CLINICAL WORKSTATION

An in-house Hospital Information System (HIS)

Christian Medical College

Vellore

PART I

AWARD APPLIED BY:

PRIVATE SECTOR ORGANIZATION

PART II

INTRODUCTORY INFORMATION

PROJECT NAME: CLINICAL WORKSTATION**:** An in-house Hospital Information System (HIS)

INSTITUTE: Christian Medical College, Vellore

AWARD CATEGORY APPLIED FOR: SKOCH DIGITAL INCLUSION AWARD – Health

ADDRESS:

Christian Medical College,

Ida Scudder Road,

Vellore, Tamil Nadu – 632004

India

Telephone:0416-2282010

Email: directorate@cmcvellore.ac.in

PROJECT COMMENCEMENT DATE: 2004

PROJECT COMPLETION DATE: December 2006

DETAILS OF RESPONDENT:

Dr. Sunil Chandy,

Director,

Christian Medical College,

Vellore, Tamil Nadu – 632004

India

Telephone:0416-2282010

Email: directorate@cmcvellore.ac.in

CLINICAL WORKSTATION: AN IN-HOUSE HOSPITAL INFORMATION SYSTEM

Brief Overview of the project

Christian Medical College, Vellore (CMC) is an unaided, Christian minority health care institution which is committed to delivering world class health care to all sections of society, aided by the use of caring, cost effective technology. From its humble beginnings as a one-bedded clinic over a hundred years ago, CMC has blossomed into a large institution catering to over 6000 outpatients and 2600 inpatients daily, and home to 10,500 staff and students. An institution of this magnitude brings with it a raft of administrative and organizational complexities, which need to be continuously addressed in order to facilitate CMC's goal of excellence in education, service and research.

In order to integrate the functions of various sections of the hospital – Laboratories, Medical Records Department (MRD), Pharmacy, Dietary, in-patient (IP) and out-patient (OP) areas, CMC required a fully integrated Hospital Information System (HIS) for the Main Hospital and peripheral centres. Since it would have been prohibitively expensive to outsource the development of a user friendly program that would be sophisticated enough to meet the needs of an ever expanding institution, CMC's Department of Centralised Hospital Information Processing Systems (CHIPS) took up the challenge of developing, in-house, a program with the desired specifications. This HIS covers the patient registration and appointment system, admission-discharge-transfer (ADT) process, Outpatient and Inpatient billing, Company & Insurance billing and Reimbursement procedures, and is integrated with MRD, Laboratories, Pharmacy Department, Operation Theatre, Anaesthesia Department, Dietary and Laundry. It includes the Clinical Workstation that is an interface by which doctors can view and manipulate patient data.

The HIS has resulted in a tremendous increase in efficiency at all levels of the health care delivery process within CMC - allowing prompt service, reducing costs, minimizing the margin for human error and providing a tool for Continuous Quality Improvement (CQI) strategies by CMC.

Challenges faced before deployment of the project

CMC started with stand-alone microcomputers to perform Billing and Accounts procedures. However, as the services of the hospital expanded and the number of patients soared, so also did the need for storage and sharing of data.Results entered in the labs would previously take at least a day to reach the doctors desk based on which treatment would be modified. The lack of integration caused significant delays in patient billing, increased waiting time, and incurred additional costsin terms of finance and resources. Retrieving patient and financial information was difficult, thereby limiting decision-making processes. Manual processes were subject to entry errors. Information was available at limited areas and sometimes could not be provided in real-time. Gathering information for statistics and research was a complex operation. Generating financial statements was a phenomenal task.

Objectives of the project

1. To develop a fully integrated HIS for various areas of the hospital – Emergency Services, Pharmacy, Labs, MRD (Patient registrations, doctor schedules and OP/IP charts), IP areas (wards & intensive care units, billing, reimbursement and credit authorizations), OP areas (OPDs) and Dietary services.

2. To develop an integrated, user friendly Clinical workstation for doctors to view appointments, results, clinical images, theatre postings and inpatient lists; schedule doctor appointments & procedures; order investigations and prescriptions; and generate medical reports and discharge summaries – all at a single click.
3. To allow acquisition and availability of relevant real-time information and allow billing to be automated with data entry.
4. To ensure transaction security andminimize human errors.
5. To incorporate a Self-Service Module allowing ease of access to an individual's information.

Description of the implemented project

The Department of CHIPS in CMC set about the arduous task of developing an integrated HIS in-house in 2003.

The following modules were developed and incorporated into the HIS:

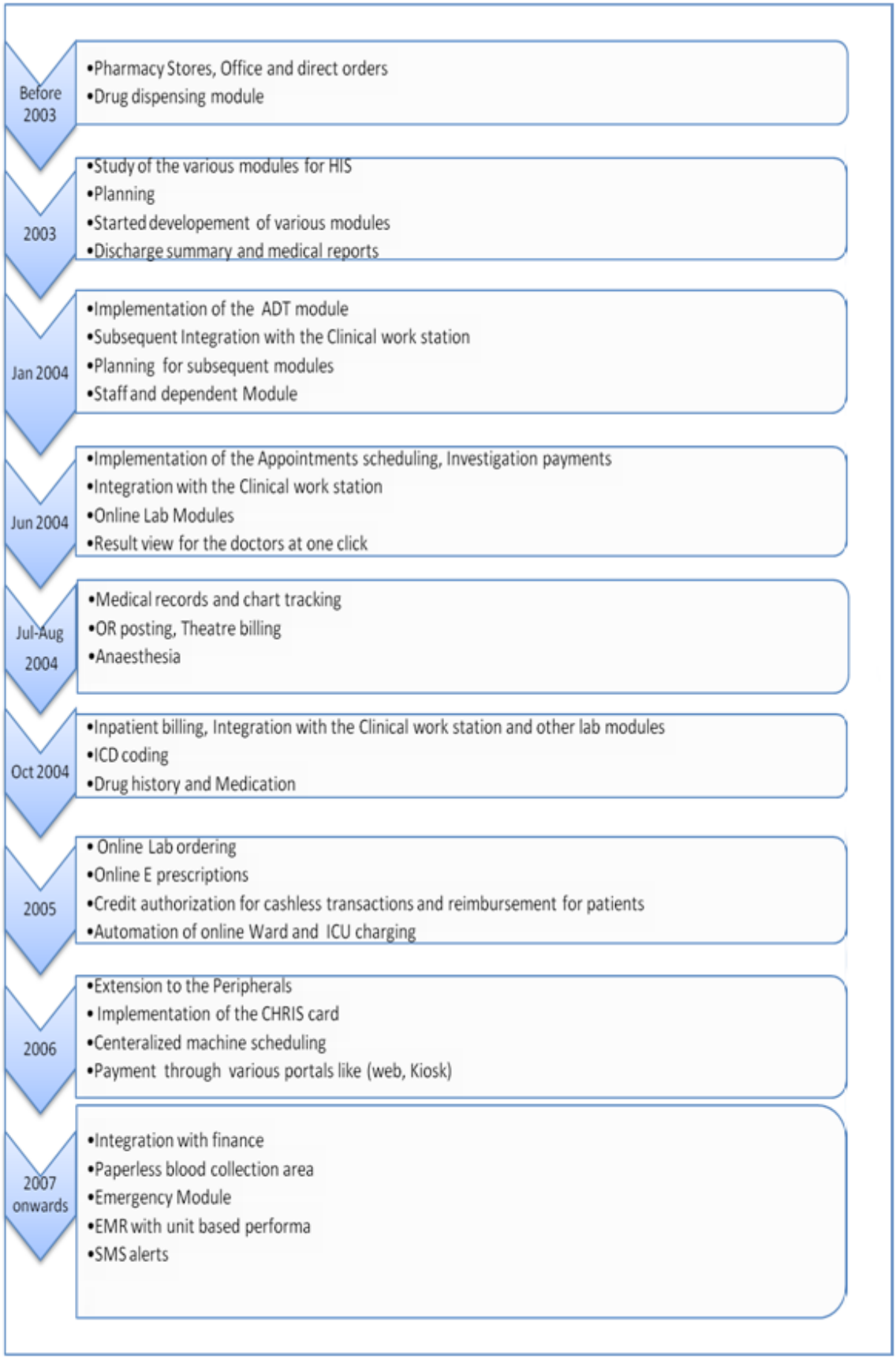
1. Patient registration and appointment system using multiple portals (Manual, Call centres, Web, Smart Card)
2. Paperless Lab orders and authenticated online investigation results
3. Paperless Blood collection area: this has been linked with a pneumatic chute system to transfer samples from the collection point to lab areas, thus minimizing delay and human error
4. A system of optional alerts for lab results which are grossly abnormal or presumed to have a high clinical impact
5. A Clinical Work station that:

- Allows doctors to view appointments, results, clinical images and summaries for admissions & prescriptions; schedule doctor appointments & procedures; order online IP/OP investigations and prescriptions;facilitate online billing for services and operative charges; finalize theatre postings; and generate medical reports and discharge summaries
- Alerts physicians regarding potential drug interactions with each prescription
- Provides online patient and doctor alerts via software/SMS

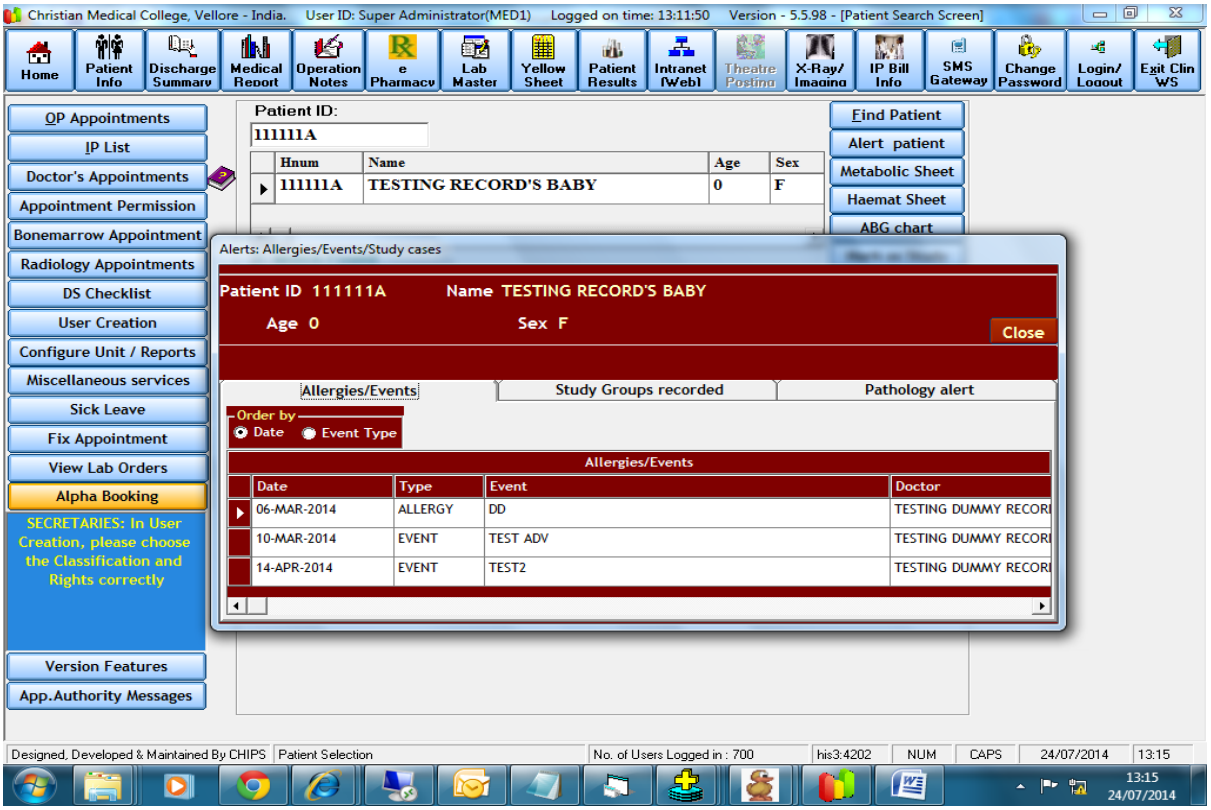
6. Customized SMS Gateway for alerts to employees and patients
7. Web paging, multi-line telephonic paging and CART (Cardiac Arrest Resuscitation Team) paging for priority paging
8. Surgery and Anaesthesia Management with scheduling, automated billing and logbooks for doctors
9. Pharmacy management – Quotations and Purchase Order Management integrated with Finance module, Stores, Dispensing and Returns
10. Admission-Discharge-Transfer management with automated billing
11. Credit authorization for cashless transactions and reimbursement for patients
12. Online Dietary orders
13. Antenatal records linked with birth registers
14. Doctors schedule management integrated with Patient appointments
15. Procedure appointment module
16. MRD module: IP and OP chart tracking and International Classification of Diseases (ICD) coding

17. Electronic Medical Records (EMR): Using a unit based proforma with options for entry of patient's history, vital signs, diagnosis, prescription and imaging; OP Follow-up, PDF creation, and patient correspondence
18. Online patient calling system in OPD
19. Automated Casualty Module: incorporating Doctor's alerts and Patient tracking based on priority
20. HR Module: Integrated with Finance, and including leave management, auditing of concessional benefits, and a Biometric attendance management system
21. Inventory programs
22. Built in Security with authentication for all levels of information
23. Payment
    - All HIS modules are integrated with the Billing module, Company and Insurance billing, and reimbursements
    - Payment is also possible via CHRIS card (CMC debit card) and credit card
24. Finance and Accounting: All HIS modules are integrated with the Finance Module
25. Purchase of all equipment has also been computerized along with stores management process

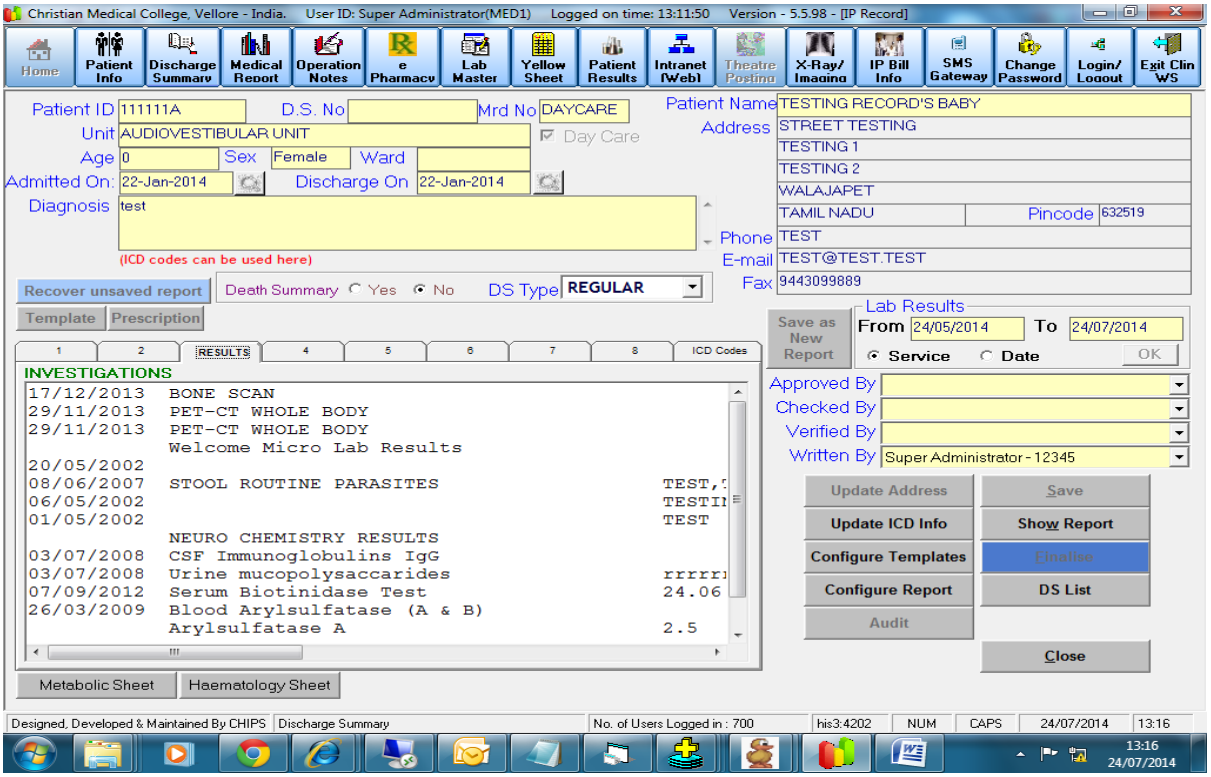
The Development of CMC's Hospital Information System



DRUG ALLERGY ALERTS



DISCHARGE SUMMARY MODULE



E-PHARMACY TO ORDER MEDICATIONS AND CHECK DRUG INTERACTIONS

Christian Medical College, Vellore - India. User ID: Super Administrator(MED1) Logged on time: 13:11:50 Version - 5.5.98 - [Prescription - Super A]

Home | Patient Info | Discharge Summary | Medical Report | Operation Notes | e Pharmacy | Lab Master | Yellow Sheet | Patient Results | Intranet (Web) | Theatre Posting | X-Ray/ Imaging | IP Bill Info | SMS Gateway | Change Password | Login/ Logout | Exit Clin WS

Hospital NUM : 111111A Name : TESTING RECORD'S BABY Sex : Female OP/IP : IP Ward : R Category :PRIVATE DOB : 10/10/2013

Latest Paper Prescriptions

Date	Dispensed	Amount
14/07/2014	Yes	1.05
14/07/2014	Yes	1.05
14/07/2014	No	1.05
08/07/2014	Yes	1.36

Form	Generic Name	Brand Name	Strength	Measu	UOM	No.s/ ml	Frequen	Duration	Dur. Unit	Direction	Remarks
TABL	PARACETAMOL	CALPOL-500 (STRIP)		500	mg	1	1	1	Day(s)	1 TABLET Once Daily	

Save as new prescription | Edit this prescription | Cancel entire prescription | Close

Mouse-over "Recommanded Dosage" OR Press - F10:View Drug Dosage F12: IDR Info
F8:View Drugs in the Package
Column " Nos. / ml / gm" - (Black) Numbers, (Blue) ml, (Red) gm Out of Stock: In target pharmacy In CMC

Target Pharmacy MAIN PHARMACY Change
No.of prescriptions 1

Designed, Developed & Maintained By CHIPS | ePharmacy | No. of Users Logged in : 700 | his3:4202 | NUM | CAPS | 24/07/2014 | 13:18

Christian Medical College, Vellore - India. User ID: Super Administrator(AVC) Logged on time: 14:19:16 Version - 5.5.98 - [Prescription - Super Ad]

Home | Patient Info | Discharge Summary | Medical Report | Operation Notes | e Pharmacy | Lab Master | Yellow Sheet | Patient Results | Intranet (Web) | Theatre Posting | X-Ray/ Imaging | IP Bill Info | SMS Gateway | Change Password | Login/ Logout | Exit Clin WS

Hospital NUM : 9088 ... DOB : 19/06/2014

Personal

Configure | IDR Info | BMI/BSA | Print Prescription | Drug Prices and Stock | Medication History

PARACETAMOL- Pharmacology

General Information	It an analgesic and antipyretic drug.
MOA	It acts on CNS to produce analgesia and antipyretic effect. It has negligible antiinflammatory action in therapeutic doses.
Adverse Effects	Nausea, epigastric distress, rarely it can cause skin rash. Acute toxicity may result in hepatic failure.
Contraindications	Analgesic nephropathy.
Special Precautions	Long-term use may predispose to chronic renal disease.
Pregnancy	May be used.
Breast Feeding	May be used.
Elderly	Caution, May be given in reduced dose.
Interactions	Cholestyramine: Reduces absorption of paracetamol. Charcoal: Activated, administered immediately reduces absorption of paracetamol. Domperidone and metochlopramide: Enhance absorption of paracetamol. Alcohol: Chronic excessive ingestion of alcohol potentiates hepatotoxicity of paracetamol. Zidovudine: Effects zidovudine may be decreased.
Indications	Pain and fever. Paracetamol is used for the rapid relief of fever, pains and aches such as headache, earache, toothache, fibrositis, myalgia, neuralgia, arthralgia, osteoarthritis and postoperative pain.
Dosage	Adults: .5-1g 3-6 times daily, maximum: 4g. Children: 15mg/kg/dose or 60mg/kg/24 hour divided every 6 hours. Maximum: 5 doses s.o.s.(each dose 0-3 months: 40 mg; 4-11 months: 80mg; 1-6 years: 120-240mg; 6-12 years: 220-480mg; maximum: 5 doses/24 hours). One tablet 3-4 times a day, to a maximum of 4g (4 tablets) a day.

All | General Information | MOA | PharmacoKinetics | Adverse Effects | Contraindications | Special Precautions | Pregnancy | Breast Feeding | Elderly | Interactions | Indications | Dosage | Exit

Drug Form | Generic Name | Recommanded Dose | Do not substitute | Print

TABL PARACETAMOL

Show Info | Concessio

Mouse-over "Recommanded Dosage" OR Press - F10:View Drug Dosage F12: IDR Info
F8:View Drugs in the Package
Column " Nos. / ml / gm" - (Black) Numbers, (Blue) ml, (Red) gm Out of Stock: In target pharmacy In CMC

Target Pharmacy OUT-PATIENT PHARMACY Change
No.of prescriptions 1

Designed, Developed & Maintained By CHIPS | ePharmacy | No. of Users Logged in : 700 | his3:1588 | NUM | CAPS | 24/07/2014 | 14:22

ONLINE LAB MASTER TO ORDER INVESTIGATIONS

Christian Medical College, Vellore - India. User ID: Super Administrator(MED1) Logged on time: 13:22:39 Version - 5.5.98 - [Lab Ordering]

Home | Patient Info | Discharge Summary | Medical Report | Operation Notes | e Pharmacy | Lab Master | Yellow Sheet | Patient Results | Intranet (Web) | Theatre Posting | X-Ray/ Imaging | IP Bill Info | SMS Gateway | Change Password | Login/ Logout | Exit Clin WS

Personal | Unit | CMC

Service/code

Department: CARDIOLOGY-DEPT

	Tariffcod	ServiceName	Qty
1	06053	AMBULATORY BP CARDIOLOGY	1
2	06042	ANGIO CHARGES	1
3	06058	ARTRIAL FIBRILLATION RADIOFREQUENT	1
4	06037	ASD/VSD DEVICE CLOSURE (DEVICE COS	1
5	06021	BMV/BAV	1
6	06051	CARDIAC MONITOR	1
7	06A00	CARDIOLOGY PACKAGE	1
8	06067	CARDIOPLEGIA	1
9	06009	CATH.LAB	1
10	06061	COMPLEX RADIOFREQUENCY ABLATION	1
11	06059	CRT IMPLANTATION CHARGES	1
12	06006	E.C.G. - OFF TIME/BED SIDE	1

HNo 111111A Name TESTING RECORD'S BABY

Age 0 Sex Female Category REGULAR RATE(R)

Configure | Show ART>> | Show Diabetes>> | Show Check-up>> | Show Form 3>> | Show Generic>>

	Date	Dept	Doctor
1	07/07/2014	LCEC	12345
2	07/07/2014	LCEC	12345
3	06/06/2014	URO1	12345
4	06/05/2014	CRD1	12345
5	05/05/2014	URO1	12345
6	28/02/2014	116	52217
7	25/01/2014	MED1	12345
8	22/01/2014	CRD1	12345
9	15/01/2014	AVC	12345
10	30/11/2013	GEC	12345
11	29/11/2013	GEC	12345
12	22/11/2013	MED1	12345

Service Name	Result	Result Unit	Result

	Dscode	ServiceName	Qty	Amount	Rate	AccountNo	Instruction	Remarks	TotalAmount	PayMode	Empno
1	06058	ARTRIAL FIBRILLATION RADIOFREQ	1	94040.00	R RATE				194040.00	CASH	
2											

Change Rate | Lab History | My Lab orders. | Save | Clear | Close | << Show all | Hide Cost >>

Total Amount : 194040
Concession : 0
Amount to Pay : 194040

Investigations that have been paid. Investigations that have not been paid.
Click on Lab history to Edit or Cancel an investigation that has not been paid .

Designed, Developed & Maintained By CHIPS | Patient Selection | No. of Users Logged in : 665 | his3:2230 | NUM | CAPS | 24/07/2014 | 13:23

VIEWING PATIENT RESULTS

Christian Medical College, Vellore - India. User ID: Super Administrator(MED1) Logged on time: 13:22:39 Version - 5.5.98 - [Results from 24-JUL-20]

Home | Patient Info | Discharge Summary | Medical Report | Operation Notes | e Pharmacy | Lab Master | Yellow Sheet | Patient Results | Intranet (Web) | Theatre Posting | X-Ray/ Imaging | IP Bill Info | SMS Gateway | Change Password | Login/ Logout | Exit Clin WS

Pat ID : 111111A Name : TESTING RECORD'S BABY Age : 0 Sex : F 24- Jul -2011 To 24- Jul -2014 OK

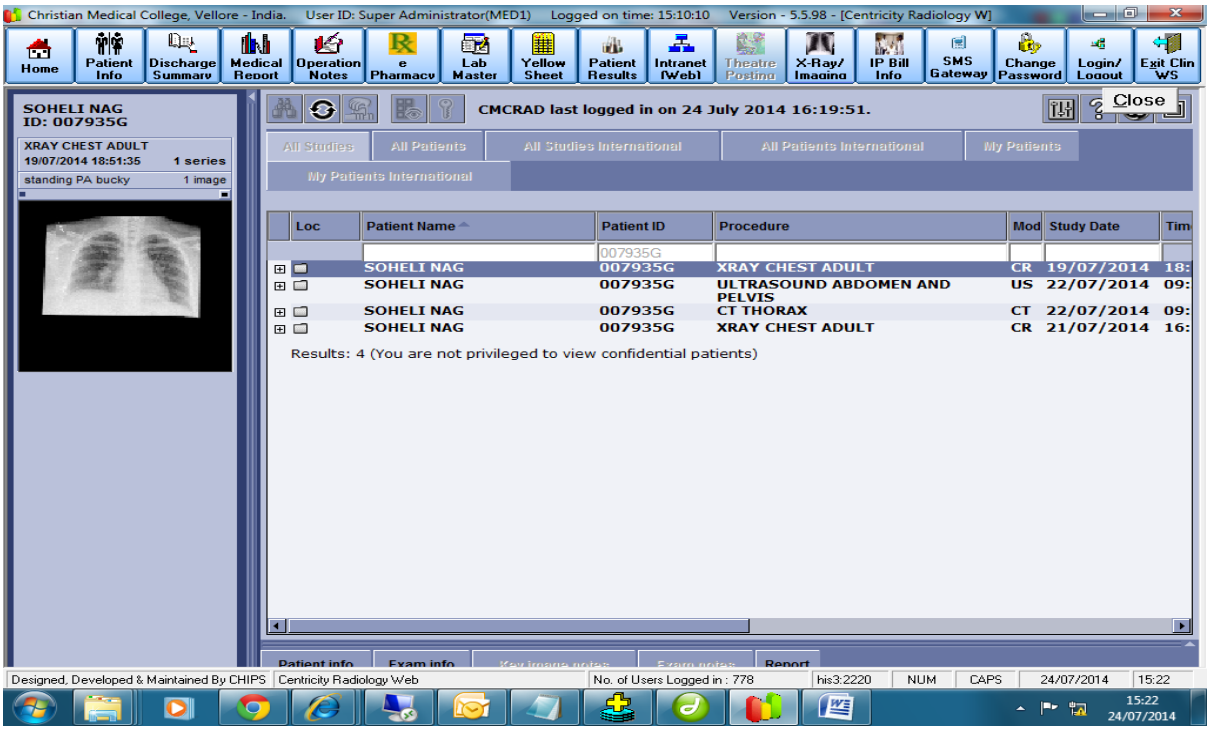
Tests Ordered | Metabolic Sheet | Haemat Sheet | H1N1 Result Date Wise Service Wise Close

Nuclear Medicine Results link through CWS Patient Results has been temporarily disabled. Please use the Intranet link to view reports

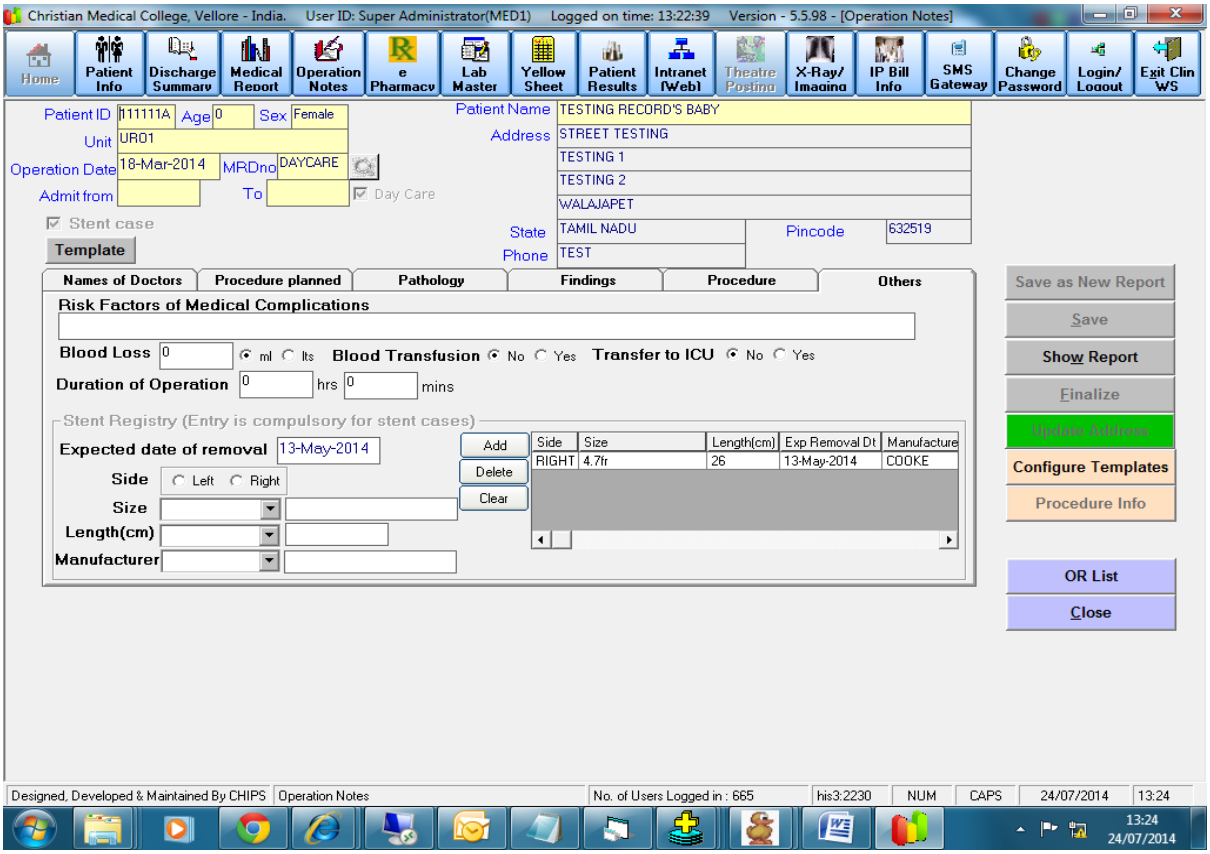
Date & Time	Investigation Name	Result	Unit	Reference	Normal Range
15/03/2014 08:45	WBC TOTAL [Cancelled]		/CU MM		
15/03/2014 08:36	HAEMOGLOBIN [Cancelled]		GM%		
01/03/2014 12:22	CBC PROFILE				
	MCV		fl		
	MCH		PG		
	MCHC		G/DL		
	RDW		%		
	TOTAL WBC		/CUMM		
	HB		GM/DL		
	PLATELET COUNT		/CUMM		
	RBC				
	HCT(PCV)		%		
	RETICS		%		
01/03/2014 12:22	VDRL				
				Micro No:	
01/03/2014 12:22	LFT				
	BILIRUBIN TOTAL		mg%		0.5-1.0
	DIRECT		mg%		
	PROTEIN TOTAL		g%		6.0-8.5
	ALBUMIN		g%		3.5-5.0
	AST (SGOT)		U/L		8-40
	ALT (SGPT)		U/L		5-35
	ALKALINE PHOSPHATASE		U/L		40-125

Designed, Developed & Maintained By CHIPS | PATIENT RESULT FROM 24-JUL-2011 | No. of Users Logged in : 665 | his3:2230 | NUM | CAPS | 24/07/2014 | 13:23

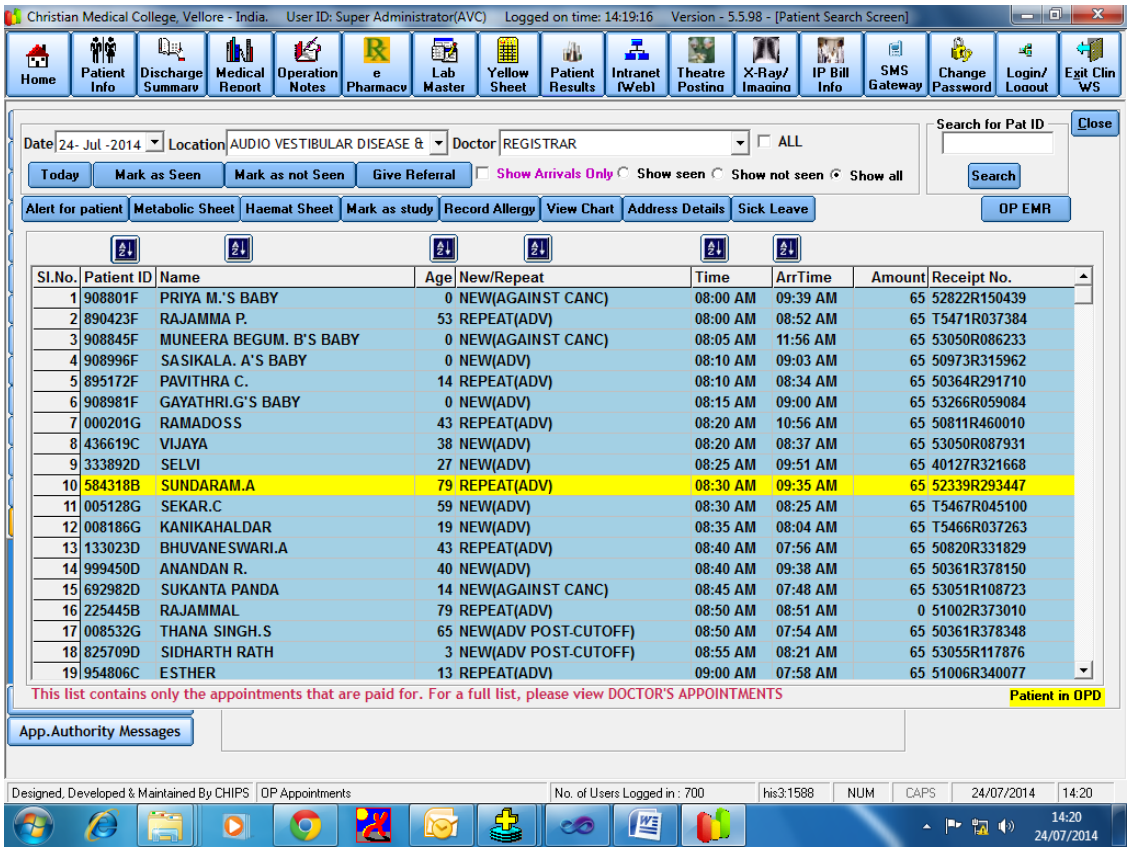
IMAGING



OPERATION NOTES

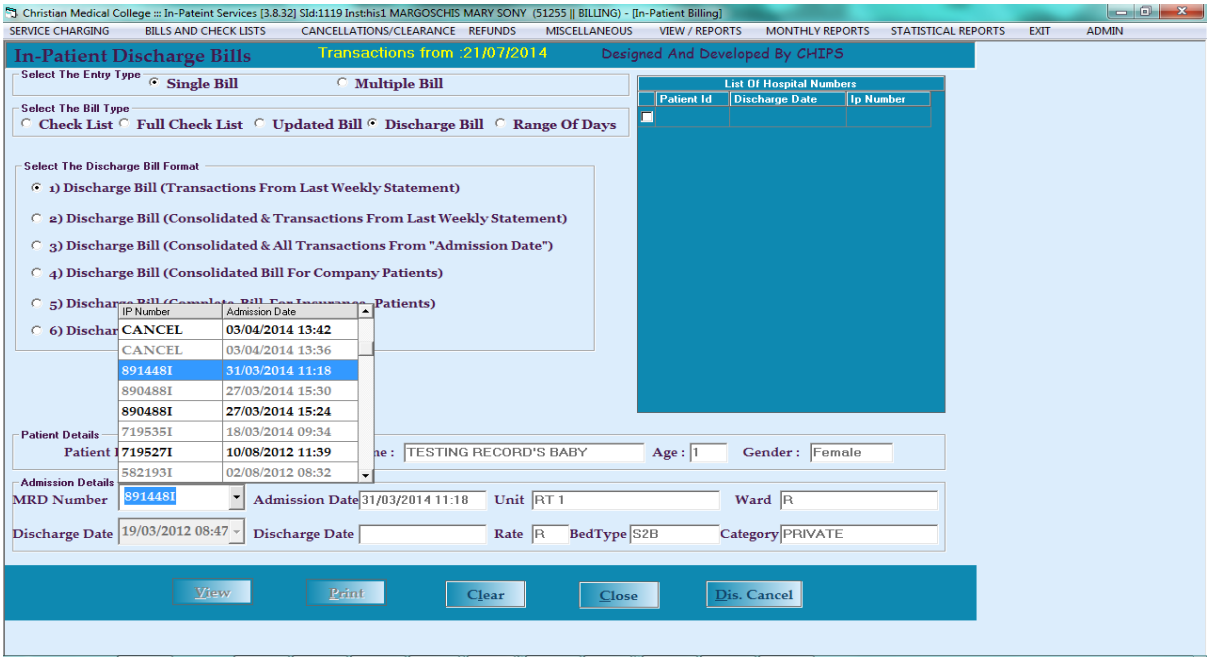


DOCTOR'S APPOINTMENT MANAGEMENT

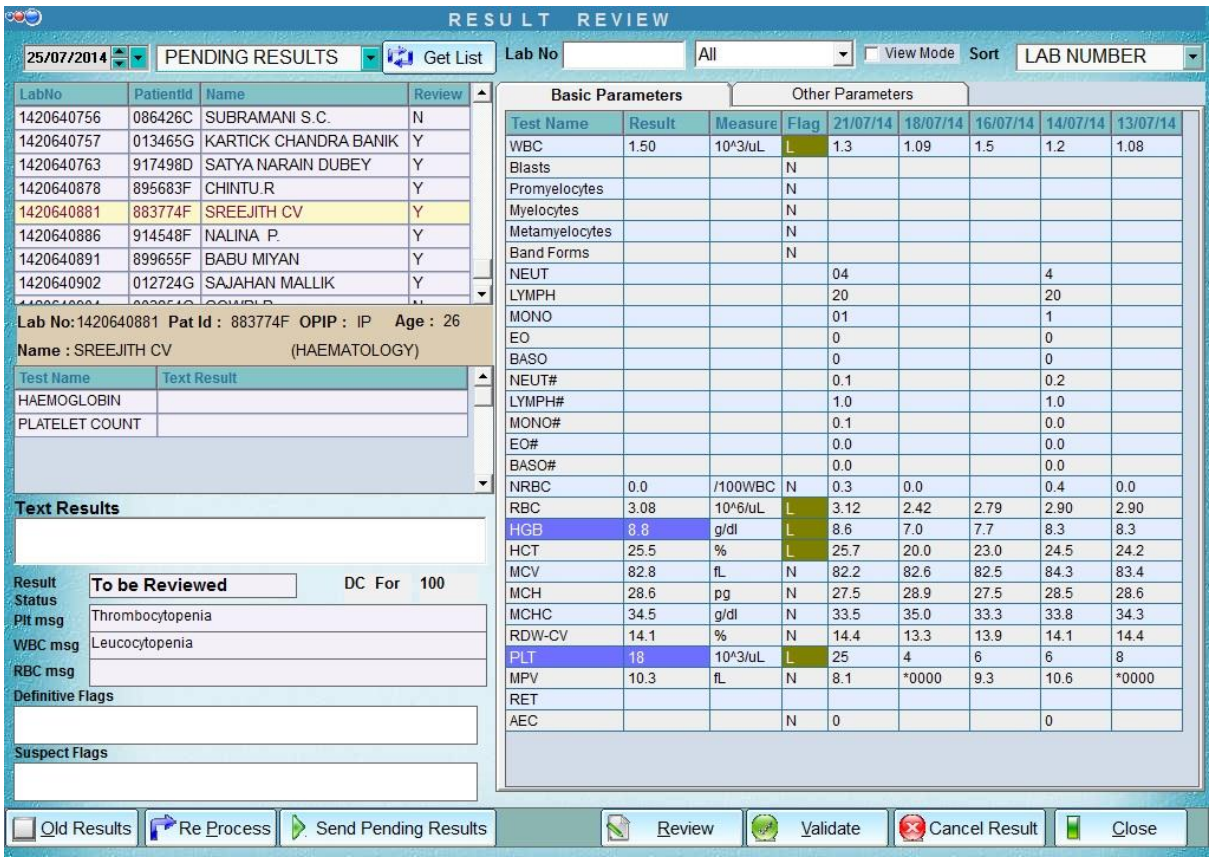


BED MANAGEMENT SYSTEM

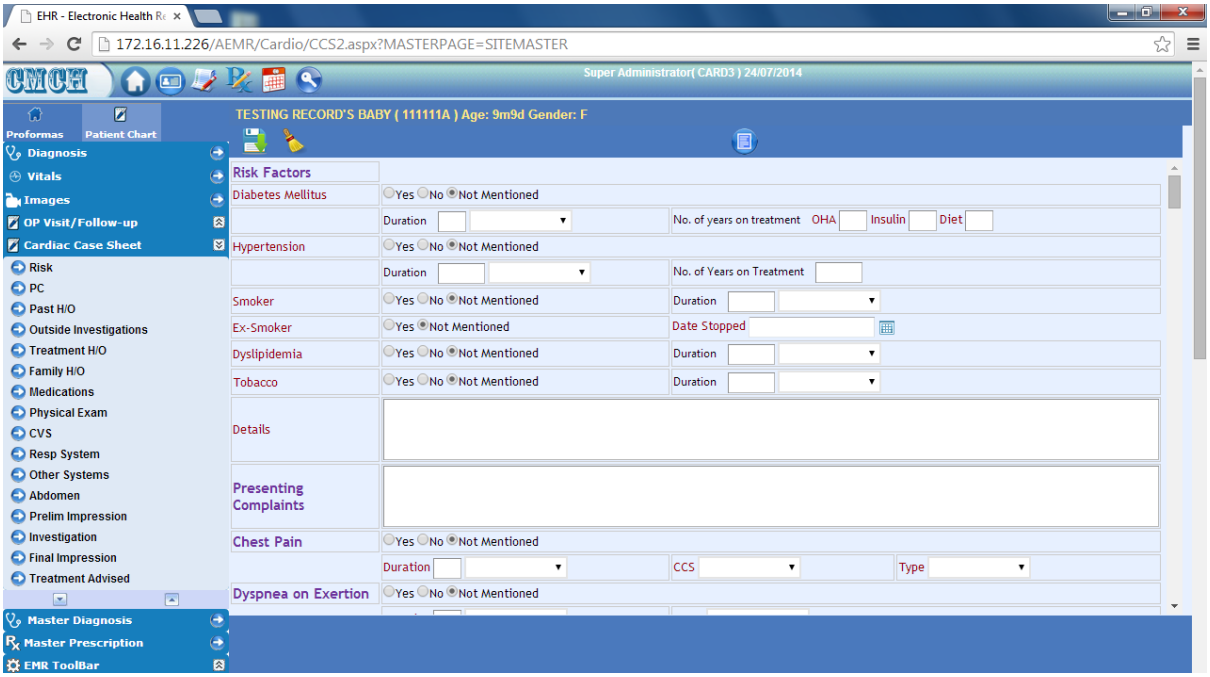
IP DISCHARGE BILL PROCESSING

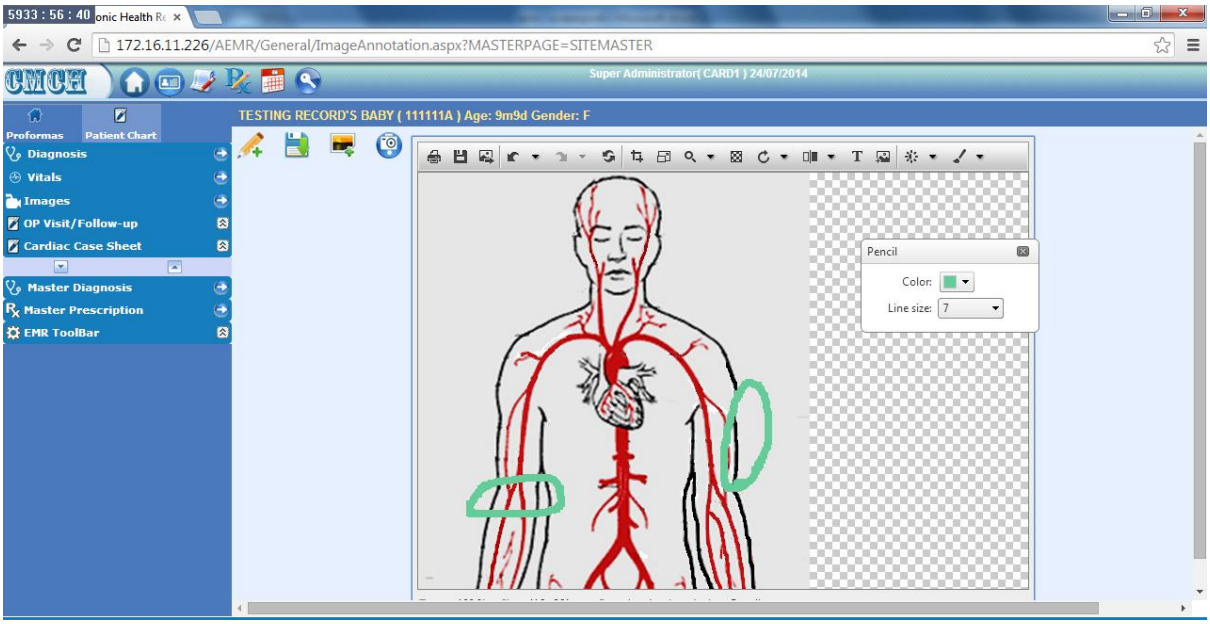


LABORATORY MODULE



ELECTRONIC MEDICAL RECORDS





Description of the hardware and software products, technologies and solutions deployed in the project

Software: Oracle and VB, VB.net, ASP, ASP.net.

Hardware: RAC (Real Application Cluster) 3 Node environment with a two node RAC for business continuity (Disaster Recovery) and a separate datamining server. The benefit of this is that RAC will be able to handle load balancing and failover, deliver high performance, increased throughput, and high availability of the database for 365x24x7 environments. We have achieved 99.999% availability and eliminated system downtime during scheduled maintenance.Real Application Clusters also support all Oracle backup procedures.Currently CMC is able to store data from the year 2000 onwards.

Further details regarding the specifications and capabilities of the hardware used are available at http://www.oracle.com/us/corporate/customers/customersearch/christian-vellore-1-db-ss-1837054.html

Other technologies/solutions employed:

- CMC debit card (CHRIS card), which can be used for payments at cash counters and kiosks within hospital, for online payment and payment through the CMC Call Centre
- Machine interfaces in labs
- Security implemented via passwords and/or contactless security card
- Customized SMS Gateway for alerts to employees and patients
- Web paging, multi-line telephonic paging and CART (Cardiac Arrest Resuscitation Team) paging for priority paging
- Complete CISCO switched network with Virtual Private Networks and security walls was put in place, which extended Clinical services to the entire CMC residential campus through broadband or LREs
- Audit vault

Details of coverage of the targeted population

Christian Medical College, Vellore serves 16.72 lakh outpatients per year in the main hospital and about 4.7 lakh outpatients in the peripheral centres. We have 3049 beds including those at peripheral centres, which cater to 1.30 lakh inpatients and 17,883 new births per year.

Comparison of the pre-deployment scenario and post deployment benefits

Prior to development of the HIS, the system was plagued by delays in reporting of investigations, admission-discharge-transfer management, billing and procurement. Retrieving patient information for clinical care and research, and generating financial statements to aidin decision making was difficult. The dependence on manual entry led to document storage issues and increased the risk of human error.

The development of the HIS brought about a sea change in the organizational capabilities of the institution, besides boosting efficiency at every level.

- Secure, real-time, relevant information is now available anywhere on the institutional campuses
- MIS for Administration and Auditors
- Online investigation results available as soon as they are ready, thus aiding clinical decision making. Trend of lab investigations over a time period can be studied using graphical displays.
- Information regarding drug interactions is available in real-time, as a prescription is being written
- Every patient’s Drug and Investigative history is available online for auditing
- Speed of service has increased significantly
- Patient billing delays have decreased dramatically

- Patient reports are generated quickly without needing re-entry of data.
- Research information is easily retrievable; alerts can be generated for study participants and patients enrolled in clinical trials
- Change in workflow can be easily managed since an in-house team has developed the solution

Note on the cost effectiveness of the project

1. **In terms of Cost savings**

   The cost of Oracle licences is 4.5 lakhs and the expenditure on Salary for all staff employed in CHIPS is approximately 12.5 Lakhs per year.

   This is a cost effective solution for CMC, since in addition to the cost saved on purchase of software, maintenance and alteration costs are also reducedas all solutions are developed in-house.

2. **In terms of improving customer service**

   - A customized, cost-effective, smart card solution with full security features (CHRIS card) was introduced. E-account holders of banks like Punjab National Bank and IOB can now make web payments and appointments online through a module provided by CHIPS. Credit card holders of any bank can make payments and book appointments through the payment gateway of ICICI Bank.
   - Information is available at kiosks with the use of the CHRIS card
   - Patients have benefited from a dramatic reduction in billing and appointment delays and significant increase in speed of service

- Drug and Investigative history being available to doctors at the time of treatment means that drug interactions, duplicate ordersand payments can be avoided.

Details on the extent of integration with other e-Governance projects

- A CMC debit card (CHRIS card), was developed, which can be used for payments at cash counters and kiosks within hospital, for online payment and payment through the CMC Call Centre
- Patients can book repeat appointments for doctors online, through ICICI payment gateway.
- A Customized SMS Gateway was constructed for alerts to employees and patients
- The system incorporates Web paging, multi-line telephonic paging and CART (Cardiac Arrest Resuscitation Team) paging for priority paging

Details of the Cyber Security measures in the project

We have enabled Audit trails (Oracle Audit Vault) for sensitive data and role based authentication for information to ensure that data is not exposed to all.

Future Road map on coverage, up gradation/integration

The main aim for the future is moving towards a paperless hospital with Electronic Medical records (EMR) and a good decision support system. It is also planned to create a patient tracking system using RFID tags for the monitoring of drugs, equipment and other valuable items.

The HIS development team

Mr. Ebenezer Sundararaj, Sr. Systems Manager introduced RDBMS in CMC. Storage of the patient's life-time clinical record was planned and the migration of existing data from Fox to Oracle spearheaded. The Clinical Workstation was his brainchild and has seen steady growth since its inception. The list of other personnel involved are as follows:

EBINEZER SUNDARRAJ	Sr. Systems Manager	B.Sc.,M.C.A.,M.Phil
ANISHA R MACADEN	Systems Manager II	B.Sc,M.C.A
SURESH S	Sr. Programmer I	B.Sc,M.C.A
ANITHA SHEBA RACHEL A	Systems Manager II	B.TECH,M.S.
MARGOSCHIS MARY SONY	Sr. Programmer I	B.Sc,M.C.A
LAKSHMIKANTHAN S	Sr. Programmer III	B.Sc,M.C.A
VASANTHI S	Sr. Programmer III	B.Sc,M.C.A
MARSHAL DAVID E.	Sr. Programmer III	B.Sc,M.C.A
PRAKASH M	Sr. Programmer III	B.Sc,M.C.A
SHARFUNNISA K A	Sr. Programmer IV	B.Sc,M.C.A
SAM THEOPHILUS A	Sr. Programmer IV	B.Sc,M.C.A
VASUMATHI J	Sr. Programmer IV	B.E.,
RADHIKA M	Sr. Programmer IV	B.E.,(Comp. Science & Eng.)
SILPA KUMARI M	Sr. Programmer IV	B.Sc,M.C.A
ARTHI T.	Sr. Programmer V	B.Tech.,
BHARATH B.	Sr. Programmer V	B.Tech.,
K. HEMALATHA	Sr. Programmer V	B.Sc,M.C.A
S. DEEPA DORATHY	Sr. Programmer V	B.Sc,M.C.A
GODWIN JEBAKUMAR C.V.	Sr. Programmer V	M.Sc (Software Engineering)
DEEPAK PRAVEEN RAJ A	Sr. Programmer V	B.E (Computer Science)
NAVIN R	Sr. Programmer V	B.Sc,M.C.A
MARY NANCY C.	Sr. Programmer V	B.E (Computer Science)

CURRICULUM VITAE

Ebinezar Sundarraj
Department of Computerized Hospital Information Processing Service (CHIPS)
Medical Informatics
Christian Medical College Hospital
Vellore - 632 004 (Tamil Nadu), India.

email: ebby@cmcvellore.ac.in
esundararaj@gmail.com

Date Of Birth: 14th April 1968

Gender: Male

Educational Qualifications:

Year	Qualification
2003	M.Phil. Manonmaniam Sundarnar University
1998	MCA Madurai Kamaraj University
1989	Post Graduate Diploma in Computer Applications(Rank Institute Madras)
1989	B.Sc.(Maths), Voorhees College, Madras University

Joined Christian Medical College, Hospital in the year 1990 and in 1991 started the first Clinical Network in the Department of Neurological Sciences., extending the IT services to Operation theatre, ICU's, Wards, Consultants room and Neuro Labs. In the year 2001 was promoted as EDP Manager of the Christian Medical College, started the New Hospital Information System (HIS), Today CMC is an institution with more than 3000 beds and 6000 outpatients on a given day with 8400 employess, The IT needs of this 112 Years institution is fully taken care by the In-House team. All the five campuses are connected through Optical Fibre and through Wireless connections

Nature of Job: Project Architect and Database Administrator (Oracle)

WORK EXPERIENCE

Year	Post Held
2014-	General superintendent for CMC hospital
2013-	Head of department- (CHIPS)
2012-	Sr.Systems Manager
2010-2012	Systems Manager
2001-2010	EDP Manager
1995-2001	Programmer-Sr.Programmer

Worked as Senior Developer & Site Manager at NORMAH, Kuching Malaysia
Eutech Cybernetics Ltd, Malaysia (Health Care Division) for 3 months March – May 2000

Worked as HIS Consultant, for Bosco Institute of Information Technology (BIIT), Yelagiri November 2010 – February 2011

Project Details in Brief:

HIS(Hospital Information System):
Introduced RDBMS (Oracle) in CMC. Storage of the patient's life-time clinical record was planned and the migration of existing data from Fox to Oracle spearheaded. CHIPS now provides 24/7 services with no downtime for backups and 99.2% service uptime. Planned and implemented the integration of various function in different sections of the hospital – Laboratories, Medical Records Department (MRD), Pharmacy, Dietary, in-patient (IP) and out-patient (OP) areas, New practices for the Admission-Discharge-Transfer process were introduced and Online Bed Availability Status viewing was enabled. The Human Resource Management module was started and categories (staff, dependants, students, etc) commanding medical benefits were streamlined. The Theater billing processes, tariffs, and clinical data entry were streamlined. This not only resulted in financial profit, but also provided ready clinical data for surgeons. IP & OP billing processes were redefined and all existing computer modules were integrated with the billing module so that all billing information was available online.

Finance:
Planned and implemented all the finance software like Payment cashbook, Ledger, Receipt Cash books, Trail balance and salary and salary related modules that is currently running CMC. Planned and Migrated the old finance data from the Fox to the new System. **Contactless security cards** for authentication was introduced for all rule based financial transactions.

Networks:
A new networking infrastructure was introduced - a CISCO network with Virtual Private Networks and security walls was put in place which enabled CHIPS to extend Clinical services to the entire CMC residential campus through broadband. Currently the number of active nodes at a any given point of time is around 3000. Planned the implementation of MAN (metro area network) covering 5 campuses on fiber with RF as redundancy. Planned the implementation of WAN to get connected to internet and Telemedicine . Planned the implementation of LAN on traditional Ethernet to interconnect 3000 and odd computers to access HIS, intranet and internet. Optical fiber LAN has been implemented on residential quarters to access Intranet, PACS and HIS at residence to attend on emergencies.

Extension to Peripherals:
All peripheral hospitals were connected to the main hospital network through optic fibre. All existing software modules were extended to Schell Hospital, LCECU, Rehabilitation Institute and MHC, CHAD and RUHSA

CHRIS Card and Net Banking:

A customized cost-effective smart card solution with full security features was introduced. E-account holders of banks like Punjab National Bank and IOB can now make web payments and appointments online through a module provided by CHIPS. Credit card holders of any bank can make payments through the payment gateway of ICICI Bank.

SMS and Paging:

Introduced, planned and implemented the Customized SMS Gateway, web paging, multi-line telephonic paging and CART (Cardiac Arrest Resuscitation Team) paging for priority paging.

Purchase and Material Management Module:

Planned and set the work flow for the Purchase and Material management module for the process of procurement, receiving and distribution of all the items in CMC which is linked to the finance module.

Implementation of RAC & Oracle Database administrator:

Deployed Oracle RDBMS and been the Database administrator for oracle databases since it was started in 2000. Migrated to the current setup consisting of RAC (Real Application Cluster) 3 Node environment with a two node RAC for business continuity (Disaster Recovery) and a separate data mining server. Planned the migration from Oracle Database 11*g*, Enterprise Edition with Real Application Clusters and implement Oracle Enterprise Manager to achieve 99.999% availability and eliminate system downtime during scheduled maintenance. The upgrade also improved system performance by approximately 50%.

Senior Training Fellowship Award
Visited various Health Care Centers in USA between September 2000 – December 2000 for studying Clinical Information Systems
EDGE Award – 2011 for the Hospital Information Systems

Other Administrative work

Member, IT Policy Committee
Member, Salary Revision(2008) Committee
Member, Salary Anomaly Consideration Committee
Member, Information Technology Advisory Committee
Member, Computer Sub committee
Member, Employees Grievances Redressal Committee (Class 1 Employees)
Member, Hospital Billing & Tariff Committee

Christian Medical College

Ida Scudder Road,
Vellore, Tamil Nadu - 632004
India
Telephone : 0416-2282010
Email: directorate@cmcvellore.ac.in