>

```

```

<subject typeCode="SUBJ">
  <registrationEvent classCode="REG" moodCode="EVN">
    <id nullFlavor="NA"/>
    <statusCode code="active"/>
    <subject1 typeCode="SBJ">
      <patient classCode="PAT">
        <id root="1.2.840.114350.1.13.99998.8734" extension="34827R534"/>
        <statusCode code="active"/>
        <patientPerson>
          <name>
            <given>Jim</given>
            <family>Jones</family>
          </name>
          <telecom value="tel:+1-795-555-4745" use="HP"/>
          <administrativeGenderCode code="M"/>
          <birthTime value="19630713"/>
          <addr>
            <streetAddressLine>8734 Blue Ocean Street</streetAddressLine>
            <city>Other City</city>
            <state>IL</state>
          </addr>
          <asOtherIDs classCode="CIT">
            <id root="2.16.840.1.113883.4.1" extension="999-89-3300"/>
            <scopingOrganization classCode="ORG"
determinerCode="INSTANCE">
              <id root="2.16.840.1.113883.4.1"/>
            </scopingOrganization>
          </asOtherIDs>
        </patientPerson>
        <providerOrganization classCode="ORG" determinerCode="INSTANCE">
          <id root="1.2.840.114350.1.13.99998.8734"/>
          <name>Good Health Clinic</name>
          <contactParty classCode="CON">
            <telecom value="tel:+1-342-555-8394"/>
          </contactParty>
        </providerOrganization>
        <subjectOf1>
          <queryMatchObservation classCode="COND" moodCode="EVN">
            <code code="IHE_PDQ"/>
            <value xsi:type="INT" value="85"/>
          </queryMatchObservation>
        </subjectOf1>
      </patient>
    </subject1>
    <custodian typeCode="CST">
      <assignedEntity classCode="ASSIGNED">
        <id root="1.2.840.114350.1.13.99998.8734"/>
      </assignedEntity>
    </custodian>
  </registrationEvent>
</subject>
<queryAck>
  <queryId root="1.2.840.114350.1.13.28.1.18.5.999" extension="18204"/>
  <queryResponseCode code="OK"/>
  <resultTotalQuantity value="5"/>
  <resultCurrentQuantity value="2"/>
  <resultRemainingQuantity value="3"/>

```

```
</queryAck>
<queryByParameter>
  <queryId root="1.2.840.114350.1.13.28.1.18.5.999" extension="18204"/>
  <statusCode code="new"/>
  <initialQuantity value="2"/>
  <parameterList>
    <livingSubjectAdministrativeGender>
      <value code="M"/>
      <semanticsText>LivingSubject.administrativeGender</semanticsText>
    </livingSubjectAdministrativeGender>
    <livingSubjectBirthTime>
      <value value="19630804"/>
      <semanticsText>LivingSubject..birthTime</semanticsText>
    </livingSubjectBirthTime>
    <livingSubjectName>
      <value>
        <given>Jimmy</given>
        <family>Jones</family>
      </value>
      <semanticsText>LivingSubject.name</semanticsText>
    </livingSubjectName>
    <otherIDsScopingOrganization>
      <value root="1.2.840.114350.1.13.99997.2.3412"/>
      <semanticsText>OtherIDs.scopingOrganization.id</semanticsText>
    </otherIDsScopingOrganization>
    <otherIDsScopingOrganization>
      <value root="2.16.840.1.113883.4.1"/>
      <semanticsText>OtherIDs.scopingOrganization.id</semanticsText>
    </otherIDsScopingOrganization>
    <otherIDsScopingOrganization>
      <value root="1.2.840.114350.1.13.99998.8734"/>
      <semanticsText>OtherIDs.scopingOrganization.id</semanticsText>
    </otherIDsScopingOrganization>
  </parameterList>
</queryByParameter>
</controlActProcess>
</PRPA_IN201306UV02>
```


8. APPENDIX B – NATIONAL IDENTIFICATION FORMATTING RULES

8.1 EHEALTH ID

The eHealth ID has to be 14 digits and must not be a sequential.

8.2 CITIZEN ID

The Citizen ID has to be 10 digits, numeric, and the first digit must be 1.

8.3 RESIDENT ID AND DISPLACED ID

The Resident ID and Displaced ID has to be 10 digits, numeric, and the first digit must be 2.

8.4 BORDER ID

The Border ID has to be 10 digits, numeric, and the first digit must be either 3 or 5.

8.5 VISA NUMBER

The Visa number has to be 10 digits, numeric.

8.6 PASSPORT NUMBER

The passport number has to be a string with a maximum of 12 characters.

Note: The function below may be used to validate the National ID, Iqama ID and Displaced ID:

```
public static boolean isNationalNumber(String nationalNumber) {
    if (!isBegin(nationalNumber, "127") || !isNumeric
(nationalNumber) || !isLength(nationalNumber, 10))
        return false;
    char[] charArray = nationalNumber.toCharArray();
    int[] numArray = new int[10];
    for (int i = 0; i < charArray.length; i++) {
        numArray[i] = Character.getNumericValue(charArray[i]);
    }
    int sum = 0;
    for (int i = 0; i < numArray.length - 1; i++) {
        if (i % 2 != 0) {
            sum += numArray[i];
        } else {
            int oddByTwo = numArray[i] * 2;
            String oddByTwoString = String.valueOf(oddByTwo);
```

```
int[] oddByTwoArray = new int[oddByTwoString.length ()];
int oddByTwoSum = 0;
for (int j = 0; j < oddByTwoArray.length; j++) {
    oddByTwoArray[j] = Character.getNumericValue
(oddByTwoString.charAt(j));
    oddByTwoSum += oddByTwoArray[j];
}
sum += oddByTwoSum;
}
}
```