Health Management Information System—HMIS*

Mona Khandhar

Joint Secretary, Department of Health and Family Welfare
Government of Gujarat, Gandhinagar, Gujarat

Amarjit Singh

Commissioner, Health, Medical Service and Medical Education
First Floor, Jivraj Mehta Bhavan, Gandhinagar, Gujarat
js-hfwd@gujarat.gov.in

ABSTRACT

The Government of Gujarat has identified quality health services and the efficiency of Government managed hospitals as key contributors for building trust and confidence for the general hospitals in the hearts of the citizen of the state. In order to be able to take prompt decisions at appropriate times required a holistic view of the functioning of all district level hospitals at the state head quarter level which mandated integrated information system deployment across the hospital processes.

The Health Management Information System (HMIS) has been envisaged to not only help the administrators to have better monitoring and control of the functioning of hospitals across the state using decision support indicators but also assist the doctors and medical staff to improve health services with readily reference patient data, work flow enabled less-paper process and parameterized alarms and triggers during patient treatment cycle.

HMIS enables monitoring pre-defined health indicators and the embedded exception reporting facilitates decision making by the hospital management and state level administrators for policy and strategic decisions. HMIS has enabled providing better care to patients by automating all the major functional areas of the hospitals and the entire gamut of hospital activities.

HMIS has gone live in 12 out of the 30 Government hospitals in the state and target is to go live in all the 30 hospitals by March 2008.

1. Introduction

Project conceptualization

HMIS project was conceptualized by the department of health and family welfare to ensure the quality health care by IT application in such a manner so has to provides of standard clinical and disagnostic protocal tolls, hospital management tools and integration of management information at the state level so as to ensure onlie review and monitoring.

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* CSI Nihilent e-Governance Awards 2006–07, Department – Joint Winner.

This is amied at management of vital patient records, analysis of the critical health related data so as to provide an updated planning and policy tool towards provision of quality heath services.

2.   Project Vision, Stakeholders, Objectives and Services

Vision

Access to quality health care services for all
- by providing improved patient care
- through effective clinical and administrative processes
- with the help of Information Communication Technology.

Stakeholders

- Citizens (patients and their relatives)
- Government hospitals
- Commissionerate of Health, Medical Services, Medical Education and Research
- Health and Family Welfare and Medical Education Dept., Medical GoG.
- Science and Technology department, GoG - GSWAN.
- Total solution provider (Tata Consultancy Services Ltd.)

Objectives

- To provide access to quality health care.
- To create electronic medical records.
- To improve clinical and diagnostic services.
- To provide early alerts on disease trends and cause of deaths as per International codes for disease surveillance and rapid action.
- To get integrated state-level holistic view of the resource utilization.
- To monitor identified indicators and to get comparison of efficiency and performance among hospitals.
- To provide evidence based effective and responsive hospital management.
- To provide tools for effective health policy making and planning.

Services

The various services provided through HMIS are as given below.

Patient care services
- Registration
- Wards

- Pharmacy
- Billing
- Patient education
- Information kiosk
- Nursing care

Clinical services

- Clinical/EMR (gynecology, ophthalmic, orthopedic, ENT, gastro medicine, general medicine, nephrology, pediatric, surgery, urology, skin, etc.)
- Laboratory (pathology, microbiology, biochemistry, radiology)
- Blood bank
- Imaging

Hospital administration

- Hospital administration
- Human resource
- Payroll
- Financial accounting
- Stores/Inventory
- Purchase
- Complaints and redresses
- Transportation
- MIS Reports
- EIS Reports

Ancillary services

- National programs
- Linen management
- Equipment maintenance
- Resource scheduling
- Special camp and training
- Biomedical waste
- Application security

3. Public Private Partnership (PPP)

HMIS project is not implemented on PPP model. The entire project has been funded by the State Government.

4. Necessity/Needs

HMIS project was necessitated for the following reasons.
- Difficulty in integration of patient records and hospital activities affected quality of health care services adversely,
- Difficulty in getting real time information regarding the outbreak of epidemics,
- Need for an integrated tool for timely monitoring of services,
- Lack of timely information resulting in inefficient utilization of resource.
- Adoption of quality standards for processes such as NABH, NABL and ICD 10 for diseases, death causes, etc.
- Necessity for effective tool for health policy making.

5. Project Plan

Requirements of process re-engineering and Legal framework
- Process of registration re-engineered so as to form the basis for e-database, workflow and work list.
- Templatized Clinical treatment protocols.
- Diagnostic process simplified through single sample collection.
- Administrative formats are standardized to cut down on repetitive work which resulted in saving of time for administrative staff, doctors and nurses.
- Online stock management: procurement and issue of medicines, consumables, other house keeping materials is re-engineered so as to identify the fast moving items.
- Convergence of standardized Biomedical Waste Management, death causes, NABL, NABH compliance and Codification of Diseases (ICD) with HMIS.
- Provision of number of financial, technical, managerial and policy tools to help take right decisions at right time.
- Integrated management of inpatient through linking surgeries, nursing care, ward management, laboratory, radiology and blood bank.
- HRD management through allocation of work list, workflow resulted in to optimum resource utilization through tracking breakdown and maintenance of equipments and effective usage of ambulance services.

Technology architecture

HMIS has been developed on .NET technology with SQL Server 2005 as backend. The technology architecture for HMIS project is as follows:
Tier 1 (Presentation logic): Includes simple controls and user input validation
Tier 2 (Application server): Includes business processes logic and the data access

Tier 3 (Data server): Provides business data

6. Milestones

Fig. 1

Fig. 2

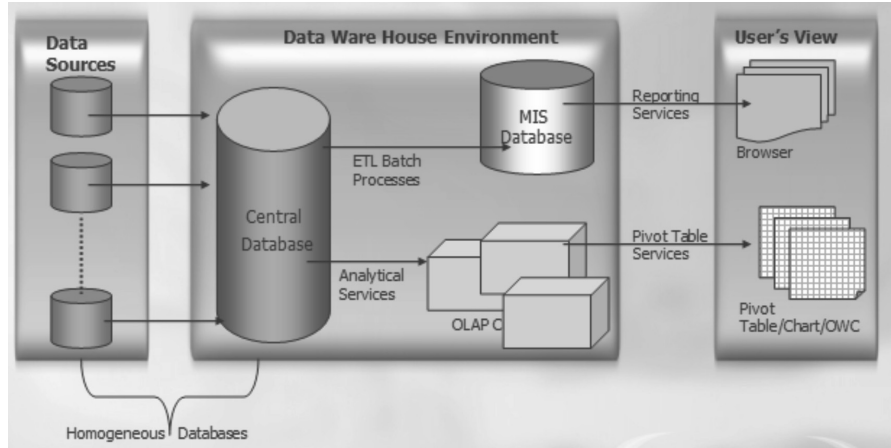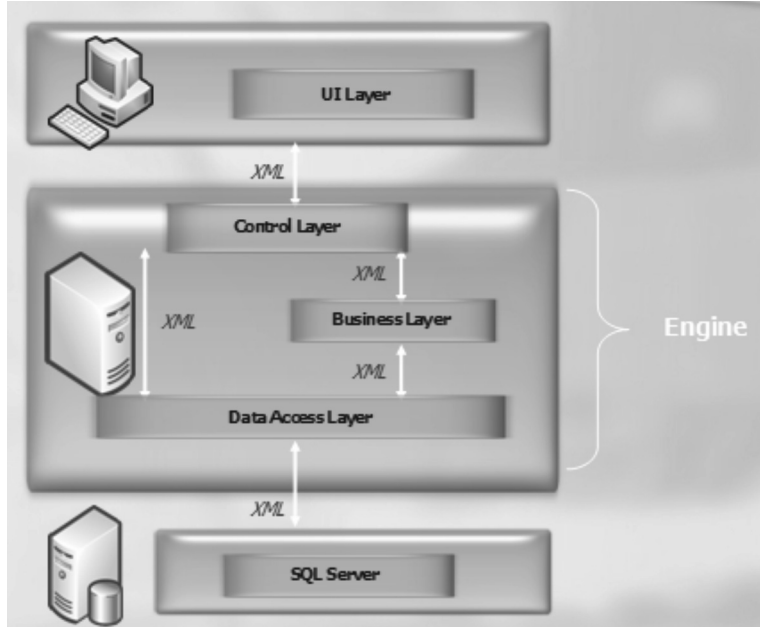Project Initiation   January 2005
Pilot Go live   June 2006
Complete Rollout   March 2008
Warranty support of12 months

7. Project Management Structure

State level

- Central monitoring committee reviews implementation fortnightly
- Technical committees to suggest and approve individual modules
- Field visits by Joint Secretary and Regional Deputy Director to ensure implementation as per schedule

Hospital level

- Technical team to provide onsite support and coordinate rollout
- Continuous monitoring by Civil Surgeons and Hospital administrators

8. Implementation

Strategy for pilot to roll out

The strategy adopted for implementation of HMIS project has been as follows:

- Selected an IT partner, who had required experties and total solutions with proven track record. ready-to-deploy HMIS framework application earlier, therefore having proven record and experience about functional as well as technical know-how,
- Identication of SSG, Vadodara as teaching and Gandhinagar Civil hospital as district hospital for pilot sites,
- 250+ users from across the roles and hospitals interviewed, observations documented and proof-of-concept replayed to these users prior to their approving for roll-out to other hospitals,
- On site hand holding team, regular reviews at Civil Surgeon level as well as Commissioner level for ensuring progress and change management.

9. Capacity Building

Government of Gujarat has put lot of emphasis on capacity building for successful implementation of HMIS project.

- Detailed manual for every module have been prepared and issued to all the hospitals
- All the users have been provided with the basic computer training along with the HMIS specific training and hands on training
- Hand holding to all the users have been provided through a technical team of total solution provider and concerned hospital
- Periodical orientation and refresher training imparted to all the users.

Fig. 2   *Governance structure*
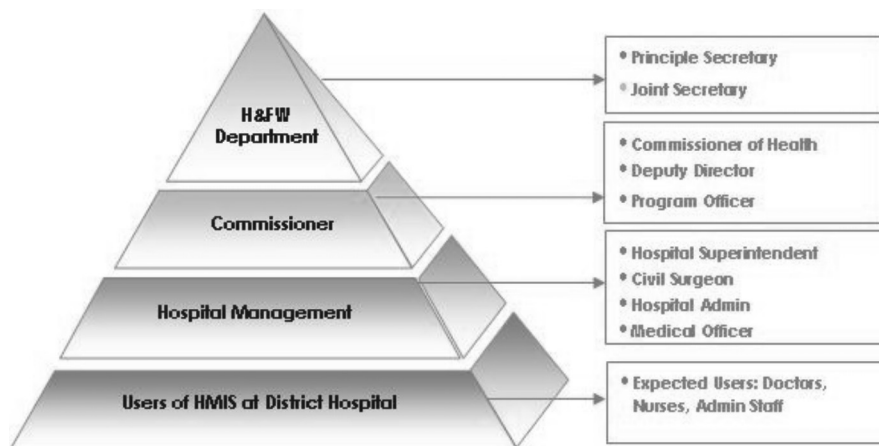
Project management teams

- Project Management: Additional Director, Civil Surgeon at respective hospitals and representatives from solution provider
- Project Policy level: Commissioner, Joint Secy, Additional Director
- Change Management: Commissioner, Civil Surgeon and Medical Superintendent, IT Committee that includes HoDs of different medical specialties

10. Evaluation and Measurement

The Stakeholder Need Assessment is being done twice a year by taking structured user feedback survey based on following parameters:
- Quality of deliverables
- Project management
- Post-implementation support
- Documentations
- Responsiveness
- Communication

- Infrastructure
- Security and confidentiality

The satisfaction of users of HMIS can be confirmed by the rating of more than 90% received during the last 2 Need Assessment surveys carried out.

The Service Levels Agreement [SLA] have been defined for the implementing partner.

Table 1

Sl.	SLA Measure	Description
1.	Issue response time/ Acknowledgement	All cases from case open time to support team acknowledgement time
2.	Issue resolution time	All cases from case open time to case close time. SLA provided for system support cases
3.	Age of issue	Current open cases from case open time. SLA provided for system support cases
4.	Backlog of issue	Current open cases by rolling four weeks total volume

11. Issues and their Solutions

Critical success factors

- Customization
- User convenience
- Uniform and integrated system
- Adequate security and authentication provisions
- Change management
- Ongoing training and support

Replication in other states

The HMIS project can be easily replicated in other states with little customization.

Road ahead

- Touch screen kiosk for health promotion and prevention.
- SMS alerts to staff
- RFID/Smart card for capturing patient and doctor s' data.
- HL7 (Health Level 7)
- Bar Code for patient identification and even for other items.
- Biometrics for employees attendance system as well as for retrieving the patients' data.

- Online appointments
- Tele medicine
- CME—Continued Medical Education
- Research patterns for medical colleges.

12. Status and Results

Present status

- HMIS has gone live in 12 Government Hospitals
- More than 3,400 users of 30 hospitals have been provided training

13. Specific Achievements during the Year 2006–07

All the 12 hospitals have gone live during 2006–07.

14. Future Plans for Readers Seeking more Information on Project

The future plans for HMIS are as follows:
- Integration of HMIS with PHCs, CHCs and Municipal corporation's governed hospitals
- Citizen portal for health services.