

Abstract:

This paper discusses the development approaches of building BurnHelp application for IOS and Android. We define the overall scope of the project, architecture and process to attain Functional & Non Functional Requirements, Business Rules, functional definition of the proposed system and the solution provided to the client.

Introduction

Our clients wanted to create life saving mobile application as a communication channel to help emergency room physicians to contact burn experts of main hospital to assess the burn wounds and determine the course of treatment.

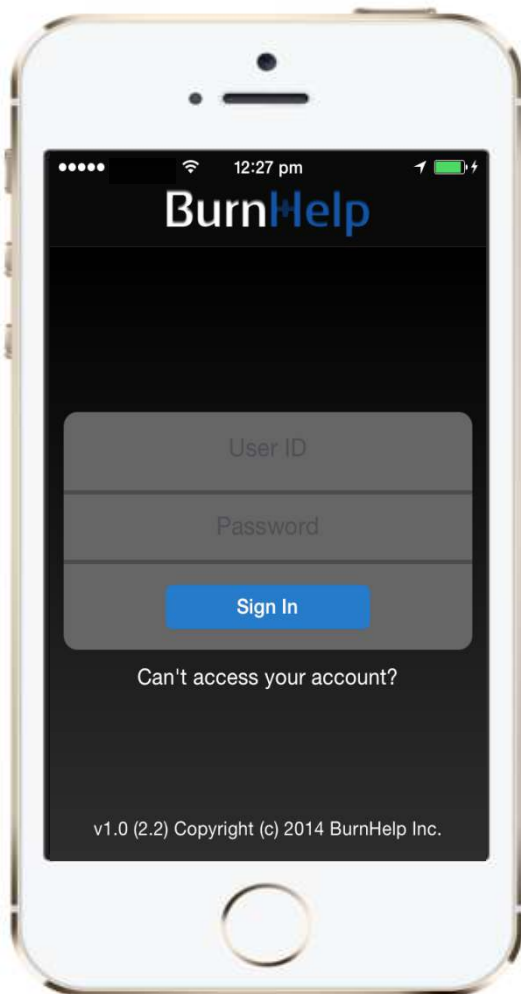
System Objectives and Background information:

The challenge was to create a communication channel to help emergency room physicians to contact burn experts and streamline burn care even before a burn patient arrives at the ER.

In the U.S not every hospital has a burn expert in house, and most burn experts provide services to multiple hospitals. Their services are requested by physicians on an as needed basis. Since burn treatment requires immediate treatment and each burn requires different type of treatment from the get go, the burn experts need to be involved even before the patient arrives at the ER.

A physician usually calls in the main hospitals to get some assistance from burn experts to determine the course of treatments. By using this app, the physicians take pictures of the burns and passes on this info to a pool of burn surgeons/experts. Any of the burn experts in the pool can take on the patient and can start coordinating with physician for the course of treatment. All physician and Burn experts communication can be accomplished via the iOS app or via a web application.

Both the applications are HIPAA compliant and thus allow a free and secure communication pathway and workflow between a physician and a burn expert.



In response of following requirements we created a web application to store data in database and manage system stakeholders and a BurnHelp Mobile App as a communication channel among following users.

The app consists of three parts:

1. Sending side
2. Receiving side
3. Cloud repository

The general flow of the App is as follows:

Sending of patient information via mobile application:

- Patient presents with burn wounds to referring hospitals.
- Physician or other practitioner at a referring hospital treats the patients when he/she want to seek advice from burn experts.
- Physician or other practitioner than login into application, take some photos of the patients along with its demographics and submit it to a web server.
- System (web server) receives the patient information and sends the notifications to all burn experts of a specific burn center.

Receiving of patient information via mobile application:

- Burn experts after receiving the application login into application.
- Burn experts view his/her newly notified patient case.
- After view the patient photos and information Burn expert makes call to give his/her expert advice to referring physician.
- After having a conference call with physician burn expert open the application again and mark the status of the patient's case in order to notify other experts that whether the case has been resolved or it needs further attention.

Application Flow - Sending Side

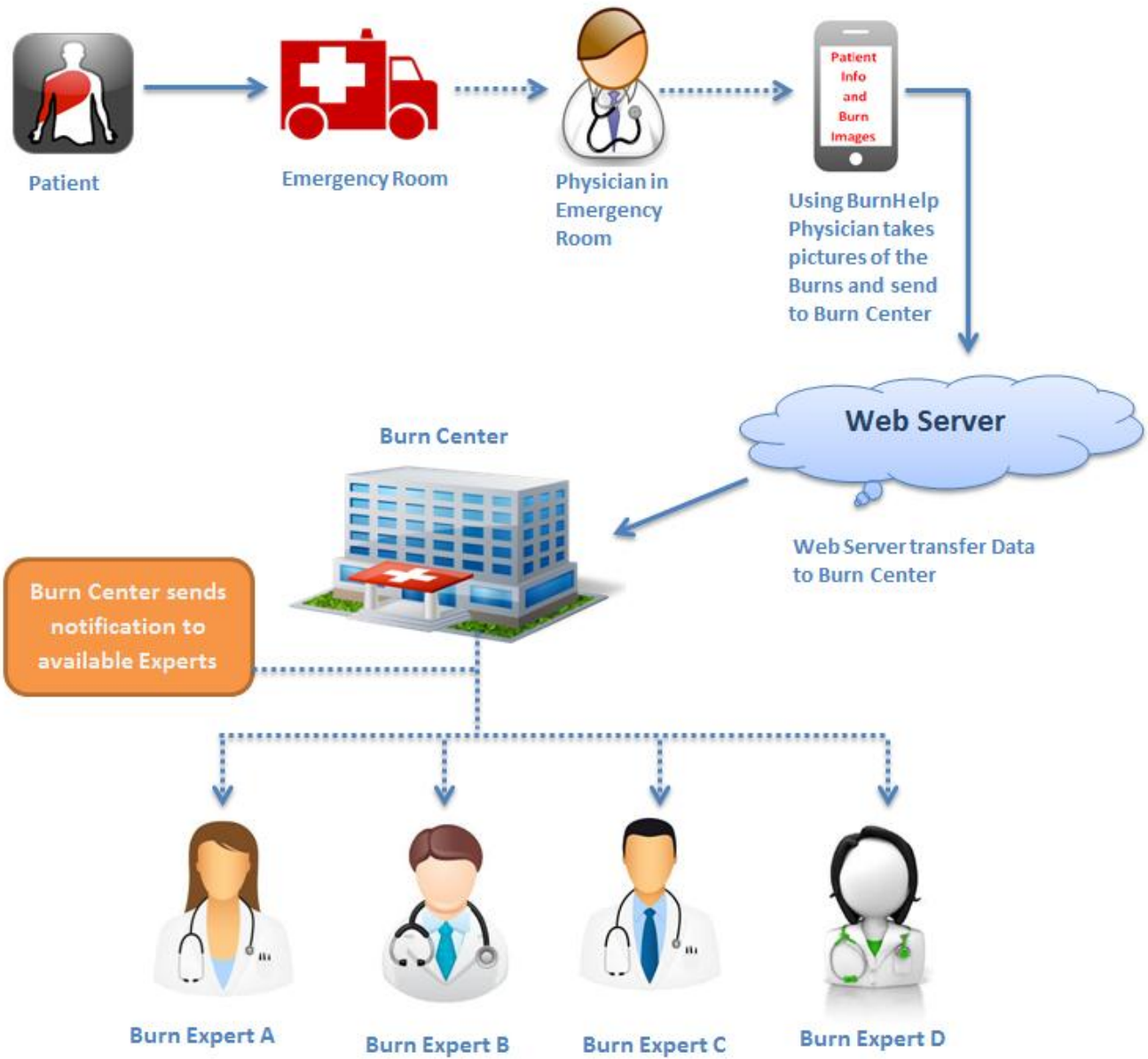


Fig-1: Schematic representation of Sending Side Implementations

Application Flow – Receiving Side

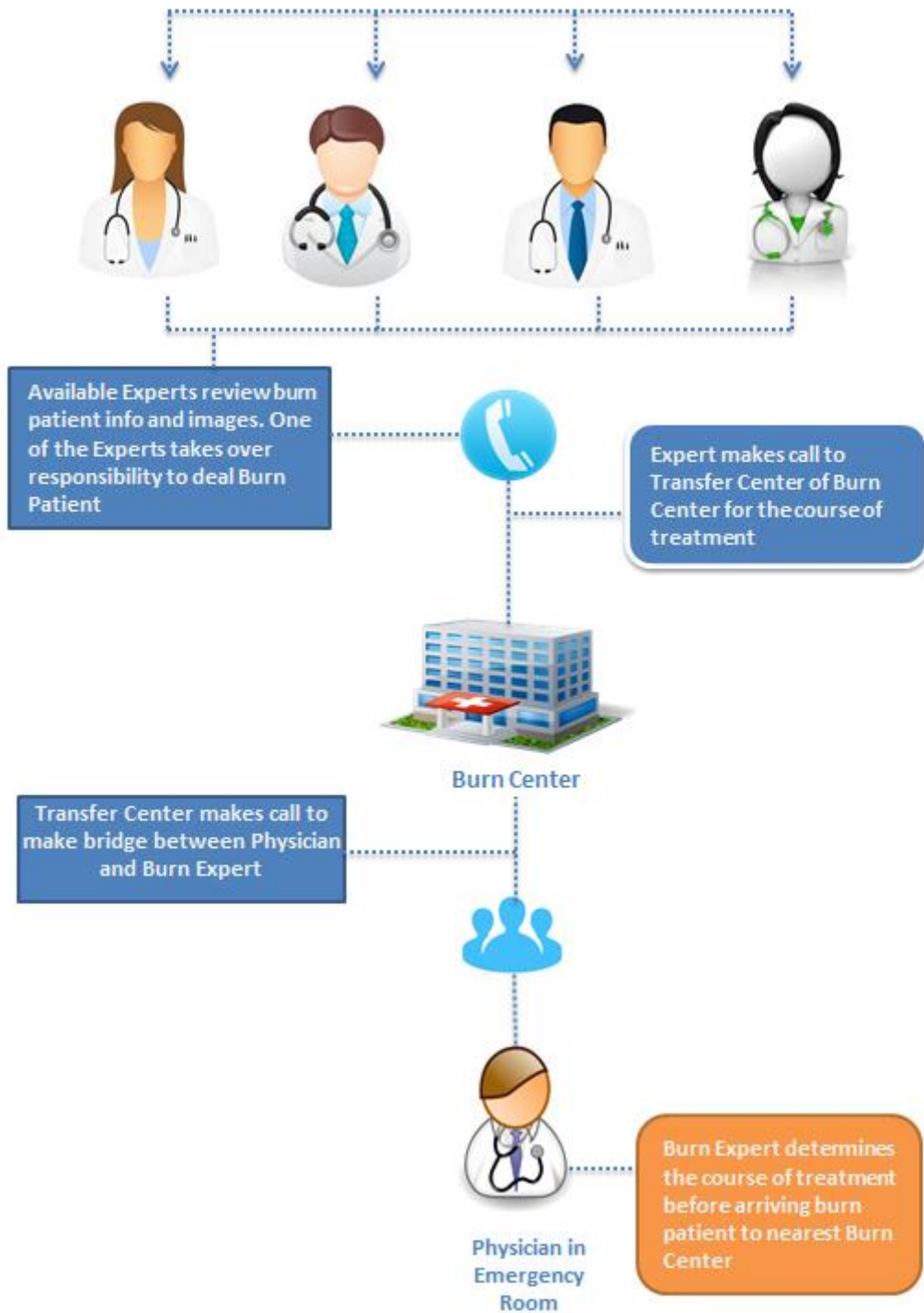


Fig-2: Schematic representation of Receiving Side Implementations

Application Platforms:

BurnHelp application is designed for iPhone mobile devices only. Minimum supported OS for iPhone devices: iOS 6.0 or later.

System Constraints:

Application not works if devices are not connected to internet via 3G or Wi-Fi network.

System Stakeholders:

- Mobile App
 - Burn Expert
 - Physician
 - Other Practitioners (Junior Physician, Trainee, Nurse Practitioner)
- Web App
 - Administrators

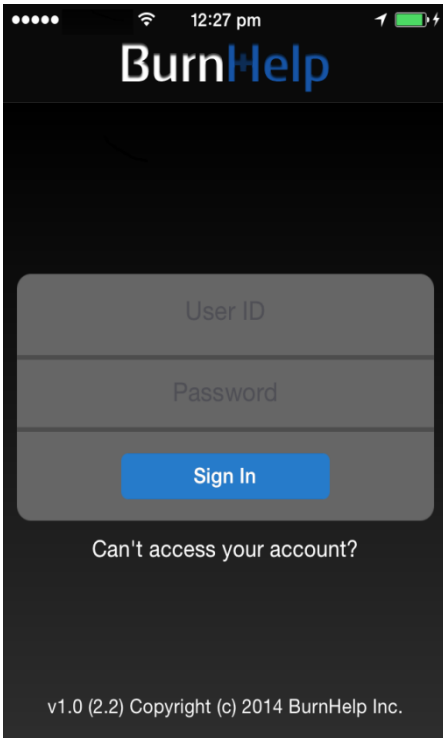
Important Technical Achievements:

Following were some important technical achievements in this project:

- The full implementation was done in record time, enabling our client to successfully establish communication channel to help emergency room physicians to contact burn experts and streamline burn care before a burn patient arrives at the ER.
- Web application accessible over HTTPS instead of plain HTTP.
- Permission page created for assigning rights to burncenter & facility administrators as per client's requirement.
- Critical search criteria created based on permission assigned by master administrator
- Created a secure Database Encryption Logging. (*RSA 256 bit encryption*)
- Action logging was required to be performed to track all the activity of all the users. Based on requirements, all the logged activities of facility and master administrator can logged and sent via email to Administrator by the end of the day.
- On completion iOS sends a request to service to update the case status to "Triage"
- Both Mobile & Web applications are HIPAA compliant and thus allow a free and secure communication pathway.

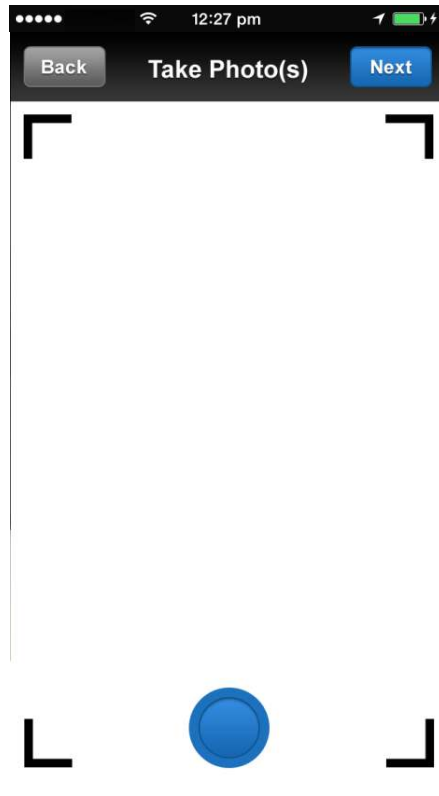
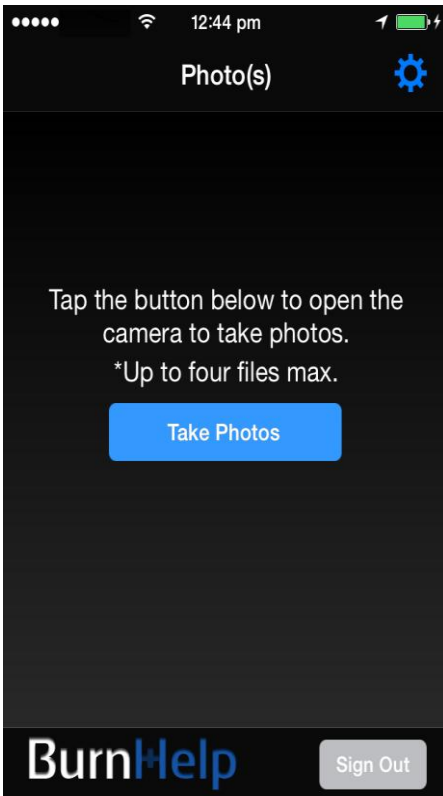
Key Screens for Mobile App

1. For Physician/Other Practitioners



Login Screen

This is the login screen where existing physicians, other practitioners and burn experts log into the application.



Patient Photo(s)

This is take patient photos screen. Once existing physicians, other practitioners logged into application they will be redirected here. After taking photos of the patient they choose best three photos to be sent to the web server.



TECHNO SOFT

12:27 pm

Back Patient Information

Selected Photos Change

Last Name:

First Name:

Middle Initial:

Birth Date:
Must use slashes, i.e. 10/31/12

Date of Injury:
Must use slashes, i.e. 10/31/12

Burn Type: Select

Referring Physician:

Submitted By:

Submit

BurnHelp Sign Out

Patient Demographics Fill up

When existing physicians or other practitioners take photos of patient and after selecting best three patient photos then they need to fill up patient demographics/information required to move further with the submission of patient case.

Physician/other practitioner get notification after the successful submission of patient case.

2. For Burn Experts

12:27 pm

Patient Information

Last Name: Smith

First Name: John

Middle Initial: C.

Birth Date: 5/18/1975

Date of Injury: 10/8/2013

Burn Type: 3rd Degree

Referring Physician: Dr. Miller

Submitted By: Dr. Johnson

Facility: Lehigh Valley


Next

BurnHelp Sign Out

12:27 pm

Back View Photo(s)

Tap on the thumbnail to view.

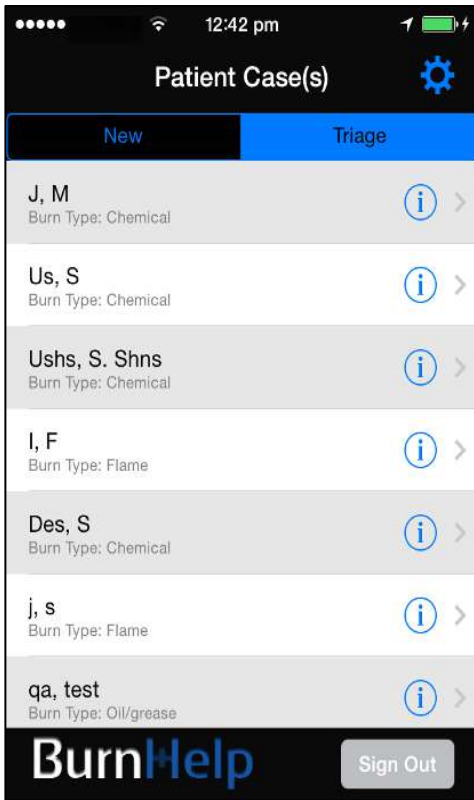


Call Transfer Center

BurnHelp Sign Out

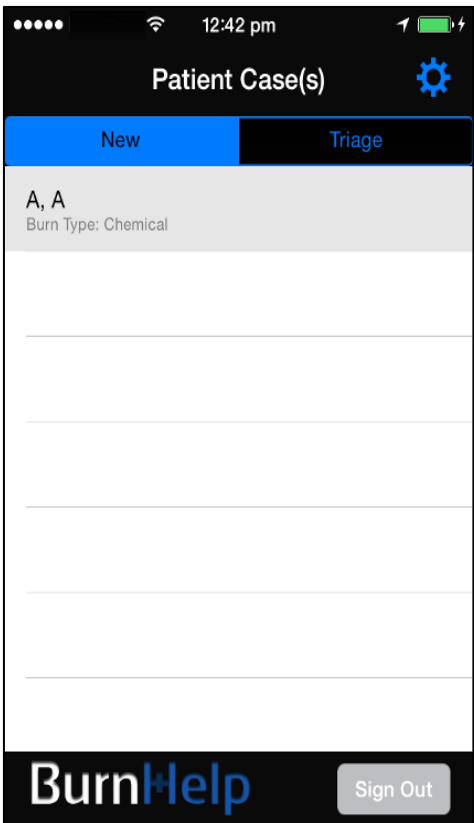
Patient Case Information

This is patient information screen where burn experts view patient information.



Triage Patient Case

This is Triage information screen where burn experts view patient triage information.



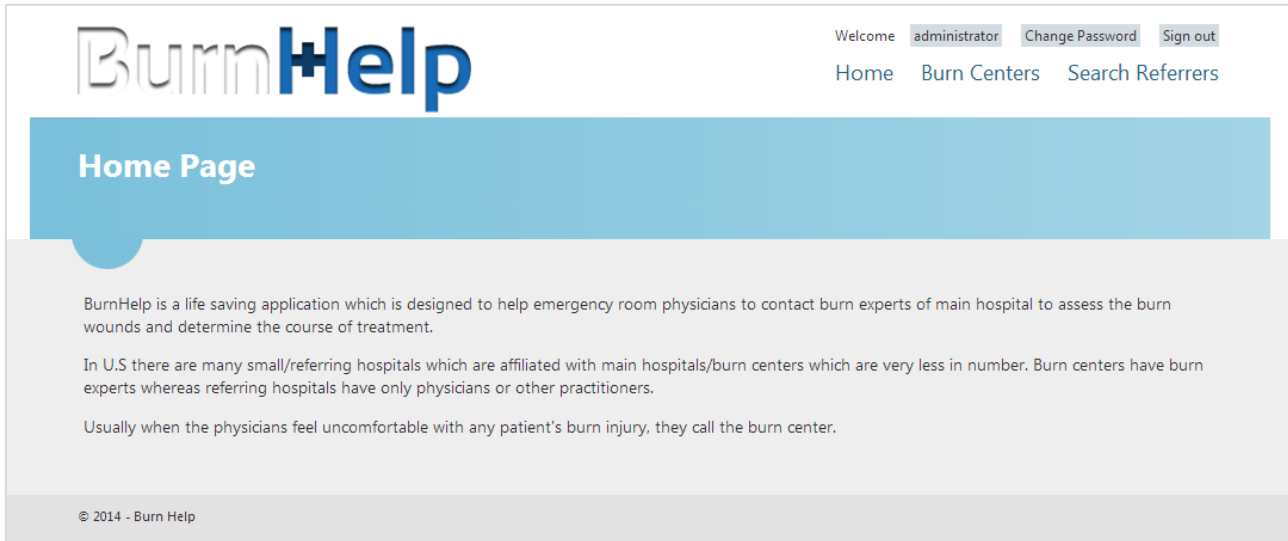
New Patient Case

This is new patient case information screen where burn experts view new patient information.

Key Screens of Web Application

Main Screen

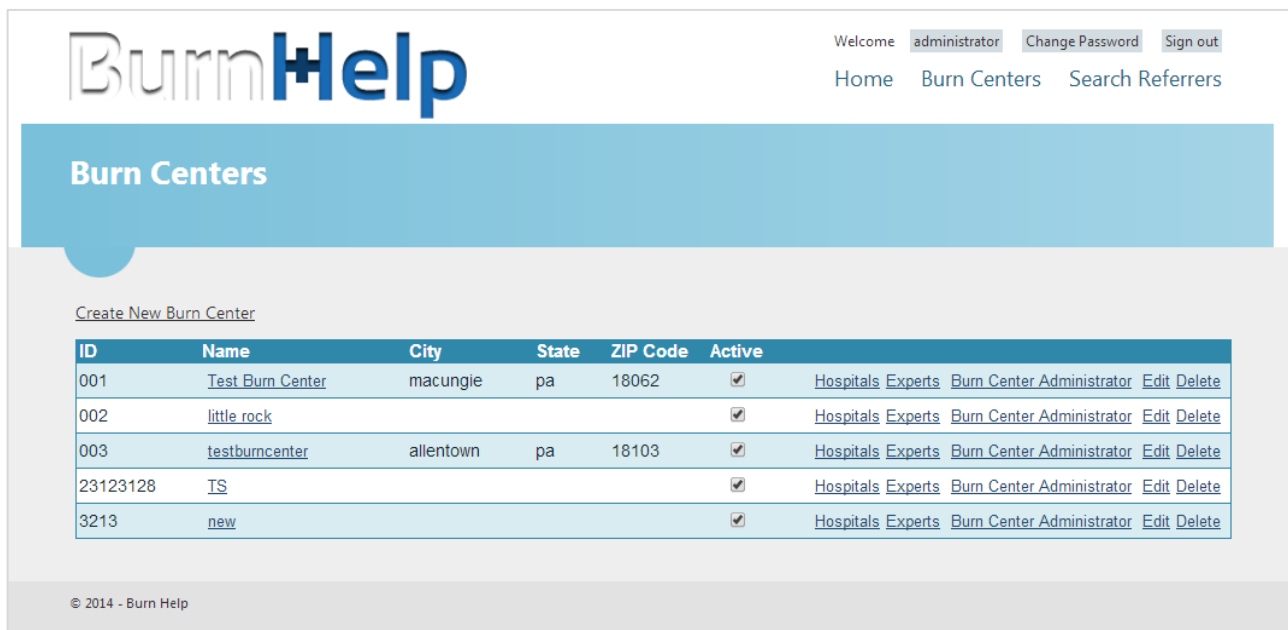
This is main screen. Once administrator is logged into the web application, they redirected here.



The screenshot shows the main interface of the BurnHelp application. At the top left is the 'BurnHelp' logo. To the right, there is a navigation bar with 'Welcome administrator', 'Change Password', and 'Sign out' buttons, and links for 'Home', 'Burn Centers', and 'Search Referrers'. Below the navigation bar is a blue header with the text 'Home Page'. The main content area contains a paragraph describing the application's purpose: 'BurnHelp is a life saving application which is designed to help emergency room physicians to contact burn experts of main hospital to assess the burn wounds and determine the course of treatment.' It also mentions that in the U.S., there are many small/referring hospitals affiliated with main hospitals/burn centers, and that burn centers have burn experts while referring hospitals have only physicians or other practitioners. A final note states that physicians usually call the burn center when they feel uncomfortable with a patient's burn injury. The footer contains the copyright notice '© 2014 - Burn Help'.

Burn Center list screen

This screen displays when administrator clicks on 'Burn Centers' link button from top navigation bar.



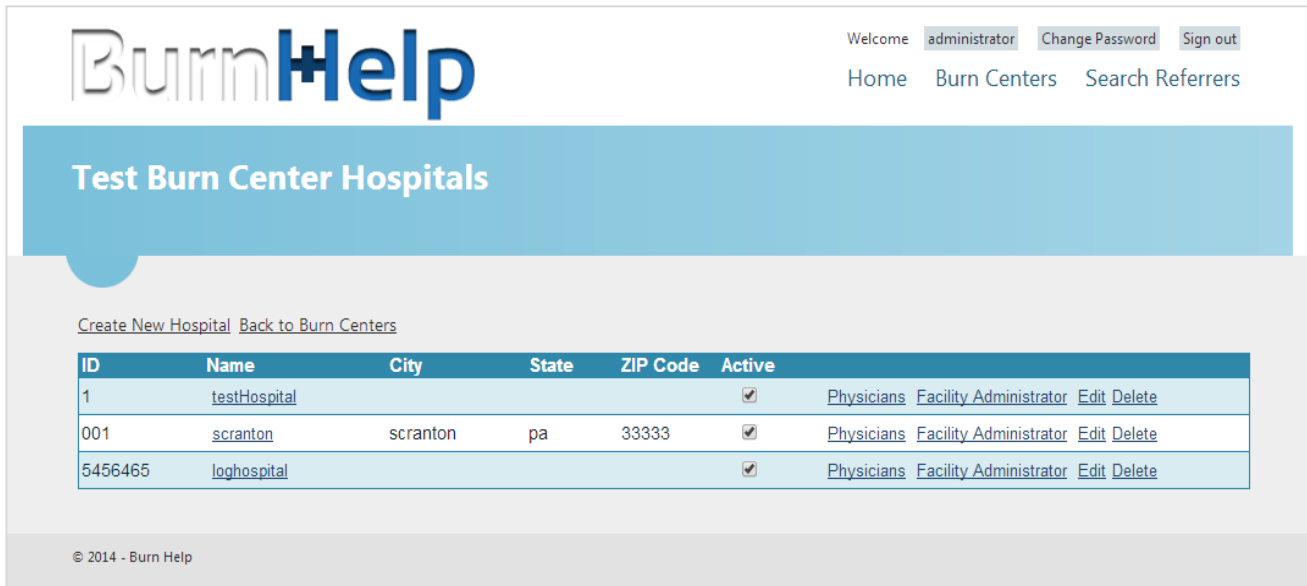
The screenshot shows the 'Burn Centers' list screen. It features the same navigation bar as the home page. Below the navigation bar is a blue header with the text 'Burn Centers'. Underneath, there is a link 'Create New Burn Center'. A table lists the existing burn centers with columns for ID, Name, City, State, ZIP Code, and Active status. Each row also includes links for 'Hospitals', 'Experts', 'Burn Center Administrator', 'Edit', and 'Delete'. The footer contains the copyright notice '© 2014 - Burn Help'.

ID	Name	City	State	ZIP Code	Active	
001	Test Burn Center	macungie	pa	18062	<input checked="" type="checkbox"/>	Hospitals Experts Burn Center Administrator Edit Delete
002	little rock				<input checked="" type="checkbox"/>	Hospitals Experts Burn Center Administrator Edit Delete
003	testburncenter	allentown	pa	18103	<input checked="" type="checkbox"/>	Hospitals Experts Burn Center Administrator Edit Delete
23123128	TS				<input checked="" type="checkbox"/>	Hospitals Experts Burn Center Administrator Edit Delete
3213	new				<input checked="" type="checkbox"/>	Hospitals Experts Burn Center Administrator Edit Delete

- All burn centers are listed in this screen.
- Administrator can create new burn center by clicking 'Create New Burn Center' link button.

Hospital list screen

This screen displays when administrator click on 'View Hospitals' link button against a burn center.



Welcome administrator Change Password Sign out
Home Burn Centers Search Referrers

Test Burn Center Hospitals

[Create New Hospital](#) [Back to Burn Centers](#)

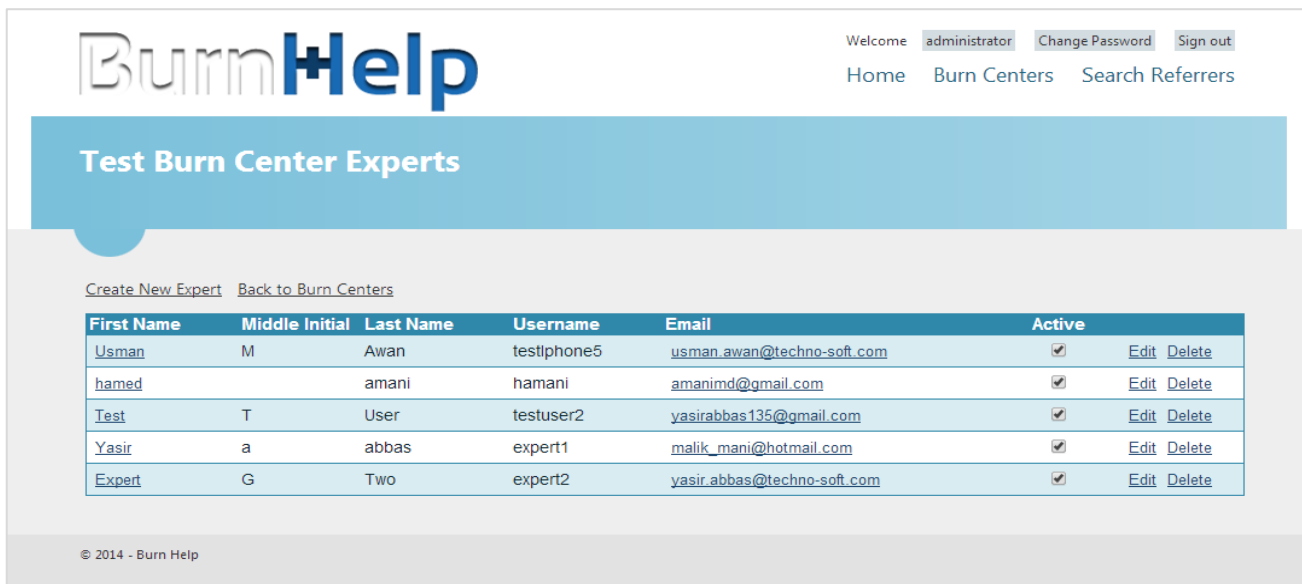
ID	Name	City	State	ZIP Code	Active	
1	testHospital				<input checked="" type="checkbox"/>	Physicians Facility Administrator Edit Delete
001	scranton	scranton	pa	33333	<input checked="" type="checkbox"/>	Physicians Facility Administrator Edit Delete
5456465	loghospital				<input checked="" type="checkbox"/>	Physicians Facility Administrator Edit Delete

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- All child hospitals of specified burn center will be listed in this screen.
- Administrator can create new hospital center by clicking 'Create New Hospital' link button.
- Administrator can go back to burn centers by clicking 'Back to Burn Centers' link button

Experts list screen

This screen displays when administrator clicks on 'View Experts' link button against a burn center.



Welcome administrator Change Password Sign out
Home Burn Centers Search Referrers

Test Burn Center Experts

[Create New Expert](#) [Back to Burn Centers](#)

First Name	Middle Initial	Last Name	Username	Email	Active	
Usman	M	Awan	testlphone5	usman.awan@techno-soft.com	<input checked="" type="checkbox"/>	Edit Delete
hamed		amani	hamani	amanimd@gmail.com	<input checked="" type="checkbox"/>	Edit Delete
Test	T	User	testuser2	yasirabbas135@gmail.com	<input checked="" type="checkbox"/>	Edit Delete
Yasir	a	abbas	expert1	malik_mani@hotmail.com	<input checked="" type="checkbox"/>	Edit Delete
Expert	G	Two	expert2	yasir.abbas@techno-soft.com	<input checked="" type="checkbox"/>	Edit Delete

© 2014 - Burn Help

Customer Benefits

The app is now being used by Burn Experts, Physicians and other Practitioners (Junior Physician, Trainee, and Nurse Practitioner). The app proves successful immediate course of action and communication channel to help emergency room physicians to contact burn experts of main hospital to assess the burn wounds and determine the course of treatment before arriving burn patient at the ER.

Future Relationship

The full implementation was done in record time. The client was highly satisfied with the project and was pleased with Technosoft's working solution. He is in touch with maintenance work. Client has also referenced us new business leads and we are working on his referred prospects.

About Technosoft Solutions Inc.

Technosoft Solutions Inc. is leading outsourcing software and application development company dedicated in Healthcare Software Development and Integration Services. We are offering a full range of IT solution and support services to companies developing healthcare solution for the U.S market. For more than 10 years, our commitment to providing reliable healthcare system software solutions has remained constant and stable.

Many of our clients are well versed in software development and have healthcare solutions deployed at main hospitals. We augment their resources with our HL7 integration, HIPAA privacy & security services.

We are endowed with quality certifications and standards, including CMMI ML2, ISO 9001:2008, Sun, MySQL and as IBM Certified Partner.