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Enabling Standards-Based eHealth Interoperability

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Saudi eHealth Patient Identification Interoperability Use Case

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1.0	April 21, 2016	First Release	Saudi Health Council

PREFACE

KEY CONCEPTS

Key concepts used in this document are introduced below. Consult *ISO302 SeHE Project Glossary* for other terms used within this document.

Interoperability Use Case: In software engineering, a Use Case is a technique for capturing the requirements of a new or updated system. Each Use Case provides one or more business scenarios that convey how the system should interact with end-users or other systems to achieve a specific business goal. Interoperability Use Cases use language that end-users and domain experts can understand, rather than technical jargon. Use Cases are often co-authored or co-developed by business analysts and end-users.

Business Scenario: The business scenario is defined as a sequence of activities by one or more users (e.g. patients, clinicians, etc.) that describe a real-world story. A business scenario executes one or more business processes in a sequence of end-user interactions called a process flow. Business scenarios are the starting point of the analysis leading to the discovery of actors and services necessary to meet the requirements of the assigned Use Case.

Actors: In this specification actors describe the interoperable software components which support interoperable exchanges of information between systems.

Services: Services describe collections of capabilities of a system that enable communication and exchange through standards-based messages and information content. A capability within a service describes the smallest unit of useful work that facilitates information exchange between systems.

Process Flow: A process flow represents a possible sequence of business processes being executed to perform the work of the Use Case. Process flows are identified by analysis of business scenarios through the identification of common reusable sequences of business processes.

Main Flow: The main flow of a Use Case usually describes the simplest path through the smallest set of business processes necessary to complete the work of the Use Case. It describes the minimal skeleton of the Use Case which appears in common across the various business scenarios which explore the scope of the Use Case. The main flow is the sequence of business processes that is both common to and required to be executed in all normal business scenarios.

Alternative Flow: Alternative flows describe additional paths that can be taken to provide additional capabilities to the main flow of work. Alternative flows are described as auxiliary paths that can be added-on to the main flow in one or more locations.

Exception Flow: Exception flows describe alterations to the main flow under exceptional or out of the ordinary circumstances. The existence of exception flows allows for alternative exit paths from the main flow that allow a work flow to complete under extreme situations, even though it deviates from the main flow.

Business Process: A business process is a reusable unit of interaction between an end-user and one or more information systems. Business processes perform work through the execution of services provided in the information system environment.

APPROACH

The approach used to develop this Use Case specification starts with the identification of a stakeholder group of end-users, beneficiaries and implementers of systems which may be affected by implementation of Interoperability Specifications supporting the Use Cases in the work stream described by this document. These stakeholders identify real-world scenarios in which users and other individuals (e.g., patients) interact with systems to perform or receive a service. The process used is as follows:

- Scenarios are identified by first identifying the simplest (but not necessarily the most common) case in which the Use Case can be completed. More complex scenarios are added which illustrate the range of complexity of the Use Case until essential requirements have been identified.
- Through analysis of these scenarios, a main flow, and often one or more alternative and exception flows are identified. These process flows identified need not match one-to-one with the real-world scenarios originally used to explore the Use Case; however, they are derived from them.
- The process flows are decomposed into business processes, where a business process is described as an end-user initiated interaction with one or more systems in order to complete some essential task in the Use Case.
- The systems and business processes are analyzed to identify the common system components (Actors) responsible for supporting the end-user in the work being done.
- The actors and business processes are further analyzed to identify the necessary services which support the requirements identified in the Use Case.
- The collection of actors and services forms the solution space for the Use Case, representing the system components and the interoperability that is necessary to meet the requirements of the Use Case.
- From business scenarios implemented by systems and operated by users to actors and services, the derivation of the service model can be shown through a clear progress of analysis.

Lastly, stakeholders contribute candidate data elements to the use case that support the information exchanges identified in the business scenarios.

CONVENTIONS

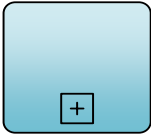
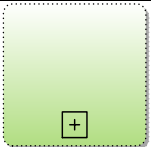
This document has adopted the following conventions for representing the Use Case concepts and information workflow.

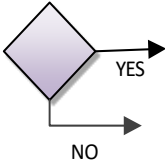
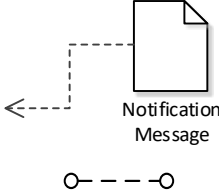
Process Flow Diagrams

The descriptions of interoperability Use Cases that follow include process flow diagrams that illustrate a series of visual representation of related tasks that a person, business, and/or system executes to achieve a desired outcome of the Use Case. The process flow diagrams are created using the Business Process Modeling Notation (BPMN) format. The notations of the diagram represent different shape such as an event (a circle shape denotes start/end of process), an activity (a rectangle describes actions performed by the actor), a gateway (diamond shape determines forking and merging of paths depending on the conditions expressed), and a connector to show in which order the activities are performed and the intermingling of actions between actors and other systems. Complete explanations of the business process diagram elements used within this document are in the table below.

There are main process flows, followed by optional alternative or exception flows.

TABLE 2.1-1 SEHE BUSINESS PROCESS MODELING NOTATION CONVENTIONS

SHAPE	DESCRIPTION
 Start	Start event acts as a trigger to launch the business process.
 End	End event acts as a trigger to terminate the business process.
	Activity that represented with a rounded-corner rectangle and describes systematic action performed by the actor
	Sub-process used to denote additional levels of business process by referring to an action that can be broken down to a finer level of details or to another business process name.
	External activity that represented with a rounded-corner rectangle and describes systematic action performed by the actor
	External sub-process used to denote additional levels of business process by referring to an action that can be broken down to a finer level of details or to another business process name.

SHAPE	DESCRIPTION
	Activity that represented with a light colored rectangle and describes physical action performed by the actor
	Gateway that determines forking and merging of paths depending on the conditions expressed
	Sequence flow that shows in which order the activities are performed and the intermingling of actions between different actors or other systems.
	Message flow that shows the flow of messages between two actors or systems that are prepared to send and receive messages.
Send Notification 	Message event used to send a message and to invoke other activity within the business processes then the token will immediately moves to the invoked flow of the process

Requirements Language

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

SHALL: the definition is an absolute requirement of the specification.

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.

PROJECT PURPOSE

The National eHealth strategy has established a number of key business objectives for the Saudi eHealth program including the definition and implementation of healthcare applications to support critical business scenarios.

Within this overarching strategy, an eHealth Standards-based Interoperability Specification and Policy project has been identified, with scope defined to:

- Deliver the Interoperability Specifications (i.e. standards, profiles, terminologies, etc.)
- Deliver test plans, test tools, and testing and certification policies to support the associated conformance testing for new and existing information systems (Hospital Information Systems [HIS], Primary Healthcare [PHC] Systems, Electronic Medical Record [EMR] Systems, Laboratory Information Systems [LIS], Radiology Information Systems [RIS]/ Picture and Archiving Communication Systems [PACS], etc.). These test plans, test tools, and testing and certification policies will ensure that these systems connect to the a Saudi Health Information Exchange (HIE) platform and its internal Systems which includes patient identification management, provider directory, document and image repository, and access control, etc.
- Establish the policies for health information exchange in Saudi Arabia. These policies ensure trust relationships between the various healthcare organizations sharing information as well as the health professionals and patients in the Kingdom.

¹ Definitions based upon RFC 2119

The project's goal is to enable interoperability and to mainly specify the external interfaces of the local edge systems (i.e. point of care HIS or PHC applications), without constraining:

- The local systems' internal design
- The intra-organization interoperability policies or management processes used to implement such policies.

FIGURE 2.1- 1 SCOPE OF EHEALTH STANDARD BASED INTEROPERABILITY SPECIFICATIONS AND POLICY PROJECT depicts the general scope and focus of the project highlighted in red.

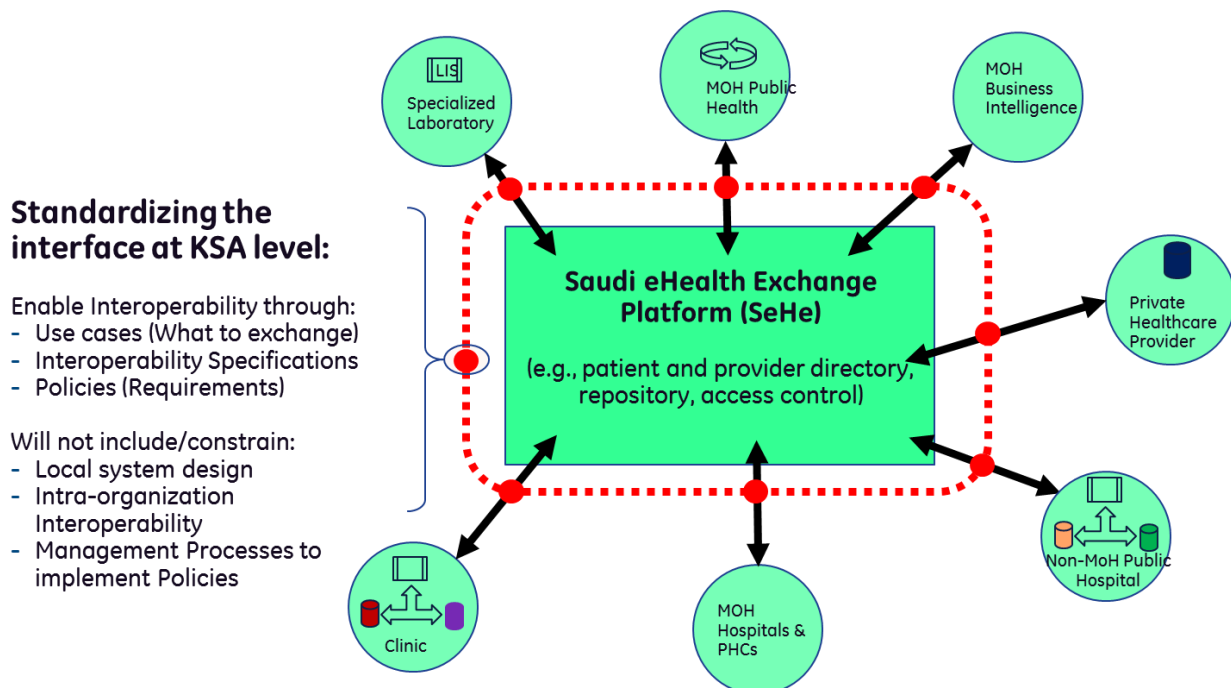


FIGURE 2.1- 1 SCOPE OF EHEALTH STANDARD BASED INTEROPERABILITY SPECIFICATIONS AND POLICY PROJECT

REFERENCES

Saudi eHealth Interoperability Specification Document

A Saudi eHealth Interoperability Specification documents the selection of profiles and standards that support specific Saudi eHealth Interoperability Use Cases. Such Interoperability Specifications apply to new and existing information systems (HIS, PHC, Laboratory, etc.) and ensure their connection to the national Saudi Health Information Exchange platform (HIE).

Saudi Health Information Exchange Policy Document

IS0303 *Saudi Health Information Exchange Policies* is used to set the policies applicable to users and systems connected to the HIE Platform.

Examples of such policies are:

- Authentication Policy
- Consent and Access Control Policy
- Identity Management Policy
- Breach Notification Policy
- Others

The Use Cases specified in this document operate within the context of these Health Information Exchange policies.

MIDDLE- OUT METHODOLOGY

Like most eHealth programs around the world, the challenge to identify and document a large number of business Use Cases and variants is avoided by using a “middle-out” methodology. The core requirements start with the Interoperability Use Cases, especially when those are “classical Use Cases” that have been analyzed by the profiles and standards development organizations in their prior work.

illustrates the main steps of this methodology, where the knowledge of the array of Business Scenarios come from the stakeholders and a validation performed through their experiences (i.e., issues and gaps corrected based on their feedback).

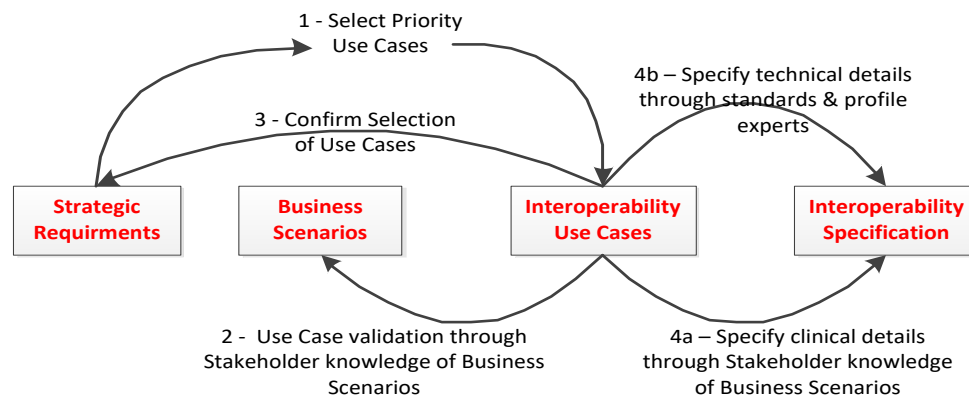


FIGURE 2.1- 2 METHODOLOGY STEPS FOR THE EHEALTH STANDARDS-BASED INTEROPERABILITY SPECIFICATIONS AND POLICY PROJECT

The Interoperability Use Cases provide a description of the workflows that need to be addressed and the main exception situations. They are not expected to cover all design details in term of error codes, data element specification and terminology code sets to be used.

This level of detail is appropriately addressed in the Interoperability Specification (See step 4a in the diagram methodology steps). It contains the detailed design specification against which

implementations will be tested and certified. An Interoperability Use Case is a scoping document and is a stepping stone to the development of a Saudi eHealth Core Interoperability Specification and supporting Saudi eHealth Core Interoperability Specifications. Together these Interoperability Specifications cover five complementary aspects:

- The specification of the information transport running above the Internet TCP/IP layer.
- The specification of one or more data exchange services suitable for the workflow needed by the Use Case that runs over the above transport.
- The specification of one or more information content data structure enabling the structured representation of the health information data elements and their specific attributes to be conveyed.
- The specification of one set of coded values, each to be placed into a specific attribute of a selected data elements to be conveyed by the above data structure.
- The specification of the technical measures to ensure security and privacy of the information conveyed and accessed.

These Interoperability Specifications and the standards and profiles they reference are designed to form a complete specification covering all aspects necessary to achieve the standards-based exchange of information across the HIE Platform (except for interoperability policy matters that are addressed separately). The Saudi eHealth Interoperability Specifications are the authoritative documents for software implementers and system deployment teams.

As a consequence, rigorous but concise test plans (i.e., a set of test scripts) may be developed and when executed result in a reasonable assurance of interoperability between successfully tested systems. Such testing for interoperability may be performed against test tools as well as between systems under test; a combination widely accepted as the most efficient testing process. These test plans and test tools provide closure against the Core Interoperability Specifications and Supporting Interoperability Specifications, thus bringing the necessary level of quality in interoperable IT systems development and deployment. This is depicted in FIGURE 2.1- 3 VERIFICATION OF CONFORMANCE TO A CORE SAUDI EHEALTH INTEROPERABILITY SPECIFICATION

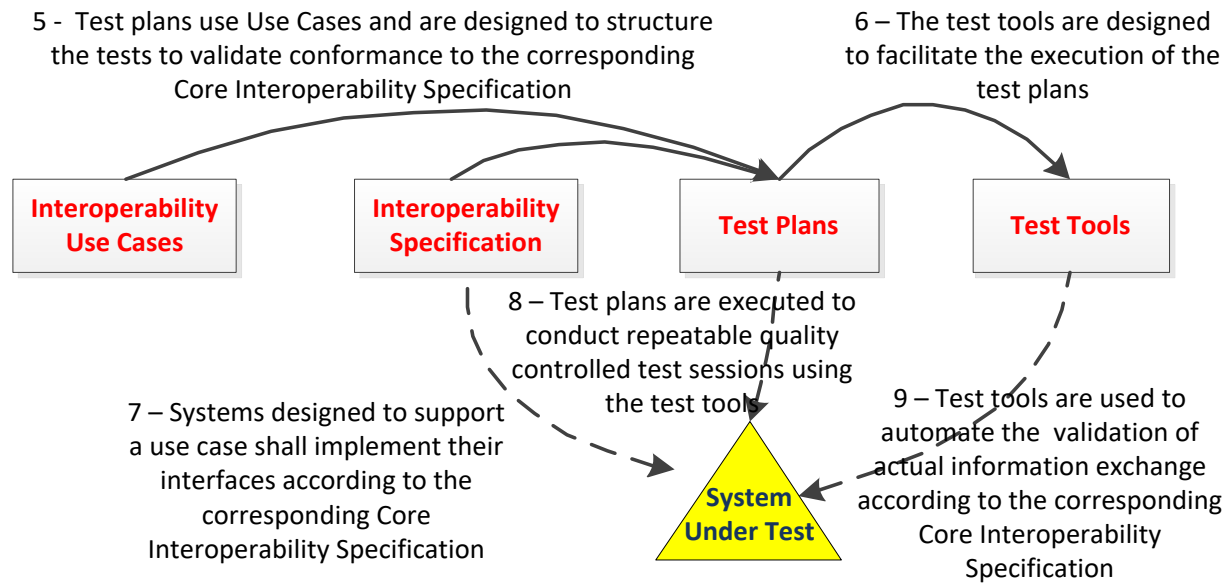


FIGURE 2.1- 3 VERIFICATION OF CONFORMANCE TO A CORE SAUDI EHEALTH INTEROPERABILITY SPECIFICATION

KSA-WIDE PATIENT DEMOGRAPHIC QUERY – INTEROPERABILITY USE CASE

1 Description

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. This Use Case aligns with the Saudi e-Government Interoperability Standards (YEFI) to expedite national adoption.

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.

It is recognized that the “patient client registry” needs to be populated, maintained, and updated. Among the Use Cases supported by such a system, this Interoperability Use Case 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 SeHE System.

This Health ID is used 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 eGovernment services (bank accounts, fines, etc.).
2. Permanent Residents: based on the “Iqama” number, which is managed by the Ministry of Interior - National Information Center and used for various eGovernment services (bank accounts, fines, etc.).
3. Displaced People: based on the “Displaced ID”, which is managed by the Ministry of Interior - National Information Center and used for various eGovernment services (bank accounts, fines, etc.).
4. Pilgrims and Visitors: based on the “Border ID/Passport Number”, 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. Cooperation Council for the Arab States of the Gulf (GCC) Citizens: based upon the GCC National ID with its associated nationality.

Notes:

- 1- The detailed structure for the Health ID and the rules associated with its management are described in the Saudi eHealth Interoperability Specifications and the Saudi Health Interoperability Policies documents.
- 2- In some regions within Saudi Arabia, the frequency of tourists or visitors needing healthcare is low compared to the frequency of citizens and permanent residents. However, this may not be the case for certain regions and times of the year such as Hajj.
- 3- The Health ID may be issued on a temporary basis in the case of a newborn or of an unidentifiable patient (e.g. emergency).

2 Use Case Benefits

- Manage patient's identification and basic demographics data throughout connected healthcare systems.
- Timely access to patient ID and demographics across all stakeholders, such as hospitals, primary care centers, labs, imaging centers, pharmacies, etc.
- Accurate and consistent patient ID and demographics inserted into patient records (i.e. discharge summaries, laboratory results reports, imaging reports, etc.) generated by the stakeholders.
- Reduce errors for patient identification and patient care.

3 Actors

The Actors defined in this Use Case are described in Table 2.2-1 Actors.

Table 2.2-1 Actors

ACTOR NAME	DESCRIPTION	EXAMPLE REAL-WORLD IT SYSTEMS
Patient Demographics Supplier	Patient Demographics Supplier receives the query for a patient matching request that includes patient demographic attributes and sends back one or more corresponding patient matches with the associated demographic attributes to the Patient Demographics Consumer.	Saudi eHealth Exchange (SeHE) – Patient Client Registry
Patient Demographics Consumer	Patient Demographics Consumer queries the Patient Demographics Supplier with patient demographic attributes as query keys. If any match, it receives one or more matching patient demographic attributes from the Patient Demographics Supplier.	Point of Care Systems, such, such as: • Hospital Information Systems (HIS) • Primary Healthcare (PHC) Electronic Medical Record Systems • Laboratory Information Systems • Radiology Information Systems • Other Point of care systems • Business Systems

4 Main Flow of Events

4.1 Query by ID

The most common method to match a patient with its identity is to query by ID. There are four classes of IDs:

1. Citizen ID – used to identify Saudi Citizens.
2. Iqama Number – used to identify Permanent Residents.
3. Displaced ID – used to identify Displaced People.
4. Border ID, GCC National ID or Passport Number – used to identify Pilgrims and Visitors.

A successful “query by ID” will always return a single match for the patient. This match provides the patient’s Health ID and associated demographics attributes. This Health ID is used for the unique identification of a patient and their health records.

If a “query by ID” fails (i.e. patient not found), the operator should “double check” the use of the correct ID for the query (i.e. check for human error). If the query still returns a failure, the operator needs to access the exception web application discussed in Section 6.

Figure 2.2- 1 KSA Patient Demographic Query by ID Process Flow

and the text below provides a typical high level example of the main information workflow when querying using the Citizen ID.

Note: The same workflow occurs if querying by the Iqama Number or Border ID/Passport Number.

The patient visits a hospital or primary physician in a local PHC and provides their Citizen ID. The local system (e.g. a HIS or EMR acting as a Patient Demographics Consumer) uses the Citizen ID to query the Patient Client Registry (SeHE). The Patient Client Registry (acting as a Patient Demographics Supplier) processes the query and returns a match with the Health ID, Citizen ID and other basic demographic data such as patient’s name, gender, date of birth, etc.

Note: At this time, the Health ID and patient demographic attributes are available. Local systems may store the information internally and use it throughout its organization. It must use the Health ID to externally access and share health information with the SeHE System. Interoperability policies will be specified to better define such usage, these policies are outside the scope of this Use Case document.

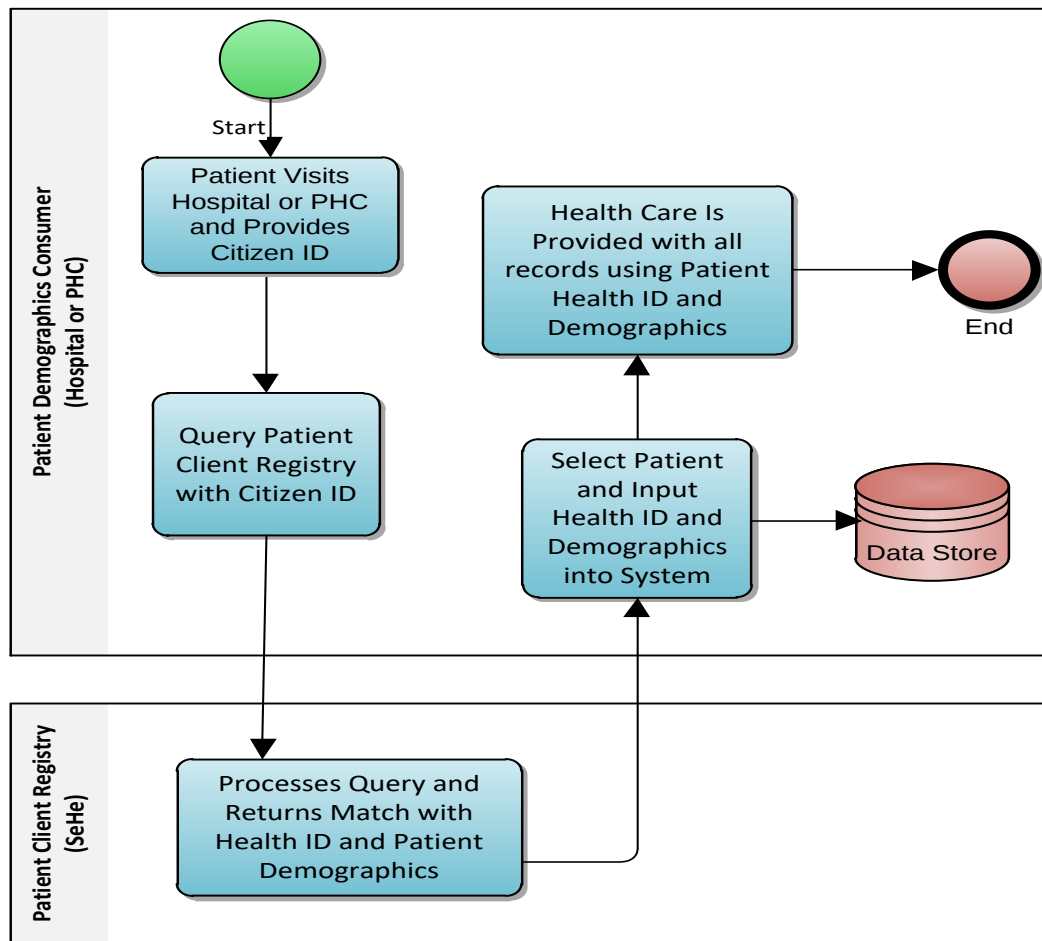


FIGURE 2.2- 1 KSA PATIENT DEMOGRAPHIC QUERY BY ID PROCESS FLOW

5 Alternative Flow of Events

5.1 Patient Demographic Query Using patient Attributes

When the “query by ID” method cannot be performed (e.g. a Saudi citizen without their Citizen ID card), the operator may use the “query by patient attributes” method.

A successful “query by patient attributes” will return one or more corresponding patient matches with the associated Health ID and patient demographic attributes. The operator will select the patient from this list. This Health ID is used for the unique identification of a patient and its health records.

If no matches are returned or the matches returned do not provide enough information for the operator to select the correct patient, the operator will need to access the exception web application discussed in Section 6.

Figure 2.2- 2 KSA Patient Demographic Query Using Patient Attributes

and the text below provides a typical high level example of the information workflow based upon a query using patient demographic attributes.

The patient visits a hospital or primary care physician in a local PHC and provides patient attributes such as name, birth date, gender, etc. The local system (e.g. a HIS or EMR acting as a Patient Demographics Consumer) uses the patient attributes to query the Patient Client Registry (SeHE). The Patient Client Registry (acting as a Patient Demographics Supplier) processes the query and returns one or more potential matches from which one may be selected.

Note: At this time, the Health ID and patient demographic attributes are available to local systems. They may store the information internally and use it throughout its organization. It must use the Health ID to externally access and share health information with the SeHE System. Interoperability policies will be specified to better define such usage. These policies are outside the scope of this Use Case document. If the local ID is not reconciled with the Health ID, the health record is not shared in SeHE.

Note: Additionally, the support for both Arabic and Western spellings of names is required. Translation from Arabic to Western spellings is not always precise, for example Mohammad, Muhammad, Mohamed are typical spellings of the same name in Arabic. Therefore, support for “fuzzy” matching on names is required to solve this issue.

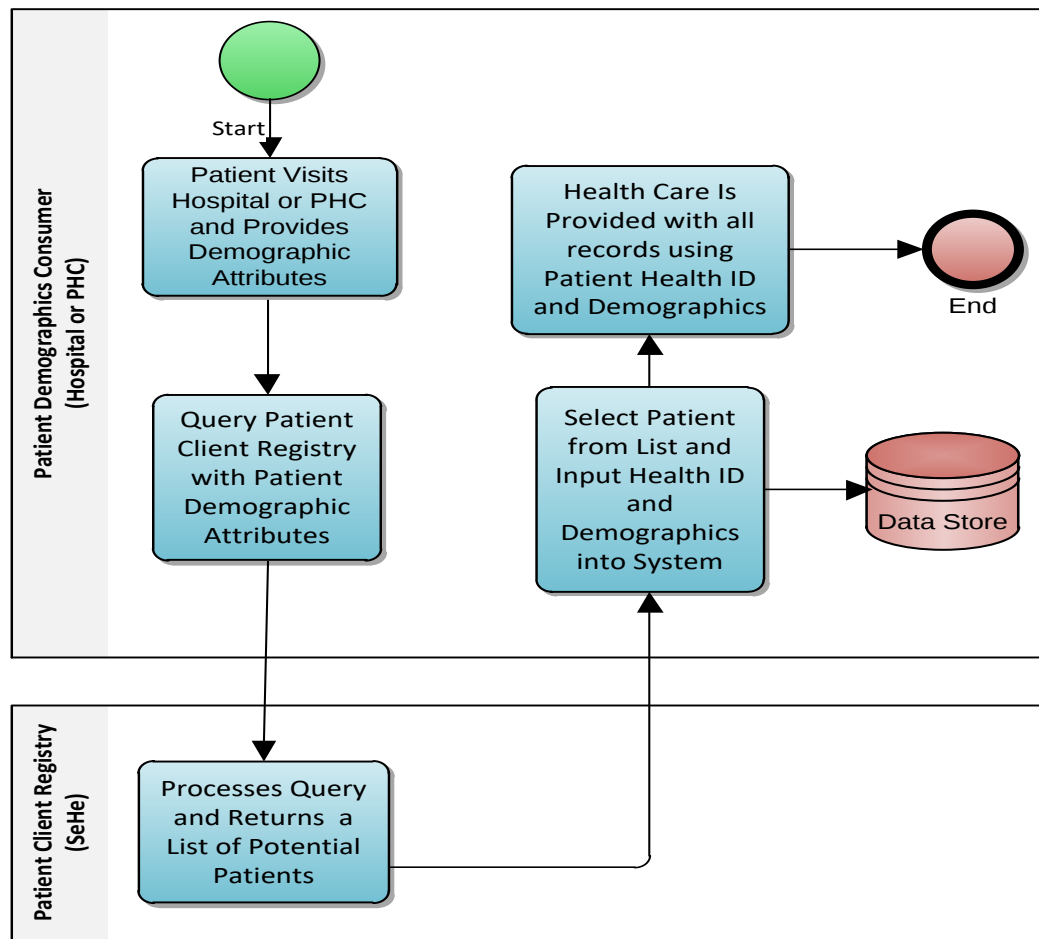


FIGURE 2.2- 2 KSA PATIENT DEMOGRAPHIC QUERY USING PATIENT ATTRIBUTES

6 Exceptions Workflow

6.1 Patient Not Found

When an operator's query to the Patient Client Registry fails (i.e. patient not found), the operator uses a web registration application on the Patient Client Registry to reconcile the failure. Typical examples would be newborn patients, unidentifiable patients, illegal residents, or incorrect/insufficient entry of demographic attributes.

Figure 2.2- 3 KSA Patient Demographic Query Patient Not Found

and the text below provide an example of where a query to the Patient Client Registry fails (no matching patient) and identifies the workflow to reconcile the failure.

An operator using an edge system, such as a HIS acting as a Patient Demographics Consumer, queries the Patient Client Registry with the

demographic attributes it received from the patient. The Patient Client Registry (acting as a Patient Demographics Supplier) does not find a match for the patient or returns a list of candidates where the operator using the HIS cannot match any of the lists of candidates with the actual patient.

At this time, the process goes into exception mode and the operator accesses a web registration application on the Patient Client Registry and attempts to reconcile the failure. The actions performed by the operator will differ based on the reason of the failure. Such actions include:

- **Newborn Patient:** use the web registration application to register the newborn patient into the Patient Client Registry and obtain a Health ID.
- **Unidentifiable Patient:** use the web registration application for the creation of a temporary identifier for use in cases of emergency care or natural disaster.
- **Valid Citizen, Resident or Visitor:** use the web registration application to determine if a Health ID can be obtained.
- **Illegal Visitor (or other non-matching cases):** use the web registration application to determine that a Health ID cannot be obtained.

If the operator was able to successfully obtain the Health ID via the web registration application the HIS (acting as a Patient Demographics Consumer) queries the Patient Client Registry with the Health ID returned by the Patient Client Registry web application. The Patient Client Registry (acting as a 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 his/hers health records for communication with external healthcare systems.

The health record cannot be shared in SeHE unless a permanent or temporary Health ID is available. If the operator was unable to successfully obtain the Health ID via the web registration application, the HIS generates and uses a local ID to manage the patient's records within the HIS system. This local ID may or may not be reconciled in the future. For example, Illegal Visitors may not be reconciled; however Newborn Patients, Unidentified Patient and New Residents should be reconciled.

For Unidentified Patients that become identified with their permanent Health ID, the web registration application shall be used to link the existing records associated with the temporary Health ID with the now found permanent Health ID.

Note: The functional requirements will be defined for this registration to ensure that flexibility is provided in capturing contextual information in the web registration application user interface. However, no standardized service is defined (See Section 15

for further analysis). This ensures that a broad variety of special cases can be supported by a centrally managed web registration application that may easily evolve with changes in interoperability policy.

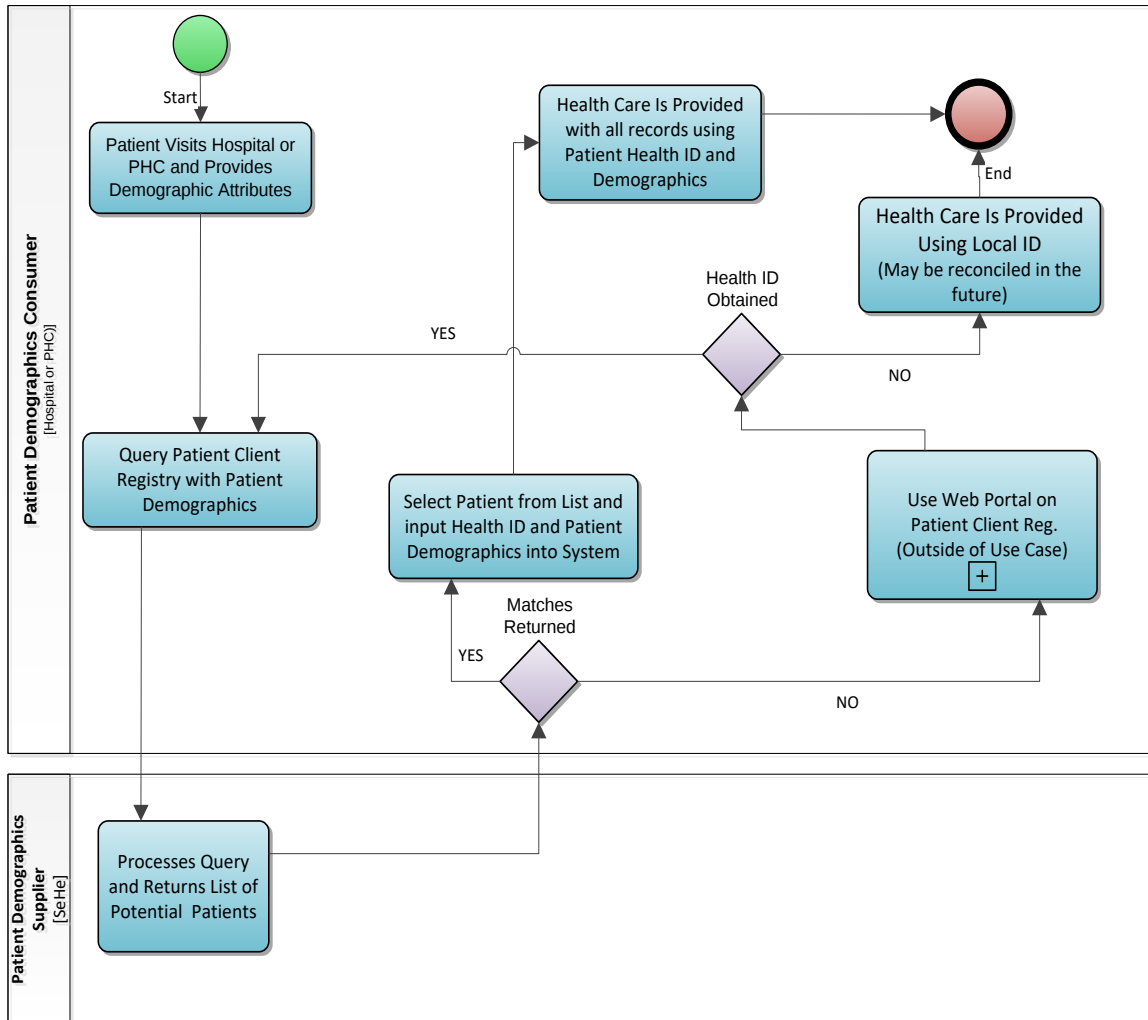


FIGURE 2.2- 3 KSA PATIENT DEMOGRAPHIC QUERY PATIENT NOT FOUND

7 Specific Workflow Scenarios

The following sections provide short descriptions of scenarios that complement the use case flow of events by using the defined transactions in specific ways. Some of these scenarios highlight variants to the use case main flow of events while others describe interactions with 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.

7.1 Scenario 1: An Unidentified Emergency Patient Needs Patient Care

An emergency patient arrives at a hospital (i.e. unconscious, etc.); therefore a local Patient ID is used for the local health record and the Client Registry web registration application is used for the creation of a temporary Health ID for sharing information with SeHE in cases of emergency care or natural disaster. Once the patient identification is reconciled. The web registration application is used to link the existing records associated with the temporary Health ID with the permanent Health ID.

7.2 Scenario 2: A New Born Baby is Transferred After Registration for a National Health ID

A new born baby is born in Hospital A and Hospital A applies for a Health ID which is immediately obtained through the web registration applications. The baby is transferred to Hospital B. Hospital B uses the baby's Mothers ID, Date of Birth, and Birth Order etc. to query the patient client registry to obtain the baby's national Health ID.

8 Service Model

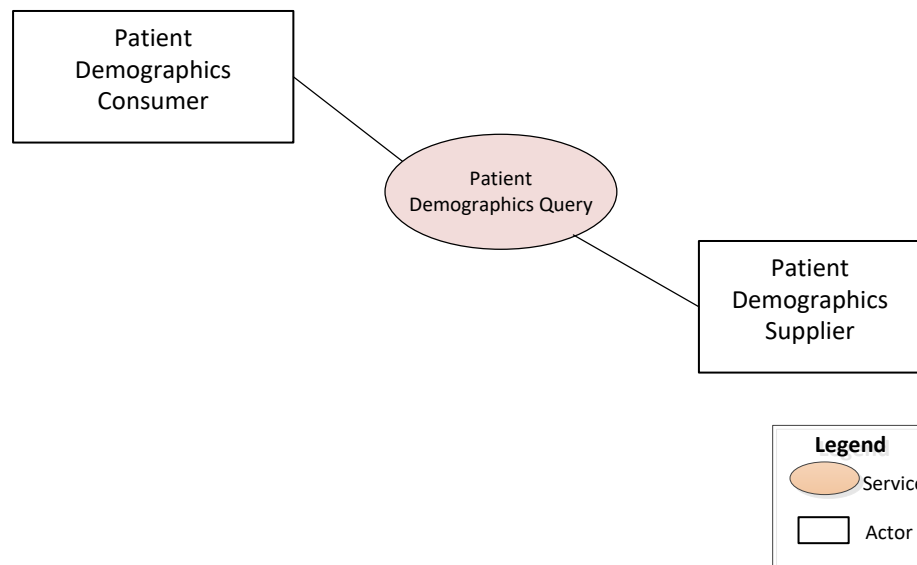


FIGURE 2.2- 4 PATIENT DEMOGRAPHIC QUERY SERVICE MODEL

9 Service Description

The Services defined in this Use Case are described in

Table 2.2-2 Services.

Table 2.2-2 Services

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 demographic attributes for one or more patients matching the criteria provided by the specific query initiated by the Patient Demographics Consumer.

10 Pre-Conditions

Table 2.2-3 Pre-Conditions identifies pre-conditions for this Use Case.

Table 2.2-3 Pre-Conditions

ACTOR NAME	SERVICES	DESCRIPTION
All Actors	Patient Demographics Query	It is expected that all services initiated or provided by this actor operate in accordance with the Saudi eHealth Interoperability Policies and Interoperability Specifications.
Patient Demographics Supplier	Patient Demographics Query	Saudi National Information Center demographics are synchronized to the Patient Demographics Supplier Actor which provides current demographic data. How this is accomplished is out of scope of this project (registration of new citizen, demographic updates, synchronization frequency, etc.). The ability to accomplish this synchronization is a requirement for the success of this Use Case. It is maintained for each national Health ID and provides associated patient demographic attributes based on matching criteria.
Patient Demographics Consumer	Patient Demographics Query	For exceptions and error situations, such as patient not found (e.g. new born babies) or the detection of duplicate entries, an exception process application (such as a web registration application) is used to offer KSA-wide registrations of patients, error reporting, etc. Edge systems are required to locally cache the patient demographic attributes. The interoperability policies document will define the rules and constraints associated with the management of locally cached patient demographic attributes (e.g. refreshing).

11 Post-Conditions

Table 2.2-4 *Post Conditions* identifies post-conditions for this Use Case.

Table 2.2-4 Post Conditions

ACTOR NAME	SERVICES	DESCRIPTION
Patient Demographics Consumer	All Services	A patient's Health ID and other patient demographic attributes are available to the edge systems. The Health ID is used to manage a patient's KSA national health record.

12 Data Requirements

This section defines the general scope of the type of data needed for this Use Case. However, it does not define the entire detailed data set as this will be discussed in the Saudi eHealth Interoperability Specification design document.

12.1 Patient Demographic Query Data

The information content managed by the Patient Demographics Supplier includes basic demographic information for the patient made available throughout SeHE System.

This data is defined in Table 2.2-5 KSA Patient Demographic Data Content which lists the patient attributes that may be queried as well as the attributes that may be returned.

Table 2.2-5 KSA Patient Demographic Data Content

KEY CONCEPTS	DESCRIPTION	TEXT/ CODED
Health ID	An identifier that uniquely identifies the individual in SeHE System to which the exchange refers and connects information to the individual's personal health record.	Text
Citizen ID /Iqama Number	An identifier that is provided to every citizen and legal resident by the National Information Center to uniquely identify the individual.	Text
Border ID	An identifier generated by the National Information Center to identify the individual visitors of the KSA (based upon the visitor's visa).	Text
Visa Number	Visa number generated by the Saudi Embassies to authorize the individual to visit Saudi Arabia.	Text

Passport Number	Passport number of the visitor/pilgrim used to visit Saudi Arabia.	Text
Nationality	The nationality of the person being identified.	Coded
Last and First Name	The patient's last and first name. The Arabic and Western spellings of the patient's name are required.	Name formatted
Birth Date	The patient's birth date.	Date formatted
Birth Order	For the cases of multiple birth cases, this attribute specifies the birth order of the client.	Text
Gender	The administrative gender of the patient.	Coded
Mother's Last and First name	The patient's mothers last and first name. The Arabic and Western spellings of the patient's name are required.	Name formatted
GCC National ID	An identifier given to a citizen from another GCC country.	Text
Mother's National ID	A patient's (new born baby's) mothers national identification (i.e., citizen ID, Iqama number, Border ID, etc.).	Text

13 Assumptions and Dependencies

N/A

14 Special Requirements

N/A

15 Notes and Issues

15.1 Handling of Patient National Health ID Exception Cases

In the KSA-Wide Patient Demographic Query Use Case, the Patient Demographics Consumer Actor is offered a standardized query service. All exception cases (e.g. patient's name is not found) are handled via a web browser access to the Patient Client Registry web registration application co-hosted with the Patient Demographics Supplier.

15.1.1 Handling of Patient Health ID Exceptions

Most queries will result in one or more matches if correct demographic attributes are entered assuming that the patient records with a limited number of attributes in the National Information Center (last and first name, date of birth, gender) can be “replicated” in the national patient client registry. A failure to obtain a match may result from any of the following three classes of cases:

1. The information provided and/or entered at the point of care system is incorrect and no match is the right response (e.g. clerk human error).

Hastily registering a new patient in the national registry could be a reason for such a mismatch. The registration clerk must be faced with the fact that addressing this exception will require more effort (e.g. opening the exception web browser and filling an exception resolution screen) than just rechecking the demographics attributes entered and insisting that the patient provides his/her Citizen ID card or other form of identification. If there is a medical emergency and the operator is unable to obtain a temporary Health ID, the local temporary patient identification process will be used, which requires reconciliation processing at a later time.

2. The patient is not known from the national patient client registry (i.e. illegal) and this will be quickly understood by the registration clerk. In this case, moving to the exception process will be the logical next step (e.g. opening a web registration application browser). This application must support a broad variety of special cases that can be centrally managed and may evolve with interoperability policy changes. The application may cover a variety of rare cases where a Health ID does not exist, but can be created with the capture of appropriate information specific to each case to ensure on-going consistency.
3. This applies to a new born not yet registered by his parent for which a Health ID may be assigned ahead of the assignment of a national ID to the Newborn.
4. If an apparent duplicate is found, the clerk is expected to report this duplication and initiate a resolution process. It is recommended not to use any of these National identifiers until the duplicate ID is resolved. This resolution process may be escalated to the National Information Center where it originated from.

15.1.2 Constraints for Caching Health IDs and Demographics Attributes in Local IT Systems

From the discussion above, local systems are likely to cache the nationwide Health ID and associated demographics as well as locally captured patient information. It is a good practice to make a record of the date/time for when these nationwide demographics were retrieved. Therefore every time the cached identification information is used and the last query is older than a configurable time period (e.g. a week), the cached information will be checked by issuing a new query using the previously cached Health ID:

1. If there is a single match, the demographic attributes received take precedence over the previously retrieved ones if there are any changes detected, otherwise no action is taken. If a change is detected, local demographics should be updated.