

# e-Hospital@NIC: Simplifying Health Care Delivery

Tucked away at the southernmost tip of the Northeast, the state of Tripura has made significant contribution to public health care by pioneering e-Hospital@NIC – an integrated Hospital Management Information System (HMIS) which now runs in almost 30 major public hospitals across the country, including premier institutions such as AIIMS and RML in Delhi and NIMHANS in Bangalore. It is an HL7 Development Framework (HDF) compliant and ISO/IEC 9126 certified end-to-end solution for managing processes and services in hospitals including providing tele-medicine services.

Edited by  
**RUBAIYAT ALI**

**T**he genesis of e-Hospital@NIC lies in a project conceived, developed and implemented in the Agartala Government Medical College and GBP Teaching Hospital in Tripura by the NIC Tripura State Centre in 2009. Thereafter, a core group in NIC was assigned the task of providing a one-stop ICT solution targeting government hospitals, embracing healthcare and e-Governance standards, at an affordable cost free from proprietary, vendor-locked know-how and license fees etc. e-Hospital@NIC took shape in response to the exponentially increasing work load on government hospitals due to rapid increase in population. e-Hospital@NIC adopts an overall two-pronged approach: it aims to facilitate hospital management by computerizing and

streamlining all aspects of the hospital workflow, and thereby facilitates easy access to health care to people at large. e-Hospital@NIC assumes added significance in view of the high priority that every government accords to the sector. It is a G2C, G2G, G2E and G2S application all rolled into one.

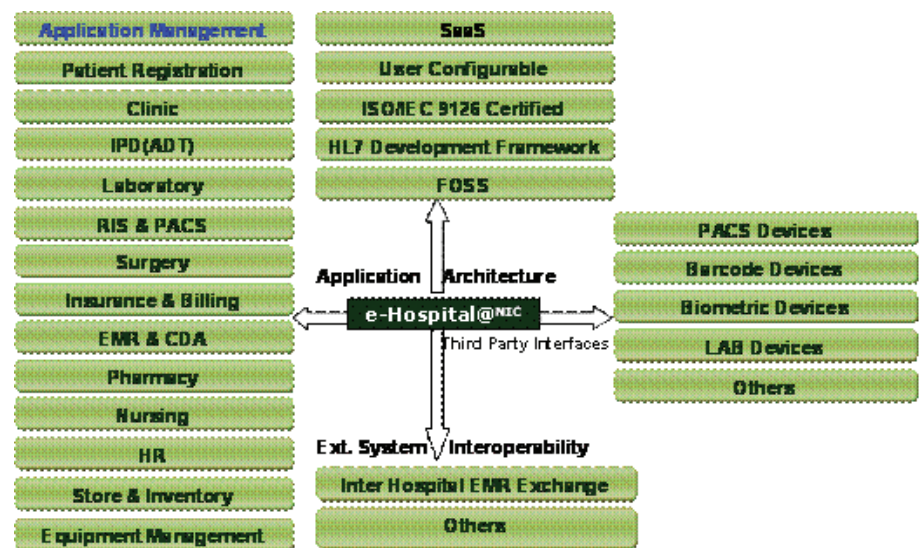
An Open Source Software (OSS) stack-based HMIS, e-Hospital@NIC is a generic application, which addresses all the major functional areas of a hospital. It is more of a patient-centric system rather than a series of add-ons to a financial system. Being a workflow-based application, it deals with the complete treatment cycle of OPD/IPD patients, and integrates various functions in the areas of clinical treatment, administration and billing/ insurance making it an integrated HMIS suite consisting of Hospital Information System (HIS), Laboratory Information System (LIS), Radiology Information System (RIS),



**C.K. DHAR**  
Senior Technical Director &  
State Informatics Officer,  
chayan@nic.in



**CHAITALI BHATTACHARJEE**  
Principal Systems Analyst  
& Correspondent  
NIC Tripura  
chaitali.b@nic.in



Workflow diagram of e-Hospital@NIC



e-Hospital@nic at the service of patients in AIIMS, New Delhi

patients, diseases, investigations, diagnoses, prescribed medicines, past history, etc.; better control over the stock maintenance resulting in possible inventory reduction and proper billing and up-to-date accounts

maintenance.

Registration of patients is an area in which e-Hospital@NIC lends complete control. It keeps track of all registered patients through Unique Permanent Health Identification Numbers. Returning patients are therefore not treated as new patients.

e-Hospital@NIC provides various MIS reports related to billing, MRD, consultants, inventory, etc., which helps management in better monitoring and planning. It also

Picture Archiving and Communication System (PACS), Application Programming Interfaces (APIs), and Blood Bank and Telemedicine Information Systems.

**FUNCTIONAL FEATURES OF e-HOSPITAL@NIC**

- Registration
- Billing and Patient Registration
- Clinics
- Emergency Accounts
- Path Lab (LIS)
- Radiology /Imaging (RIS)
- PACS Interface
- Blood Bank Management
- IPD(ADT)
- OT Management
- Pharmacy Management
- Electronic Medical Records (EMR)
- Telemedicine Suite
- Birth & Death Registration
- Care Provision
- Stores & Inventory
- Dietary Services
- Laundry Services
- Personnel Management
- Student Management System (For Teaching Hospital)

**TANGIBLE BENEFITS OF e-HOSPITAL@NIC**

Tangible benefits of e-Hospital@NIC include drastic reduction in patient “waiting time”; overall streamlining of all hospital processes, easy access for doctors to relevant information on

Service/Facilities	In Manual System	Using e-Hospital@NIC
Patient Registration	1 Minute 15 seconds per new patient	35 seconds per new patient
Follow-Up (Re-Registration with UHID)	15 - 30 minutes per patient	15 seconds per patient
Billing & Cash Collection	2 – 4 hours per patient	30 seconds
Laboratory Investigation report for OPD patient	1 day to 2days	Same day in most cases
Radiology Investigation Report for OPD Patient	1 day to 2 days	Same day in most cases
Emergency Services such as Ambulance, Blood Bank, OT etc	Unmanaged and available only at specific service delivery counters.	Managed and available at all care points
Dietary Service	Unmanaged diet distribution among patient as per diet scale	Managed diet distribution among patient as per diet scale & linked with inventory system of raw materials
Inventory Service	Unmanaged with wastage of valuable stocks	Reduced waste – no stockpiling or expired products
Blood Bank	Manual- inefficient	Increase in blood utilization, specially on the high cost products - wastage avoided • Donor's information shared and disseminated helping Donor deferral process and avoiding repeat of expensive tests. • Centralize Blood inventory information -saves time, cost and makes blood banking productive.
Care Planning by Physicians	Care planning is event based and time consuming	EMR of a patient helps physician in better care planning and monitoring

provides statistical reports which give information on common diseases prevalent in the catchment areas of the hospital.

A comparative study of services/facilities delivery status before and after implementation of e-Hospital@NIC makes its impact obvious.

**HOSPITALS RUNNING ON e-HOSPITAL@NIC**

At present 25 hospitals including the most premier institutions in India such as AIIMS, New Delhi and NIMHANS, Bangalore are using e-Hospital@NIC.

**TECHNOLOGY & ROLLOUT**

e-Hospital@NIC is built over HL7 Development Framework (HDF) – a standard framework for hospital processes and services. It is ISO/IEC 9126 certified and fulfills minimum dataset requirements of EMR/EHR Standards prescribed by the Ministry

**Free Open Source Software tools**  
**Operating System:** LINUX  
**Framework:** JSP, Servlet, Struts, JSF, Ajax & Hibernate  
**Application Server:** JBOSS  
**Backend RDBMS:** PostgreSQL 8.4

of Health and Family Welfare beside fulfilling requirements of HL7 Dataset parameters. ISO/IEC 25051 –COTS certification is in progress.

e-Hospital@NIC is fully web enabled and is made available on Open Source Software and Standards:

A minimum of two 4GB RAM/RAID-based servers are required along with requisite number 2 GB RAM client PC systems depending on the size of the hospital.


e-Hospital@NIC is free from proprietary software/technology and therefore comes with a low overall cost of ownership of the HMIS and is free from vendor-lock issues. It has been

designed for cloud infrastructure; its multi-tenancy feature is the key which makes it possible for multiple hospitals to use the same instance of e-Hospital@NIC

The high configurability of e-Hospital@NIC makes rollout and deployment easy and fast. Most of the User Interfaces (UIs) and Report Formats are configurable. Template based diagnostic and laboratory reports are configurable by doctors/para-medical staffs to suit their own localized requirements and choices without compromising standards and inter-operability. Easily customizable and configurable User Interfaces (UIs) and template based-reports also makes it easy for users to adapt very fast to the system.

The project is scalable and a small data setup in a hospital can be upgraded to act as a mini-data center and can push data in regular intervals to State Data Centres (SDCs) to act as data repository for Electronic Medical Records (EMRs), research activities as well as Disaster Recovery (DR) services. The software is scalable enough to be used by different hospitals as Software As A Service (SaaS) over private cloud infrastructure being created under NeGP (SDCs and NIC DCs) using the cloud technology.

e-Hospital@NIC simplifies health care delivery in the Government sector like never before. By doing so it looks at a future of organized and readily accessible and available health care in the country – especially for the multitudes who cannot afford costly health care facilities. The application has already made its mark. The initiative has been awarded the CSI-Nihilent Award of Excellence 2013.

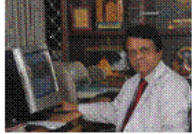


**NATIONAL INSTITUTE OF MENTAL HEALTH AND NEURO SCIENCES**  
 (DEEMED UNIVERSITY)  
 P.B. 2900, Bangalore - 560 029 (India)


**Dr. P Satish Chandra**  
 MBBS, DM (Neuro), FAMS, FIAN  
 Director / Vice Chancellor  
 Professor of Neurology

Off : 91-80-26564140, 26561811  
 26565822, 26590001 / 2  
 Res : 91-80-26720506 / 25727475  
 Fax : 91-80-26564830 / 26562121  
 Email : posttsh@nimhans.kar.nic.in  
 Grams : \*NIMHANS\*

**STAKEHOLDER CERTIFICATE**  
TO WHOM IT MAY CONCERN



National Institute of Mental Health and Neuro Sciences, Bangalore always strives to excel in patient care and academic pursuit in the area of Mental Health and Neurosciences. As an Information Communication Technology initiative and with an objective to improve quality & efficiency in healthcare delivery, we are using eHospital@NIC, a hospital management system from National Informatics Centre, since we could achieve significant operational efficiency by implementing Patient Management, Administrative Operations, Billing & Accounts, Clinical Processes, Lab, Auto Analyser, Interface and PACS gateway of e-Hospital@NIC.

  
 Director-Vice Chancellor 21/08/13

Dated: 3<sup>rd</sup> August 2013

**FOR FURTHER INFORMATION:**  
**Shri C.K.Dhar**  
 Senior Technical Director &  
 State Informatics Officer, NIC Tripura  
 E-mail:chayan@nic.in