Software Requirements Specification

for

Electronic Medical Information System (EMIS)

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# Introduction

## Purpose

This Software Requirements Specification document has been created in order to guide the software development team in creation of the Electronic Medical Information System (EMIS) and allow stakeholders to view the design aspects. It describes in detail who will be able to use the system and the functionality of what can be performed by each user.

## Scope

The software being created is called the Electronic Medical Information System(EMIS). It will provide patients, doctors, nurses, clinical staff, insurance agencies, pharmacies, and lab facilities a way to communicate with greater efficiency and security than current paper methods. A patients medical history and current care will all be consolidated to a single system that allows selected access to view what each party member requires. It will not replace physical visits between a patient and doctor. The EMIS will allow documentation of all sorts, including scanned images, audio recordings, prescriptions, lab orders, vital readings, diagnosis’, and medical history to be accessed remotely.

## Acronyms, abbreviations, notational conventions

## Overview

*The rest of this document contains the functional requirements for the EMIS. It contains a Use Case Diagram with a description and detailed table description for each identified use case. There is also a Class Diagram and description for how the different facets of the software will interact within the system.*

## References

IEEE Computer Society. Software Engineering Standards Committee, and IEEE-SA Standards Board. "IEEE Recommended Practice for Software Requirements Specifications." Institute of Electrical and Electronics Engineers, 1998.

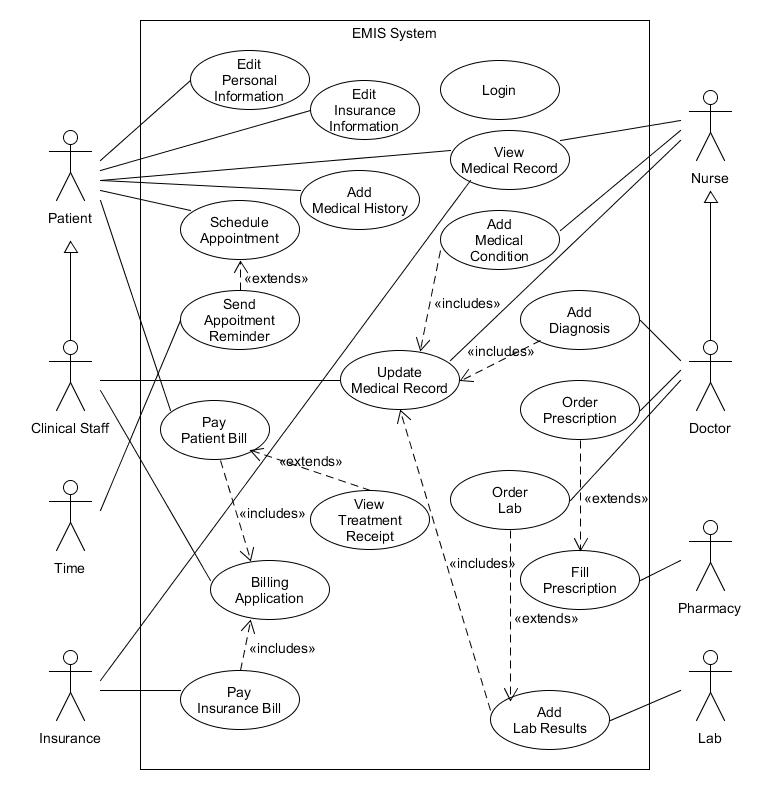
# Specific Requirements

## Functional Requirements

### Use Case Diagrams and Description

Figure 1 shows the Use Case Diagram for the EMIS system. The first use case, UC-01: Login, is connected to every other use case through the <<includes>> relationship. All actors must first succesfully login before performing any other actions within the system. Our diagram also shows that the Clinical Staff is a child of the Patient actor, as well as the Doctor is a child of the Nurse actor. Both the Clinical Staff and Doctor actors are able to perform any of the actions of their parents in addition to their own individual options. The “AddLabResults”, “AddDiagnosis”, and “AddMedicalCondition” are connected to “UpdateMedicalRecord” via the <<includes>> relationship as well because it must be updated each time they are submitted. This also happens with the “BillingApplication” and <<includes>> relationship between “PayPatientBill”, and “PayInsuranceBill”. Using the Time actor, the “SendAppointReminder” can be actived as an extension of the “ScheduleAppointment” use case.

Figure 1: Use Case Diagram



### Class Diagrams and descriptions

Figure 2 shows the Class Diagram for the EMIS system. It gives a more detailed description of how the classes and features of the EMIS will interact with each other and the users of the system. All information and interactions are connected to the MedicalChart. It can store multiple medical records, each which contains information from a patient visit. A patient will have multiple medical records as the doctors, nurses, and clinical staff update the system with information about the patient. A medical record will have information relating to vitals, diagnosies, prescriptions, lab results, receipt of treatments performed, and medical history. It can also include any physical documentation or photos scanned into the system as well as audio recordings. The patient, clinical staff, nurse, and doctor will be allowed varying access to the medical chart. Doctors are allowed to submit diagnosis, order tests and prescriptions, but the patient can only view this information after the medical record has been submitted. The pharmacy and lab will have access to both the prescription information, insurance information, and personal information in order to bill the proper parties for their services. Clinical staff and patients can access the message system in order to schedule appointments which are added to the doctor’s calendar. Time will monitor when a patient’s appointment is drawing near and send a reminder through the messaging system to the patient. The billing system allows the clinical staff to bill both the insurance and patient directly. If the patient is covered by insurance, they can submit just the co-pay amount rather than the full billed amount of services rendered.

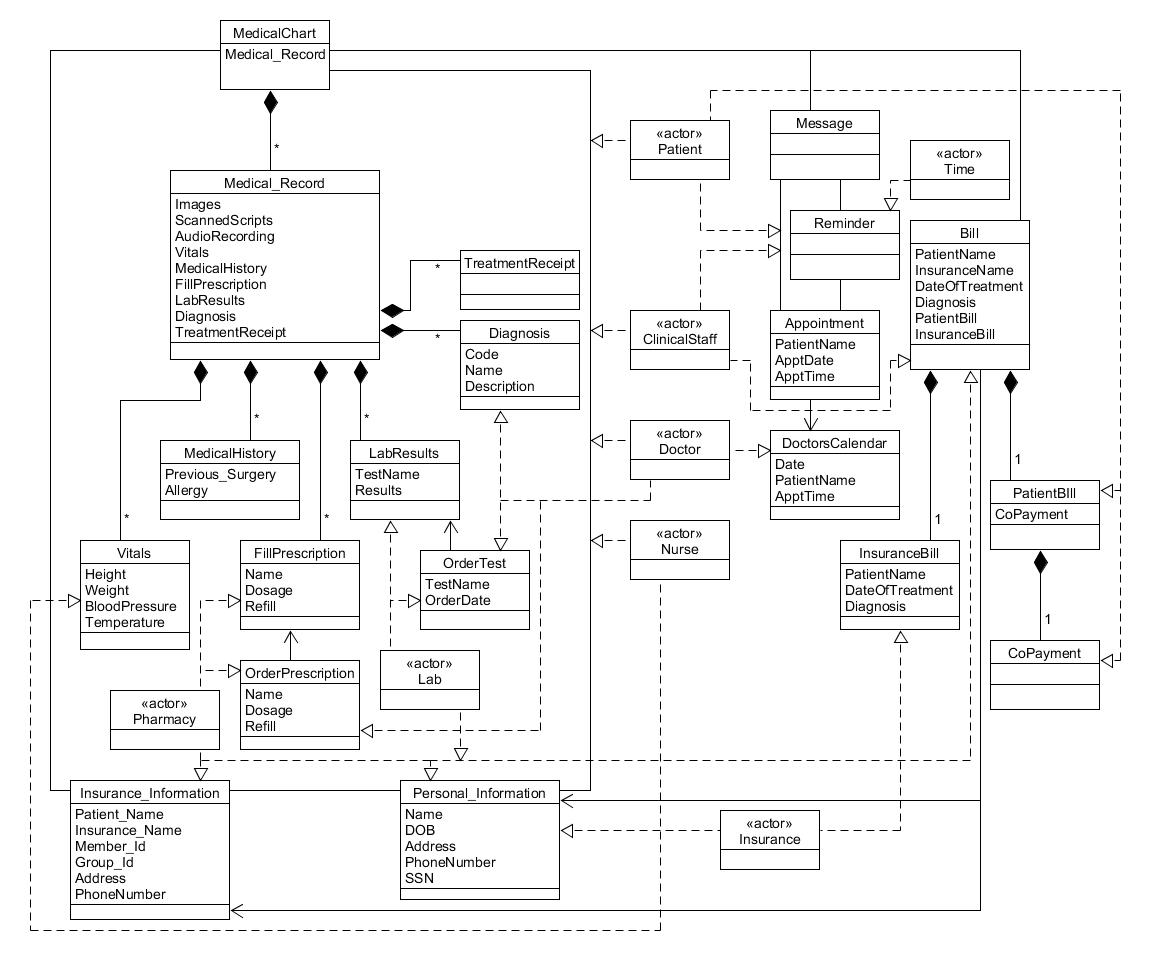


Figure 2: Class Diagram

### GUI Screenshots and Walkthrough

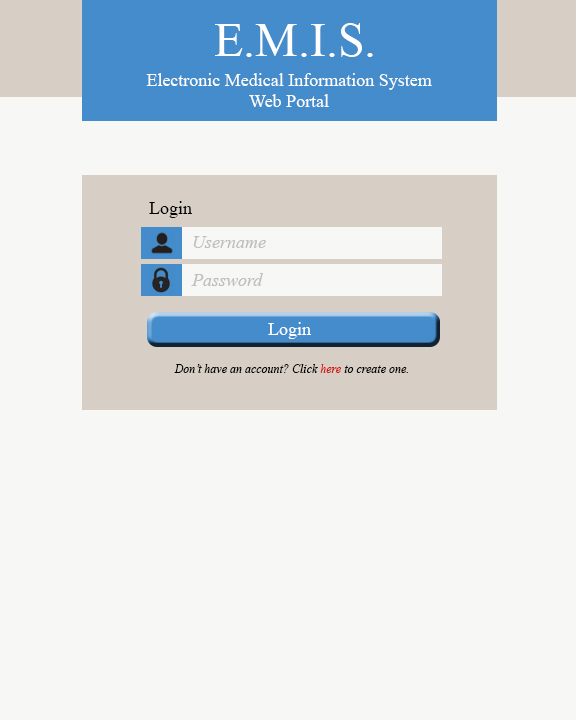
This is the main login page. The user will enter their username and password then click the Login button. If the user does not have an account, they can click the link below the login button to request a new account.

Figure 3: GUI Login

After the login button is clicked, the main page will load. The main page is unique for each of the account types: Patient, Clinical Staff, Nurse, Doctor, Pharmacy, Laboratory, and Insurance. We’ll follow the patient options first.

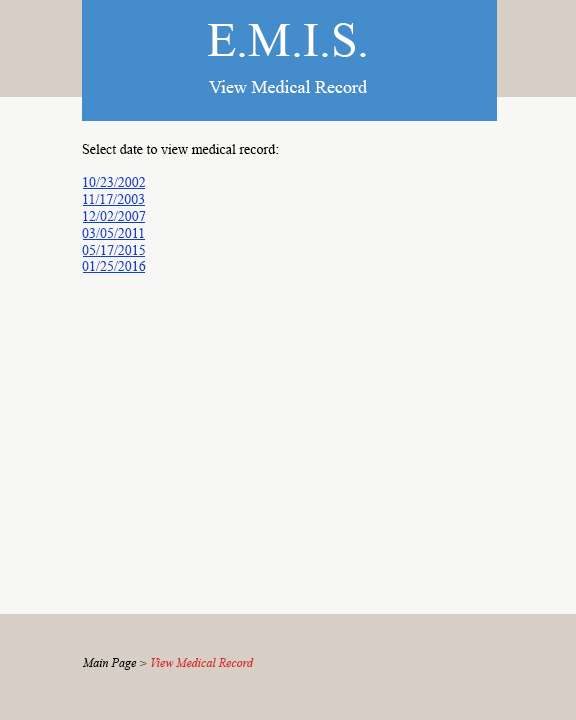
Patient Main: User clicks on “View Medical Record”

Figure 4: GUI Patient Main - “View Medical Record”



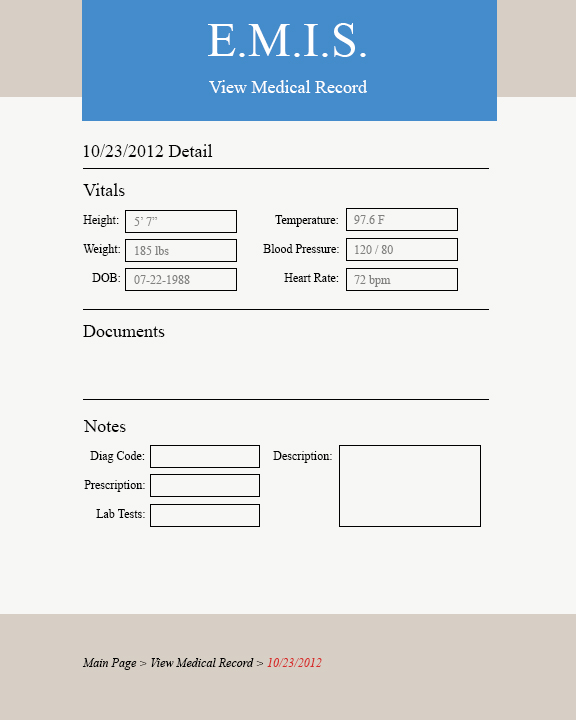
A listing of medical records will be shown by date. Then a date is selected and clicked.

Figure 5: GUI Patient - Select Medical Record



The medical record for the date chosen is shown in detail. The patient can view the information but cannot change any details. At the bottom, they can then click the “Main Page” link to return to the patient main page.

Figure 6: GUI Patient - View Medical Record



The patient selects “Add Medical History” to add past events as a medical record into their medical chart.

Figure 7: GUI Patient Main - “Add Medical History”



In this section, the patient enters the date of the history item, the description of the surgery, visit, or treatment, and upload any additional documentation they may have. Clicking the “Submit History” button will add the item to the database and return the user to their main page.

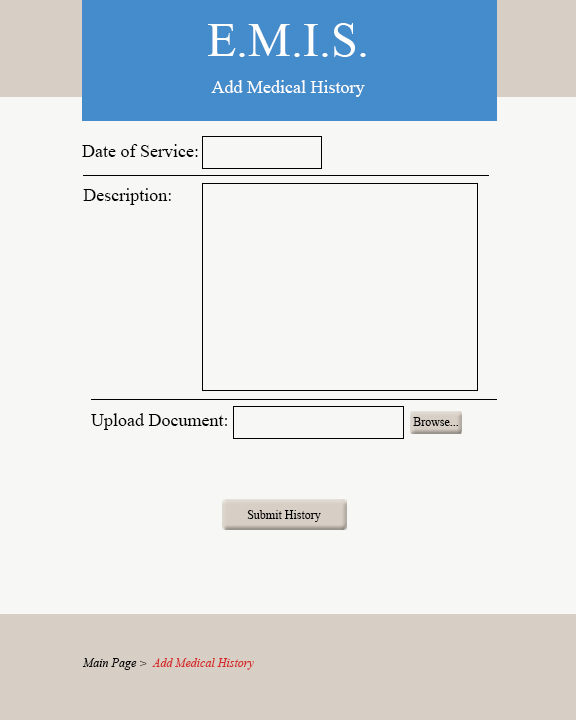


Figure 8: GUI Patient - Add Medical History

The patient clicks “Update Personal Information”.

Figure 9: GUI Patient Main - "Update Personal Information"



Here the patient can view all their personal information and update anything as needed. When complete, they can click “Submit Updates” which will update the database and take them back to the main page.

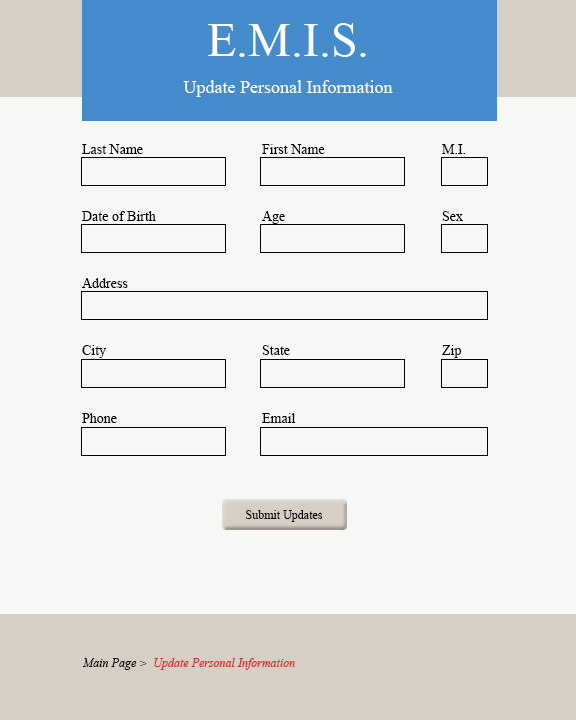


Figure 10: GUI Patient - Update Personal Information

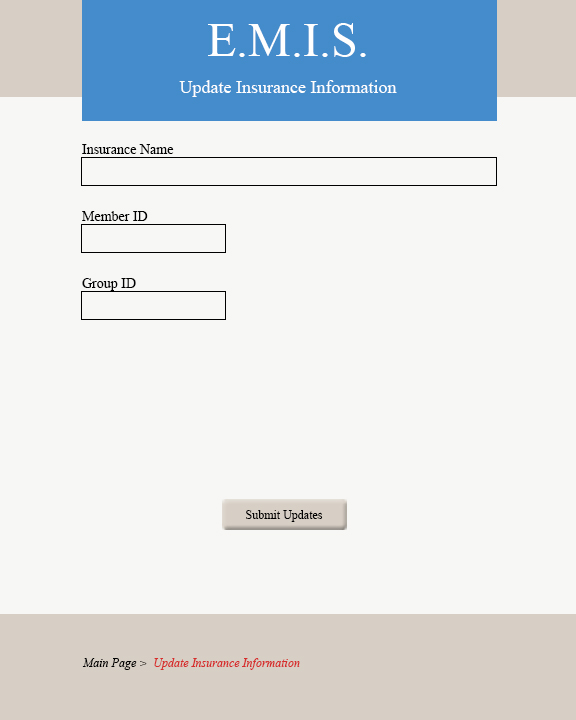
The patient selects “Update Insurance Information”.

Figure 11: GUI Patient Main - "Update Insurance Information"



The patient can view or update their insurance information. When “Submit Updates” is clicked, they care taken back to the main page.

Figure 12: GUI Patient - Update Insurance Information



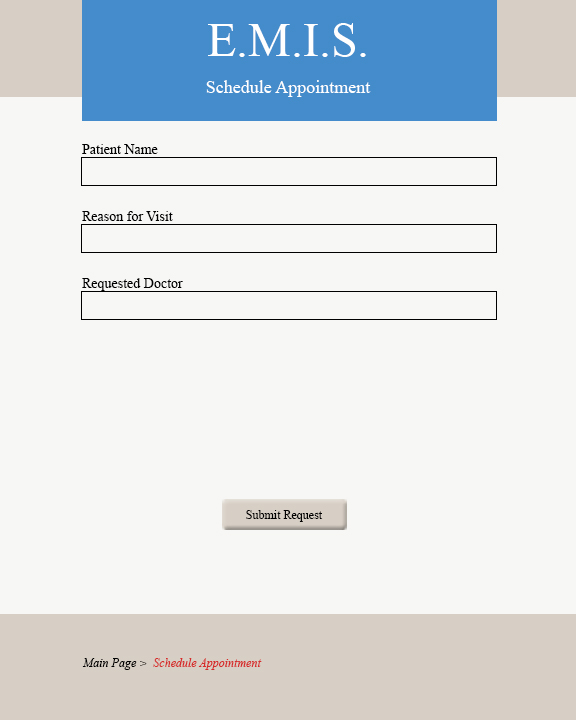
The patient selects “Schedule Appointment” from the main page.

Figure 13: GUI Patient Main - "Schedule Appointment"



The enters their name, reason for visit, and the doctor they’d like to see and clicks “Submit Request”. An email is then sent to the clinical staff who can find an opening on the calendar.

Figure 14: GUI Patient - Schedule Appointment



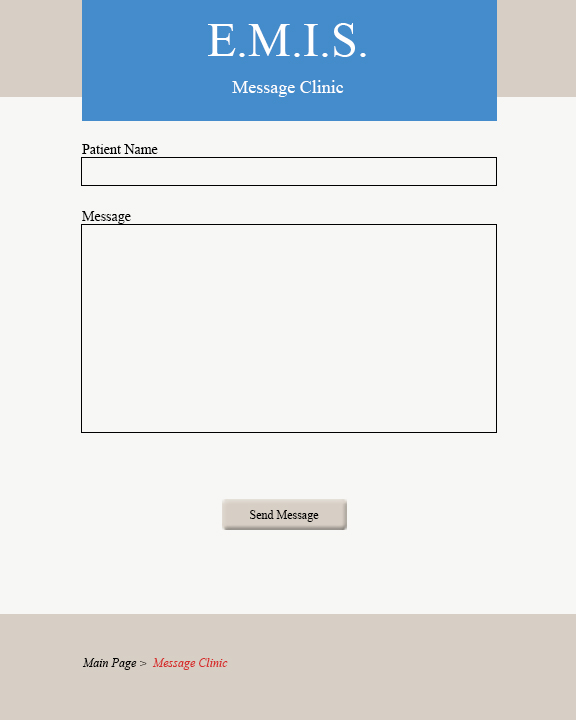
The patient clicks on “Message Clinic”.

Figure 15: GUI Patient Main - "Message Clinic"



The patients enters their name, a message, then clicks on the “Send Message” button and they are returned to the main page. An email is sent with the information to the clinical staff.

Figure 16: GUI Patient - Send Message



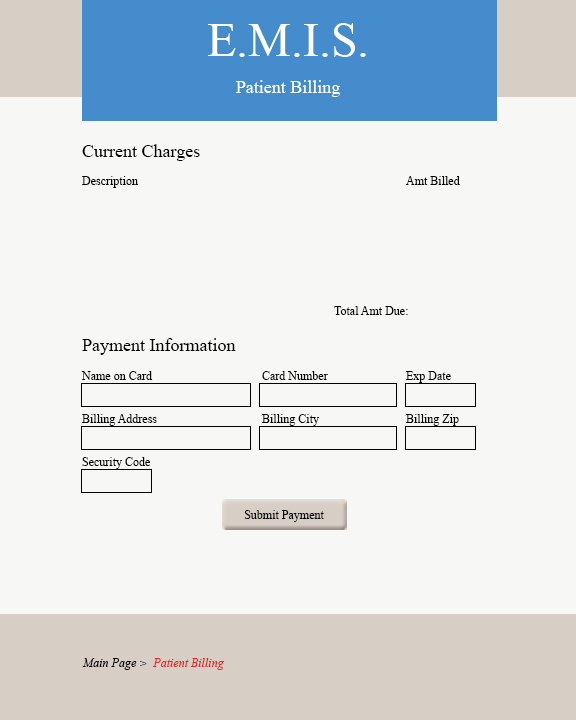
The patient clicks “View/Pay Bill Online”.

Figure 17: GUI Patient Main - "View/Pay Bill Online"



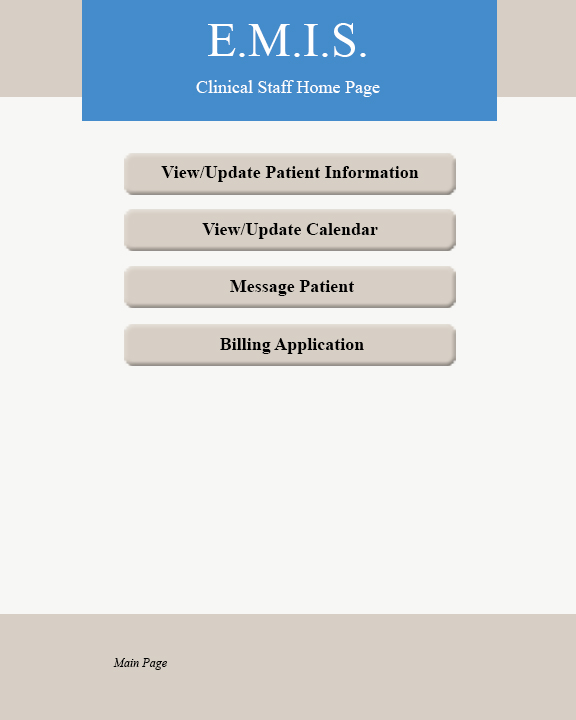
The patient can view all pending charges for their account. Then they can enter credit card information and pay those charges by clicking the “Submit Payment” button which then takes them back to the main page. The insurance user has access to this as well to pay their portion.

Figure 18: GUI Patient, Insurance - View/Pay Bill



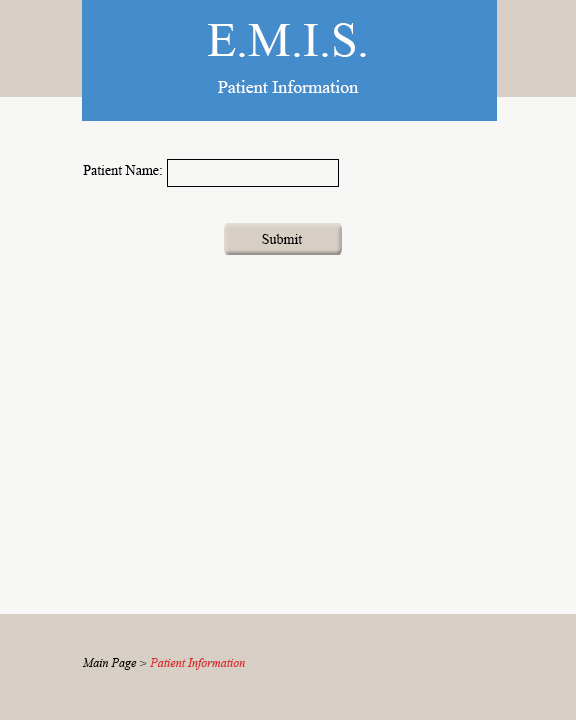
This is the main page for the clinical staff user. Clicking “View/Update Patient Information” takes them to a page to enter the patient name.

Figure 19: GUI Clinic Main - "View/Update Patient Information"



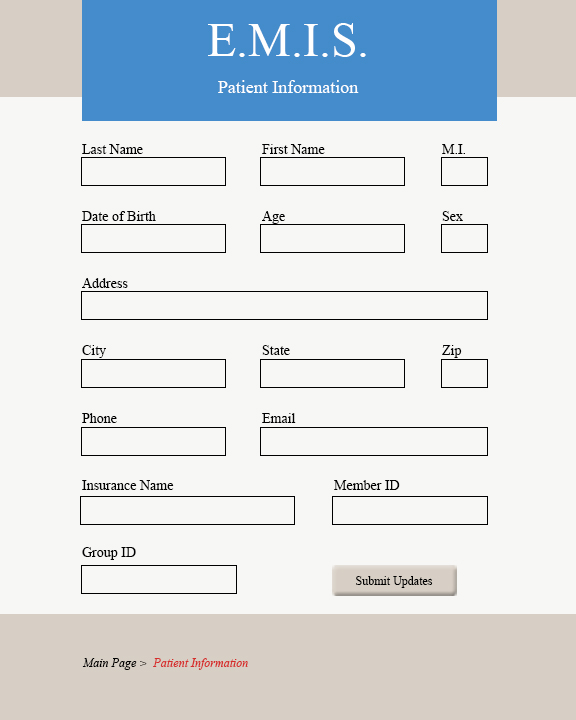
The clinical staff enters the patient name and clicks the submit button.

Figure 20: GUI Clinic - Enter Patient Name



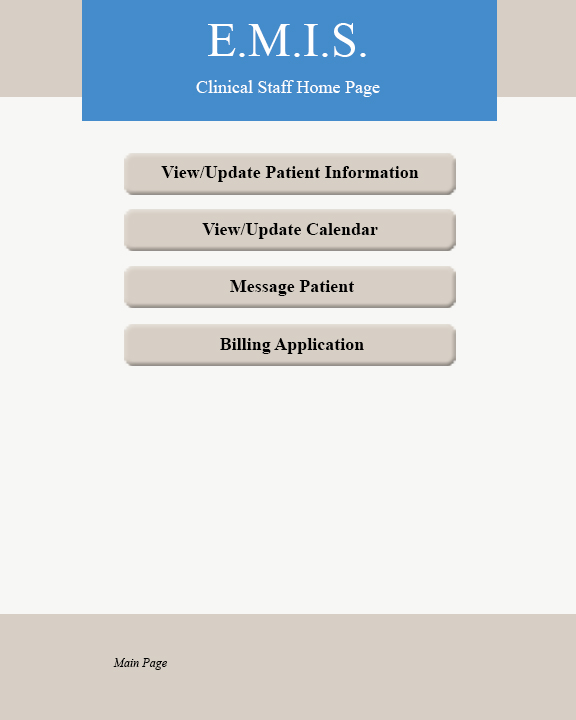
The clinical staff user can view the patient personal and insurance information. They also have the option to update the information by clicking “Submit Updates” which will then take them back to the main page.

Figure 21: GUI Clinic - View Patient Information



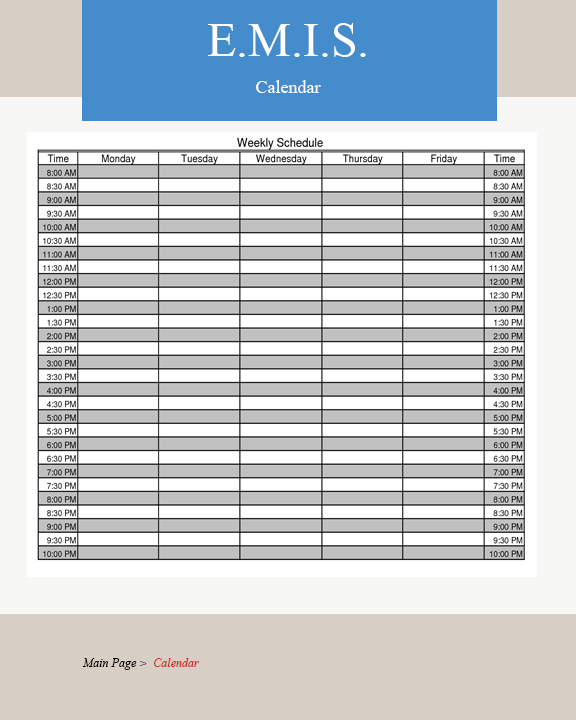
The clinical staff clicks “View/Update Calendar”.

Figure 22: GUI Clinic Main - "View/Update Calendar"



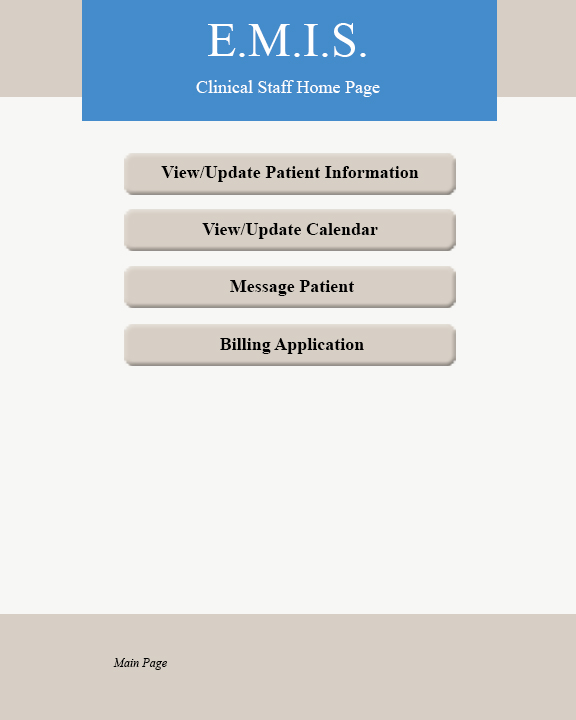
The clinical staff and doctors can view the calendar. Clicking “Main Page” at the bottom returns them to their home page.

Figure 23: GUI Clinic, Doctor - View/Update Calendar



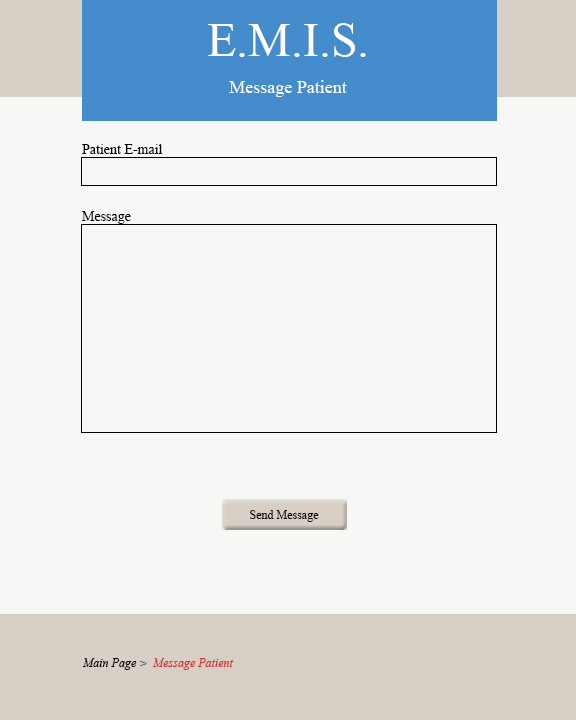
The clinical staff clicks “Message Patient”.

Figure 24: GUI Clinic Main - "Message Patient"



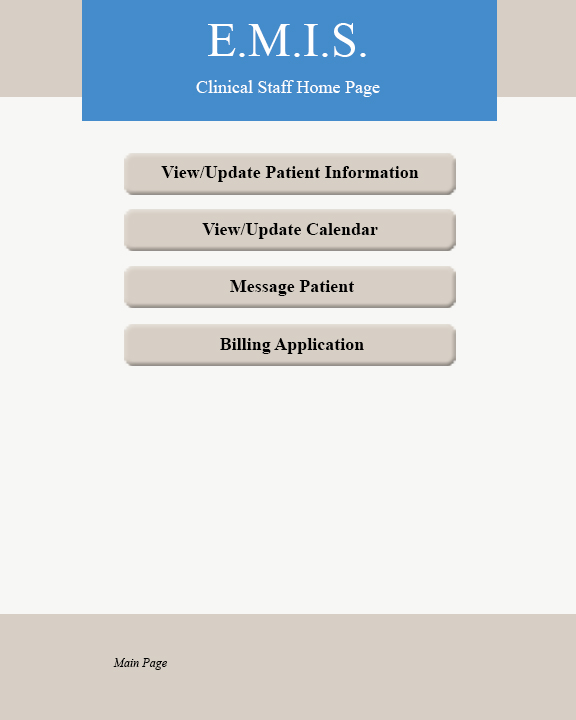
The clinical staff enters the patient email address and a message. After clicking “Send Message” an email is sent to the patient and the clinical staff is returned to the home page.

Figure 25: GUI Clinic - Message Patient



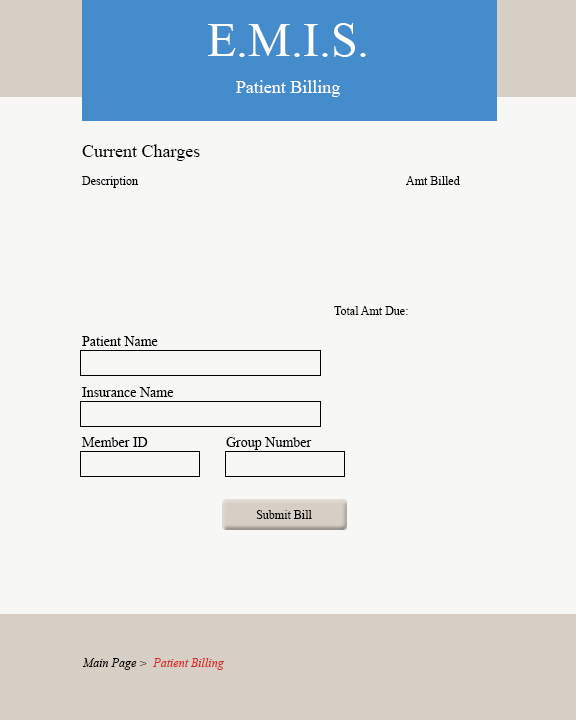
The clinic staff clicks “Billing Application”.

Figure 26: GUI Clinic Main - "Billing Application"



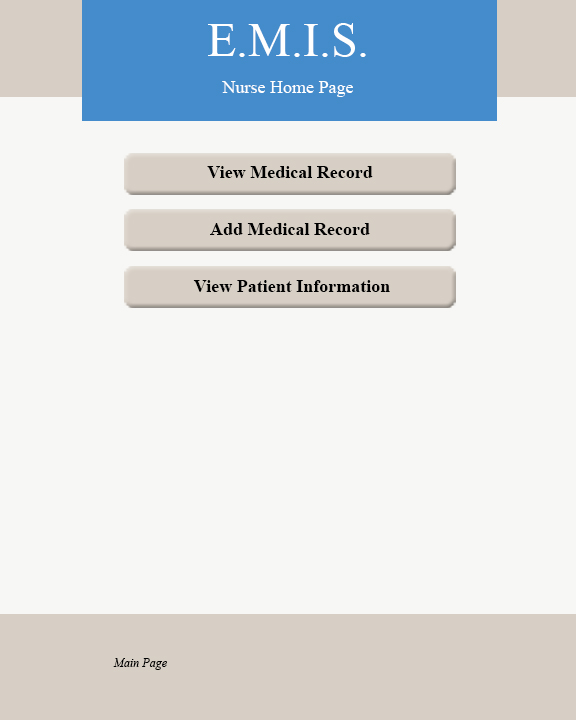
The clinical staff enters the charged items, the patient name, and insurance information. An email is sent to the patient and insurance company that a bill is available and the clinical staff is returned to the home page after clicking “Submit Bill”.

Figure 27: GUI Clinic - Billing Application



After a successful login, the Nurse, Doctor, Pharmacy, Laboratory, and Insurance see the following main pages:

Figure 28: GUI Nurse Main



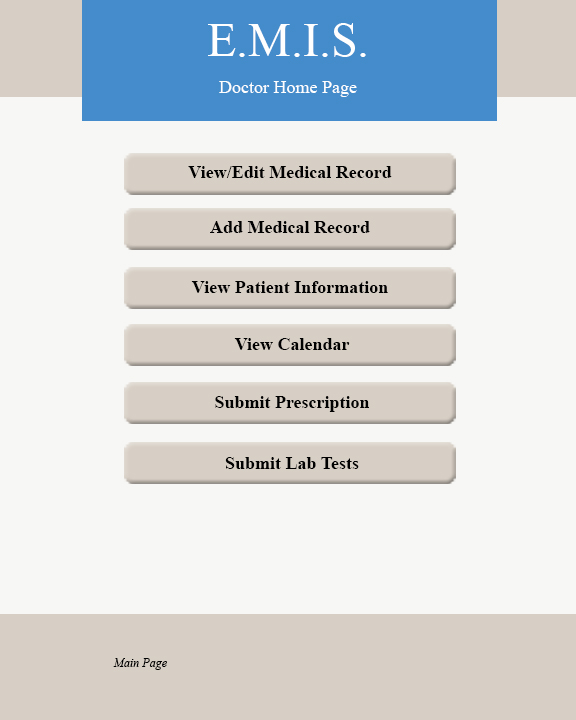


Figure 29: GUI Doctor Main

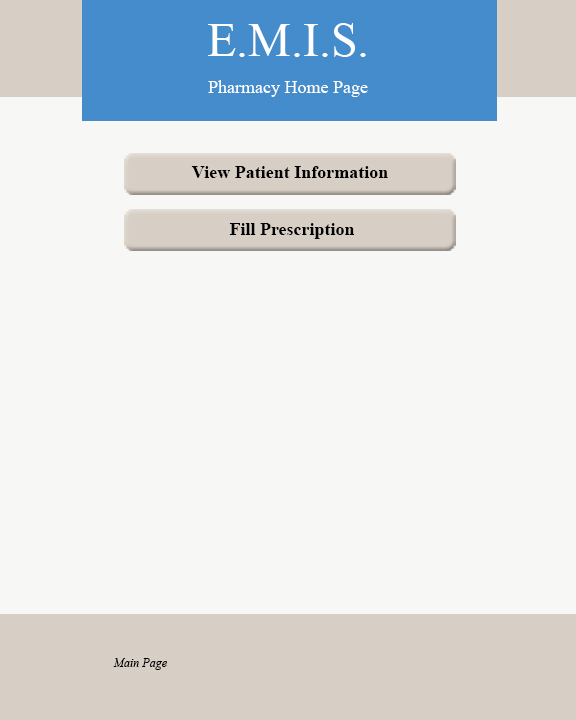


Figure 30: GUI Pharmacy Main

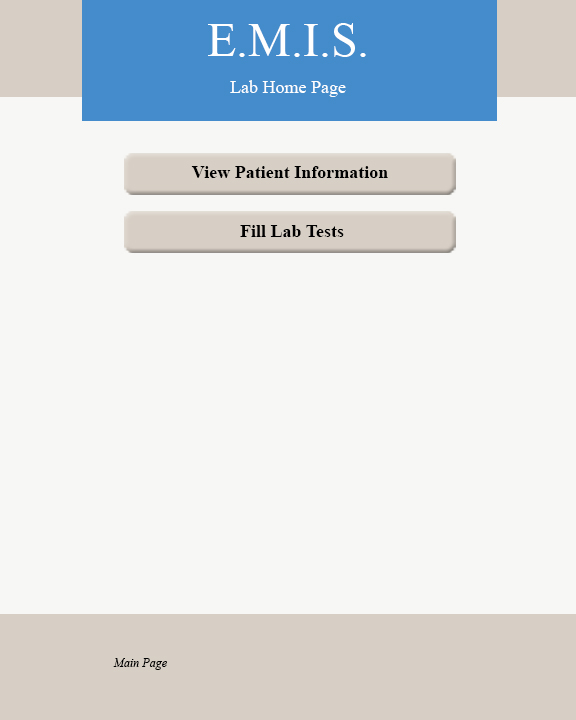


Figure 31: GUI Lab Main

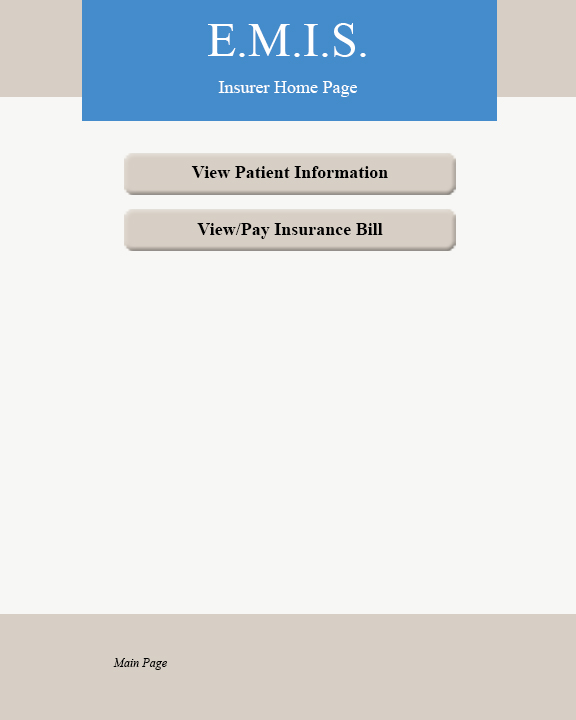


Figure 32: GUI Insurance Main

All five of these user types see the same options when clicking “View Patient Information”. They are presented with this screen to enter a patients name and clicking “Submit” will show the information. They do not have access to change any fields.

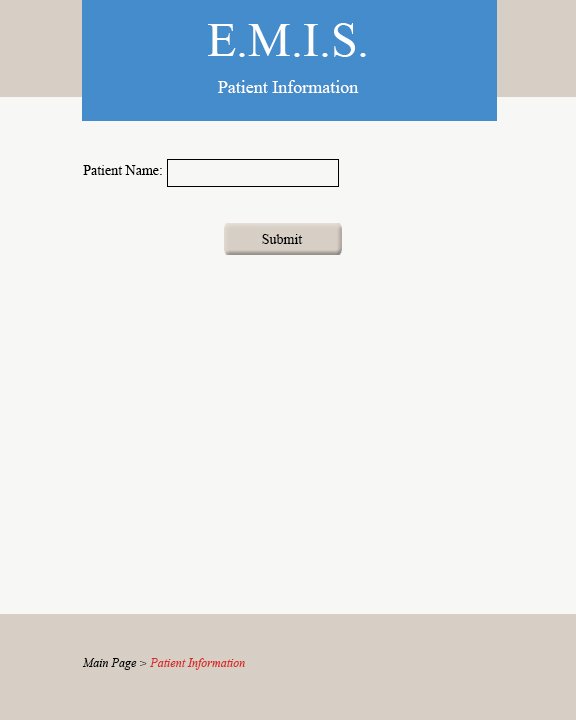


Figure 33: GUI Nurse, Doctor, Pharmacy, Lab, Insurance - Enter Patient Name

The patient information is shown. Clicking “Main Page” at the bottom will take the user to their respective home page.

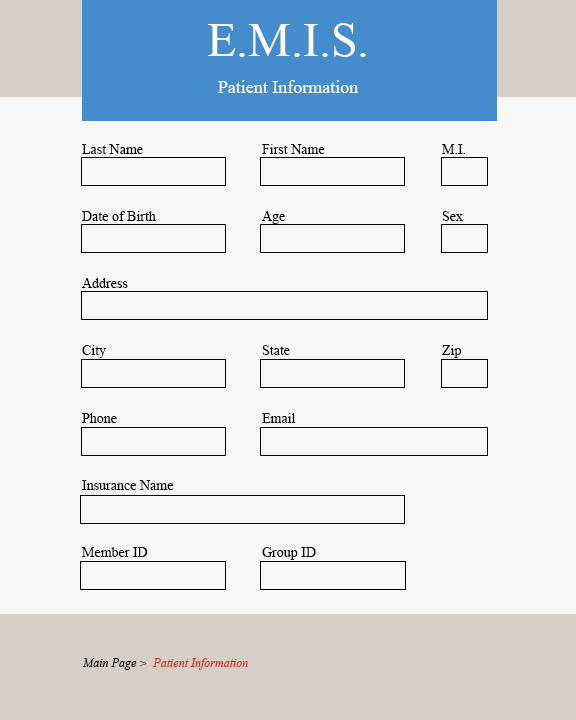


Figure 34: GUI Nurse, Doctor, Pharmacy, Lab, Insurance- View Patient Information

Both the Nurse and Doctor users can “View Medical Records” from their home pages. A patient Name is entered, then a list of records by date is shown for the patient. Clicking a date will show the record for that date.

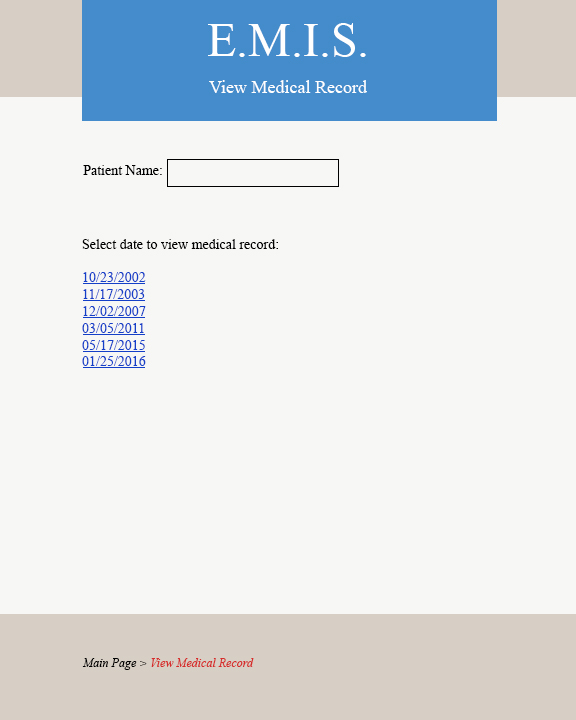


Figure 35: GUI Nurse, Doctor - Select Medical Record

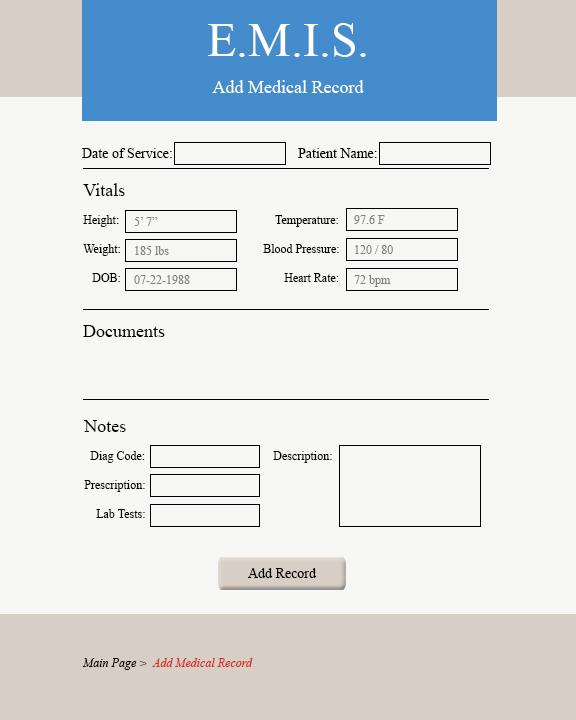
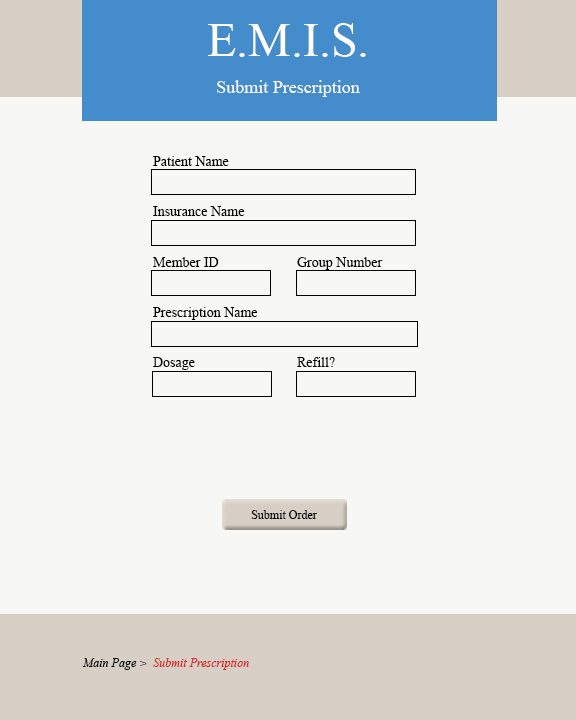
Both the Nurse and Doctor users are able to choose “Add Medical Record” from their home pages. Both user types are able to enter the date of service, patient name, and update the Vitals and Documents sections, but only the Doctor can add information in the Notes section. Clicking “Add Record” returns the user to their home page.

Figure 36: GUI Nurse, Doctor - Add Medical Record

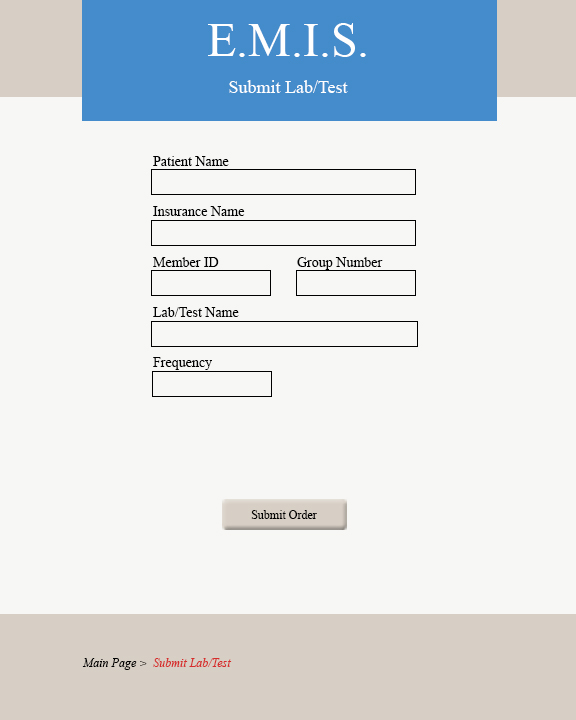
The doctor can also select “Submit Prescription” from the main menu. Once the information is entered, clicking “Submit Order” sends the information to the pharmacy and returns to the main menu.

Figure 37: GUI Doctor - Submit Prescription



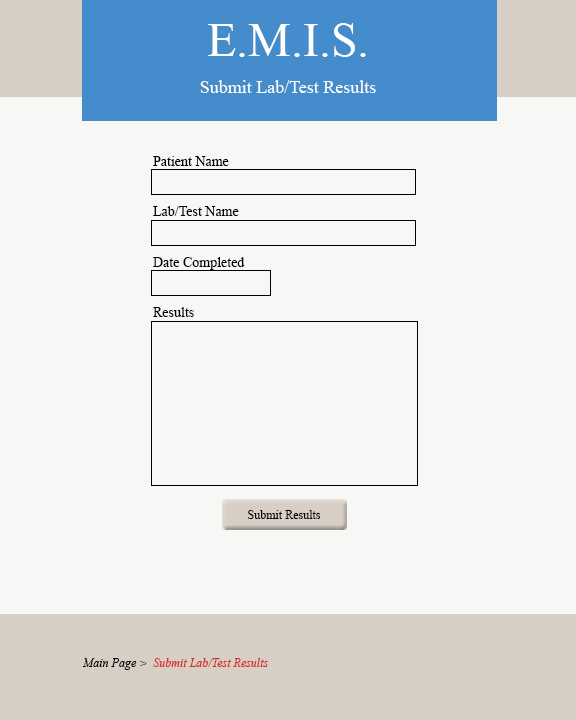
The doctor can also select “Submit Lab Tests” from the main menu. After entering the information, the “Submit Order” button sends the information to the lab and returns the user to the main screen.

Figure 38: GUI Doctor - Submit Lab Tests



The Lab can select “Fill Lab Tests” from their main screen. Clicking “Submit Results” sends the information back to the doctor and returns the user to the main page.

Figure 39: GUI Lab - Fill Lab Tests



The pharmacy can select “Fill Prescription” from their main screen. Clicking “Submit Fulfillment” sends the information back to the doctor and returns the user to the main screen.

Figure 40: GUI Pharmacy - Fill Prescription

