

I. INTRODUCTION

A. Background of the Problem

In May 2005, a group of entrepreneurs in health care industry decided to bring to the town of Taytay, Rizal a complete diagnostic facility using the latest modern medical technologies. This is in response to the long standing need by the community for accessible and affordable yet excellent quality healthcare services.

Friendly Hills Medical Services, Inc. (FHMSI) officially opened for business in November 2005 and had its' grand opening last July 2006. Its' mission is to provide quality medical services at par with global standards and practices at affordable prices. Their current list of services includes laboratory services, diagnostic services, clinical specialist services, dental care services plus a 13-hour pharmacy services. It also has its' own Laboratory Information System (LIS) that is responsible of the laboratory tests and results conducted by the Laboratory Department of FHMSI.[1]

B. Statement of the Problem

Presently, Friendly Hills Medical Services, Inc. uses a manual system of handling their patient records. Every record is entered on a pen-and-paper form. All patient records are being filled up, kept and archived manually. From the point of view of the front desk which is responsible of administering these files, the current manual system is tedious and work intensive as it requires a regular browsing of patient records. It also requires a lot of paperwork thus resulting to some problems regarding storage, monitoring and

retrieval of data. Also, essential reports such as lab referral and consultation are not possible.

C. Objectives

To create FHMSI Real-time Patient Friendly Information System (RPF-IS) via Bar Code Technology with the following features:

1. To allow patient to

- View his/her own patient record
- View doctor's schedule
- Edit password

2. To allow front desk (clerk) to

- Manage patient records(Add/edit patient general information, Add consultation record of the patient)
- Manage doctor records(Add/edit doctor record, Add/edit doctor's schedule)
- Edit password

3. To allow Doctors to

- View patient records including laboratory and diagnostic tests made
- Update follow-up record
- View doctor's schedule
- Edit password

4. To allow Administrative Officer to

- Manage user accounts (Add/edit user accounts, activate/deactivate)
- Generate monthly report according to lab/diagnostic test referral
- Generate monthly report according to consultation
- Generate monthly report according to patient referral
- Edit password

5. To allow the laboratory staff to

- Add laboratory test results
- Add diagnostic test results
- Edit password

D. Significance of the Study

Through the online FHMSI Real-time Patient Friendly Information System with Bar Code Technology, storage and retrieval of data are now easier. Information is also secured because only authorized users can access the specific functionalities of the system. Since the system has Bar Code technology, patient identification is much easier therefore reducing data errors. It also reduces the hassles in admission. Other clinic procedures can be accomplished accurately and rapidly once the patients are bar coded. Important reports such as lab referral can also be generated for further reference and studies.

E. Scope and Limitations

- Manual system is used in parallel with the automated system.
- Billing system is not handled.
- The system does not handle the printing of barcodes.
- Patient can only view their general information and the lists of tests conducted.
- Only the doctor can edit the medical record of a patient (follow-up record).
- Validity/ Integrity of inputted information, diagnoses and test results are a responsibility of the authorized user.
- The front desk (clerk) can only manage general information of the patient.
- Some error checking on information happens on certain instances.
- Conflict checking in doctor schedule is not within the scope of the system.
- Audit trailing, if there is malfunction in the equipments, is not being handled by the system.
- Laboratory and Diagnostic results are in textfile format. Images are not included.

F. Assumptions

- The laboratory staff pertains to different users in the laboratory and diagnostic department.
- The system administrator of the system is also the Administrative officer of the clinic.
- The front desk (clerk) is also a nurse.
- Consultation number represents the charge slip number or the receipt number.
- Consultation charge depends on the rate the doctor will give.

- Service charge depends on the procedures done by the doctor and the nurse. For example, use dressing of patient, insertion of catheter.
- Other charges refer to the amount of materials not purchased in the pharmacy. These materials are assumed not to be available at the pharmacy.

II. REVIEW OF RELATED LITERATURE

The Indian Health Service (IHS) National Patient Information Reporting System serves as an agency-wide statistical information system and warehouse of Indian health and health system data. It is the national data repository for IHS statistical health care data on patient registration and visit encounters occurring at either IHS facilities or contracting facilities that provide care. It collects data on persons who are members of federally recognized tribes that access IHS services. [2]

TLC Simulated Medical Center contains the computerized records of 12 fictitious patients, ranging in age from 6 to 80, with a wide variety of diagnoses related to medical, surgical, pediatric, obstetric, and psychiatric conditions. Students can access these records, learning how to read records, print out records, enter new data, document patient care, order supplies, and develop care plans. [3]

ARAMIS (the Arthritis, Rheumatism, and Aging Medical Information System) is a national chronic disease data bank system consisting of parallel, longitudinal, clinical data sets from 11 diverse U.S. and Canadian locations. Data describe the courses of thousands of patients with rheumatic diseases and healthy community residents followed for over 25 years. Unlike clinical studies based on medical records, ARAMIS data are collected with a prospective protocol using standard, defined data collection instruments. Instruments include the Health Assessment Questionnaire, an instrument which includes measures of disability, pain, global health, treatment side-effects, resource utilization, demographics and health behaviors. It has numerous associated investigators in the United States and Canada. Investigators and data banks are selected on the basis of

integrity and attention to data collection and quality and breadth in the rheumatic diseases. This breadth results in diversity and strength in research. Data banks are also selected with regard to location and demographic composition. Some sites are part of academic medical centers, others are community providers located in urban centers, and others represent population based patient groups. ARAMIS investigators have published more than 800 articles in the field of rheumatology and health services research. [4]

Care2x HIS is the smart software for hospitals and health care organizations. It is designed to integrate the different information systems existing in these organizations into one single efficient system. It solves the problems inherent in a network of multiple programs that are noncompatible with each other. It can integrate almost any type of services, systems, departments, clinic, processes, data, communication, etc. that exist in a hospital. Its design can even handle non-medical services or functions like security, maintenance, etc. It is modular and highly scalable. It uses a standard SQL database format for storing and retrieving data. The use of a single data format solves the problem of data redundancy. When configured accordingly, it can support multiple database configurations to enhance data security and integrity. It is a web based software and all its functions can be accessed with a common web browser thus there is no need for special user interface software. All program modules are processed on the server side. Module updates and extensions do not require changes on the browsers thus there are no network interruptions and downtimes. Its design supports multiple server configurations to distribute traffic and improve speed and efficiency. It is an open source development (OSD) project and distributed with a "GNU General Public License". Its source code is freely-distributed and available to the general public. [5]

Center for Development of Advanced Computing (C-DAC) Health Information System generates and accepts investigation requisitions, collects sample of investigations, prepares laboratory reports, sends samples of laboratories, and enter and validate results. It has a Result Entry Facility that allows result to be entered in different formats Single-Parameter, Multi-Parameter and so on. The Validation Facility ensures that test results are correct and ready for printing/transmission. [6]

Medicware Electronic Medical Record (EMR) is an electronic medical record software that allows physicians to efficiently and cost-effectively manage their patient's full clinical experience. With its advanced features, it eliminates common errors associated with misread prescriptions, missed drug allergies or drug interactions. [7]

University of Wisconsin Hospitals and Clinics maintains a robust electronic medical record, known as the Wisconsin Computerized Record (WISCR). Data from laboratory, radiology, transcription, billing and other departmental computer systems are transmitted over interfaces to the repository. WISCR is also described as a computer-based system which also generates reminder letters to patients who may have missed their indicated screening tests because they do not visit a provider regularly or missed their tests despite the fact that they do visit a provider [8].

The Veterans Health Information Systems and Technology Architecture (VistA) is an enterprise-wide information system built around an electronic health record, used throughout the United States Department of Veterans Affairs (VA) medical system, known as the Veterans Health Administration (VHA). By 2001, the VHA was the largest single medical system in the United States, providing care to 4 million veterans, employing 180,000 medical personnel and operating 163 hospitals, over 800 clinics and 135 nursing homes. [9]

Lattice, Inc., working in conjunction with the University of Chicago Hospitals have developed a system called MediCopia Phlebotomy Application. MediCopia Phlebotomy Application, powered by SQL Anywhere Studio from Sybase's iAnywhere subsidiary—is now in use at University of Chicago Hospitals, and is significantly increasing patient safety while reducing laboratory costs. It uses barcode technology in identifying a patient. [10]

IBM's Patient Tracking Solution allows First Responders to capture patient data and images at the incident. This data is then transmitted instantaneously over a wireless network to a back-end application. Emergency operations personnel, hospitals, and only public safety personnel who have the authorization can access the patient information via the web in real-time. This data includes the patient information, condition, patient vital and chief compliant information, images, and the hospital to where the patient is being transported. The architecture is flexible to capture additional information if required. The design supports minimum user interaction that includes drop down lists, arrow buttons,

and radio buttons to allow the responder to focus and pay attention to assist the patient.

Users can access the data via handheld devices, laptops, mobile data terminals, and PCs.

[11]

III. THEORETICAL FRAMEWORK

A. FRIENDLY HILLS MEDICAL SERVICES, INC.

Friendly Hills Medical Services, Inc. Friendly Hills Medical Services, Inc. is located in Taytay, Rizal. Its mission is to provide quality medical services at par with global standards and practices and at affordable prices.

The front desk is the one responsible of handling patients' medical records. Once they are approached by a patient, it is a must for them to ask if he/she has already a record and what has to be done. If new patient, the front desk will give him/her information sheet to be filled-up and get his/her vital signs. If the returning patient, the front desk will search the patient's record in the filing cabinet then get the vital signs. After getting the information sheet, the medical staff will assist the patient to the physician's clinic. After consultation, the patient can be referred by the physician to undergo laboratory or diagnostic tests. If so, the medical staff will issue a laboratory request form and assist the patient to the cashier then to the laboratory room.

For the case of walk-in patients for laboratory/diagnostic tests, the medical staff will ask for a lab referral from the patient. If there isn't any, the medical staff will issue a laboratory request form to the patient and will be assisted to the cashier and to the laboratory room.

B. INFORMATION SYSTEM

Information system is an automated way of dealing with the acquisition, manipulation and deletion of all kinds of data, the goal of which is to provide and easier access to certain information. There are different kinds of information system depending on your chosen discipline. Furthermore, they also differ on their approach of processing your query. For instance, if you want to obtain a particular data, some information system obtain may prompt you to type the keyword of the information you are trying to get while others would just give you a list of options from which you can select. The system would then find the data you are requesting to provide an output. [12]

Health information system is an integrated computer-assisted system designed to store, manipulate, and retrieve information concerned with the administrative and clinical aspects of providing services within the hospital. [13]

C. RELATIONAL DATABASE

A relational database is a storage mechanism that enables you to both store data and optionally implement functionality. Relational databases are used to store the information required by applications built using procedural technologies such as COBOL or FORTRAN, object technologies as Java and C#, and a component- based technologies such as Visual Basic. Because they are the dominant persistent storage technology, it is critical that all IT professionals understand at least the basics of relational databases, the challenges surrounding the technology, and when it is appropriate to use them. Relational databases store data in tables. Tables are organized into columns, and each column stores

one type of data (integer, real number, character strings, date). The data for single “instance” of a table is stored as a row. Tables typically have keys, one or more columns that uniquely identify a row within a table. An index provides a quick way to look up data based on one or more columns in the table, just like the index of a book enables you to find specific information quickly. The most common use of relational databases is to implement simple CRUD-Create, Read, Update, and Delete-functionality. [14]

D. BAR CODE

A bar code is a graphic representation of data (alpha, numeric, or both) that is machine-readable. Bar codes are a way encoding numbers and letters by using a combination of bars and spaces of varying widths. It is a reference number that a computer uses to look up an associated record that contains descriptive data and other important information. Bar codes are read by sweeping a small spot of light across the printed bar code symbol. There's only a thin red line emitted from the laser scanner; what is happening is that the scanner's light source is being absorbed by the dark bars and reflected by the light spaces. A device in the scanner takes the reflected light and converts it into an electrical signal. The scanner's laser (light source) starts to read the bar code at a white space (the quiet zone) before the first bar and continues passing by the last bar, ending in the white space that follows it. Because a bar code cannot be read if the sweep wanders outside the symbol area, bar heights are chosen to make it easy to keep the sweep within the bar code. The longer the information to be coded, the longer the bar code needed. [15]



Figure 1. Bar Code

E. KEYBOARD WEDGE SCANNER

The scanner is physically wedged in between the keyboard and a terminal or PC with a "Y" cable. The advantage of this connection is that the scanned data appears transparent to the keyboard. Data entry is independent of the application or operating system, so no unique software is required. A keyboard wedge allows data scanned by a barcode reader to appear to the computer as though it were typed manually into the keyboard. Thus the use of a keyboard wedge streamlines the process of incorporating the use of a barcode scanner to an existing system. [16]

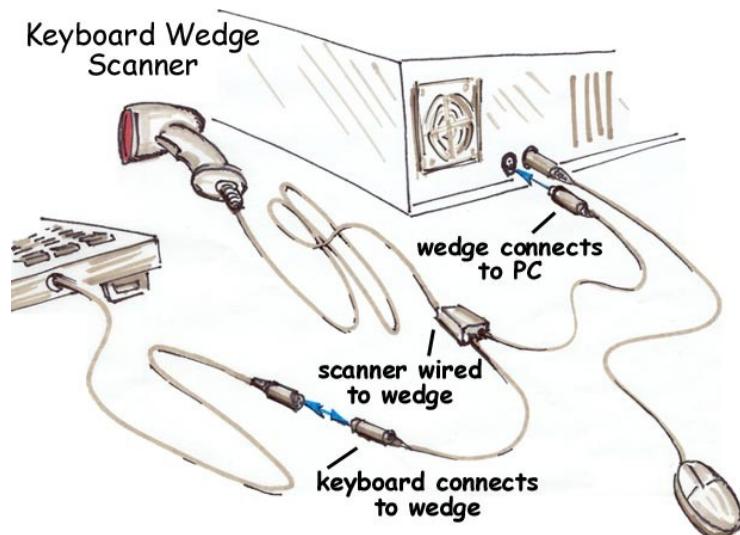


Figure 2. Keyboard wedge Scanner set-up

F. CODE 128 SYMBOLOGY

Code 128 provides excellent density for all-numeric data and good density for alphanumeric data. It is often selected over Code 39 in new applications because of its density and because it offers a much larger selection of characters. The Code 128 standard is maintained by AIM (Automatic Identification Manufacturers).

The Code 128 character set includes the digits 0-9, the letters A-Z (upper and lower case), and all standard ASCII symbols and control codes. The codes are divided into three subsets A, B, and C. There are three separate start codes to indicate which subset will be used; in addition, each subset includes control characters to switch to another subset in the middle of a barcode. Subset A includes the standard ASCII symbols, digits, upper case letters, and control codes. Subset B includes standard ASCII symbols, digits, upper and lower case letters. Subset C compresses two numeric digits into each character, providing excellent density. Here is a sample that contains 12 digits; compare its size to the sample at the top of the page that contains 12 assorted characters:

Each character is 11 times the width of the narrowest bar; using a minimum bar width of 0.010" each character would be 0.11" wide. Using the 0.010" figure, 20 data characters plus start code, check digit, and stop code would measure 2.55" wide (the stop code is 13 times as wide as a narrow bar). Using Subset C with all-numeric data provides 2:1 compression of the data for a total width of 1.45".

Each character consists of 3 bars and 3 spaces, each of which may be 1, 2, or 3 elements wide (1 element = 1/11th of the character width). The bars always use an even number of

elements and the spaces use an odd number. This provides the basis for a character-by-character consistency check during scanning. In addition, each Code 128 barcode includes a Modulo 103 checksum. [17]

IV. DESIGN AND IMPLEMENTATION

A. Entity Relationship Diagram

The entity-relationship diagram is shown in Figure 3. The front desk is the one responsible of managing patient and doctor records while the doctor is the only one that can add diagnosis to the patient record. A patient record also contains consultation and lab test and diagnostic which can only be added by the laboratory staff. A patient can have many consultations, many lab tests and many diagnostic tests. The doctor can also give many diagnoses to a patient.

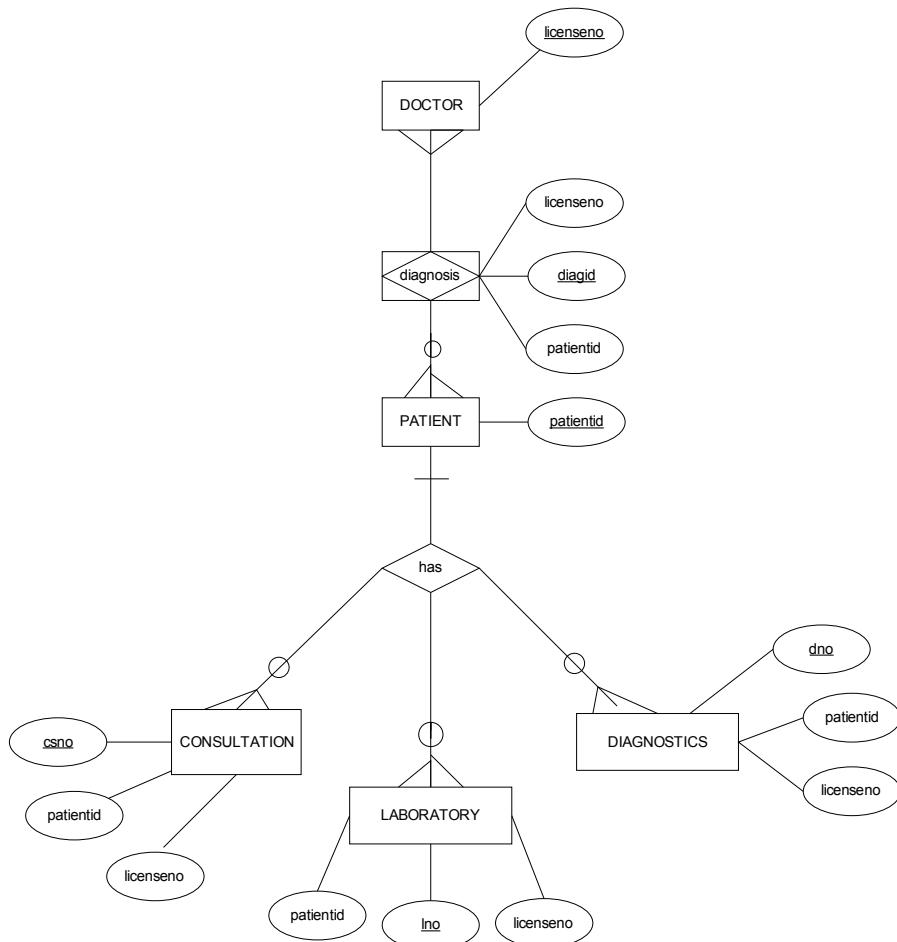


FIGURE 3. ENTITY RELATIONSHIP DIAGRAM, FHMSI RPF-IS

B. Data Dictionary

USERS- contains authorized users of the system

DATA FIELD	DATA TYPE	DESCRIPTION
<u>USERID</u>	INT	User's ID, primary key
USERNAME	VARCHAR	Username
PASSWORD	VARCHAR	User's password
USERTYPE	VARCHAR	User's type or position
UFNAME	VARCHAR	First name
ULNAME	VARCHAR	Last name
STATUS	INT	Status

PATIENT- contains patient's information

DATA FIELD	DATA TYPE	DESCRIPTION
<u>PATIENTID</u>	VARCHAR	Patient's ID, primary key
REGDATE	DATE	Date of Registration
FNAME	VARCHAR	Patient's First name
MNAME	VARCHAR	Patient's Middle name
LNAME	VARCHAR	Patient's Last name
STREET	VARCHAR	Patient's Street
BRGY	VARCHAR	Patient's barangay
CITY	VARCHAR	Patient's city
HOMENO	VARCHAR	Patient's home number
OFFICEAD	TEXT	Patient's office address
OFFICENO	VARCHAR	Patient's office number
MOBILENO	VARCHAR	Patient's mobile number
OCCUPATION	VARCHAR	Patient's occupation
BDATE	INT	Day of birth
BMONTH	INT	Month of birth

BYEAR	INT	Year of birth
HMO	VARCHAR	Patient's medical card
REFERRED	VARCHAR	Referral Doctor
GENDER	VARCHAR	Patient's gender
STATUS	VARCHAR	Patient's status
REGISTEREDBY	VARCHAR	Registered by

DOCTOR-contains doctor's information

DATA FIELD	DATA TYPE	DESCRIPTION
LICENSENO	INT	Doctor's license number, primary key
DOCTORFNAME	VARCHAR	Doctor's first name
DOCTORLNAME	VARCHAR	Doctor's last name
SPECIALIZATION	VARCHAR	Doctor's specialization
MONFROM	INT	Doctor's start of schedule on Mondays
MONTO	INT	Doctor's end of schedule on Monday
TUEFROM	INT	Doctor's start of schedule on Tuesday
TUETO	INT	Doctor's end of schedule on Tuesday
WEDFROM	INT	Doctor's start of schedule on Wednesday
WEDTO	INT	Doctor's end of schedule on Wednesday
THUFROM	INT	Doctor's start of schedule on Thursday
THUTO	INT	Doctor's end of schedule on Thursday
FRIFROM	INT	Doctor's start schedule on Friday
FRITO	INT	Doctor's start schedule on Friday
SATFROM	INT	Doctor's start schedule on Saturday
SATTO	INT	Doctor's start schedule on Saturday
SUNFROM	INT	Doctor's start schedule on Sunday
SUNTO	INT	Doctor's start schedule on Sunday
ADDRESS	VARCHAR	Doctor's address
CONTACTNO	VARCHAR	Doctor's Contact number

DIAGNOSIS-contains the diagnosis and treatment of a patient

DATA FIELD	DATA TYPE	DESCRIPTION
<u>DIAGID</u>	INT	Diagnosis ID, primary key, auto-increment
PATIENTID	INT	Patient's ID, foreign key
LICENSENO	INT	Doctor's License number, foreign key
DDATE	DATE	Date when the diagnosis is made
HISTORY	TEXT	Patient's history of illness
DIAGNOSTIC	TEXT	Doctor's diagnosis
TREATMENT	TEXT	Doctor's treatment
WEIGHT	VARCHAR	Weight
HEIGHT	VARCHAR	Height
TEMP	FLOAT	Temperature
BP	VARCHAR	Blood pressure
TESTREQUIRED	VARCHAR	Test required by the patient
FOLLOWUP	DATE	Follow-up check-up

CONSULTATION-contains consultation record of the patient

DATA FIELD	DATA TYPE	DESCRIPTION
<u>CSNO</u>	INT	Consultation number, primary key
CSDATE	INT	Date of consultation
PATIENTID	VARCHAR	Patient ID, foreign key
LICENSENO	INT	Doctor's license no, foreign key
CCHARGE	FLOAT	Consultation charge
SCHARGE	FLOAT	Service charge
OTHERS	FLOAT	Other charges
TOTAL	FLOAT	Total charge
REMARKS	TEXT	Remarks
IS_CONSULTED	ENUM	Status if the consultation has been added

DIAGNOSTICS- contains information about the diagnostic tests taken

DATA FIELD	DATA TYPE	DESCRIPTION
<u>DNO</u>	INT	Diagnostic test's ID, auto-

		increment, primary key
ORNO	VARCHAR	Official receipt no
DIAGDATE	INT	Day when the test is conducted
DIAGMONTH	INT	Month when the test is conducted
DIAGYEAR	INT	Year when the test is conducted
PATIENTID	VARCHAR	Patient's ID, foreign key
LICENSENO	INT	Doctor's ID, foreign key
CASENO	VARCHAR	Case number
CATEGORY	VARCHAR	Category
DEXAM	VARCHAR	Type of diagnostic test
DRESULT	TEXT	Diagnostic test result
INPUTBY	VARCHAR	Inputted by

LAB TEST-contains laboratory test of a patient

DATA FIELD	DATA TYPE	DESCRIPTION
<u>LNO</u>	INT	Laboratory test's no., primary key, auto-increment
ORNO	VARCHAR	Official receipt no.
LABDATE	INT	Day when the laboratory is conducted
LABMONTH	INT	Month when the laboratory is conducted
LABYEAR	INT	Year when the laboratory is conducted
PATIENTID	VARCHAR	Patient's id, foreign key
LICENSENO	INT	Doctor's id, foreign key
REFCODE	VARCHAR	Reference code
LCATEGORY	VARCHAR	Category
LABEXAM	VARCHAR	Type of Lab exam
LRESULT	TEXT	Lab test result
INPUTBY	VARCHAR	Inputted by

PENDINGPATIENTS- table containing patient's to be diagnosed

DATA FIELD	DATA TYPE	DESCRIPTION
<u>PNO</u>	INT	Pending number, primary key, auto-increment
PATIENTID	VARCHAR	Patient's ID, foreign key
LICENSENO	INT	Doctor's licenseno, foreign

		key
DATE	DATETIME	Date and time when the patient is pending
ISPENDING	ENUM	Status indicating if the patient is pending

C. Context Diagram

The context diagram is shown in Figure 4. It shows the users of the system and the input of each user and output delivered by the system. The system administrator is the one responsible for managing user accounts. The front desk manages patient and doctor

information. The system administrator is the only one that can view all the generated reports.

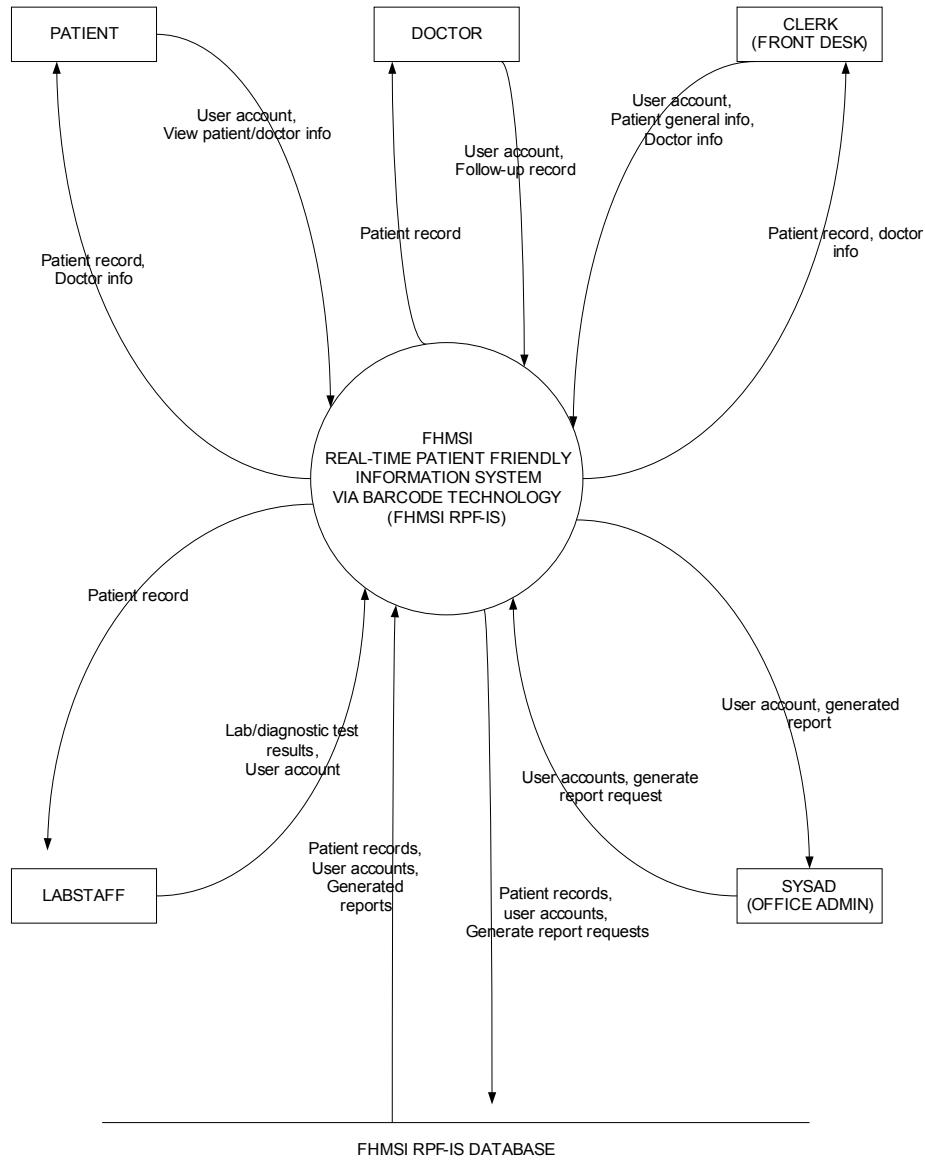


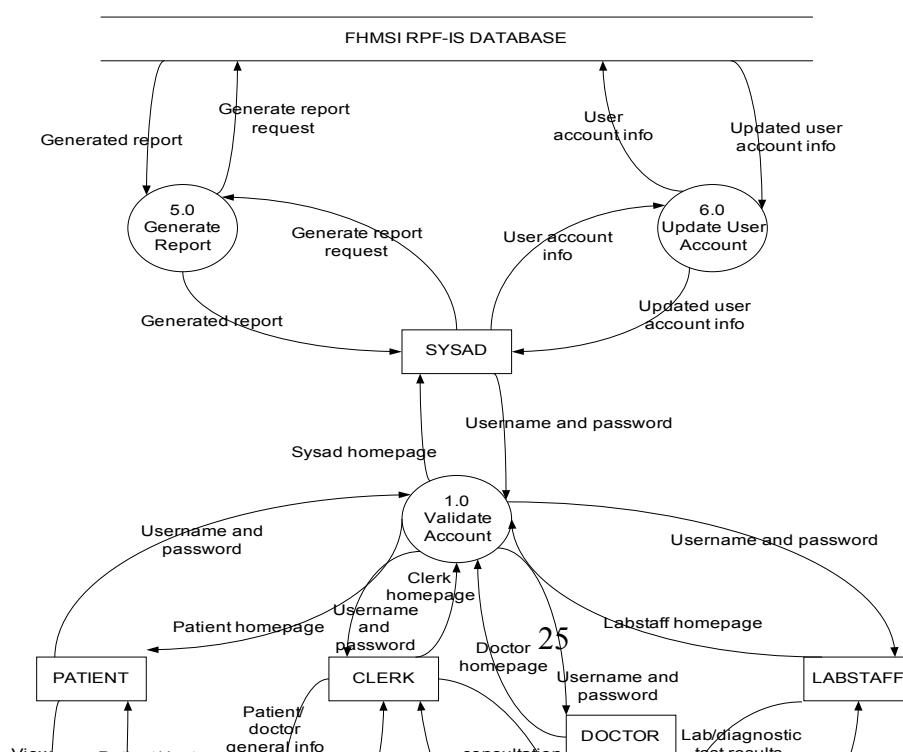
FIGURE 4. CONTEXT DIAGRAM, FHMSI RPF-IS

D. Data Flow Diagram

The main processes of the system are shown in the top level data flow diagram which can be seen on Figure 5. There are six main processes in the system namely: validate account, update patient/doctor record, update patient's medical record, view

patient/doctor info, generate report, and update user account. When the users log-in to the system, the system will immediately identify the position of the user and will limit the

functionalities he/she can perform based on his/her position.



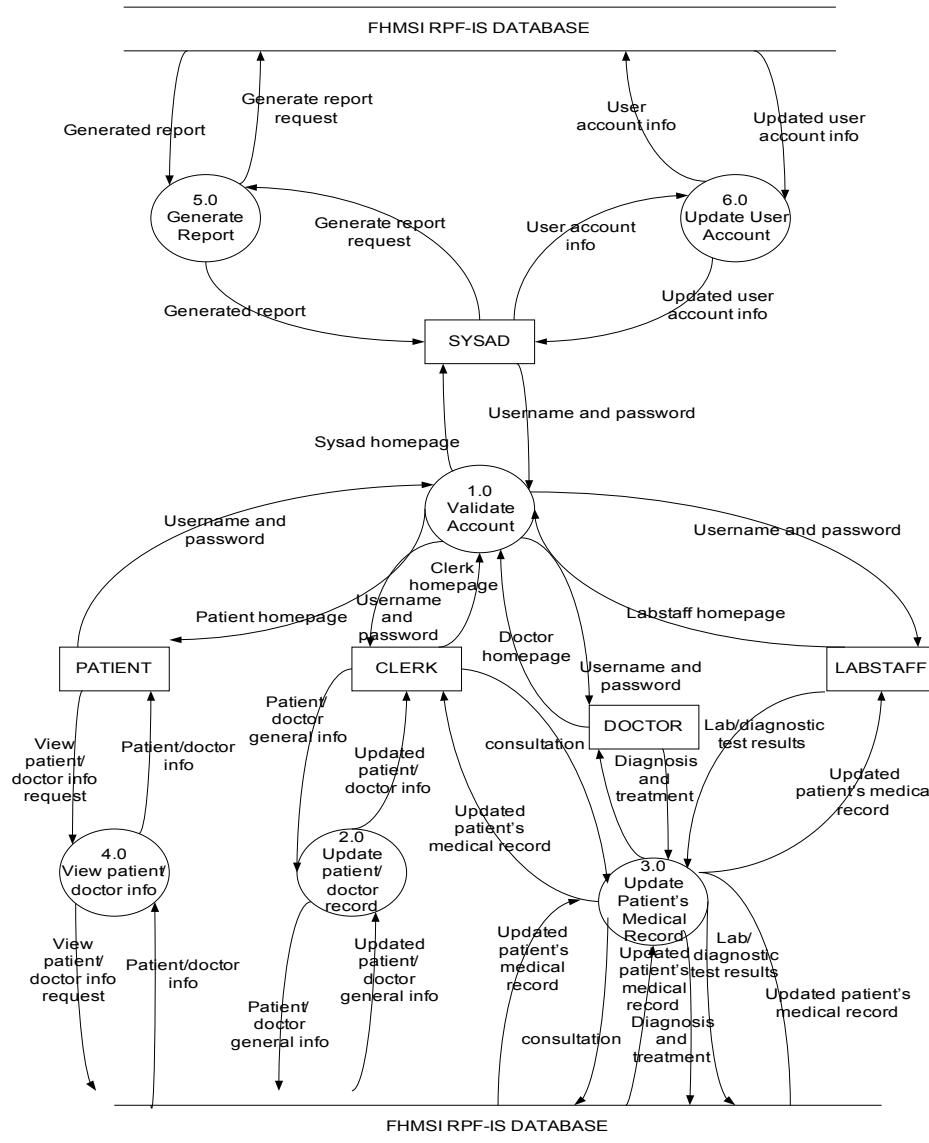


FIGURE 5. TOP- LEVEL DATA FLOW DIAGRAM, FHMSI RPF-IS

The subexplosion of Process 1 Validate Account is seen on Figure 6. There are two subprocesses: Login and Edit Password. Similarly, Figures 7-8 show the subexplosion of process 2: Update Patient/Doctor Record. The subprocesses are Update Patient General Info and Update Doctor Info.

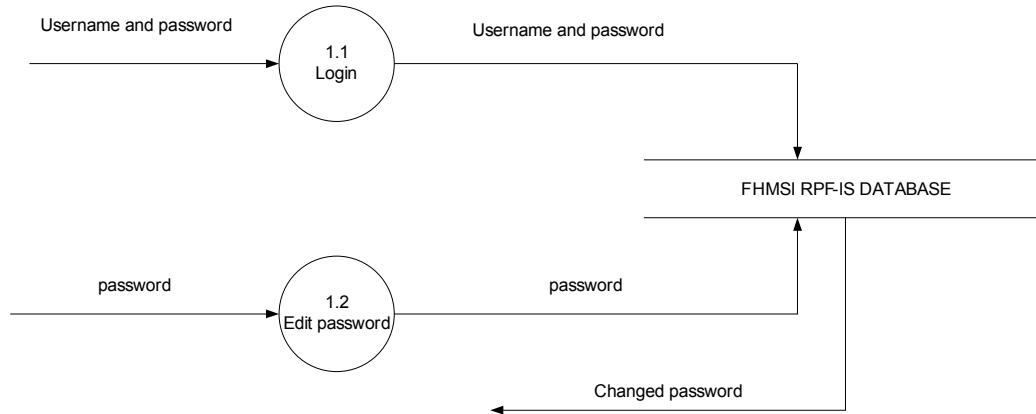


FIGURE 6. SUBEXPLOSION OF VALIDATE ACCOUNT, FHMSI RPF-IS

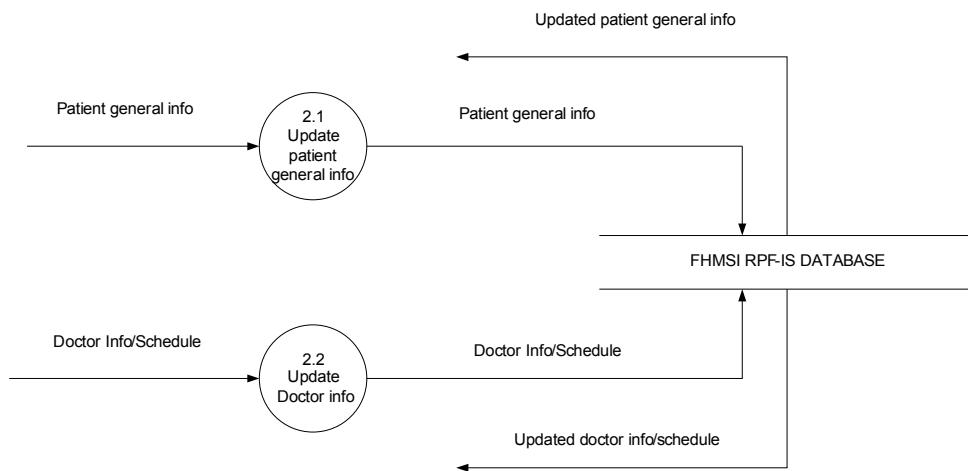


FIGURE 7. SUBEXPLOSION OF UPDATE PERSONAL RECORD, FHMSI RPF-IS

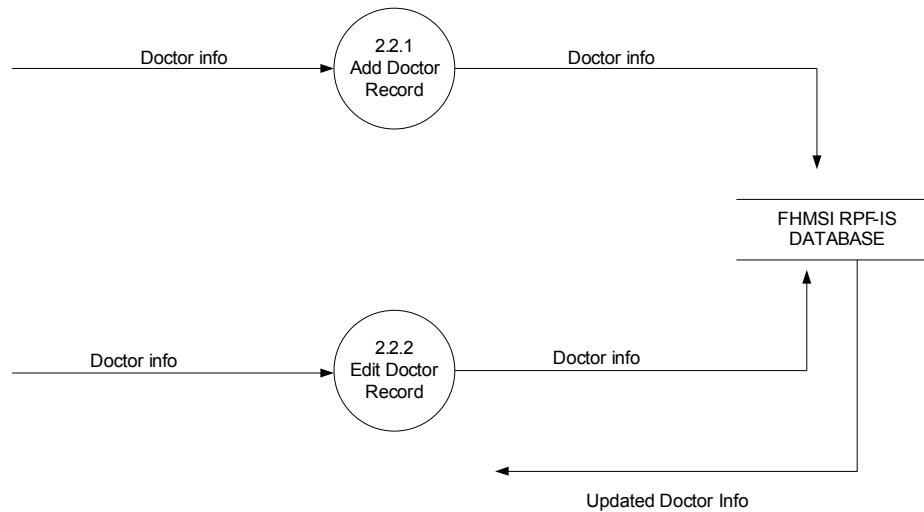


FIGURE 8. SUBEXPLOSION OF UPDATE DOCTOR INFO, FHMSI RPF-IS

Figure 9 shows the subexplosion of Process Update Patient's Medical Record. These are update follow up record, add lab/diagnostic test result and add consultation record. Patient can also view patient medical record and doctor information as seen in Figure 10.

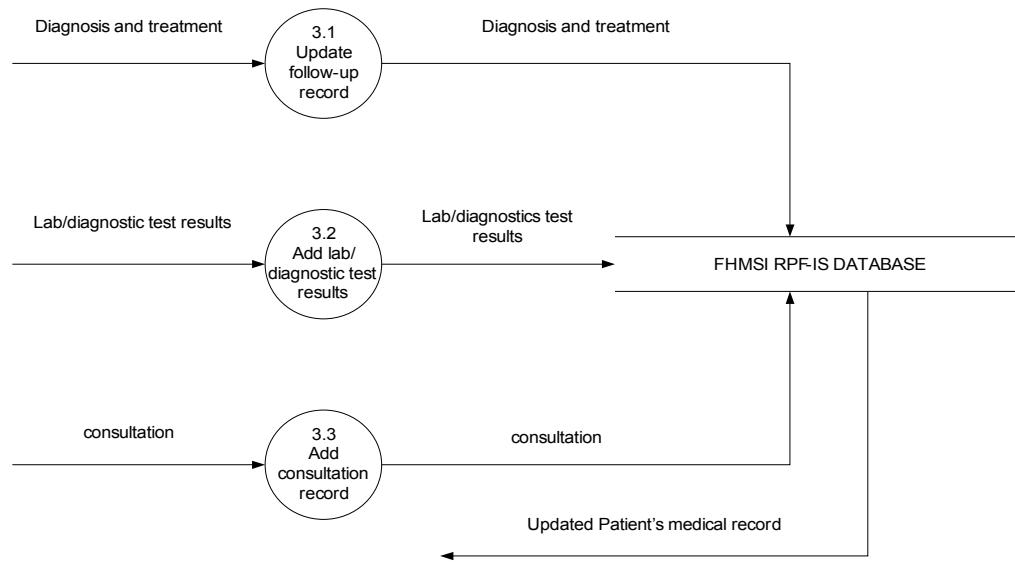


FIGURE 9. SUBEXPLOSION OF UPDATE PATIENT'S MEDICAL RECORD, FHMSI RPF-IS

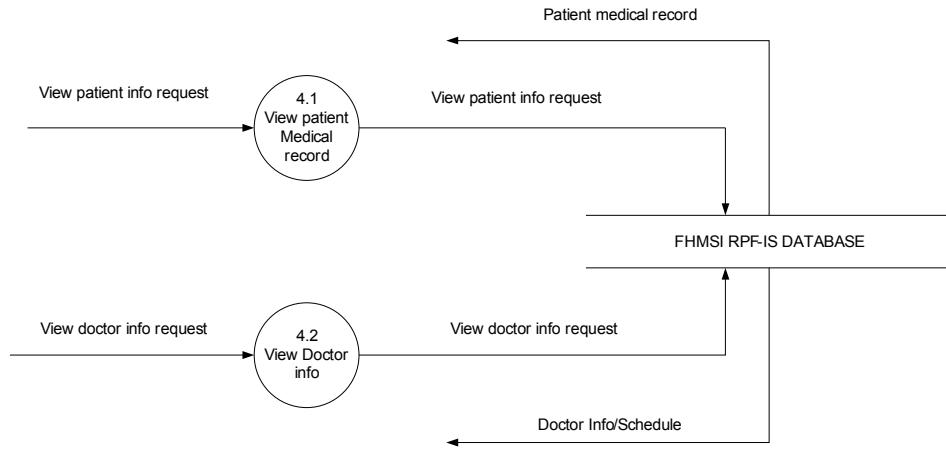


FIGURE 10. SUBEXPLOSION OF VIEW PATIENT /DOCTOR INFO, FHMSI RPF-IS

Report generations are seen in Figure 11. The reports can be classified by lab referral, by patient referral and by consultation. On the other hand, system's administrator functionalities are present in Figure 12.

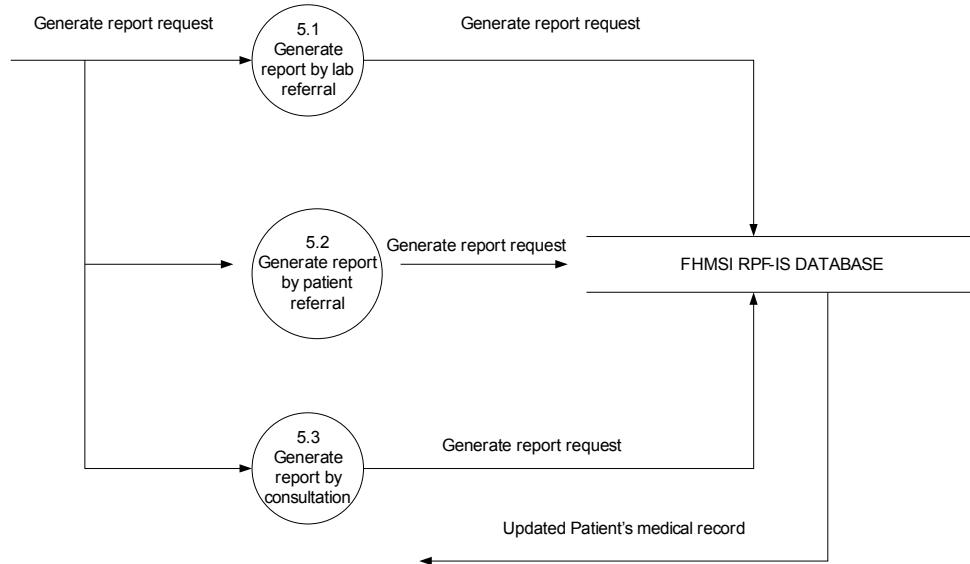


FIGURE 11. SUBEXPLOSION OF GENERATE REPORT, FHMSI RPF-IS

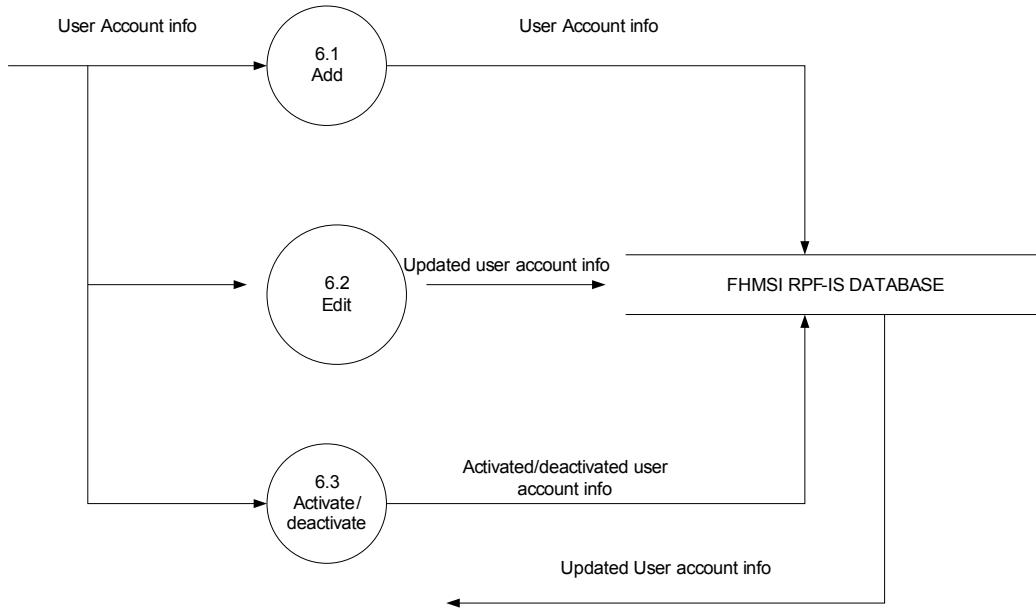


FIGURE 12. SUBEXPLOSION OF UPDATE USER ACCOUNT, FHMSI RPF-IS

E. Technical Architecture

The system would be running on a client/server computer architecture. The network must have a TCP/IP connectivity in order to install the web browsers and servers needed for an intranet.

The server machine should have a speed of at least 500 megahertz and a memory of at least 128 Mb. A bar code printer is connected to it for bar code production. It will be using the following applications:

- Apache server (at least version 1.3)
- MySQL
- PHP (at least 4.1.1)

The clients, on the other hand should have speed of at least 200 megahertz or higher with a memory of at least 128 Mb. A bar code scanner is connected to the keyboard wedge in order for the bar code to be read.

The system will run on the following operating systems with IE :

- Windows 98/Windows 2000/Windows XP (recommended)
- Linux

It is best viewed on a 1024 x 768 resolution and with a web browser (Internet Explorer of at least version 5 and Mozilla Firefox).

V. RESULTS

The main page of the system contains the login function that allows the users to access the system by giving their username and password as shown in figure 13. Once the user has been authenticated, the system checks for the position of the user. The system would then output the homepage for the corresponding user type.



Figure 13. Home Page. FHMSI RPF-IS

Once the front desk has logged-in as seen in Figure 14, he/she can automatically see the patients he/she must add a consultation record. He/she will just click on the patient's name to be able to add one. The front desk is the only one that can add a patient record as shown in Figure 15.



Figure 14. Front Desk (clerk) Page. FHMSI RPF-IS

Welcome reysie !

PATIENT FORM

REGISTRATION DATE:	21 March 2007
*PATIENTID:	0000000005
*FIRST NAME:	Charmaine Iliah
*MIDDLE NAME:	Vallefias
*LAST NAME:	Joveres
STREET ADDRESS:	422 cluster 4 Flexihomes
BARANGAY:	Rosario
CITY:	Pasig
HOME NUMBER:	6559688
OFFICE ADDRESS:	
OFFICE NUMBER:	
MOBILE NUMBER:	09212817240
OCCUPATION:	

Figure 15. Patient Form Page. FHMS RPF-IS

The doctor is the one responsible of adding a follow-up record to a patient. This includes adding history, diagnosis and treatment as well as the physical exam. Figure 16 illustrates the page of the doctor. The system automatically tells the list of patients to be diagnosed for that day. The doctor will just have to click the patient's name to add a follow-up record as seen in Figure 17.



Figure 16. Doctor Page. FHMSI RPF-IS

Patient's Full Name:	Jhoanna Mara Vallefaz Joveres	Registration Date:	2007-03-15
Home Address:	422 cluster 4 Flexihomes Rosario Pasig	Telephone No:	6559688
Office Address:	Friendly Hills Medical Services, Inc. Taytay	Telephone No:	
Occupation:	Age: 22	Gender: female	Date of Birth: 21/05/1984
Status:	single	Control Code:	Referred by: Dennis Roland Santos
			Mobile No. 09278048094
			Registered by: reysie

Figure 17. Add Follow-up Record. FHMSI RPF-IS

Figure18 illustrates how the system administrator generates monthly report. These reports are essential for further studies and can be used as a reference of the company in terms of payment of professional fees, rebates, etc.

The screenshot shows the FH-MSI MENU on the left with options like 'View Accounts', 'Create New Account', and 'Generate Monthly Report'. The main area displays a monthly report titled 'MARCH - 2007' with columns for DOCTOR, LABORATORY, and DIAGNOSTICS. The report lists various medical staff members with their respective counts. To the right of the report are two images: one showing a laboratory setting and another showing the exterior of the medical building.

MARCH - 2007		
DOCTOR	LABORATORY	DIAGNOSTICS
Dennis Roland Santos	1	0
Jeanette Vidal	1	0
Jessica Bentalan	1	0
Karen Samson	0	1
Mark Collao	0	0
Aida Patag	1	0
Chona Collado	0	0
Sharon Tullo	0	0
Richard Tan	0	0
Babes Tongson	0	0
Neil Manalo	0	0
Gina Garcia	0	0
Reynaldo Rivera	0	0
Vincent Peter Magboo	0	1
Avegail Carpio	0	0
Eden Huelgas	1	0

Figure18. Generate Report. FHMSI RPF-IS

Figure 19 shows how the laboratory staff can add diagnostic test result. The laboratory staff must search the patient first before adding a diagnostic test. Figure 20 illustrates a sample diagnostic test .

Welcome raul !

Please Fill Up this Diagnostic Test Form

Patient ID	0000000001		
Patient Name	Jhoanna Mara Joveres		
Diagnostic Test Date	20	March	20- 07
OR #:	784984		
Case No:	06-411		
Diagnostic Test Category	Radiology		
Examination:	CHEST PA		
Result:	INTERPRETATION: Both lung fields are clear. Heart is not enlarged. Hemidiaphragm and sulci are intact. Bony thorax are unremarkable. IMPRESSION: ESSENTIALLY NORMAL CHEST		
Input by:	raul		
Referring Doctor	Mark Collao		

Figure19. Add Diagnostic Test. FHMSI RPF- IS

Welcome raul !

PATIENT ID: 0000000001

Patient's Full Name:	Jhoanna Mara Vallefas Joveres	Date	2007-03-15
Home Address:	422 cluster 4 Flexihomes Rosario Pasig	Telephone No:	6559688
Office Address:	Friendly Hills Medical Services, Inc. Taytay	Telephone No:	
Occupation:	Age: 22	Gender: female	Date of Birth: 21/05/1984
Status:	HMO: Prudential Life	CONTROL CODE:	Mobile No. 09278048094
			Referred by: Dennis Roland Santos
			Registered by: reysie

Add Diagnostic Test

Add Lab Test

LABORATORY TESTS TAKEN

DATE	LABORATORY TEST	REFERRING DOCTOR
15/03/07	FBS-> 10.87 [4.6-6.4 (M/F) mmol/L] CREATININE -> 56.87 [80-115 (M) 53-97 (F) umol/L] URIC ACID-> 196 [210-420 (M) 150-350 (F) umol/L] TRIGLYCERIDES-> 1.99 [Up tp 2.83 mmol/L] TOTAL CHOLESTEROL -> 8.86 [<= 5.2 mmol/L]	Jones Estrada

DIAGNOSTIC TESTS TAKEN

DATE	DIAGNOSTIC TEST	REFERRING DOCTOR
11/2/7	INTERPRETATION: Both lung fields are clear. Heart is not enlarged. Hemidiaphragm and sulci are intact. Bony thorax are unremarkable. IMPRESSION: ESSENTIALLY NORMAL CHEST	Jones Estrada

Figure 20. A Sample Diagnostic Test Result. FHMS RPF-IS

VI. DISCUSSION

The Friendly Hills Medical Services, Inc. Real-time Patient Friendly Information System via Bar Code Technology (RPF-IS) is a web-based application for maintaining patient records of Friendly Hills Medical Services, Inc. and for generating essential reports for future references.

As a database system, the Friendly Hills Medical Services, Inc. Real-time Patient Friendly Information System via Bar Code Technology (RPF-IS) enables the front desk an easier way of storing and retrieving patient records. With its' bar code technology, possible errors are reduced most especially with giving an appropriate treatment for a patient. This system strictly stores patient records with security and confidentiality that it only allows authorized users to access the patient medical records. However, the system is only designed according to the need of the patients of Friendly Hills Medical Services, Inc. Generated reports are limited due to lack of references.

Compared to the other systems mentioned, Friendly Hills Medical Services, Inc. Real-time Patient Friendly Information System (FHMSI RPF-IS) does not handle billing unlike the Wisconsin Computerized Record (WISCR). No audit trailing is also possible in the system. On the other hand, it does provide for the electronic patient records who have received health care services from FHMSI much like Care2x software.

VII. CONCLUSION

The Friendly Hills Medical Services, Inc. Real-time Patient Friendly Information System (FHMSI RPF-IS) is an automated system that allows the front desk to update patient's general information from the database, as well as adding consultation to the patient's medical record. The system allows the doctor to update follow-up records by adding diagnosis and treatment. It also allows the laboratory staff to add diagnostic/laboratory test results in the patient's medical records. Furthermore, system administrator can manage user accounts and generate essential reports. It allows all the users to change his password. Lastly, it allows the patient to his/her own patient general information.

VIII. RECOMMENDATIONS

The Friendly Hills Medical Services, Inc. Real-time Patient Friendly Information System (FHMSI RPF-IS) can be further developed by adding audit trailing and billing system. Message Alert system can also be added to the system.

Friendly Hills Medical Services, Inc. Real-time Patient Friendly Information System (FHMSI RPF-IS) can also work in parallel with the existing Laboratory Information System (LIS).

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