Kingdom of Saudi Arabia

Ministry of Health

National eHealth Strategy and Change Management Office

(SCMO)

Enabling Standards-Based eHealth Interoperability

UC0010

Saudi eHealth eReferral and eTransfer Interoperability Use Case

Version 1.0

February 22, 2015

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Document Revision History

Version	Date	Type of update	Prepared/Revised by
1.0	February 22, 2015	First Release	eHealth Strategy Management Office – eHealth Standards Department

PREFACE

HOW TO READ THIS DOCUMENT

Sections 1 and 2 provide a high level overview of the Use Cases being addressed by this document and the actors and services that support these Use Cases.

Sections 3 and 4 provide an overview of each of the Use Cases and the associated business scenarios and process flows.

Section 5 defines the reusable business processes that result from the Use Cases described in section 3 and 4.

Section 6 elaborates the business processes from section 5 into a service architecture.

KEY CONCEPTS

Key concepts used in this document are introduced below. Consult *IS0302 SeHE Project Glossary* for other terms used within this document.

Referral: A workflow in which a physician choses to refer a patient for a consultation or diagnosis service for which the requesting physician needs to receive a response

Transfer A workflow that seeks to move a patient currently treated in a health facility to other healthcare facilities where the treatment should be continued.

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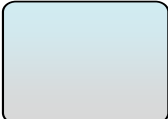
CONVENTIONS
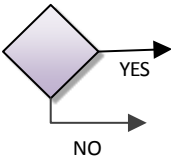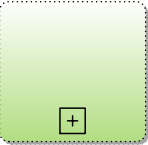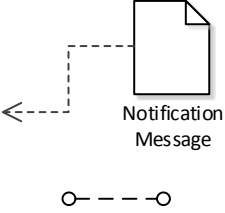
This document has adopted the following conventions for representing the Use Case concepts and information workflow.

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.

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

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 is 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.
	Activity that is represented with a light colored rectangle which describes **physical** action performed by the actor

SHAPE	DESCRIPTION
	Gateway that determines forking and merging of paths depending on the conditions expressed
	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.
	Sequence flow that shows in which order the activities are performed and the intermingling of actions between different actors or other systems.
Notification Message	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 conventions[1] 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.

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[1] Definitions based upon RFC 2119

> **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. This is further described in the National eHealth Strategy referenced in the section of that title below.

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 and certification 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 a Saudi Health Information Exchange (HIE) Platform and its internal Systems which includes patient identification management, provider directory, document and imaging repository, 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.

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 polices.

Figure i-1 Scope of eHealth Standard based Interoperability Specifications and Policy Project depicts the general scope and focus of the project highlighted in red.
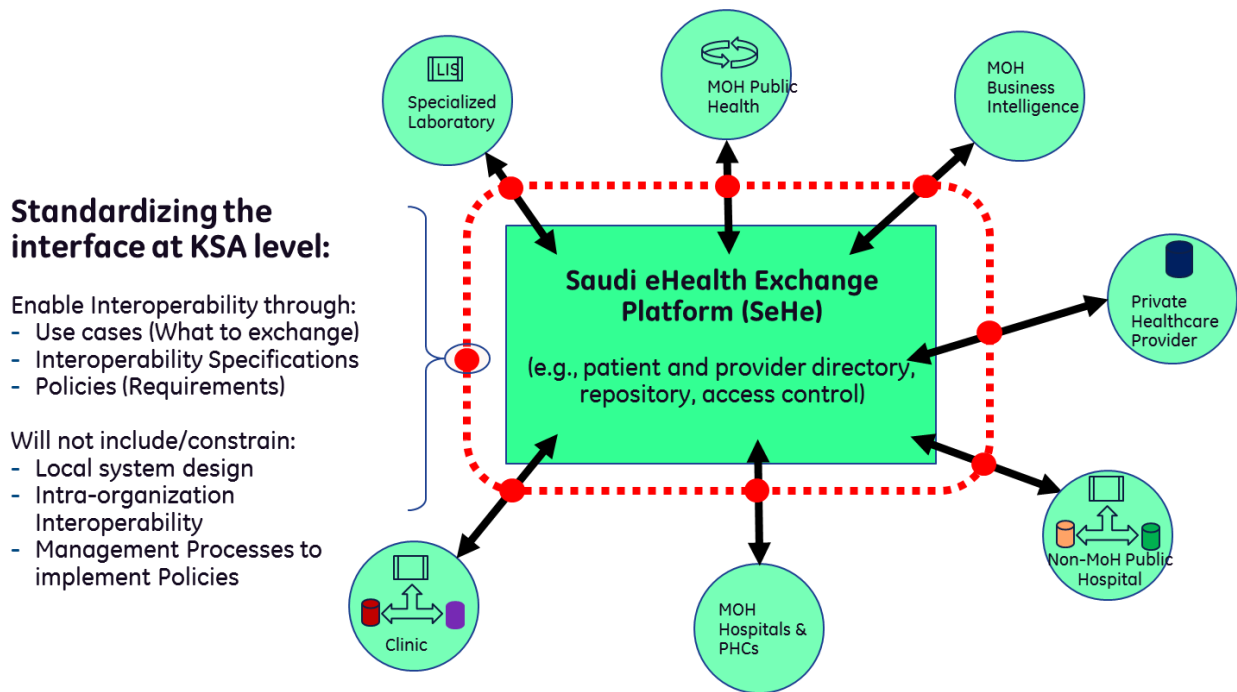
FIGURE I-1 SCOPE OF EHEALTH STANDARD BASED INTEROPERABILITY SPECIFICATIONS AND POLICY PROJECT

REFERENCES

National eHealth Strategy

See the Saudi Ministry of Health Portal (Arabic: http://www.moh.gov.sa/Ministry/nehs/Pages/default.aspx English: http://www.moh.gov.sa/en/Ministry/nehs/Pages/default.aspx) for more information.

Saudi eHealth Interoperability Specification Document

IS0303 *Saudi Health Information Exchange Policies* 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 HIE Platform.

Saudi Health Information Exchange Policy Document

The Saudi Health Information Exchange Policy document is used to set the policies applicable to users and systems connected to the national Saudi eHealth Exchange 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.

Figure i-2Methodology steps for the ehealth standards based Interoperability Specifications and policy project 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).
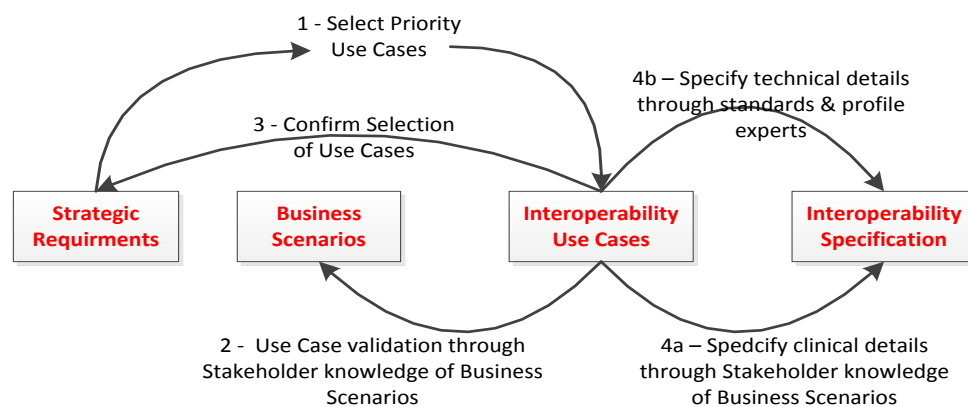
FIGURE I-2METHODOLOGY STEPS FOR THE EHEALTH STANDARDS BASED INTEROPERABILITY SPECIFICATIONS AND POLICY PROJECT

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 diagramed 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 Core 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 System (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 that is 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 i-3VERIFICATION of conformance to a core Saudi eHealth Interoperability Specification.
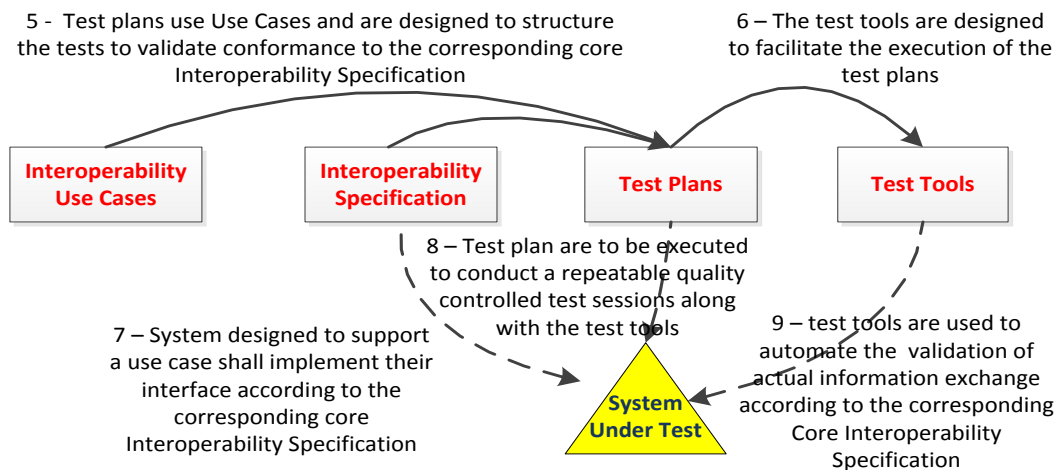
FIGURE I-3VERIFICATION OF CONFORMANCE TO A CORE SAUDI EHEALTH INTEROPERABILITY SPECIFICATION

1. EREFERRAL AND ETRANSFER USE CASES

In developing these use cases, we need to distinguish between two cases: Referrals and Transfers.

a) For Referral, it refers a patient for a consultation or diagnosis service for which the requesting physician needs to receive a response.

b) For Transfer, it transfers patients from the health facility where the patient is currently being treated to other healthcare facilities where the treatment should be continued.

We also introduce the concept of a Collaboration Circle, which defines the participants that can accept a referral or transfer from another healthcare provider. Collaboration Circles establish business policies between the participants such as to enable bidding for referrals and transfers, the escalation process for cases where a higher authority is needed to obtain referral or transfers decisions, etc. These business policies are outside the scope of this specification.

1.1 SCOPE

In Scope:

The scope of this document is the specification of the eReferral and eTransfer Use Cases. These Use Cases enable healthcare providers and facilities to refer and/or transfer patients to other healthcare facilities. This document aligns with the Saudi e-Government Interoperability Standards (YEFI) to expedite national adoption

The following topics are in scope for these Use Case:

- Referrals to hospitals (out-patient).

- Referrals to other ambulatory facilities (out-patient).

- Hospital to Hospital Transfer (in-patient).

- Hospital to Long Term Care Transfer (in-patient).

Includes all KSA approved healthcare facilities, such as Ministry of Health (MOH) based facilities, Primary Heath Care Centers, Medical Cities, Hospitals (governmental and private), private care clinics, National Guard, Military, etc.

Out of Scope:

The following is a list of topics that are specifically out of scope for these Use Case Specifications:

- Patient's generating a referral request.

- Transportation planning and method of transport.

- Internal workflow to request and manage referrals and transfers within an organization.

- Internal workflow for the acceptance or rejection process of organizations receiving referrals and transfers.

- The rules for the escalation process defined by each collaboration circle. Internal workflow to manage and update the scheduling process of referred patients.

Although these companion processes are out of scope, their linkage with the eReferral and eTransfer Use Cases is considered.

2. WORKSTREAM

The purpose of this document is to address the Kingdom of Saudi Arabia's (KSA) eHealth Interoperability Use Cases for eReferral and eTransfer. These Use Cases are applicable to existing and new information systems. The systems will be connected to Health Information Exchange (HIE) Platforms such as the Saudi eHealth Exchange (SeHE).

The eReferral and eTransfer Use Cases are used to enable Healthcare Providers and facilities to electronically refer and/or transfer patients to other healthcare facilities. This includes KSA healthcare organizations, such as Primary Healthcare Centers (PHC), Hospitals, Specialty Centers, Long-term Care, etc. It covers MOH facilities but also other governmental organizations (such as National Guard and Military) and private healthcare systems.

A typical workflow that represents eReferral and eTransfer Use Cases can be summarized as:

1. A patient's referral or transfer request is generated including information such as patient demographics, referring organizational information, reason for the referral or transfer, service(s) required, active problems, etc.
2. An organization receives the request, accesses the referral or transfer information and the patient's relevant heath records in order to determine if it will accept or not accept the request. Upon acceptance, the patient may arrive at the receiving organization allowing the requested service to be performed and a response to be generated.
3. The response and other referenced healthcare documents are available for review for the referral/transfer requester and potentially other healthcare providers.

2.1 EXPECTED BENEFITS

- Provides the referral and/or transfer requester a more rigorous means to package the request with associated supporting documentation to the referral/transfer receiver.
- Allows the referral requester to more effectively track progress and facilitates timely access to the Referral Response and associated supporting documentation.
- Provides better continuity and quality of care by having systematic feedback to the referral requester and increased patient satisfaction.
- Allows an intended referral and/or transfer receiver to communicate in a timely manner to the requester that the referral cannot be performed and the reason the referral cannot be performed.
- Enables efficiency and speed in the process to select an alternative referral/transfer receiver.
- Facilitates the sharing of health records between the referral and/or transfer requester and receiver.
- Avoids duplicate referrals and/or transfers by having the completed referral/transfer shared.
- Supports the processes that direct the patient flow (i.e., select a referring receiver organization) as well as provides the patient a choice of organizations.

2.2   USE CASE OVERVIEWS

The National eHealth Strategy has identified the eReferral and eTransfer Use Cases as a mechanism to facilitate the referral and/or transfer of patients by healthcare providers and facilities to other healthcare facilities. The requirements for eReferral and eTransfer Use Cases were verified with stakeholders and users in the Use Case development process.

2.2.1   eReferral Use Case

The eReferral Use Case enables Healthcare Providers and facilities to refer patients to other healthcare facilities in an ambulatory environment (i.e., out-patient). The Referral Request conveys key information to ensure organizations have the proper data to accept the referral (for example, requesting provider/organization, patient information, reasons for referral, services requested, relevant medical documentation, etc.). Upon acceptance, care is provided and a Referral Response is issued to the referral requester with additional clinical information resulting from the services provided. Some examples include:

- Ambulatory Referral to Hospital (Elective) or other Ambulatory.
- Ambulatory Referral to Hospital (Urgent or Emergency).
- Hospital Referral to Hospital (out-patient consultation).

2.2.2   eTransfer Use Case

The eTransfer Use Case enables healthcare providers and facilities to transfer patients that are in an in-patient environment to other healthcare in-patient facilities. The Transfer Request conveys key information to ensure organizations have the proper data to accept the transfer (including requesting provider/organization, patient information, reasons for transfer, services requested, relevant medical documentation, etc.). Upon acceptance, the patient is transferred to the receiving healthcare facility for in-patient care. Some examples include:

- Hospital to Hospital Transfer (in-patient).
- Hospital to Long Term Care.

2.3   ACTORS

The Actors defined for these Use Cases are described in Table 2.3-1 Actors.

TABLE 2.3-1 ACTORS

ACTOR NAME	DESCRIPTION	EXAMPLE REAL-WORLD IT SYSTEMS
Referral Requester	Initiates referrals of patients to other providers, and for responding to notifications of acceptance or rejection of those referrals.	Point of Care Systems such as: • Primary Healthcare Centers (PHC) Ambulatory Medical Record Systems • Private Ambulatory Clinic Medical Record Systems • Hospital Information Systems (HIS) (MOH, National Guard, Private, etc.) • MOH Provider Portal • Other Point of care systems

ACTOR NAME	DESCRIPTION	EXAMPLE REAL-WORLD IT SYSTEMS
Transfer Requester	Initiates transfers of patients to other facilities (i.e. hospital and long term care), and for responding to notifications of acceptance or rejection of those transfers.	Point of Care Systems such as: • Hospital Information Systems (HIS) (MOH, National Guard, Private) • MOH Provider Portal • Other Point of care systems
Referral/Transfer Receiver	Receives referral and transfer requests, and responding to them appropriately.	Point of Care Systems such as: • Hospital Information Systems (HIS) (MOH, National Guard, Private, Specialty Hospitals) • Long Term Care Medical Record Systems • MOH Provider Portal • Other Point of care systems
Workflow Manager	Manages the dispatching of referral and transfer requests to appropriate facilities and arbitrating and managing requests based on established referral and transfer rules.	Referral and Transfer Systems such as: • Referral and Transfer Portals Hospital Information Systems (HIS)
HIE Document Repository	Stores documents such as referral and/or transfer requests and responses. If requested, it may notify potential receivers. It also provides access to related information about the patient and/or about the patient's medical documentation. This actor includes the HIE Document Registry	HIE Systems such as: • HIE Document Registry/Repository • HIE Notification Broker

2.4   HIGH-LEVEL SERVICES OVERVIEW

2.4.1   Service Descriptions

The Services defined in this Use Case are described in Table2.4.1-1 Services.

TABLE2.4.1-1 SERVICES

SERVICE NAME	SERVICE USE
Manage Referral or Transfer	Create and manage referral and transfer workflow documents in the HIE Document Repository and request storage of these documents and registration of their metadata.
Query/Retrieve Documents	Used by Actors to query the HIE Document Repository for information about documents stored and indexed by metadata and retrieve one or more relevant documents.
Publish Document(s)	Used by Actors to provide a set of documents to the HIE Document Repository and to request that it stores these documents and register their metadata.
Notification of Document Availability	Provided by the HIE Document Repository to notify other actors that a workflow document of interest is available to be retrieved.

2.4.2   Service Model
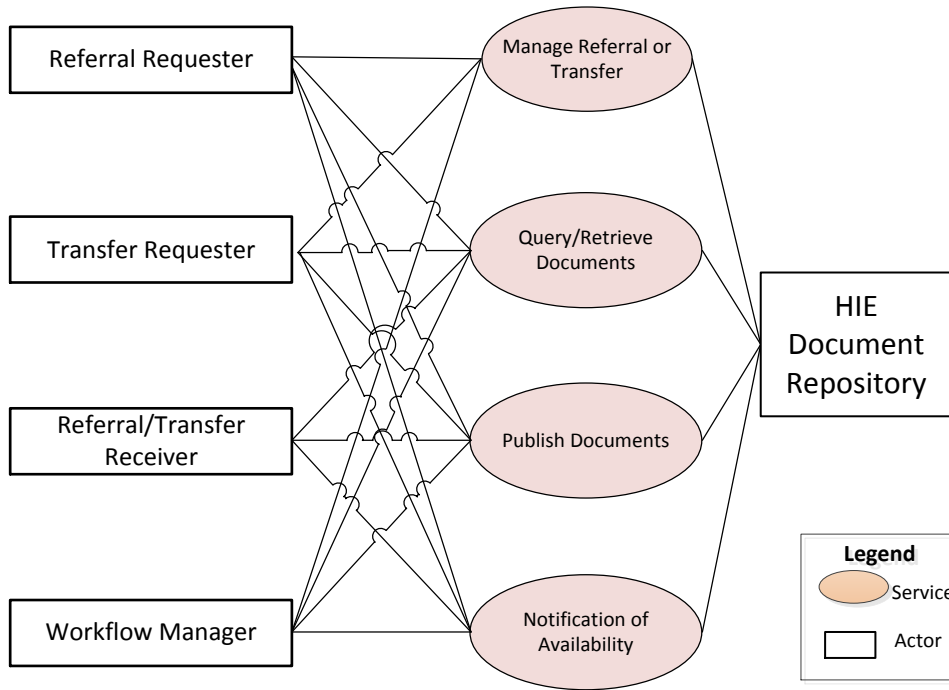
FIGURE 2.4.2-1 EREFERRAL USE CASE SERVICE MODEL

3. eReferral Use Case

This Use Case describes the information workflow of the eReferral Use Case. It enables healthcare providers and facilities to refer patients to other healthcare facilities in an ambulatory environment. The Referral Request conveys key information to ensure organizations have the proper data to accept the referral (such as requesting provider/organization, patient information, reasons for referral, services requested, relevant medical documentation, etc.). Upon acceptance, care is provided and the referral is completed along with the clinical information related to the service provided.

3.1 Scope

The eReferral Use Case is applicable to KSA Healthcare Organizations, such as Primary Healthcare Centers (PHC), Hospitals, Medical Cities, Specialty Centers, etc. This includes MOH facilities but also other governmental organizations (such as National Guard and Military) and private healthcare systems. Some examples include:

- Ambulatory Referral to Hospital (Elective) or other Ambulatory.
- Ambulatory Referral to Hospital (Urgent or Emergency).
- Hospital Referral to Hospital (out-patient consultation).

3.2 Business Scenarios

This section provides an analysis leading to refining the scope of a specific Use Case within the domain of interest.

The Use Cases considered in this document are focused on interoperability between facilities of distinct organizations and their Health Information Systems that need to communicate at the national level. These Use Cases support the interactions needed to interface with the Saudi Health Information Exchange (HIE) platform and support of cross facility data sharing and workflow.

The following users are associated with these business scenarios:

TABLE 3.2-1 SCENARIO USERS

USER	USER ROLE
Patient	The person visiting a healthcare facility (e.g. PHC, Hospital, Private Medical Center, etc.)
Administrative Staff	The person registering the patient in the information system and obtaining the patient's Health ID.
Physician	The healthcare physician/specialist responsible for patient care and the resulting referral.
Medical Coordinator/Director	The person in the hospital or at the PHC providing approval for issuing referral requests or acceptance of referral requests.
Colaboration Circle Manager	The person who establishes agreements with participants within a collaboration circle and who may be responsible for handling exceptional cases.
Specialist	The consultant or physician the patient is being referred to.

The following Information Systems are associated with these business scenarios:

TABLE 3.2-2 SCENARIO INFORMATION SYSTEMS

INFORMATION SYSTEM	SYSTEM ROLE
Ambulatory Medical Record System or Primary Healthcare Center System (PHC)	The PHC used by a Physician or other Healthcare Providers.
Hospital Information System (HIS)	The HIS used by Administrative Staff and other Healthcare Providers.
HIE Repository	The HIE Document Repository stores the Referral Requests and Responses. It also provides access to the referral information by other information systems.

3.2.1   Business Scenario 1: Patient Referred From Ambulatory Care to Hospital

A patient visits a Healthcare Provider or Organization with chest pain. The patient is registered in the Primary Healthcare System (PHC) by the Administrative Staff and his Health ID is obtained [1] from the HIE System. The physician queries and retrieves the patient health records [2] from the HIE Document Repository. The physician performs an examination; orders diagnostic testing [3], reviews diagnostic results [4,] and suspects a cardiac problem thus deciding to refer the patient to a hospital (out-patient) with a cardiac specialist.

After review by the Healthcare Organization Medical Coordinator/Director, the referral is electronically submitted [5] to the HIE Document Repository by the PHC system and includes relevant medical information (patient contact info, requesting organization, medical history, reason for referral, etc.). A mobile notification may be provided, or a referral paper may be printed and handed to the patient.

The receiving Healthcare Organization is notified that a Referral Request is available for processing. The Healthcare Organization Medical Coordinator/Director retrieves the electronic referral and associated clinical content [6] from the HIE Document Repository and reviews the documentation for completeness and appropriateness. Upon accepting the referral request [7], an appointment is made for the patient and details of the appointment are returned.

The patient visits the Healthcare Organization and is registered in the HIS by the Administrative Staff and his Health ID is obtained [8] from the HIE Document Registry. The patient's electronic referral and associated clinical content is retrieved [9,] the patient is examined by a cardiologist, and an Electrocardiogram (ECG) is performed. The patient is sent home, the encounter summary, ECG report [10], and the completed Referral Response [11] are sent to the HIE Document Repository by the Hospital Information System (HIS).

The referring Healthcare Provider or Organization is notified of this referral completion [12] and has access to the associated patient medical documentation [13].

The following Business Processes are associated with the eReferral Use Case. Some of the business processes are specified in other Use Case documents, while others are specific to this

Use Case. The details of the Business Processes may be found in Section 5 Detailed business processes.

<p style="text-align:center">*TABLE 3.2.1-3HIGH LEVEL BUSINESS PROCESSES FOR AMBULATORY CARE TO HOSPITAL*</p>

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1 & 8	N/A	Obtain Patient Health Identifier	Section 5.2.1
2 & 13	N/A	Review Historical Medical Documents	Section 5.2.4
3	N/A	Order Diagnostic Testing	Section 5.2.2
4	N/A	Review Diagnostic Results	Section 5.2.3
5	Main Flow	Create Referral Request	Section 5.1.1
6, 7, 9, 11, 12	Main Flow	Update Referral/Transfer	Section 5.1.3
10	N/A	Publish Clinical Summary Document	Section 5.2.5

3.2.2 Business Scenario 2: Patient Referred From Hospital To Hospital Ambulatory Care (Out-Patient Referral)

A patient is hospitalized for a lower member amputation. The patient is registered in the HIS system by the administrative staff, and the Health ID is obtained [1] from the HIE System. The patient's records are reviewed [2], and he/she needs a prosthetic consultation with a Specialist. After review by the Healthcare Organization Medical Coordinator/Director, the referral is electronically submitted [3] to the HIE Document Repository by the HIS and includes relevant medical information (patient contact info, images and radiology reports, etc.). A mobile notification may be provided, or a referral paper may be printed and handed to the patient.

The receiving Healthcare Organization is notified that a Referral Request is available for processing. The Healthcare Organization Medical Coordinator/Director retrieves the electronic referral and associated clinical medical documentation [4] from the HIE Document Repository, and reviews the documentation for completeness and appropriateness. Upon accepting the Referral Request [5], an appointment is made for the patient. The local Healthcare Organization makes arrangements for transportation.

A referral paper is printed and given to the patient and/or transportation personnel. The patient is transported to the Specialist at the remote Healthcare Organization. The patient is examined by the prosthetic physician who plans the creation of the artificial leg. The patient is sent back to the referring Healthcare Organization with a Referral Response [6], Encounter Summary [7] and follow-up instructions. All three documents are submitted to the HIE Document Repository by the remote HIS.

The following Business Processes are associated with the eReferral Use Case. Some of the Business Processes are specified in other Use Case documents, while others are specific to this

Use Case. The details of the Business Processes may be found in Section 5 Detailed business processes.

TABLE 3.2.2-4 HIGH LEVEL BUSINESS PROCESSES FOR HOSPITAL TO HOSPITAL (OUT-PATIENT)

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	N/A	Obtain Patient Health Identifier	Section 5.2.1
2	N/A	Review Historical Medical Documents	Section 5.2.4
3	Main Flow	Create Referral Request	Section 5.1.1
4, 5, 6	Main Flow	Update Referral/Transfer	Section 5.1.3
7	N/A	Publish Clinical Summary Document	Section 5.2.5

3.3 PROCESS FLOWS

3.3.1 Process Overview

The Business Process Model shown in the figure below is a composite of all the process flows developed for this Use Case. It has been developed based on analysis of all the process flows and identified from the Use Case scenarios described above. The diagram below depicts the user roles and the associated activities from a business user point of view.
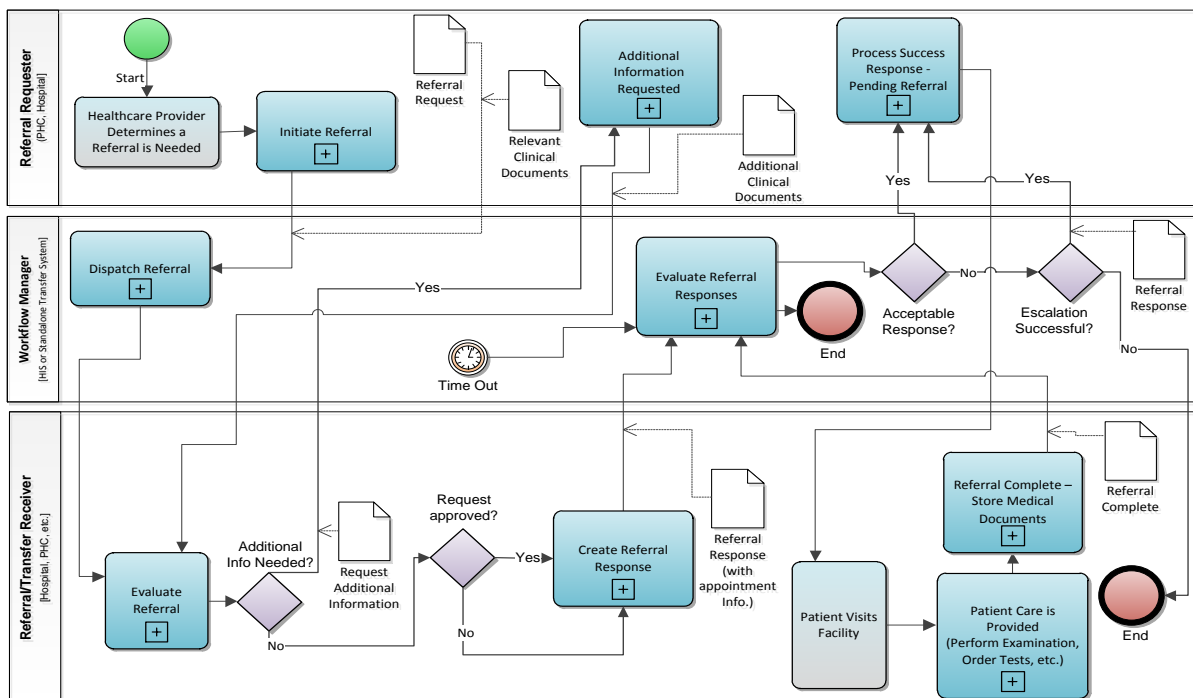
FIGURE 3.3.1-1 EREFERRAL USE CASE PROCESS OVERVIEW DIAGRAM

3.3.2   Referral Main Flow of Events

A patient visits an ambulatory healthcare facility (e.g. PHC or Out Patient Hospital) and the local physician determines a referral is needed (such as patient with chest pain who needs to be referred to a hospital).

1. The Healthcare Provider suspects a problem which requires a specialist or services not offered by the local facility, thus decides to refer the patient to another facility as an out-patient.
2. The Referral Requester Actor is used to initiate a **Referral Request.** Relevant clinical documents are attached to the request.
3. The Workflow Manager **dispatches the Referral Request** to one or more Referral/Transfer Receiver Actors within its Collaboration Circle. A timer is set by the Workflow Manager Actor to protect against non-timely Referral Responses from the Referral/Transfer Receiver Actors.

   Note: When multiple organizations are assigned, how the Workflow Manager decides upon which organizations are given the opportunity to respond is left up to the configuration of the Workflow Manager and is outside of the scope of this specification.

   Note: The dispatched referral may or may not include the ability for Referral/Transfer Receivers to bid for the referral. This is a business process agreed to between the participants of the Collaboration Circle and how the bidding is resolved is outside the scope of this specification.

4. The Referral/Transfer Receiver Actor retrieves the Referral Request, associated clinical documents and **evaluates the Referral Request**.
5. Upon review of the Referral Request and associated clinical documents, the Referral/Transfer Receiver Actor may determine additional information is needed. If yes, the Referral/Transfer Receiver Actor **requests additional information** from the Referral Requester Actor. The Referral Requester Actor **provides the additional information** to the Referral/Transfer Receiver Actor.
6. Upon accepting or not accepting the Referral Request, the Referral/Transfer Receiver Actor **updates the transfer status** (such as accepted) and generates a Referral Response along with appointment information. The Referral Response is provided to the Workflow Manager.
7. The Workflow Manager Actor **evaluates the Referral Responses** and determines to assign the referral to one of the responding Referral/Transfer Receiver Actors.

   Note: How the Workflow Manager makes a determination of which response to select is left up to the configuration of the Workflow Manager. If no organization accepts the referral, the Workflow Manager may still make an assignment (this is part of the Collaboration Circle's internal escalation process). The rules governing how a Workflow Manager makes such decisions is outside of the scope of this specification.

8. The patient arrives at the receiving facility and is registered. The Healthcare Provider performs the examination and completes the services requested by the referral. All clinical documents generated during the referral are stored.
9. The Referral/Transfer Receiver Actor **updates the status of the Referral Response** and generates an updated Referral Response document (status of completed) which is provided to the Workflow Manager.

3.3.3   Document Sharing and Notification Flow

Figure 3.3.3-2 Document Sharing and notification diagram illustrates internal flows of systems which support sharing of documents and notification of the participants during the referral and transfer workflow. The internal flows are used in all referral and transfer workflows but are only shown here to simplify the Main, Alternative or Exception diagrams.
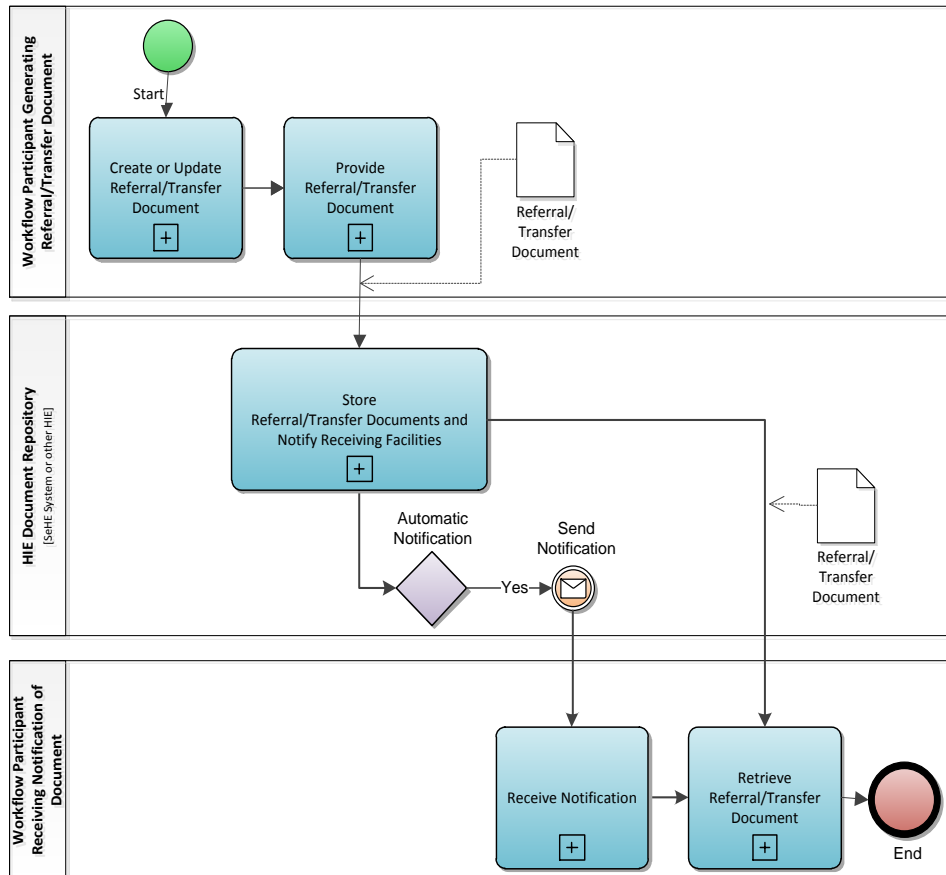
FIGURE 3.3.3-2 DOCUMENT SHARING AND NOTIFICATION DIAGRAM

3.3.4   Alternative Flows of Events

3.3.4.1   Directed Referral

The Healthcare Provider suspects a problem which requires a specialist or services only offered by a limited number of facilities, thus decides to refer the patient specifically to one of these facilities as an out-patient. When a Healthcare Provider requests a referral to a specific facility, this is called a directed referral. The receiving facility responds with their ability to accept the referral. If yes, the patient referral is accepted and may be performed.
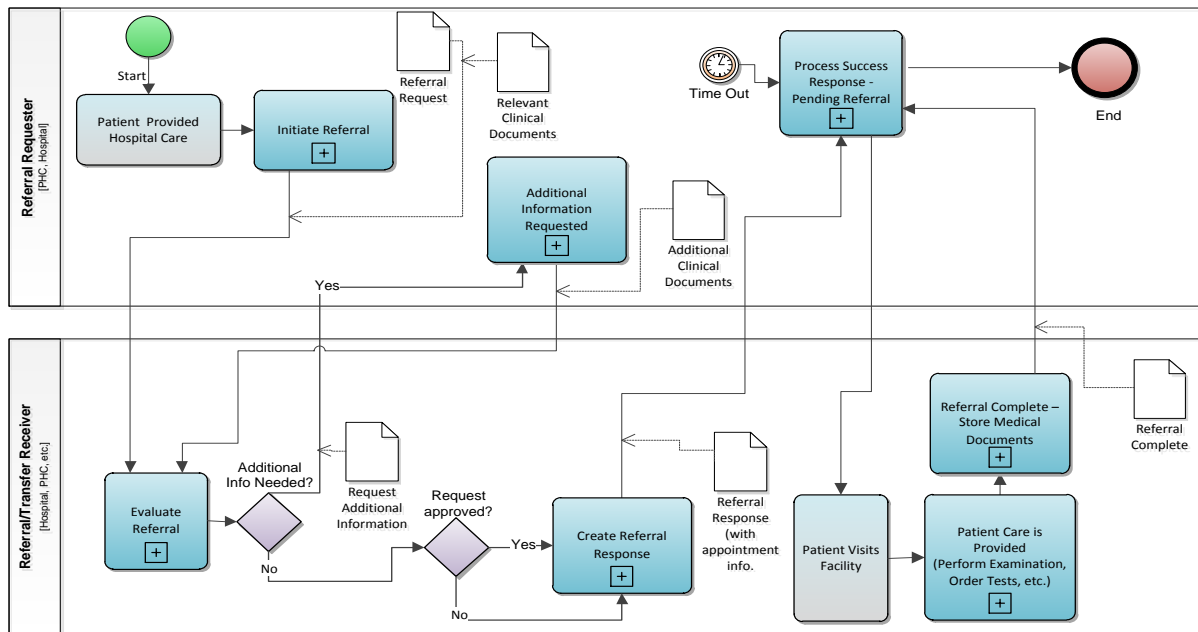
FIGURE 3.3.4.1-3 eREFERRAL USE CASE - DIRECTED REFERRAL DIAGRAM

1. The Healthcare Provider suspects a problem which requires a specialist or services only offered by a specific facility, thus decides to refer the patient to this facility as an out-patient.
2. The Referral Requester Actor is used to initiate a **Referral Request** to the specific Referral/Transfer Receiver Actor. Relevant clinical documents are attached to the request. A timer is set by the Referral Requester Actor to protect against non-timely Transfer Responses from the Referral/Transfer Receiver Actors.

   Note: Since this is a directed referral, the Workflow Manager is not involved in the workflow.

3. The Referral/Transfer Receiver Actor retrieves the Referral Request, associated clinical documents and **evaluates the Referral Request**.
4. Upon review of the Referral Request and associated clinical documents, the Referral/Transfer Receiver Actor may determine additional information is needed. If yes, the Referral/Transfer Receiver Actor **requests additional information** from the Referral Requester Actor. The Referral Requester Actor **provides the additional information** to the Referral/Transfer Receiver Actor.
5. Upon accepting or not accepting the Referral Request, the Referral/Transfer Receiver Actor **updates the referral status** (such as accepted) and generates a Referral Response. The Referral Response is provided to the Referral Requester Actor.

   Note: If the Referral/Transfer Receiver does not accept the Referral Request, the request is placed in a failed status.

6. The patient arrives at the receiving facility and is registered. The Healthcare Provider performs the examination and completes the services requested by the referral. All clinical documents generated during the referral are stored.
7. The Referral/Transfer Receiver Actor **updates the status of the Referral Response** (status of completed) and generates an updated Referral Response document which is provided directly to the Referral Requester.

3.3.4.2   Flexible Referral

The Healthcare Provider suspects a problem which requires a specialist or services that may be offered by a wide range of local facilities. The Healthcare Provider generates the referral without directing it to a specific facility or assigning it to a Collaboration Circle. This provides the patient with the flexibility to select the most convenient or appropriate facility, to make an appointment and to have the referral performed at a facility of its choosing. This is called a Flexible Referral.
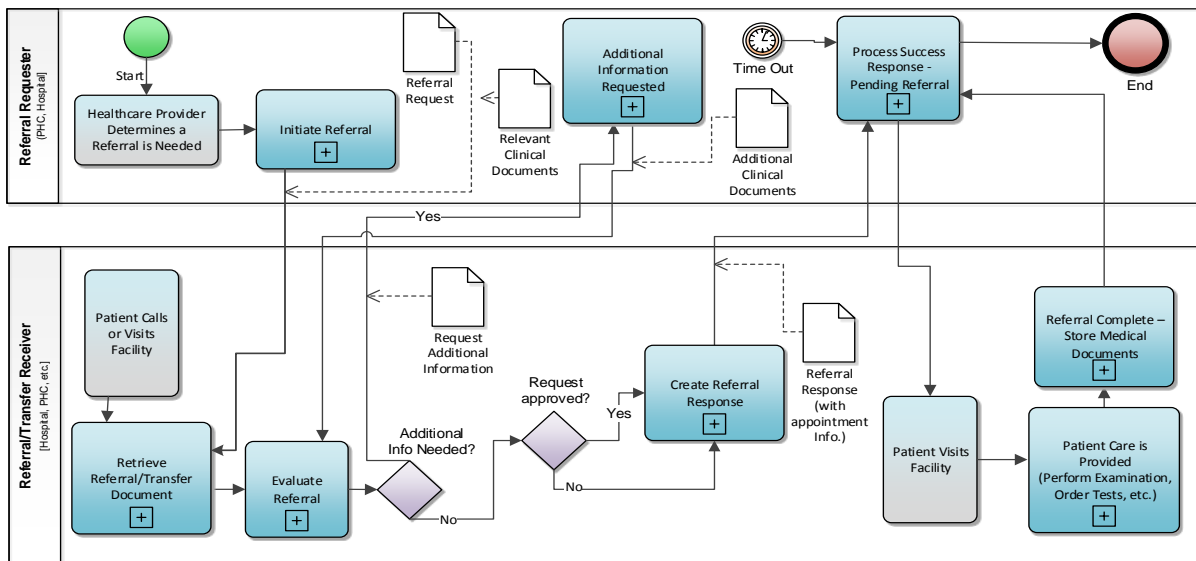
FIGURE 3.3.4.2-4 EREFERRAL USE CASE - FLEXIBLE REFERRAL DIAGRAM

1. The Healthcare Provider suspects a problem which requires referring the patient to a specialist or services offered by a wide range of facilities. The Healthcare Provider generates the referral without selecting a specific facility or Collaboration Circle for assignment.
2. The Referral Requester Actor is used to initiate a **Referral Request** as a flexible referral. Relevant clinical documents are attached to the request. A timer is set by the Referral Requester Actor to protect against non-timely Transfer Responses from the Referral/Transfer Receiver Actors.

   Note: Since this is a flexible referral, the Workflow Manager is not involved in the workflow.

3. The patient contacts the desired facility and the facility's Referral/Transfer Receiver Actor retrieves the Referral Request, associated clinical documents and **evaluates the Referral Request**.
4. Upon review of the Referral Request and associated clinical documents, the Referral/Transfer Receiver Actor may determine additional information is needed. If yes, the Referral/Transfer Receiver Actor **requests additional information** from the Referral Requester Actor. The Referral Requester Actor **provides the additional information** to the Referral/Transfer Receiver Actor.

5. Upon accepting or not accepting the Referral Request, the Referral/Transfer Receiver Actor **updates the referral status** (such as accepted) and generates a Referral Response along with appointment information. The Referral Response is provided to the Referral Requester Actor.

   Note: If the Referral/Transfer Receiver does not accept the Referral Request, the patient may try another facility.

6. The patient arrives at the receiving facility, is examined and the services requested by the referral are performed. All clinical documents generated during the referral are stored.

7. The Referral/Transfer Receiver Actor **updates the status of the Referral Response** (status of completed) and generates an updated Referral Response document which is provided to the Referral Requester.

3.3.5   Exceptions Workflow

3.3.5.1   Ambulatory Referral to Facility (Patient Fails To Arrive)

The Healthcare Provider suspects a problem which requires a specialist or services not offered by the local facility, thus decides to refer the patient to another facility as an out-patient.

The referral is accepted by a receiving Healthcare Organization and an appointment is made (such as shown in the main and alternative flow diagrams). The patient fails to appear at the Healthcare Organization (for example, decides to not have the referral performed, decides to have the referral at another facility, misses the appointment, the patient dies, etc. The receiving Healthcare Organization may abort the referral.
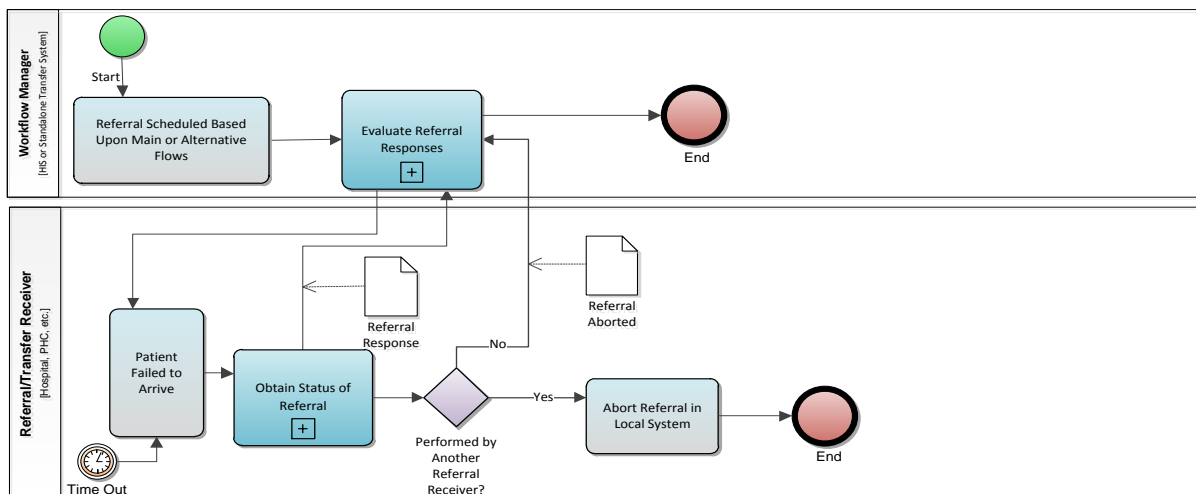
FIGURE 3.3.5.1-5eReferral Use Case - patient fails to arrive

1. The Healthcare Provider suspects a problem which requires a specialist or services not offered by the local facility, thus decides to refer the patient to another facility as an out-patient.
2. The referral request is processed as shown in the main or alternative flow diagrams.
3. The patient decides to not show up for the referral and does not cancel the appointment.

4. Upon determining the patient has not arrived for the appointment(s), after a number of missed appointments or a certain delay, the Referral/Transfer Receiver Actor checks to see if the patient referral was performed elsewhere. If no and no time extension is permitted, it **updates the referral status** to referral aborted and generates a Referral Response. If yes, the Referral/Transfer Receiver Actor need not take any action as the other receiving facility will have updated the referral status accepting the patient's referral. The original facility Referral/Transfer Receiver Actor closes the referral it its local system.

Note: For referrals based upon the Main flow, the Referral/Transfer Receiver Actor checks the Workflow Manager for the status. For referrals based upon the Alternative Flows, the Referral/Transfer Receiver Actor checks the Referral Requester that initiated the Referral.

5. The patient has been provided with healthcare at the new facility or the referral was aborted.

3.3.5.2 Referral or Transfer Cancellation

In some cases a provider may initiate a referral or transfer, and then may decide to cancel the request.

1. A referral or transfer request has been created.

2. The requesting provider determines that it is necessary to cancel the request because the patient no longer needs the requested service.

3. The Referral Requester Actor cancels the original request.

4. Recipients of the original request are notified of the cancellation.

3.4 INFORMATION 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 is addressed in IS0011 *Saudi eHealth Core IS for Referral Workflow*. Since the data are very similar between the eReferral and eTransfer Use Cases, the section defines the common data content for both Use Cases.

TABLE 3.4-1 EREFERRAL AND ETRANSFER USE CASE COMMON DATA CONTENT - REQUEST

REFERRAL REQUEST CONCEPTS	DESCRIPTION	TEXT/ CODED
Source and context information common to the eReferral and eTransfer Use Case		
Patient Demographic Information	Identifies the patient and demographic information of the referral and/or transfer. The following attributes have been identified as applicable: Health ID, Name, Gender, Birth Date	Text and coded
Patient Contact Information	Identifies the patient's contact information. The following attributes have been identified as applicable: Patient's Address, Wasel code (i.e. postal code), e-mail, mobile/phone	Text and coded

REFERRAL REQUEST CONCEPTS	DESCRIPTION	TEXT/ CODED
Referral or Transfer Workflow Identifier	Identifies the referral or transfer workflow from the time it created to the time it has completed or failed.	Text
List of Next of Kin Contact Information	Identifies the patient's next of kin's contact information. The following attributes have been identified as applicable: Patient's Address, Wasel code (i.e. postal code), e-mail, mobile/phone	Text and coded
Date/Time of Request	Date and time of the referral or transfer request.	Text
Confidentiality	Confidentiality level for the referral and/or request, such as normal or restricted.	Coded
Requesting Provider	Identifies the requesting provider. The following attributes have been identified as applicable: Provider Name, SCHS Provider ID, mobile/phone, e-mail	Text
Requesting Organization	A group of data elements which identify the requesting organization. The following attributes have been identified as applicable: Organization Name, Organization ID, Organization Address, Organization mobile/phone, Sector (MOH, NG, Private, etc.)	Text and coded
Type of Referral/ Transfer	The type of referral or transfer. For example: Elective, Urgent, Emergency, Life Threatening	Coded
Target Specialty	The service that is requested for the referral or transfer. For example: Radiology, Cardiology, Dentistry, etc.	Coded
Requested Service for Referral	The requested service for the referral, in freeform text.	Text
Ambulatory Precautions	Special precautions for the patient. For example: Hepatitis, HIV, MRSA Precautions (type of bacterial infection)	Text
Mode of Transportation	The mode of transportation arranged for the patient. This may include: Ambulance (including type of ambulance), medevac, personal transport, etc.	Coded
Insurance Type	Type of insurance available for the patient (used for private, pubic and military organizations)	Text
Attached Clinical Documents	Various medical record documents relevant to the Referral or Transfer. For example: Medication List, Allergies, List of surgeries, vital signs, immunizations, primary and secondary diagnosis (comorbidity) (for hospital transfer), etc. May be part of patient's summary record, encounter summery, scanned paper documents, or other document.	Documents

TABLE 3.4-2 eReferral and eTransfer Use Case common data content - response

REFERRAL RESPONSE CONCEPTS	DESCRIPTION	TEXT/ CODED
Source and context information common to the eReferral and eTransfer Use Case		
Patient Demographic Information	Identifies the patient and demographic information of the referral and/or transfer. The following attributes have been identified as applicable: Health ID, Name, Gender, Birth Date	Text and Coded
Requesting Provider	Identifies the requesting provider. The following attributes have been identified as applicable: Provider Name, SCHS Provider ID, mobile/phone, e-mail	Text
Requesting Organization	Identifies the requesting organization. The following attributes have been identified as applicable: Organization Name, Organization ID, Organization Address, Organization mobile/phone, Sector (MOH, NG, Private, etc.) and Collaboration Circle	Text and Coded
Receiving Provider	Identifies the receiving provider. The following attributes have been identified as applicable: Provider Name, SCHS Provider ID, mobile/phone, e-mail	Text
Receiving Organization	Identifies the receiving organization. The following attributes have been identified as applicable: Organization Name, Organization ID, Organization Address, Organization mobile/phone, Sector (MOH, NG, Private, etc.) and Collaboration Circle	Text and Coded
Additional Information Request	Request for additional information to help decided if the referral or transfer will be accepted.	Text
Scheduled Appointment Information	Calendar information to identify when and where the referral has been accepted.	Text
Date/Time of Responded	Date and time of the referral or transfer response	Text
Ambulatory Precautions	Special precautions for the patient. For example: Hepatitis, HIV, MRSA Precautions (type of bacterial infection)	Text
Mode of Transportation	The mode of transportation arranged for the patient. This may include: Ambulance (including type of ambulance), medevac, personal transport, etc.	Coded
Attached Clinical Documents	Various medical record documents relevant to the Referral or Transfer. For example: Medication List, Allergies, List of surgeries, vital signs, immunizations, primary and secondary diagnosis (comorbidity) (for hospital transfer), etc. May be part of patient's summary record, encounter summery, scanned paper documents, or other document.	Documents

4. eTRANSFER USE CASE

This Use Case describes the information workflow of the eTransfer Use Case. It enables healthcare providers and facilities to transfer patients to other healthcare facilities for continuation of the patient care in an in-patient environment. The transfer request conveys key information to ensure organizations have the proper data to accept the transfer of the patient (such as requesting provider/organization, patient information, reasons for transfer, services requested, relevant medical documentation, etc.).

4.1 SCOPE

The eTransfer Use Case is applicable to KSA Healthcare Organizations, such as Hospitals, Medical Cities, Long Term Care, etc. This includes MOH facilities but also other governmental organizations (such as National Guard and Military) and private healthcare systems. Some examples include:

- Hospital to Hospital Transfer
- Hospital to Long Term Care

4.2 BUSINESS SCENARIOS

This section provides an analysis leading to refining the scope of a specific Use Case within the domain of interest.

The Use Cases considered in this document are focused on interoperability between facilities of distinct organizations and their Health Information Systems that need to communicate at the national level. These Use Cases support the interactions needed to interface with the Saudi Health Information Exchange (HIE) platform and support of cross facility data sharing and workflow.

The following Users are associated with these business scenarios:

TABLE 4.2-1 SCENARIO USERS

USER	USER ROLE
Patient	The person visiting a healthcare facility (e.g. PHC, Hospital, Private Medical Center, etc.)
Administrative Staff	The person registering the patient in the information system and obtaining the patient's Health ID.
Physician	The healthcare physician/specialist responsible for patient care and the resulting transfer.
Medical Coordinator/Director	The person providing approval for issuing transfer requests or acceptance of transfer requests.
Specialist	The consultant or physician the patient is being transferred to.

The following Information Systems are associated with these business scenarios:

TABLE 4.2-2 SCENARIO INFORMATION SYSTEMS

INFORMATION SYSTEM	SYSTEM ROLE
Hospital Information System (HIS)	The HIS used by Administrative Staff and other Healthcare Providers.
Ambulatory Medical Record System or Primary Healthcare Center System (PHC)	The PHC used by a Physician or other Healthcare Providers.
HIE Document Repository	The HIE Document Repository stores the Transfer Requests and Responses. It also provides access to the transfer information by other information systems.

4.2.1   Business Scenario 1: Patient Transferred From Hospital To Hospital (In-Patient)

A patient is hospitalized following a car accident. The patient is registered in the Hospital Information System (HIS) by the administrative staff and his Health ID is obtained [1] from the HIE System. The Healthcare Organization emergency room stabilizes the patient and performs a whole body CT scan. The emergency physician reviews the imaging procedure [2] and determines a multi-trauma that requires extensive surgery which cannot be performed at this local Healthcare Organization. After review by the Medical Coordinator/Director, the request to transfer the patient to the nearest tertiary hospital is electronically submitted [3] to the HIE Document Repository using the local HIS. The request includes relevant information such as requesting emergency physician contact information and associated clinical information such as images and radiology reports.

The receiving Healthcare Organization is notified that a Transfer Request is available for processing. The Medical Coordinator/Director from the tertiary Healthcare Organization uses the HIS to retrieve the electronic transfer and associated clinical content [4] from the HIE Document Repository and reviews the content for completeness and appropriateness. The tertiary Healthcare Organization accepts the transfer [5], and an appointment is communicated at the time of acceptance to the local hospital.

Transport is arranged by the local Healthcare Organization to the tertiary Healthcare Organization. The patient is admitted to the tertiary Healthcare Organization and is registered in the HIS by the administrative staff and his Health ID is obtained [6] from the HIE System. The HIS updates the completed transfer status [7] to the HIE Document Repository. The patient's images/reports and other relevant medical documentation [8] is reviewed. Surgery is performed and the patient is provided follow-up care.

The following Business Processes are associated with the eTransfer Use Case. Some of the business processes are specified in other Use Case documents, while others are specific to this Use Case. The details of the Business Processes may be found in Section 5 Detailed business processes.

TABLE 4.2.1-3 HIGH LEVEL BUSINESS PROCESSES FOR HOSPITAL TO HOSPITAL TRANSFER (IN-PATIENT)

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1 & 6	N/A	Obtain Patient Health Identifier	Section 5.2.1
2	N/A	Review Diagnostic Results	Section 5.2.3
3	Main Flow	Create Transfer Request	Section 5.1.2
4, 5, 7	Main Flow	Update Referral/Transfer	Section 5.1.3
8	N/A	Review Historical Medical Documents	Section 5.2.4

4.3   PROCESS FLOWS

4.3.1   Process Overview

The Business Process Model shown in the figure below is a composite of all the process flows developed for this Use Case. It has been developed based on analysis of all the process flows and identified from the Use Case scenarios described above. The diagram below depicts the user roles and the associated activities.
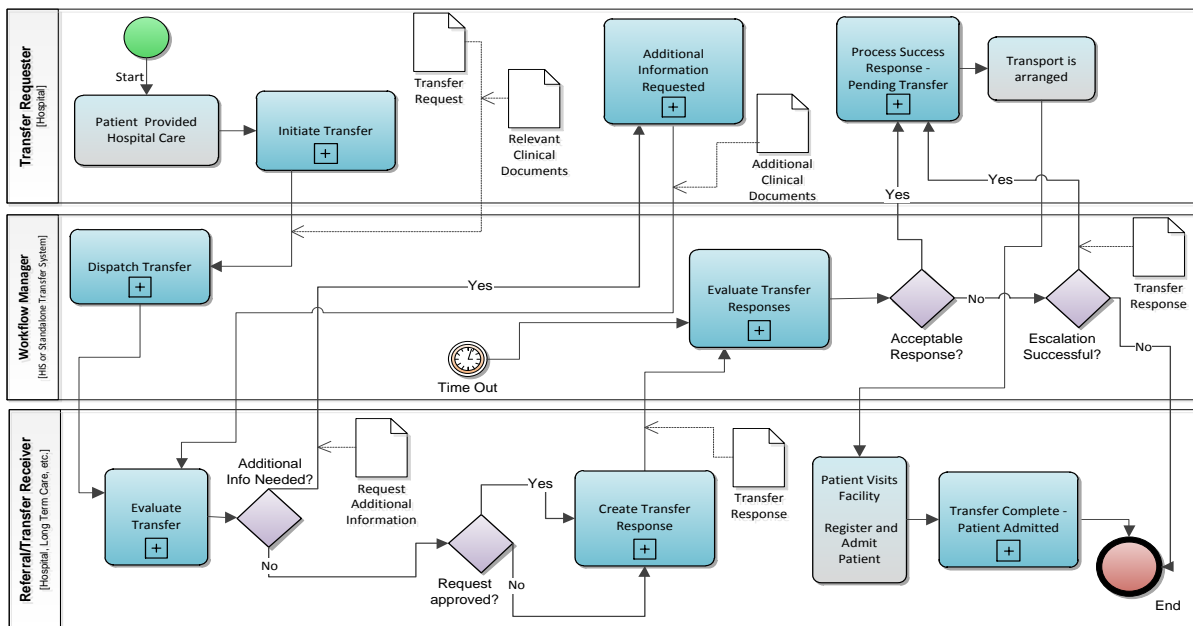

FIGURE 4.3.1-1 ETRANSFER USE CASE MAIN FLOW OF EVENTS DIAGRAM

4.3.2   Transfer Main Flow of Events

A patient is being provided healthcare in a facility and the Healthcare Providers determine that the patient needs services beyond what can be offered at this Healthcare Organization.

1. The Healthcare Provider diagnoses a problem which requires services not offered by the local Healthcare Organization, thus decides to transfer the patient to a Healthcare Organization that is able to provide the needed services.
2. The Transfer Requester Actor is used to initiate a **Transfer Request.** Relevant clinical documents are attached to the request.
3. The Workflow Manager **dispatches the Transfer Request** to one or more Referral/Transfer Receiver Actors within its Collaboration Circle. A timer is set by the Workflow Manager Actor to protect against non-timely Transfer Responses from the Referral/Transfer Receiver Actors.

   Note: When multiple organizations are assigned, how the Workflow Manager decides upon which organizations are given the opportunity to respond is left up to the configuration of the Workflow Manager and is outside of the scope of this specification.

   Note: The dispatched transfer may or may not include the ability for the Referral/Receivers to bid for the transfer. This is a business agreed to between the participants of the Collaboration Circle and how the bidding is resolved is outside the scope of this specification.

4. The Referral/Transfer Receiver Actor retrieves the Transfer Request, associated clinical documents and **evaluates the Transfer Request**.
5. Upon review of the Transfer Request and associated clinical documents, the Referral/Transfer Receiver Actor may determine additional information is needed. If yes, the Referral/Transfer Receiver Actor **requests additional information** from the Transfer Requester Actor. The Transfer Requester Actor **provides the additional information** to the Referral/Transfer Receiver Actor.
6. Upon accepting or not accepting the Transfer Request, the Referral/Transfer Receiver Actor **updates the transfer status** (such as accepted) and generates a Transfer Response. The Transfer Response is provided to the Workflow Manager.
7. The Workflow Manager Actor **evaluates the Transfer Responses** and determines to assign the transfer to one of the responding Referral/Transfer Receiver Actors.

   Note: How the Workflow Manager makes a determination of which response to select is left up to the configuration of the Workflow Manager. If no organization accepts the transfer, the Workflow Manager may still make an assignment (this is part of the Collaboration Circle's internal escalation process). The rules governing how a Workflow Manager makes such decisions is outside of the scope of this specification.

8. The local Healthcare Organization arranges transportation (e.g., ambulance, private transportation, etc.) for the patient.
9. The patient arrives as the receiving facility and is admitted (in-patient).
10. The patient is provided with healthcare.

4.3.3   Document Sharing and Notification Flow

Figure 3.3.3-2 Document Sharing and notification diagram (see Section 3.3.3) illustrates internal flows of systems which support sharing of documents and notification of the participants during the referral and transfer workflow. The internal flows are used in all referral and transfer workflows but are only shown here to simplify the Main, Alternative or Exception diagrams.

4.3.4   Alternative Flow of Events

4.3.4.1   Directed Transfer From Hospital To Hospital

A patient is being provided healthcare in a facility and the Healthcare Providers determine the patient needs services beyond what can be offered at this Healthcare Organization. When a Healthcare Provider requests a transfer to a specific hospital, this is called a directed transfer. The receiving hospital responds with their ability to accept the transfer. If yes, the patient transfer is accepted and may be performed.

FIGURE 4.3.4.1-2ETRANSFER USE CASE - DIRECTED TRANSFER DIAGRAM

1. The Healthcare Provider diagnoses a problem which requires services not offered by the local Healthcare Organization, thus decides to transfer the patient to a specific Healthcare Organization that is able to provide the needed services.
2. The Transfer Requester Actor is used to initiate a **Transfer Request** to the specific Referral/Transfer Receiver Actor. Relevant clinical documents are attached to the request. A timer is set by the Transfer Requester Actor to protect against non-timely Transfer Responses from the Referral/Transfer Receiver Actors.

   Note: Since this is a directed transfer, the Workflow Manager is not involved in the workflow.

3. The Referral/Transfer Receiver Actor retrieves the Transfer Request, associated clinical documents and **evaluates the Transfer Request**.
4. Upon review of the Transfer Request and associated clinical documents, the Referral/Transfer Receiver Actor may determine additional information is needed. If yes, the Referral/Transfer Receiver Actor **requests additional information** from the Transfer Requester Actor. The Transfer Requester Actor **provides the additional information** to the Referral/Transfer Receiver Actor.

5. Upon accepting or not accepting the Transfer Request, the Referral/Transfer Receiver Actor **updates the transfer status** (such as accepted) and generates a Transfer Response. The Transfer Response is provided to the Transfer Requester Actor.

   Note: If the Referral/Transfer Receiver does not accept the Transfer Request, the request is placed in a failed status.

6. The local Healthcare Organization arranges transportation (e.g., ambulance, private transportation, etc.) for the patient.
7. The patient arrives as the receiving facility and is admitted (in-patient).
8. The patient is provided with healthcare.

4.3.5   Exceptions Workflow

4.3.5.1   Hospital To Hospital Transfer (Patient Fails To Arrive)

A patient is being provided healthcare in a facility and the Healthcare Providers determine that the patient needs services beyond what can be offered at this Healthcare Organization.

The transfer is accepted by a receiving Healthcare Organization (such as shown in the main and alternative flow diagrams). The patient fails to appear at the Healthcare Organization (for example, the family is providing transport and decides to not take the patient to the hospital, a life threating condition occurs and the transport takes the patient to the nearest hospital, the patient dies during transport, etc.). The receiving Healthcare Organization may abort the transfer.
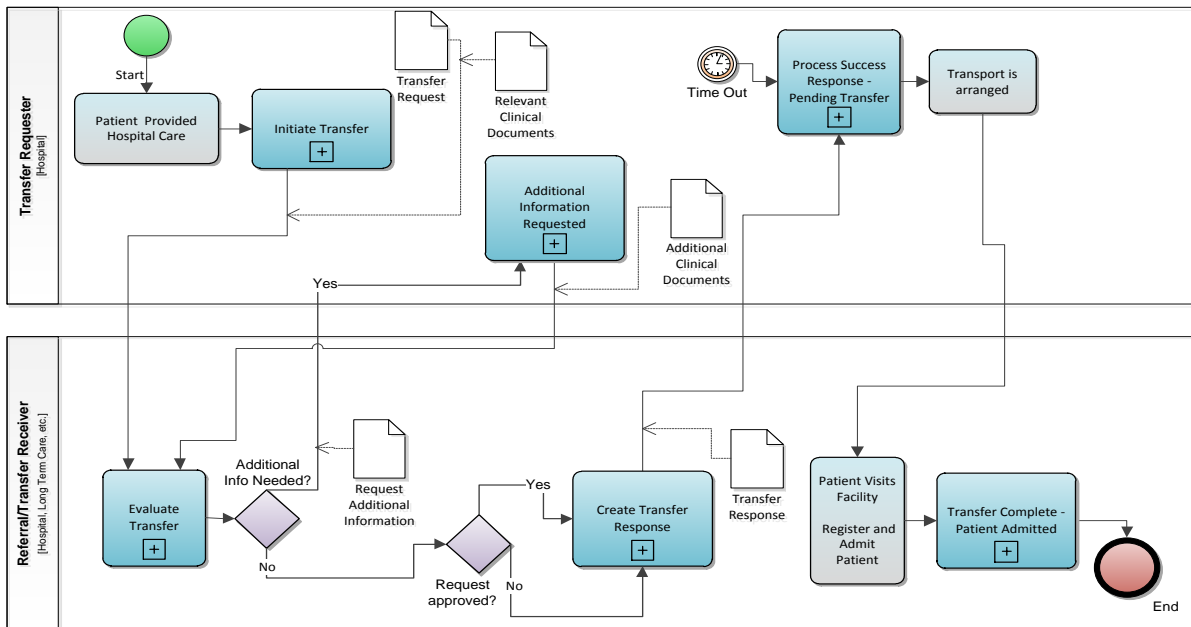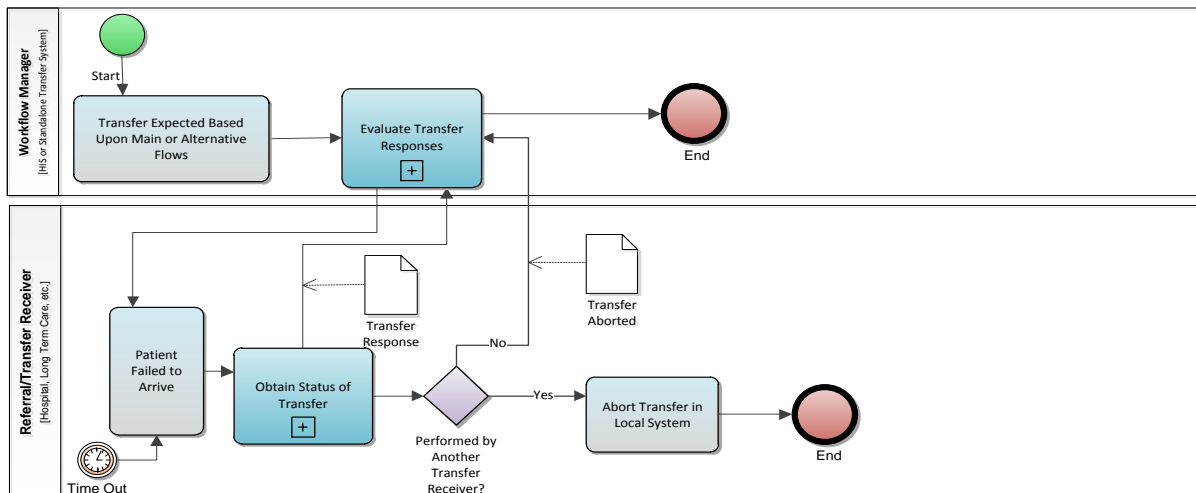

FIGURE 4.3.5.1-3ETRANSFER USE CASE - PATIENT FAILS TO ARRIVE

1. The Healthcare Provider diagnoses a problem which requires services not offered by the local Healthcare Organization, thus decides to transfer the patient to a specific Healthcare Organization that is able to provide the needed services.
2. The transfer request is processed as shown in the main or alternative flow diagrams.
3. During the patient transport, it is decided to re-route the patient, such as to another facility or no facility as the patient dies during transport. The result is the patient does not arrive at the expected receiving facility.
4. Upon determining the patient is not arriving, the Referral/Transfer Receiver Actor checks to see if the patient was admitted elsewhere. If no, it **updates the transfer status** (such as

transfer aborted) and generates a Transfer Response. If yes, the Referral/Transfer Receiver Actor need not take any action as the other receiving facility will have updated the transfer status accepting the patient, therefore the original facility Referral/Transfer Receiver Actor may close the transfer it its local system.

Note: For transfers based upon the Main flow, the Referral/Transfer Receiver Actor checks the Workflow Manager for the status. For transfers based upon the Alternative Flows, the Referral/Transfer Receiver Actor checks the Transfer Requester that initiated the Transfer.

5. The patient has been provided with healthcare in the new facility or the transfer was aborted.

4.4   INFORMATION 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 is address in IS0011 *Saudi eHealth Core IS for Referral Workflow*.

TABLE 4.4-1 ETRANSFER USE CASE DATA CONTENT - REQUEST

TRANSFER REQUEST CONCEPTS	DESCRIPTION	TEXT/ CODED
Common data elements to the eReferral and eTransfer Use Case See Table 3.4-1 eReferral and eTransfer Use Case common data content - request		
Justification for Requesting Transfer	The justification for the requested transfer (used for hospital transfer), such as: No available beds, lack of medical equipment, no specialty doctor, service not available, etc.	Coded

TABLE 4.4-2 ETRANSFER USE CASE DATA CONTENT - RESPONSE

TRANSFER RESPONSE CONCEPTS	DESCRIPTION	TEXT/ CODED
Common data elements to the eReferral and eTransfer Use Case See Table 3.4-2 eReferral and eTransfer Use Case common data content - response		

5. DETAILED BUSINESS PROCESSES

These are comprised of a number of Business Processes, some of which are defined in this document and others which are defined in documents external to this Use Case.

5.1 EREFERRAL AND ETRANSFER USE CASE BUSINESS PROCESSES

These business processes aggregate several business processes from the Use Cases described in the Saudi eHealth project.

5.1.1 Create Referral Request

This business process is initiated by the user to **Create a Referral Request**. A Referral Request is used in an ambulatory setting, such as an out-patient referral from a PHC to hospital, or hospital to out-patient hospital referral, etc. The main flow of events for creating a referral request is:

1. The Healthcare Provider (e.g. physician) determines a referral to a specialist is needed for the patient.
2. The Healthcare Provider provides the Referral Request to the HIE Document Repository using the local Information System (e.g. HIS, EHR). Attached to the request are relevant patient medical record documents.
3. The HIE Document Repository receives and stores the request.
4. A notification is provided to one or more identified receiving facilities.
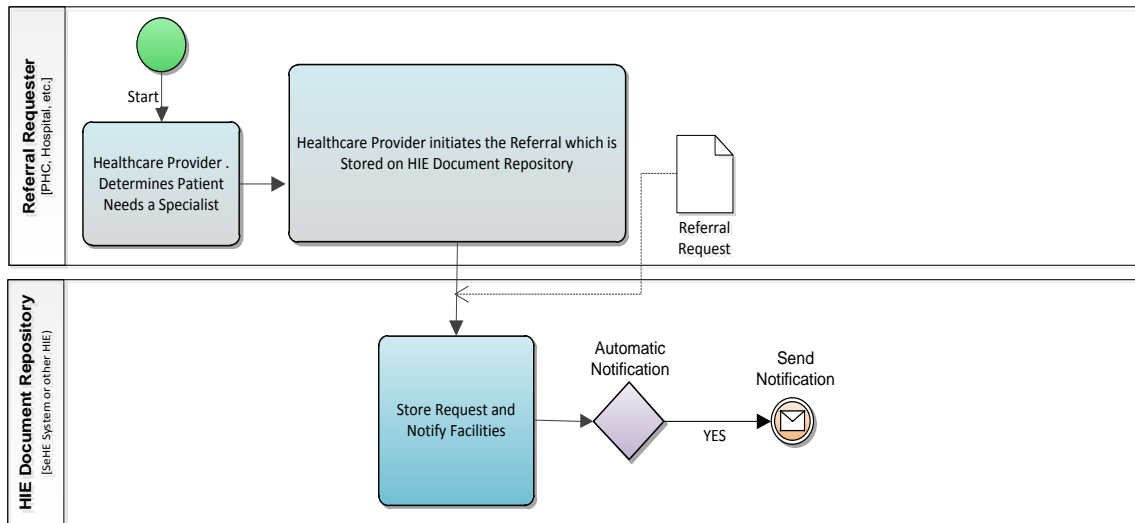
FIGURE 5.1.1-1 CREATE REFERRAL REQUEST

5.1.2   Create Transfer Request

This business process is initiated by the user to **Create a Transfer Request**. A Transfer Request is used in an in-patient setting, such as an in-patient transfer hospital to hospital, or in-patient hospital to in-patient long term care, etc. The main flow of events for creating a Transfer Request is:

1. The Healthcare Provider (e.g. physician) determines a transfer to another healthcare facility is needed for the patient.
2. The Healthcare Provider provides the Transfer Request to the HIE Document Repository using the local Information System (e.g. HIS, EHR). Attached to the request are relevant patient medical record documents.
3. The HIE Document Repository receives and stores the request.
4. A notification is provided to one or more identified receiving facilities.
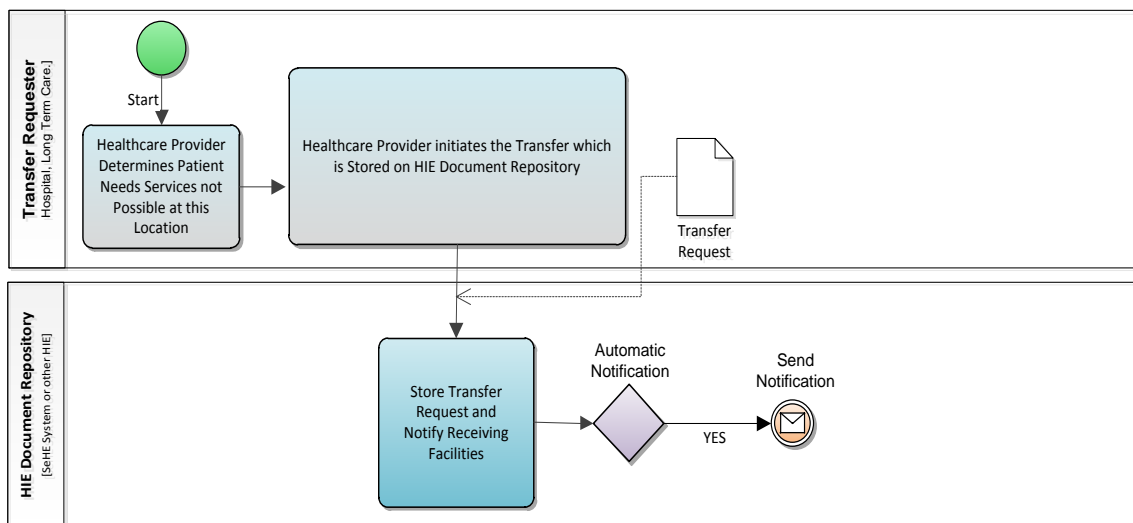
FIGURE 5.1.2-2 CREATE TRANSFER REQUEST

5.1.3   Update Referral/Transfer

This business process is initiated by the user to **Update a Referral/Transfer Request**. It is used to manage the changes of "status" of the Referral and/or Transfer Request, such as accepted, in escalation, cancelled, aborted, completed, etc. The typical main flow of events for updating a Referral or Transfer Request is:

1. A facility receives a notification of a Referral or Transfer Request from the HIE Document Repository.
2. The receiving facility's Healthcare Provider retrieves and processes the Referral or Transfer Request and associated clinical documents.
3. Upon accepting the Referral or Transfer Request the receiving facility's healthcare provider accepts the referral/transfer by updating the status. An appointment is generated for referrals.
4. Notification is provided to the requesting facility.

5. The receiving facility performs the service (either referral or transfer) and updates the referral/transfer status to complete.
6. Notification is provided to the requesting facility.

Note: There are many exceptions to this typical workflow as the referral/transfer could be aborted, canceled, placed in escalation, sending a request for additional information, etc.
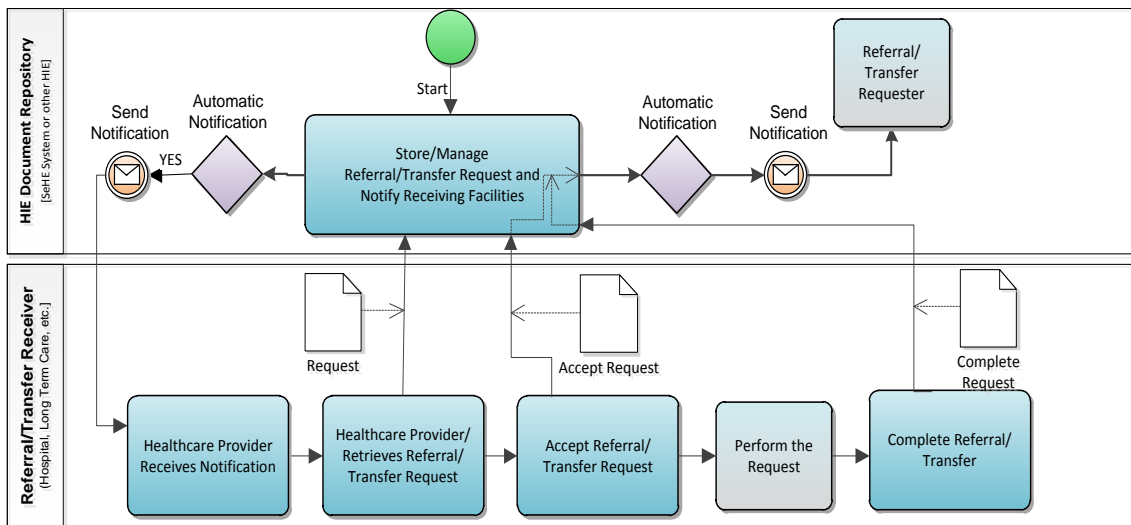
FIGURE 5.1.3-3 UPDATE REFERRAL/TRANSFER REQUEST

5.2   EXTERNAL BUSINESS PROCESSES

The following Business Processes are referenced in the eReferral and eTransfer Use Case but are defined in other Use Cases.

5.2.1 Obtain Patient Health Identifier

This Business Process is initiated to retrieve a patient's Health ID from the HIE System. In order to query/retrieve any information (e.g. documents, images) for a patient from the HIE System, it is first necessary to **Obtain Patient Health Identifier** using Patient Demographic Consumer Actor.

TABLE 5.2.1-1 OBTAIN PATIENT HEALTH IDENTIFIER

BUSINESS PROCESS	REFERENCE
Obtain Patient Health Identifier	*UC0001 Saudi eHealth Patient Identification Interoperability Use Case*

5.2.2 Order Diagnostic Testing

This Business Process is initiated to **Order Diagnostic Testing** both locally and for the purpose of sharing diagnostic testing orders using the Composite Order Diagnostic Testing Actor. At this time only Laboratory Orders can be shared through the HIE System.

TABLE 5.2.2-2 SHARED ORDER DIAGNOSTIC TESTING

BUSINESS PROCESS	REFERENCE
Order Laboratory Test	*UC0003 Saudi eHealth Laboratory Interoperability Use Case*

5.2.3 Review Diagnostic Results

This Business Process is initiated to **Review Diagnostic Results** for a given patient. The Diagnostic Results may be stored locally or on the HIE System. Shared diagnostic results can be queried and retrieved from the HIE System using the Composite Clinical Content Consumer Actor. The following types of diagnostic tests are supported through the HIE System:

TABLE 5.2.3-3 SHARED DIAGNOSTIC TEST RESULTS

BUSINESS PROCESS	REFERENCE
Review Laboratory Results	*UC0003 Saudi eHealth Laboratory Interoperability Use Case*
Review Imaging Results	*UC0005 Saudi eHealth Imaging Interoperability Use Case*
Review Images	*UC0005 Saudi eHealth Imaging Interoperability Use Case*

5.2.4 Review Historical Medical Documents

The user can Review Historical Medical Documents using the Composite Clinical Content Consumer Actor from the local EHR Systems or by querying the HIE System using the Health ID to query and retrieve relevant documents.

TABLE 5.2.4-4 REVIEW HISTORICAL MEDICAL DOCUMENTS

BUSINESS PROCESS	REFERENCE
Review Historical Medical Documents	*UC0007 Saudi eHealth Interoperability Use Case for Clinical Notes and Summaries*

5.2.5 Publish Clinical Summary Document

This business process is initiated by the user to Publish Clinical Summary Document to the Document Repository for the purpose of sharing.

TABLE 5.2.5-5 PUBLISH CLINICAL SUMMARY DOCUMENTS

BUSINESS PROCESS	REFERENCE
Publish Clinical Summary Document	*UC0007 Saudi eHealth Interoperability Use Case for Clinical Notes and Summaries*

6. SERVICES

6.1 SERVICE DESCRIPTIONS

The Services defined in this Use Case are described in Table 6.1-1 Services.

TABLE 6.1-1 SERVICES

SERVICE NAME	SERVICE USE
Manage Referral or Transfer	Create and manage referral and transfer workflow documents in the HIE Document Repository and request that it stores these documents and register their metadata.
Query/Retrieve Documents	Used by Actors to query the HIE Document Repository for information about documents stored and indexed by metadata and retrieve one or more relevant documents.
Publish Document(s)	Used by Actors to provide a set of documents to the HIE Document Repository and to request that it stores these documents and register their metadata.
Notification of Document Availability	Provided by the HIE Document Repository to notify other actors that a workflow document of interest is available to be retrieved.

6.1.1 Pre-conditions

Table 6.1.1-2 Pre-conditions identifies pre-conditions for this Use Case.

TABLE 6.1.1-2 PRE-CONDITIONS

ACTOR NAME	SERVICES	DESCRIPTION
Actor	All Services	It is expected that all services initiated or provided by this actor operate in accordance with the Saudi eHealth Interoperability Polices and Interoperability Specifications.
Referral Requester	Manage Referral or Transfer	A KSA authorized Healthcare Provider and/or Organization determines that one or more referral requests are needed for a patient.
		The patient's Health ID has been obtained and is used for all medical records for the patient.
Transfer Requester	Manage Referral or Transfer	A KSA authorized Healthcare Provider and/or Organization determines that a transfer request is needed for a patient.
		The patient's Health ID has been obtained and is used for all medical records for the patient.
Referral/Transfer Receiver	Query/Retrieve Documents	The Healthcare Provider and/or Organization are authorized by the KSA to perform services that may be requested by referrals and/or transfers.
		The internal organization workflow for performing the requests is outside the scope of this Use Case. Such as the acceptance criteria, escalation process, patient transport management, etc.

6.1.2 Post-Conditions

Table 6.1.2-3 Post-conditions identifies post-conditions for this Use Case.

TABLE 6.1.2-3 POST-CONDITIONS

ACTOR NAME	SERVICES	DESCRIPTION
Referral/Transfer Receiver	All Services	The service(s) asked for in a patient's referral and/or request has been processed (i.e. completed, aborted, or canceled). If completed, a Referral Response has been generated.

6.1.3   Assumptions and Dependencies

Table 6.1.3-4 Use Case Dependencies identifies and describes Use Cases which this Use Case depends upon for information workflow.

TABLE 6.1.3-4 USE CASE DEPENDENCIES

USE CASE NAME	DEPENDENCY ASSUMPTIONS
KSA-Wide Patient Demographic Query	The KSA-Wide Patient Demographic Query Use Case is used to obtain a Health ID and demographic attributes for the patient that the referral and/or transfer is being performed.
Healthcare Provider Directory Query	The Healthcare Provider Directory Query Use Case is used to obtain provider and organizational information. It may be used to identify requesting physicians and organizations and also receiver personal and organization information.
Sharing Coded Laboratory Results	The Sharing Coded Laboratory Results may be used to access relevant prior laboratory tests results.
Sharing Images and Imaging Reports	The Sharing Images and Imaging Reports Use Case may be used to access images and imaging reports for review.
Clinical Note and Summaries	The Clinical Note and Summaries Use Case may be used to publish and access the patient's clinical summary documents.

6.1.4   Special Requirements

N/A

6.1.5   Notes and Issues

N/A

7. REFERENCED DOCUMENTS AND STANDARDS

The following Saudi eHealth documents are referenced by this Use Case.

TABLE 7-1 INTERNAL REFERRENCES

MOH DOCUMENT	DESCRIPTION
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 MOH 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.
IS0303 Saudi Health Information Exchange Policies	Contains the policies and supporting definitions that support the security and privacy aspects of the Saudi Health Information Exchange. The Saudi Health Information Exchange Policies apply to all individuals and organizations that have access to the Saudi Health Information Exchange managed health records, including those connected to the Saudi Health Information Exchange, their Business Associates, as well as any subcontractors of Business Associates. These policies apply to all information provided to or retrieved from the Saudi Health Information Exchange.
UC0007 Saudi eHealth Interoperability Use Case for Clinical Notes and Summaries	Specifies the Saudi eHealth Interoperability Use Cases applicable to existing and new information systems to be connected to the national Saudi Health Information Exchange (HIE) platform. The Clinical Notes and Summaries Use Cases address improvement of patient care through increased healthcare provider access to information during a transition of patient care. Each Use Case provides one or more technical scenarios that convey how the system should interact with the end user, or another system, to achieve a specific business goal. These Use Cases provide a set of high-level functional requirements. Standards and Profiles supporting these Use Cases are documented in the Saudi Interoperability Specification and Interoperability Policies.