

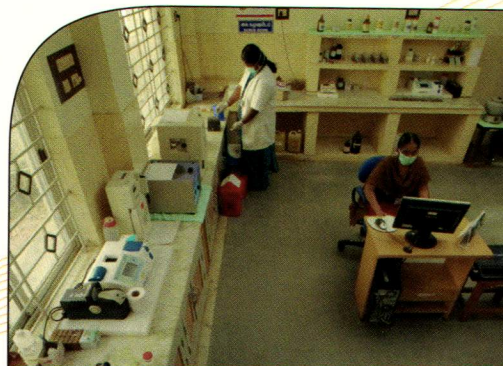
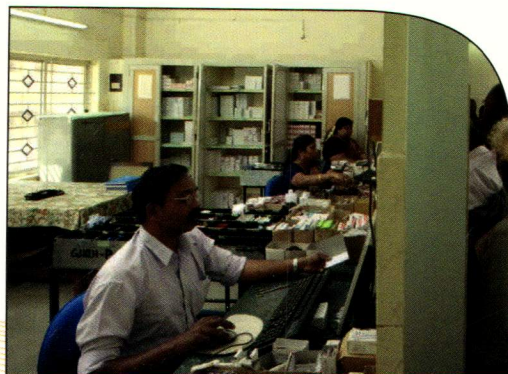
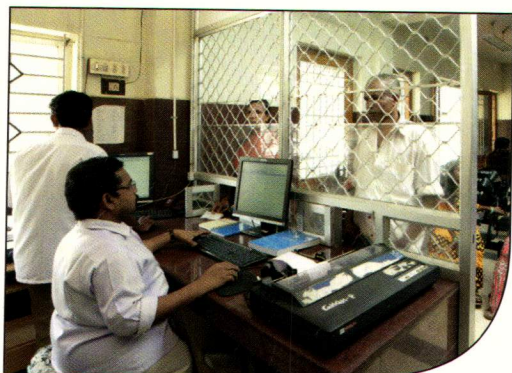


**“DOCUMENTATION AND DISSEMINATION
OF A BEST PRACTICE”**



Health Management Information System

By
Tamil Nadu Health Systems Project
Department of Health & Family Welfare,
Govt of Tamil Nadu



Documentation Supported by :

**DEPARTMENT OF ADMINISTRATIVE REFORMS & PUBLIC GRIEVANCES
MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES AND PENSIONS
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Chapter 1

Tamil Nadu Healthcare System – The Need for Health Management Information System (HMIS)

Situation Before the Practice

Anjali, 32 years now, had been coming to the Tambaram Government Hospital since she was a child. Every time she came, her details were noted down in a register afresh. She was treated as a first-time patient and though records are maintained of every visit, accessing old information was not easy. Therefore, every time the doctor consulted, she narrated her medical history as she does not realize the importance of bringing her earlier prescriptions. On some days, there can be a long queue at the hospital and it can take at least an hour for the doctor to see her. Once he was done with her, he gives her a handwritten prescription. When she goes to the pharmacy, the queue could be long there too. The wait makes her impatient, and by the time she reaches the pharmacist, she is irritable. The pharmacist glances through the prescription and takes some time to look for the medicines. As Anjali waits impatiently, he returns to say the medicine was out of stock. Both have




had a tiring day, and so a short argument follows. Anjali walked out in a huff. She had been told that it would take a week for the medicine to be restocked. She would have to ask the doctor for an alternative medicine, and again stand in the queue to see him. This and other such similar incidents were quite a common sight in government healthcare centers till a few years ago.

Encounters and challenges faced by the innovators

But if there were constraints at the patient's side, on the administrative side too, access to real-time information was restricted. In the conventional system of manual registration of patients and documentation by hand, access to timely, accurate data was a challenge. This was proving to be a roadblock in taking policy decisions and understanding healthcare requirements of the state. There was no way of knowing how many people used the services, the nature of health problems and any





preventive action that needed to be taken. There was no accurate way of assessing the workload of the doctors, or whether the current staff was enough to cope with the inflow of patients.

Tamil Nadu, the seventh most populous state in India, has an estimated population of 7.2 crores. The state has been geographically divided into 32 revenue districts, each headed by a Collector.



The Department of Health and Family Welfare, Government of Tamil Nadu, is committed to providing quality healthcare services in the state through a three-tier system; with 1613 Primary Health Centers, 267 Secondary Hospitals and 17 Government Medical College hospitals and one Dr.MGR Medical University that cover the healthcare needs of the entire state. The

system designed by the Government of Tamil Nadu is specially aimed at the socio-economically under privileged, disadvantaged groups of people living below the poverty line and the tribal population to ensure a health care system that is highly accessible free of cost, equitable and effective.

The Primary Healthcare Centres work at the grassroots level, providing general medicine and maternity services. More severe health cases are referred to district hospitals, which have facilities for lab testing and general surgery, apart from regular consulting. The super-specialty cases are handled by medical college hospitals. This way, every village, every tribal society in every district gets healthcare cover. Traditionally, the entire healthcare administration in the state was managed manually. From patient registration to consultation, everything was manually noted.

This involved time consuming creation of documents, the need for proper storage, difficulty in retrieval and high cost maintenance. Manual registers were a drain on the exchequer. Then there was the risk of duplication of records since every time a patient visited the centre, he or she was registered afresh.

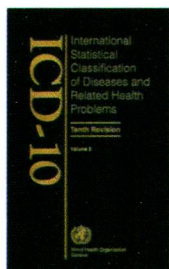
Till 1996, only manual reports were sent to the department regarding patient registrations. Since then, a monthly report was generated. But, this system had several restrictions, not the least of which was inaccuracy of the records, the cumbersome nature of storage and retrieval and the high cost of maintenance.



With only manual records, getting an overview of the number of patients visiting the hospital or the nature of problems that needed immediate action – say, to prevent the breaking out of an epidemic – was not possible. The reliability of the collected health care data for analysis was questionable. No

snapshot/dashboard view was available to monitor the performance of the hospitals. Therefore, at the Institutional, District or the State level, there was no up to date information available on the transactions happening at the hospitals.

There were no proper records of the equipment at the hospitals, how many of them were functioning properly, how many needed repairs. Similar was the case with hospital infrastructure. In the case of drugs too, there were many challenges, such as accountability, monitoring of expiry dates, stocks and auto indenting. All these were available as manual records and timely updating was a challenge.



At the institutional level, the In-Patient disease classification was not mapped to the International Classification of Diseases (ICD) that is recommended and followed worldwide.



In a nutshell, the problems faced included:

- No real time data available to monitor the performance of the hospital
- Evidence based program management was a challenge
- Undue delays in receipt of data



- Retrieval of old manual records was ineffective and time consuming.
- Duplication of records was a setback to correct understanding
- Monthly reports sent as hard copy - a real challenge for data analysis/comparison
- Drug inventory/equipment inventory maintenance and tracking of warranty/AMC-more cumbersome
- Lack of standard names and codes

In such a scenario, there was clearly a pressing need to provide tools and solutions that would improve healthcare management in the state. The only solution was to introduce Information and Communication Technology (ICT) to facilitate better healthcare management system, as well as to integrate the three levels of healthcare management at the village, district and hospital levels.

Personnel Management



With over 2000 healthcare centres of varying sizes, just the medical and paramedical staffs such as doctors, nurses, lab technicians and pharmacists form a massive number. With the administrative staff across the departments also added to these numbers, the employee strength is nearing 90,000 people

at various levels of the hierarchy. Again, manual records on each employee is maintained but it is an administrative nightmare to keep track of each of them. Recruitments, retirement, promotions, complaints – the list of HR activities per employee runs high. It is a Herculean task not only because of the numbers, but also because it is distributed across the state and needs diligent monitoring and follow up's for effective personnel management.

As each and every aspect of running the department of healthcare and family welfare demanded efficient management, it was inevitable that the powers that be should come together to find out the most integrative, effective way to facilitate the improvement.

Tamil Nadu Health Systems Project (TNHSP) is being implemented since 2005 by the Government of Tamil Nadu with World Bank loan for several programs to improve the health delivery systems. One of the key areas was the introduction of Hospital Management Information System, a flagship project, to be implemented in three phases.



In the pilot phase, Government Hospitals in Tambaram, Sriperumbudur in Kanchipuram district, Sholingur in Vellore district, and Padmanabhapuram, Colachel in Kanyakumari district were identified. The hospital building in several places were being renovated. In these five hospitals, the civil work was already done and so they were taken up first.

In Phase I, HMS was implemented in five Districts viz. Theni, Kanyakumari, Dharmapuri, Krishnagiri & Pudukkottai districts comprising of thirty six hospitals also, management information system has been implemented in primary health centres. Phase II is an extension of this work across the state for 222 hospitals.

Phase III is a comprehensive project, where specialty screens for tertiary care hospitals and implementation of a University Automation System for Tamil Nadu Dr. MGR Medical University with a College Management System is undertaken. This will enable the college students and staff to handle right from admission of the candidate to the medical colleges to their checking results online. The attached hospitals also connected to the entire HMIS system. Currently SRS for specialty screens has been prepared. Procurement and further implementation of Phase III is in progress for HMS.



Project Strategy

To address the need to smoothen the management of the healthcare services in the state, to have a real time data availability to monitor the hospital performance and to bring about evidence based programme management. For which, ICT initiatives, Policy and Process initiatives were undertaken to attain the paradigm shift.

ICT Initiatives

It was decided that the developments in the information and communication technology was well suited to help achieve the goal of a smoother healthcare delivery and receive feedback on the impact of the various initiatives from remote centres. There by a centralised web based user friendly application was developed, procurement of computers and other hardwares required for establishment of IT infrastructure was made through Tamil Nadu Medical Service Corporation (TNMSC) and Electronics Corporation of Tamil Nadu (ELCOT). Utilization of other infrastructure investment of the state like placement of servers in Tamil Nadu State Data Centre, Tamil nadu State Wide Area Network (TNSWAN). Data backup and data security is ensured by a dedicated helpdesk at TNHSP comprising of server administrators and technical coordinators (IT). e-core team was formed in the individual hospitals by the district IT Coordinators for the smooth functioning of HMIS. Government of Tamil Nadu is the owner of application developed on open source platform (J2EE), Solaris Operating System, Postgre SQL data base and Glass fish Application Server, adopting industrial three tier architectural standard. Unique Patient identification number generated can be interfaced with Aadhar UID number.

Policy Initiatives

To enable this, the government issued orders for implementation, sustainability and usage; fixing of responsibilities on the end users; budgetary provisions for maintenance and support; and removal of manual records. The government also created new posts at district and state levels to support ICT interventions. Heads of Departments and Directorates were instructed to use data from HMIS for purposes of monitoring, review and analysis. Instructions to dispense away with the system of manual reporting and instructions to audit teams were also passed. A dedicated team was formed at the Directorate while a centralized help desk was also established at the directorate. The revised medical code for Tamil Nadu Medical Service also contains a chapter on HMIS. This acts as an information guide to the new recruits in TNMS.

Process Initiatives

Real-time data was considered one of the critical factors for timely intervention by Health Directorates and to provide critical health data across the health chain. For software requirement specification (SRS) through study of the entire health system and its process were studied. It was decided that the World Bank supported Tamil Nadu Health Systems Project (TNHSP) would facilitate introducing an integrated systems that would provide information on:

- Patient inflow and profiling – this would include how many men, women, children
- Nature of consultation – outpatient, casualty, admissions as inpatient
- Nature of complaints of inpatients – infectious diseases, surgeries, gynaecological and so on
- Discharge information in case of inpatients
- Equipment and infrastructure related information for administrative purposes
- Personnel related information for HR management.

All these would be integrated at the central level so that senior officials and Directors could access information on any health centre, hospital or medical college hospital from anywhere using a secure password.

This would assist the Government of Tamil Nadu to:

1. Increase access and raise the quality of a series of highly cost-effective interventions to improve health outcomes of the poor and underserved population with a focus on the regional disparities.
2. Strengthen the institutional and policy framework for the health system in Tamil Nadu.


Methodology

Sourcing of expertise in any government project has to be through the tender process.

It was decided that:

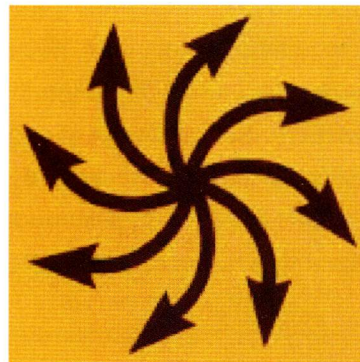
- 1) A technical working group will co-opt representatives of each directorate for systems analysis and development of appropriate HMIS for the directorate.



- 
- 2) The current HMIS and indicators used in each directorate for performance assessment will be reviewed.
 - 3) External assistance / Consultants will be used for software development, training and implementation of the system on a turnkey basis
 - 4) Information network communications infrastructure (INCI) will be established at each service delivery point at tertiary level, secondary level and primary level up to PHCs and all administrative offices in GOTN health sector.
 - 5) INCI will be linked across all government health institutions for speedy flow of information and to promote collaborative effort for quality care.
 - 6) At each service delivery point and administrative office, for taking over the system, one or two existing government staff with aptitude for functioning as systems operator will be identified and made responsible for INCI and other operations as also the key managers involved at all levels.


TNHSP had to follow Quality and Cost-based transparent procurement process. Hence all procurement activities were done through Government agencies “TNMSC”(Tamilnadu Medical Services Corporation) and “ELCOT” (Electronic Corporation of Tamilnadu).

The first stage was to identify the software solution provider, and the most suitable was selected from these six, based on the RFP (Request for Proposal) submitted by them. Then software solution provider interacted with all the stakeholders of the software – the different groups of doctors, nurses, lab technicians, pharmacists and so on to prepare the software requirement specification (SRS). This process, initiated in 2007, took another year and a half to complete.



The basic requirements for HMIS identified were:

1. Coverage of clinical services of all departments at each level within the framework of the entire health sector in Tamil Nadu.
2. Coverage of Program Services of all departments at each level within the framework of the entire health community in the state and national level supplies.
3. To study and facilitate analysis on disease pattern, morbidity and mortality.

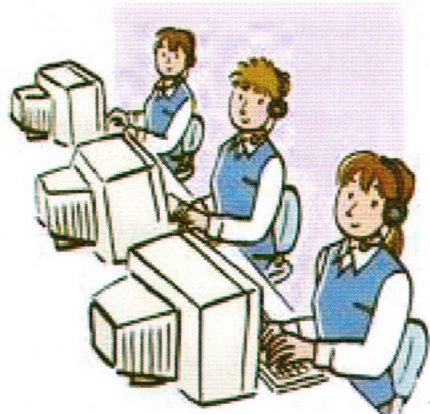
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4. To feed information to all the users within the health department at state and national levels.
 5. To integrate the entire system in such a manner so as to avoid redundancy in capture of information and to maintain sustained flow of information at all levels

Thus, for preparing the Software Requirement Specification (SRS) for developing the application, a through study of the entire health system and its process were studied. Extensive training sessions were conducted for various categories in the health department.

The cost estimates for all the above activities works out to crores hence, in addition to investment from the government of Tamil Nadu, the World Bank soft loan was also used for this purpose. It was also decided that data entry operators will not be used since the system would collapse if they were to leave. Instead, each user would have to use the services himself/herself to ensure effectiveness. Therefore, training was identified as an important component of the entire process.

Once the SRS document was ready, the hardware requirements were spelt out. For each of the components, a different vendor had to be identified through the tendering process. The hardware solution included components right from computers, printers, furniture, stationery and consumables. There were two types of connectivity's – primary through TNSWAN and secondary through VPNoBB by BSNL. In addition to computers, servers, switches and routers, power was also a challenge. Therefore, complete power back up solutions in the form of UPS with two-hour back up and generators were provided. Periodic review meeting with the various stake holders were conducted and the the follow up action also taken by the respective stake holders.

To monitor the infrastructure setup in the hospitals and to coordinate with the hospital authorities and stake holders, a centralised helpdesk was facilitated at TNHSP Head Quarters. The prime duty of the helpdesk is to monitor primary connectivity through NMS and to facilitate alternate service through VPNoBB. Software consultants were also accomodated in the helpdesk.



Chapter 3 | Implementing HMIS



Scope

The mandate given to the software solution provider was to implement a solution that would cover all the 32 districts from the primary level upwards. It will link the primary, secondary and tertiary levels for patient monitoring and referral, apart from providing information to programme managers and administrators. Within hospitals, it will serve as a tool for better hospital management and thereby ensuring better service delivery for the community. Hence the HMIS will provide at each level the information required to assess and correct (if required) their performance.

It will in its final form enable on-line receipt and exchange of information across the hospitals, dispensaries and health centres for timely decision making for patient management, program management, camps management, surveillance and epidemic control, emergencies management and management of resources.

The HMIS is expected to serve as a decision support system (DSS) once Phase III is also implemented for coordinated planning, monitoring, implementation, assessing achievements, reporting and feedback, policy formulation and strategy development.

The Modules

The following are the key areas that the HMIS addresses:

Inventory

- Personnel
- Infrastructure and Equipment (Available, Working, Repairable, Required)

Performance

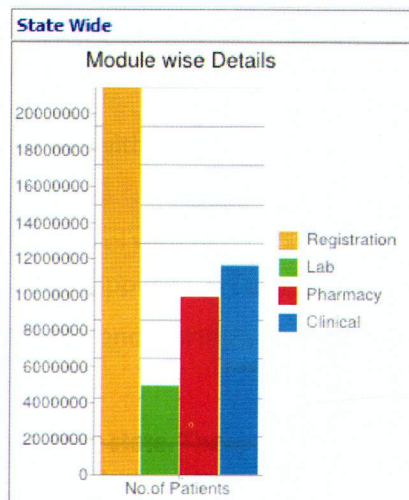
- National Health Programmes
- Other state programmes

Hospitals Activity and Efficiency Indicators

- In-patient and Outpatient Departments (IPD/ OPD) and work flow in and out
- Referral
- Biodiversity Waste Management
- Quality of care
- Morbidity / Mortality

Finance

- Budget
- Expenditure on various items



Thus HMIS has two components:

- HMS – Hospital Management System
 - o Registration
 - o Our Patient
 - o Impatient
 - o Medical Records
 - o Lab, X-ray & other investigations
 - o Pharmacy
 - o Stores
 - o Blood Bank
 - o Diet
 - o Linen
 - o Module for online daily report generation-MRD
 - o Final diagnosis is mapped to ICD-10 classification

These module are regarded as patient management information system

MIS Management Information System

- Unified Health Reporting System
 - o Clinical Information (auto populate+)
 - Patient census, Morbidity, Mortality
 - Patient services, Immunization, etc.
 - o Ancillary Services
 - ISMR
 - Blood Bank, Lab Services, etc.
 - o Administrative Information
 - Buildings, Finance, Personnel, Vehicle, etc.
 - o Program Information
 - Malaria, Blindness control, etc.

The solution follows industry standard, three tier architecture - Presentation, Business logic and Data layer. User-friendly screens were developed so that right from registration to consultation and drug availability, all information could be entered by the users themselves. SUSE Linux OS has been implemented at the end user level.

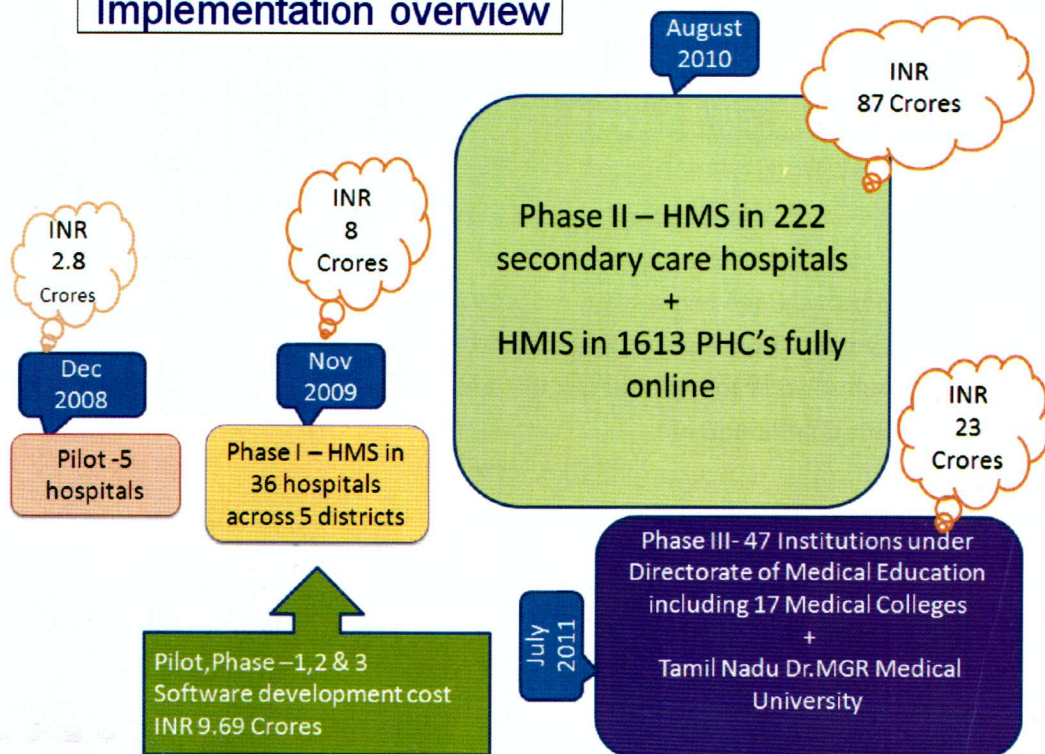
Being vendor independent, the centralized web based application along with fail-proof connectivity, is a robust one. So, this system is successfully deployed in all the hospitals—whether it is in an urban area, a village, or a remote location, independent of the volume of patients handled. The simplicity of the interface enables the use of the application directly by the end users without any assistance from data entry operators. This is one of the reasons why the system succeeded where the counterpart in other states did not – since there was external dependence to keep HMIS running.



At a Glance

- HMIS is currently functional in all 1613 PHCs
- HMS (Health Management System) is functional in 265 out of 267 locations (Pilot, Phase I – Completed, and Phase – II, nearing completion)
- Phase III, Software Requirement Specification (SRS) and Procurement are under progress

Implementation overview



Chapter 4 | Results achieved

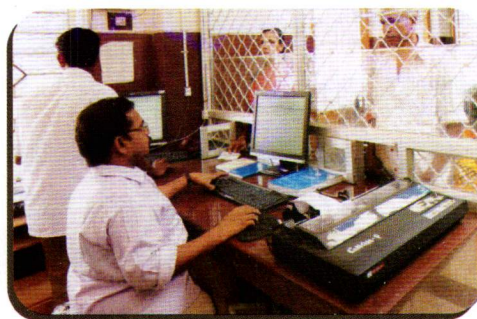
Ease of Access:

The State Data Centre (SDC) for Tamil Nadu was established as per the guidelines of Govt of India Department of IT to support e-Governance initiatives under NeGP (National e-Governance Plan). It consolidates services, applications and infrastructure to provide efficient electronic delivery by providing vertical and horizontal connectivity. Among the many functionalities it provides via TNSWAN (Tamil Nadu State Wide Area Network) and CSC (Common Service Centre), the core network consists 708 nodes (POPs- Point of Presence). Of this, 17 servers are utilized for HMIS activities. Two server administrators are stationed at ELCOT Perungudi State Data Center. User friendly application with no data entry operators and staff enters all health data directly. Thirty three IT technical coordinators and e-core team in each hospital help the users for easy access of the system. In addition to optimum connectivity (Primary and Secondary), HMIS also has a strong back up system. It has a data back up policy and the back up activities include:

1. Tape back-up
2. NAS-Network attached storage (cluster hard disc). Two NAS site
3. Disaster Recovery site other than TNSDC .The system is also standardised on STQC - Standardization Testing and Quality Certification, which ensures all mandatory requirements for TNSDC. HIPS - Host intrusion prevention system - is provided for the safety of the application.

Patient Registration:

OP registration module captures all relevant demographic details. When a patient walks into any of the secondary care hospitals, they are given a print out slip that contains Patient name, age, gender PIN/OP number, name of the Govt Hospital and date of visit by the hospital workers in the registration counters meant for OP tickets..

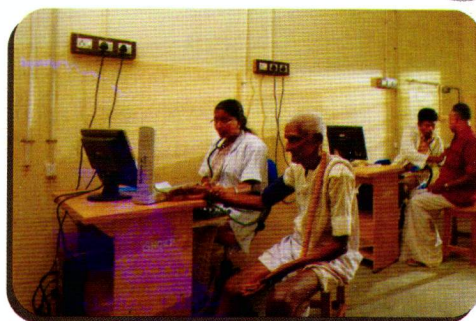


The Doctor Story

When the patient consults the doctor, the doctor accesses the record. This becomes a lifetime record of the patient and each consultation results are noted directly into the system. The



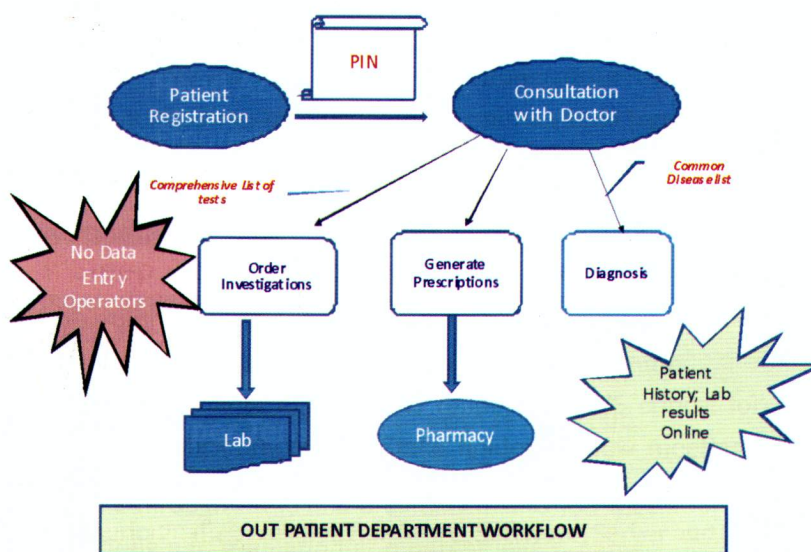
doctor prescribes a medicine and enters that also in the record. The pharmacy module gets an alert and shows the stock position immediately. The doctor knows directly if there are enough medicines there or if he or she needs to change the prescription. If there is an injection to be administered, the nurses are alerted.



The doctor can create standard kits of medicines that he typically prescribes. Also the diseases are classified as per international standards. As a result of this module, the number of patients a doctor can see in a day has gone up.

Briefly

- o Unique Patient Identification Number (PIN)
- o Patients can visit any Secondary Care Hospital within Tamil Nadu using the PIN
- o Online health record available for easy retrieval by doctors during subsequent visits of the patients
- o Directly access doctor for follow up as re-registration not required
- o Patient is issued the print outs of prescription, Lab reports and discharge summary.



At the Nurses' Station

When a doctor prescribes an injection to an outpatient, the nurses are alerted immediately. They keep the injection ready, and when the patient walks in, administer it immediately. The introduction of HMIS has helped save a lot of time earlier needed to maintain too many registers. Today, all details of the patients are updated real time online, and the diet, injections and medicines due, transfer between wards, discharge date – all pertinent information can be accessed through in the system. The data is categorised neatly under separate categories. Or, the nurse can also click on a patient name to check the status.



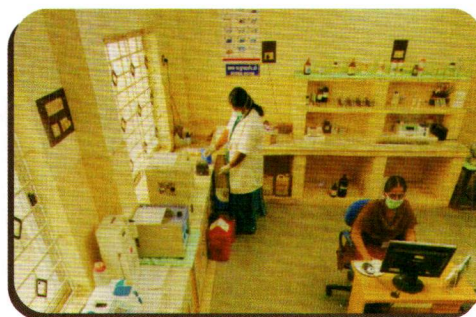
Diet, drugs and linen indenting can be done from the wards, thus making maintenance of the ward inventory easy. Once the lab investigation results are uploaded, even before the reports reach the wards in the traditional route, the nurses can access the records online and update the doctors coming on rounds. The discharge summary is prepared online and stored. It is also given to the patient as print outs for their records. Handing over and taking over of charge, patients censuses are all handled online, enhancing accountability and transparency. The system also enables the nurses to monitor and manage the blood bag availability. Drug expiry dates, another critical area of work, is monitored on a real time basis.



Getting Tests Done

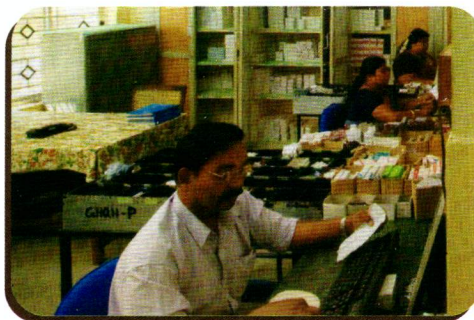
If the doctor feels the need for further tests like blood, urine, X-ray etc, he can indicate the tests in the system and the laboratory is alerted.

Once the lab tests are completed, the test results are updated in the patient's record and the nurses and doctors can access this sitting in their place. Currently the patients are given the print out of the test results, the doctor can prescribe appropriate treatment based on the results available on the system.



For Pharmacists

The moment a doctor prescribes medicines, the system alerts the pharmacist, who can keep them ready. In case of insufficient stock, there is an automatic indent in the pharmacy module, alerting the local store on the need to replenish the medicines.

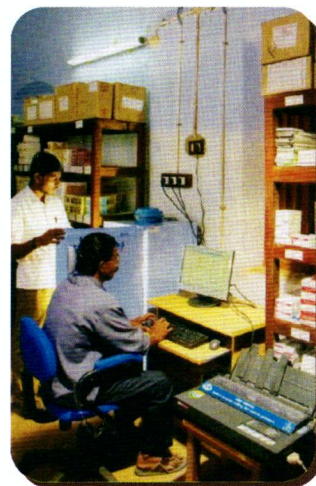


This has brought in transparency and accountability in managing drugs and equipment stocks. Drug stocks are updated every time a drug is issued. The pharmacist can monitor the expiry dates and the batch number of each drug. Earlier, the pharmacist had to count the tokens and consolidate them for stock position. Now the information is available at fingertips.

Benefits to hospitals/staff

With the HMIS in place, managing infrastructure, equipment, admissions, surgeries, maternity ward etc – all these are tracked with ease. The record of each patient is transferred from ward to ward based on requirement. Lab testing and results can also be noted and remain in the system, to be accessed if needed later.

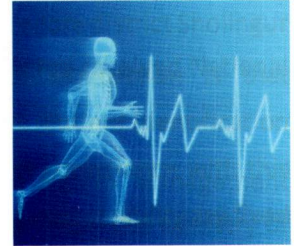
With the implementation of the system, the number of patients handled at each level has gone up. In the initial stages, the system developed glitches and the old manual method had to be deployed, doubling the workload. Doctors had to manually note down the patient details and then update the system. Now those glitches have been handled successfully and the number of patients seen by each doctor has gone up. So is the case along the entire healthcare chain, it thus becoming a boon to the patient as well as the hospitals.



Briefly:

- o Time saved for reports and data consolidation
- o Quick retrieval of records
- o Single point of data entry – at end user level
- o Uniform and standardized reporting formats across the health chain

- o Highly scalable solution
- o Ten Thousand users and one lakh patients cycled through system daily
- o 3 million transactions per day.
- o Real time data available – for monitoring and swift decision making by the State Health Authorities
- o Reduced/minimal duplication of data entry and proper data maintenance
- o Automatic consolidation / collation of data
- o Inbuilt validations for data entry – reduction in data entry errors
- o Master data entry forms – standardized to bring in uniformity of reporting
- o User friendly easy to use screens.



Hospital Administration

As a result of collation of all pertinent data related to patients and administration under different categories in one system, health administrators can retrieve any data within seconds. This gives them an overall view, as well as specific information on different aspects of running the healthcare centers.

Benefits

- o Quick and easy retrieval of data – real time data across hospitals/districts available on line
- o Close monitoring and follow up easier with data available on line
- o Upgraded and improved inventory
- o Human Resources Management
- o Easy access to data helps to analyze disease patterns and trends
- o Evidence based decisions for investments, improvements of the Health System
- o Savings in terms of paper and records maintenance
- o Records of referral chain and patient movement
- o Easy consolidation of data – for comparison, validation, etc.
- o Cost effectiveness

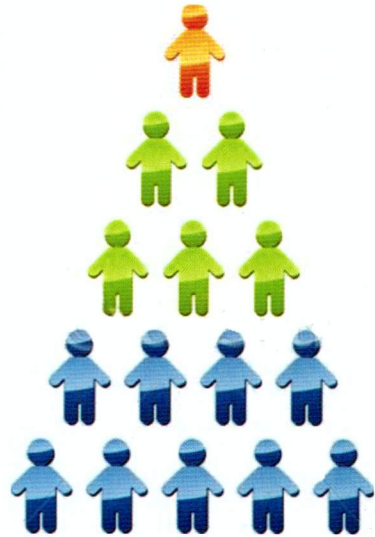
Personnel Management

The Administrative Information System in the HMIS contains a Personnel Module. Personnel management had been identified as one of the areas that required ICT for smoother functioning. The module has been developed such that the details of each employee – such as qualification, personal details, the post they are in, their transfer, post graduation, promotion, disciplinary – if any, service related, retirement, family members and nomination are captured and stored.

At each department level, the number of posts, sanctioned strength, in position and vacancy details are captured and can be accessed through manpower-sanctioned positions screen.

There are dedicated links to access information on increments, regularization, probation, surrender of leave salary of each employee. Deputation details, disciplinary action taken against an employee are also covered as are compulsory retirement details, employee audit and hospital audit details.

The personnel module also provides for access to leave details such as Earn Leave credit\ Debit, Earned leave on medical certificate and without MC etc. Other screens captured in personnel module are Cadre Register, Employee Position Screen, Representation of SC/ST, Record Sheet. The implementation of the personnel management system has made HR management easier.



No job is complete with just the implementation. If anything, it is just the first step. HMIS story is no different. The purpose of implementing the HMIS was to have a grip on the pulse of the healthcare initiatives, its impact and the areas that need attention.

One of the important measurable outcomes of the HMIS implementation is that approximately 80 percent of the registered patients bring back the PIN (Patient Identification Number) during their subsequent visits, which shows the high patient compliance with this system. Implementation of this system ensures that accountability and responsibility are fixed on the individual health care providers.

The results are clearly indicative of the success of this project. Poor patients walkout of Government hospitals with a pride of holding printed prescription slip/OP case record/Lab investigation report. The smile in their face indicates the usefulness of this system(HMIS)



As a result of HMIS implementation, following are the benefits for the poor patients using Govt Hospitals. Unique Patient Identification Number (PIN) is obtained, Unique Institution codes across all Government Hospitals and Offices made available, Unique employee numbers/user names and password for access to system given. Reuse of drug codes (from other central procurement agency) & Reuse of the treasury codes for finance related information available. Uniform and standardized reporting formats across all institutions, provision to link the PIN to the AADHAR UID The Lab test results are being given to the patients with test report reference values. The final disease diagnosis is linked to ICD-10 master data. Real time data availability 24X7 helps to bring about evidence based programme management. Currently Directorate of Medical & Rural Health Services, Directorate of Public Health and Directorate of Medical Education along with Tamilnadu Dr.MGR Medical University are utilising HMIS. Individual Directorates will sustain the system once the TNHSP is over. In future this will be extended to other health verticals. The IT department of Govt of Tamilnadu will help in the sustainability of HMIS once TNHSP is completed by providing annual technical support. The recurring expenditure will be factored in annual budgeting of the directorate for sustainability.

Monitoring Aspects



In addition to being able to monitor the progress of the healthcare services, it was also important to assess the performance of the HMIS system itself and the progress in implementation. Therefore, there are periodic review meetings by the stakeholders including the doctors, nurses, and the administrative staff across different levels. Each meeting is recorded and follow ups done to monitor the progress on the action to be taken. The World Bank also monitors the project periodically and helps regularise the functions.

A central help desk has been established to facilitate and coordinate in case of any difficulties at the individual hospital levels. The primary responsibility of the help desk is to monitor the use of IT equipment and provide online help in case of any breakdown. The help desk is also responsible for taking equipment break down calls from the hospitals. But since the central help desk works remotely and cannot always visualise the problem faced at the hospital or communicate the correction method over the phone, TNHSP also appointed IT coordinators in each district to monitor all infrastructure related activities. The IT Technical coordinators also provide application support and training for end users. Formation of e-core team in individual hospitals helps to resolve IT related issues without any time delay.

At the state level, the government has issued several orders that have further enhanced the functioning of the HMIS. Used to the traditional paperwork, the departments and directorates needed a GO to use data from HMIS for purpose of monitoring, review and analysis instead of wait for paper reports. There was also specific instruction to dispense away with the system of manual reporting and instructions to audit teams to conduct audit based on HMIS records..

A dedicated team is established at the Project Head Quarters situated in the directorate campus to monitor the hospitals staff for online reporting, implementation, sustainability and usage of the ICT systems. By fixing responsibility on the end users, it is ensured that the ICT initiative would be utilised effectively and not die a premature death. Budgetary provisions were also made for maintenance and support. But most importantly, manual records have been done away with to a large extent, thus rendering HMIS critical for the healthcare department to function efficiently. Weekly Stake holders review meeting is conducted by Project Director TNHSP along with Managing Director ELCOT to resolve HMIS infra issues. Video Conferencing done periodically to resolve Hardware, Software, Server and Connectivity issues

Challenges and Lessons Learnt

Today, a patient walks in and can be out of the hospital in no time. Any senior official can login using his special user ID and password and access information on any hospital, any district, any personnel to know how they are functioning. The HMIS system implemented by the Tamil Nadu healthcare department has won many accolades for its efficiency and sustainable model.

But the journey to reaching this point hasn't been simple or easy.

Mindset is one of the biggest challenges any new initiative faces. Or rather, resistance to new initiatives is. And the implementation of HMIS was no exception to this. Used to their old system that seemed to work just fine for the doctors and all the other hospital are available – onsite and off staff, the new system seemed filled with hurdles and inefficiencies. Training and ensuring the use of the systems correctly has been a task in itself.



The journey to IT-enablement began slowly, with delays in getting the clearance for initiating the process of implementing the HMIS. Even when the software vendor was identified, the decision was contested, further delaying the take off.

The software vendor then took time to prepare the SRS and so the hardware procurement process was delayed too. Once the hardware requirements were identified, the quality control process created its own complications. Instead of opting for one turnkey solution provider, each hardware item on the list had to be procured individually. The procuring agency, Tamil Nadu Medical Services Corporation (TNMSC), is a drug procurement agency and so there were challenges in understanding and evaluating the requirements. Today, TNHSP has to deal with 12 vendors for the various IT products. So the agency has been changed to ELCOT which is the Government IT agency, and outsourced IT coordinators have been appointed through ELCOT to handle issues with IT at the local level. [Pilot & Phase-I were done through TNMSC, Phase-II & Phase-III done through ELCOT].

Primary connectivity provided by TNSWAN is a robust one, if this fails due to power issues, physical damage & POP end issues a redundant connectivity provided by BSNL as a secondary line has to take over automatically. But this ASO automatic switching over is delayed or never happens due to several technical reasons hence this remains as a major challenge. Next, Server stabilization continues to be another major challenge since load



balancing activity was the hurdle we had to overcome. Manpower shortage at the user-end has put tremendous pressure on the staff who sometimes end up handling manual entry and then updating the system due to server issues. And, over and above that, the power shortage in the state, though to some extent ameliorated by the back up power that has been provided, is an issue in itself.



Lack of basic computer knowledge required training the staff not only on the HMIS but even computer operations. Mapping existing processes and rationalization of input forms for standardization was important and a Herculean task.

Since the hospital doors can never be closed or locked, safety of the hardware has been a challenge as sometimes different IT components go missing. Hospital and District administration takes special care to ensure the safety.

Scope for replication

The solution is replicable in other states of India. TNEGA is the agency under the department of IT, Govt. of Tamil Nadu is co-ordinating for replicability. But, no project can run its course without facing hurdles, and hurdles are meant to be overcome. From doctors to the pharmacist, every cog in the healthcare wheel runs smoothly for the successful implementation of the HMIS. It has made information access easy, and so policy decisions by health administrators are backed by evidence from the state health care facilities across the state.

Future Endeavors :

The success in implementation had given TNHSP the courage to dream higher. The vision is to create a State Health Data Resource Center (SHDRC) at the headquarters which will be a central repository of data from all tertiary, secondary and primary health care facilities in the state for collation and analysis of health information obtained not only from the public health settings but also from the private institutions. The SHDRC will be capable of processing institution wise granular data available through HMIS and providing institution wise information for decision making, data monitoring and evaluation at different levels, namely District and Directorate and support evidence based policy formulation by the State Health Department.



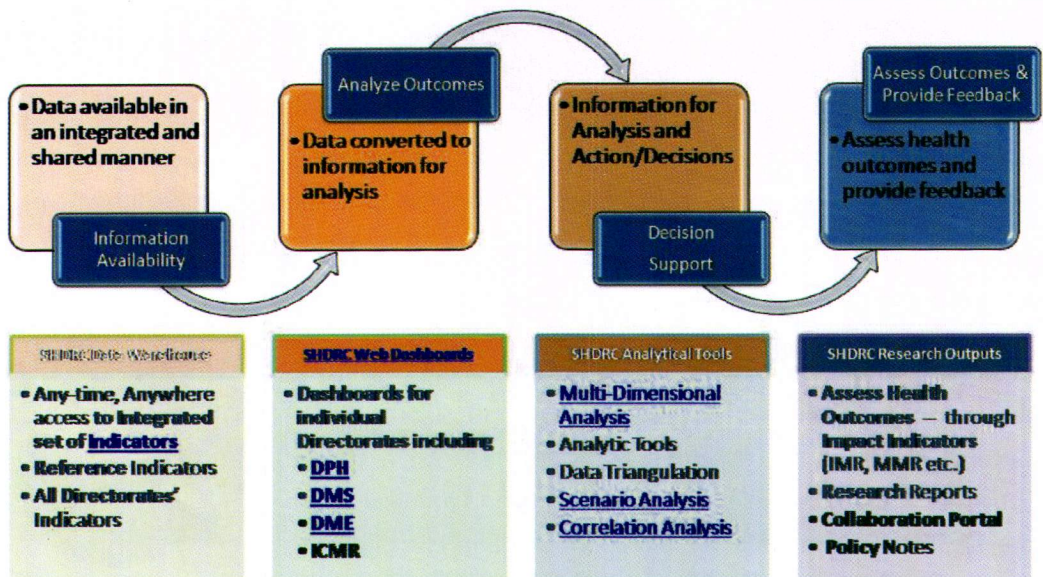
This repository will combine a list of Reference Indicators from National/ International Surveys and Health Indicators from other States for comparative benchmarking and to address the existing gaps in the health system in Tamil Nadu

The Geographical Information System (GIS) for mapping health related demographic and topological details of the health care centers of the state is an additional innovation incorporated into the health system. The HMIS data from 20 vertical Health departments is thus converted into information and knowledge to improve the health care outcomes in the state of Tamil Nadu through performance and policy evaluation.

As part of future endeavors, it is proposed to form State Health Communication Resource Center (SHCRC) and State Health Research Resource Center (SHRRC) which will be operational under SHDRC and HMIS will remain as data transmission pathway.

SHDRC: Concept of Operations

SHDRC: Overall Framework for Health Research Improvement






Appendix

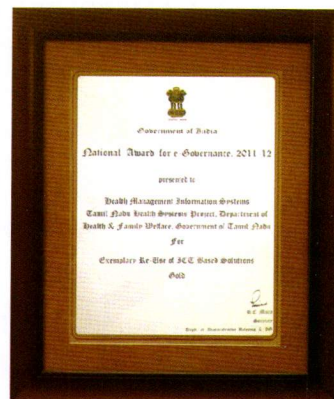
Accolades

There have been several attempts before at implementing IT solutions in state-sponsored healthcare management in many states in India. But since there was external dependency, they failed soon after the implementation. The Tamil Nadu experiment stands out because the stakeholders are also the ones who are responsible for using the system and therefore their interest in its success is ensured. In recognition of the distinctiveness and magnitude, the HMIS project in Tamil Nadu has won many awards and honors.

Some of them include:

- ❖ This Project is the winner of the e-India 2009 Jury award under eHealth category for “Best Government Policy / Initiative of the year 2009 ” which was awarded during the e-Asia Conference 2009 event held at Hyderabad August 25-27,2009.
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- ❖ The Project Paper was selected for oral presentation at eAsia Conference 2009 held at Colombo, Srilanka, during December 24, 2009.
 - ❖ The Project Paper was selected for an oral presentation at the MedeTel 2010 conference at Luxembourg during April 14-16,2010.
 - ❖ Based on the cost effective approach, this project has attracted the attention of the following International Publishers, who have offered to publish this project as a book.
 - The Lambert Academic Publishing AG & Co., KG, Germany.
 - VDM publishing house Ltd., Mauritius.
 - ❖ Short listed for the final round of e-governance National Award for the year 2010-11.
 - ❖ Shortlisted for the final round of CSI Nihilent e-governance Award for the year 2011-12 and awarded a citation certificate
 - ❖ HMIS Project has been selected as Topic of Study by research scholars of Periyar Maniammai University, Thanjavur Annamalai University Chidambaram in Tamilnadu and Tata Institute of Social Sciences Mumbai.

- ❖ Namakkal district Government Head Quarters Hospital and Vellore district Sholingur Government Hospital where HMIS was successfully implemented received National Accreditation Board for Hospitals certification(NABH)
- ❖ Selected for presentation at workshop on assessment of Health Management Information Systems in Sri Lanka at Colombo upon invitation from the Ministry of Health, Sri Lanka on 23rd of January, 2012. Dr.S.K.Thirunavukkarasu, Deputy Director HMIS presented the HMIS implementation process.
- ❖ HMIS Presentation was well appreciated in the e-Governance workshop at Trivandrum during February 2012 conducted by officials of Administrative Staff College of India, Hyderabad
- ❖ Under directions from Govt. of India, Project Director was invited to present “HMIS in Tamil Nadu” before Advisor Health, Planning Commission of India during March 2012 .
- ❖ The presentation made by TNHSP Project Director in the World IT Forum (WITFOR) organized by 5th IFIP at Vigyan Bhawan, New Delhi during April 2012 was well received by the foreign delegates and International IT companies.
- ❖ On faculty exchange programme organized by World Health Organization during July 2012. Delegates from North Korea visited Tambaram Govt. Secondary Care Hospital. Team appreciated the implementation and HMIS usage to BPL patients
- ❖ The Success story on HMIS in Tamil Nadu was presented during August 2012 in the 3rd e-Health conference at Hyderabad conducted by Apollo Group of Hospitals by Dr. Amenda Tampoe Samuel, Medical Officer of HMIS.
- ❖ NRHM Mission Director and team from the state of Himachal Pradesh visited during September 2012 to study the HMIS functioning in one of the secondary care hospitals.



- ❖ IT & Health department teams from Uttar Pradesh, Andhra Pradesh, Jharkand, Karnataka and Haryana visited secondary care hospital in the district of Kancheepuram Tamil Nadu to study the HMIS and its benefits in Government Health sector.
- ❖ NRHM Mission Director, Haryana inspected HMIS operations during the month of August 2012 and held discussions with HMIS team. The ICT initiatives, process initiatives and policy initiatives for the establishment of HMIS was very much appreciated by NRHM.
- ❖ A team from Republic of Maldives led by Health Minister visited Tambaram Govt. Hospital during December 2012 and appreciated HMIS functionality.
- ❖ 15th National e-governance awards 2011-2012 under the category of "Exemplary Reuse of ICT based solutions" was awarded to THNSP HMIS by Department of AR&PG, Govt of India on 10/02/12 at Bhubaneswar, Odisha. Shri. Pankaj Kumar Bansal, I.A.S., Project Director TNHSP received the award along with HMIS team from His Excellency Governor of Odisha.



**The National e-Governance
Award 2011-2012
for Health Management
Information Systems**



