Kingdom of Saudi Arabia

Ministry of Health

National eHealth Strategy and Change Management Office

(SCMO)

Enabling Standards-Based eHealth Interoperability

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Saudi eHealth Interoperability Use Case for Clinical Notes and Summaries

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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Document Revision History

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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 to 7 provide an overview of each of the Use Cases and the associated business scenarios and process flows.

Section 8 defines the reusable business processes that result from the Use Cases described in section 3 to 7.

Section 9 elaborates the business processes from section 8 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.

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

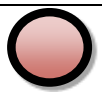
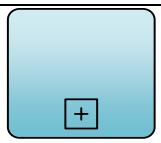
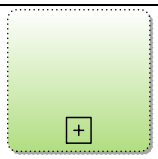
This document has adopted the following conventions for representing the Use Case concepts and information workflow.

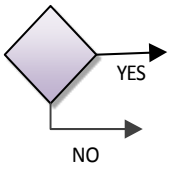
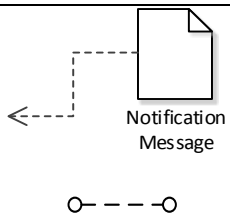
Process Flow Diagrams

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 0-1 SEHE BUSINESS PROCESS MODELING NOTATION CONVENTIONS

SHAPE	DESCRIPTION
	Start event acts as a trigger to launch the business process.
	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 conventions[1] 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.

[1] Definitions based upon RFC 2119

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.

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 0-1 Scope of eHealth Standard based Interoperability Specifications and Policy Projectdepicts the general scope and focus of the project highlighted in red.

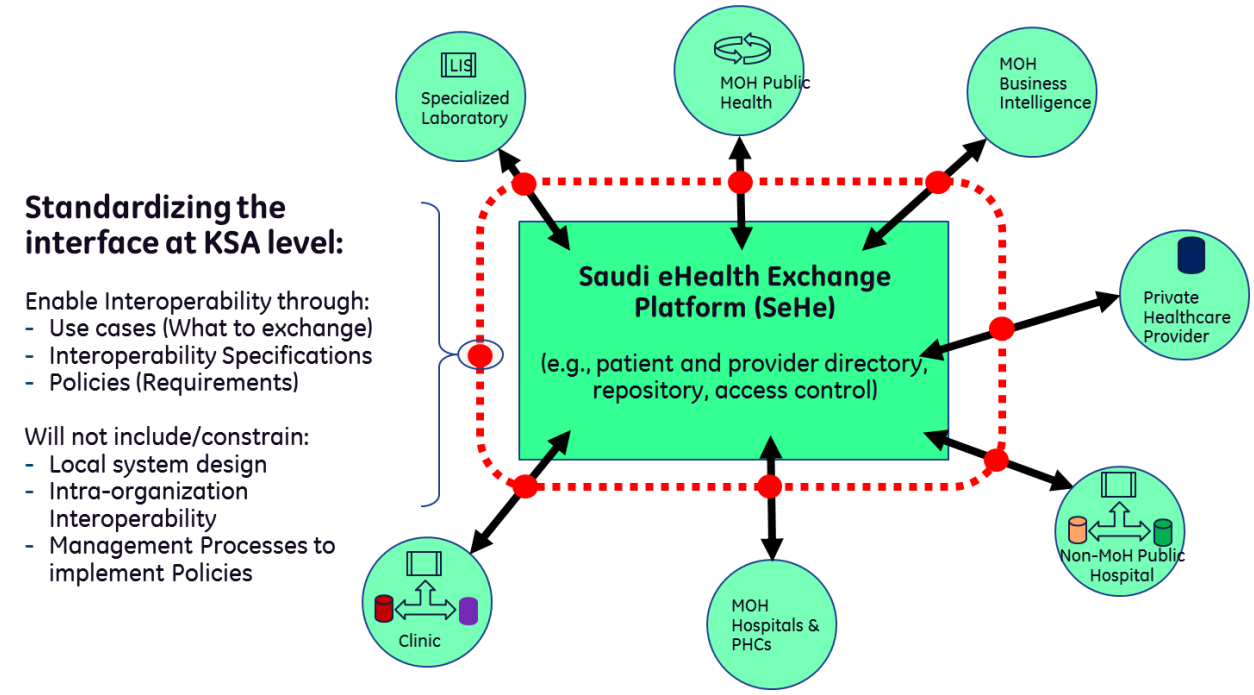


FIGURE 0-1 SCOPE OF EHEALTH STANDARD BASED INTEROPERABILITY SPECIFICATIONS AND POLICY PROJECT

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

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.

Figure 0-1Methodology 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).

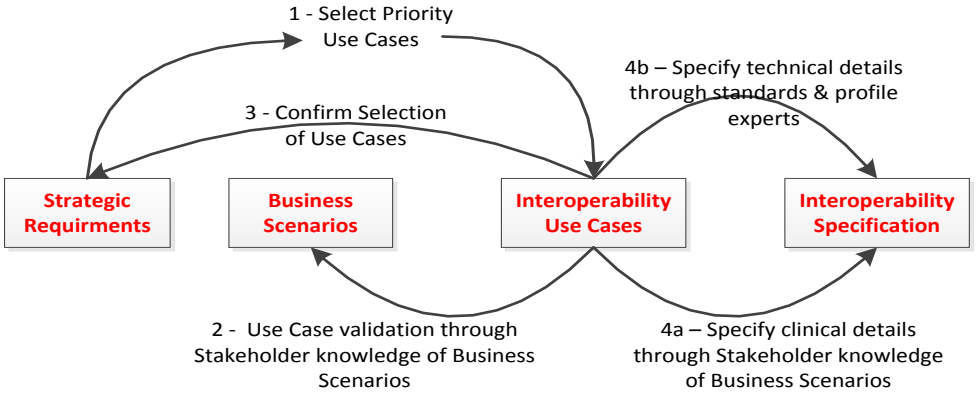


FIGURE 0-1METHODOLOGY STEPS FOR THE EHEALTH STANDARDS-BASED INTEROPERABILITY SPECIFICATIONS AND POLICY PROJECT

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 0-2Verification of Conformance to a Core Saudi eHealth Interoperability Specification.

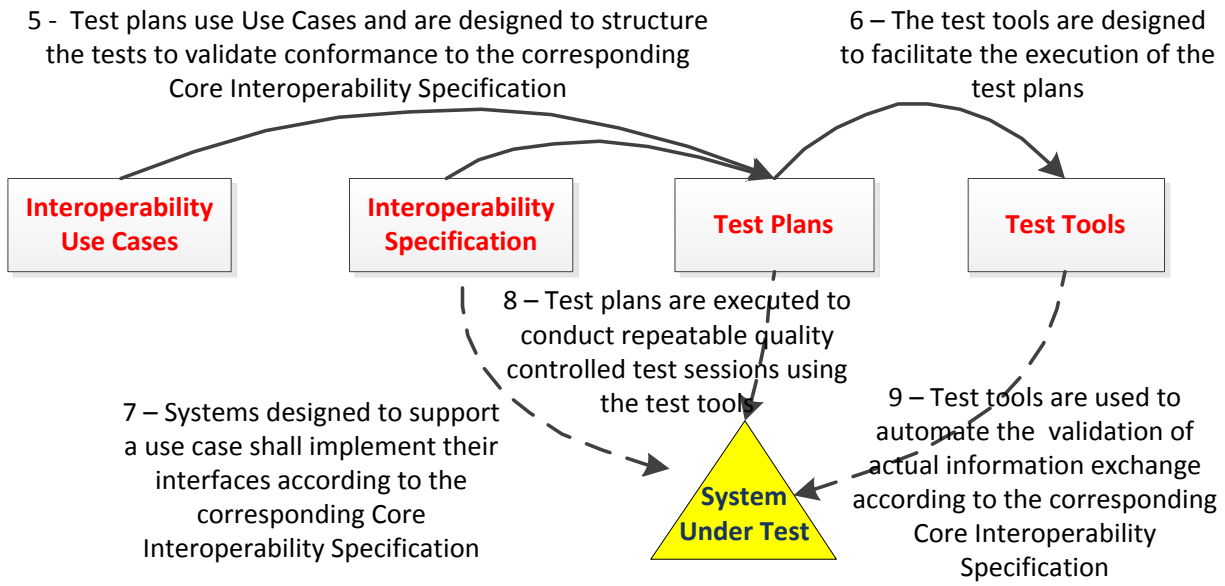


FIGURE 0-2VERIFICATION OF CONFORMANCE TO A CORE SAUDI EHEALTH INTEROPERABILITY SPECIFICATION

1. CLINICAL NOTES AND SUMMARIES USE CASE

1.1 SCOPE

In Scope:

The scope of this document is the specification of the business requirements for the Clinical Notes and Summaries Use Case. It has defined a strategy for defining shareable documentation to enhance the transition of care, as well as providing up-to-date clinical data for Healthcare Providers at any time. This document aligns with the Saudi e-Government Interoperability Standards (YEFI) to expedite national adoption. The following topics are in scope for this Use Case:

- Shared clinical summaries to be used to support transitions of care (i.e. Outpatient Encounter Summary, Discharge Summary, Maternal Discharge Summary and Newborn Discharge Summary).
- Shared clinical summary to be used to provide clinical data (e.g. vital signs, medications, problem list) for any encounter (i.e. iEHR Summary) , and
- Shared clinical operative note to provide the surgical details for future reference.

The scope of this document is further constrained as follows:

- Clinical Notes and Summaries may only be shared for patients with KSA-Wide Health Identifiers (IDs). All citizens and legal KSA visitors either have a KSA-Wide Health ID, or will be provided with one when they visit the Emergency Department. A new KSA-Wide Health ID will be created for newborns as part of their hospital stay, and unidentified patients will be provided temporary KSA-Wide Health IDs. (See *UC0001 Saudi eHealth Patient Identification Interoperability Use Case*).

Out of Scope:

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

- Requirements for the User Interface for querying and retrieving Clinical Notes and Summaries
- Requirements for the User Interface for the visualization of the Clinical Notes and Summaries, and
- Internal requirements for the documentation of clinical notes and summaries within a specific Healthcare Organization

2. WORKSTREAM

2.1 CURRENT STATE

Currently the content of clinical notes and summaries are created manually, from text dictated by the Healthcare Provider or generated out of systems including the Health Information System (HIS); the Electronic Health Record System (EHR); or the Electronic Medical Record System (EMR).

Most transition of care communication relies on paper-based communications which depends upon patients, care-givers and others for the transfer of information. The clinical information used to support transitions of care has challenges with consistency and completeness with critical pieces of information sometimes being unavailable.

2.2 EXPECTED BENEFITS

The Clinical Notes and Summaries work stream provides the requirements to support the exchange of specific types of Patients' Summary documents using the HIE Platform, and defined the necessary clinical information which must be supported in each case.

- Provides Healthcare Providers/Organizations with consistent documentation for transitions of care.
- Enables better continuity and quality of care by ensuring access to critical clinical data such as medications, problems, allergies etc.
- Facilitates the access and the sharing of transitions of care and clinical data between Healthcare Providers/Organizations.
- Provides timely access to transitions of care notes and summaries across all stakeholders, such as hospitals, primary care centers, MOH business applications etc.
- Reduces errors in patient care related to accessing transfer of care summary information and clinical data.

2.3 USE CASE OVERVIEWS

The Saudi eHealth strategy has identified the Clinical Notes and Summaries documents listed below as being the priority clinical documentation to support in for transitions of care. The list of supported Clinical Notes and Summaries documents is likely to grow over time. The list was verified with the stakeholders during the workshops. The verification was part of the Use Case development process.

2.3.1 Outpatient Encounter Summary

During an outpatient encounter at a Primary Health Center (PHC) or with a private physician, a patient may be diagnosed and/or referred to a Healthcare Provider and/or Organization. The necessary information must be conveyed to the Healthcare Provider and/or Organization to ensure that the necessary follow-up and care is provided.

2.3.2 Discharge Summary

When a patient is admitted to the hospital for care, various orders are issued and referrals are provided for follow-up care on discharge. The necessary information for care must be communicated to PHCs and specialists to describe the hospital stay and ensure that the necessary follow up care is provided.

2.3.3 Maternal Discharge Summary

A Maternal Discharge Summary is a specialized version of a Discharge Summary. In the case of a mother who has just given birth, there are additional steps and information necessary to ensure the health of the mother and newborn child.

2.3.4 Newborn Discharge Summary

A Newborn Discharge Summary is a specialized version of a Discharge Summary. In the case of a newborn, there are additional steps and information necessary to ensure the health of the newborn child.

2.3.5 Operative Note

The Operative Note is a document produced by a surgeon who participated in a surgical intervention, and which contains a detailed account of the findings, the procedure used, the specimens removed, the preoperative and postoperative diagnoses, and names of the primary performing surgeon and any assistants. This record is important for ensuring that appropriate post-operative care is provided beyond the patient encounter.

2.4 ACTORS

The Actors defined in for Clinical Notes and Summaries are described in Table 2.4-1 Actors.

TABLE 2.4-1 ACTORS

ACTOR NAME	DESCRIPTION	EXAMPLE REAL-WORLD IT SYSTEMS
Clinical Summary Content Creator	Responsible for the creation of care summary content (e.g. Discharge Summary, Outpatient Encounter Summary) of the electronic document and publishing the report to the Health Information Exchange (HIE) Document Repository. It is also responsible to manage the updates to summary documents, such as replace, amend and/or deprecate.	Primary Healthcare (PHC) Electronic Medical Record Systems Private Ambulatory Clinic Electronic Medical Record Systems Hospital Information Systems (HIS)
Clinical Note Content Creator	Responsible for the creation of clinical notes content (e.g. Operative Note) of the electronic document and publishing the report to the HIE Document Repository. It also is responsible to manage the updates to Clinical notes documents, such as replace, amend and/or deprecate.	Hospital Information Systems (HIS)

ACTOR NAME	DESCRIPTION	EXAMPLE REAL-WORLD IT SYSTEMS
Clinical Content Consumer	Responsible for querying and retrieving clinical notes and summaries for viewing, importing, or other processing of content from the HIE Document Repository.	Point of Care Systems such as: • Hospital Information Systems (HIS) • Primary Healthcare (PHC) Electronic Medical Record Systems • Private Ambulatory Clinic Electronic Medical Record Systems • Laboratory Information Systems (LIS) • Patient Portal • Physician Portal • Other Point of care systems • MOH Business Applications
HIE Document Repository	Stores the Documents and maintains metadata about each document. Also stores other shared historical medical documents (e.g. Laboratory Results Report, Images)	HIE Platform – Document Registry/Repository
Clinical Data Repository	Maintains detailed demographic and clinical data for each patient. The Clinical Data Repository extends from the Clinical Content Consumer Actor to support extraction of data from clinical documents.	HIE Platform – Clinical Data Repository
iEHR Document Source	Creates iEHR Summary Documents on demand based upon the clinical data currently stored in the Clinical Data Repository.	HIE Platform – iEHR Document Source
Composite Clinical Content Consumer	Responsible for querying and retrieving any type of clinical medical documents for viewing, importing, or other processing of content from the HIE Document Repository. Note: It is not a requirement that a single system be capable of supporting every type of HIE Document.	Point of Care Systems such as: • Hospital Information Systems (HIS) • Primary Healthcare (PHC) Electronic Medical Record Systems • Private Ambulatory Clinic Electronic Medical Record Systems • Laboratory Information Systems (LIS) • Patient Portal • Physician Portal • Other Point of care systems • MOH Business Applications

2.5 HIGH-LEVEL SERVICES OVERVIEW

For the purpose of Interoperability, Services provide an abstract for the communication between Actors through standards-based messages and information content. The service model for the Clinical Notes and Summaries Use Cases appears in **Error! Reference source not found.** below.

2.5.1 Service Descriptions

TABLE 2.5-1: OVERVIEW OF CLINICAL NOTES AND SUMMARIES SERVICES

SERVICE	DESCRIPTION
Publish Document(s)	Used by the Clinical Content Summary Creator and the Clinical Content Note Creator to create and manage the clinical notes and summaries in the HIE Document Repository and to request that it registers and stores these documents.
Query/Retrieve Document(s)	Queries the HIE Document Repository for information about stored clinical notes and summaries.
Notification of Document Availability	Provided by the HIE Document Repository for information about documents stored and indexed in a registry. This also includes the retrieval of one or more documents.
Reconciliation	Supports the synchronization of the clinical data between the HIE Platform and Clinical Content Consumer actors.
iEHR On-Demand Summary	Generates dynamic summaries of clinical data (iEHR Summaries) based upon the clinical documents in the HIE Document Repository.
Query Existing Data	Supports retrieval of detailed clinical data for a patient from the Clinical Data Repository.

2.5.2 Service Model

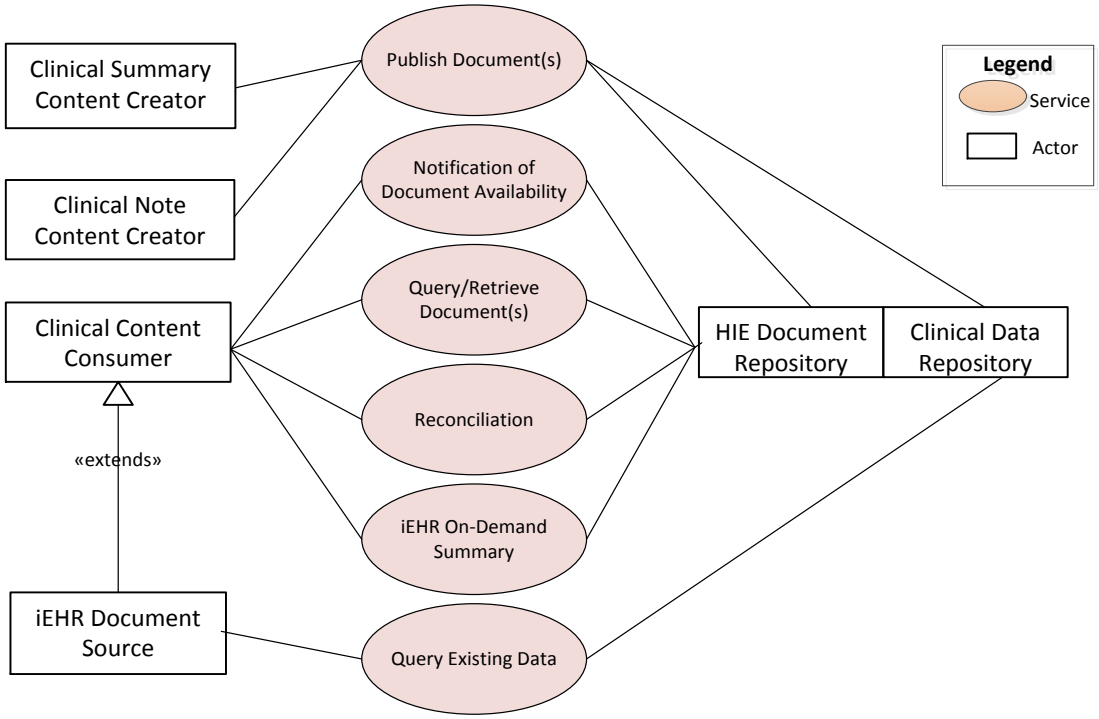


FIGURE 2.5-1 CLINICAL NOTES AND SUMMARIES SERVICE MODEL

3. OUTPATIENT ENCOUNTER SUMMARY USE CASE

This Use Case describes the information workflow of an outpatient encounter, which requires access to prior relevant clinical documentation from the HIE Platform as well as the sharing of the Outpatient Encounter Summary in order to transition a patient to the care of a specialist or other referral (e.g., hospital for surgery). It may also be used by MOH business applications, including public health organizations.

The Outpatient Encounter Summary contains information such as:

- General information on the patient
- Information on why the patient was there (e.g. chief complaint, follow-up)
- Information on the patient's status when they arrived
- General information on the patient as a result of an examination
- Tests and their results that were performed during the encounter
- Prescriptions made during the visit
- Recommendations or a plan of care
- Follow-up Orders.

The Outpatient Encounter Summary is created in a format that supports both human-readable rendering and machine-processing (i.e. coded results data).

3.1 SCOPE

The Outpatient Encounter Summary Use Case covers all outpatient encounters for patients with KSA-Wide Health IDs, where the encounter summary information needs to be shared through the HIE Document Repository.

3.1.1 Additional Considerations

Saudi Citizens and residents with Health IDs are assigned to a PHC. However, some patients choose not to use their assigned PHCs and are either seen by private physician, or use the Emergency Department.

A patient may temporarily be assigned to different PHC because of travel. This includes such situations as a new mother and baby staying with the mother's family before and after delivery.

3.2 EXPECTED BENEFITS

- Produces encounter summaries in both human and machine readable format
- Provides timely access to encounter summaries across all stakeholders, such as hospitals, primary care centers, MOH business applications, etc.
- Reduces errors in patient care related to accessing transfer of care summary information
- Enables Organizations that didn't have access to the information before to access structured, encounter summaries.

3.3 BUSINESS SCENARIO

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

The scope of each Use Case is defined to support a wide number of business scenarios relevant to the health information domain being considered. This is generally done in a flow-down discovery analysis, especially for Use Cases that are not well established.

The following section illustrates typical business scenarios that involve the identification of patients and obtaining of provider and/or organization information.

The following Users are associated with these Business Scenarios:

TABLE 3.3-1: OUTPATIENT ENCOUNTER USERS

USER	USER ROLE
Patient	The person visiting a Healthcare Provider.
Administrative Staff	The person(s) registering the patient in the Medical Information System (e.g. HIS, EMR) for the encounter.
Physician	The healthcare provider responsible for examination and treatment of the patient and the resulting Outpatient Encounter Summary.
Family Member	A person or persons associated with the patient.
Specialist	The consultant or physician the patient is being referred to for further patient care.
Hospital	The hospital the patient is being referred for further patient care.
Emergency Department	The Hospital Emergency Department the patient is being referred to for immediate further patient care.

The following Information Systems are associated with these Business Scenarios:

TABLE 3.3-2: OUTPATIENT ENCOUNTER INFORMATION SYSTEMS

INFORMATION SYSTEM	SYSTEM ROLE
EMR	The Electronic Medical Records System used by a PHC, Outpatient Department specialist or a private physician
HIE Document Repository	KSA-wide centralized repository for storing Clinical Documentation and also an Interoperability Environment enabling healthcare providers to share the clinical information of the patient.
Clinical Data Repository	KSA-wide centralized repository for collecting a patient's clinical data from all types of healthcare encounters. Healthcare Providers/Organizations can use this clinical data to reconcile it with local clinical data.

For each of the following business scenarios, the individual steps are followed by their equivalent step number in the following table in square brackets (e.g., [1] for table step 1).

In the case of the Clinical Summaries, many of the potential steps within an outpatient encounter or hospital stay are the same. For example, laboratory tests are ordered and reviewed, medications are prescribed, immunizations are administered and referrals are made. The potential steps performed in a typical business scenario may vary according to need. For this reason, not all of the steps are shown in any given business scenario for a single Use Case, but each step will be shown in at least one of the business scenarios outlined in the Clinical Notes and Summaries work stream.

3.3.1 Business Scenario 1: Outpatient Encounter With a Referral to a Hospital

An infant is brought to the PHC for a routine vaccination. The patient is registered and his Health ID is located [1]. To review the infant's past medical history, the physician uses the infant's Health ID to retrieve and reconcile the infant's clinical data [2], and query and retrieve the infant's shared records for past care encounters summaries**,** history of vaccinations and the Newborn Discharge Summary, as well as prior laboratory tests from the HIE Document Repository [3].

Due to the infant's history of neonatal jaundice, laboratory tests are ordered [4]. The laboratory test results confirm [5] the physician's suspected diagnosis of febrile and jaundiced. The physician creates an Outpatient Encounter Summary which can be shared with the hospital [6]. The physician then writes a referral request [7] to the nearby hospital.

The following are the Business Processes associated with the outpatient encounter. The details of the Business Processes may be found in Section 8 Detailed Business Processes.

TABLE 3.3-3 : HIGH LEVEL BUSINESS PROCESSES FOR AN OUTPATIENT ENCOUNTER

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow (Sec. 3.4.2)	Obtain Patient Health Identifier	See Section 8.2.1
2	Main Flow (Sec3.4.2)	Retrieve and reconcile Clinical Data	See Section 8.1.1
3	Main Flow (Sec. 3.4.2)	Review Historical Medical Documentation	See Section 8.1.2
4	Main Flow (Sec. 3.4.2)	Order Diagnostic Testing	See Section 8.2.3
5	Main Flow (Sec. 3.4.2)	Review Diagnostic Results	See Section 8.2.5
6	Main Flow (Sec. 3.4.2)	Publish Clinical Summary Document	See Section 8.1.3
7	Alternate Flow (Sec. 3.4.23.4.3)	Referral Request	See Section 8.2.12
#	See Business Process Name (BP X-ref) in Flow Name (Flow X-ref)		

3.3.2 Business Scenario 2: Outpatient Department or Specialist Encounter

A patient diagnosed with bradycardia has had surgery to implant a pacemaker and been released from the hospital. The patient has been referred to the Outpatient Department for follow-up care. The patient arrives at the facility for a scheduled appointment. The patient is registered and his Health ID is located [1]. To review the patient's past medical history, the healthcare provider uses the patient's Health ID to retrieve and reconcile the patient's clinical data [2], and query and retrieve the patient's shared records for past care encounters summaries**,** including the Discharge Summary and Operative Note; as well as prior laboratory tests from the HIE Document Repository [3].

The pacemaker check is performed and the necessary adjustments are made on the pacemaker. An Outpatient Encounter Summary which can be shared is created. [4].

The following are the minimal Business Processes associated with the Outpatient Department/Specialist encounter. The details of the Business Processes may be found in Section 8 Detailed Business Processes.

TABLE 3.3-4: HIGH LEVEL BUSINESS PROCESSES FOR AN OUTPATIENT DEPARTMENT/SPECIALIST ENCOUNTER

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow (Sec. 3.4.2)	Obtain Patient Health Identifier	See Section 8.2.1
2	Main Flow (Sec3.4.2)	Retrieve and reconcile Clinical Data	See Section 8.1.1
3	Main Flow (Sec. 3.4.2)	Review Historical Medical Documentation	See Section 8.1.2
4	Main Flow (Sec. 3.4.2)	Publish Clinical Summary Document	See Section 8.1.3
#	See Business Process Name (BP X-ref) in Flow Name (Flow X-ref)		

3.3.3 Business Scenario 3: Emergency Department With No Hospital Stay

Note: The type of Summary (Outpatient Encounter Summary versus a Discharge Summary (See Section 4 *Discharge Summary Use Case*) produced from an Emergency Department encounter without hospitalization varies based upon organizations preference.

A patient comes into the Emergency Department (ED) complaining of severe back pain caused by heavy manual labor. The patient is registered and his Health ID is located [1]. The patient's past medical history is reviewed, in particular the medical information regarding the history of present illnesses, current medications and allergies and adverse reactions, using the patient's Health ID to retrieve and reconcile the patient's clinical data [2], and query and retrieve the patient's shared records from the HIE Document Repository [3].

The ED physician performs a general examination as well as a neurological examination, in order to make an assessment. The patient is diagnosed with an acute non-specific back pain, and given a recommended plan of care including the use of a heating pad and non-steroidal anti-inflammatory drugs (e.g. aspirin or acetaminophen), as well as other educational materials on

how treat back pain. The ED Physician also recommends that the patient follow-up with their PHC if the pain persists, and creates an Outpatient Encounter Summary which can be shared with the patient's PHC [4].

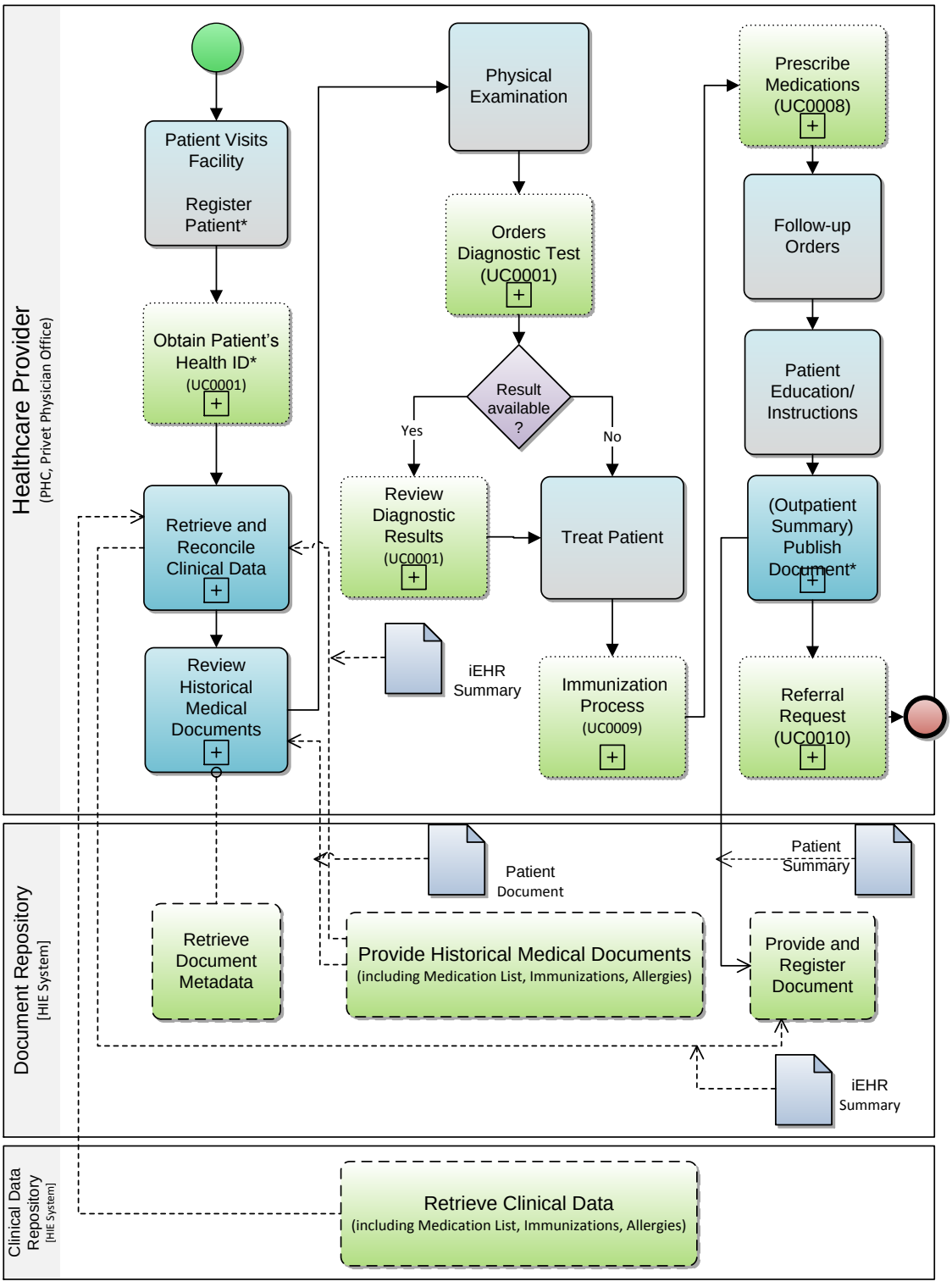
The minimal Business Processes associated with the Emergency Department encounter resulting in an Outpatient Encounter Summary are the same as those found in Section 3.3.2 Business Scenario 2: Outpatient Department or Specialist Encounter

The details of the Business Processes may be found in Section 8 Detailed Business Processes.

3.4 PROCESS FLOWS

3.4.1 Process Overview

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



* These business process are required steps in this flow of event

FIGURE 3.4-1 OUTPATIENT ENCOUNTER COMPOSITE FLOW

3.4.2 Main Flow of Events – Basic Outpatient Encounter

A patient visits their primary Healthcare Provider (e.g., PHC, private physician office) as part of their patient's care. Upon completion of the outpatient visit, an Outpatient Encounter Summary is published to the HIE Document Repository.

The main flow of events of the Outpatient Encounter Summary Use Case is the following:

1. Upon arrival of the patient to an outpatient clinic (e.g. a PHC private physician office), the Healthcare Provider registers the patient and uses the Patient Demographic Consumer Actor (e.g. EMR or EHR) to **obtain the Patient Health Identifier** from the HIE Registry.
2. Using the patient's Health ID, the patient's local clinical data are reconciled with any updated clinical summary data in the Clinical Data Repository by using the iEHR Document Source Actor to **retrieve and reconcile clinical data.**
3. Using the patient's Health ID the patient's relevant shared clinical documentation may be retrieved from the HIE Document Repository by the Composite Clinical Content Consumer Actor to **review historical medical documents**.
4. The Healthcare Provider performs the physical examination based upon the patient's reason for visit using all of the relevant clinical documentation (both from the locally and the information retrieved from the HIE Platform) along with information provided by the patient (e.g. the patient's chief complaint) to determine a course of action.
5. The Healthcare Provider may then need to perform treatments or **order diagnostic testing** (e.g. Radiology or Laboratory) using the Composite Order Diagnostic Testing Actor.
6. In some cases the results from the diagnostic testing will be available prior to the end of the encounter, and the Healthcare Provider can **review the diagnostic results** using the Composite Clinical Content Consumer Actor to retrieve the clinical documentation from the HIE Document Repository.
7. The Healthcare Provider may need to administer vaccinations through the **immunization process** (See *UC0009 Saudi eHealth Immunization Interoperability Use Case*) and record them during the encounter using the Clinical Summary Content Creator Actor.
8. Prior to the completion of the patient visit, the Healthcare Provider will determine the primary diagnosis and set the course of action which may include such steps as the need to **prescribe medication** using the Prescriber Actor, create follow-up orders and/or provide patient instructions (e.g. patient education, patient instructions on medications).
9. At the conclusion of the patient visit, the Healthcare Provider will produce an Outpatient Encounter Summary with such information as the patient's condition, recommendations/plan of care and relevant patient history. The Clinical Summary Content Creator Actor will be used to create the Outpatient Encounter Summary and **publish the clinical summary document** to the HIE Document Repository so that it is available for sharing.

Note: In the case that a clinical summary includes the administration of an immunization, it will be registered once the clinical summary is published to the HIE Document Repository (See *UC0009 Saudi eHealth Immunization Interoperability Use Case*). Flow depicts the workflow of an outpatient encounter.

3.4.3 Alternative Flows of Events

3.4.3.1 Clinical Summary Amendment

The process of amending any clinical summary document is identical. The existence of the original clinical summary document is a pre-condition to amending a clinical summary document (see the workflow described in the main flow of events for the specific type of clinical summary document, as it is not documented in this section).

The Healthcare Provider creating the original clinical summary determines that additional information needs to be added to the summary (e.g. additional Laboratory Results Report, procedure outcomes).

1. The Healthcare Provider creates the amended clinical summary document using the Clinical Summary Content Creator Actor to update the clinical summary document and **publishes the clinical summary document** as a clinical summary to the HIE Document Repository. The new clinical summary document references the original clinical summary document and informs the Document Consumer Actor that it's an amendment to the original. This information is used by the HIE Document Repository to manage the two versions (i.e. deprecate the original clinical summary document). If a referral request has been made and the Healthcare Provider has chosen to provide notification of availability to the referred Healthcare Provider/Organization, an automatic notification is sent to the Healthcare Provider/Organization regarding the amended clinical summary document.

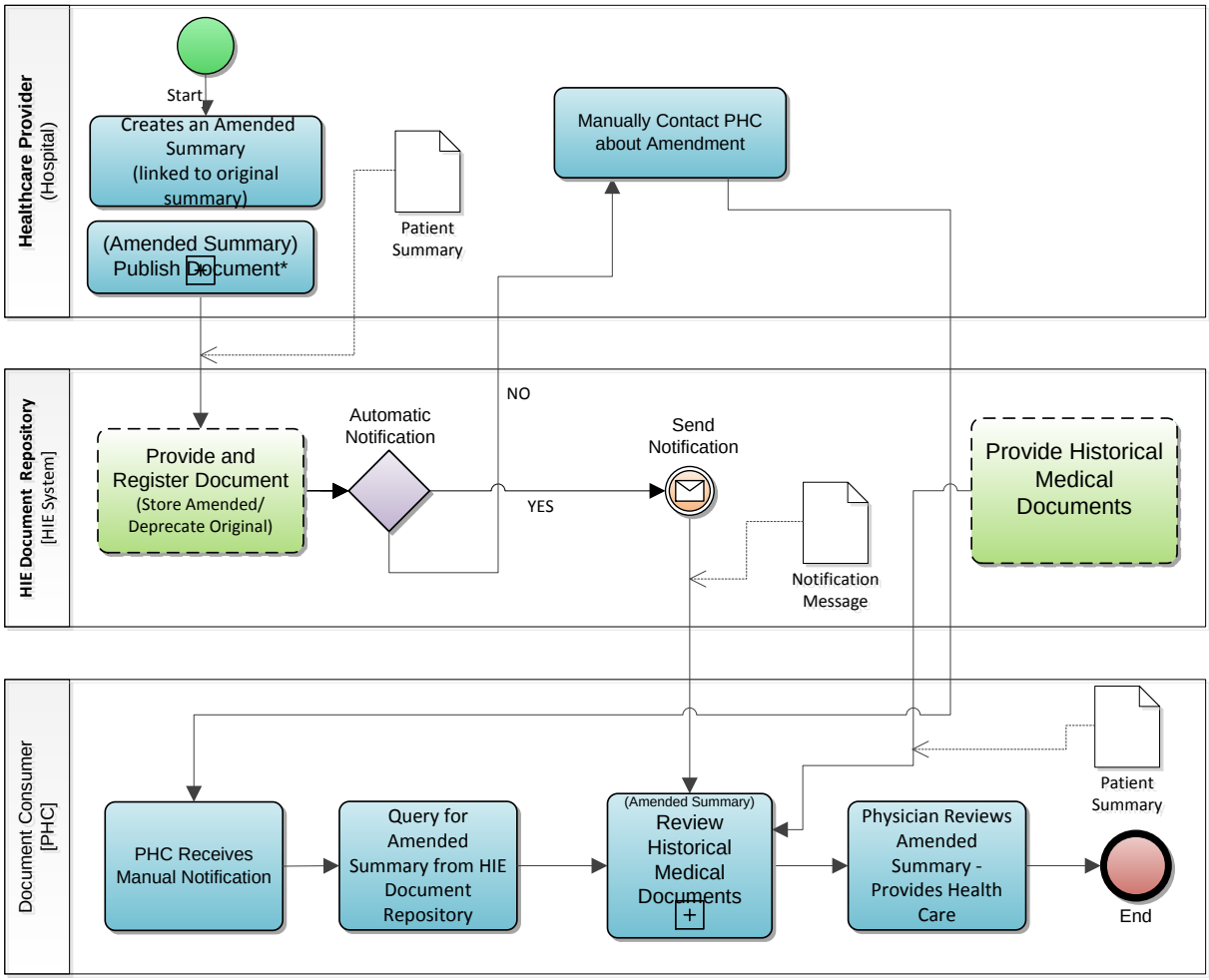


FIGURE 3.4-2 CLINICAL SUMMARY AMENDMENT TYPICAL PROCESS FLOW

3.4.3.2 Patient Referral

The workflow described in the main flow of events (Section 3.4.2 Main Flow of Events – Basic Outpatient Encounter) is a pre-condition to creating a referral for follow-up (e.g. additional care by a specialist, hospital transfer) and not documented in this section. At the conclusion of outpatient encounter, the Healthcare Provider may determine that the recommended plan of care requires a referral to a specialist or a hospital.

1. The course of action for the patient includes a referral. As part of the **publish the Clinical Summary document**, as an Outpatient Encounter summary, the Healthcare Provider may choose to provide notification of availability to the referred Healthcare Provider/Organization.
2. The Healthcare Provider creates a **referral request** using the Referral Requestor Actor.

3.4.4 Exceptions Work Flow

N/A

3.5 INFORMATION REQUIREMENTS

This section conceptually describes the data exchange requirements for this Use Case.

3.5.1 Outpatient Encounter Summary

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 document. Table 3.5-1 Outpatient Encounter Summary data content provides a minimum set of information content for an Outpatient Encounter Summary.

Summary data transmitted includes all new and updated clinical information that occurred during the encounter. For example, if a medication is discontinued, or a prior problem is marked as resolved during the encounter, that information is included in the summary. This is essential to ensure synchronization of clinical data with the HIE Platform.

TABLE 3.5-1 OUTPATIENT ENCOUNTER SUMMARY DATA CONTENT

ENCOUNTER SUMMARY CONCEPTS	DESCRIPTION	TEXT/ CODED
Source and context information of the Outpatient Encounter Summary		
Patient Demographics	A group of data elements which identify the patient, and provide additional information about them that may be important in the transition of care for a Patient. The following are attributes which have been identified as important: • Health ID • Nationality • Gender • Associated PHC or private physician • Contact Information • Marital Status NOTE: The Marital Status may be provided if known, and will be maintained in the HIE Platform. An update will only occur if provided by the Healthcare Provider/Organization.	Text and Coded
Most Responsible Physician	A set of attributes including the name, identifier and contact information for the Most Responsible physician. .This is the Healthcare Provider who is the legal authenticator of the Outpatient Encounter Summary and who is responsible for the content of the Outpatient Encounter Summary.	Text and Coded
Chief Complaint	The Chief Complaint is a subjective statement made by a patient describing the most significant or serious symptoms or signs of illness or dysfunction that caused him or her to seek healthcare.	Text
Problem List	The Problem List contains the problems currently being monitored for the patient, including currently active and recently resolved problems.	Text and Coded
Medications	The Medications contain the patient's current medications and pertinent medication history at the end of the encounter.	Text and Coded

ENCOUNTER SUMMARY CONCEPTS	DESCRIPTION	TEXT/ CODED
History of Present Illness	The History of Present Illness describes the history related to the reason for the encounter. It contains the historical details leading up to and pertaining to the patient's current complaint or reason for seeking medical care.	Text
History of Procedures	The History of Procedures defines all interventional, surgical, diagnostic, or therapeutic procedures or treatments pertinent to the patient historically at the time of the encounter.	Text or Coded
Allergies	Allergies list and describe any medication allergies, adverse reactions, idiosyncratic reactions, anaphylaxis/anaphylactoid reactions to food items, and metabolic variations or adverse reactions/allergies to other substances (such as latex, iodine, tape adhesives) used to assure the safety of healthcare delivery. NOTE: For Medication Allergies coding is required.	Text and Coded
Diagnosis	The Diagnosis contains a narrative description of the primary reason for the encounter.	Text
Immunizations	The Immunization contains a list of the vaccinations administered to the patient during the encounter.	Text and Coded
Vital Signs	The Vital Signs include a group of data elements containing relevant vital signs such as blood pressure, heart rate, respiratory rate, height, weight, body mass index, head circumference, Pain Assessment and pulse oximetry.	Text or Coded
Physical Examination	The Physical Exam includes direct observations made by the clinician. The examination may include the use of simple instruments and may also describe simple maneuvers performed directly on the patient's body.	Text
Devices	Devices include a description of the medical devices apparent on physical exam that have been inserted into the patient, whether internal or partially external.	Text
Outpatient Course	The Outpatient Course describes the sequence of events during the course of the encounter.	Text
Drains	The Drains describe any drains implanted during a procedure.	Text
Recommendation/ Plan of Care	The Plan of Care data elements define any pending orders, interventions, encounters, services and procedures for the patient after the completion of the Outpatient encounter. The Plan of Care may also include other information such as patient education, nutritional diet, follow-up orders, etc.	Text

3.5.2 iEHR Summary

The iEHR Summary introduced in this Use Case is used to access the current health status of the patient for all summary document Use Cases in this work stream. The information content of the iEHR summary includes patient demographics and relevant and pertinent clinical data that is

expected to be imported and reconciled with the local system to ensure accurate and up-to-date care information for the patient. Table 3.5-2 iEHR Summary data content provides a minimum set of information content for an iEHR Summary.

The summary data transmitted includes all new and updated clinical information that occurred during an outpatient encounter, a hospital stay or other types of healthcare interactions (e.g. Immunization Program/Campaign (See *UC0009 Saudi eHealth Immunization Interoperability Use Case*), Medications prescriptions/dispensations (See *UC0008 Saudi eHealth Medication Interoperability Use Case*)). For example, if a medication is discontinued, or a prior problem is marked as resolved, that information is included in an iEHR Summary. This is essential to ensure synchronization of clinical data with the HIE Platform.

TABLE 3.5-2 IEHR SUMMARY DATA CONTENT

IEHR CONCEPTS	DESCRIPTION	TEXT/ CODED
Problem List	Contains the problems currently being monitored for the patient, including currently active and recently resolved problems.	Text and Coded
Allergies	Lists and describes any medication allergies, adverse reactions, idiosyncratic reactions, anaphylaxis/anaphylactoid reactions to food items, and metabolic variations or adverse reactions/allergies to other substances (such as latex, iodine, tape adhesives) used to assure the safety of healthcare delivery. NOTE: For Medication Allergies coding is required.	Text and Coded
Medication Lists	Containing out-patient medication information (Dispensations, Prescriptions) as well as in-patient medication information (Administered Medication during a hospital stay)	Text and Coded
Vital Signs	Recent history of vital signs for the patient.	Text or Coded
Laboratory Results	List of recently completed laboratory test results for the patient. (Used for reconciliation of the Laboratory Results).	Text or Coded
Immunizations	Patient's current immunization status.	Text and Coded
Plan of Care	Data elements defining any pending orders, interventions, encounters, services and procedures for the patient. The Plan of Care may also include other information such as patient education, nutritional diet, follow-up orders, etc.	Text
Outpatient Course	Assessment and plan describing the assessment of the patient condition and expectations for care including proposals, goals, and order requests for monitoring, tracking, or improving the condition of the patient.	Text
History of Procedures	Defines all interventional, surgical, diagnostic, or therapeutic procedures or treatments pertinent to the patient historically at the time of the encounter.	Text or Coded
Devices	Describes the medical devices apparent on physical exam that have been inserted into the patient, whether internal or partially external.	Text

Social History	Describes the person's beliefs, home life, community life, work life, hobbies, and risky habits.	Text
Family History	Contains a description of the genetic family members, to the extent that they are known, the diseases they suffered from, their ages at death, and other relevant genetic information.	Text
Blood Group	Determined through laboratory testing. The reporting of the blood group is part of a Laboratory Results Report, but may be reported as an individual coded result.	Coded

3.5.2.1 Face Sheet

The Face Sheet is an overview of a patient's record. The iEHR Summary provides all of the information typically available on the Face Sheet. The table below provides the list of information required for the Saudi eHealth Face Sheet.

TABLE 3.5-3 SAUDI EHEALTH FACE SHEET DATA CONTENT

FACE SHEET CONCEPT	DESCRIPTION	TEXT/ CODED
Patient Demographics	Name, Age, Date of Birth and Gender	Text
Next of Kin	Name, Contact Information	Text
Problem List	All currently active problems, and any problems resolved in the past 30 days.	Text and Coded
Allergies	All currently active allergies. NOTE: For Medication Allergies coding is required.	Text and Coded
Medication Lists	All currently active medications, and any medication treatments finished in the last 30 days.	Text and Coded
Vital Signs	The most current vital signs.	Text or Coded
Laboratory Results	Any laboratory results from the last 30 days.	Text or Coded
Immunizations	All immunizations given within the last year.	Text and Coded
Plan of Care	All pending orders, interventions, encounters, services and procedures for the patient.	Text
History of Procedures	Any procedures performed in the last 30 days.	Text or Coded
Devices	All current medication devices and any medical devices that may have been removed in the last year.	Text
Social History	Current social history.	Text

Family History	Current family history.	Text
Blood Group	Most recent laboratory result reporting the patient's blood group.	Coded

4. DISCHARGE SUMMARY USE CASE

This Use Case describes the information workflow of a hospital visit, which requires access to prior relevant Clinical Documentation from the HIE Platform as well as the sharing of a Discharge Summary in order to transition a patient to the care of a PHC, private physician, specialist, or another facility. It may also be used by MOH business applications, including public health organizations.

The Discharge Summary contains information such as:

- General information about the patient
- Information on why the patient was there (e.g. chief complaint, problem list, follow-up)
- Information on the patient's status when they arrived
- General information on the patient as a result of an examination
- Tests that were performed during the visit
- Prescriptions ordered at the end of the hospital stay
- Procedures or Surgeries performed during the visit
- Recommendations or a plan of care
- Follow-up Orders
- Patient diagnosis made, if any

The Discharge Summary is created in a format that supports both human-readable rendering and machine-processing (i.e. coded results data).

4.1 SCOPE

The Discharge Summary Use Case covers the general Discharge Summary created when a patient is released from a hospital stay to be shared through the HIE Document Repository.

The purpose of the Discharge Summary is to ensure that important information about a hospital stay is available throughout the Health Information Exchange. For this reason, there may be various diagnostic test results and in-hospital medications which the Healthcare Providers/Organization chooses not to include in the shared Discharge Summary.

- Hospitals may use an internal system to prescribe/dispense medications within the hospital. Therefore, only hospital administered medications documented in the discharge summary will be part of a patient's medication list.

4.1.1 Additional Considerations

See Section 3.1.1 Additional Considerations

4.2 EXPECTED BENEFITS

See Section 3.2 Expected Benefits

4.3 BUSINESS SCENARIO

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

The scope of each Use Case is defined to support a wide number of Business Scenarios relevant to the health information domain being considered. This is generally done in a flow-down discovery analysis, especially for Use Cases that are not well established.

The following section illustrates typical Business Scenarios that involve the identification of patients and obtaining of provider and/or organization information.

The following Users are associated with these Business Scenarios:

TABLE 4.3-1: HOSPITAL ENCOUNTER USERS

USER	USER ROLE
Patient	The person being registered through the Emergency Department or admitted into the Hospital
Administrative Staff	The person(s) registering and/or admitting the patient through the Hospital Information System (HIS)
Emergency Department (ED) physician	The physician responsible for examining the patient in the Emergency Department.
Resident physician	A physician in-training who may be caring for the patient and creating the preliminary Discharge Summary (to be approved by the attending physician).
Attending physician or Consultant	The physician responsible for approving the Discharge Summary created at the time the patient is released from the Hospital
Family Member	A person or persons associated with the Patient.
Healthcare Trauma Team	The Emergency Department (ED) team responsible for initially caring for and evaluating a patient.

The following Information Systems are associated with these Business Scenarios:

TABLE 4.3-2: HOSPITAL ENCOUNTER INFORMATION SYSTEMS

INFORMATION SYSTEM	SYSTEM ROLE
HIS	The Hospital Information System (HIS) used by the Hospital to store and retrieve Electronic Healthcare Records.
HIE Document Repository	KSA-wide centralized repository for storing Clinical Documentation and also an Interoperability Environment enabling healthcare providers to share the clinical information of the patient.
Clinical Data Repository	KSA-wide centralized repository for collecting a patient's clinical data from all types of healthcare encounters. Healthcare Providers/Organizations can use this clinical data to reconcile it with local clinical data.

For each of the following Business Scenarios, the individual steps are followed by their equivalent step number in the following table in square brackets (e.g., [1] for table step 1)

In the case of the Clinical Summaries, many of the potential steps within an outpatient encounter or hospital stay are the same. For example, laboratory tests are ordered and reviewed, medications are prescribed, immunizations are administered and referrals are made. The potential steps performed in a typical Business Scenario may vary according to need. For this reason, not all of the steps are shown in any given Business Scenario for a single Use Case, but each step will be shown in at least one of the Business Scenarios outlined in the Clinical Notes and Summaries work stream.

4.3.1 Business Scenario 1: Patient Brought Into Hospital by Referral

An infant has been diagnosed by a PHC physician as febrile and jaundiced, and is referred to the Hospital for treatment. The infant is admitted into the hospital and the infant's Health ID is located [1]. To review the infant's past medical history, the physician uses the Health ID to query and retrieve the infant's shared records for the Outpatient Encounter Summary created by the PHC, other past care encounters summaries**,** history of vaccinations, the Newborn Discharge Summary, and prior laboratory tests from the HIE Document Repository. [2].

The physician reviews the past medical history and performs a physical examination. As the assessment is in agreement with the primary diagnosis, treatment is started.

Upon completion of the treatment course, the newborn is released from the hospital. Prior to the release from the hospital, a Discharge Summary is created by the consultant, the attending physician or the resident physician, and approved by the attending physician or consultant. The Discharge Summary which includes such information as patient discharge instructions and follow-up orders are reviewed with the family. The Discharge Summary is made available for sharing through the HIE Document Repository [3].

TABLE 4.3-3 : HIGH LEVEL BUSINESS PROCESSES FOR A HOSPITAL ENCOUNTER BY REFERRAL

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Obtain Patient Health Identifier	See Section 8.2.1
2	Main Flow	Review Historical Medical Documents	See Section 8.1.2
3	Main Flow	Publish Clinical Summary Document	See Section 8.1.3

4.3.2 Business Scenario 2: Patient Brought Into Hospital For Emergency Surgery

A patient is brought into the Emergency Department with injuries including both a femoral fracture and occult bleeding sustained from a traffic accident. The patient is initially registered with an unknown identity, and later the patient identification is reconciled so the Health ID can be used to obtain the patient prior medical history. The patient is registered and his Health ID is located [1]. The patient's past medical history is reviewed, in particular the medical information regarding the history of present illnesses, current medications and allergies and adverse

reactions, the healthcare team uses the patient's Health ID to query and retrieve the patient's shared records from the HIE Document Repository [2]**.**

The ED physician is informed on the patient's status, and performs a physical examination and makes an assessment in order to determine the tests that should be run. The ED physician orders Laboratory and Radiology tests [3]. The physician reviews the Laboratory Results Report, the Imaging Results Report and the Images [4] to determine the course of action. Diagnoses and a Diagnosis Priority are set based upon the injuries, the vital signs and the injury mechanisms (the ABCDEs of trauma) in order create a treatment plan.

The patient is informed of the diagnosis, which in this case requires surgery, and is admitted to the Hospital. Upon the completion of the surgery an Operative Note is created and stored to the HIE Document Repository [5] (See Operative Note Use Case). After a stay in post-operative recovery, it is determined that additional surgery is necessary, but it cannot be performed the current hospital. The Healthcare Provider requests a transfer request [6] to a hospital that can perform the surgery. Upon approval of the transfer, the Healthcare Provider creates the Discharge Summary. The Discharge Summary is reviewed with the patient and made available for sharing through the HIE Document Repository [7].

The following are the business processes associated with the Discharge Summary. The details of the Business Processes may be found in Section 8 Detailed Business Processes.

TABLE 4.3-4 : HIGH LEVEL BUSINESS PROCESSES FOR A HOSPITAL STAY WITH SURGERY

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Obtain Patient Health Identifier	See Section 8.2.1
2	Main Flow	Review Historical Medical Documentation	See Section 8.1.2
3	Main Flow	Order Diagnostic Testing	See Section 8.2.3
4	Main Flow	Review Diagnostic Results	See Section 8.2.5
5	Alternative Flow – Surgery (Sec 4.4.3.1)	Publish Clinical Note Document	See Section 8.1.4
6	Alternate Flow – Patient Transfer (Sec 4.4.3.2)	Transfer Request	See Section 8.2.11
7	Main Flow	Publish Clinical Summary Document	See Section 8.1.3

4.3.3 Business Scenario 3: Patient Brought to the Hospital for Day Surgery

A patient scheduled for a colonoscopy arrives at the hospital and is registered and admitted into the hospital, and their Health ID is located [1]. The patient's past medical history is reviewed, in particular the medical information regarding the history of present illnesses, current medications

and allergies and adverse reactions, the healthcare team uses the patient's Health ID to query and retrieve the patient's shared records from the HIE Document Repository [2]**.**

The patient is cleared for surgery. Upon the completion of the surgery an Operative Note is created and stored to the HIE Document Repository [3] (See Operative Note Use Case). After a stay in post-operative recovery, the surgeon reviews the findings (including the review of the Imaging Results Report and the Images [4]). The Discharge Summary, which includes patient education and follow-up recommendations is reviewed with the patient, and made available for sharing through the HIE Document Repository [5]. The patient is sent home.

The following are the business processes associated with the Discharge Summary. The details of the Business Processes may be found in Section 8 Detailed Business Processes.

TABLE 4.3-5: HIGH LEVEL BUSINESS PROCESSES FOR DAY SURGERY

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Obtain Patient Health Identifier	See Section 8.2.1
2	Main Flow	Review Historical Medical Documentation	See Section 8.1.2
3	Alternative Flow – Surgery (Sec 4.4.3.1)	Publish Clinical Note Document	See Section 8.1.4
4	Main Flow	Review Diagnostic Results	See Section 8.2.5
5	Main Flow	Publish Clinical Summary Document	See Section 8.1.3

4.3.4 Business Scenario 4: Patient Brought to the Hospital for Day Care

A patient has been receiving hemodialysis at the hospital on a regular basis, and has regularly scheduled appointments. Upon arriving at the hospital, the patient is admitted into the hospital, and their Health ID is located [1]. The patient's past medical history is reviewed, in particular the medical information regarding the history of present illnesses, current medications and allergies and adverse reactions, the healthcare team uses the patient's Health ID to query and retrieve the patient's shared records from the HIE Document Repository [2]**.**

The patient's vital signs are taken, and if scheduled the physician reviews Laboratory Results Reports [3]. The patient is prepared for hemodialysis. During and after the hemodialysis the vital signs are monitored.

Upon completion of the hemodialysis, the healthcare provider prescribes medications [4], orders any Laboratory tests [5] and creates the Discharge Summary. The Discharge Summary, which includes patient education and follow-up recommendations is reviewed with the patient and made available for sharing through the HIE Document Repository [6]. The patient is sent home.

The following are the business processes associated with the Discharge Summary. The details of the Business Processes may be found in Section 8 Detailed Business Processes.

TABLE 4.3-6: HIGH LEVEL BUSINESS PROCESSES FOR DAY SURGERY

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Obtain Patient Health Identifier	See Section 8.2.1
2	Main Flow	Review Historical Medical Documentation	See Section 8.1.2
3	Main Flow	Review Diagnostic Results	See Section 8.2.5
4	Main Flow	Prescribe Medications	See Section **Error! Reference source not found.**
5	Main Flow	Order Diagnostic Testing	See Section 8.2.3
6	Main Flow	Publish Clinical Summary Document	See Section 8.1.3

4.3.5 Business Scenario 5: Emergency Department With No Hospital Stay

Note: The type of Summary (Outpatient Encounter Summary (See Section **Error! Reference source not found.** **Error! Reference source not found.** versus a Discharge Summary) produced from an Emergency Department encounter without hospitalization varies based upon organizations preference

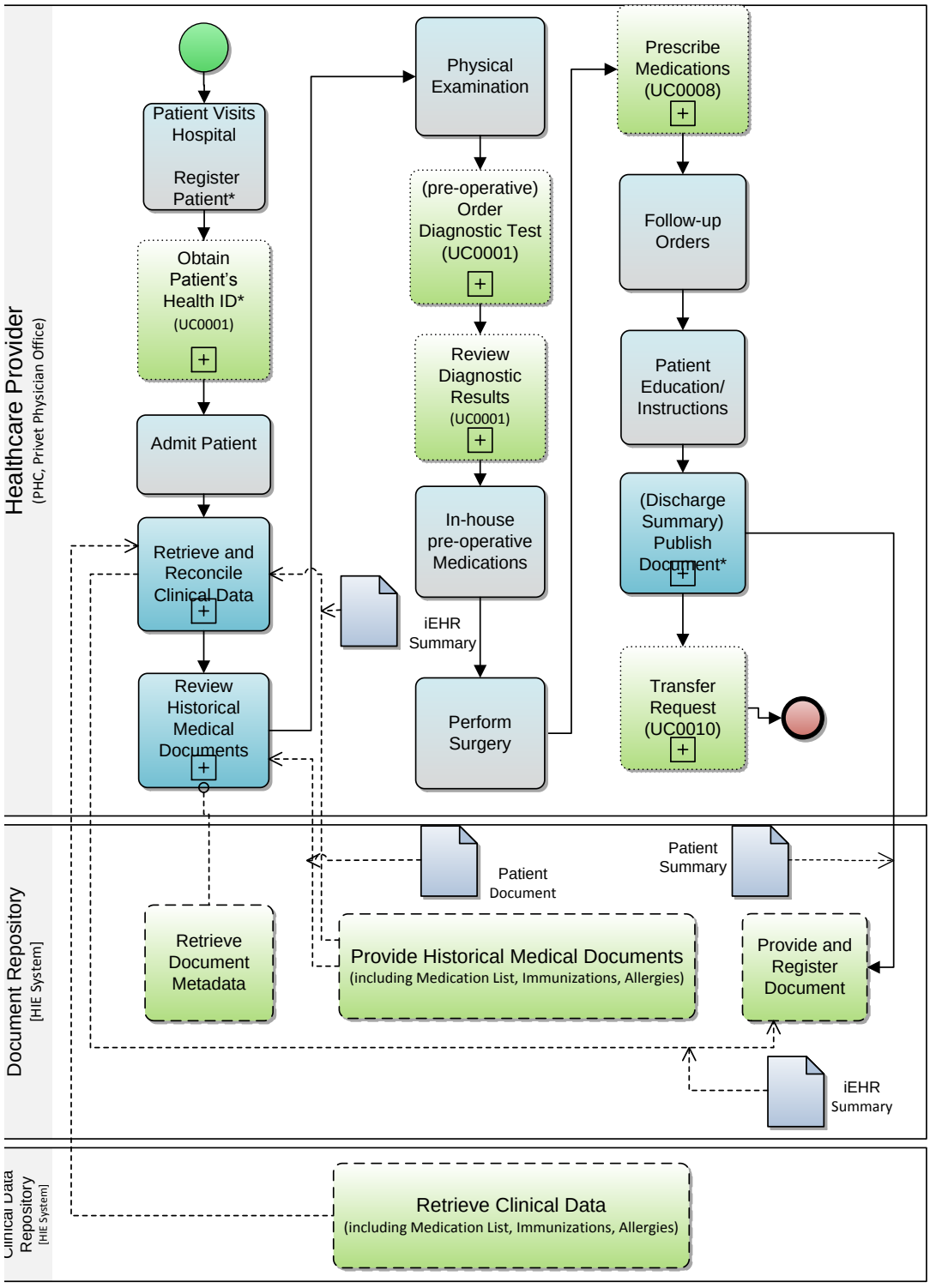
The Business Scenario is identical to Section **Error! Reference source not found.** with the exception that the clinical summary document published is a Discharge Summary.

The details of the Business Processes may be found in Section 8 Detailed Business Processes.

4.4 PROCESS FLOWS

4.4.1 Process Overview

The hospital stay Business Process Model shown in the figure below is a composite of all of the process flows developed for this Use Case. It has been developed based on analysis of all of the process flows and identified from the Use Case scenarios described above. The diagram below depicts the user roles and the associated activities. Only the Actors directly related to this Use Case are shown in this Process Flow, all of the other Actors are used within the Business Processes.



* These business process are required steps in this flow of event

FIGURE 4.4-1 DISCHARGE SUMMARY COMPOSITE FLOW

4.4.2 Main Flow of Events – Basic Hospital Stay

A patient is admitted to a Healthcare Organization for treatment. Upon completion of the stay, a Discharge Summary is published to the HIE Document Repository.

The main flow of events of the Discharge Summary Use Case as follows:

1. Upon arrival to the Healthcare Organization for an in-patient treatment, the Healthcare Provider registers the patient and uses the Patient Demographic Consumer Actor (e.g. EHR or HIS) to **obtain the Patient Health Identifier** from the HIE Registry. The patient is then admitted directly into the Healthcare Organization (or first triaged through the Emergency Department).
2. Using the patient's Health ID, the patient's local clinical data are reconciled with any updated clinical summary data in the Clinical Data Repository by using the iEHR Document Source Actor to **retrieve and reconcile clinical data.**
3. Using the patient's Health ID, the patient's relevant shared clinical documentation is retrieved from the HIE Document Repository by the Composite Clinical Content Consumer Actor to **review historical medical documents**.
4. The Healthcare Provider performs the physical examination based upon the patient's reason for visit using all of the relevant Clinical Documentation (both from the local HIS and the information retrieved from the HIE Platform) along with information provided by the patient (e.g. the patient's chief complaint) to determine a course of action. In the case of an extended hospital stay, this may occur multiple times during the stay. During this time patient information will be collected and stored locally in the HIS.
5. The Healthcare Provider may then need to perform treatments, **orders diagnostic testing** (e.g. Radiology or Laboratory) using the Composite Order Diagnostic Testing Actor, administer immunizations and/or prescribe medications

   Note: The handing of medications internal to a hospital stay is covered by a hospital process which does not require any interoperability. However, documentation such as the Operative Note and Discharge Summaries contain information on the relevant medication administered during the hospital stay.
6. In some cases, the results from the diagnostic testing will be available prior to the end of the stay, and the Healthcare Provider can **review the diagnostic results** using the Composite Clinical Content Consumer Actor to retrieve the clinical documentation from the HIE Document Repository.
7. Prior to the completion of the Healthcare Organization stay, the Healthcare Provider will determine the primary diagnosis and set the post-hospitalization course of action which may include such steps as the need to **prescribe medication** using the Prescriber Actor, create follow-up orders and/or provide patient instructions (e.g. patient education, patient instructions on medications).
8. At the conclusion of the patient visit, the Healthcare Provider will produce a Discharge Summary about the Healthcare Organization stay. The Discharge Summary includes such information as the patient's condition, recommendations/plan of care and relevant patient history. The Clinical Summary Content Creator Actor will be

used to create the Discharge Summary and **publish the clinical summary document** to the HIE Document Repository so that it is available for sharing.

> **Note:** In the case that a Clinical Summary includes the administrating of an immunization, it will be registered once the Clinical Summary is published to the HIE Document Repository (See *UC0009 Saudi eHealth Immunization Interoperability Use Case*).

4.4.3 Alternative Flow of Events

4.4.3.1 Hospital Stay With Surgery

The workflow described in the main flow of events (Section 3.4.2 Main Flow of Events – Basic Hospital Stay) is a pre-condition to a patient having surgery in a hospital, and not documented in this section. The purpose of a planned hospital stay may be surgery, a patient may be brought into a hospital through the Emergency Department requiring surgery, or a patient already hospitalized may require surgery.

1. In the case that the course of action for the patient is surgery, surgery will be scheduled after the patient is examined, and any pre-operative diagnostic testing, medications, etc. have been completed (Step 4 or 5 of the main flow of events). The actual course of the surgery may be found in the Operative Note Use Case. Upon completion of the surgery, the surgeon will create the Operative Note and **publish the Clinical Note document**.

4.4.3.2 Patient Referral

The workflow described in the main flow of events (Section 3.4.2 Main Flow of Events – Basic Hospital Stay) is a pre-condition to creating a referral for follow-up (e.g. follow-up for a suture removal, follow-up with a Specialist) and not documented in this section. At the conclusion of hospital stay, the Healthcare Provider may determine that the recommended plan of care requires a follow-up with a specialist. (See Section 3.4.3.2 Patient Referral).

4.4.3.3 Patient Transfer

The workflow described in the main flow of events (Section 3.4.2 Main Flow of Events – Basic Hospital Stay) is a pre-condition to creating a referral for follow-up (e.g. hospital transfer, transfer to nursing home) and not documented in this section. At the conclusion of hospital stay, the Healthcare Provider may determine that the recommended plan of care requires a transition of care to a transfer to another hospital or facility.

1. The course of action for the patient includes a transfer to another facility. Prior to completing the Discharge Summary, the Healthcare Provider creates a **transfer request** using the Transfer Requestor Actor.
2. Once the transfer request has been approved, the Healthcare Provider completes the Discharge Summary. As part of the **publish the Clinical Summary document** as a Discharge Summary, the Healthcare Provider may choose to provide notification of availability to the referred Healthcare Provider/Organization.

4.4.3.4 Clinical Summary Amendment

See Section 3.4.3.1 Clinical Summary Amendment.

4.4.4 Exceptions Work Flow

4.4.4.1 Patient Without KSA-Wide Health ID

A patient may arrive in the Healthcare Organization and be unidentified until later in their stay. Without the Health ID, prior history cannot be reviewed. However, a temporary KSA-Wide Health ID may be created so that shared Laboratory tests can be ordered, and other information can be shared, as the KSA-Wide Health ID is a prerequisite for these actions. Upon determination of identification, the HIS should be able to offer the healthcare team the ability to reconcile all of the patient's information and review medical histories without requiring significant additional effort (UC0001 Saudi eHealth Patient Identification Interoperability Use Case).

4.4.4.2 Patient Death

Upon the death of a patient, the normal workflow for a hospital stay is terminated and continues as patient death reporting. A Use Case for patient death reporting has not been prioritized for development at this time.

4.5 INFORMATION REQUIREMENTS

The information content of a Discharge Summary includes a summary of a hospital stay for sharing through the HIE Platform. Table 4.5-1 Discharge Summary data content provides a minimum set of information content for a Discharge Summary.

Summary data transmitted includes all new and updated clinical information that occurred during the admission. For example, if a medication is discontinued, or a prior problem is marked as resolved during the patient stay, that information is included in the Discharge Summary. This is essential to ensure synchronization of clinical data with the HIE Platform.

TABLE 4.5-1 DISCHARGE SUMMARY DATA CONTENT

DISCHARGE SUMMARY CONCEPTS	DESCRIPTION	TEXT/ CODED
Source and context information of the Outpatient Encounter Summary		
Patient Demographics	A group of data elements which identify the patient, and provide additional information about them that may be important in the transition of care for a Patient. The following are attributes which have been identified as important: • Health ID • Nationality • Gender • Associated PHC or private physician • Contact Information* • Marital Status NOTE: The Marital Status may be provided if known, and will be maintained in the HIE Platform. An update will only occur if provided by the Healthcare Provider/Organization.	Text and Coded

DISCHARGE SUMMARY CONCEPTS	DESCRIPTION	TEXT/ CODED
Most Responsible Physician	A set of attributes including the name, identifier and contact information for the Most Responsible physician. .This is the Healthcare Provider who is the legal authenticator of the Outpatient Encounter Summary and who is responsible for the content of the Outpatient Encounter Summary.	Text and Coded
Chief Complaint	The Chief Complaint is a subjective statement made by a patient describing the most significant or serious symptoms or signs of illness or dysfunction that caused him or her to seek healthcare.	Text
Problem List	The Problem List contains the problems currently being monitored for the patient, including currently active and recently resolved problems.	Text and Coded
Pre-Admission Medications	The Pre-Admissions Medications contain the patient's current medications and pertinent medication history at the start of the encounter.	Text or Coded
History of Present Illness	The History of Present Illness describes the history related to the reason for the encounter. It contains the historical details leading up to and pertaining to the patient's current complaint or reason for seeking medical care.	Text
History of Procedures	The History of Procedures defines all interventional, surgical, diagnostic, or therapeutic procedures or treatments pertinent to the patient historically at the time of the encounter.	Text or Coded
Allergies	Allergies list and describe any medication allergies, adverse reactions, idiosyncratic reactions, anaphylaxis/anaphylactoid reactions to food items, and metabolic variations or adverse reactions/allergies to other substances (such as latex, iodine, tape adhesives) used to assure the safety of healthcare delivery. NOTE: For Medication Allergies coding is required.	Text and Coded
Pre-Admission Diagnosis	The Admitting Diagnosis contains a narrative description of the primary reason for the encounter.	Text
Immunizations	The Immunization contains a list of the vaccinations administered to the patient during the encounter.	Text and Coded
Vital Signs	The Vital Signs include a group of data elements containing relevant vital signs such as blood pressure, heart rate, respiratory rate, height, weight, body mass index, head circumference, Pain Assessment and pulse oximetry.	Text or Coded
Physical Examination	The Physical Exam includes direct observations made by the clinician. The examination may include the use of simple instruments and may also describe simple maneuvers performed directly on the patient's body.	Text
Devices	Devices include a description of the medical devices apparent on physical exam that have been inserted into the patient, whether internal or partially external.	Text
Hospital Course	The Hospital Course describes the sequence of events during the course of the hospital stay.	Text

DISCHARGE SUMMARY CONCEPTS	DESCRIPTION	TEXT/ CODED
Drains	The Drains describe any drains implanted during a procedure.	Text
Recommendation/ Plan of Care	The Plan of Care data elements define any pending orders, interventions, encounters, services and procedures for the patient after the completion of the Outpatient encounter. The Plan of Care may also include other information such as patient education, nutritional diet, discharge instructions, follow-up orders, etc.	Text
In-Hospital Medications	The In-hospital Medications contain the relevant medications administered to the patient during the hospital.	Text or Coded
Discharge Medications	The Discharge Medications contain the patient's current medications and pertinent medication history at the end of the hospital stay.	Text or Coded
Discharge Condition	Observations of problems or other clinical statements captured at the completion of the encounter which represent the ongoing process tracked over time.	Coded
Discharge Destination	The Discharge Destination contains the place the patient is going or being sent upon discharge from the hospital.	Coded

4.5.1 iEHR Summary

The definition of the minimum data set for the iEHR Summary used to access the current health status of the patient may be found in Section 3.5.2 iEHR Summary.

5. MATERNAL DISCHARGE SUMMARY USE CASE

This Use Case describes the information workflow of a maternal hospital visit for the purpose of delivery. This Use Case is a specialized version of the Discharge Summary Use Case and is typically paired with the Newborn Discharge Summary Use Case. During this type of hospital stay, access to prior relevant Clinical Documentation from the HIE Document Repository is required, as well as the sharing of the Maternal Discharge Summary (and Newborn Discharge Summary) in order to transition the patient(s) to the care of a PHC, private physician, specialist, home or another Facility. It may also be used by MOH business applications, including public health organizations.

The Maternal Discharge summary contains information such as:

- General information on the patient
- Information on the patient's status when they arrived
- Mode of delivery and the delivery outcome
- Procedures or surgeries performed during the visit
- Recommendations or a plan of care
- Follow-up orders

The maternal Discharge Summary is created in a format that supports both human-readable rendering and machine-processing (i.e. coded results data).

5.1 SCOPE

The Maternal Discharge Summary Use Case covers the Discharge Summary created when a patient is released after a delivery from the hospital so the summary information can be shared through the HIE Document Repository.

5.1.1 Additional Considerations

See Section 3.1.1 Additional Considerations.

5.2 EXPECTED BENEFITS

See Section 3.2 Expected Benefits

5.3 BUSINESS SCENARIO

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

The scope of each Use Case is defined to support a wide number of Business Scenarios relevant to the health information domain being considered. This is generally done in a flow-down discovery analysis, especially for Use Cases that are not well established.

The following section illustrates typical Business Scenarios that involve the identification of patients and obtaining of provider and/or organization information.

The following Users are associated with these Business Scenarios:

TABLE 5.3-1: HOSPITAL DELIVERY ENCOUNTER USERS

USER	USER ROLE
Mother	The mother being registered through the Emergency Department and admitted into the Hospital for delivery.
Newborn	The infant(s) delivered during the Hospital stay.
Administrative Staff	The person(s) registering and admitting the mother through the Hospital Information System (HIS)
ED physician	The physician responsible for examining the mother in the Emergency Department.
Resident physician	A physician in-training who may be caring for the mother and creating the preliminary Maternal Discharge Summary (to be approved by the attending physician).
Attending physician or Consultant	The physician for delivering the infant and responsible for approving the Maternal Discharge Summary created at the time the patient is released from the Hospital
Surgeon	Physician performing the cesarean section.
Family Member	A person or persons associated with the patient.
Healthcare Trauma Team	The Emergency Department (ED) team responsible for initially caring for and evaluating the mother.

The following Information Systems are associated with these Business Scenarios:

TABLE 5.3-2: HOSPITAL DELIVERY ENCOUNTER INFORMATION SYSTEMS

INFORMATION SYSTEM	SYSTEM ROLE
HIS	The Hospital Information System (HIS) used by the hospital to store and retrieve Electronic Healthcare Records.
HIE Document Repository	KSA-wide centralized repository for storing Clinical Documentation and also an Interoperability Environment enabling healthcare providers to share the clinical information of the patient.
Clinical Data Repository	KSA-wide centralized repository for collecting a patient's clinical data from all types of healthcare encounters. Healthcare Providers/Organizations can use this clinical data to reconcile it with local clinical data.

For each of the following Business Scenarios, the individual steps are followed by their equivalent step number in the following table in square brackets (e.g., [1] for table step 1)

The Maternal Discharge Summary is a special case of a Discharge Summary. This Use Case will only focus on the differences that are distinctive for this Use Case, and will not show all of the steps that would otherwise normally appear within a Discharge Summary.

5.3.1 Business Scenario 1: Normal Delivery

A mother is brought to the Emergency Department with labor pains. This is the mother's first pregnancy, and she is in her 38th week of pregnancy. During the course of the mother's pregnancy she has been seen at 2 different hospitals for 3 antenatal visits each.

The mother is registered and her Health ID is located [1]. To review the mother's pregnancy history, the physician uses the Mother's Health ID to retrieve the Mother's Outpatient Encounter Summaries, Laboratory Results Reports and Imaging Results Reports as well as any other relevant past medical and /or surgical history [2]. The ED physician performs a physical examination and assess that the mother is full-term and is in active labor.

The mother is admitted from the Emergency Department to the hospital delivery ward where a vaginal mode of delivery results in a normal delivery outcome. During the delivery an episiotomy procedure is performed with local anesthesia. The mother and newborn are moved to the obstetrics' ward after 2 hours and discharged after 24 hours.

At the time of the discharge, a Maternal Discharge Summary is created. In addition to the standard Discharge Summary information, the maternal Discharge Summary includes information on the mother's and baby's discharge condition, follow-up orders, the recommended plan of care and discharge instructions as well as maternal/newborn education instructions. The maternal Discharge Summary is reviewed with the mother and made available for sharing [3]. The physician then writes a referral for the mother to visit the Outpatient Department, the PHC or a private physician for follow-up.

TABLE 5.3-3 : HIGH LEVEL BUSINESS PROCESSES FOR A NORMAL HOSPITAL DELIVERY

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Obtain Patient Health Identifier	See Section 8.2.1
2	Main Flow	Review Historical Medical Documents	See Section 8.1.2
3	Main Flow	Publish Clinical Summary Document	See Section 8.1.3

5.3.2 Business Scenario 2: Emergency Hospital Cesarean Section Delivery

A mother is brought to the Emergency Department after being involved in a traffic accident. The mother is registered and her Health ID is located [1]. To review the mother's pregnancy history, the physician uses the Mother's Health ID to retrieve the Mother's Outpatient Encounter Summaries, Laboratory Results Reports and Imaging Results Reports as well as any other relevant past medical and /or surgical history [2]. A healthcare trauma team assesses the mother by performing a physical examination and speaking to the mother. The chief complaint is vaginal bleeding at 32 weeks. Blood samples are sent to the blood bank for urgent blood grouping and cross matching for 4 units. Routine preoperative investigation Laboratory Orders are placed and Radiology tests are ordered [3]. The fetal ultrasound Imaging Results Report indicates fetal distress [4], and a decision is made to perform an emergency cesarean section procedure, as the mother's condition continues to worsen.

The mother immediately transferred to the operating room without waiting for the Laboratory Results Report, and the planned cesarean procedure is performed. The baby and the placenta are extracted, and the mother is sutured. After the mother is moved to the obstetrics' ward and an Operative Note (See Section Operative Note Use Case) is created [5].

The obstetrics' ward follows the post-operative instructions and the post-operative prescribed medications and the mother's condition continues to improve. Additional Laboratory tests are ordered [6] and the Laboratory Results Report is normal [7]. After the third day the mother is able to be discharged with the baby.

> Note: The handing of post-operative medications internal to a hospital stay is covered by a hospital process which does not require any interoperability. However, documentation such as the Operative Note and Discharge Summaries contain information on the pertinent medication administered during the hospital stay.

At the time of the discharge, a maternal Discharge Summary is created. In addition to the standard Discharge Summary information, the maternal Discharge Summary includes information on the mother's and baby's discharge condition, follow-up orders (including a follow-up order for the mother to be seen by the Outpatient Department after 4 days for follow-up and stitch removal), the recommended plan of care and discharge instructions as well as maternal/newborn education instructions. The Maternal Discharge Summary is reviewed with the mother and made available for sharing [8]. The physician then writes a referral for the mother to visit the Outpatient Department for follow-up [9].

TABLE 5.3-4 : HIGH LEVEL BUSINESS PROCESSES FOR A DELIVERY WITH SURGERY

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Obtain Patient Health Identifier	See Section 8.2.1
2	Main Flow	Review Historical Medical Documents	See Section 8.1.2
3,6	Main Flow	Order Diagnostic Testing	See Section 8.2.3
4,7	Main Flow	Review Diagnostic Results	See Section 8.2.5
5	Alternative Flow - Surgery (Sec 4.4.3.15.4.3.1)	Publish Clinical Note Document	See Section 8.1.4
8	Main Flow	Publish Clinical Summary Document	See Section 8.1.3
9	Alternative Flow – Patient Referral (Sec. 4.4.3.2)	Referral Request	See Section 8.2.11

5.3.3 Business Scenario 3: Non-hospital Delivery

A mother delivers a baby outside of the hospital. This may occur for a variety of reason including a planned home delivery, an emergency delivery in an ambulance or on the roadside. The mother and the newborn is brought into the Emergency Department for a follow-up. The mother is

registered and her Health ID is located [1]. To review the mother's pregnancy history, the physician uses the Mother's Health ID to retrieve the Mother's Outpatient Encounter Summaries, Laboratory Results Reports and Imaging Results Reports as well as any other relevant past medical and /or surgical history [2]. A healthcare trauma team assesses the mother by performing a physical examination and speaking to the mother. As part of the assessment, the healthcare trauma team needs to understand how the delivery was preformed, and specifically whether the cord was cut or clamped, and if the conditions were sterile. Based upon the assessment, the mother may be admitted into the hospital for further care.

At the time of the discharge, a maternal Discharge Summary is created. This maternal Discharge Summary serves as a record of the delivery. In addition to the standard Discharge Summary information, the maternal Discharge Summary includes information on the mother's and baby's discharge condition, follow-up orders (including a follow-up order for the mother to be seen by the Outpatient Department), the recommended plan of care and discharge instructions as well as maternal/newborn education instructions. The Maternal Discharge Summary is reviewed with the mother and made available for sharing [3].

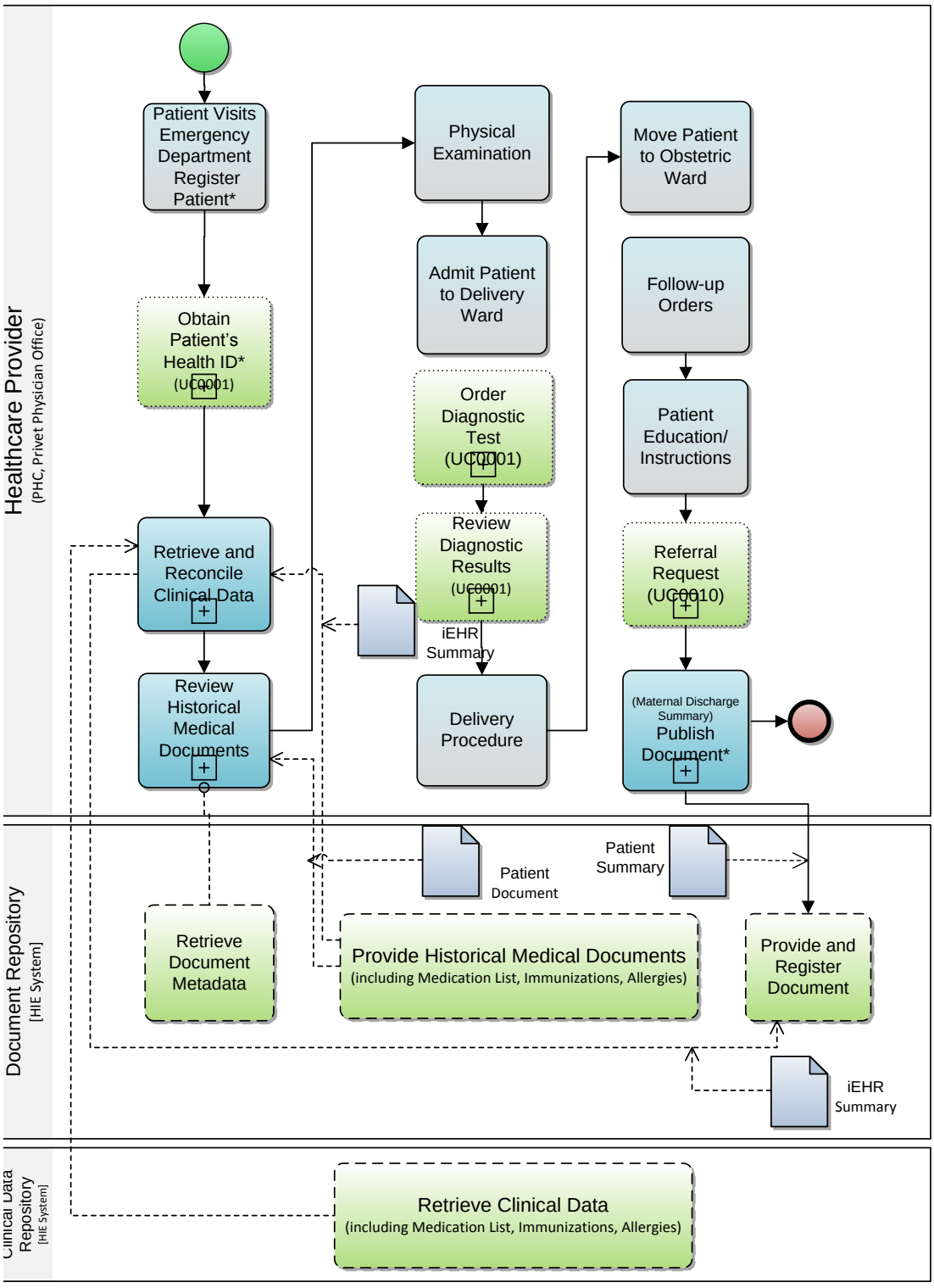
TABLE 5.3-5: HIGH LEVEL BUSINESS PROCESSES FOR A NON-HOSPITAL DELIVERY

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Obtain Patient Health Identifier	See Section 8.2.1
2	Main Flow	Review Historical Medical Documents	See Section 8.1.2
3	Main Flow	Publish Clinical Summary Document	See Section 8.1.3

5.4 PROCESS FLOWS

5.4.1 Process Overview

The Hospital Delivery Business Process Model shown in the figure below is a composite of all of the process flows developed for this Use Case. It has been developed based on analysis of all of the process flows and identified from the Use Case scenarios described above. The diagram below depicts the user roles and the associated activities. Only the Actors directly related to this Use Case are shown in this Process Flow, all of the other Actors are used within the Business Processes.



* These business process are required steps in this flow of event

FIGURE 5.4-1 MATERNAL DISCHARGE SUMMARY WORKFLOW

5.4.2 Main Flow of Events – Normal Delivery

A mother is admitted to a hospital for the delivery. Upon completion of the delivery, a Maternal Discharge Summary is published to the HIE Document Repository.

The main flow of events of the Maternal Discharge Summary Use Case is the following:

1. Upon arrival to the hospital, the Healthcare Provider registers the mother and uses the Patient Demographic Consumer Actor (e.g. EHR or HIS) to **obtain the Patient Health Identifier** from the HIE Registry.
2. Using the mother's Health ID, the mother's local clinical data are reconciled with any updated clinical summary data in the HIE Document Repository by using the iEHR Document Source Actor to **retrieve and reconcile clinical data.**
3. Using the patient's Health ID, the patient's relevant shared Clinical Documentation is retrieved from the HIE Document Repository by the Composite Clinical Content Consumer Actor to **review historical medical documents**.
4. The Healthcare Provider performs the physical examination and assesses the mother's labor state. If appropriate, the mother will be admitted directly into the hospital delivery ward.
5. The Healthcare Provider may then need to **order diagnostic testing** (e.g. Radiology or Laboratory) using the Composite Order Diagnostic Testing Actor, and/or prescribe medications

   Note: The handing of medications internal to a hospital stay is covered by a hospital process which does not require any interoperability. However, documentation such as the Operative Note and Discharge Summaries contain information on the medication administered during the hospital stay
6. The mother has a normal delivery. During the delivery a procedure is performed with local anesthesia. After recovering from the delivery the mother and the newborn are moved to the obstetrics' ward.
7. At the conclusion of the hospital stay, the Healthcare Provider will produce a Maternal Discharge Summary, along with a Newborn Discharge Summary. The Maternal Discharge Summary contains all of the information included in a Discharge Summary as well as the additional maternal delivery information. The course of action for the mother is referral to a PHC, Outpatient Department or private physician for delivery follow-up care.
8. The Clinical Summary Content Creator Actor will be used to create the Maternal Discharge Summary and **publish the clinical summary document** to the HIE Document Repository so that it is available for sharing. As part of the publishing process, the Healthcare Provider may choose to provide notification of availability to the Healthcare Organization where the follow-up patient care will occur.

5.4.3 Alternative Flow of Events

All of the Discharge Summary Use Case Alternative flows of events apply to the Maternal Discharge Summary Use Case.

5.4.3.1 Cesarean Section Delivery

The workflow described in the main flow of events (Section 3.4.2 Main Flow of Events – Normal Delivery) is a pre-condition to a patient having a cesarean section delivery in a hospital, and not documented is this section. A cesarean section delivery is considered surgery, and may have been planned (i.e. the mother is admitted directly into the hospital), or not, in which case the mother is most likely admitted through the Emergency Department.

1. In the case that the course of action for the delivery is a cesarean section, the mother will be scheduled for surgery after the mother is examined, and any pre-operative diagnostic testing, medications, etc. have been completed. The actual course of the cesarean section (surgery) may be found in the Operative Note Use Case. Upon completion of the caesarean section, the surgeon will create the Operative Note and **publish the clinical note document** using the Clinical Note Content Creator Actor.
2. Once the mother has recovered from the surgery, the mother and newborn are moved to the obstetrics' ward, and the remainder of a normal delivery workflow is followed.

5.4.3.2 Non-hospital delivery

In the case of a non-hospital delivery, the mother has delivered prior to actually entering the Emergency Department, The workflow described in the main flow of events (Section 3.4.2 Main Flow of Events – Basic Hospital Stay) is a pre-condition to a following up with a mother who has delivered outside of the hospital, and not documented is this section. The mother may or may not be admitted to the hospital depending upon the assessment performed in the Emergency Department. At the end of the hospital stay, the normal delivery workflow is followed.

5.4.4 Exception Flows

All of the exception workflows apply to the Maternal Discharge Summary Use Case.

5.4.4.1 Stillborn Birth

Currently the reporting of a stillborn birth is reported in the Maternal Discharge Summary (as the delivery outcome). There is a desire to capture additional information about the stillborn, as this information may be useful to existing or future siblings. A Use Case for stillborn reporting has not been prioritized for development at this time.

5.5 INFORMATION REQUIREMENTS

The information content of a Maternal Discharge Summary includes a summary of a delivery stay for the purposes of sharing through the HIE Document Repository. The Maternal Discharge Summary data content is an extension of the Discharge Summary found in Table 5.5-1 Maternal Discharge Summary data content. Table 5.5-1 Maternal Discharge Summary data content provides the additional minimum set of information content for Maternal Discharge Summary.

TABLE 5.5-1 MATERNAL DISCHARGE SUMMARY DATA CONTENT

Maternal Discharge Summary CONCEPTS	DESCRIPTION	TEXT/ CODED
Source and context information of the Outpatient Encounter Summary		
Pregnancy History	The Pregnancy History contains information gathered about a woman's prior pregnancies, how the baby was born and any problems related to the pregnancy.	Text
Blood Group	The Blood Group of the newborn, including the Rhesus Factor (RF) blood test measures the amount of the Rhesus Factor antibody present in the blood. The reporting of the blood group is part of a Laboratory Results Report, but may be reported as an individual coded result.	Coded
Mode of Delivery	The Mode of Delivery describes the method used for childbirth.	Coded
Delivery Outcome	The Delivery Outcome describes the end result of the delivery. Delivery Outcome must include the birth status, post-partum complications, whether an episiotomy was done, and whether treatment for RH Factor incompatibility was received. In the case of a home /ambulance/unattended delivery additional information on how the cord was handled and whether the delivery was done in a sterile environment.	Text and Coded
Baby's Discharge Condition	Observations of problems or other clinical statements captured about the baby at the completion of the encounter which represent the ongoing process tracked over time.	Text

5.5.1 iEHR Summary

The definition of the minimum data set for the iEHR Summary used to access the current health status of the patient may be found in Section 3.5.2 iEHR Summary.

6. NEWBORN DISCHARGE SUMMARY USE CASE

This Use Case describes the information workflow of a hospital birth and resulting newborn discharge. This Use Case is a specialized version of the Discharge Summary Use Case and is typically paired with the Maternal Discharge Summary Use Case. During this type of hospital stay a Newborn Discharge Summary is created in order to transition the infant to the care of a PHC, private physician, specialist, home or another Facility. It may also be used by MOH business applications, including public health organizations.

- General information on the infant
- Information on the infant's condition at birth
- Mode of delivery and the delivery outcome
- Procedures or surgeries performed during the visit
- Recommendations or a plan of care
- Follow-up orders.

The Newborn Discharge Summary is created in a format that supports both human-readable rendering and machine-processing (i.e. coded results data).

6.1 SCOPE

The Newborn Discharge Summary Use Case covers the Discharge Summary created when a newborn is released from the hospital so the summary information can be shared through the HIE Document Repository.

6.2 EXPECTED BENEFITS

See Section 3.2 Expected Benefits

6.3 BUSINESS SCENARIO

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

The scope of each Use Case is defined to support a wide number of Business Scenarios relevant to the health information domain being considered. This is generally done in a flow-down discovery analysis, especially for Use Cases that are not well established.

The following section illustrates typical Business Scenarios that involve the identification of patients and obtaining of provider and/or organization information.

The following Users are associated with these Business Scenarios:

TABLE 6.3-1: HOSPITAL BIRTH ENCOUNTER USERS

USER	USER ROLE
Mother	The mother being registered through the Emergency Department and admitted into the hospital for delivery.

Newborn	The infant(s) delivered during the hospital stay.
Administrative Staff	The person(s) registering the newborn through the Hospital Information System (HIS)
Surgeon	Physician performing the procedures on the newborn.
Resident physician	A physician in-training who may be caring for the newborn and creating the preliminary Newborn Discharge Summary (to be approved by the attending physician).
Attending physician or Consultant	The physician responsible for approving the Newborn Discharge Summary created at the time the patient is released from the hospital
Family Member	A person or persons associated with the Infant.
NICU Healthcare Team	The Healthcare team responsible for caring and evaluating a newborn in the Neonatal Intensive Care Unit (NICU).

The following Information Systems are associated with these Business Scenarios:

TABLE 6.3-2: HOSPITAL BIRTH ENCOUNTER INFORMATION SYSTEMS

INFORMATION SYSTEM	SYSTEM ROLE
HIS	The Hospital Information System (HIS) used by the Hospital to store and retrieve Electronic Healthcare Records.
HIE Document Repository	KSA-wide centralized repository for storing Clinical Documentation and also an Interoperability Environment enabling healthcare providers to share the clinical information of the patient.

For each of the following Business Scenarios, the individual steps are followed by their equivalent step number in the following table in square brackets (e.g., [1] for table step 1)

The Newborn Discharge Summary is a special case of a Discharge Summary. This Use Case will only focus on the differences that are distinctive for this Use Case, and will not show all of the steps that would otherwise normally appear within a Discharge Summary.

6.3.1 Business Scenario 1: Normal Hospital Delivery

A healthy baby is delivered in the delivery room of a hospital. The initial assessment including Apgar, vital signs and a physical examination are all within normal ranges. A wrist band containing the sex of the baby and the name of the mother are used to identify baby (along with their foot prints.) A new Health ID is created for the newborn [1]. The standard sets of Laboratory Orders are created for a newborn [2], and the Laboratory Results Report for the local laboratory results [3] are also within normal ranges. Additional newborn screening is performed [4] on the newborn as well as the newborn immunization process [5].

The next day the newborn is discharged along with the mother, and a Newborn Discharge Summary is created at the same time as the Maternal Discharge Summary is created for the mother. Since the Newborn Discharge Summary contains information about the delivery, the Mother's Health ID is also needed. The Newborn Discharge Summary is made available for

sharing. [6] The parents are given information on follow-up orders to visit the PHC for the baby, and to follow-up on the results of the newborn screening tests. Additional discharge instructions are provided on education for breast feeding and routine newborn care, an Immunization Card and birth notification is sent to the Ministry of Interior so that the official vital signs record can be recorded.

> Note: In the case that a clinical summary includes the administrating of an immunization, it will be registered once the clinical summary is published to the HIE Document Repository (See *UC0009 Saudi eHealth Immunization Use Case*).

TABLE 6.3-3 : HIGH LEVEL BUSINESS PROCESSES FOR A NORMAL HOSPITAL BIRTH

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Identify Baby	See Section 8.2.2
2,4	Main Flow	Order Diagnostic Tests	See Section 8.2.3
3	Main Flow	Review Diagnostic results	See Section 8.2.5
5	Main Flow	Immunization process	See Section 8.2.11
6	Main Flow	Publish Clinical Summary Document	See Section 8.1.3

6.3.2 Business Scenario 2: Hospital Delivery With Complications

A baby is delivered surgically in the operating room of a hospital. The initial assessment showed the baby to be limp, apneaic and bradycardiac. Procedures are performed to resuscitate the baby. The baby responds well to the resuscitative efforts and is continued to be given oxygen by a face mask. The Apgar and other initial assessments continue to show great improvement, and before the baby is moved to NICU, the umbilical cord is clamped and cut, and an examination is performed. A wrist band containing the sex of the baby and the name of the mother are used to identify baby (along with their footprints). A new Health ID is created for the newborn [1].

The baby is transferred to NICU along with all the details of what occurred in the operating room. After the newborn is moved an Operative Note is created [2]. The prescribed post-operative course is followed which includes incubation for 3 days, the administering of IV Fluids and the administering of post-operative medications. During this time the standard sets of Laboratory Orders are created for a newborn, Newborn Screening is conducted [3] and the newborn immunization process is completed [4].

> Note: The handing of medications internal to a hospital stay is covered by a hospital process. However, documentation such as the Operative Note and Discharge Summaries contain information on the medication administered during the hospital stay

After the third day the baby's condition has stabilized, and the Laboratory Results Report for the local laboratory results are within normal ranges [5]. The newborn is discharged and a Newborn Discharge Summary is created. The Newborn Discharge Summary is made available for sharing [6]. The Parents are given information on follow-up orders to visit the Outpatient Department

after one week, for follow-up care for the baby, and to follow-up on the results of the newborn screening tests. Additional Discharge instructions are provided on education for breast feeding and routine newborn care, immunizations are reported to the Immunization Registry with the vaccinations detail provided to the parents on the Immunization card (See *UC0009 Saudi eHealth Immunization Use Case*) and a birth notification is sent to the Ministry of Interior so that the official vital signs record can be recorded.

TABLE 6.3-4 : HIGH LEVEL BUSINESS PROCESSES FOR A HOSPITAL BIRTH WITH COMPLICATIONS

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Identify Baby	See Section 8.2.2
2	Alternative Flow (Sec 6.4.3.1)	Publish Clinical Note Document	See Section 8.1.4
3	Main Flow	Order Diagnostic Tests	See Section 8.2.3
4	Main Flow	Immunization process	See Section 8.2.11
5	Main Flow	Review Diagnostic results	See Section 8.2.5
6	Main Flow	Publish Clinical Summary Document	See Section 8.1.3

6.3.3 Business Scenario 3: Non-hospital Delivery

A baby is delivered outside of the hospital. This may occur for a variety of reasons including a planned home delivery, an emergency delivery in an ambulance or on the roadside. The mother and the newborn is brought into the Emergency Department for a follow-up. Information about the delivery is gathered. This includes information on whether the delivery environment was sterile, as the newborn will need to receive a tetanus shot since the delivery environment was not sterile. The initial assessment including vital signs and a physical examination are all within normal ranges. A wrist band containing the sex of the baby and the name of the mother are used to identify baby (along with their foot prints.) A new Health ID is created for the newborn. [1]. The standard sets of Laboratory Orders are created for a newborn [2], and the Laboratory Results Report for the local laboratory results [3] are also within normal ranges. Additional newborn screening is performed [4] on the newborn as well as the newborn immunization process [5].

The newborn is discharged along with the mother, and a Newborn Discharge Summary is created at the same time as the Maternal Discharge Summary is created for the mother. Since the Newborn Discharge Summary contains information about the delivery, the Mother's Health ID is also needed. The Newborn Discharge Summary is made available for sharing [6]. The parents are given information on follow-up orders to visit the PHC for the baby, and to follow-up on the results of the newborn screening tests. Additional discharge instructions are provided on education for breast feeding and routine newborn care, an Immunization Card and birth notification is sent to the Ministry of Interior so that the official vital signs record can be recorded.

Note: In the case that a clinical summary includes the administrating of an immunization, it will be registered once the clinical summary is published to the HIE Document Repository (See *UC0009 Saudi eHealth Immunization Interoperability Use Case*).

TABLE 6.3-5 : HIGH LEVEL BUSINESS PROCESSES FOR A NON-HOSPITAL BIRTH

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Identify Baby	See Section 8.2.2
2,4	Main Flow	Order Diagnostic Tests	See Section 8.2.3
3	Main Flow	Review Diagnostic results	See Section 8.2.5
5	Main Flow	Immunization process	See Section 8.2.11
6	Main Flow	Publish Clinical Summary Document	See Section 8.1.3

6.4 PROCESS FLOWS

6.4.1 Process Overview

The Hospital Birth Business Process Model shown in the figure below is a composite of all of the process flows developed for this Use Case. It has been developed based on analysis of all of the process flows and identified from the Use Case scenarios described above. The diagram below depicts the user roles and the associated activities. Only the Actors directly related to this Use Case are shown in this Process Flow, all of the other Actors are used within the Business Processes.

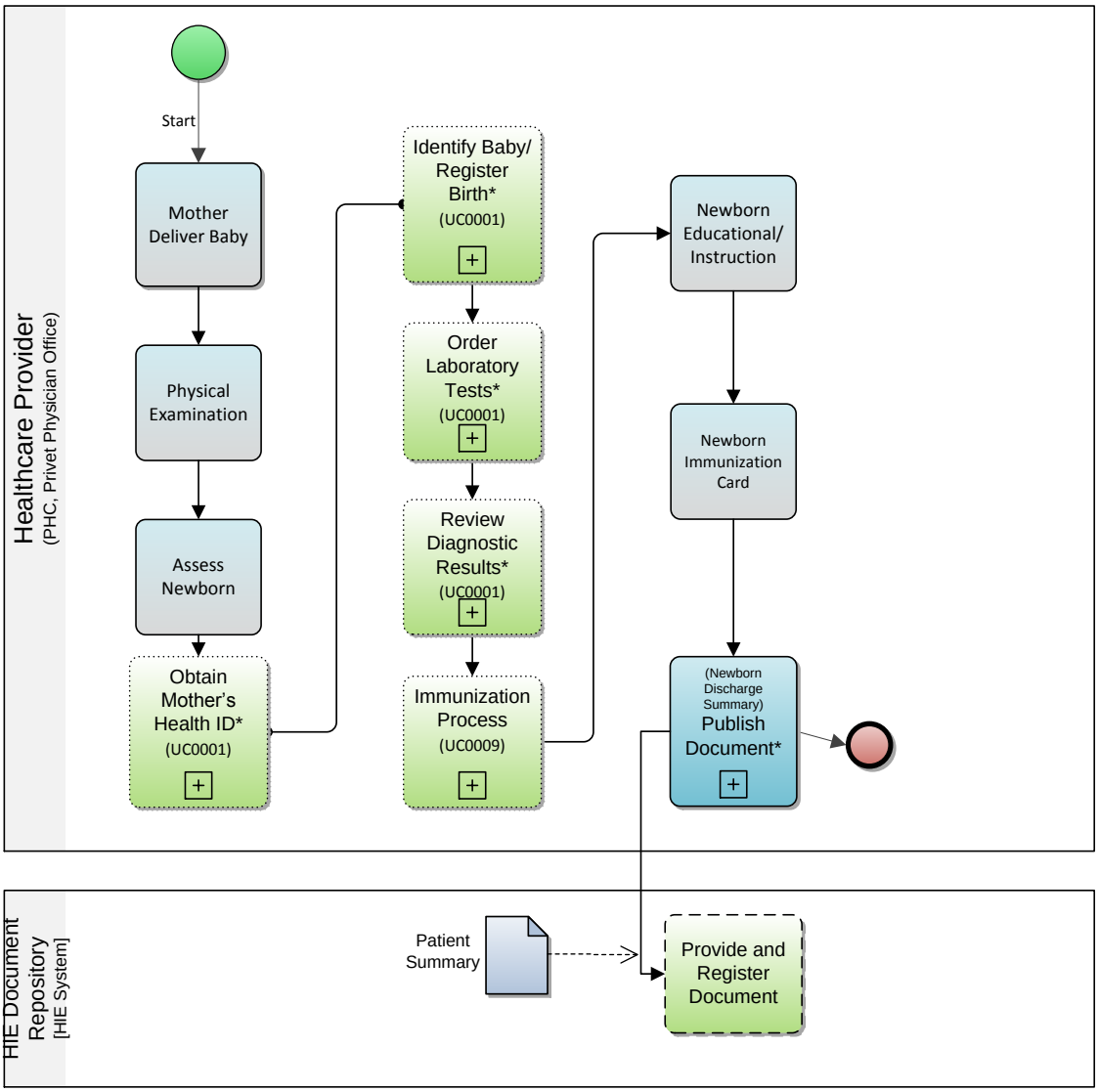


FIGURE 6.4-1 NEWBORN DISCHARGE SUMMARY WORKFLOW

6.4.2 Main Flow of Events – Normal Delivery

A mother gives birth to a baby. Upon completion of the delivery, a Newborn Discharge Summary is published to the HIE Document Repository.

The main flow of events of the Newborn Discharge Summary Use Case is the following:

1. Upon the birth of the baby, Healthcare Provider performs the physical examination and assesses the newborn. The Healthcare Provider uses the Patient Demographic Consumer Actor (e.g. EHR or HIS) to **obtain the Mother's Health ID, and use it to identify the baby** and register the birth with the HIE Registry. The mother and the newborn are moved to the obstetrics' ward.
2. The Healthcare Provider **orders diagnostic testing** (i.e., standard newborn Laboratory tests and newborn screening tests) using the Composite Order Diagnostic Testing Actor.

3. The Healthcare Provider administers vaccinations through the **immunization process** (See *UC0009 Saudi eHealth Immunization Interoperability Use Case*) and records them during the hospital stay using the Clinical Summary Content Creator Actor.
4. At the conclusion of the hospital stay, the Healthcare Provider will produce a Newborn Discharge Summary, using the newborn's newly created Health ID. The Newborn Discharge Summary all of the information included in a Discharge Summary and the additional newborn delivery information.

   Note that the Newborn Discharge Summary includes information about the Mother, and hence the Mother's Health ID is also required (if known).

5. The mother will receive educational information on the newborn care as well as an Immunization Card for the newborn (See *UC0009 Saudi eHealth Immunization Interoperability Use Case*). The course of action for the newborn is referral to a PHC, Outpatient Department or private physician for newborn follow-up care.

6. The Clinical Summary Content Creator Actor will be used to create the Newborn Discharge Summary and **publish the Clinical Newborn Summary document** to the HIE Document Repository so that it is available for sharing. As part of the publishing process, the Healthcare Provider may choose to provide notification of availability to the Healthcare Organization where the follow-up patient care will occur.

6.4.3 Alternative Flow of Events

6.4.3.1 Delivery With Complications

The workflow described in the main flow of events (Section 4.4.2 Main Flow of Events – Normal Delivery) is a pre-condition to a newborn delivery with complications, and not documented is this section. In the case of delivery complications, some of the workflow may be out of order, and surgical procedures may be required.

1. Upon the birth of the baby, the Healthcare Provider performs the physical examination and assesses the newborn. If there are complications, the Health Provider may need to perform procedures to improve the condition of the newborn. Once the state of the newborn is stable, the newborn may be moved to the NICU. Prior to moving the newborn, the Healthcare Provider uses the Patient Demographic Consumer Actor (e.g. EHR or HIS) to **identify the baby** and register the birth with the HIE Registry
2. As part of the transfer process to the NICU, all of the details of what occurred in the operating room are passed onto the NICU team and the Healthcare Provider **publishes the Clinical Note document** using the Clinical Note Content Creator Actor.
3. The remainder of the newborn workflow is the same as the Main Flow of Events – Normal Delivery, with the exception that there may be a need to **order diagnostic tests** using the Composite Order Diagnostic Testing Actor, beyond the standard newborn testing and to **prescribe medication** using the Prescribe Medication Actor.

6.4.3.2 Non-hospital Delivery

The workflow described in the main flow of events (Sections 4.4.2 Main Flow of Events – Basic Hospital Stay and 6.3.1 Main Flow of Events – Normal Delivery) are pre-conditions to a non-hospital delivery, and not documented is this section. In the case of a non-hospital delivery, some of the workflow may be out of order.

1. Upon the newborn being brought to the Emergency Department, the Healthcare Provider performs the physical examination and assesses the newborn. Part of the assessment is the determination if a tetanus shot is required. Assuming there are no complications, the Healthcare Provider uses the Patient Demographic Consumer Actor (e.g. EHR or HIS) to **identify the baby** and register the birth with the HIE Registry.
2. The remainder of the newborn workflow is the same as the Main Flow of Events – Normal Delivery, with the exception that there may be a need to administer a tetanus shot using the **vaccination process** beyond the standard newborn.

6.4.4 Exception Flows

6.4.4.1 Stillborn Birth

In the case of a stillborn birth, no Newborn Discharge Summary is created, and any information related to the stillborn birth is documented as part of the Maternal Discharge Summary and Mother's Healthcare Record. There is a desire to capture additional information about the stillborn, as this information may be useful to existing or future siblings. A Use Case for stillborn reporting has not been prioritized for development at this time.

6.5 INFORMATION REQUIREMENTS

The information content of a Newborn Discharge Summary includes a summary of a delivery stay for the purposes of sharing through the HIE Document Repository. The Newborn Discharge Summary data content is an extension of the Discharge Summary found in Table 4.5-1 Discharge Summary data content. Table 6.5-1 Newborn Discharge Summary data content provides the additional minimum set of information content for Newborn Discharge Summary.

TABLE 6.5-1 NEWBORN DISCHARGE SUMMARY DATA CONTENT

Encounter Summary CONCEPTS	DESCRIPTION	TEXT/ CODED
Source and context information of the Outpatient Encounter Summary		
Pregnancy History	Contains information gathered about a woman's prior pregnancies, how the baby was born and any problems related to the pregnancy.	Text
Blood Group	The Blood Group of the newborn, including the Rhesus Factor (RF) blood test measures the amount of the Rhesus Factor antibody present in the blood. The reporting of the blood group is part of a Laboratory Results Report, but may be reported as an individual coded result.	Coded

Encounter Summary CONCEPTS	DESCRIPTION	TEXT/ CODED
Apgar	Contains the values of the repeatable method used to quickly and summarily assess the health of newborn children immediately after birth.	Text
Newborn Screening	Contains the status of the performed on newborns to screen for serious treatable diseases most of which are genetic.	Text
Mode of Delivery	Describes the method used for childbirth.	Coded
Delivery Outcome	Describes the end result of the delivery. Delivery Outcome must include the birth status, post-partum complications, whether an episiotomy was done, and whether treatment for RH Factor incompatibility was received. In the case of a home /ambulance/unattended delivery additional information on how the cord was handled and whether the delivery was done in a sterile environment.	Text and Coded
Gestational Age	The calculated period of time between conception and birth.	Text
Maternal History	Contains medical information about the Mother that may be relevant to the care of the newborn.	Text

7. OPERATIVE NOTE USE CASE

This Use Case describes the information workflow within an operating room (OR), and the resulting Operative Note describing the surgery and the post-operative activities surrounding a surgery. An Operative Note is created in order to provide a detailed record of the surgery and the subsequent follow-up, and becomes part of a patient's permanent record. It may also be used by MOH business applications, including public health organizations.

- General information on the patient
- Information on the patient 's condition pre- and post-operative
- Procedures or surgeries performed
- Information about the surgery
- Recommendations or a plan of care
- Follow-up orders

The Operative Note is created in a format that supports both human-readable rendering and machine-processing (i.e., coded results data).

7.1 SCOPE

The Operative Note Use Case covers the Operative Note created when a patient is released from the Operation Room (OR) and provides a detailed report of the surgery along with post-operative care requirements. The clinical note information can be shared through the HIE Document Repository.

7.2 EXPECTED BENEFITS

- Produces Operative Notes in both human and machine readable format
- Provides timely access to Operative Notes across all stakeholders, such as hospitals, primary care centers, MOH business applications, etc.
- Reduces errors in patient care related to accessing surgery information
- Organizations that didn't have access to the information before can now access structured, Operative Notes

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

7.3 BUSINESS SCENARIO

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 eHealth Information Exchange (HIE) Platform and support of cross facility data sharing and workflow.

The scope of each Use Case is defined to support a wide number of Business Scenarios relevant to the health information domain being considered. This is generally done in a flow-down discovery analysis, especially for Use Cases that are not well established.

The following section illustrates typical Business Scenarios that involve the identification of patients and obtaining of provider and/or organization information.

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

The following Users are associated with these Business Scenarios:

TABLE 7.3-1: OPERATIVE NOTE USERS

USER	USER ROLE
Patient	The person being registered through the Emergency Department and/or admitted into the hospital for surgery
Administrative Staff	The person(s) registering and/or admitting the patient through the Hospital Information System (HIS)
Surgeon	The physician(s) performing the surgery on the patient
ED physician	The physician responsible for examining the patient in the Emergency Department.
Resident physician	A physician in-training who may be caring for the patient and creating the preliminary Discharge Summary (to be approved by the attending physician).
Attending physician or Consultant	The physician responsible for approving the Discharge Summary created at the time the patient is released from the Hospital
Family Member	A person or persons associated with the patient.
Healthcare Trauma Team	The Emergency Department (ED) team responsible for initially caring and evaluating a patient.

The following Information Systems are associated with these Business Scenarios:

TABLE 7.3-2: OPERATIVE NOTE INFORMATION SYSTEMS

INFORMATION SYSTEM	SYSTEM ROLE
HIS	The Hospital Information System (HIS) used by the hospital to store and retrieve Electronic Healthcare Records.
HIE Document Repository	KSA-wide centralized repository for storing Clinical Documentation and also an Interoperability Environment enabling healthcare providers to share the clinical information of the patient.

For each of the following Business Scenarios, the individual steps are followed by their equivalent step number in the following table in square brackets (e.g., [1] for table step 1)

7.3.1 Business Scenario 1: Hospital Surgery

A patient is brought into the Emergency Department with injuries sustained from a traffic accident. The patient has registered and his Health ID is located [1]. (See Business Scenario 2: Patient Brought Into Hospital For Emergency Surgery for the Workflow and associated Business Processes). The patient has been admitted through the ED, and the diagnoses and diagnosis priority has been assessed. The patient is informed of the diagnosis and the need to operate.

Prior to clearing a patient for surgery, a patient consent along with an anesthesia and Medical Consult are required. The patient is provided with the expected post-operative condition as well as patient instructions. Prior to the start of surgery pre-operative diagnostic tests have been ordered [2] and the diagnostic test results have been reviewed [3]. Additionally pre-operative medications had been prescribed and administered. The surgery is performed and the details are documented locally in an Operative Note created by the surgeon, along with Anesthesia and Nursing Notes.

> Note: The pre-operative and post-operative handing of medications is a hospital process which does not require any interoperability. However, documentation such as the Operative Note and Discharge Summaries contain information on the relevant medication administered during the hospital stay

While in recovery, the patient is given post-operative instructions and the expected post-operative condition. Post-operative test Diagnostic orders [4] and post-operative medications are prescribed.

Once the patient is moved out of recovery to a Hospital ward the Operative Note is finalized and made available for sharing through the HIE Document Repository [5]. Prior to the release of the patient a Discharge Summary is created (See Section 4 Discharge Summary Use Case).

TABLE 7.3-3 : HIGH LEVEL BUSINESS PROCESSES FOR A HOSPITAL SURGERY

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Obtain Patient Health Identifier	See Section 8.2.1
2,4	Main Flow	Order Diagnostic Testing	See Section 8.2.3
3	Main Flow	Review Diagnostic Results	See Section 8.2.5
5	Main Flow	Publish Clinical Note Document	See Section 8.1.4

7.3.2 Business Scenario 2: Hospital Surgery with Complications

A patient with type I diabetes who has been on insulin for 20 years is presented to the ED with abdominal pain and vomiting. The patient is registered and his Health ID is located [1]. The pre-operative diagnosis is acute cholecystitis and a decision is made to perform a Laparoscopic Cholecystectomy within the next 24 hours.

The patient is admitted into the surgical ward. A Medical Consult is made to control blood pressure and blood sugar. The appropriate medications are prescribed and given pre-operatively. Prior to clearing the patient for surgery, a patient consent along with an Anesthesia Consult is

required. The patient is provided with the expected post-operative condition as well as patient instructions.

> Note: The pre-operative and post-operative handing of medications is a hospital process. However, documentation such as the Operative Note and Discharge Summaries contain information on the medication administered during the hospital stay.

Upon bringing the patient in for surgery, the patient's Health ID is checked by the nurse, and the operative time in noted. The details of the surgery are documented locally in an Operative Note created by the surgeon, along with Anesthesia and Nursing Notes.

The gall bladder which was full of stones and mud was sent to Histopathology for analysis [2]. The patient was moved to recovery where post-operative instructions for standing Laboratory Orders [3] and an expected post-operative course of 2 days post-operatively are shared with the patient.

Once the patient is moved out of recovery to a hospital ward the Operative Note is finalized and made available for sharing through the HIE Document Repository [4].

On the second day the patient re-develops abdominal pain, distention and vomiting. The attending physician performs a physical examination and orders additional Laboratory and Imaging tests [5]. In reviewing the Laboratory Results Report and Imaging Results Report [6], the diagnosis is a missed Common Bile Duct stone with obstruction.

Another surgical procedure is immediately schedule to relieve the obstruction. Upon bringing the patient in for Surgery, the patient's Health ID is checked by the nurse, and the Operative time in noted. The details of the surgery are documented locally in an Operative Note created by the surgeon, along with Anesthesia and Nursing Notes. The procedure fails, and an additional procedure is performed to repair and relieve the obstruction.

The patient is moved out of recovery to Intensive Care Unit (ICU) for observation, and the second Operative Note is finalized and made available for sharing through the HIE Document Repository [7]. The patient recovers completely and is discharged 5 days post-operatively after a Discharge Summary is created.

TABLE 7.3-4 : HIGH LEVEL BUSINESS PROCESSES FOR A HOSPITAL SURGERY WITH COMPLICATIONS

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Obtain Patient Health Identifier	See Section 8.2.1
2,3,5	Main Flow	Order Diagnostic Tests	See Section 8.2.3
4,7	Main Flow	Publish Clinical Note Document	See Section 8.1.4
6	Main Flow	Review Diagnostic Results	See Section 8.2.5

7.3.3 Business Scenario 3: Hospital Surgery for Unidentified Patient

A patient is brought into the Emergency Department with injuries sustained from a traffic accident. The patient is unconscious, and cannot be identified. Initially the patient is registered with a temporary KSA-wide Health ID [1]. (See Discharge Summary Use Case Business

Scenario 2: Patient Brought Into Hospital For Emergency Surgery for the Workflow and associated Business Processes). The patient has been admitted through the ED, and the diagnoses and diagnosis priority has been assessed without any prior medical history being available. Because of the critical nature of the patient's injuries, the patient is moved directly to surgery.

Using the temporary KSA-wide Health ID, the patient is operated upon (See Operative Note Use Case Business Scenario 1: Hospital Surgery for the Workflow and associated Business Processes). The patient's medical documentation can be reconciled once the patient has been identified.

TABLE 7.3-5 : HIGH LEVEL BUSINESS PROCESSES FOR A HOSPITAL SURGERY

STEP	FLOW	BUSINESS PROCESS	REFERENCE
1	Main Flow	Obtain Patient Health Identifier	See Section 8.2.1
2,4	Main Flow	Order Diagnostic Testing	See Section 8.2.3
3	Main Flow	Review Diagnostic Results	See Section 8.2.5
5	Main Flow	Publish Clinical Note Document	See Section 8.1.4
6	Exception Workflow	Obtain Patient Health Identifier	See Section 4.4.4.1

7.4 PROCESS FLOWS

7.4.1 Process Overview

The Operative Note Business Process Model shown in the figure below is a composite of all of the process flows developed for this Use Case. It has been developed based on analysis of all of the process flows and identified from the Use Case scenarios described above. The diagram below depicts the user roles and the associated activities. Only the Actors directly related to this Use Case are shown in this Process Flow, all of the other Actors are used within the Business Processes.

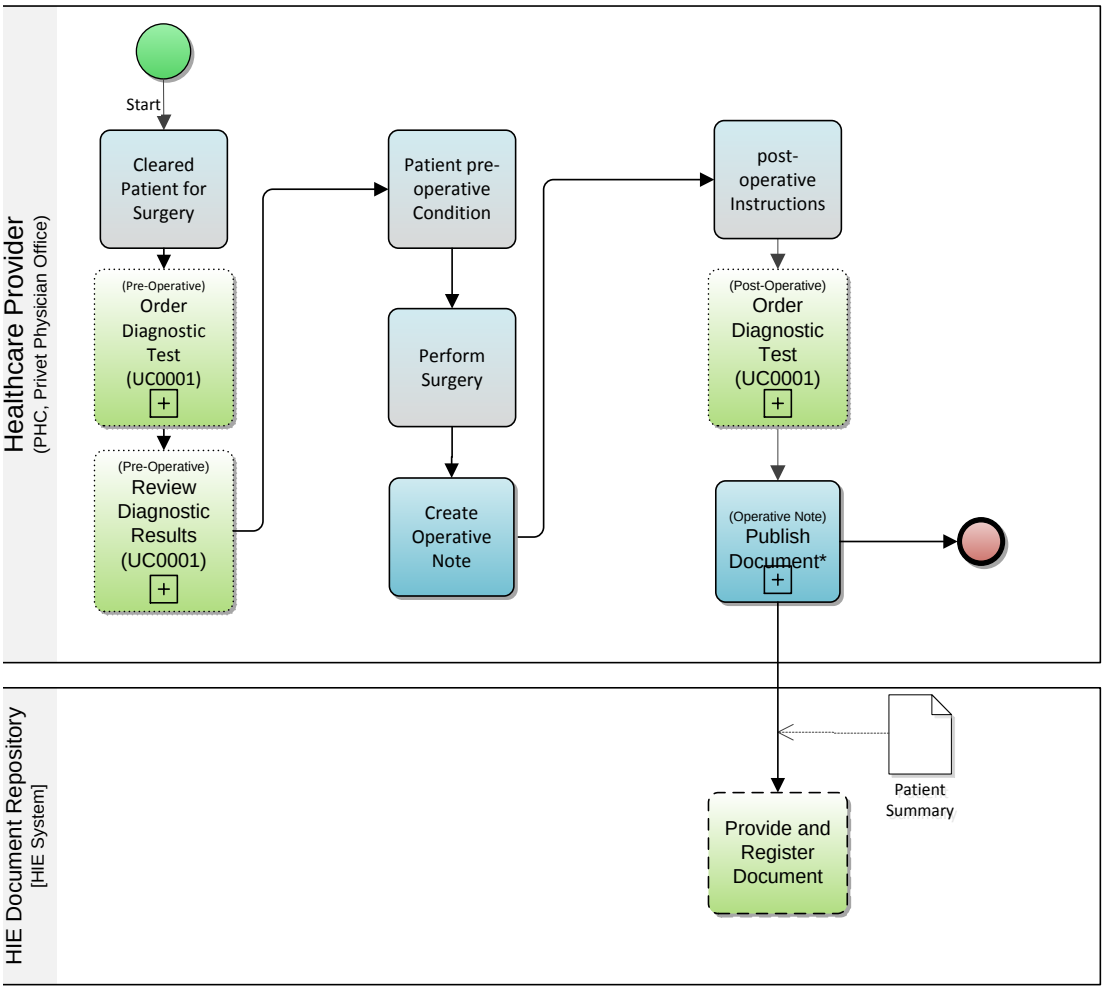


FIGURE 7.4-1 OPERATIVE NOTE COMPOSITE WORKFLOW

7.4.2 Main Flow of Events – Surgery

A patient is admitted to a hospital for surgery. Upon completion of the surgery course, an Operative Note detailing the surgery is published to the HIE Document Repository.

The main flow of events of the Operative Note Use Case is the following:

1. Upon arrival to the hospital, the Healthcare Provider registers the patient and uses the Patient Demographic Consumer Actor (e.g. EHR or HIS) to **obtain the Patient Health Identifier** from the HIE Registry. The patient is cleared for surgery, and the required patient consent, Anesthesia and Medical Consult occur.
2. Using the patient's Health ID, the patient's local clinical data are reconciled with any updated clinical summary data in the HIE Document Repository by using the iEHR Document Source Actor to **retrieve and reconcile clinical data**.
3. As part of the Hospital Stay, pre-operative diagnostic testing, laboratory testing may need to be ordered and reviewed, and medications may need to be administered.

4. Prior to the start of the surgery the patient is provided with the expected post-operative condition as well as patient instructions. The surgery is performed and the details are documented locally in an Operative Note created by the surgeon, along with Anesthesia and Nursing Notes.
5. The patient is moved to recovery, where they are then given post-operative instructions and the expected post-operative condition. The Healthcare Provider and/or the surgeon may then need to post-operatively order diagnostic testing, laboratory testing, and medications.
6. At the conclusion of the surgery the Clinical Note Content Creator Actor will be used to finalize the Operative Note and **publish the Clinical Note document** to the HIE Document Repository so that it is available for sharing. The patient is moved to either a Hospital ward or discharged.

7.4.3 Alternative Flow of Events

7.4.3.1 Additional Surgery

Sometimes surgery will require multiple operations. This may be caused by a failed surgery, or prescribed by the procedure(s) to be performed. An individual Operative Note is created for each surgical encounter.

7.4.3.2 Clinical Note Amendment

The workflow for amending/correcting a Clinical Note is identical to that of a Clinical Summary (See Clinical Summary Amendment). The only difference is the document type being updated.

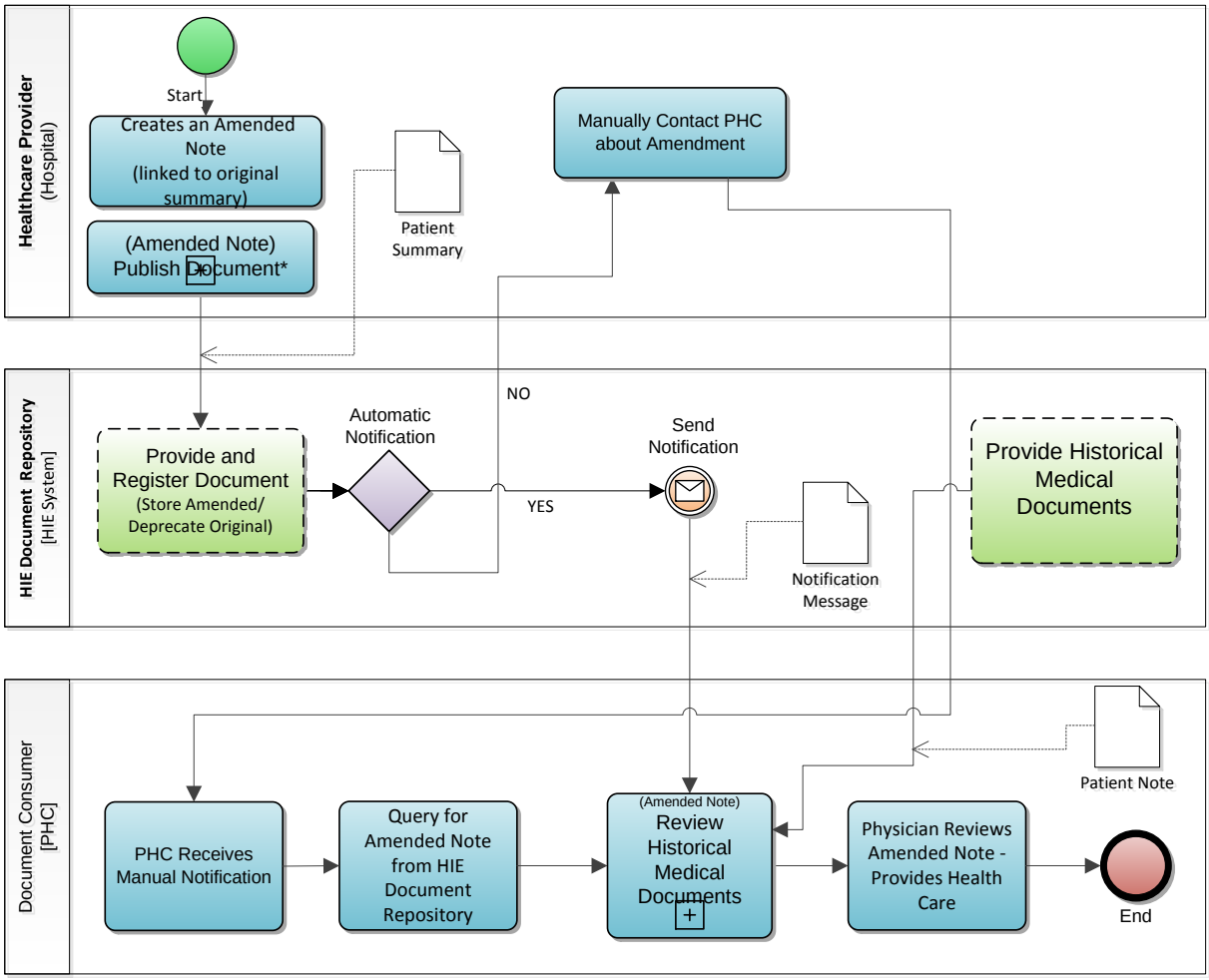


FIGURE 7.4-2CLINICAL NOTE AMENDMENT WORKFLOW

7.4.4 Exception Flows

7.4.4.1 Patient Without KSA-Wide Health ID

See the Exception Flow for the Discharge Summary Use Case Patient Without KSA-Wide Health ID.

7.4.4.2 Patient Death

Upon the death of a patient, the normal workflow for the surgery is terminated and continues as patient death reporting. A Use Case for patient death reporting has not been prioritized for development at this time.

7.5 INFORMATION REQUIREMENTS

The information content of an Operative Note includes a summary of the surgery performed for the purposes of sharing through the HIE Document Repository. Table 7.5-1 Operative Note data content provides a minimum set of information content for an Operative Note.

Operative Note data transmitted includes all new and updated clinical information that occurred during the surgery. For example, when a problem is resolved during the surgery, that problem is marked as resolved and included in the operative note. This is essential to ensure synchronization of clinical data with the HIE Platform.

TABLE 7.5-1 OPERATIVE NOTE DATA CONTENT

OPERATIVE NOTE CONCEPTS	DESCRIPTION	TEXT/ CODED
Source and context information of the Outpatient Encounter Summary		
Patient Demographics	A group of data elements which identify the patient, and provide additional information about them that may be important in the transition of care for a Patient. The following are attributes which have been identified as important: • Health ID • Nationality • Gender • Associated PHC or private physician	Text and Coded
Most Responsible Surgeon	A set of attributes including the name, identifier and contact information for the Most Responsible surgeon. This is the Healthcare Provider who is the legal authenticator of the Outpatient Encounter Summary and who is responsible for the content of the Outpatient Encounter Summary.	Text and Coded
Operative Personnel	The Operative Personnel contains the identifiers and names of the personnel performing the procedures or treatment.	Text and Coded
Problem List	The Problem List contains the problems currently being monitored for the patient, including currently active and recently resolved problems.	Text and Code
Post-Operative Diagnosis	The Post-Operative Diagnosis records the diagnosis or diagnoses confirmed during the procedure.	Text or Coded
Pre-Operative Condition	Observations of problems or other clinical statements captured at the onset of the procedure or treatment, which represents the ongoing process tracked over time.	Text
Post-Operative Condition	Observations of problems or other clinical statements captured at the completion of the procedure or treatment, which represent the ongoing process tracked over time.	Text
Pre-Admission Diagnosis	The Admitting Diagnosis contains a narrative description of the primary reason for the encounter.	Text

OPERATIVE NOTE CONCEPTS	DESCRIPTION	TEXT/ CODED
Devices	Devices is a description of the medical devices apparent on physical exam that have been inserted into the patient, whether internal or partially external.	Text
Acuity	The Acuity Assessment contains a description of the acuity (keenness of vision, thought, etc.) of the patient upon presentation to the encounter.	Text
Type of Procedure	The priority of the surgery (procedure) to be performed (e.g. Emergency (to be performed immediately), Urgent (to be performed as soon as possible), Elective (to be scheduled)).	Coded
Planned Procedure	The Planned Procedures for this encounter include interventional, surgical, diagnostic, or therapeutic procedures or treatments.	Text
Procedures Performed	The Procedures performed for this encounter include interventional, surgical, diagnostic, or therapeutic procedures or treatments.	Text
Additional Procedures Performed	The list of additional Procedures performed beyond those that were planned include interventional, surgical, diagnostic, or therapeutic procedures or treatments.	Text
Operative Course	The Operative Course describes the sequence of events during the course of the procedure or treatment.	Text
Drains	The Drains describe any drains implanted during a procedure.	Text
Estimated Blood Loss	The Estimated Blood Loss describes the amount of blood loss during the procedure.	Text
Anesthesia Type	The Anesthesia Type records the type of anesthesia used (e.g. local or general).	Coded
Fluids	The Fluids record information about the in-take or out-take of fluids during the procedure.	Text
Transfusion	The Transfusion records information on any transfusions done during the procedure.	Text
Complications	The Complications record information on any issues that arose during the procedure.	Text
Findings	The Findings is a narrative description of any observations made during the time of the procedure or the treatment.	Text
Specimens	Specimens describe any samples or pathology obtained for Laboratory Testing during the surgery.	Text
Operative Duration	The Operative Duration is the length of time the procedure/treatment took. (timestamp)	Text
Operative Time In/Out	The Operative Time In/Out is the time from when the patient is brought into OR to the time they are taken to recovery. (timestamp)	Text

OPERATIVE NOTE CONCEPTS	DESCRIPTION	TEXT/ CODED
Preparation	The Preparation describes what was done to the patient to prepare them for the procedure/treatment.	Text
Post-Operative Instructions	The Post-Operative Instructions describe surgeon's directives and education for the patient post-surgery.	Text
Post-Operative Orders	The Follow-up Orders contain a list of Diagnostic Imaging, Laboratory and other Orders which need to done after the procedure or treatment is complete.	Text

8. 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.

8.1 CLINICAL NOTES AND SUMMARIES BUSINESS PROCESSES

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

How patient clinical documents, including laboratory reports, are rendered to the physician is the responsibility of the local application such as a HIS or PHC. This is outside the scope of this Use Case.

8.1.1 Retrieve and Reconcile Clinical Data

The user can **Retrieve and Reconcile Clinical Data** using the Clinical Content Consumer to retrieve all of the iEHR Summaries that have been created since the time of last publication of a document to the HIE Document Repository. The data within these summaries are then reconciled by the Healthcare Provider into the local system. The purpose of this step is to ensure that any updates to the patient's record occurring from the outside appear within the local system.

The main flow of events of the **Retrieve and Reconcile Clinical Data** Business Process is:

1. The Clinical Content Consumer uses the Query/Retrieve Document(s) Service to retrieve the Document Metadata for the last clinical summary document from the HIE Document Repository.
2. If an iEHR Summary has not been published since the last time a clinical summary document was sent to the HIE Document Repository, the iEHR Document Source is requested to generate a new iEHR Summary using the iEHR On-Demand Summary Service. Using the Query Existing Data Service, the iEHR Document Source retrieves the discrete clinical data from the Clinical Data Repository, and then creating a new instance of an iEHR Summary.
3. The Clinical Summary Content Creator then uses the Publish Document Service to send the new iEHR Summary to the HIE Document Repository.
4. The Clinical Content Consumer uses the Query/Retrieve Document(s) Service to retrieve all of the iEHR Summaries that have been generated since the last time a clinical summary document was published by the local system from the HIE Document Repository.
5. The Clinical Content Consumer uses all of the iEHR Summaries to reconcile the clinical data provided in the iEHR Summaries with the data in the local system using the Reconciliation Service.

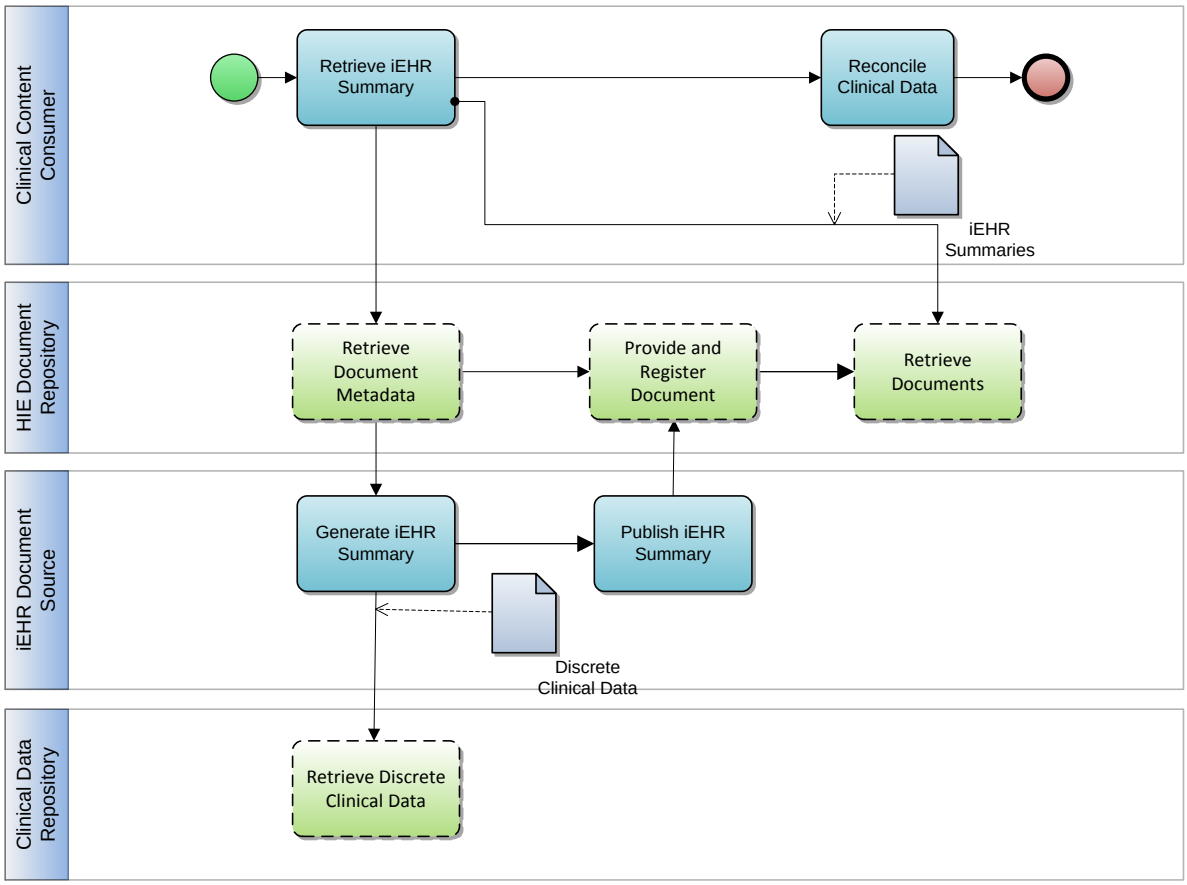


FIGURE 8.1-1 REVIEW AND RECONCILE CLINICAL DATA WORKFLOW

8.1.2 Review Historical Medical Documents

The user can **Review Historical Medical Documents** using the Composite Clinical Content Consumer Actor from the local EHR or EMR Systems or query the HIE Document Repository using the KSA-Wide Health ID to query and retrieve relevant documents.

The user can review a number of different documents from the HIE Document Repository as needed to provide appropriate patient care including:

- Laboratory results
- Imaging results
- Imaging studies
- Clinical notes and summaries
- Immunization history
- Medications

. Specific references describing how to access each of the individual clinical documents can be found in Table 8.1-1 : Review Historical Medical Documents Business Processes.

Note: The **Review Historical Medical Documents** is a composite of several Business Processes. The review of each type of clinical document requires the use of the Business Process for the individual type of clinical document.

Error! Reference source not found. below depicts the workflow associated with the **Review Historical Medical Documents**, while Table 8.1-1 : Review Historical Medical Documents Business Processes lists all of the Business Processes associated with the **Review Historical Medical Documents** Business Process.

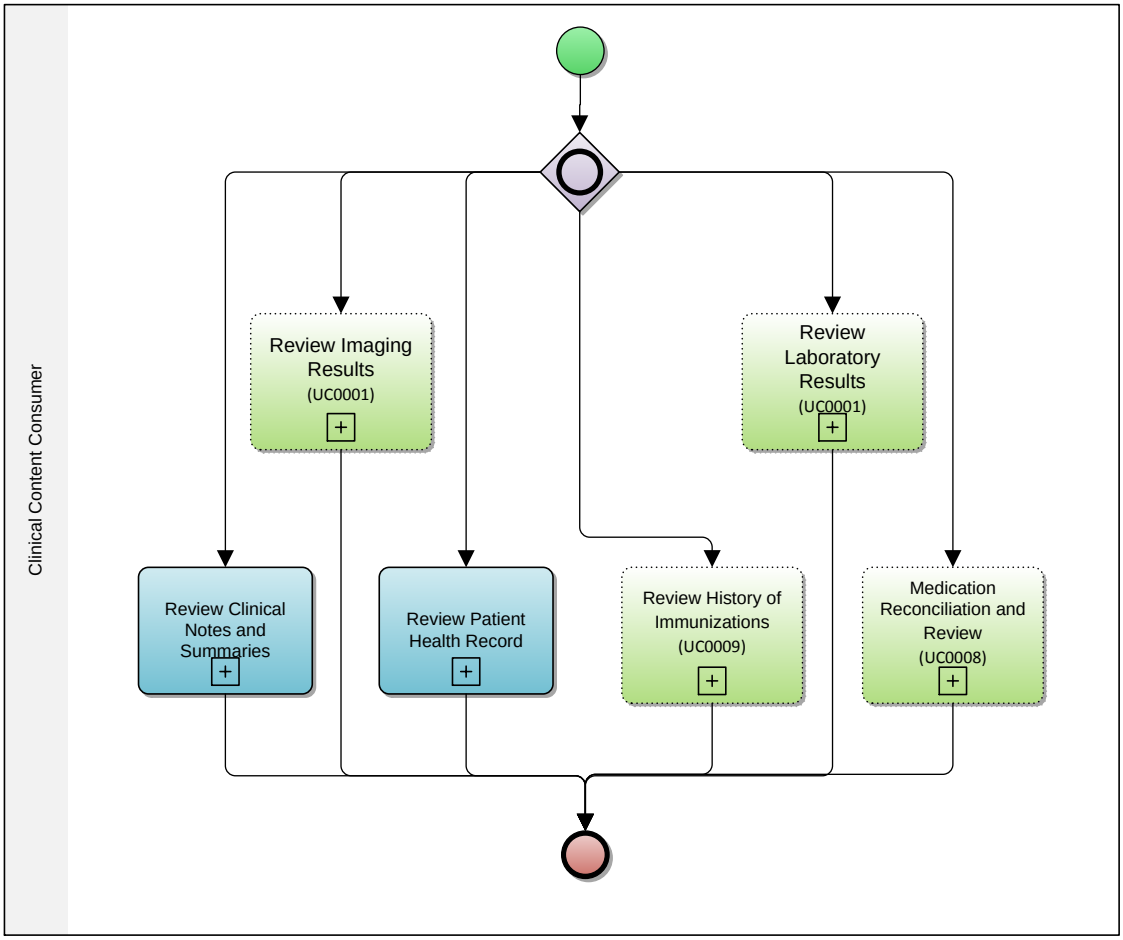


FIGURE 8.1-2 REVIEW HISTORICAL MEDICAL DOCUMENTS WORKFLOW

TABLE 8.1-1 : REVIEW HISTORICAL MEDICAL DOCUMENTS BUSINESS PROCESSES

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

BUSINESS PROCESS	REFERENCE
Review Clinical Notes and Summaries	UC0007 Saudi eHealth Interoperability Use Case for Clinical Notes and Summaries: Review Clinical Notes and Summaries (this document)
Review Patient Health Record	UC0007 Saudi eHealth Interoperability Use Case for Clinical Notes and Summaries: Review Clinical Notes and Summaries (See Review Clinical Notes and Summaries)
Review History of Immunizations	UC0009 Saudi eHealth Immunization Interoperability Use Case
Medication Reconciliation and Review	UC0008 Saudi eHealth Medication Interoperability Use Case

8.1.3 Publish Clinical Summary Document

This Business Process is initiated by the user to Publish a Clinical Summary Document to the HIE Document Repository for the purpose of sharing. The main flow of events for publishing a clinical summary document is:

1. The Healthcare Provider (e.g. physician) completes and signs the summary document on the local Information System (e.g. HIS, EHR, EMR).
2. This triggers the production of the appropriate summary document by the Clinical Summary Content Creator. The Clinical Summary Content Creator is responsible for preparing the Clinical Summary document for storage in the HIE Document Repository (including such requirements as the addition of the document metadata).
3. The Clinical Summary Content Creator then uses the Publish Document Service to send the clinical summary document to the HIE Document Repository.
4. Based upon the user's request (within the Clinical Summary document), the HIE Document Repository sends a notification to other users interested in new or updated documents.

Figure 8.1-3 Process to publish a Clinical Summary document below depicts the process for **Publish Clinical Summary Document**.

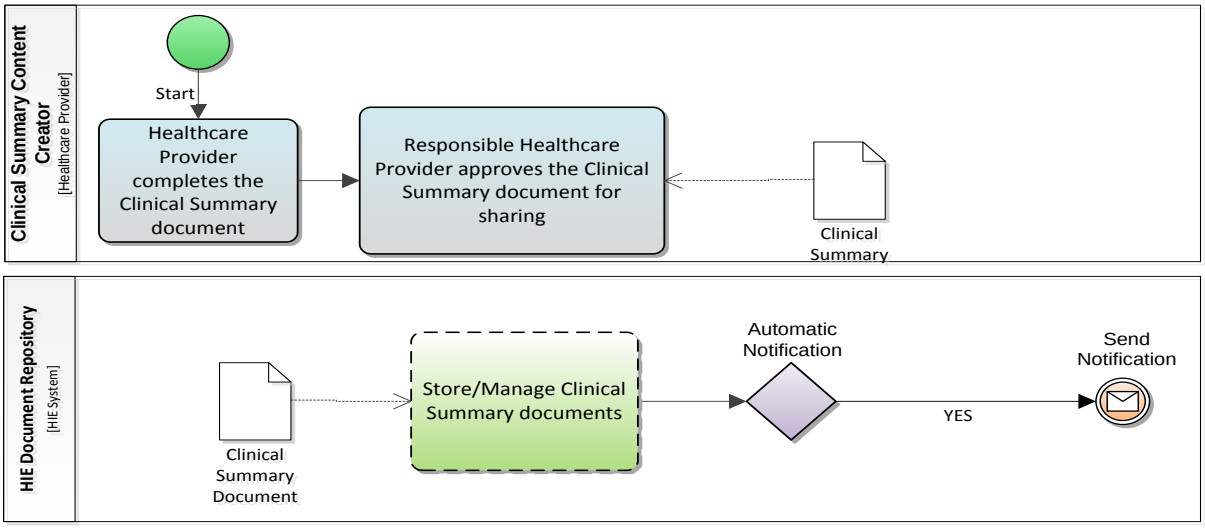


FIGURE 8.1-3 PROCESS TO PUBLISH A CLINICAL SUMMARY DOCUMENT

8.1.4 Publish Clinical Note Document

This business process is initiated by the user to Publish a Clinical Note Document to the HIE Document Repository for the purpose of sharing. The main flow of events for publishing a clinical note document is:

1. The Healthcare Provider (e.g. physician) completes and signs the clinical note document on the local Information System (e.g. HIS).
2. This triggers the production of the appropriate clinical note document by the Clinical Note Content Creator. The Clinical Note Content Creator is responsible for preparing the clinical note document for storage in the HIE Document Repository (including such requirements as the addition of the document metadata).
3. The Clinical Note Content Creator then uses the Publish Document Service to send the clinical note document to the HIE Document Repository.
4. Based upon the user's request (within the clinical note document), the HIE Document Repository sends a notification to other users interested in new or updated documents.

Error! Reference source not found. below depicts the process for **Publish Clinical Note Document**.

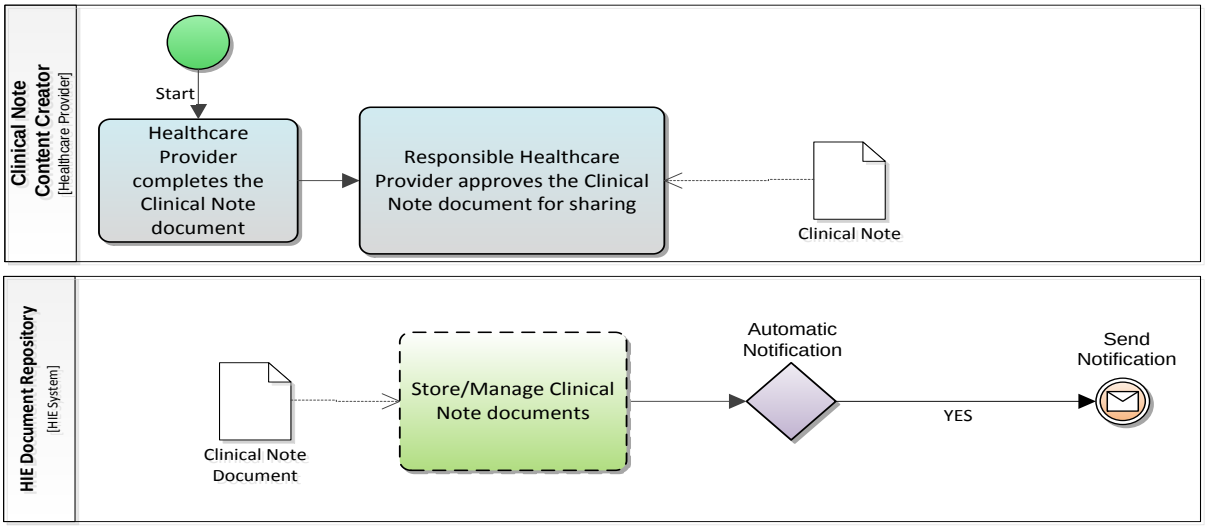


FIGURE 8.1-4 PROCESS TO PUBLISH A CLINICAL NOTE DOCUMENT

8.1.5 Review Clinical Notes and Summaries

The user can **Review Clinical Notes and Summaries documents** using the Clinical Content Consumer Actor from the local EHR or EMR Systems or query the HIE Document Repository using the KSA-Wide Health ID to query and retrieve relevant clinical notes and summaries documents as well as Patient Health Records (iEHR Summaries).

Figure 8.1-5 Process to review clinical notes and summariesbelow depicts the workflow associated with the **Review Clinical Notes and Summaries documents.** The Clinical Notes and Summaries documents returned from the HIE Document Repository are based upon the query parameters. Table 8.1-2 Query Parameters for Clinical notes and summaries provides a list of query parameters typically used to retrieve Clinical Notes and Summaries.

TABLE 8.1-2 QUERY PARAMETERS FOR CLINICAL NOTES AND SUMMARIES

QUERY CONCEPTS	DESCRIPTION	TYPE
Patient KSA-wide Health ID	Clinical Notes and Summaries documents may be returned for a particular patient by providing the Patient KSA-wide Health ID. Note: For Clinical applications, the patient KSA-wide Health ID is required.	ID
Date Range	Clinical Notes and Summaries documents may be returned for a specific time period by providing a start (earliest) and end (latest) date.	Timestamp
Document Type	The specific type of Clinical Notes and Summaries documents which may be returned include: Discharge Summary, Outpatient Encounter Summaries, Maternal Discharge Summary, Newborn Discharge Summary, Operative Note Patient Health Record and iEHR Summary.	Code

QUERY CONCEPTS	DESCRIPTION	TYPE
Specialty	Clinical Notes and Summaries documents created by a Healthcare Provider with a specific specialty (e.g. Surgery, Obstetrics & Gynecology) may be returned.	Code
Healthcare Provider and/or Organization	Clinical Notes and Summary documents created by a Healthcare Provider and or Organization may be returned.	ID
Practice Setting	Clinical Notes and Summary documents created by a specific Organization Provider Type (e.g. Clinic, General Hospital, Day Surgery Centers) may be returned.	Code

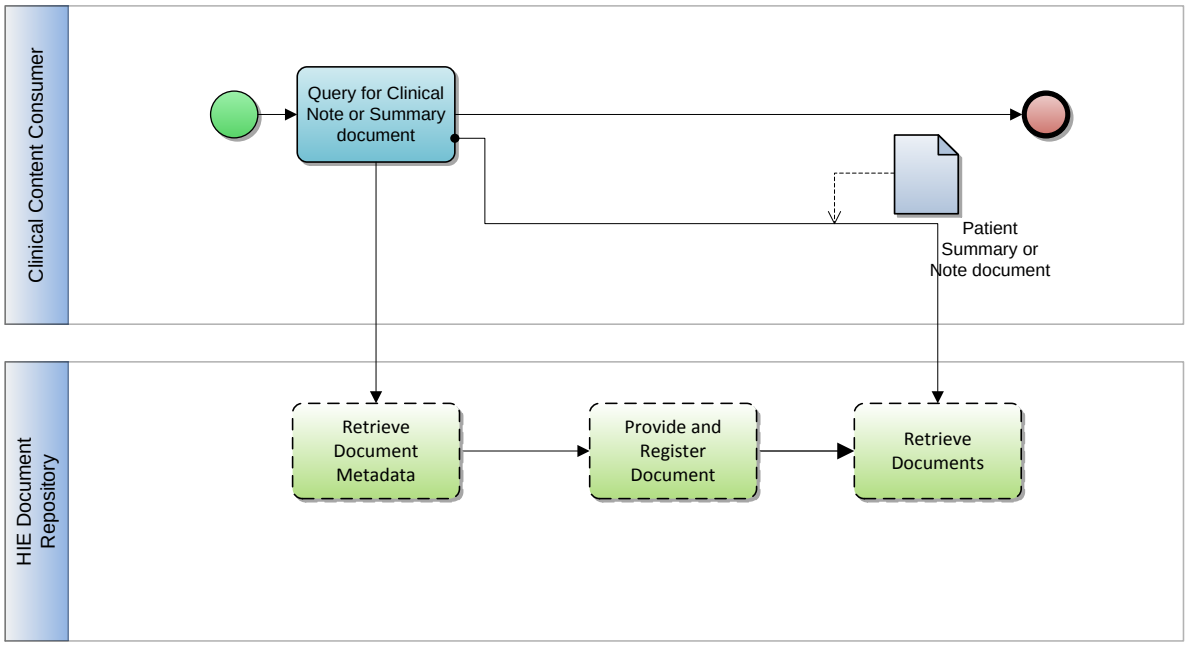


FIGURE 8.1-5 PROCESS TO REVIEW CLINICAL NOTES AND SUMMARIES

8.2 EXTERNAL BUSINESS PROCESSES

The following Business Processes are referenced in the Clinical Notes and Summaries Use Cases, but are defined in other Use Cases.

8.2.1 Obtain Patient Health Identifier

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

TABLE 8.2-1 OBTAIN PATIENT HEALTH IDENTIFIER

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

8.2.2 Identify Baby

This Business Process is initiated to retrieve the newborn's identification to use with the HIE Platform. Since no Health ID exists for a newborn, new Health ID needs s to be created as part of the process of identifying a newborn within the HIE Platform. The information which is required to create the new Health ID includes the following: Mother's Health ID, Date of Birth, Gender, Birth Order, and local Hospital Identifier. In order to query/retrieve any information (e.g. documents, images) for the newborn from the HIE Platform it is first necessary to **Identify Baby** using Patient Demographic Consumer Actor.

TABLE 8.2-2 IDENTIFY BABY

BUSINESS PROCESS	REFERENCE
Identify Baby	*UC0001 Saudi eHealth Patient Identification Interoperability Use CaseCase*

8.2.3 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 Document Repository.

TABLE 8.2-3 SHARED ORDER DIAGNOSTIC TESTING

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

8.2.4 Order Laboratory Test

See Section Order Diagnostic Testing

8.2.5 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 Document Repository. 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 Document Repository:

TABLE 8.2-4 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

8.2.6 Review Laboratory Results

See Section Review Diagnostic Results

8.2.7 Review Imaging Results

See Section Review Diagnostic Results

8.2.8 Review History of Immunizations

This Business Process is initiated to **Review History of Immunizations** for a given patient. The history of a patient's immunization are stored within the HIE Platform and may be queried and retrieved from the HIE Platform using the Composite Clinical Content Consumer Actor.

TABLE 8.2-5 HISTORY OF IMMUNIZATIONS

BUSINESS PROCESS	REFERENCE
Review History of Immunizations	*UC0009 Saudi eHealth Immunization Interoperability Use Case*

8.2.9 Medication Reconciliation and Review

This Business Process is initiated to **Medication Reconciliation and Review** for a given patient. When a request is made to review the medication list for a patient, the list of medications on the HIE Platform must be first obtained and then provided for reconciliation and review by the Composite Clinical Content Consumer Actor.

TABLE 8.2-6 MEDICATION RECONCILIATION AND REVIEW

BUSINESS PROCESS	REFERENCE
Medication Reconciliation and Review	*UC0008 Saudi eHealth Medication Interoperability Use Case*

8.2.10 Prescribe Medication

This Business Process is initiated to **Prescribe Medication** for a given patient. This Business Process does not apply to medications prescribed within a hospital stay. A request is made to prescribe medication by the Prescriber Actor.

TABLE 8.2-7 PRESCRIBE MEDICATION

BUSINESS PROCESS	REFERENCE
Prescribe Medication	*UC0008 Saudi eHealth Medication Interoperability Use Case*

8.2.11 Immunization Process

This Business Process is initiated to administer the **Immunization Process** for a given patient. This Business Process is contained within *UC0009 Saudi eHealth Immunization Interoperability Use Cases* with the exception of the recording of the vaccination which is performed by the Clinical Summary Creator Actor.

TABLE 8.2-8 IMMUNIZATION PROCESS

BUSINESS PROCESS	REFERENCE
Immunization Process	*UC0009 Saudi eHealth Immunization Interoperability Use Case*

8.2.12 Referral Request

This Business Process is initiated to start a **Referral Request** for a given patient. The purpose of the referral request is to enable healthcare providers and facilities to electronically refer patients to specialists or healthcare facilities. Some examples include referrals from PHCs to Outpatient Department specialist or to a hospital. A Referral Request is made using the Referral Requestor Actor.

TABLE 8.2-9 REFERRAL REQUEST

BUSINESS PROCESS	REFERENCE
Referral Request	*UC0010 Saudi eHealth eReferral and eTransfer Interoperability Use Case*

8.2.13 Transfer Request

This Business Process is initiated to start a **Transfer Request** for a given patient. The purpose of the transfer request is to enable healthcare providers and facilities to electronically transfer patients to other healthcare facilities. Some examples include transfers to another hospital or to a nursing home. A transfer request is made using the Transfer Requestor Actor.

TABLE 8.2-10 TRANSFER REQUEST

BUSINESS PROCESS	REFERENCE
Transfer Request	*UC0010 Saudi eHealth eReferral and eTransfer Interoperability Use Case*

9. SERVICES

9.1 SERVICE DESCRIPTION

The Services defined in this Use Case are described in Table 9.1-1 Services

TABLE 9.1-1 SERVICES

SERVICE NAME	SERVICE USE
Publish Document(s)	Used by the Clinical Content Summary Creator and Clinical Content Note Creator to create and manage the clinical notes and summaries in the HIE Document Repository and to request that it stores these documents and registers their metadata.
Query/Retrieve Document(s)	Queries the HIE Document Repository for information about documents stored and indexed in a registry. This also includes the retrieval of one or more documents.
Notification of Document Availability	Provided by the HIE Document Repository to notify a Clinical Document Consumer Actor of a clinical note or summary of interest that is available to be retrieved.
Reconciliation	Supports the synchronization of the clinical data between the HIE Platform and Clinical Content Consumer actors.
iEHR On-Demand Summary	Generates dynamic summaries of clinical data (iEHR Summaries) based upon the clinical documents in the HIE Document Repository.
Query Existing Data	Supports retrieval of detailed clinical data for a patient from the Clinical Data Repository.

9.1.1 Pre-Conditions

Table 9.1-2 Pre-Conditions identifies pre-conditions for this Use Case.

TABLE 9.1-2 PRE-CONDITIONS

ACTOR NAME	SERVICES	DESCRIPTION
All Actors	Patient Demographic Query	It is expected that all services initiated or provided by this actor operate in accordance with the Saudi eHealth Interoperability Polices and Interoperability Specifications.
Clinical Summary Content Creator	Publish Document(s)	Patients without KSA-Wide Health IDs will need to have temporary KSA-Wide Health IDs issued In order to store Clinical Summaries. Patients without KSA-Wide Health ID are excluded and expected to be stored locally, such as in the local Electronic Medical Record system.
Clinical Note Content Creator	Publish Document(s)	Patients without KSA-Wide Health IDs will need to have temporary KSA-Wide Health IDs issued In order to store Clinical Notes. Patients without KSA-Wide Health ID are excluded and expected to be stored locally, such as in the Local Hospital Information system.

ACTOR NAME	SERVICES	DESCRIPTION
Clinical Content Consumer	Query/Retrieve Document(s)	How the Clinical notes and summaries are rendered to the physician is outside of the scope of the use Case. Local applications are responsible to process coded clinical notes and summaries data, filter the subset of interest to health professional and provide a user friendly layout in context with other information needed to deliver care.
Clinical Content Consumer	Reconcile Clinical Data	Original Identifiers are maintained on import to the local system.
Clinical Data Content Consumer	Query/Retrieve Document(s)	How the Clinical notes and summaries are rendered to the physician is outside of the scope of the use Case. Local applications are responsible to process coded clinical notes and summaries data, filter the subset of interest to health professional and provide a user friendly layout in context with other information needed to deliver care.
Clinical Data Repository	Query Existing Data	Clinical data are extracted from clinical documents into the Clinical Data Repository after publication.
iEHR Document Source	Publish Document(s)	An iEHR Summary is only created if new data has been provided since the last iEHR Summary was produced.

9.1.2 Post-Conditions

Table 9.1-3 Post Conditions identifies post-conditions for this Use Case.

TABLE 9.1-3 POST CONDITIONS

ACTOR NAME	SERVICES	DESCRIPTION
HIE Document Repository	Query/Retrieve Document(s)	Clinical Notes and Summary documents are available for access throughout the national HIE Platform.
HIE Document Repository	Notification of Document Availability	The Clinical Data Repository is notified whenever a new document is submitted that is not an iEHR Summary. In addition, Clinical Data are extracted from clinical documents into the HIE Document Repository upon receipt of notification.
Clinical Data Repository	Notification of Document Availability	Clinical Data are extracted from clinical documents into the Clinical Data Repository upon receipt of notification.

9.1.3 Assumptions and Dependencies

Table 9.1-4 Use Case Dependencies identifies and describes Use Cases which this Use Case depends upon for information workflow.

TABLE 9.1-4 USE CASE DEPENDENCIES

USE CASE NAME	DEPENDENCY ASSUMPTIONS
KSA-Wide Patient Demographic Query	Used to obtain a Health ID and demographic attributes for the patient the laboratory test is being performed. It is used to provide consistent data in the report header (i.e. consistent with all patient health record documents). This includes the creation of a new Health ID in the case of a newborn or a legal patient without a Health ID (e.g. a visitor, a citizen's first-time visit), or a temporary Health ID in the case of an unidentified patient.
Healthcare Provider Directory Query	Obtains provider and organizational information. It may be used to identify ordering physicians and organizations and also laboratory personal and laboratory organization information.
Coded Laboratory Orders	Manages the laboratory ordering process that resulted in sharing of a laboratory report. Note: A laboratory report may be generated without an electronic order (i.e. manual paper order).
Sharing Coded Laboratory Results	Upon the completion of the order, the performing laboratory generates a Lab Report which is shared and communicated to the order creator using the Sharing Coded Laboratory Results Use Case. Note: A laboratory report may not be generated if the order was canceled or aborted. The Sharing Coded Laboratory Results may also be used by the performing laboratory to access relevant prior laboratory tests results.
Sharing Images and Imaging Reports	Creates and stores the images acquired and to be interpreted in responding to the tele-radiology order as well as the imaging report resulting from this tele-radiology order. It also is used to pull prior related images and imaging reports for review.
eReferral and eTransfer	Enables Healthcare Providers and facilities to electronically refer and/or transfer patients to other healthcare facilities.
Medications	The Medication Use Cases ePrescription" and eDispensation" provide the recording of prescription and dispensation in electronic form in order to improve patient care through Healthcare Provider access to medication information of the patient

9.1.4 Special Requirements

To ensure accurate and complete data are in the Clinical Data Repository, each local system must maintain the identity of the clinical data items it imports. Clinical item reconciliation must be performed by healthcare provider at the beginning of the encounter. At the end of an encounter, any relevant clinical item which has been newly created during the encounter, and any pre-existing whose state was updated (e.g., a medication discontinued, a problem resolved) must be reported.

The Clinical Data Repository maintains integrity based on the date of modification of the clinical data item, not on the date of publication of that item. This prevents cases where a failed update or

delayed publication of an earlier clinical note or summary would overwrite more recent and more accurate data.

10. REFERENCED DOCUMENTS AND STANDARDS

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

TABLE 10-1 REFERENCED DOCUMENTS

DOCUMENT OR STANDARD	DESCRIPTION
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.
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.
UC0002 Saudi eHealth Provider Identification Interoperability Use Case	This Use Case describes the ability to access information about health professionals and the organizations where they practice. This information is centrally managed by a national healthcare provider directory; the directory which supports searches for providers and organizations and conveys authoritative attributes related to them. This information describes organizations that provide patient care, such as public and private hospitals, primary care centers, laboratories, pharmacies, etc. It is used by these organizations and by the MOH business applications.
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.
UC0008 Saudi eHealth Medication Interoperability Use Case	The Medication Use Cases "Prescription" and "Dispensation" provide the recording of prescription and Dispensation in electronic form in order to improve patient care through Healthcare Provider access to medication information of the patient. 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 as well as a set of high-level functional requirements. Standards and Profiles supporting these Use Cases are documented in the Saudi Interoperability Specification and Interoperability Policies.

DOCUMENT OR STANDARD	DESCRIPTION
UC0009 Saudi eHealth Immunization Interoperability Use Case	Specifies the Immunization Use Case supporting the collection and reporting of immunizations to the public health system, along with support for the associated vaccination monitoring. The immunizations are informed by the vaccination history, the patient clinical condition, the immunization schedule defined by MOH, and the assessment of vaccinations due as determined by MOH. Education and the vaccination record, including the immunizations provided and due dates for pending immunizations is provided to the patient to document and to set expectations for the child's immunization needs.
UC0010 Saudi eHealth eReferral and eTransfer Interoperability Use Cases	The Saudi eHealth 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 all applicable 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.

11. APPENDIX A – CLINICAL USE CASES CREATED IN WORKSHOP

During the Clinical Notes and Summaries Use Case Development Workshop the Stakeholders were divided up into diverse teams in order to develop Clinical Use Cases surrounding the creation and use of the Discharge and Encounter Summaries as well as the Operative Note. Each group concentrated on a different Clinical Use Case – Primary Care Encounter, Maternal and Newborn Discharge Summaries with an Operative Note when surgery was needed. The groups were asked to start with a simple straightforward Clinical Use Case and then add complexity to the cases. This section reflects the raw Clinical Use Cases which were developed during the Workshop. They were used extensively in the development of the Clinical Notes and Summaries Use Case.

As part of the analysis of the Clinical Use Cases, several components of the Clinical Use Cases have been diagramed. These include:

Activities relevant to a business scenario have been highlighted through the use of underlining. For example: The patient was identified, along with their PHC.

Documents relevant to a Clinical Use Case have been highlighted through the use of bolded double underlined. For example: **Discharge Summary**.

Clinical data elements within the Clinical Use Case through the use of bolding. For example: **CHIEF CLINICAL COMPLAINT**

11.1 ENCOUNTER SUMMARY WITH REFERRAL

The following Clinical Use Case was created to highlight an ***Encounter Summary*** with a referral.

11.1.1 Background

2 month old infant brought to PHC.

REASON FOR VISIT: routine vaccination. To review this patient past medical history the Patient KSA-Wide Health ID was used to lookup

NEWBORN DISCHARGE SUMMARY: Newborn Discharge Summary,

IMMUNIZATION: history of vaccination,

LABORATORY RESULTS: prior lab results as the mother gave a history of neonatal jaundice.

11.1.2 Creation of the Encounter Summary

We needed to record the current encounter as an

ENCOUNTER SUMMARY since we found patient to be

PRIMARY DIAGNOSIS: *febrile and jaundiced*.

Laboratory tests were ordered and performed to check her CBC (Complete Blood Count) & LFT (Liver Function Test).

LABORATORY RESULTS REPORT revealed increased WBC (White Blood Count) & TSB (Total Serum Bilirubin).

We wrote **REFERRAL** to a pediatrician in nearby hospital.

11.2 MATERNAL AND NEWBORN DISCHARGE SUMMARY

The following Clinical Use Case was created to highlight the discharge of a Mother and her child after a normal pregnancy and delivery. Two Clinical Discharge Summary documents are created as a result of this episode, a ***Maternal Discharge Summary*** and a ***Newborn Discharge Summary***.

11.2.1 Background

A 26 year old Saudi mother is presented to the Labor ward at Hospital X with **CHIEF COMPLAINT:** Labor Pains.

PREGNANCY HISTORY: she is primigravida (first pregnancy) with 38 weeks pregnancy by dates.

ENCOUNTER SUMMARIES: She is a booked case with 3 antenatal visits in hospital Y and three antenatal visits in Hospital Z.

LABORATORY RESULTS REPORT worked up at Hospital X showed a blood group of B positive, negative Hepatitis B surface antigen status and negative TORCH. A **RADIOLOGY IMAGING REPORT** reports that an Ultrasound done at 30 weeks in Hospital Z showed a single viable fetus with no congenital anomalies and adequate liquor.

PAST MEDICAL/SURGICAL HISTORY no complications during this pregnancy and no history of exposure to any teratogens.

11.2.2 Creation of the Maternal Discharge Summary

Mother was admitted to the Delivery Room from the Emergency Department.

DIAGNOSIS: active Labor.

VITAL SIGNS: vitals were normal.

ASSESSMENT: clinically she was assessed to be carrying a term pregnancy.

RADIOLOGY IMAGING REPORT - an ultrasound done in the ED showed 38 week pregnancy, cephalic presentation, with adequate liquor.

LABORATORY RESULTS REPORT showed Complete Blood Counts, Bleeding Profile, and Blood glucose was normal.

A CTG (cardiotocogaph) done showed normal reactive fetal heart rate.

In the Delivery Room, she progressed normally

DELIVERY OUTCOME: delivered a baby boy on Feb 02-2013 at 6 pm

MODE OF DELIVERY: normal spontaneous vaginal delivery.

PROCEDURES PERFORMED: right mediolateral episiotomy done

ANESTHESIA TYPE: local anesthesia.

She was shifted to the postnatal ward after two hours.

HOSPITAL COURSE: Her immediate postpartum period was uneventful.

DISCHARGE DESTINATION: discharged home after 24 hours.

DISCHARGE CONDITION: in good general condition.

11.2.3 Creation of the Newborn Discharge Summary

Baby boy delivered on Feb 02-2013 at 6pm.

ASSESSMENT: Baby cried immediately. Required routine newborn care in the delivery room.

APGAR: was 8,9,9 at 1,5,10 minutes respectively.

PHYSICAL EXAMINATION: Anthropometry was weight -3kg, Head circumference- 35cm, Length-50cm. Examination revealed a healthy term baby and normal head to toe examination.

VITAL SIGNS: normal vitals

Lab work up done for the baby -- CBC-normal, Blood group- B positive, Direct Coombs-negative,

LABORATORY ORDER: Cord blood sent for TSH (Thyroid-Stimulating Hormone) (results awaited),

NEWBORN SCREENING: heel prick blood spot for Newborn Screening Program obtained on filter paper and sent (results awaited).

IMMUNIZATIONS: Baby received vaccination - BCG (Bacillus Calmette–Guérin) vaccination and Hepatitis B vaccine.

DISCHARGE/BABY'S DISCHARGE CONDITION: Both mother and baby were discharged after 24 hours.

DISCHARGE INSTRUCTIONS: Parents were given Immunization card, Birth Notification, given

FOLLOW-UP ORDERS: after one week in the PHC for the baby and to follow up the results of the screening tests.

RECOMMENDATIONS/PLAN OF CARE: (Mother received

DISCHARGE INSTRUCTIONS: education about breast feeding, immunization and routine newborn care.)

11.3 MATERNAL AND NEWBORN DISCHARGE SUMMARY WITH COMPLICATIONS

The following Clinical Use Case was created to highlight the discharge of a Mother and her child after delivery complications. Two Clinical Discharge Summary documents are created as a result of this episode, a ***Maternal Discharge Summary*** and a ***Newborn Discharge Summary*** as well as an ***Operative Note*** for the Mother's delivery.

11.3.1 Background

A 29 yr. old Saudi female was brought to ED by ambulance after a RTA (Roadside Traffic Accident). She had been travelling on a highway with her family from Jeddah where she was living with her husband, who is an army officer, and her 2 daughters (all were involved in the accident) on their way to visit her family in Duba city.

It was difficult at first to provide any legal identification since the husband was severely injured; however, after nearly one hour the police men were able to bring the family card **(NATIONAL HEALTH ID)** from the crashed car. The 2 daughters were mostly unaffected, but they were so worried and afraid that after the completion of the physical examination they were allowed to speak to their mother, and reassured about their father. They were then delivered to social workers.

11.3.2 Creation of a Maternal Discharge Summary with Surgical Needs (Operative Note)

In the Main ED the Mother was

VITAL SIGNS: vitally stable

PROBLEM LIST: severe abdominal pain and multiple abrasions and bruises on face, chest and both arms.

CHIEF COMPLAINT: she was in her 32nd week pregnancy and that she has vaginal bleeding.

PHYSICAL EXAMINATION: examined her and decided that she needs no surgical interference at the moment, but she may need urgent obstetric care since she was having severe vaginal bleeding.

Blood samples were sent to blood bank for urgent blood grouping and cross matching for 4 units, and for routine laboratory preoperative investigation. Bedside tests showed a RBS (Random Blood Sugar) of 115 mg.

FLUIDS: An IV line was opened, a urinary catheter was fixed and IV fluids were running.

The patient was then urgently shifted to DR (Diagnostic Radiology) where a

RADIOLOGY IMAGING REPORT of an ultrasound confirmed a partial abruptio placenta and fetal distress.

CTG (Cardiograph) showed regular uterine contractions and fetal bradycardia.

During the ultrasound she began to be

PRE-OPERATIVE CONDITION: tachycardia and apprehensive, and the pp (pulse pressure) was falling, but luckily

TRANSFUSION: 2 units of blood were ready at that time and a blood transfusion was started. Meanwhile the patient was

TYPE OF PROCEDURE: urgently shifted to OR (emergency)

PLANNED PROCEDURE: urgent CS (Cesarean section) without waiting for any lab results.

PROCEDURE PERFORMED/MODE OF DELIVERY: lower segment CS where the baby and placenta were extracted,

OPERATIVE COURSE: the wound was stuttered as usual and the surgery passed uneventfully.

The Mother was moved to the obstetrics' ward for the post-operative period. The mother

POST-OPERATIVE CONDITION: did well.

POST-OPERATIVE INSTRUCTIONS: NPO (Nothing by Mouth) and received only IV Fluids over the night.

POST-OPERATIVE MEDICATIONS: prophylactic heparin dose and gradual feeding was tolerated the next day. The urine catheter was removed and early ambulation was encouraged by nursing staff.

The Laboratory results were collected from the

LABORATORY RESULTS REPORT and showed her liver & renal functions to be normal, she was negative for HB (Hepatitis B) and HC (Hepatitis C) and HIV (Human Immunodeficiency virus)

RH FACTOR: blood group A+ve.

By the third day the wound was dry and clean, the mother received
RECOMMENDATIONS/PLAN OF CARE: health education about puerperium and breast feeding

and was discharged

MATERNAL DISCHARGE SUMMARY: summary discharge

FOLLOW-UP ORDERS: OPD (Out-patient Department) appointment after 4 days for follow-up and stitch removal.

11.3.3 Creation of a Newborn Discharge Summary with Complications

The baby was

PROBLEM LIST: limp, apneaic and bradycardiac when received by pedestrian on radiant warmer

PROCEDURES PERFORMED: resuscitated by stimulation, chest compression and positive ventilation with bag and mask with Oxygen.

POST-OPERATIVE CONDITION: responded well to the resuscitative efforts within 2 minutes

APGAR scores of 5 at one minute, 8 at 3 minutes, and 9 at 5 minutes.

PROBLEM LIST: mild RD (Respiratory Distress) in the form of tachypnea 70/minute and retractions,

VITAL SIGNS: Oxygen sat was maintained on 92% Oxygen by a face mask.

Before shifting the baby to NICU (Neonatal Intensive Care Unit) the

PROCEDURE PERFORMED: umbilical cord was clamped and cut and a hand band with the sex of the baby and the name of mother was fixed to the baby's Right wrist. **PHYSICAL EXAMINATION:** baby's measurements were Wt. 2.4 kg; Head Circumference 32cm; length 45 cm, which are normal for his 32 weeks gestation.

The baby was transferred to NICU in a preheated portable incubator on Oxygen by mask and turned over to the NICU staff with complete data about what happened in OR (local Encounter summary).

A photograph showing the face and sex of baby was done along with a foot print of the baby. A blood sample was taken for laboratory testing.

RH FACTOR: blood grouping was A+ve. The baby

HOSPITAL COURSE: was kept in incubator for 3 days where he received:

- FLUIDS: Ivf
- POST-OPERATIVE MEDICATION: Vit k 1mg IM
- **POST-OPERATIVE MEDICATION:** Oxygen by nasal canulla for one day which was withdrawn gradually on the 2nd day since the RD improved and o2 sat was maintained 97-99 in room air
- **IMMUNIZATIONS:** Vaccination for TB and Hep.B was done.
- **LABORATORY ORDER**: Blood sample for metabolic screening was sent.

Oral feeding was gradually tolerated from the 2nd day and ivf were gradually withdrawn.

On the 3rd day the bay was ok,

BABY'S DISCHARGE CONDITION: tolerating oral feeding, with no RD, no jaundice, stable temp. outside the incubator, so he was discharged with:

-NEWBORN DISCHARGE SUMMARY: Discharge Summary

-IMMUNIZATION SUMMARY vaccination card

-birth certificate

-FOLLOW-UP ORDERS: OPD appointment after one week for follow-up

11.4 WORKFLOW FOR EMERGENCY SURGERY

The following Clinical Use Case was created to highlight the documents associated with an ED Surgical visit. This includes past medical information from past ***Encounter Summaries*** the ***Operative Note*** written as a result of surgery and upon the release from the Hospital a ***Discharge Summary***.

11.4.1 Background

A 45 year old male patient weighing 80kg is brought into the Emergency Department with a femoral fracture and occult bleeding due to a road traffic accident. The case is received by the healthcare team responsible for the management of trauma patients. The Patient's

PAST MEDICAL HISTORY: past history is retrieved using the KSA-Wide Patient ID **(NATIONAL HEALTH ID)**. The Patient is known to have

HISTORY OF PRESENT ILLNESS: IDDM (Insulin Dependent Diabetes Mellitus), HTN (Hypertension), heart disease which is being treated with warfarin and Allergies.

11.4.2 Arrival at the ED and Admission for Surgery

A registered ED Doctor is informed of the patient status on arrival.

The patient was examined

VITAL SIGNS: HR (Heart Rate) 134, BP (Blood Pressure) 87/42, RR (Respiratory Rate) 32 SpO2 (Pulse Oximetry) 89% on 100% oxygen by mask

PRE-OPERATIVE CONDITION: Patient is conscious, has a large bruise over the left side of his scalp, airway is patent, abdominal pain to touch, obvious left ankle deformation.

PAST MEDICAL HISTORY: Allergies, Medications, Last Meal and the events of the accident.

PHYSICAL EXAMINATION: Physical exam from head to toe

ASSESSMENT: Frequent reassessment of vitals

Diagnostic studies at this time simultaneously.

Order X-rays, CT/FAST scans – FAST exam (Ultrasound)

Order Labs

Review the Results

LABORATORY RESULTS REPORT ABO (Blood) typing, lab work

RADIOLOGY IMAGING REPORT Standard trauma radiographs – Chest X-ray, pelvis, lateral C-spine

Patient must be monitored in X-Ray

Dictated by the patient's condition and available resources the patient will be sent to the OR or admitted to the ward prior to OR.

ASSESSMENTS: additional series of exams

Look for Mental Status changes

Abdominal exams for increased bruising or pain

Check lungs for changes in air movement

DIAGNOSES/DIAGNOSIS PRIORITY: Patients are assessed and treatment priorities are established based upon their injuries, vital signs and injury mechanisms (ABCDEs of trauma). The patient disposition is as following. The patient is admitted with a TTT (Treatment Plan)

The patient is informed of the diagnosis and that they will need to operate.

11.4.3 Operative Note Creation

Prior to the Operation

Consent for OR

Anesthesia request for consultation (locally)

Medical request for consultation (locally)

Patient cleared for OR

Patient given
POST-OPERATIVE INSTRUCTIONS: instructions and his predictable
POST-OPERATIVE CONDITION: post-operative state.

Local Operative, Anesthesia and Nursing Notes are created.

and the surgeon provides

POST-OPERATIVE ORDERS and

POST-OPERATIVE MEDICATIONS based upon the Operation and

HISTORY OF PRESENT ILLNESS. . The approved

OPERATIVE NOTE is uploaded to the eHealth System.

11.4.4 Release from Hospital

DISCHARGE SUMMARY **is** created on the local system by a resident and approved by the attending/consulting physician. This includes the

PATIENT DISCHARGE INSTRUCTIONS. The approved

DISCHARGE SUMMARY is uploaded to the eHealth System.

11.5 Operative Note With Surgical Complications

The following Clinical Use Case was created to highlight the ***Operative Note*** written as a result of surgery. Upon the release from the Hospital a ***Discharge Summary*** is be written.

11.5.1 Background

A 45 year old female patient known to have

HISTORY OF PRESENT ILLNESS: type I diabetes and has been treated with
PREADMISSION MEDICATION: insulin for 20 years (HTN on Rx x 2ys)

is presented to the ED

CHIEF COMPLAINT: abdominal pain located on the right upper quadrant radiating to the right shoulder for the past 2 days. The pain is persistent dull aching associated with vomiting not responding to Paracetamol.

PAST MEDICAL HISTORY: From reviewing past

ENCOUNTER SUMMARIES there is a previous history of similar episodes but short lived and relieved with Paracetamol.

She reports a visit to a local hospital where

RADIOLOGY IMAGING REPORT: U/S (Ultrasound) revealed the presence of gallstones.

The patient was examined:

VITAL SIGNS: T 38.2, Bp 150/90, P 100, RR 20, SpO2 96%

PHYSICAL EXAMINATION:

Abdominal exam: soft, right upper quadrant tenderness, +ve murphy's sign.

Investigations revealed leukocytosis with neutrophil predominance. **RADIOLOGY IMAGING REPORT** from an U/S showed an acute cholecystitis with a normal CBD (Common Bile Duct).

DIAGNOSIS: diagnosis of acute cholecystitis was made based on the above history and physical examination.

The decision was to take the patient

TYPE OF PROCEDURE: within 24 hours

PLANNED PROCEDURE: laparoscopic Cholecystectomy.

Patient is admitted to the surgical ward. A Medical Consult was made for control of the BP and blood sugar. Patient is booked for OR.

11.5.2 Creation of the Operative Note

Patient KSA-Wide Health ID is checked by the nurse.

OPERATIVE TIME IN/OUT: Time in/out is recorded.

ANESTHESIA TYPE: The patient is prepared for general anesthesia.

OPERATIVE PERSONNEL: Personnel involved identified and scrub for the procedure.
PROCEDURE PERFORMED/OUTCOME: procedure of laparoscopic cholecystectomy was performed uneventfully.

The gall bladder was full of stones and mud and sent for histopathology.

The patient was sent to the recovery room with the

POST-OPERATIVE INSTRUCTIONS. Standing orders for labs were made.

POSTOPERATIVE COURSE was uneventful and discharged in 2 days post-operatively.

11.5.3 Continuing Complications from Surgery - Background

The second day post-operatively, the patient developed

CHIEF COMPLAINT: abdominal pain, distension and vomiting.

On examination:

VITAL SIGNS: T 39, RR 20, P 120, Bp 160/90

PHYSICAL EXAMINATION: Abdominal exam revealed a soft distended abdomen. With marked tenderness in the right upper quadrant.

LABORATORY RESULTS REPORT investigations showed: Leucocytosis, elevated Liver enzymes

RADIOLOGY IMAGING REPORT on the Ultrasound: Revealed a stone in the CBD with proximal dilatation.

DIAGNOSIS: missed CBD stone with obstruction.

11.5.4 Continuing Complications from Surgery - Creation of a Second Operative Note

TYPE OF PROCEDURE: urgent

PROCEDURE PERFORMED: ERCP (Endoscopic Retrograde Cholangiopancreatogram) to relieve the obstruction was undertaken.

OUTCOME: ERCP failed

and the patient was sent for an

TYPE OF PROCEDURE: urgent

ADDITIONAL PROCEDURES PERFORMED: Laparotomy for a repair and relieve of obstruction.

11.5.5 Post-operative Hospital Stay

Patient was admitted for ICU for

OPERATIVE COURSE: 24 hours post-op for observation. The patient recovered fully and discharged 5 days post-operatively.

11.6 ANOTHER SURGICAL CLINICAL USE CASE WITH COMPLICATIONS

The following is another Clinical Use Case which was created to highlight the ***Operative Note*** written as a result of surgery. Upon the release from the Hospital a ***Discharge Summary*** is be written.

11.6.1 Background

A 45 year old female Saudi obese patient is admitted from the Outpatient Department

CHIEF COMPLAINT: rt. upper quadrant pain which has had recurrent for 5 years with progressive severity.

11.6.2 Hospital Admission

Admission includes Patient Identification, capture of patient consent, and identification of patient's PHC or private physician.

Review of the past history.

PAST MEDICAL HISTORY: of type 2 D.M. (diabetes mellitus) **on**

PRE-ADMISSION MEDICATION: oral hypoglycemia

PHYSICAL EXAMINATION:

DIAGNOSIS: was chronic cholecystitis with biliary duct disease

patient was well conscious oriented

VITAL SIGNS: vitally stable

Laboratory Tests ordered: FBS (Fasting Blood Sugar), HCV (Hepatitis C Virus), HIV (Human Immunodeficiency virus), CBC (Complete Blood Count) and

Radiology Tests Ordered: Ultrasound

LABORATORY RESULTS REPORT: FBS 160 . HCV and HIV was -ve CBC show Leukocytosis 16,000 Hb was 12, lipid liver and renal profile was within normal range

RADIOLOGY IMAGING REPORT: Abdomen show normal size of liver no fibrosis or cirrhosis gall bladder show 2 small stone each about 1 cm with thick wall bladder no mud inside CBD show no dilation or obstruction

PRE-OPERATIVE DIAGNOSIS: was chronic calculus cholycititis

TYPE OF PROCEDURE: elective

PLANNED PROCEDURES: laparoscopic cholecystectomy and the case was consultant with anesthesia preparation

PREPARATIONS: Started OR preparations which included

PRE-OPERATIVE MEDICATIONS: hospital Medications

Insulin sliding scale

Prophylactic Heparin

Prophylactic Antibiotics

And Patient seen by dietician to make diet control

11.6.3 First Operation with the Creation of an Operative Note

Patient shifted to OR

PLANNED PROCEDURE: laparoscopic Cholecystectomy

OUTCOMES: Surgery done successfully

Follow up labs ordered along with U/S

RADIOLOGY IMAGING REPORT: CBD (Common Bile Duct) checked for stone and was no stones seen

OPERATIVE COURSE: patient recovered successfully from anesthesia

OPERATIVE NOTE submitted.

11.6.4 Part of the Encounter: Patient shifted to Ward

On 2nd day patient showed **PRE-OPERATIVE CONDITION:** yellowish discoloration of sclera with dark color urine.

More labs ordered: STAT Liver Panel

LABORATORY RESULTS REPORT: Urgent liver panel show marked raised bilirubin total bilirubin was 8 and indirect 4

Patient start to

CHIEF COMPLAINT: complain again from colicky pain;

PHYSICAL EXAMINATION: on examination there was tender rigidity of the abdomen.

11.6.5 Second Operation with the Creation of an Operative Note

PERFORMED PROCEDURE: Endoscopic procedure performed.

TYPE OF PROCEDURE: Urgent ERCP

OUTCOMES: revealed there is injury and leakage of the CBD. Again patient transferred to ICU and prepared for

TYPE OF PROCEDURE: urgent operation

PLANNED PROCEDURE: emergency cholidecojujenostomy.

FINDINGS: Injury of CBD was confirmed during operation

INTRA-OPERATIVE COURSE: was smooth,

DRAIN: post-operative drain inserted

OPERATIVE COURSE: patient recover from anesthesia successfully

and shifted to ICU

OPERATIVE NOTE submitted.

11.6.6 Part of the Encounter: ICU Recovery

POST-OPERATIVE MEDICATIONS: Antibiotics, heparin, insulin sliding scale was given

CONDITION: Patient was conscious oriented vitally stable no complain

2nd day there was No clinical or laboratories signs of jaundice ,

DRAIN: drain was removed

CONDITION: Urine was clear, bowl sound was audible ,

Oral fluid started gradually as tolerated 4th day shifted from ICU to ward and start mobilization 7th day the suture was removed.

11.6.7 Creation of a Discharge Summary

Patient discharged with dry clean wound

RECOMMENDATION/CARE PLAN: Patient given 2 weeks sick leave (Note sick leave data needed in care plan);

FOLLOW-UP ORDERS: appointment in Outpatient Department after 10 days (hospital first visit goes back to hospital, then back to PHC for other follow-up).

DISCHARGE MEDICATIONS*:* Oral hypoglycemia, Pain killer PRN ePrescribed.

REFERRAL written for patient to go to dietitian for diet and Weight control.

DISCHARGE SUMMARY submitted; which also includes

LABORATORY RESULTS REPORTs,

RADIOLOGY IMAGING REPORTs, other studies, consultations, and

OPERATIVE NOTES; to HIE Document Repository.

NOTE: One PHC may need to notify another PHC in the cases of patient travel (e.g., back home) [With respect to PHC, may also be a private physician.]