

Health Management Information System implemented in Government Hospitals of Tamil Nadu

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Abstract -The HMIS or the Health Management Information System is an online portal through which medical professionals and the support staff in medical establishments can maintain crucial information about the patients. Ever since the creation of government health centres and public health services, there has been a great gap created between the decision makers and the implementers. This gap has been due to the lack of processes when it comes to processing the information and the lack of feedback upon sub-functional but existing systems. One of the many initiatives to bridge this gap has been the implementation of the HMIS system in every major public hospital, rural health centre and primary health centres across the state.

Index Terms - HMIS, HMS, Inpatient, Outpatient, Pharmacy, Staff, Tamil Nadu Health Systems Project

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INTRODUCTION

“A next generation MIS, that is powerful, flexible and easy to use has been designed and developed to deliver real conceivable benefits to hospitals.” “Hospitals need to decide how services could be delivered more effectively to reduce costs, improve quality and extend reach.”

Tamilnadu Health Systems Project (TNHSP) is being implemented since 2005 by the Government of Tamilnadu with World Bank soft loan for several programs to improve the health delivery systems. One of the key areas was the introduction of Hospital Management Information System (HMIS) a flagship programme of TNHSP, to be implemented in three phases after a successful Pilot phase. “Access to the right information and automation of complex tasks and work flow is the key focus of the HMIS, enabling freeing the staff to spend more time on caring for patients and extending the reach of services. HMIS has four components (1) HMS....Hospital Management System (2)MIS.....Management Information

system (3) CMS...College Management System (4) UAS.....University Automation System

In the pilot phase, Government Hospitals in Tambaram, Sriperumbudur in Kancheepuram district, Sholingur in Vellore district, and Padmanabhapuram, Colachel in Kanyakumari district were identified.

Under Phase I, Hospital Management System (HMS) was implemented in five districts viz. Theni, Kanyakumari, Dharmapuri, Krishnagiri and Pudukottai districts comprising of thirty six hospitals. Phase II is an extension of this work across the state for 222 hospitals. Currently HMS & MIS is functional in 267 Secondary Care hospitals, MIS in all the 1613 PHCs.

Phase III is a comprehensive project involving Govt Tertiary care hospitals and implementation of a University Automation System for Tamilnadu Dr.MGR Medical University with a College Management System. 47 institutions under Directorate of Medical Education including 17 Medical Colleges will also be in the stream (shown in Fig.1).

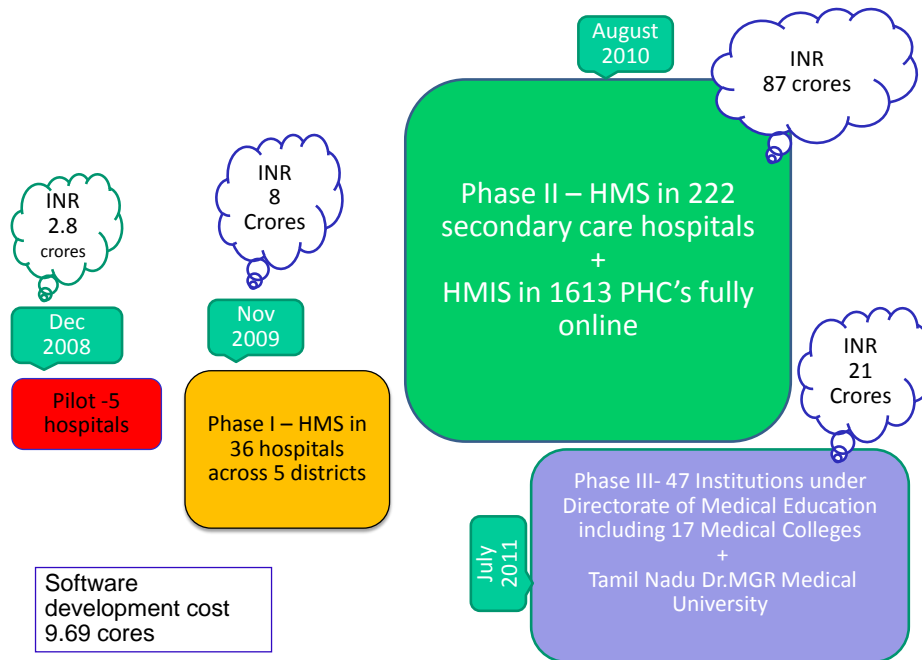


Fig. 1 Implementation Overview

OBJECTIVES

Even though there have been multiple attempts at quantifying the effectiveness of management systems, there have not been much research on the bench marks that have been achieved in the medical system today. This paper attempts to look at the benchmarks that have been achieved and provide a clear understanding of the pain points of the system that existed earlier. With the growth and prevalence of information technology, a detailed look into how the issues have been managed and resolved is presented in this paper. The HMIS Solution architecture has been designed for scalability and long term sustainability. After several iterations of requirements, uniformity and standardization of input formats were finalized and resulted in significant level of changes. Common uniform system of reporting will provide for ease of data comparison and performance monitoring across institutions.

METHODOLOGY

All the hospital records were being maintained manually, which meant more time consuming and even more time utilised for retrieving records. Spending more funds towards procurement of manual registers, Duplication of records of the patients, unreliability of the collected data, lack of monitoring the performance of the

ANALYSIS BASED ON DATA

The state of Tamil Nadu has been segregated into 32 districts for effective administration and in these 32 districts the Government of Tamil Nadu under the auspices

of hospitals, Proper maintenance of Equipment Inventory, monitoring of Equipment downtime, Drug stocks auto indent, drug stock accountability and monitoring for the drug expiry dates were some of the challenges, that we had to overcome.

By identifying key features which can be taken as a benchmark for the performance of the HMIS system, we attempt to measure the impact of this system on the existing issues. The project has been conceptualized as a centralized web based software solution to minimize technology support and maintenance dependencies. Hassle free connectivity through Tamil Nadu State Wide Area Network (TNSWAN), which is a 2 Mbps dedicated leased line terminating at each hospital level.

Broadband Connectivity of 2 Mbps connectivity has also been setup at all hospitals as a redundant connection. We have also established Automatic switch over from TNSWAN to broadband and vice-a-versa during times when either one of them fails. A centralized web server which houses the entire database placed at a fully equipped Data center. TNHSP in coordination with Tamil Nadu Electricity Board has ensured that there are no power cuts during the Outpatient hours of the hospitals. We have also supplied UPS with 2 hours back up to all the hospitals in case of a power failure.

of the Health and Family Welfare departments, 268 institutions have been identified to be connected through the centralised HMIS system (shown in Fig.2).

Hospitals covered under HMS	
HQRS	30
Taluk Hospitals	156
Non Taluk Hospitals	75
Women and Children Hospital	7

Fig.2

For the purposes of this paper, the data collected from these 268 institutions are analysed and the effectiveness of the HMIS system in terms of transparency and efficiency is presented. One of the main sources of information that is generated by the system is the reports that are available to the various senior officials. These officials in turn can use the data for making decisions and recommendations to the government aimed at making the overall health system more effective.

TRAINING AND ORIENTATION – HANDHOLDING

To improve the performance and functionality of the HMIS system, the supposed users are trained by experts on everyday basis. Every mode of input and the various nuances of using the system will be shown screen by screen and case by case.

These systems require regular maintenance and servicing for proper functioning of the system. These IT Coordinators would be available at every institution and would be the caretaker of hardware like Computer, Monitor, UPS etc. Also they monitor the Primary and Secondary Connectivity provided by TNSWAN & BSNL. They regularly interact with hospital staff; resolve the hardware and software issues by interaction with helpdesk at headquarters. The IT Coordinators with the help of Three Server Administrators at State Data Center ensure uninterrupted system functionality & data backup. The HMIS team at Head quarters supervise the effective functionality of HMIS along with the Technical expertise of ELCOT and other Stake holders of TNHSP HMIS. Thus maintenance of the system would determine its efficiency and reliability.

HMIS HELP DESK AT HEAD QUARTERS – ESTABLISHED BY TNHSP FOR SOFTWARE & OTHER IT INFRASTRUCTURE CLARIFICATIONS REQUIRED BY THE END USER

The concept of help desk is to guide and provide every single end user with all the relevant information that they are looking for. This toll free number can be reached by end user 24X7 and they can get their help and guidelines from the helpdesk IT coordinators and Medical Officers. CUG number for the helpdesk is obtained and all end users can get connected to helpdesk for their IT infra issues. An exclusive software helpdesk with SW professionals are also available at headquarters for answering all queries related to application. This is executed by application stakeholder M/s Tata Consultancy Services.

AMC REPORTS:

The AMC (Application Maintenance Cost) reports are the feedback and suggestions on the software that is being implemented by the TNHSP. It gives a detailed report about the usage of the software and modifications required for field usage. These reports helps us estimate the costing and longevity of each set up, which in turn helps us decide the monetary allocation for each district.

HOSPITAL PERFORMANCE DATA

The HMS comparative performances for the years 2012 (July - June) and 2013 (July - June) on various parameters are displayed below as a comparative statement. On analysing these data we can find out that there is a remarkable improvement in the usage of HMS in respect of Outpatients, In-patient registration, Lab tests, Stores, Discharge, Diet, Bio Medical Waste Management, Blood bank, and Radiology. 68 % of Out patients registered at HMS are treated by doctors at HMS and for 85% of their pharmacy issues are made through HMS. 66% of the inpatients are discharged, 83% of the laboratory results are entered and 73% of the store issues are done through HMS.

HMS usage for two year 2012 and 2013 in the state

Parameters	July 2011 to June 2012	July 2012 to June 2013
O.OP---Old OP	55,80,452	97,99,517
N.OP---New OP	1,05,73,215	1,85,53,860
Cas---Casualty OP	9,47,830	17,15,861

Spec---Speciality OP	8,82,923	11,67,172
MLC---Medico Legal Cases	3,261	3,279
Tot---Total OP	1,79,87,792	3,12,39,689
IP---IP Registration	4,11,376	7,94,541
L.Req---Lab Tests	53,24,646	98,79,984
L.Res---Lab Results	45,21,677	79,74,117
Cl.OP---Clinical OP	1,19,77,001	2,12,41,802
Ph---Pharmacy	1,01,76,443	1,80,92,083
S.Ind---Stores Indents	89,545	2,18,066
S.Iss---Stores Issues	68,195	1,77,511
Wd.Dis---Ward Discharge	2,97,145	5,67,007
Diet---Diet	3,78,913	5,43,296
BMW---Bio Medical Waste Management	92,270	2,61,106
BB---Blood Bank Donor Registration	5,746	14,965
X.Ray---Radiology	64,370	1,41,096



COMPARISON OF HMS USAGE FOR TWO YEARS								
S.No	District Name	Institution Name	Total OP registration		Clinical OP		Pharmacy	
			July 2011 to June 2012	July 2012 to June 2013	July 2011 to June 2012	July 2012 to June 2013	July 2011 to June 2012	July 2012 to June 2013
1	ERODE	ERODE	72781	322816	24564	121022	19569	95809
2	KANCHEEPURAM	TAMBARAM	246183	261316	143505	171175	125199	170950

3	KRISHNAGIRI	KRISHNAGIRI	239039	260408	117247	142750	76877	102410
4	MADURAI	USILAMPATTI	238882	295289	168721	178214	134942	140263
5	NAGAPATTINAM	MAYILADUTHURAI	33514	236729	15242	119701	10856	92611
6	NAGAPATTINAM	NAGAPATTINAM	162409	316622	56714	158843	38546	111613
7	NAGAPATTINAM	SIRKAZHI	179409	257930	120565	130954	101020	153845
8	NAMAKKAL	NAMAKKAL	347737	351202	185862	249251	144225	203164
9	RAMANATHAPURAM	RAMANATHAPURAM	86593	344650	41941	209762	32820	144254
10	THANJAVUR	KUMBAKONAM	51281	241308	34273	161389	29406	135279
11	THENI	PERIAKULAM	197269	278135	91819	179609	74206	152399
12	THOOTHUKUDI	KOVILPATTI	90219	263894	59368	190375	46149	157294
13	TIRUNELVELI	TENKASI	104680	288957	29362	153062	23726	126290
14	TIRUPUR	TIRUPPUR	39396	284702	20773	103674	14849	61003
15	TIRUPUR	UDUMALPET	36094	249221	28874	206987	23438	174205
16	TIRUVALLUR	THIRUVALLUR	204687	270253	111749	187136	75141	142412
17	TIRUVANNAMALAI	ARANI	74762	236756	57754	191049	55210	177935
18	TIRUVANNAMALAI	POLUR	83571	243781	77144	225555	68413	200410
19	TIRUVANNAMALAI	WANDAVASH	82439	249130	71050	204628	60846	177682
20	TIRUVARUR	MANNARGUDI	208160	391460	147558	319791	131361	290358
21	VELLORE	GUDIYATHAM	245623	310842	177651	211514	134935	187634
22	VELLORE	TIRUPATHUR	200829	324414	165118	257899	144164	222272
23	VELLORE	WALAJAPET	138453	291896	94380	164656	73801	147364
24	VILLUPURAM	GINGEE	61116	266292	52898	227891	47781	200955
25	VILLUPURAM	TIRUKOILUR	90740	376777	72404	316696	58796	270615

Fig. 4

On analyzing the HMS usage of outpatients, OP registration, Clinical OP and pharmacy for 25 hospitals during the past two years 2012 and 2013 (July to June) we

found that there is remarkable increase in Op registration, Clinical Op and Pharmacy.

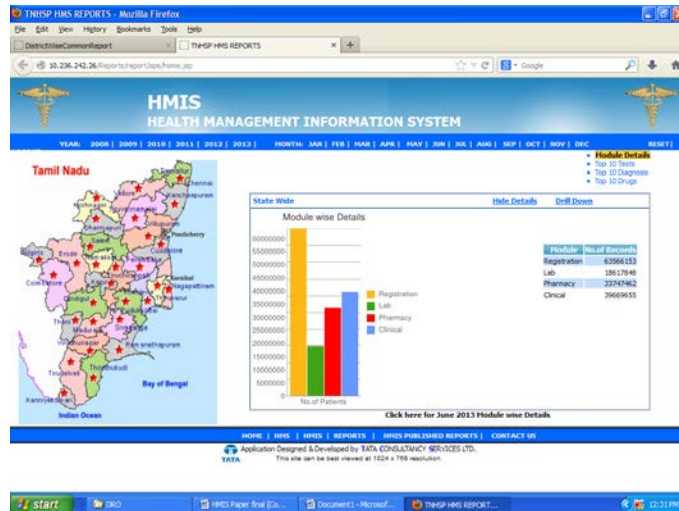


Fig.5

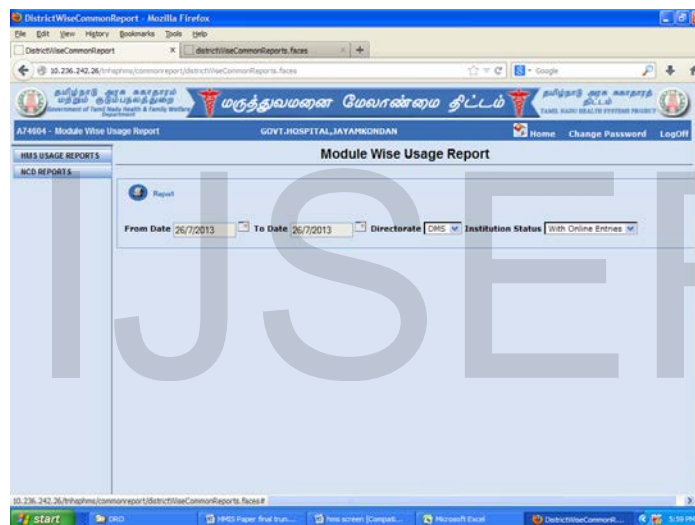


Fig.6

This is a screenshot of the HMIS and HMS module being used to generate data:

COSTING OF IMPLEMENTATION

In order to set up this entire system the costing would be divided into 2, the system and people working on the system.

The cost incurred by the system would depend on the cost of the software and hardware that is being used. Apart from the cost of hardware the cost of implementing the hardware for this system should be taken in account. The other cost of implementation of this system would be the cost of training people for this specialised task and to hire them to work as a part of this system. Additional cost that would add up for this system would be that of maintaining and monitoring the whole system for efficiency and accuracy.

RESULTS AND DISCUSSION

Health Management Information System provides information based support for the implementation of cutting-edge reforms by the Tamilnadu Health Systems Project. The broad objective of the project is to use ICT in improving the ability to collect, store and analyze accurate health data across the state.

Under the Tamil Nadu Health Systems project (TNHSP) this World bank Funded initiative has now turned into one of the largest Healthcare Information Systems platform in the world supporting over 1613 Primary Care Centres (Server + MIS Support), 268 Secondary Care Hospitals (HMS+MIS) and is currently

being up scaled to cover Govt Medical Colleges & hospitals

One of the important measurable outcomes of the HMIS implementation is that approximately 80% of the registered patients bring back the PIN (Patient Identification Number) during their subsequent visits, which shows the high patient compliance with this system. The results are clearly indicative of the success of this project and TNHSP HMIS received the "e-India 2009 award for category e- Health, Best Government initiative/policy for the year 2009" at the e-India event, held at Hyderabad and the Prestigious National e-Governance Gold Medal award for the year 2012 under the category of "Exemplary reuse of ICT based solutions".

CONCLUSION:

While there has been commendable progress there are also new challenges which are systemic. One of such systemic issues is the management of the available information for action and coordination between all health verticals to design comprehensive and integrated health planning. A robust HMIS is available in the state addressing few concerns at present.

By introducing the judicious combination of Information Technology (IT) and Management Systems a remarkable change has been attained as follows (1) Automation of work flow process at the Government hospitals (2) Gradual removal of manual registers and records (3) Real Time monitoring of Secondary care

hospitals performances from the head quarters (4) Electronic Medical records are now available for the poor patients (5) Since the system does not encourage data entry operators, involvement of regular staff ultimately lead to computer skill development among the hospital staff. Online drug and equipment inventory also being maintained by hospital staff effectively.

This study explains the ICT initiatives, the Policy initiatives, Process initiatives with Challenges faced during implementation of HMIS, levels of success, capacity building and finally about the paradigm shift which leads to a revolutionary change in the Health Department.

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