Requirements Specifications Document

Project M.A.R.K.

Alohomora Solutions

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Revision History

Name	Date	Reason for Changes	Version
Requirements Specification Document	Oct-30-2018	Initial Draft	0.9
Requirements Specification Document	Nov-07-2018	First Version	1.0

1 Introduction

1.1 Purpose

This document will describe the software requirements for version 1.0 of Correcords, an electronic medical record (EMR) management system commissioned by Healthetica. Correcords will streamline the management of patient records within any medical institution that chooses to implement this system. The objective of this product is to remove existing bottlenecks in the record keeping process. The scope of this product covers the retrieval of patient data, entering it into a patient record, and syncing that data with a record stored in CareConnect.

1.2 Project Scope

Correcords is an EMR management system designed to be implemented across connected medical institutions under Healthetica. The purpose of the product is to provide efficient workflows for medical personnel resulting in shortened wait times and more up-to-date knowledge of patient records. Achieving this will allow medical institutions to provide quicker and more accurate service to more patients. By ensuring consistent EMR data across multiple medical institutions, medical personnel can focus on providing care patients and not worry about whether the data is correct or up-to-date.

1.3 Glossary of Terms

Term	Description
Access history	A chronological list of all users that have accessed a record. This is only available to health managers.
Access notification	This notification consists of: name of patient, name of nurse, time and date of access, and location of access.
CareConnect	The patient-centric eHealth Viewer used by the Province of British Columbia. It is considered an Electronic Health Record system as it is a cloud-based web service that provides authorized medical personnel with secure, view-only access to integrated clinical information from a multitude of health institutions and is accessible anywhere on the provincial network.
Correcords	Name of the system, EMR
Credentials	A medical personnel's username and password
Data	All personal and medical information within the patient record
Emergency information	Any data within the patient record that is pertinent to the patient's life in critical situations such as allergies, blood type, date of birth, height, weight, associated risks.

EMR	Electronic Medical Record
Local database	The database local to the medical institution, but external to the system
M.A.R.K.	“Medically Approved Record Keeper”, name of project
Medical institutions	Hospitals and clinics
Medical personnel	Doctors, nurses, and health managers
Patient data	All information inside a patient record
Patient identifier	Search criteria to find patient within local database
Patient record	A container for all patient data
Patient search bar	A search bar used to find patients
PHN	Personal Health Number
Product	Mentions of “the product” refer to Correcords
Record field	A specific category within a patient record, which contains specific data
Record search bar	A search bar used to find data within the patient record
Search value	The values located in the field, eg. peanuts
System	The EMR (Correcords)
Test database	Database used by IT technicians. It is separate from the local database and can be populated by the technicians.
Timestamp	Date, time, person who accessed, and workstation identifier
User	Doctors, nurses, health managers, and IT technicians
User account	An account of a user of the EMR
Workstation	A physical machine that the medical personnel have access to, eg. desktop
Workstation identifier	A unique identifier assigned to every workstation connected to the EMR

1.4 References

Bhattacharyya, S. (2018). Designing Hospital Information Systems | Information Technology. [online] Asian Healthcare Management System. Available at: https://www.asianhhm.com/information-technology/hospital-information-systems [Accessed 30 Sep.

2018].

1.5 Overview

The following sections of this document provide a general description, the characteristics of the users for this project, and the functional, non-functional, and data requirements of the system. A general description of the project is discussed in section 2 of this document. Section 3 gives the project perspective and lists the features of the system. Section 3 also goes into deeper detail about the functional requirements and their use cases. Section 4 lists the external interface requirements. Section 5 details the non-functional requirements. Section 6 includes all the use cases and user interface mockups. Section 7 includes all the models, diagrams, and user interface models relevant to the project.

2 Overall Description

2.1 Product Perspective

The system will be an EMR management system, which will replace the current medical standard. It will be a standalone system; however, it will connect with other larger systems such as CareConnect.

2.2 Product Features

The major features of the system include:

- **Data Consolidation:** medical personnel will be able to see existing patient records from a different medical institution.
- **Patient Search:** medical personnel will be able to search for patient records.
- **Record Search:** medical personnel will be able to search a patient record for specific patient data.
- **Append to Record Field**: medical personnel will be able to append new data to patient record fields.
- **Create New Patient Record**: selected medical personnel will be able to create a new patient record if the patient does not exist in the system.

2.3 User Classes and Characteristics

The following are the anticipated user classes of the system:

- Doctors
- Nurses
- Health Managers
- IT Technicians

Doctors are responsible for diagnosing and assigning treatment to a patient. Therefore, they require the ability to create new patient records and to append to existing patient records. Doctors must have full access to all patient records.

Nurses are responsible for monitoring and administering treatment to a patient. Therefore, they require the ability to view and append to existing patient records. They must have full access to patient records

to which they are assigned. Patient records are assigned to nurses by doctors and health managers; however, this functionality is not part of the system. They have have limited access to patient record to which they are not assigned, as discussed in section 3.

Health managers are responsible for managing staff of the medical institution. They deal with planning, directing, and coordinating the medical services of the department. Therefore, they require the ability to create new patient records, to append to existing patient records, and to view the access history of patient records. They must have full access to all patient records.

IT technicians are responsible for maintenance and operation of the medical institution software systems. They require access to the system but do not require access to patient data. When an IT technician is logged in, their EMR data is synced from the test database.

2.4 Operating Environment

The operating environment is based on the environment on which the current system is installed. This requires compatibility with an operating system of Windows XP or higher. The software will also be compatible with external software components such as the existing authorization credentials and CareConnect. All software will be compatible with existing hardware platforms and servers.

2.5 Design and Implementation Constraints

Design challenges include maintaining compatibility between CareConnect and the local database. The system will retrieve data from the local database and migrate any additions to CareConnect. This capability is described in section 3.1 Consolidation of Data. The implementation must strictly follow applicable privacy laws. The system will be constrained by the current hardware used within the adopting institution. Offline access will not be implemented as specified by the clients in Client Meeting #2 held on October 4th, 2018. Conflict resolution is not a concern with this implementation because any additions to a patient file are simply appended to the relevant field.

2.6 Assumptions and Dependencies

One assumption will be that the system integrates with the current database of patient records. In addition, two assumptions will be made about the existing hardware: first, that the hardware is accessible, and second that it is compatible with the system. By being accessible, the current hardware must be available for use. For compatibility, our system must be able to run on the current hardware with no issues.
There are two external factors on which the system depends. The system must sync with CareConnect and function with the current operating system running on machines within the medical institution.

3 System Features

3.1 Consolidation of Data

3.1.1 Description and Priority

This feature is a high priority. The most recent and correct patient records must be available to medical

personnel from any connected medical institution.

3.1.2 Functional Requirements

REQ-3.1.1: The most recent patient records are retrieved from CareConnect when medical personnel search for patients.

1) This requirement was explicitly stated in the RFP 1.0 Problem Description and aims to “sync patient records between EMRs” using CareConnect and reduce “fragmentation of medical data.”
2) Verification of the requirement is TBD.

REQ-3.1.2: The updated patient records must be viewable from any medical institution connected to CareConnect.

1) This requirement was explicitly stated in the RFP 1.0 Problem Description and aims to increase “communication between EMRs.”
2) Verification of the requirement is TBD.

REQ-3.1.3: When a save button is selected, new data within the patient records must be updated automatically to CareConnect.

1) This requirement was explicitly stated in the RFP 1.0 Problem Description and aims to “sync patient records between EMRs” using CareConnect.
2) Verification of the requirement is TBD.

Error conditions and invalid inputs:

- Failure to retrieve from CareConnect during system downtime results in an error notification.
- Failure to update to CareConnect during system downtime results in an error notification.

3.1.3 Use Cases associated with the Feature or Functional Requirements

The use cases associated with Consolidation of Data are use cases 6.2, 6.4, and 6.5. The use cases and use case diagrams can be found in section 6.

3.2 Patient Search

3.2.1 Description and Priority

This feature is a high priority. Medical personnel must be able to retrieve an existing patient record from the local database and CareConnect from any connected medical institution.

3.2.2 Functional Requirements

REQ-3.2.1: Any newly entered data in the record must be retrieved from CareConnect and must be updated with the local database.

1) This requirement was explicitly stated in the RFP 1.0 Problem Description and aims to “sync patient records between EMRs” using CareConnect and reduce “fragmentation of medical data.”
2) Verification of the requirement is TBD.

REQ-3.2.2: Based on the search results of the search value entered, medical personnel must be able to

view the list of existing patient records retrieved from the local database.

1) This requirement was not mentioned by the client, however, we deemed the function necessary for the system.
2) Verification of the requirement is TBD.

REQ-3.2.3: An access notification must be sent to the health manager whenever a nurse accesses a patient record to which they are not assigned.

1) The entire access history of the record should be transparent to health managers, which was mentioned by the clients in several meetings. Email correspondence can be found in Appendix B under item B.4.
2) Verification of the requirement is TBD.

3.2.3 Use Cases associated with the Feature or Functional Requirements

The use case associated with searching patient records is use case 6.2. The use case and use case diagram can be found in section 6.

3.3 Record Search

3.3.1 Description and Priority

This feature is a high priority as requested by the clients. Medical personnel must be able to find specific patient data within a patient record.

3.3.2 Functional Requirements

REQ-3.3.1: For health managers and doctors, fields within a patient record must be searchable via a search bar.

1) This was requested by the clients within the RD 1.1 review. This can be found in Appendix B under B.2.
2) Verification of the requirement is TBD.

REQ-3.3.2: For nurses, if they have access to a patient record, fields within a patient record must be searchable via a search bar.

3) This was requested by the clients within the RD 1.1 review. This can be found in Appendix B under B.2.
4) Verification of the requirement is TBD.

REQ-3.3.3: For nurses, if they access patient record fields within a patient record to which they do not have access, health managers will automatically be sent an access notification.

5) This was requested by the clients within the RD 1.1 review. This can be found in Appendix B under B.5.
6) Verification of the requirement is TBD.

3.3.3 Use Cases associated with the Feature or Functional Requirements

The use cases associated with searching record fields are use case 6.3.1 and 6.3.2. The use cases and use

case diagrams can be found in section 6.

3.4 Append to Record Field

3.4.1 Description and Priority

This feature is a high priority. Medical personnel have the ability to append new patient data into a patient record field. To ensure the integrity of patient records, medical personnel cannot remove or edit data from a record.

3.4.2 Functional Requirements

REQ-3.4.1: Modifying existing data is strictly forbidden because patient records must contain a complete history of past additions. Patient data cannot be removed.

1) Clients expressed the need for this within RD 1.1 feedback, which can be found in Appendix B under item B.3.
2) Verification of the requirement is TBD.

REQ-3.4.2: When a patient record is updated, the timestamp is saved to the patient record.

1) The entire history of the record should be transparent, which was mentioned by the clients in several meetings. Email correspondence can be found in Appendix B under item B.4.
2) Verification of the requirement is TBD.

Error conditions and invalid inputs:

- If data is not updated to the patient record and/or the local database due to technical or connectivity issues, an error notification will be displayed: “An error occurred. Your change could not be saved.”
- Invalid inputs within patient record fields will be detected when the save button is pressed. This will include the detection of invalid characters and insecure phrases leading to code injection.

3.4.3 Use Cases associated with the Feature or Functional Requirements

The use case associated with appending to record fields is use case 6.4. The use case and use case diagram can be found in section 6.

3.5 Create New Patient Record

3.5.1 Description and Priority

The system requires this feature, but it was not explicitly stated by the clients, therefore, it has a medium priority. The ability to create a new patient record must be used when a patient record does not currently exist in the system. Permission to create a new patient record is only given to doctors and health managers. When this option is selected, an empty patient record form is displayed with further options to save or cancel the creation of the new record.

3.5.2 Functional Requirements

REQ-3.5.1: Entering previously non-existent patient records into the system. This requires a “create new

record" button, which is only available to doctors and health managers. It will still appear for nurses but will be grey and unselectable.

1) This requirement was not mentioned by the client, however, we deemed the function necessary for the system.
2) Verification of the requirement is TBD.

REQ-3.5.2: When a patient record is created, the timestamp is saved to the patient record.

1) The entire history of the record should be transparent, which was mentioned by the clients in several meetings. Email correspondence can be found in Appendix B under item B.4.
2) Verification of the requirement is TBD.

Error conditions and invalid inputs:

- Patient record uniqueness is ensured through the PHN of every patient in the database. When the save button is pressed, the system will check all existing records to ensure this patient record does not already exist.
- Invalid inputs within patient record fields will be detected when the save button is pressed. This will include the detection of invalid characters and insecure phrases leading to code injection.

3.5.3 Use Cases associated with the Feature or Functional Requirements

The use case associated with creating new patient records is use case 6.5. The use case and use case diagram can be found in section 6.

4 External Interface Requirements

4.1 User Interfaces

The user interface requirements are dictated by Healthetica. The user interface acts as a replacement for CareConnect's interface. The interface will allow medical personnel to retrieve data from CareConnect and, with the correct level of authorization, view patient records.

The system that IT technicians can access is functionally identical to the one accessed by medical personnel, however, crucially, the system does not sync with the local database. Instead, it syncs with a test database, which will only contain data input by IT technicians for testing purposes. This ensures that IT technicians do not have access to actual patient records.

In order to serve the user base, usability is a high priority of the user interface. To ensure the usability of the system meets the client's standards, the page layouts have been redesigned at every level of the system. The primary view, a patient record, is organized in an easy-to-read, tile layout where basic and emergency information is always displayed at the top with a tile interface below. Each tile represents a different patient field such as past procedures, medications, surgeries. Search bars are very important to the clients, so we have made them plainly visible at the top of the patient record. For peace-of-mind of the medical personnel, when they save a patient record, the record will automatically be synced to CareConnect and they will receive a confirmation of the successful sync on screen.

4.2 Software Interfaces

The data entered into the system must be synced with CareConnect. Therefore, an interface between these two services must exist. Data entered into the system by an authorized medical personnel to update an existing or create a new patient record is stored in the local database. The data must then be synced to CareConnect. This is a vital component of the software as it ensures that connected medical institutions have identical patient records. The system will operate on the operating system currently installed on the machines in the adopting medical institutions.

5 Other Non-Functional Requirements

5.1 Performance Requirements

Two major performance requirements are reliability and real-time display. Reliability is defined as the time for which the system is available to medical personnel. Reliability must exceed rates of 99.9% in non-clinical environments and 100% in clinical environments (Bhattacharyya, 2018). Real-time display is defined as the ability for multiple medical personnel to see new data additions as they are appended. Additions made in a patient record must be visible to other medical personnel within 1 second.

5.2 Security Requirements

Authorized medical personnel must comply with the security requirements. The following security requirements are absolutely necessary:

- Only authorized users can access the system (use case 6.1).
- Only medical personnel can access patient records.
- IT technicians must not be able to see any real patient records and will be strictly limited to a test database.
- When a medical personnel views a record, creates a new record, or appends to a patient record, a timestamp is saved to the patient record.
- When a nurse views a patient record they are not assigned to, an access notification is sent to a health manager (use case 6.3.2).

Authorization will be used to control access to patient records based on the medical personnel's privileges. The available authorization levels are categorized into the following four tiers:

- Tier 1 - Health Managers
- Tier 2 - Doctors
- Tier 3 - Nurses
- Tier 4 - IT Technicians

5.3 Software Quality Attributes

In descending order of priority, the required software quality attributes are correctness, interoperability, and usability.

Correctness is defined as the accuracy of patient data which includes, but is not limited to: blood type, current medications, and allergy data. The correctness of data is necessary in order to ensure proper

medical treatment. Retrieval of patient data (from both local database and CareConnect) must be correct 100% of the time.

Interoperability is defined as the ability to connect to external software components such as CareConnect and the existing authorization system. The system must be able to communicate fully with CareConnect 100% of the time.

Usability is defined as the user's ability to quickly and easily locate the necessary patient data. This requires data to displayed in a well-organized manner and functions on data to be straightforward.

6 Use Cases and User Interface Mockups

Important note regarding IT technicians:
Every use case will be available to IT technicians despite their omittance from the following use cases. The system that IT technicians can access is functionally identical to the one accessed by medical personnel, however, crucially, the system does not sync with the local database. Instead, it syncs with a test database, which will only contain data input by IT technicians for testing purposes. This ensures that IT technicians do not have access to actual patient records. Access to the system's full functionality for IT technicians is a high priority for the client (see B.5 in Appendix B).

Use Case 6.1 Authenticate User Account

Description: Authenticating a user account involves a user logging into a workstation with the system installed with their unique credentials. If the user is authorized, they gain access to the system, otherwise, they are not given access.
Specifications:

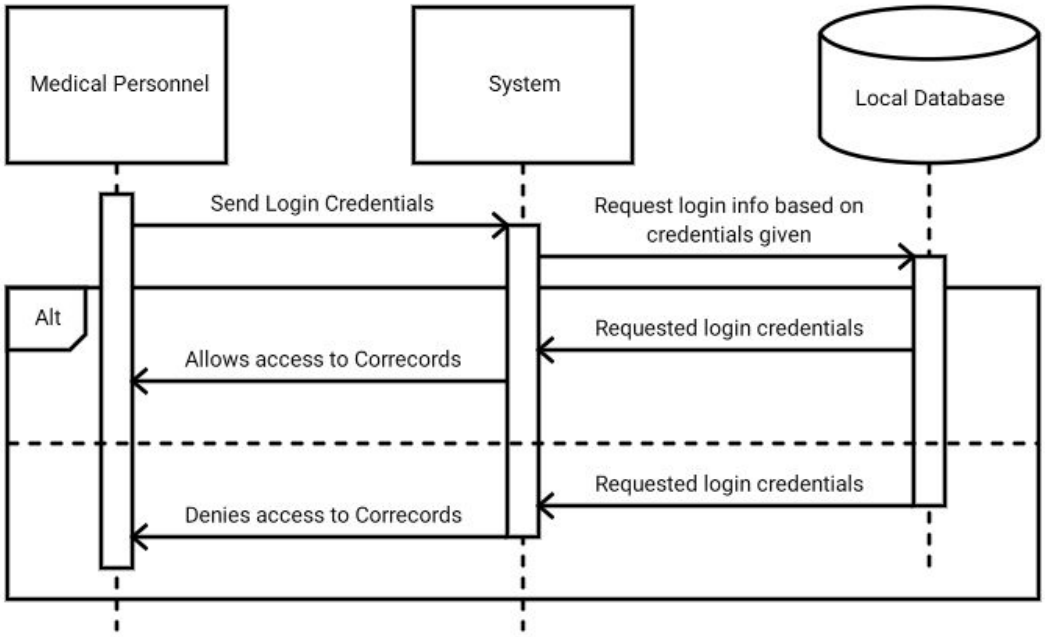
Actors: Medical Personnel (MP)
Pre-conditions: User has access to a workstation with the system installed
Steps:

1) MP enters credentials
2) MP submits the login request
3) Credentials accepted

Success Condition: Gain access to the system
Alternate Path(s):

3) Credentials not accepted
Alternate Post Condition: Error message "Credentials incorrect" and access to the system not granted

Sequence diagram:



UI mockups:

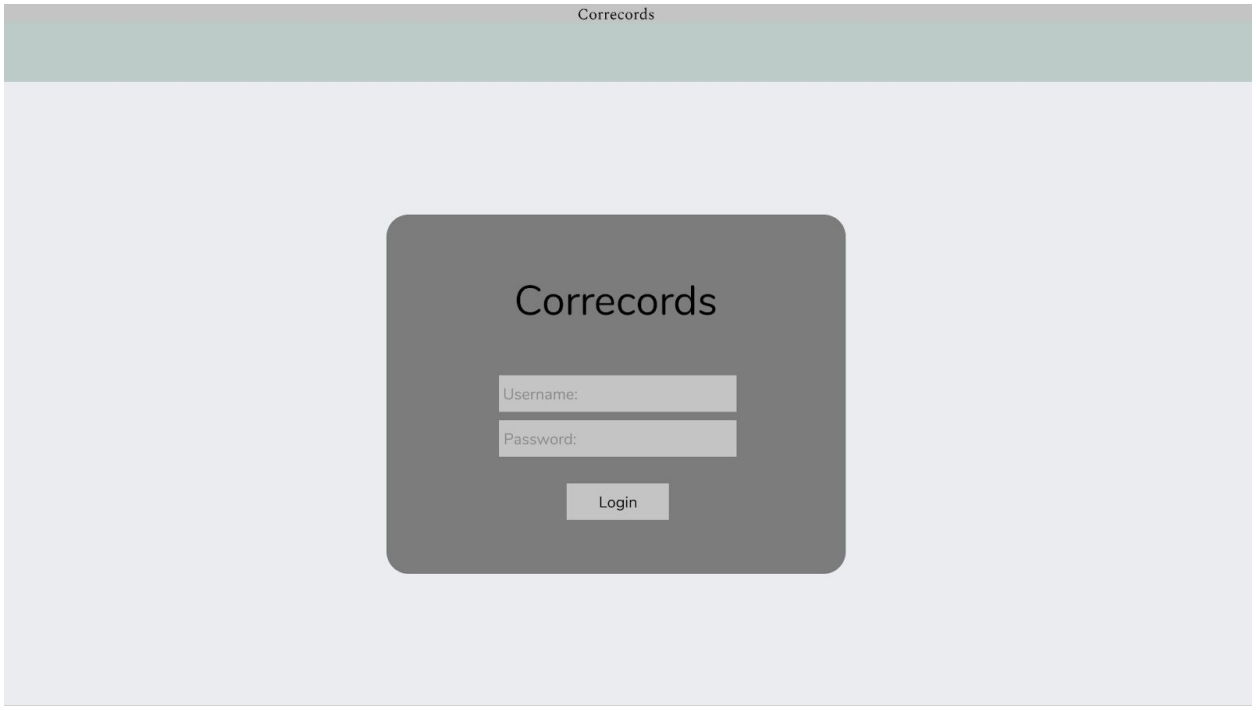


Figure 6.1-1. Correcords login view.

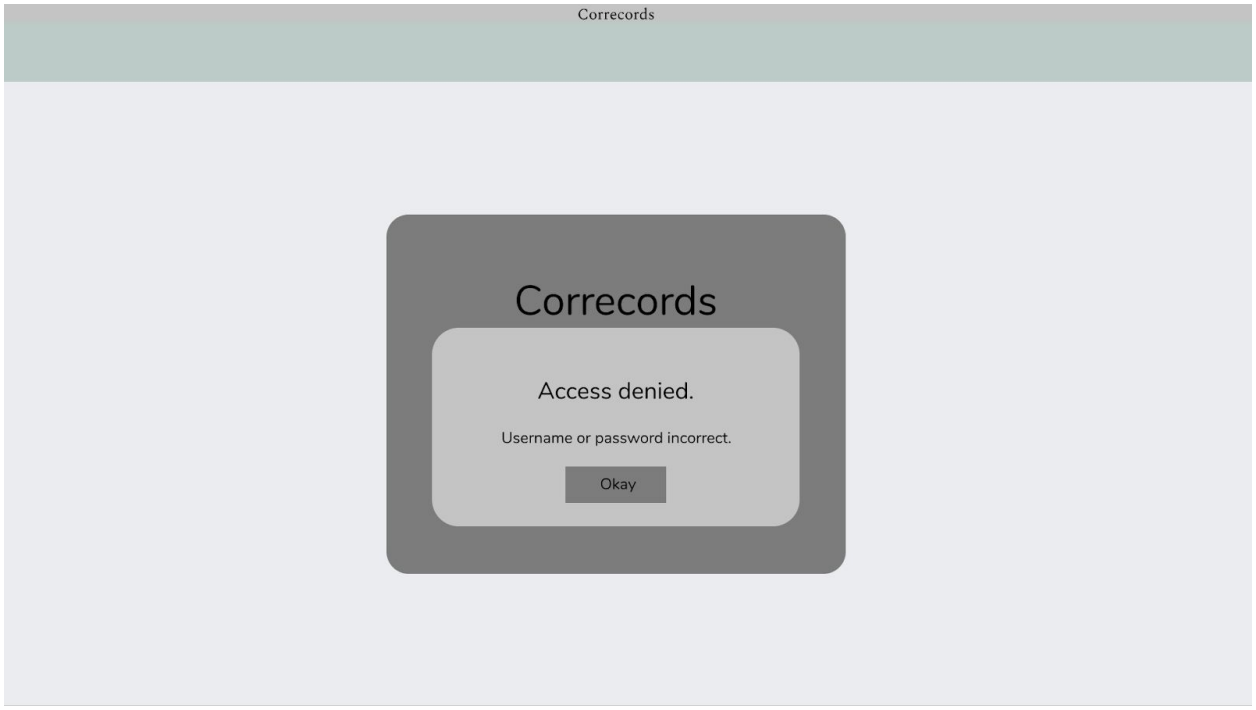


Figure 6.1-2. Correcords login denied view.

Use Case 6.2 Patient Search

Description: Displaying a patient record requires that the medical personnel have access to the system (Use case 6.1). The medical personnel then enters the relevant patient identifier into the patient search bar. If a match is found, the results are displayed to the medical personnel, otherwise, no matching records exist in the local database. After search request is sent, the local database is consolidated with CareConnect to ensure local database has the most recent patient record.

When a patient record is displayed, a timestamp is saved to the patient record and is viewable in the "Access History" tab by health managers.

Specification:

Actors: Medical personnel (MP)

Pre-conditions: Authenticate User Account (Use case 6.1)

Steps:

1) MP selects patient search bar
2) MP enters patient identifier
3) MP submits patient search request
4) Requested patient record found in database

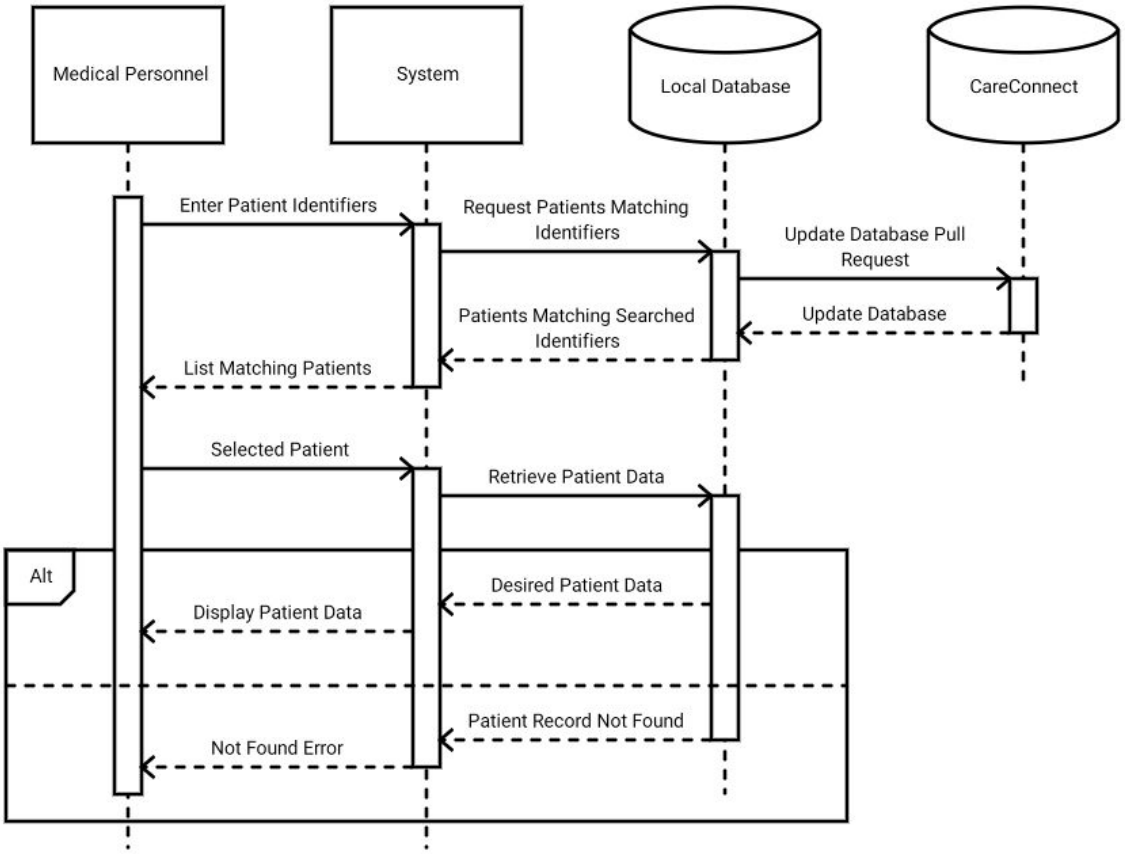
Success Condition: Requested patient record is displayed

Alternate Path(s):

4) Requested patient record does not exist in database

Alternate Post Condition: "No results found" message displayed

Sequence diagram:



UI mockups:

Figure 6.2-1. Correcords patient search view.

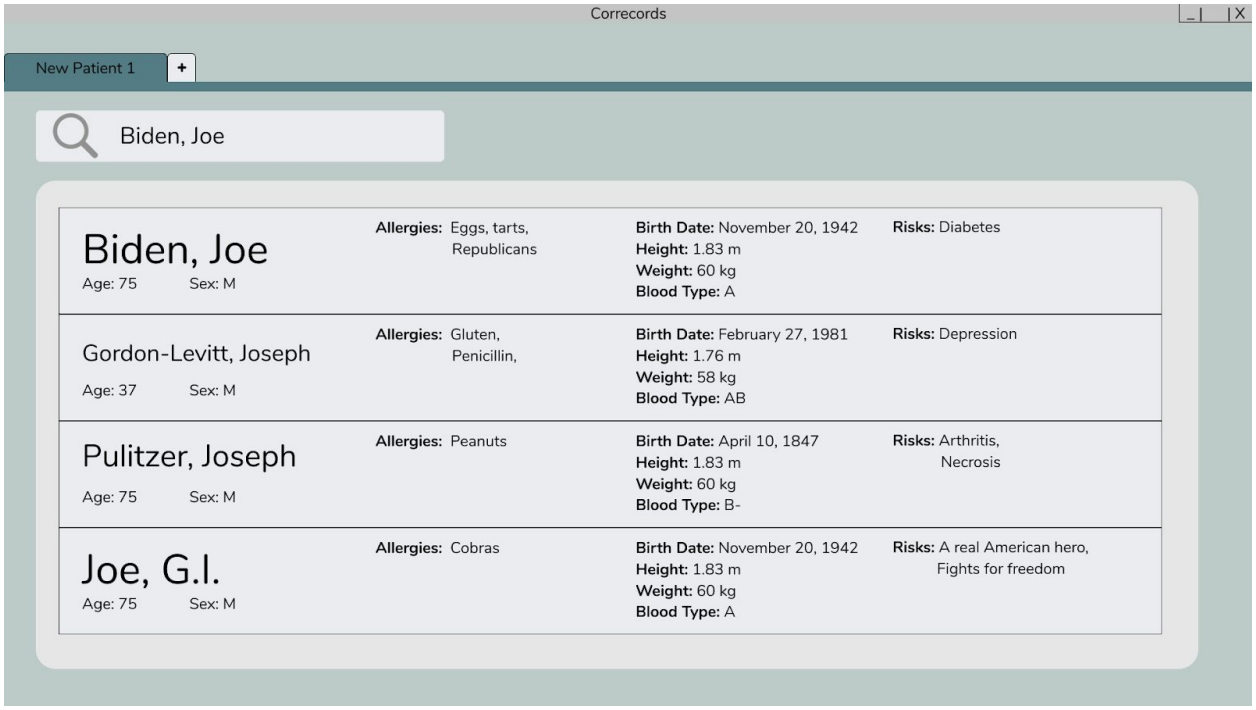


Figure 6.2-2. Correcords patient search results view.

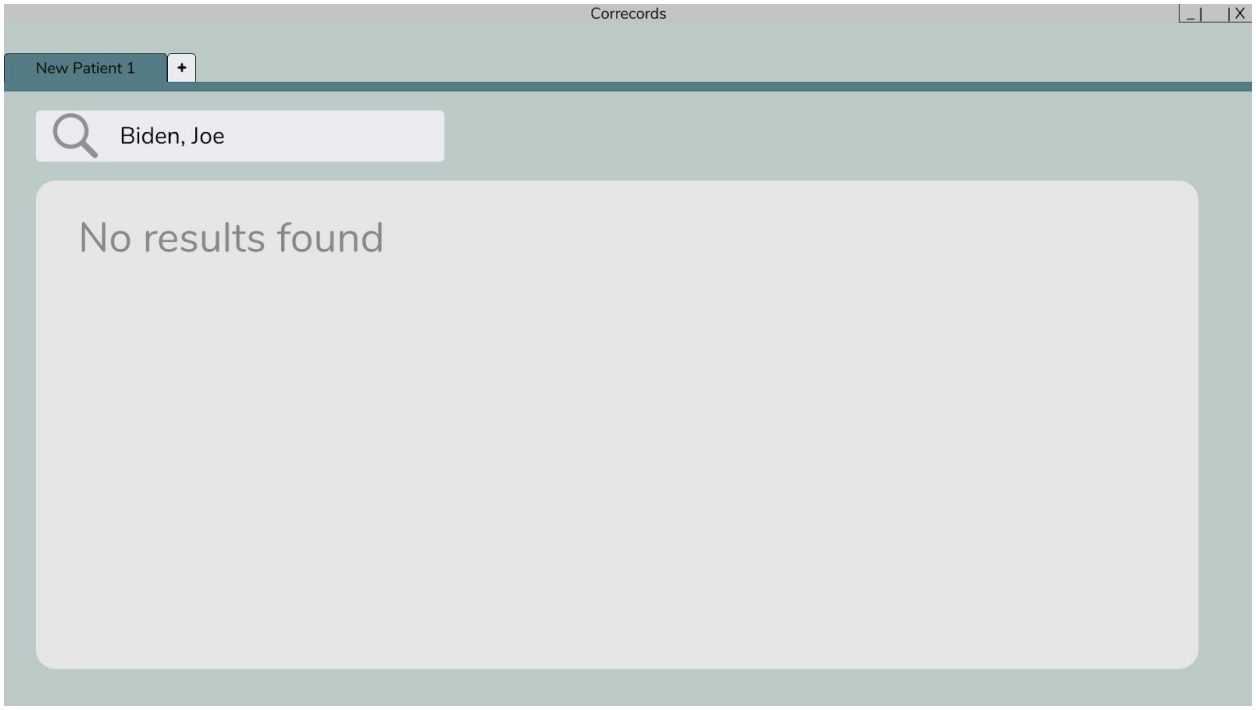


Figure 6.2-3. Correcords patient search with no results found view.

Use Case 6.3.1 Record Search and Display for Medical Personnel with Access

Description: Searching the record fields requires that the medical personnel have access to the patient record (Use case 6.2). For nurses, they must be assigned to the patient in order to gain access to the patient record. The medical personnel then enters the requested value into the search bar. If the value exists, the value under the appropriate field(s) is displayed, otherwise, the value does not exist within the record.

Specification:

Actors: Medical Personnel with Access (MP)

Pre-conditions: Patient Search (Use case 6.2), medical personnel have access to patient record

Steps:

1) MP selects record search bar

2) MP enters search value

2.1) Drop-down autofill window appears below the search bar and is accordingly populated

3) MP submits search value request

4) Requested value found

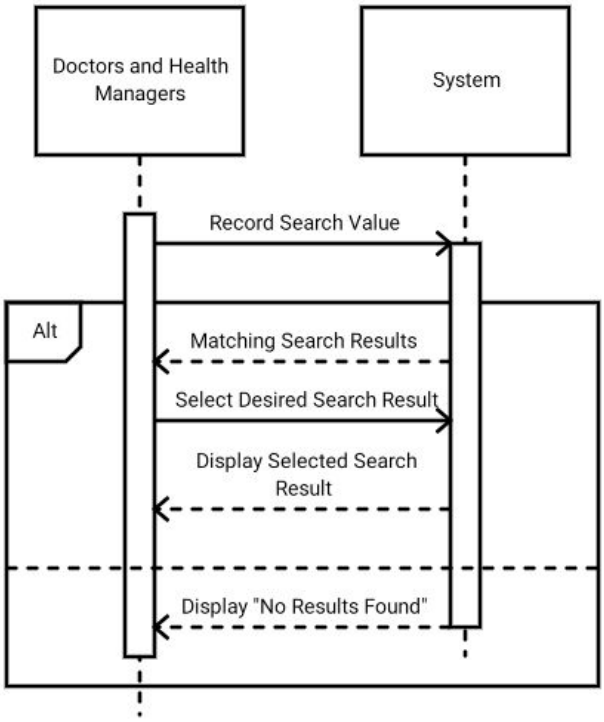
Success Condition: Requested value displayed under the appropriate field

Alternate Path(s):

4) Requested value not found

Alternate Post Condition: “No results found” message displayed

Sequence diagram:



UI mockups:

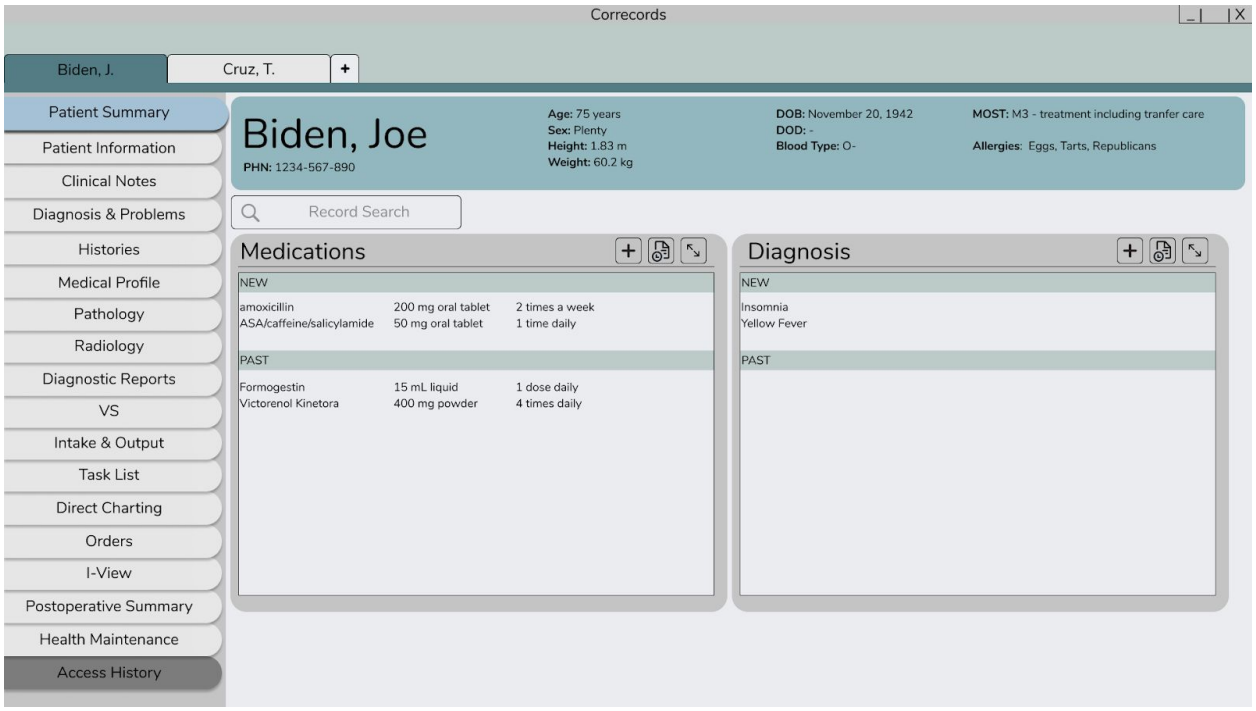


Figure 6.3.1-1. Patient record view showing search field.

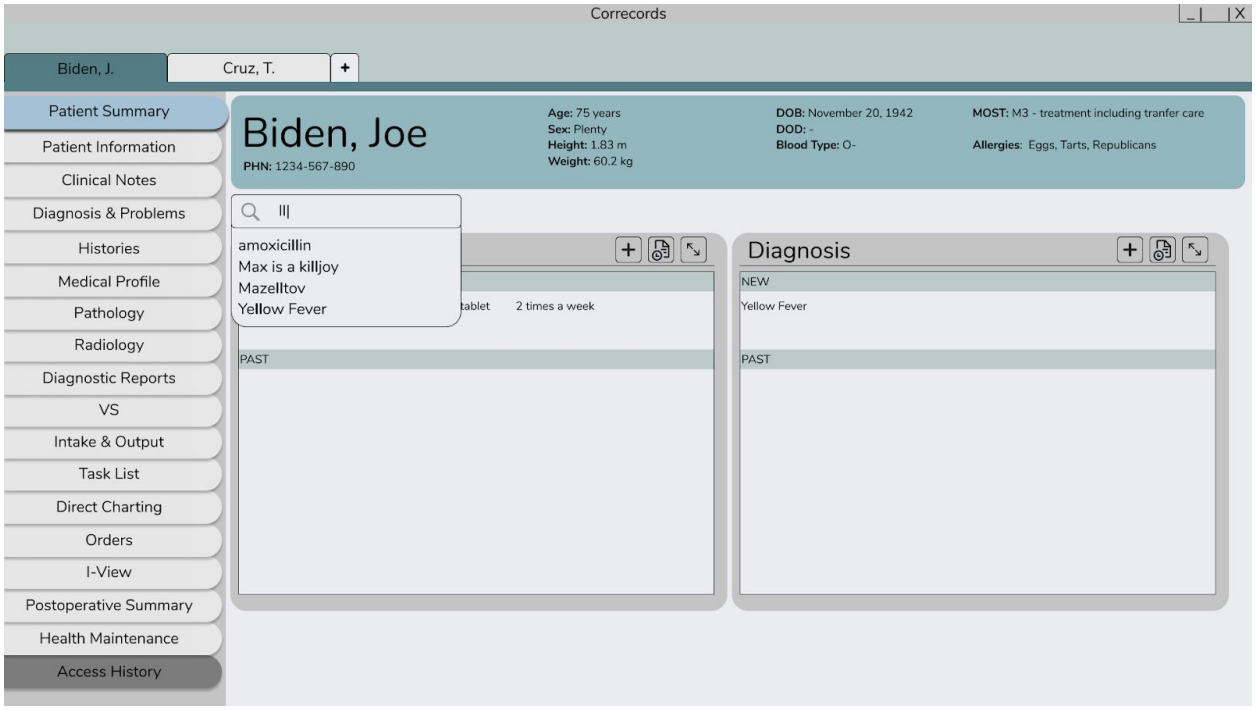


Figure 6.3.1-2. Patient record view showing search results from drop-down menu.

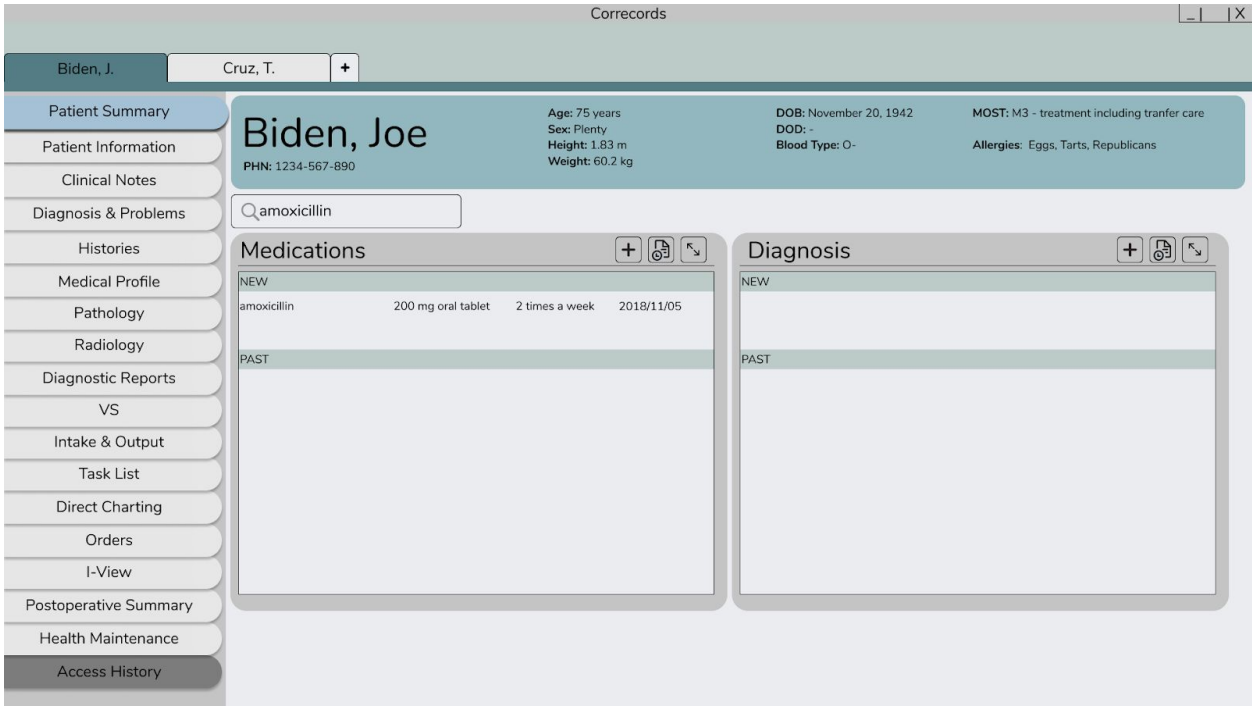


Figure 6.3.1-3. Patient record view showing search results.

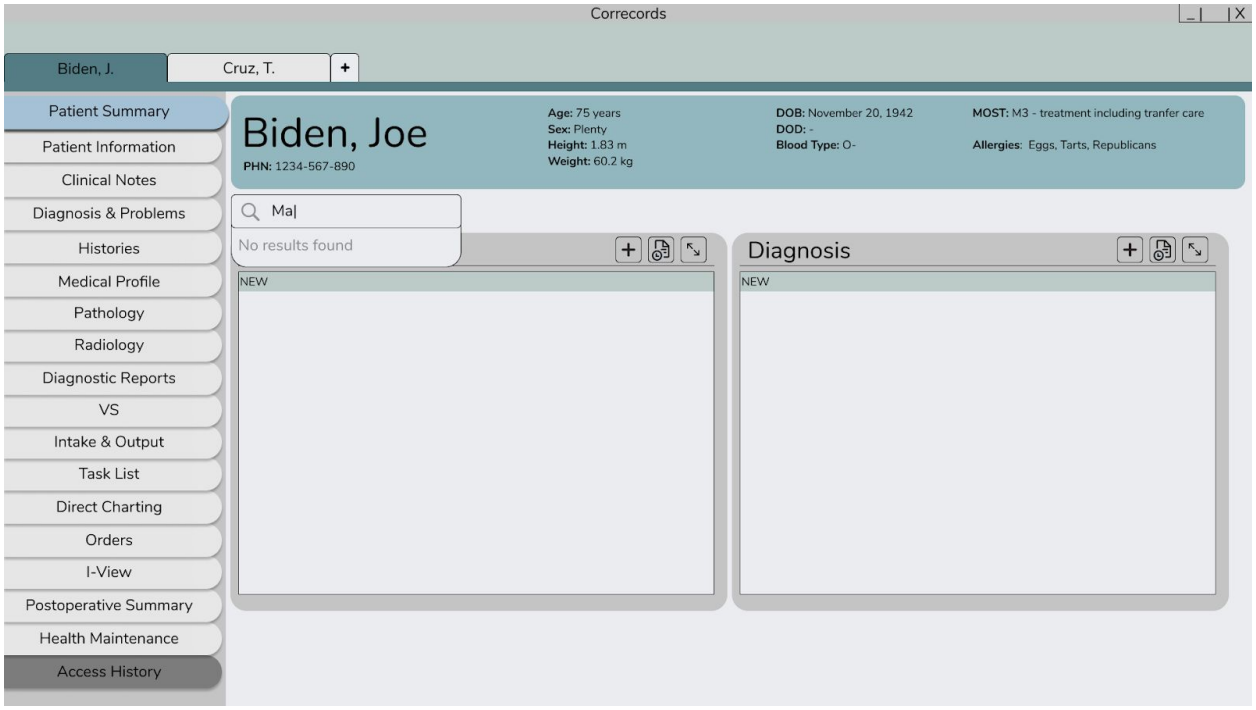


Figure 6.3.1-4. Patient record view showing search results (No result found).

Use Case 6.3.2 Record Search and Display for Nurses without Access

Description: When a nurse access a patient record to which they are not assigned, all fields are initially inaccessible. This is made apparent when the nurse views the record and all fields other than the emergency information are greyed out. The nurse has the option to select the record search bar to gain full access to the record data. Upon confirming full access to a record via prompt, an access notification is sent to a health manager.

Specification:

Actors: Nurses

Pre-conditions: Patient Search (Use case 6.2), nurse does not have access to patient record

Steps:

1) Nurse selects record search bar

2) Confirmation prompt for access request pops up: “You are requesting access to a record you do not have authorization for. If you wish to continue, your health manager will be notified.?”

2.1) Nurse confirms access by selecting “Yes”

3) Nurse enters a search value to a search bar

3.1) Drop-down autofill window appears below the search bar and is accordingly populated

4) Nurse submits search value request

5) Requested value found

Success Condition: Requested value displayed under the appropriate field

Alternate Path(s):

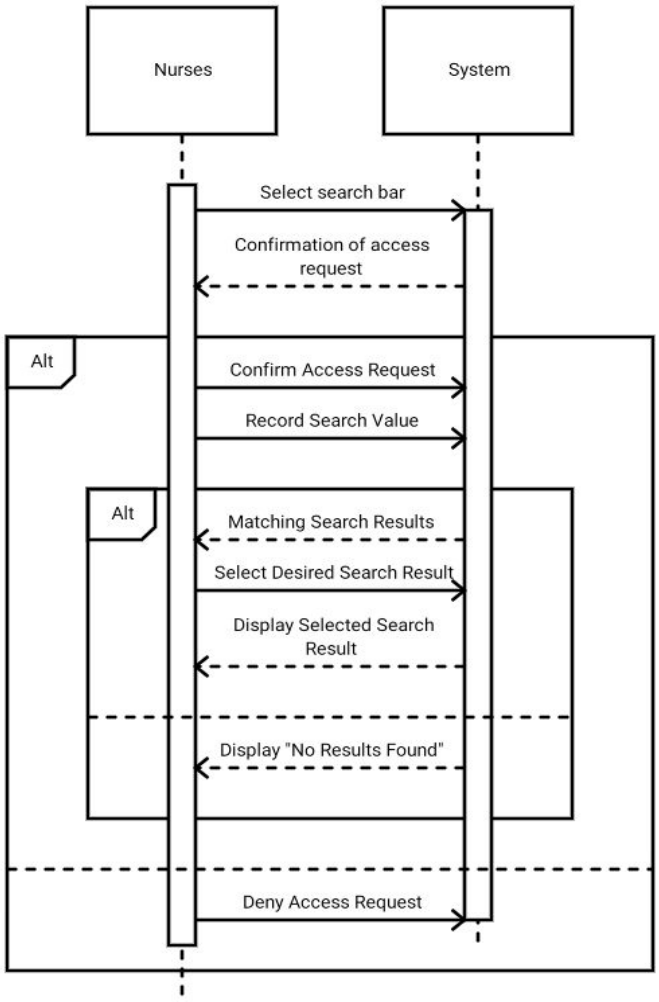
2.1) Nurse declines access by selecting “No”

Alternate Post Condition: Fields remain inaccessible and no access notification is sent to health managers

5) Requested value not found

Alternate Post Condition: Display message: “No results found”

Sequence diagram:



UI mockups:

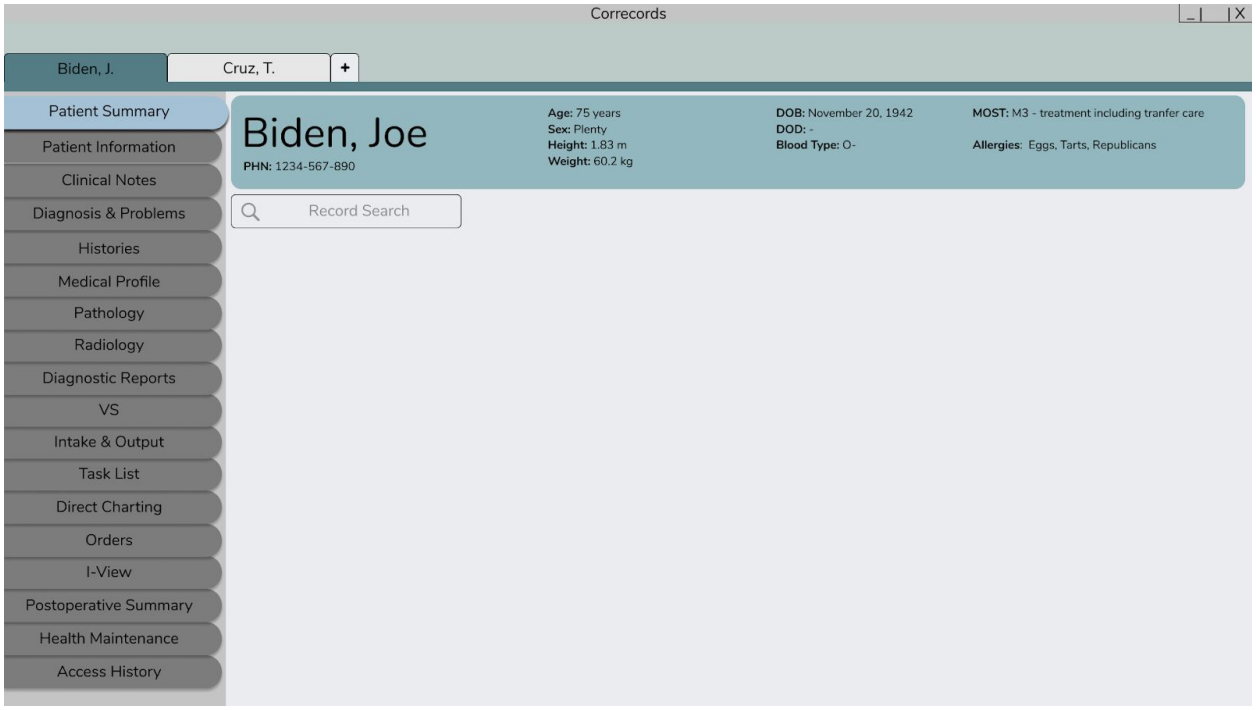


Figure 6.3.2-1. Nurses without access view.

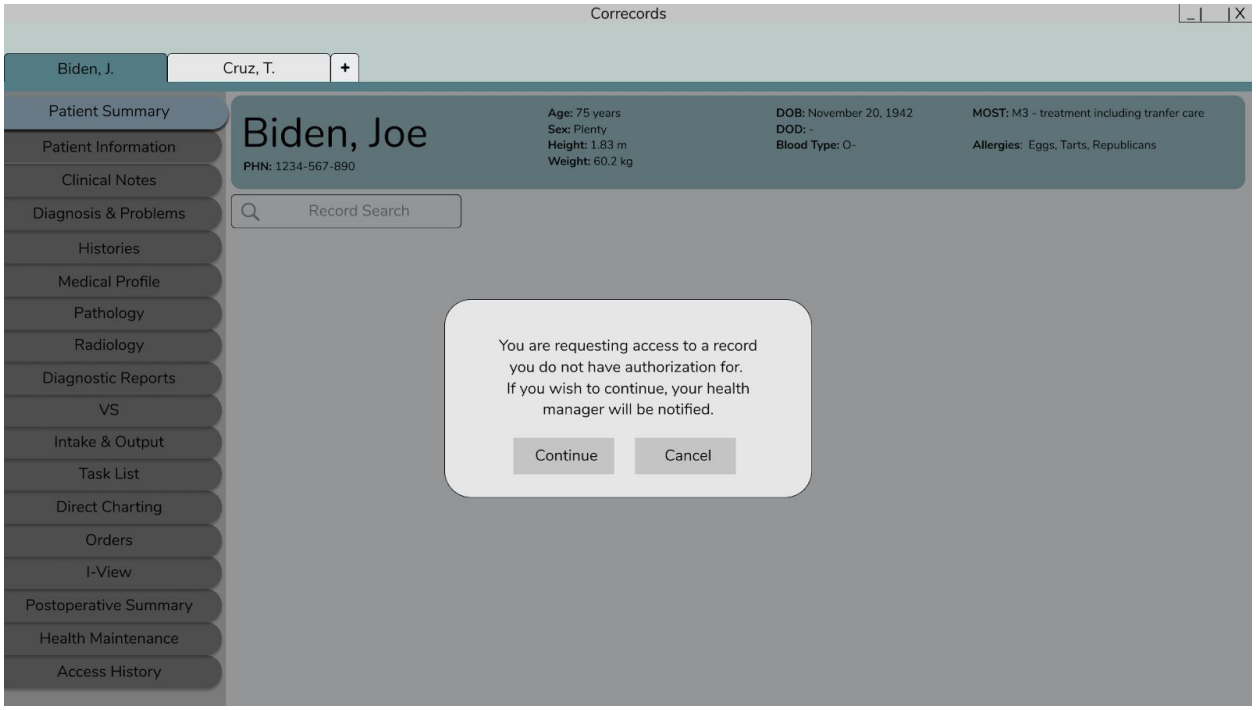


Figure 6.3.2-2. Confirm access.

Use Case 6.4 Append to Patient Record Field

Description: Appending to a patient record requires that the medical personnel have access to the EMR (Use case 6.1) and a patient record (Use case 6.2). The medical personnel then selects the field to which they would like to add new patient data. New patient data is then entered. The medical personnel submits the save request followed by a confirmation notification. When a patient record is updated, the timestamp is saved to the patient record.

Medical personnel can choose to cancel the changes instead of saving. This will prompt for confirmation of cancellation, followed by a notification indicating that the record has not been updated.

If data is not updated to the patient record and/or the local database due to technical or connectivity issues, an error notification will be displayed: “An error occurred. Your change could not be saved.”

Specification:

Actors: Medical Personnel (MP)

Pre-conditions: Patient Search (Use case 6.2)

Steps:

1) MP selects a record field
2) MP creates a new append request
3) MP enters new patient data
4) MP submits the new record append request
    4.1) MP confirms the append request
    4.2) Display confirmation notification: “Record Updated”

Success Condition: Local database and CareConnect are updated

Alternate Path(s):

4.2) Technical or connectivity issues between databases

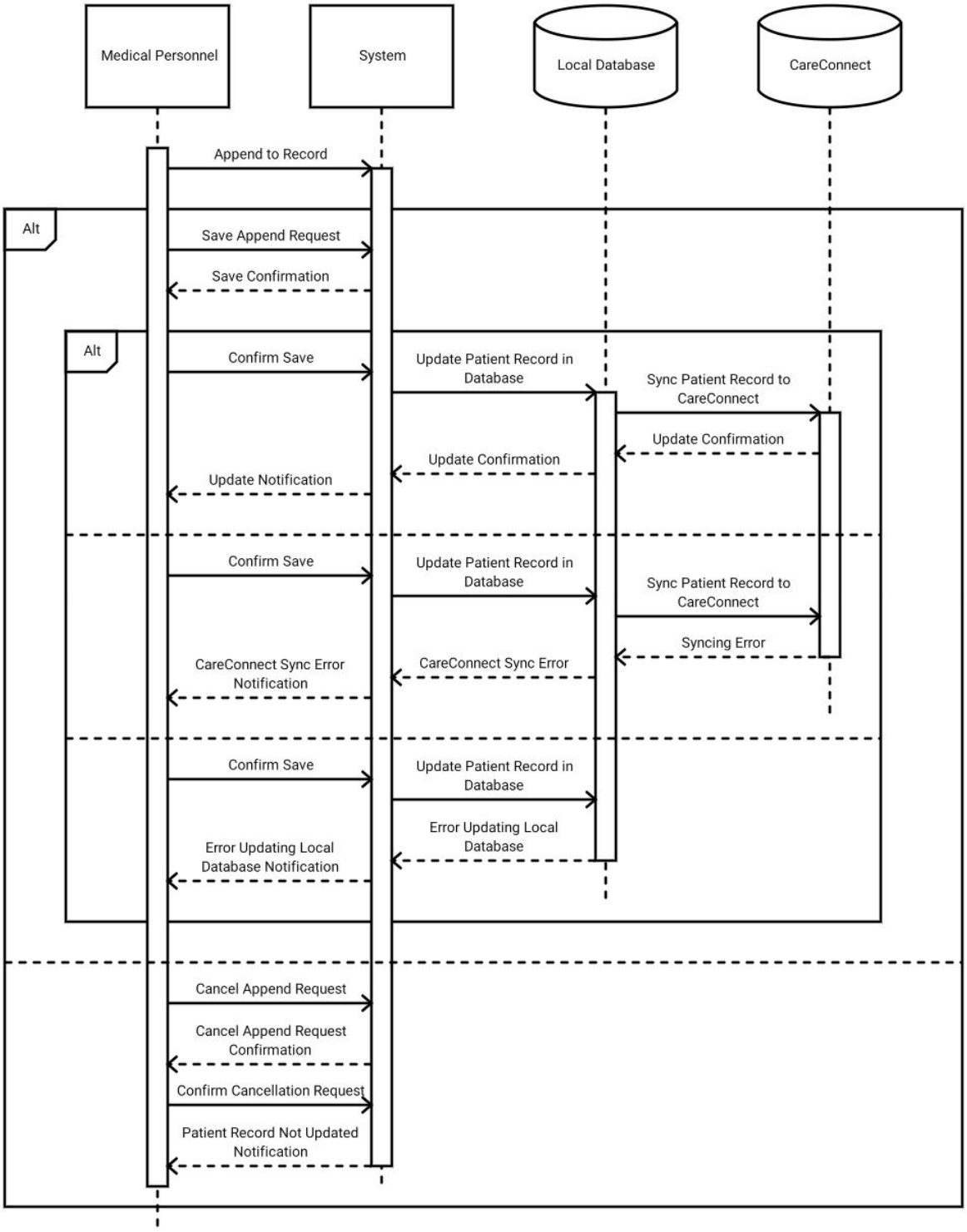
Alternate Post Condition(s):

- Local databases and CareConnect are not updated
- Error message: “An error occurred. Your changes could not be saved”

4) MP cancels the new record append request
    4.1) MP cancels the append request
    4.2) Display cancel notification: “Record Not Updated”

Alternate Post Condition: Local database and CareConnect are not updated

Sequence diagram:


Medical Personnel
System
Local Database
CareConnect
Append to Record
Alt
Save Append Request
Save Confirmation
Alt
Confirm Save
Update Patient Record in Database
Sync Patient Record to CareConnect
Update Confirmation
Update Confirmation
Update Notification
Confirm Save
Update Patient Record in Database
Sync Patient Record to CareConnect
Syncing Error
CareConnect Sync Error Notification
CareConnect Sync Error
Confirm Save
Update Patient Record in Database
Error Updating Local Database
Error Updating Local Database Notification
Cancel Append Request
Cancel Append Request Confirmation
Confirm Cancellation Request
Patient Record Not Updated Notification

UI mockups:

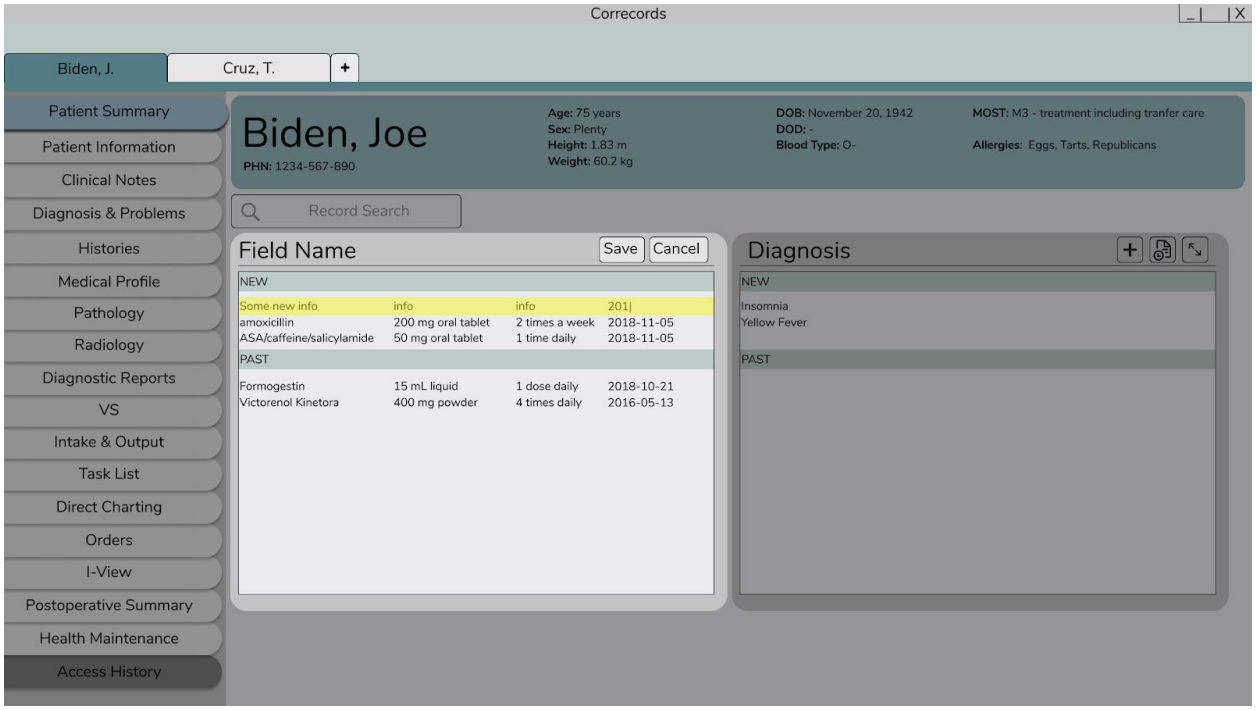


Figure 6.4-1. Selecting a record field.

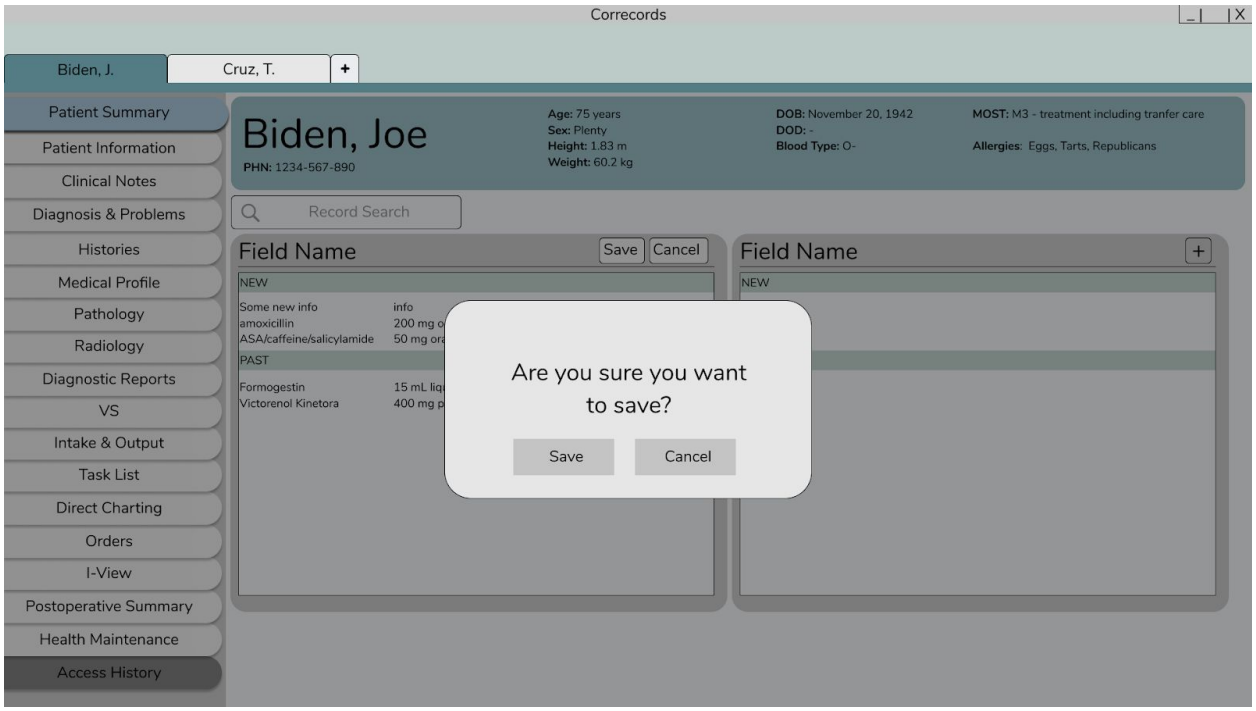


Figure 6.4-2. Saving confirmation prompt.

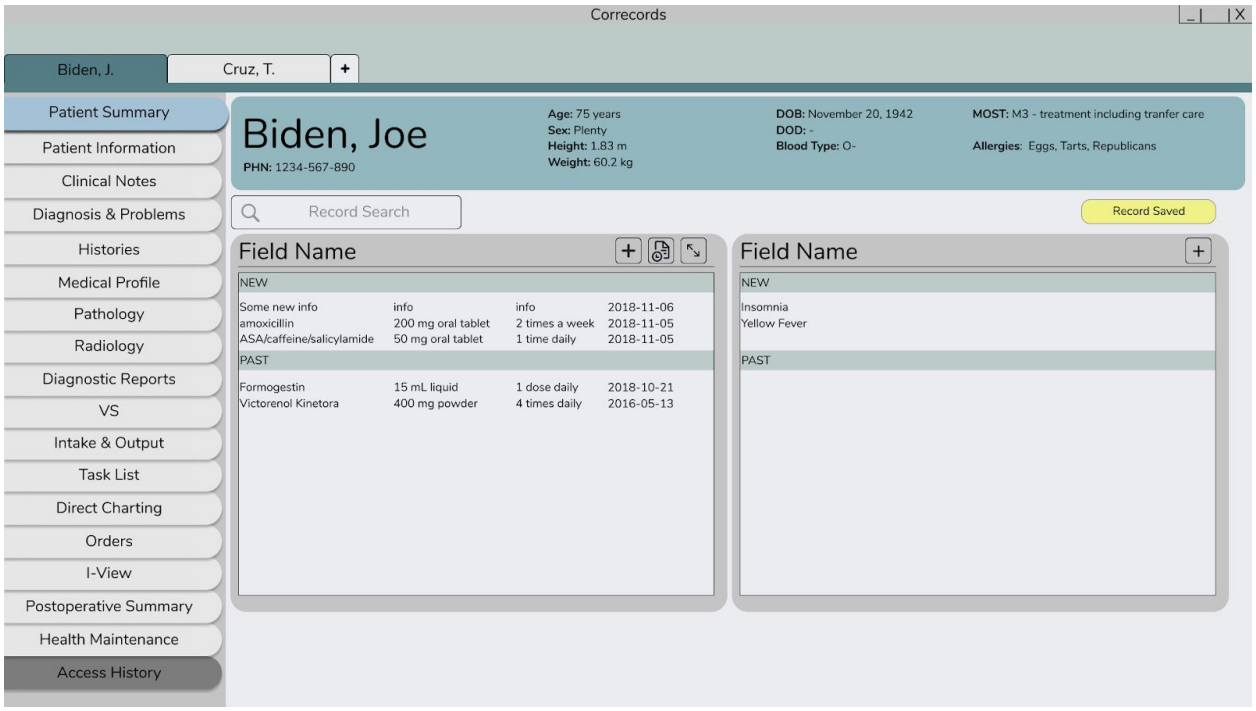


Figure 6.4-3. New append to patient record saved.

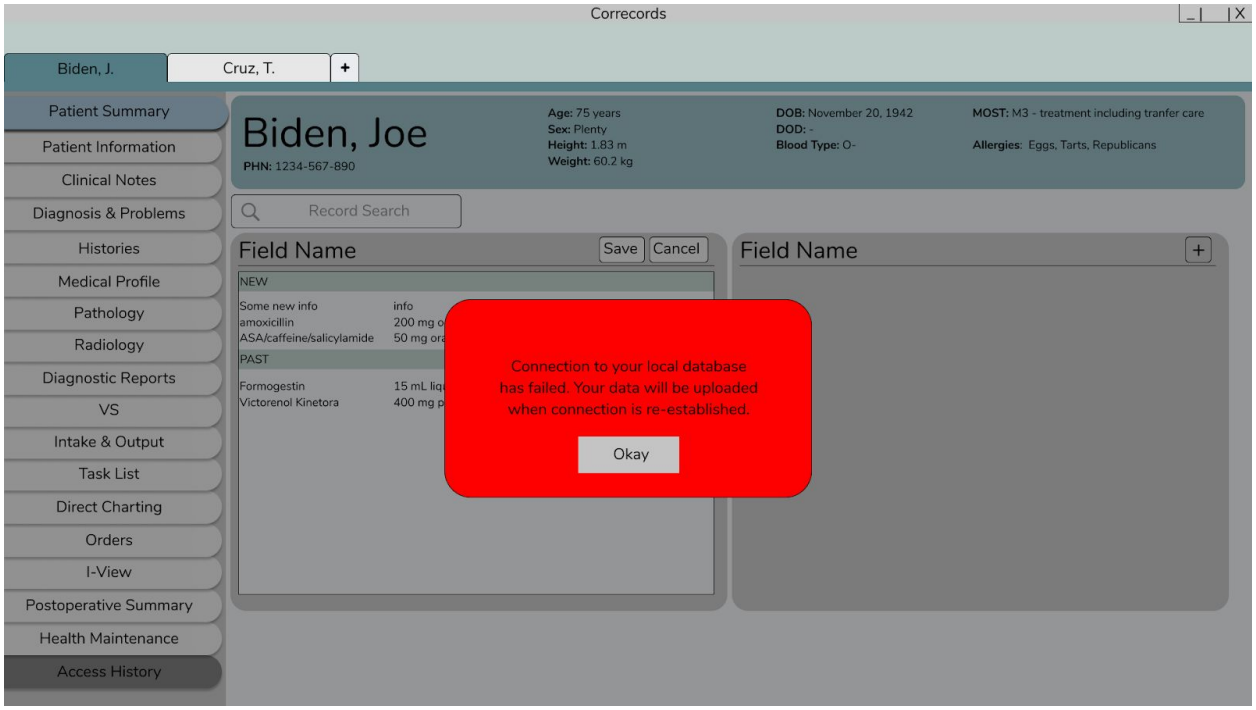


Figure 6.4-4. Connection error when saving new addition to a patient record.

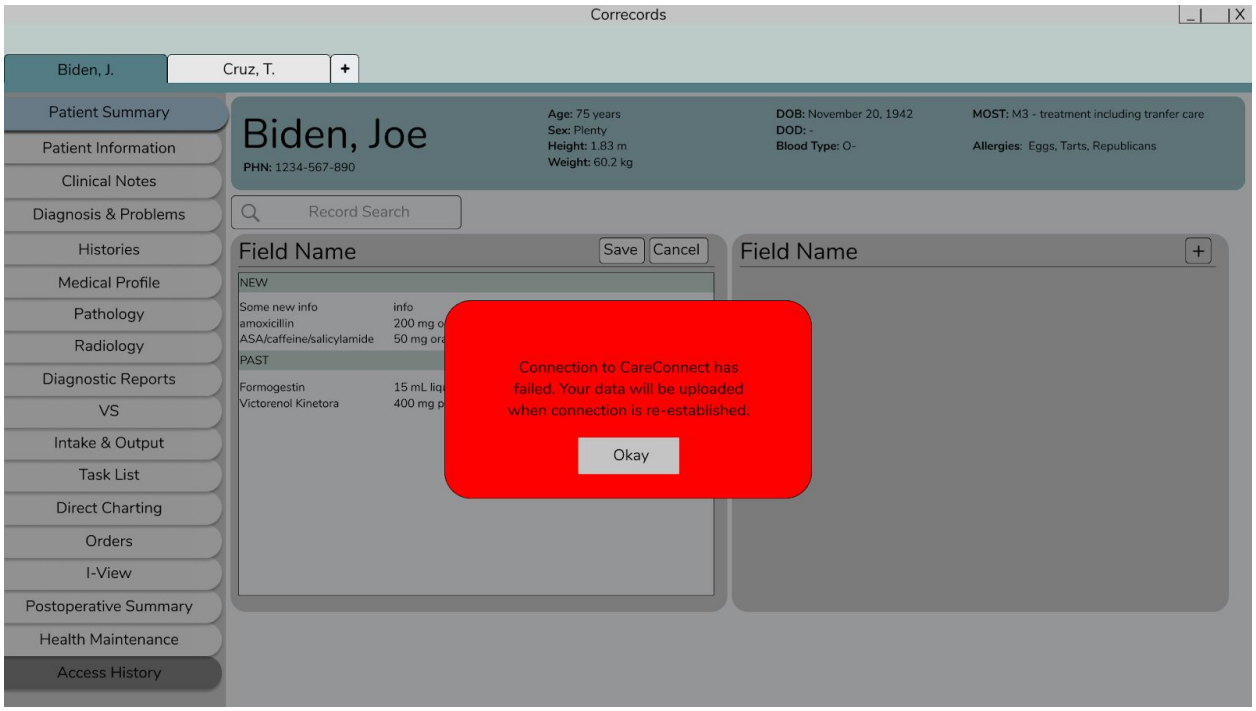


Figure 6.4-5. Connection error to CareConnect prompt.

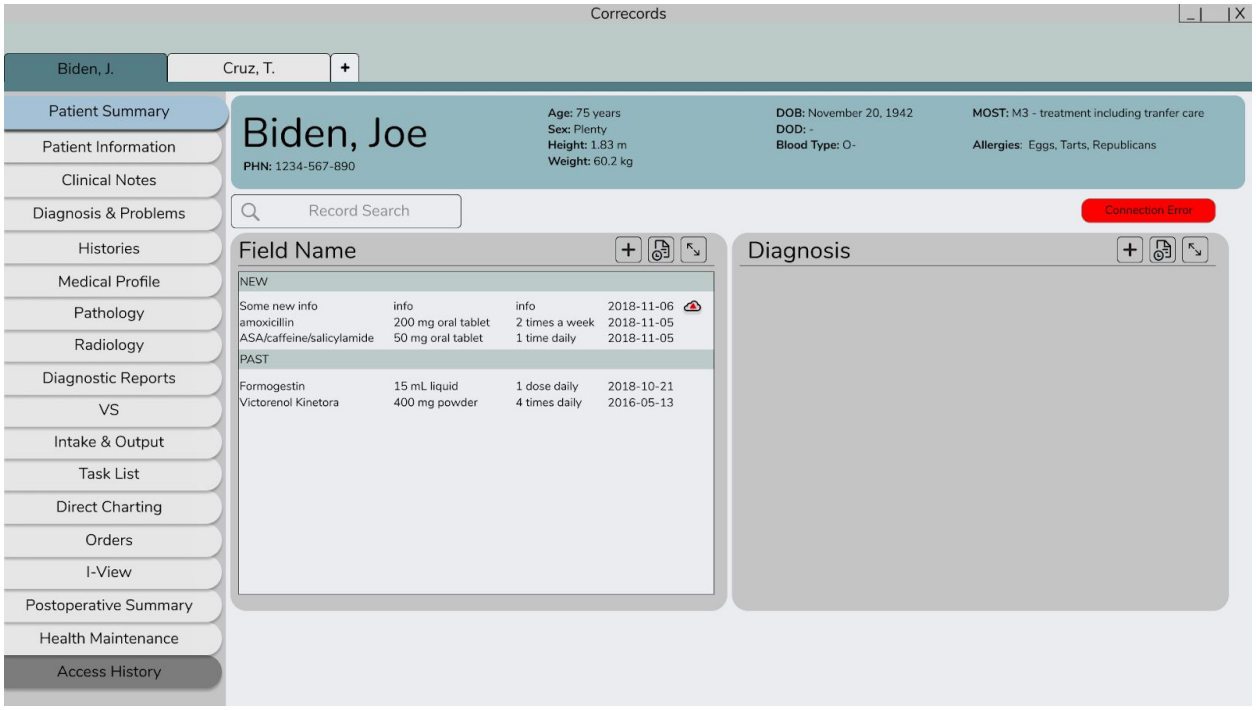


Figure 6.4-6. Connection error when saving new addition to a patient record.

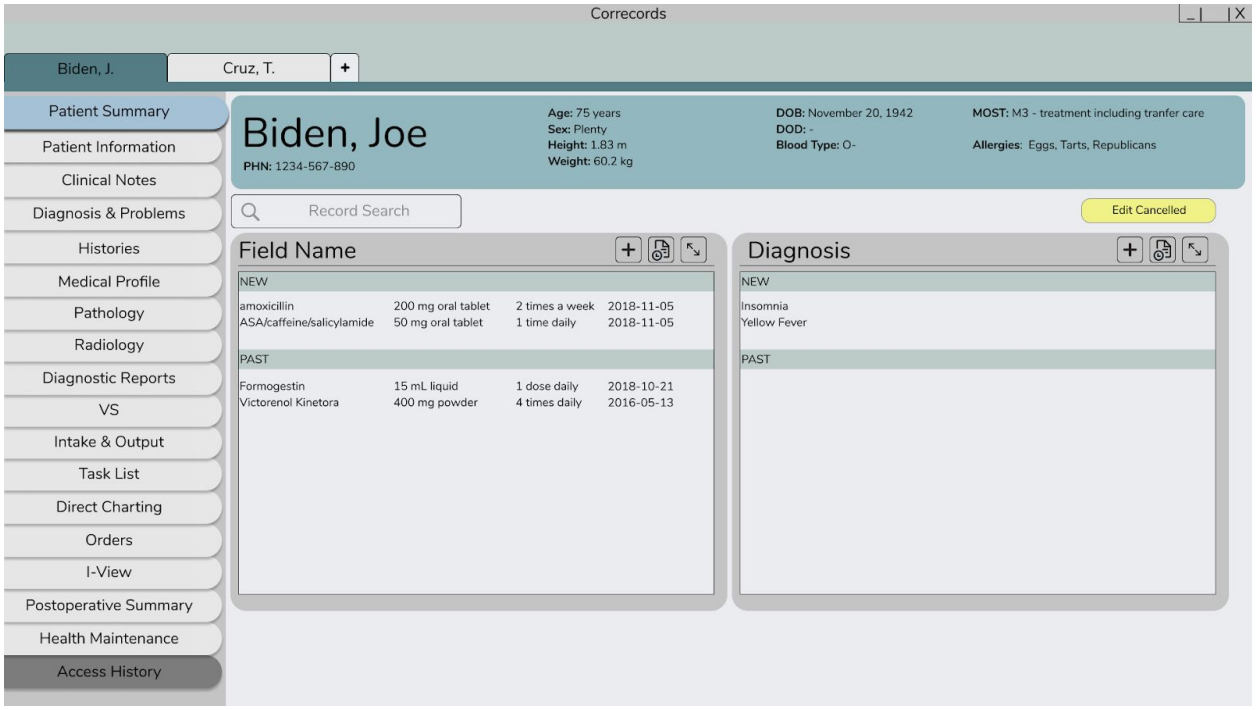


Figure 6.4-7. Patient record after edit cancellation.

Use Case 6.5 Create New Patient Record

Description: Creating a new patient record requires that the medical personnel: have access to the system (Use case 6.1), are a health manager or a doctor, and that the patient record does not already exist in the database. Health managers or doctors can create a new record by entering the initial patient data. The health manager or doctor can then choose to save the record or cancel the creation process. When a patient record is created, the timestamp is saved to the patient record.

Specifications:

Actors: Health Managers and Doctors (HM & D)

Pre-conditions: Authenticate User Account (Use case 6.1), the patient record does not exist in the local database

Steps:

1) HM & D creates a new record request
2) HM & D enters new patient data into an empty record
3) HM & D submits a new record request
    3.1) HM & D confirms the new record request
    3.2) Display confirmation notification: “Record Created”

Success Condition:

- New patient record is created
- Local database and CareConnect are updated

Alternate Path(s):

3) HM & D cancels the new record request

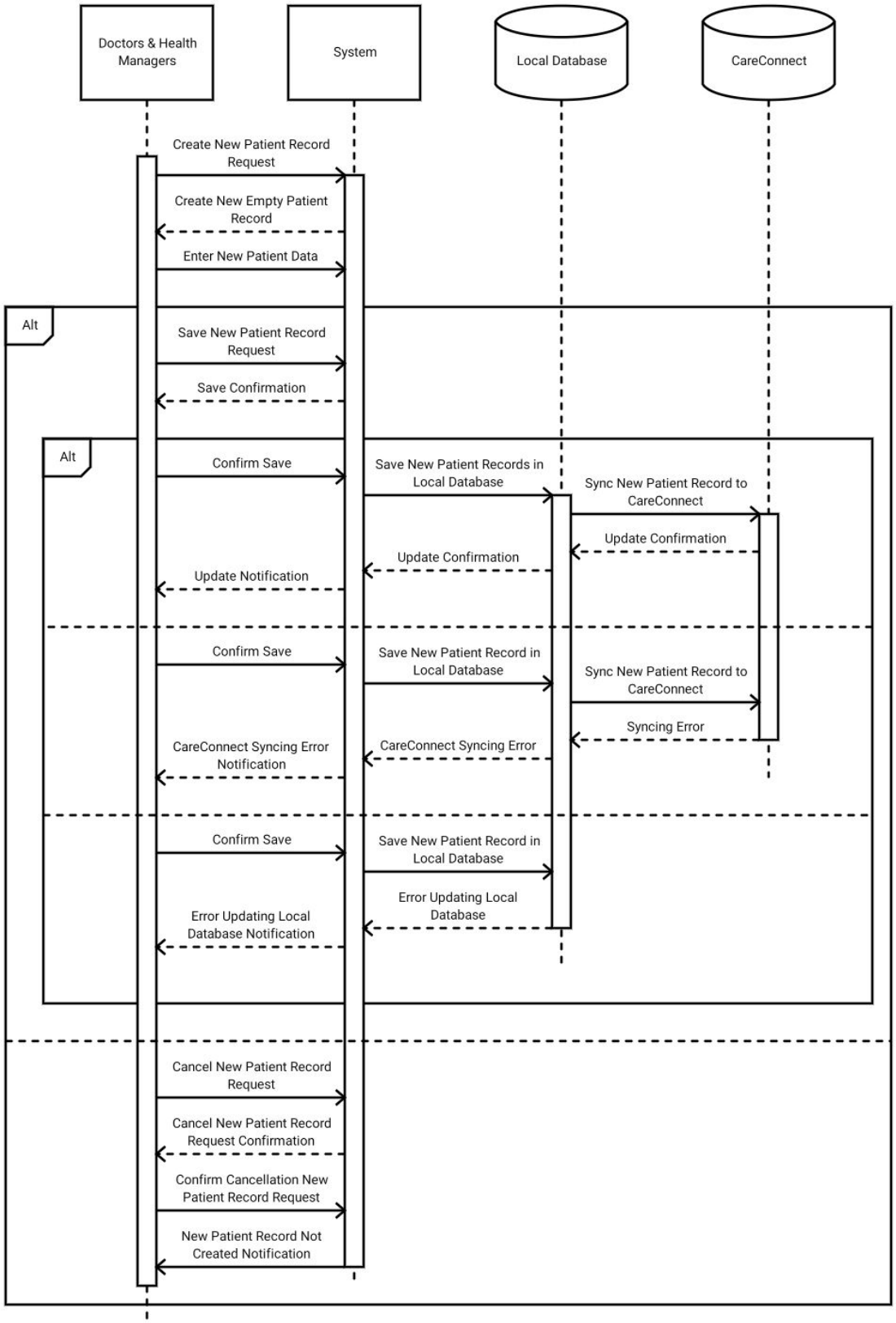
3.1) HM & D confirms the cancellation

3.2) Display cancel notification: “Record Not Created”

Alternate Post Condition:

- New patient record is not created
- Local database and CareConnect are not updated

Sequence diagram:


Doctors & Health Managers
System
Local Database
CareConnect
Create New Patient Record Request
Create New Empty Patient Record
Enter New Patient Data
Alt
Save New Patient Record Request
Save Confirmation
Alt
Confirm Save
Save New Patient Records in Local Database
Sync New Patient Record to CareConnect
Update Confirmation
Update Confirmation
Update Notification
Confirm Save
Save New Patient Record in Local Database
Sync New Patient Record to CareConnect
Syncing Error
CareConnect Syncing Error
CareConnect Syncing Error Notification
Confirm Save
Save New Patient Record in Local Database
Error Updating Local Database
Error Updating Local Database Notification
Cancel New Patient Record Request
Cancel New Patient Record Request Confirmation
Confirm Cancellation New Patient Record Request
New Patient Record Not Created Notification

UI mockups:

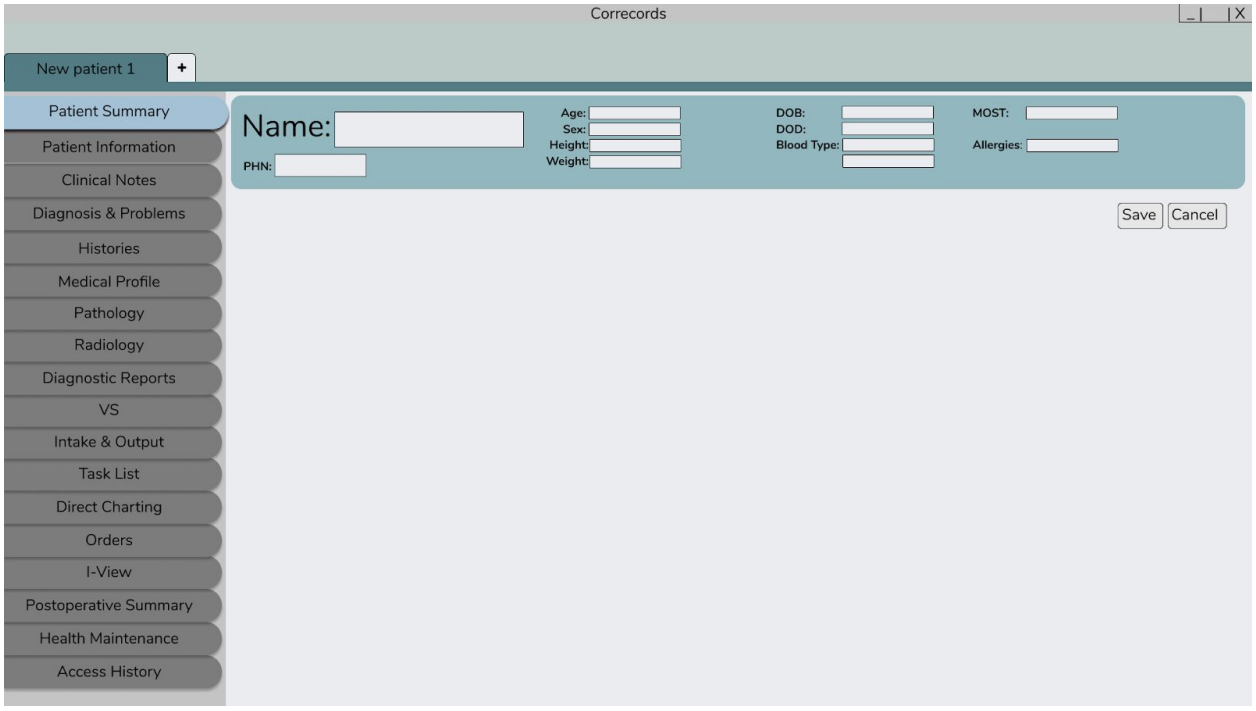


Figure 6.5. Create a new patient record.

Use Case 6.6 View Access History

Description: Only health managers can view the access history of a patient record. They can view this by selecting the “Access History” tab which is only visible to health managers. This tab is greyed out for doctors and nurses. This tab features a full history of the past record access.

Specifications:

Actors: Health Manager (HM)

Pre-conditions: Authenticate User Account (Use case 6.1), Patient record displayed (Use case 6.2)

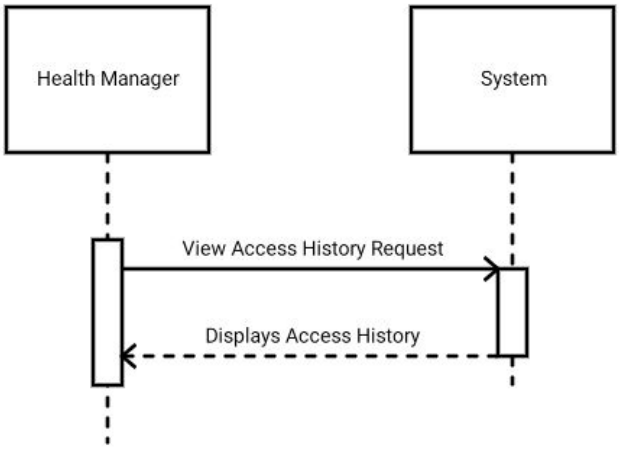
Step:

1) HM selects the “Access History” tab

Success Condition:

- History of patient record access is displayed.

Sequence diagram:



UI mockups:

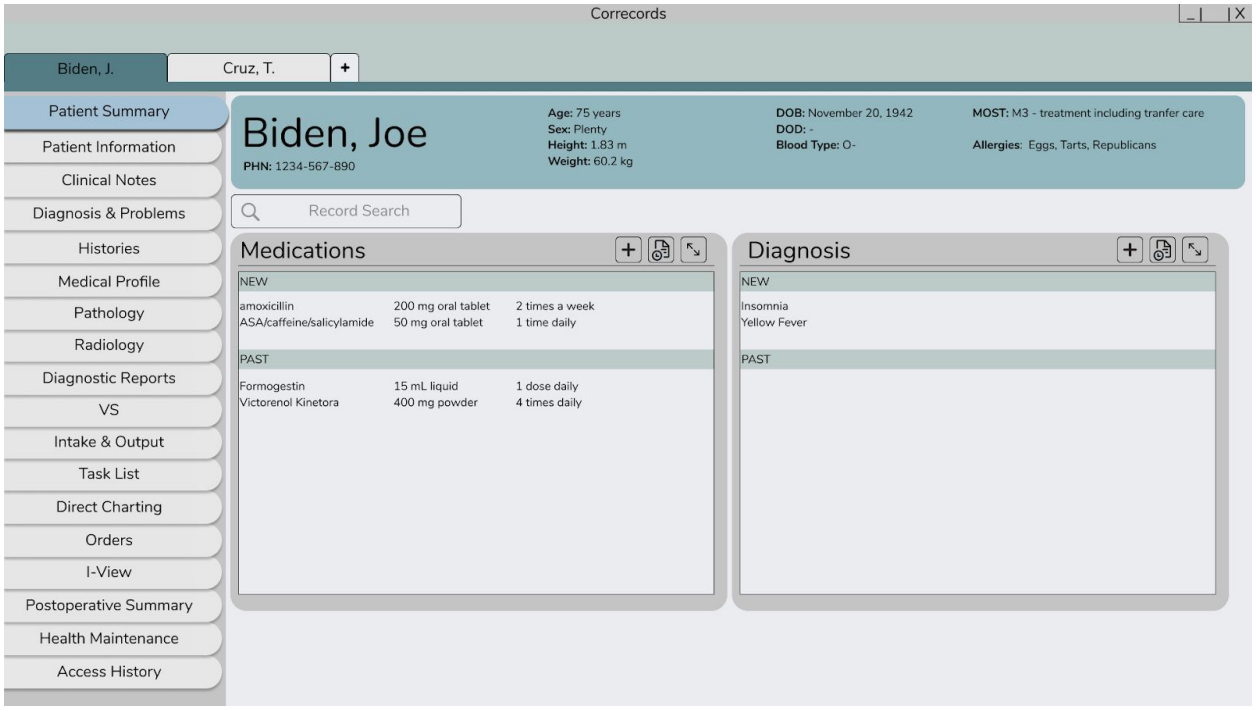


Figure 6.6-1. The health manager's view with access history.

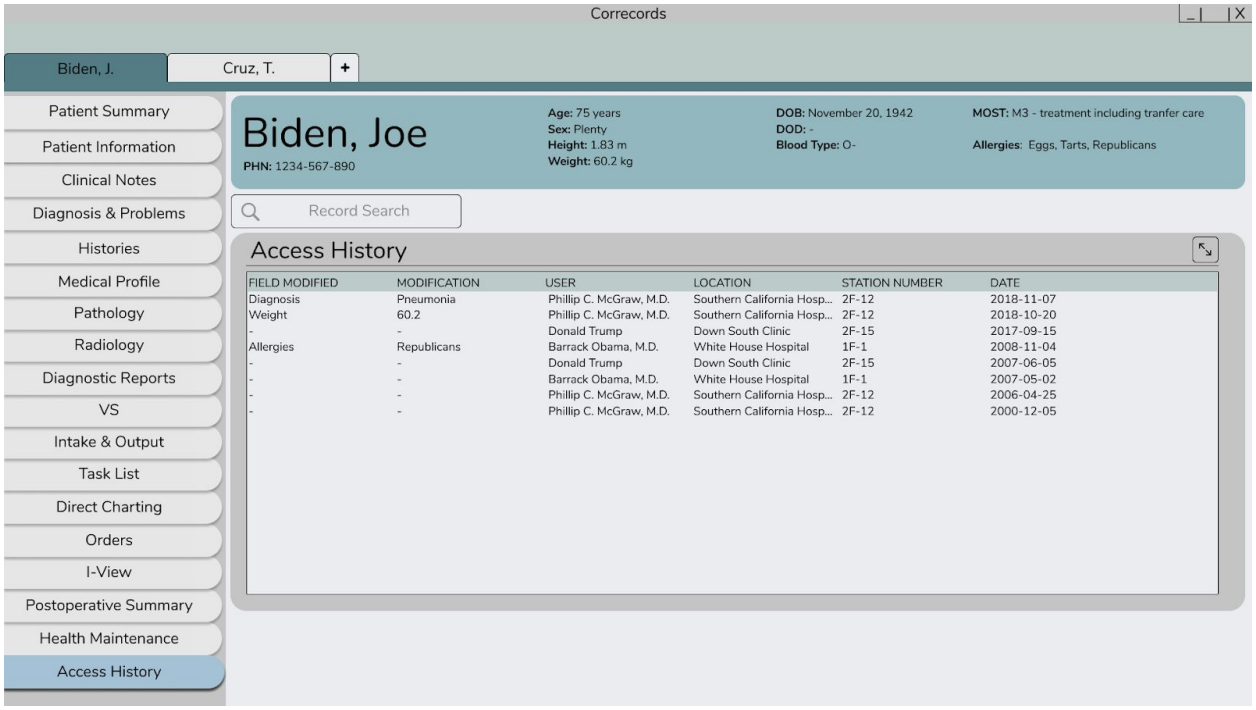
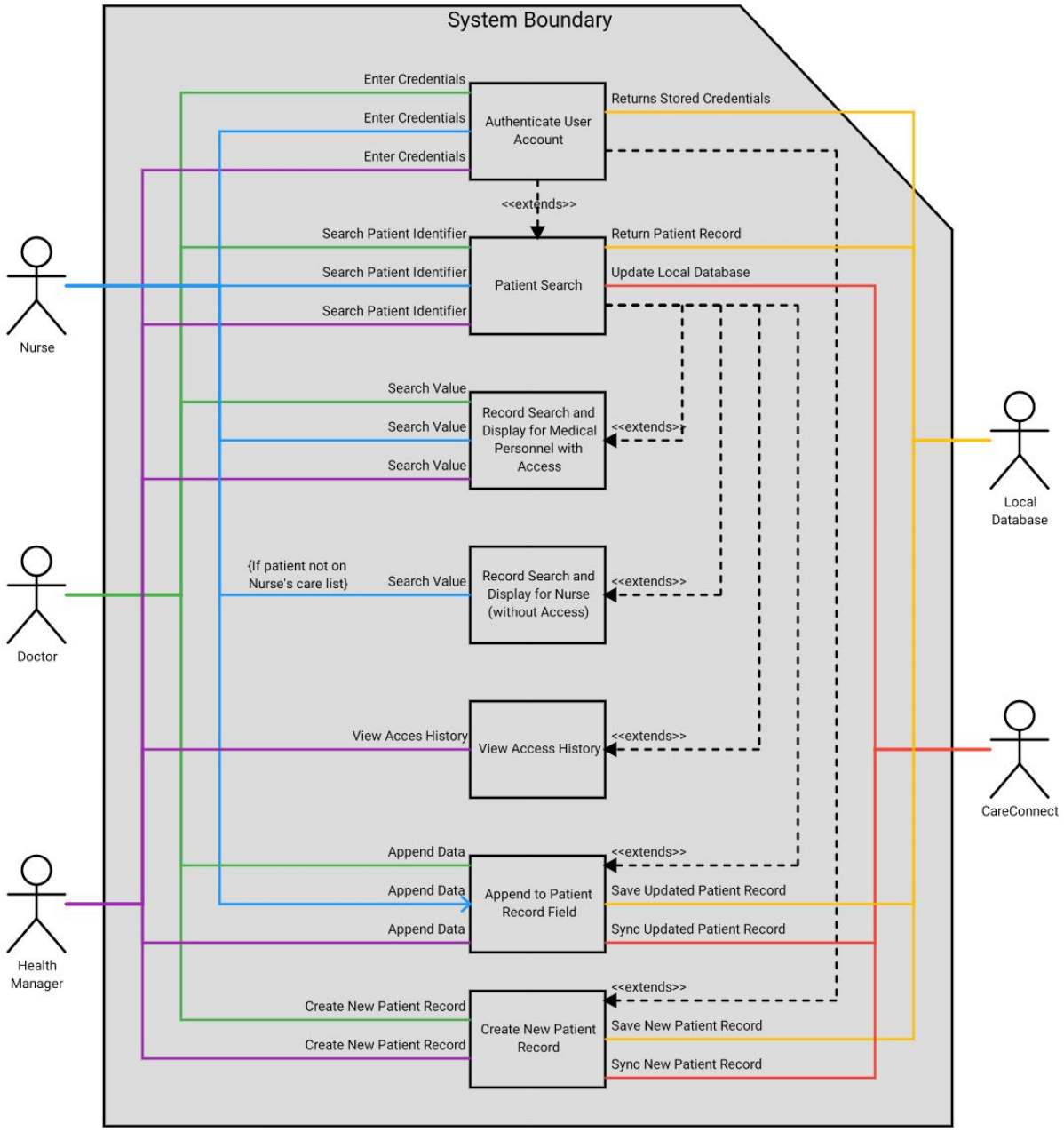


Figure 6.6-2. The access history tab.

7 Analysis Models

7.1 Use Case Model

Description: All users can authenticate user accounts. Only medical personnel can access the EMR with patient data. All medical personnel can search and append to patient records. However, only health managers and doctors can create new patient records. All updates are synced with the local database and CareConnect. Nurses can search and view record fields of patients they have access to and request access to patient records they do not have access to. Health managers can view the access history of patient records.



7.2 Entity Relationship Diagram

Description: Users have access to patient records via the EMR[1]. Each patient has information such as name, date of birth, and PHN. Each patient can have only one record with fields such as (but not limited to): allergies, medication, treatment.

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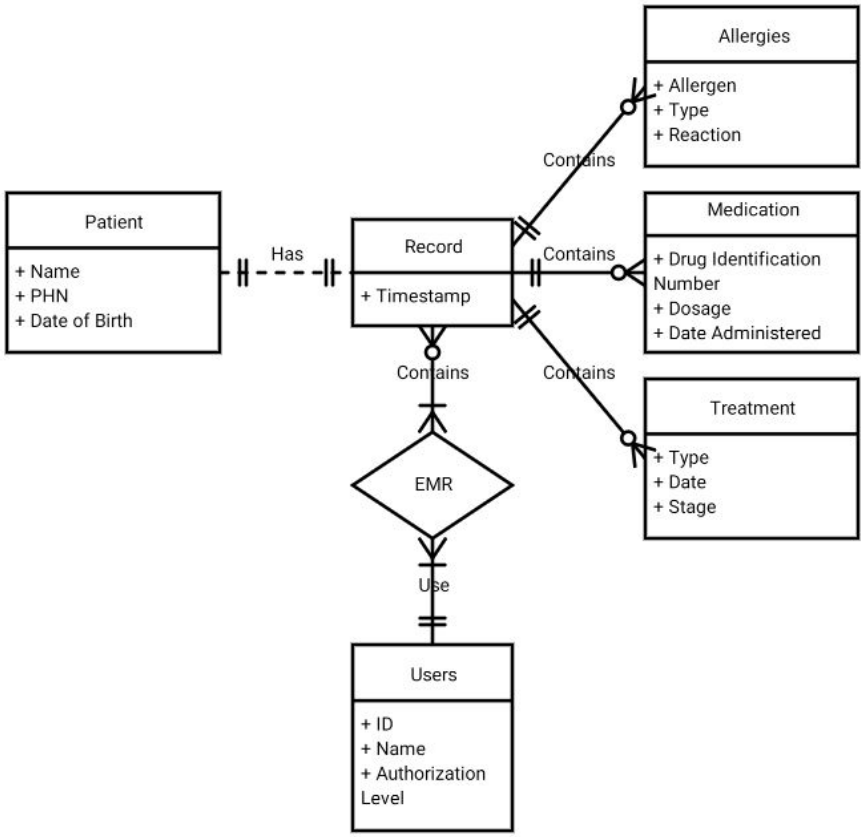
[1] IT technicians only have access to patient records in the test database.

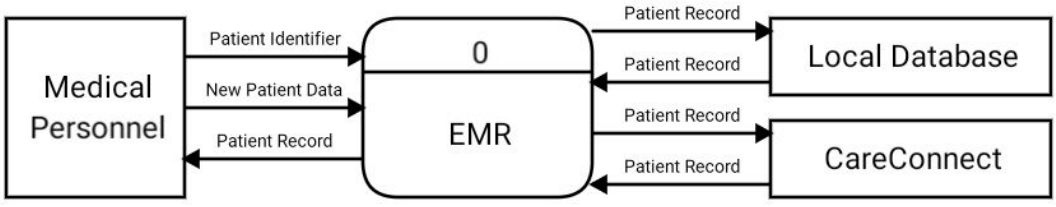


7.3 Data Flow Diagrams (DFDs)

Important Note Regarding IT Technicians:
IT technicians only interact with a test database. This is to ensure that they do not view any patient data. IT technicians have all the same workflows as all medical personnel. IT technicians and the test database were omitted from the data flow diagrams from clarity.

7.3.1 Context Diagram (DFD 0)

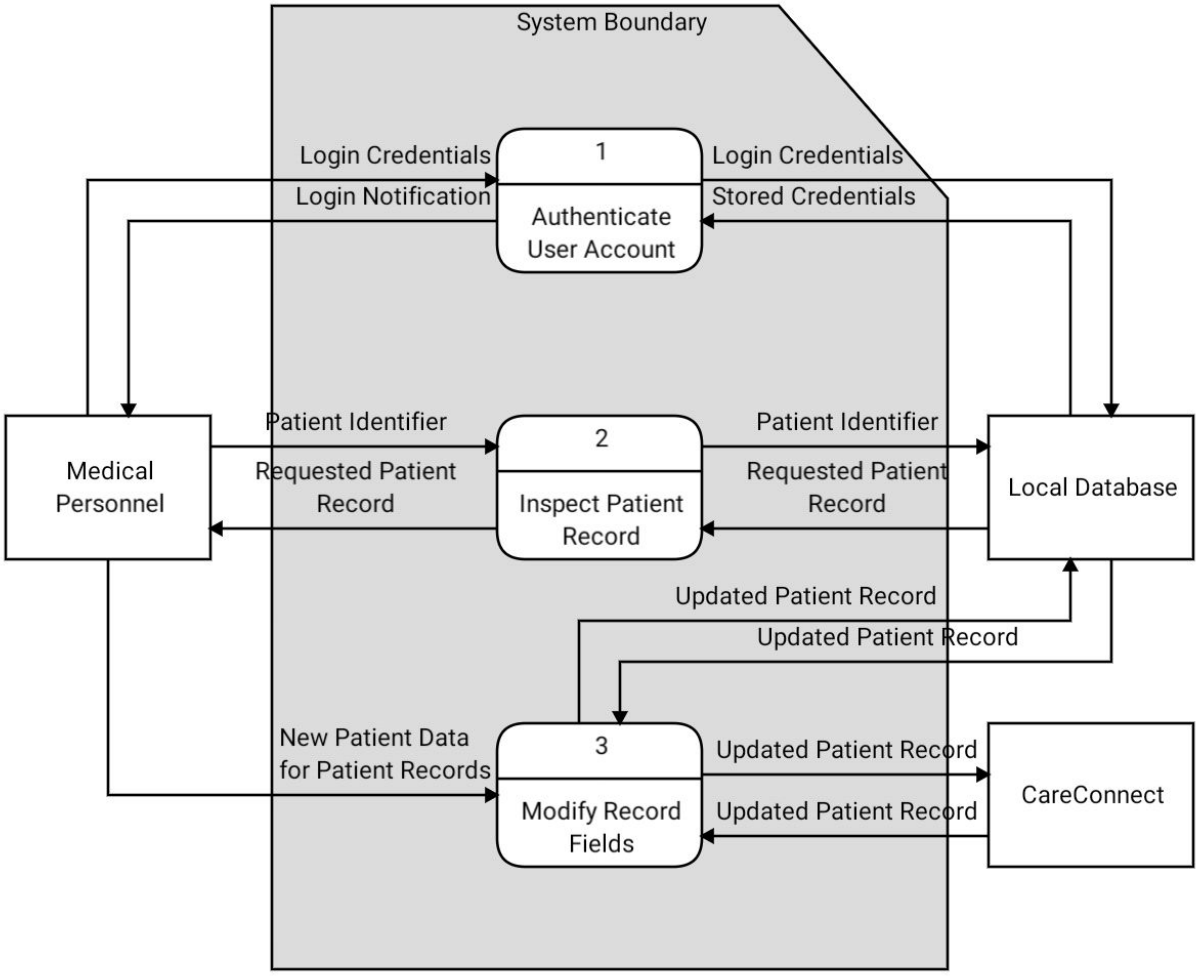
Description: Medical personnel send a patient identifier or new patient data (in the case of creating a new record) to the EMR and receive a patient record from the EMR. The EMR sends and receives patient records from the local database and CareConnect.



7.3.2 DFD 1

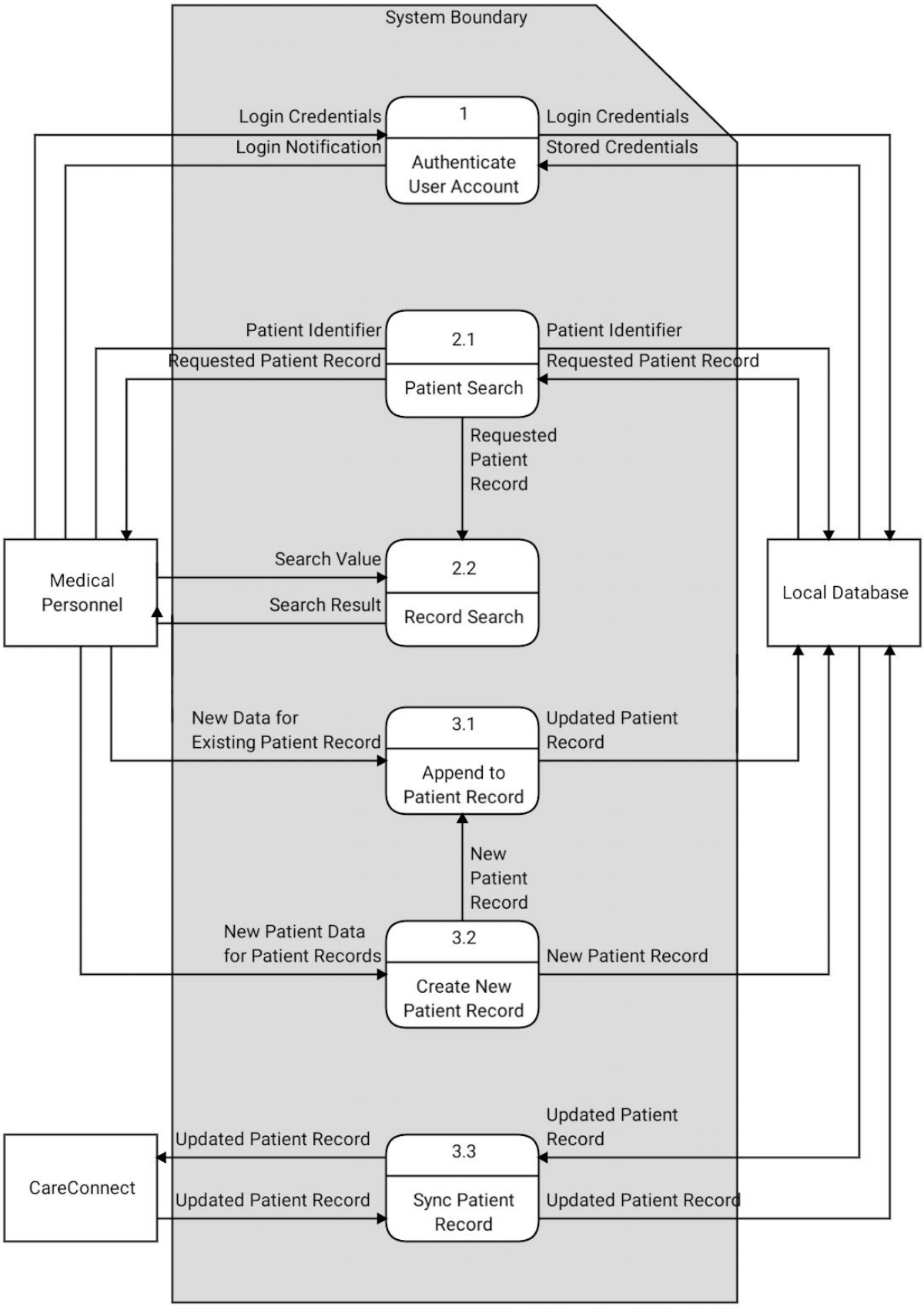
Description: Medical personnel authenticate their account which is verified with the local database. When inspecting patient records, a patient identifier and timestamp is stored in the local database.

When modifying a patient record, the new record is updated with CareConnect. IT technicians have equal functionality as medical personnel except they are strictly limited to a test database.



7.3.3 DFD 2

Description: Inspecting a record can be decomposed into patient search and record search. Modifying a record field can be decomposed into creating a new record, appending to a record, and syncing with CareConnect. IT technicians have equal functionality as medical personnel except they are strictly limited to a test database.


System Boundary
1
Authenticate User Account
Login Credentials
Login Notification
Login Credentials
Stored Credentials
2.1
Patient Search
Patient Identifier
Requested Patient Record
Patient Identifier
Requested Patient Record
Requested Patient Record
2.2
Record Search
Search Value
Search Result
Medical Personnel
Local Database
3.1
Append to Patient Record
New Data for Existing Patient Record
Updated Patient Record
New Patient Record
3.2
Create New Patient Record
New Patient Data for Patient Records
New Patient Record
3.3
Sync Patient Record
Updated Patient Record
Updated Patient Record
Updated Patient Record
Updated Patient Record
CareConnect

7.4 Diagram Glossary

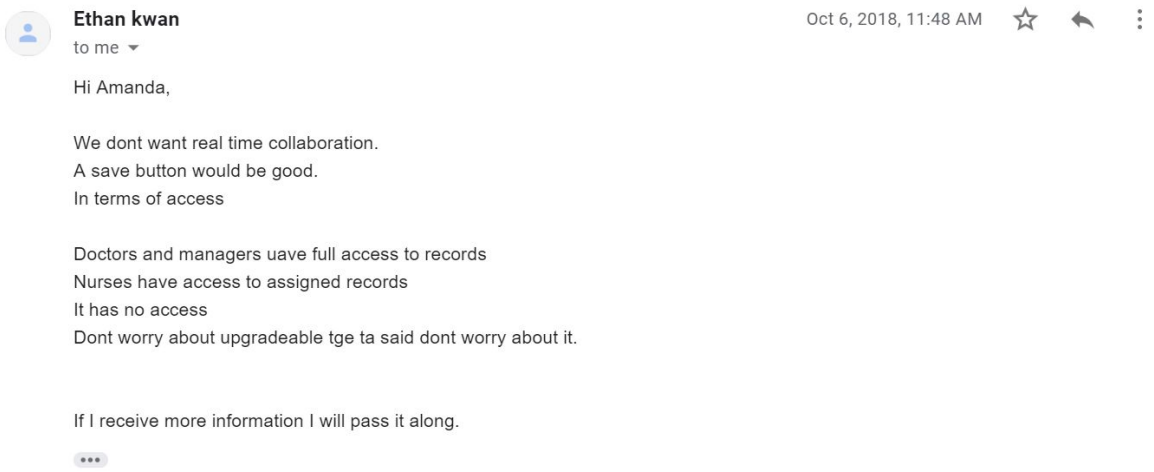
Term	Definition
Alt	Alternate path
Notification	A message prompt to notify the user
UI	User interface

Appendix A: Issues List

Issue	Description	Date
Forward Traceability	How all functional requirements will be verified is TBD in RSD 2.0.	Nov-26th-2018
DFD 2	DFD 2 needs to be modified to reflect that nurses cannot create a new patient record and health managers can view access history. This will be addressed in RSD 2.0.	Nov-26th-2018
Logout button	Not currently in the UI. Will be implemented for RSD 2.0	Nov-26th-2018

Appendix B: Client Correspondence

B.1: Email with Ethan Kwan from Group 3.



Ethan kwan Oct 6, 2018, 11:48 AM

to me

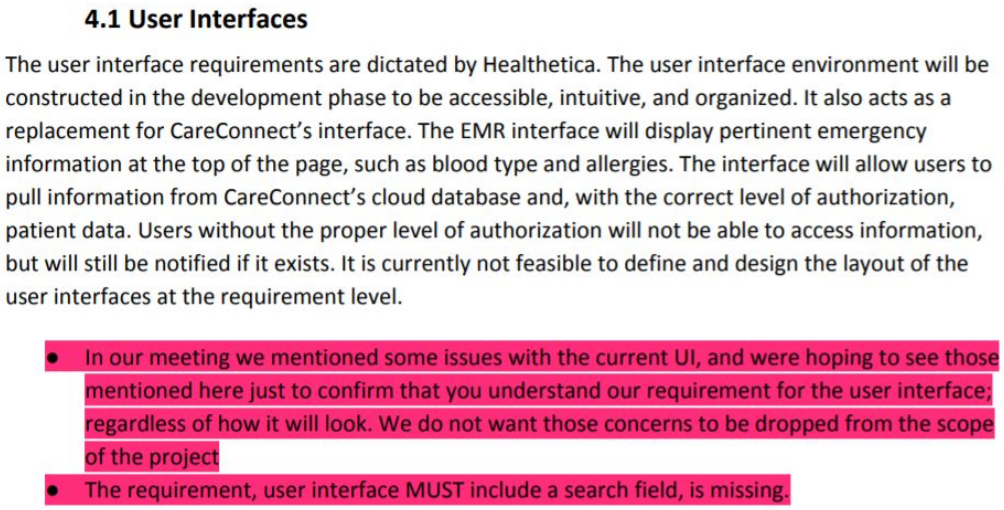
Hi Amanda,

We dont want real time collaboration.
A save button would be good.
In terms of access

Doctors and managers uave full access to records
Nurses have access to assigned records
It has no access
Dont worry about upgradeable tge ta said dont worry about it.

If I receive more information I will pass it along.

B.2: Comment from Group 3 on the RD1.1 indicating the need for a search bar.



4.1 User Interfaces

The user interface requirements are dictated by Healthetica. The user interface environment will be constructed in the development phase to be accessible, intuitive, and organized. It also acts as a replacement for CareConnect's interface. The EMR interface will display pertinent emergency information at the top of the page, such as blood type and allergies. The interface will allow users to pull information from CareConnect's cloud database and, with the correct level of authorization, patient data. Users without the proper level of authorization will not be able to access information, but will still be notified if it exists. It is currently not feasible to define and design the layout of the user interfaces at the requirement level.

- In our meeting we mentioned some issues with the current UI, and were hoping to see those mentioned here just to confirm that you understand our requirement for the user interface; regardless of how it will look. We do not want those concerns to be dropped from the scope of the project
- The requirement, user interface MUST include a search field, is missing.

B.3: Comment from Group 3 on the RD1.1 indicating zero removal of data.

5.2 Security Requirements

5.2.1 Levels of Authorization

Authorized users must comply with the security requirements to keep the whole system operating safely and efficiently. The following will be security requirements for the EMR:

- Only authorized users may enter or change any data.
  - Please confirm that users cannot change ***any*** data

B.4: Comment from Group 3 on the RD1.1 indicating the need for a paper trail.

REQ-3.1.2: Patient records are updated automatically so requested files from any medical institution are correct.

- Is there a paper trail to compare past updates to a document? Updating automatically does not mean "correct", so it is important to be able to rollback or see who made changes to contact them for resolving disagreements

B.5: Email from Group 3 clarifying their stance on IT classes and the access workflow for nurses.

Ethan kwan Nov 2, 2018, 8:31 AM (2 days ago)
to me

Dear Alohomora Solutions,

Thank you for the entertaining and informative presentation today (and the candy!). As requested, we have our list of adjustments and clarifications we would like to inform you of.

1. It was noted that a patient record could not be created without a minimum set of data (Phone Number, Address, etc.) and that this data will not always be available (take, for example, the case of an unconscious patient without identification). This means that there is no way to store any information regarding the patient into Correcords until the patient is identified. We would like to request a feature (of low priority relative to other features) that would allow us to store patient visit information temporarily until the patient can be identified.
2. We understand your decision to exclude IT as a user class; however we would still like if IT could be able to log in and interact with the user interface (even if they can't do anything, just so they can see, to some extent, what doctors and nurses deal with as they traverse through Correcords). Even a single login for all IT members would satisfy this, where they cannot view ANY patient records.
3. This pointer completely disregards IT, as they should not be able to view any patient information for any reason. A few inconsistencies and misinterpretations have aroused during communication regarding searching of fields that users do not have access to. We have requested that nurses, under normal circumstances, cannot view fields of patients that they are not assigned to. However, they should be able to under emergency circumstances. Nurses should see fields that they do not have access to grayed out (that is, see the form name but not the field data inside it). Ideally, under emergency circumstances, a nurse should be able to search a field, and if it is grayed out, be able to click on it anyways. At this point the nurse should see a confirmation box that warns them that they do not have access. If they wish to continue anyways, they should be granted access to the record, and a notification should be sent to health managers. As always, their viewing of the record should be logged in the record.
4. We are not sure if this feature is already implemented, but if it is, we request that it be explicitly stated in the RSD under all relevant sections. Whenever a record is created or edited, along with the log of versions should include who performed the edit/creation that lead to that version.

Please let us know if you have any questions regarding the above information.

Thank You,

Healthetica Inc.