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Hospital Management Information System(HMIS) in India

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Abstract—*The purpose of this paper is to examine the adoption of information system in healthcare services in India. The use of information system in the public health sector is limited. Information system in healthcare is a relatively novel concept in public health in India. Hospital Management Information System (HMIS) is a comprehensive, integrated information System for monitoring control over the functioning of hospitals by using decision support indicators, to assist doctors and medical staff to improve health services with readily reference patient records and a work flow enabled less paper process and to provide efficient and timely treatment to patients through automatic alerts during patient treatment cycle, such hot issues seeks much attention of researchers in this field. GOI-MOH&FW has initiated towards the implementation of Hospital Management Information System in public healthcare organizations of India. This paper provides relevant aspects of the HMIS like its structure, functionality and the technology used for e-Hospital in Indian public healthcare organizations. It also illustrates the benefits derived from e-hospitals in comparison to the manual process in India. An attempt is made in this paper to understand the implementation of Hospital Management Information System (HMIS) in Indian public tertiary and district hospitals.*

1. INTRODUCTION

The use of information system in the public health sector is limited. Information system in public healthcare is a relatively novel concept in India. For empowering the information infrastructure of the public health sector GOI-MOH&FW has initiated towards the implementation of information technology in public health care organizations of India. The Ministry of Health & Family Welfare has made significant contribution to public health care by pioneering e-Hospital – an integrated Hospital Management Information System (HMIS) which now runs in almost 30 major public hospitals across the Country including premier institutions such as All India Institute of Medical Sciences (AIIMS) and Dr Ram ManoharLohia (RML) in Delhi and National Institute of Mental Health and Neuro Sciences (NIMHANS) in Bangalore. E-hospital solution helps small to large size hospitals to streamline patient care, hospital administration, ancillary services and clinical support activities. E-hospital specifically implemented in Indian public hospitals consists of more than 20 core modules. Each module can be implemented individually or be combined to form an integrated system to suit any of the hospital's needs. E-hospital solution is fully web enabled and provides end-to-end solution for managing processes and services in hospitals.

E-hospital took shape in response to the exponentially increasing work load on government hospitals due to rapid increase in population. E-hospital 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 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.

2. HMIS IN INDIAN PUBLIC HEALTHCARE

A Hospital Management Information System is a workflow based ICT solution for hospitals specifically meant for the hospitals in government sector. E-hospital suite is a web based solution, developed by National Information Centre (NIC), Ministry of Communication and Information technology, Government of India. E-hospital is developed using Open Source Software (OSS) stack and conforms to HL7 Standards, for managing healthcare service delivery in public hospitals in India and solution is made available to public hospitals in India as Software As A Services (SaaS) for accelerated infusion/ adoption of ICT tools and healthcare standards by large number of public hospitals. E-hospital solution also deployed in many hospital premises with interoperability features as per HL7 Standards. This is generic software which covers major functional areas like patient care, laboratory services, work flow based document/information exchange, human resource and medical records management of a Hospital.

2.1 E-hospital Features

1. ISO/IEC 9126 Certified
2. Based on HDF (HL7 Development Framework)

3. Enabled data sharing across various departments across different hospitals
4. Unicode based Indian Multilingual Support
5. Vocabulary- ICD-9, LIONC etc.
6. Comprehensive Reporting on various customizable parameters
7. Comprehensive Role based Access Control and Security
8. Data Security and Privacy
9. Audit logging of transactions
10. Powerful search facility and tracking of patient history
11. Available on Linux platform
12. Embedded User Manual
13. Touch Screen Kiosk Interface

3. FUNCTIONALITY & DATAFLOW OF E-HOSPITAL IN INDIA

e-Hospital consists of more than 20 core modules which includes OPD Patient Registration, IPD Patient Registration, Ward, ICU and Cabin Management, OPD Clinic Prescription, Pharmacy, OT Management System, Cash Counter, Radiology System, Pathology, Blood Bank Management System, Hospital Staff Scheduling, Store and Inventory, Dietary Module, Laundry Management, Birth, Death and Hospital Record Management System, Payroll and Personal Information System, Administrative Module.

3.1 Functional Modules of e-Hospitals

1. Patient Registration
2. Clinics
3. Emergency Registration
4. Billing and Accounts
5. Path Labs (LIS)
6. Radiology/Imaging (RIS)
7. PACS Interface
8. Blood Bank Management
9. IPD (ADT)
10. OT Management
11. Touch Screen Kiosk Interface
12. Pharmacy Management
13. Electronic Medical Records(EMR)
14. Telemedicine Suite
15. Birth & Death Registration
16. Care Provision
17. Stores & Inventory
18. Dietary Services
19. Laundry Services
20. Personnel Management

3.2 Flow of Data in Indian Public e-hospitals

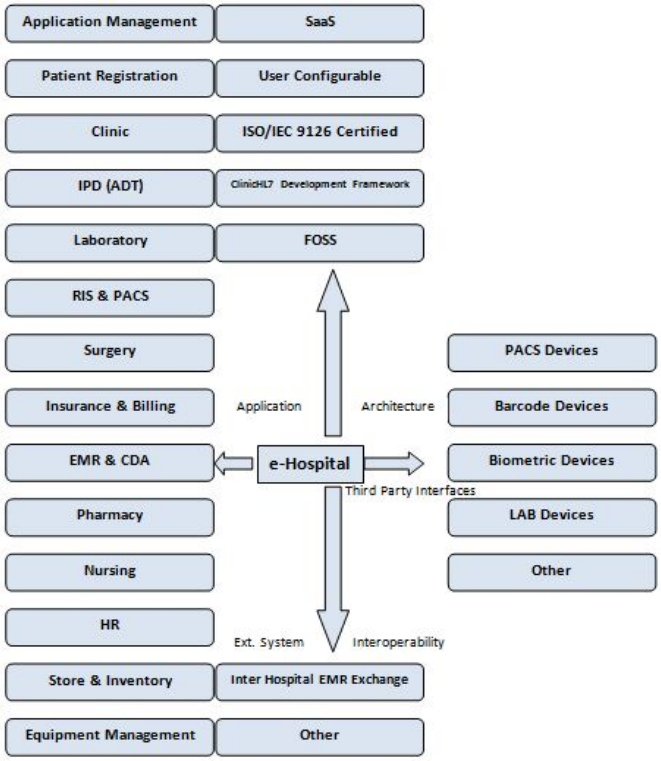

Fig. 1: Data Flow in Indian Public Hospitals

4. TECHNOLOGY USED FOR E-HOSPITAL IN INDIAN PUBLIC HEALTHCARE

e-Hospital 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 of Health and Family Welfare beside fulfilling requirements of HL7 Dataset parameters. ISO/IEC 25051–COTS certification is in progress. E-hospital is fully web enabled and is made available on Open Source Software and Standards as given below

Table 1: Software used for e-Hospital

Free Open Source Software Tools	
Operating System	Linux
Framework	JSP, Servlet, Struts, JSF, Ajax & Hibernate
Application Server	JBOSS
Backend RDBMS	PostgreSql 8.4

A minimum of two 64GB 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 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-tendency feature is the key which makes it possible for multiple hospitals to use the same instance of e-Hospital. The high configurability of e-Hospital makes rollout and deployment easy and fast. Most of the User Interfaces (UIs) and reports 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 make 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 Centers (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 NICDCs) using the cloud technology.

5. BENEFITS DERIVED FROM E-HOSPITAL

Tangible benefits of e-Hospital include drastic reduction in patient "waiting time" overall streamlining of all hospital processes, easy access for doctors to relevant information on 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.

Table 2: Comparative Analysis

Service/Facilities	In Manual System	Using e-Hospital
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, especially 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

Registration of patients is an area in which e-Hospital 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 provides various MIS reports related to billing, MRD, consultants, inventory, etc., which helps management in better monitoring and planning. It also 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 makes its impact obvious

6. HMIS IMPLEMENTATION IN INDIAN PUBLIC HOSPITALS

Table 3: List of Public e-hospitals in India

Sr. No.	E-hospitals in India
1	Dr. Ram ManoharLohia Hospital, New Delhi
2	AIIMS, Jhajjar, Haryana
3	Agartala Government Medical College &G.B.P Hospital, Agartala, Tripura
4	Dr. B.R. Ambedkar Memorial Teaching Hospital, Hapania, Agartala
5	Ernakulam General Dist. Hospital, Kerala
6	Malapuram Ayurveda Medical College, Kerala
7	Cherthela District Hospital, Kerala
8	IGM Gas Rahat Hospital, Bhopal
9	Shakir Ali Khan Hospital, Bhopal
10	Ganesh Das Hospital, Shillong, Meghalaya
11	Civil Hospital, Shillong, Meghalaya
12	Civil Hospital Willamnagar, Meghalaya
13	Civil Hospital, Tura Civil, Meghalaya
14	Civil Hospital Nongpoh, Meghalaya
15	Civil Hospital Nongstoin, Meghalaya
16	Civil Hospital Mairang, Meghalaya
17	Civil Hospital Tura MCH, Meghalaya
18	Indira Gandhi Institute of Child Health, Bangalore
19	PMSSY Super Speciality hospital, Bangalore
20	Ali Yavar Jung National institute for the hearing Handicapped (AYJNIHH), Mumbai
21	Gandhi agar District Hospital, Jammu, J&K
22	Jawaharlal Nehru Memorial Hospital, Srinagar, J&K
23	SVIMS, Tirupati
24	Kamla Nehru Hospital
25	Master Lal Singh Hospital
26	RAS(Pulmonary Medicine Center)
27	Jawaharlal Nehru Gas Rahat Hospital
28	K.C. General Hospital, Bangalore
29	General Hospital, Jayanagar, Bangalore
30	Government Medical College, Jammu

7. CONCLUSION

This is an appreciable initiation by Ministry of Health & Family Welfare, Government of India towards the adoption of information technology in operation management of Indian public tertiary and district hospitals. Presently the Hospital

Management Information System is working in some of the specific public multispecialty and district hospitals. Still there is lack of Hospital Management Information System implementation at the sub centre, primary health centers, community health centers and sub divisional hospitals and district hospitals. The public primary health care organizations are handling all the operations manually. There is lack of technological adoption at the primary health care level in Indian public health care. The ministry of Health & family welfare, government of India need to make immediate efforts for the implementation of HMIS at the primary level of Indian public health care.

REFERENCES

[1] Annual Report published by Ministry of Health & Family Welfare, India 2013-14

[2] Annual Report of Ministry of Statistics & Programme Implementation 2013-14

[3] e-hospital Newsletter by Health Informatics Divisions, National Informatics Division, Department of Electronics and Information Technology, Ministry of Communications and Information Technology 2014

[4] RUBAIYAT ALI, “e-Hospital@NIC, Simplifying Health Care Delivery”, Jan 2014, pp 9-11

[5] Union Budget 2013-14

[6] Economic Survey 2013-14

[7] http://egovreach.in/uploads/presentation/aizwal/NIC_Aizwal_PPT_v1.0.pdf