

Student Project 2008-2009 OIT HI SIM LAB

Name: Collection and integration of patient health data into an EMR

Description: This project will collect patient data from several monitoring devices, convert the data into HL7 format, and securely transmit the data to the GE Centricity Electronics Medical Records. This data will be stored in a data repository that facilitates the integration of the data into the patient record for use by the doctor and patient. This will include setup and configuration of the selected monitoring devices, automatic data acquisition, applying HL7 protocols for data transmission, validation of patient data integration into the Centricity EMR

Location : OIT Portland

Faculty Sponsor: Jay Bockelman (Software Engineering)

Students: Steve Bloedel, Jason Hardesty, Brian Holm, Leonard O'Dell

Learning Objectives:

- a. Students will work with industry vendors to understand how their hardware and software apply to a complex real-world healthcare problem
- b. Students will gain teamwork skills in analyzing a given problem, designing a solution, collaborating with industry vendors, and implementing an acceptable solution
- c. Students will identify a complex real-world healthcare problem, decomposing the problem into its core elements, design, implement, test and document a solution to this problem
- d. Students will learn healthcare regulatory, compliance, business and technology requirements
- e. Students will gain experience with an Electronic Medical Records application and learn data interfaces, standard protocols, rules, and patient data flow through the system.
- f. Students will gain oral and written presentation skills

Goals for Fall term 2008:

Utilizing existing blood pressure and blood glucose monitoring devices and the SIM Lab EMR to determine how the device data is captured, stored and transmitted to a data repository that facilitates the integration of the data into the SIM Lab EMR for use by the doctor and patient.

- a. Collecting patient data from one of the patient monitoring devices
- b. Translating this raw data into the HL7 format required by the EMR system
- c. Encapsulating this data into the format defined by the Centricity EMR database
- d. Sending this data, via the internet, to the Centricity EMR database
- e. Making this data available for medical practitioner review to be entered into the patient record

Results:

- a. Selected and purchased 2 patient health monitoring devices
 - i. MicroLife Blood Pressure Monitor
 - ii. Welch-Allyn ProPaq LT Monitor
- b. Signed NDA agreements with Welch-Allyn and MicroLife corporations to gain access to their proprietary software and source code, and customer support.
- c. Collected data samples from each device through these vendor supplied routines
- d. Analyzed format of data as it was captured from each device, and with vendor support, developed software for capturing raw data directly from device
- e. Analyzed HL7 format used by Centricity, and successfully formatted this data into the Centricity defined HL7 format
- f. Through support from HealthCo, developed routines for transferring this HL7 patient data from devices directly to Centricity DTS
- g. Students successfully demonstrated this data was accepted into the Centricity EMR and displayed in the patient's medical record
- h. Students developed a working demonstration of the project, and successfully documented and presented their results to a healthcare audience

Goals for Winter term 2009

- a. Enhance SimLab application to enable "One Click Sending" of device data to EMR – enhance the application so that with one single push of a button, it would take the blood pressure, wrap it up into an HL7 file and send it to Centricity.
- b. Add collection, analysis and transmittal of additional data for pulse oxygen saturation from Welch-Allyn device
- c. Research and develop an approach to send data from a monitoring device to the Kryptiq server (and then to the Centricity server)
- d. Develop method for securely transferring patient data from monitoring device to the Centricity EMR (completion of last term's task).
- e. Develop application to collect and transmit blood pressure data from MicroLife device to Centricity EMR.
- f. Complete documentation for :
 1. Status Reports
 2. Project report
 3. Student user manual

Results:

- a. Completed application enhancement to support one-click end to end data collection, conversion to an HL7 file and secure transmittal to Centricity EMR. This enhancement allowed patients to simply press a single keyboard button to collect data from any supported device, analyze the data, convert it to a supported HL7 format, and securely transmit it to a supported EMR service.
- b. Completed support of pulse oxygen saturation readings from Welch-Allyn device and sending it securely to the Centricity EMR. This entailed continuous reading of values from device, real-time analysis of data, and only sending those values to an EMR that fell outside of a predetermined range of acceptable values.

- c. Through support from Kryptiq, determined that the version of Centricity EMR installed at OIT was not compatible with current level of Kryptiq interfaces. Worked with Kryptiq engineers to work around this problem, but limited support and incompatibilities prevented further development in this area. This part of the project was deferred to a later date.
- d. Completed secure file transfer of all device data to Centricity EMR. Tried multiple approaches, including Kryptiq Secure Messaging system, but settled on a standard SFTP approach.
- e. Successfully collected blood pressure data from MicroLife device and securely sent it to Centricity EMR
- f. Completed weekly status reports, final project report and notes on device protocols and secure transmission. Successfully demonstrated data collected from additional monitoring devices was accepted integrated in the patient's medical record in the Centricity EMR

Goals for Spring term 2009

- a. Connection of a blue-tooth enabled monitoring device, and communication of data to the Centricity EMR
- b. Complete documentation for :
 - 1. Status Report
 - 2. Final project report
 - 3. Final project presentation
 - 4. Publishable paper

Results:

- a. Selected and purchased a blue-tooth enabled patient health monitoring device - Nonan pulse-oxygen saturation monitor
- b. Connected to Nonan blue-tooth device and read pulse and oxygen saturation values. However, the data values collected from the device did not correspond to the provided documentation. In addition, the supplied vendor code was written in a language (Visual Basic 6) that was obsolete and not compatible with the one used for developing the SimLab application (C#). Consequently, though the data was successfully captured, and the SimLab application was enhanced to support sending the data to the EMR, the data values could not be interpreted properly to complete this part of the project.
- c. Students developed a working demonstration of the project, and successfully documented and presented their results at the Project Symposium. Project paper is still under development and scheduled to be completed during the summer.