Building Health Informatics Infrastructure (HII) in India - An update as in the year - 2000

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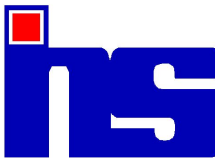

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Building Health Informatics Infrastructure in India-An Update as in the Year 2000

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In this conference last year we had reported about IHSNET and the efforts by the Institute of Health Systems towards building India's health Informatics infrastructure (Mahapatra et al, 1999). We now bring to you an update on progress made so far. Firstly let us recap and take stock of the rationale for development of HII.

Although development of general information infrastructure is a prerequisite for application of information technology to any area, it is not sufficient for development of health informatic solutions. The health sector can leverage the National Information Infrastructure (NII) only if commensurate development of health informatics infrastructure (HII) takes place.

Integrated computer and telecommunication systems, linked through networks of health care workstations, will be an essential enabling technology infrastructure for the design, implementation, evaluation and dynamic improvement of health care delivery mechanism in the future. These linked systems will have features that amplify the effectiveness of the organisational structures responsible for care. Progress in system development will be evolutionary and incremental, building on the current traditions of medical practice but exploring new opportunities to eliminate waste and inefficiency and increase the satisfaction the stakeholders. Integrated into the delivery process, therefore, will be a management capability, supported by the same enabling computing and telecommunications matrix that will facilitate system improvement by driving a cycle of assessment, action and evaluation, bridging the traditional gap between administration and practitioner and allowing mutual support of shared goals and objectives.

The Indian Health Systems Network is a non profit closed user group wide area network and associated health information infrastructure resource in India, developed by the Institute of health Systems (IHS), Hyderabad. Even though it is currently maintained by the Institute of Health Systems the long term objective is to develop an organisational form and separate it from the IHS.

One of the major objectives of this network is to help hospital / health care managers to adopt cost effective quality patient care methods by the use of the resources of this network. IHSNET is a non profit health care wide area network and is available on membership and cost sharing basis to health care and related institutions.

With an objective towards building the health infrastructure in the country the Institute of Health Systems has concentrated on two major aspects; the training and the network.

I. IHSNET - The Wide Area Network

A. Usage needs to be increased

B. Interests generated

1. Public

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   i. APVVP
   ii. APSWAN
   iii. APTWINS
2. Private
   i. Apollo group of hospitals

Users, databases and medical / health activity must be tied together. Networks provide the ability to overcome certain traditional organisational obstacles

II. Building human resources

A. Certificate in Health Intranet Systems Administration

An important goal of IHS has been to promote application of information technology to the health sector and there by improve its efficacy. In this connection IHS has designed and is offering a Certificate course on Health Intranet System Administration (HISA) to meet the needs of hospitals and health care organisations. The course intake consists of two streams, namely the initial career students and the mid-career (in service) students. Initial career students are graduate with a basic training in computers, an interest and aptitude for health informatic sector enter the course. Mid-career students are from among allied health personnel already working in health care institution. These candidates have at least a diploma in an allied health subject and three years experience.

The students are provided rigorous training in networking essentials, network operating system (Windows NT) administration, network administration, IHSNET, and health informatic solutions. These students are then equipped to independently build local area networks and act system administrators, maintain personal computers and fix common problems experienced by PC users. Then they are trained to exchange information over a wide area network like the IHSNET.

This course includes coverage of Windows NT as prescribed by the AP State Board of Technical Education and Training (APSBTET). This course has received accreditation from the State Board of Technical Education. Candidates in this course are eligible to write the common examination to be conducted by the AP State Board of Technical Education in collaboration with the JNTU, Hyderabad.

To ensure that these candidates have enough exposure to the specific needs of health care institutions, IHS has structured the course to allow for a period of internship. Students who complete the course work in phase-1 are eligible for the Internship. The duration of internship is one year. During the internship, students works full time in a health care institution, under the guidance of a local mentor and an IHS Faculty. The IHS faculty pays periodical visits to review contributions by the intern to development and / or maintenance of the host institutions information system. However, the intern is under the full administrative control of the host institution. The intern plays the role of a system administrator to the host institutions and where system administrators already exist, the intern is attached to him / her as an assistant. The host institution pays a recommended stipend to the intern during this internship period.

B. Software Engineer Internship Programme:

1. [Here describe about our GNIIT internships pgm]

C. SMART Use of Computers by Health Executives

IHS has been offering a series of courses on medical informatics to medical and health care managers on an ongoing basis. All the Medical Superintendents/District Co-ordinators of the APVVP hospitals and some hospital administrators in the twin cities have attended this training programme so far. The major objectives of this one week rigorous training course are to explore the utility of merged technologies in meeting the needs of patients, planners, regulators, suppliers and administrators. The course also focuses on the use of computer applications in simple operating environments to resolve recurrent organisational and management challenges. The other objectives of the course are to make the participants understand the strengths as well as limitations of computers as a management tool, enable them to use office suits and epidemiological applications programmes for applied research purposes. By the end of the course they are able to complete a small project to generate a management information and epidemiological analytic report using data/problem of their own institutions.

D. Introduction to Health Level 7 Standards

This course on Health Level 7 of the OSI layers was offered for the first time in the country in this institute. Health Level Seven (HL7) is a set of application layer (OSI Layer-7) standards to facilitate electronic interchange of health system data.

Some major objectives of this course were to develop a solid understanding of the HL7 standard, master a mental road map to the standards document, unearth real world interfacing facts and obtain the skills to plan health information technology in using the HL7 standard This course attempts to look at how the HL7 standards body developed the standards and how we can join the process. A brief review of each committee or special interest group is provided. Most importantly, it trains on how to obtain the standards document itself. An opportunity to explore real world examples of entire messages, code tables, and segments and how HL7 has gone through several major revisions is also provided. This course also looks at each version and sees what was changed and what are the new introductions.

In the past there were no facility for data to be shared between different vendor health applications. Subsequently providers and vendors built custom interfaces to move patient data. These point-to-point interfaces were expensive to create and maintain. These costs and a belief that "there had to be a better way" inspired the HL7 standard. This will be a three-day outlook at HL7 messaging. It focuses on Version 2.3 of the HL7 standard and "real world" applications of HL7 messaging.

The course structure included familiarity with basic concepts of HL7, HL7 organisations and standards, examination of the 2.3 - defined segments, messages and message flow, relating HL7 to "real world" networks and communications, interface Engine concepts and the future of HL7 in Andhra Pradesh.

E. Developing training programs for medical personnel

F. SMART use of Computers by Public Health Executives

G. Managing Primary Health Centres in Rural Areas

This course is designed and targeted for medical officers in the rural areas. The major objectives of this course is to develop techno-managerial skills of the medical officers and other staff working in tribal areas and other remote areas. This is a 14 day intensive training

program and covers topics like organisation of the govt. health services in tribal areas, setting priorities for action, monitoring and evaluating PHC health services, community participation, leadership styles, personnel management, accounting and financial management, patient referral, medicolegal issues, program specific techno-managerial issues, tapping and channelling global resources for local health and personal computer applications.

The department of tribal welfare has commissioned the institute to conduct training programs for the medical officers in tribal areas. Five training programs with 57 officers have already been completed by now. Another 3 training programs have been scheduled during the month of March-April.

III.Public domain applications in health (PAH)

A. EpiInfo

1. Cultivation of EpiInfo user skills:

The Institute is maintaining a pool of three to four faculties familiar with usage of the EpiInfo software. This is achieved by making usage of EpiInfo mandatory for most data entry work relating to household surveys. The research studies use EpiInfo software for questionnaire building, data entry and data analysis. As a result a pool of persons familiar with programming and questionnaire development on the EpiInfo platform is readily available.

2. Dissemination of EpiInfo skills:

All training programmes of the Institute include a small module on EpiInfo. A conscious effort to increase awareness and use of EpiInfo is done as this is a simple and free software in the public domain and consists of a word processor, a database and a statistical program. This software can be installed in computers of lower configurations and hence is cost-effective in use. Further, being simple, it is useful for medical and health professionals as a good tool.

3. Bibliographic resource:

As a part of its effort to build health information infrastructure for the country, IHS is striving to act as a National resource centre for EpiInfo, the epidemiological information management software developed by the WHO and US-CDC. IHS is already subscribing to the EpiInfo News group. It is planning to have news group discussion available to users of IHS library through hard copy of the messages, so that people can access it without a computer. The IHS librarian is maintaining a folder titled "EpiInfo Discussion Folder". Hard copies of all useful messages and discussion threads received through our subscription to the EpiInfo discussion group is filed here. A faculty is designated as the Key EpiInfo resource person. She is responsible to decide on what messages are to be filed in the above folder. The librarian is responsible for this folder and making it available to IHS library users.

B. Conquest:

1. [Describe about it. This is available in our network. We should say that we are maintaining it but its usage has not picked up due to lack of awareness of about its availability in IHS. We hope people will make use of this resource in future.]

IV.Public Databases

A. APHIDB

The AP Health Institutions Database (APHIDB) is a database of all health care institutions in Andhra Pradesh. The public health institutions component of this database has its origins from the AP Vaidya Vidhana Parishad hospitals database. The private hospitals component of the APHIDB originates from a survey conducted by the government of AP around December 1992 to January 1993. This data is being gradually validated by the IHS through periodic campaigns. Validation campaign typically start with mailing of a letter to each private health institution (PHI) included in the APHIDB. A request is made to the owner manager of the PHI to check the information furnished to them and make necessary corrections based on ground realities. Not all PHIs will, however, respond to the letter. Field enquiry is then done to supplement the mailing effort. Field enquiry seek to (a) check a sample of authenticated replies in mail to ensure that the information received by IHS can be relied upon, (b) check with those who returned the form but did not authenticate if the data is correct, (c) contact all those who did not respond at all, and (d) look for new health institutions if any that may not be in the database. To locate unlisted health institutions, field investigators enquire from multiple sources including, the concerned municipal office, IMA local branch, medical representatives, drug stores, etc. The APHIDB is made available by IHS over its local area network to visiting public, researchers and health policy analysts for reference. Standard queries to generate summaries by hospital location, size or type of service etc. are provided. Individual hospitals can also be queried. Special queries have been written to meet specific requirement of researchers. Mostly people have used the database to generate list of hospitals at a chosen place, to generate a sampling frame of hospitals in a given area for purposes of research.

Design: List of basic HCI information entities that HIDB design is capable of holding are:

1. Beds (current and history)
2. Equipment's (current and history)
3. Services available
4. HCI Premises
5. Incorporation information
6. Tariffs
7. Contact persons and communication information (like Phones, E-mails etc.)
8. Staff categories and staff capacity
9. Training activities conducted by HCIs
10. Survey operations conducted by the HIDB governing body
11. Alternative names and identifiers given to the HCIs by other schemes
12. Reference links to other HCIs
13. Medical records retention periods

Instances Installed: Currently this design is applied to hold the Andhra Pradeshs HCI information and named as APHIDB.

Development: The instances (Back-End to hold information) of this database design will be in Microsoft SQL Server 6.5 database format and the Application (Front-end) to process the information developed using Microsoft Visual Basic 6.0 is being developed.

B. Medflor

The Institute of Health Systems has set up a computerised database of Medicinal flora called “MEDFLOR - INDIA”. Published and unpublished literature containing ethnobotanical information are collected. These articles are coded by an ethnobiologist to yield structured information for the database. The Institute provides search and query services to researchers, research institutions, public health workers about medicinal plants. This database was set-up in the year 1993. To start with, the Institute is focusing on the medicinal plants in A.P. So far 200 unique usage entries of 400 plant species have been incorporated in the database. The database was set up in technical assistance from the department of pharmacy, University of Illinois at Chicago (UIC) and the department of botany, S K university, Anantapur. Editorial guidelines for MEDFLOR and a format for collection of ethnobotanical information has been developed. Further development of this database is affected due to lack of funding. The Institute is looking for support to continue to build up this important resource.

V. Health Informatics Standards

A. HL7

B. IHSDD

The Institute of health systems data dictionary (IHSDD) will be useful for the people who are developing software for Health Management Information Systems. In the process of developing a feasible Data Dictionary which can serve the purpose of naming the data elements and Endfixes in such a way that it can be easily recognisable by paramedical people as well as conveying an appropriate meaning for the data. A lot of paramedical personnel’s were consulted and after having a group discussion with physicians as well as software Engineers, Medical Researchers, Psychologists IHS has finalized the appropriate names for the data elements and End fixes. Right now we have three Objects. Each Object will contain the type of data belonging to it:

a. Endfixes

Endfix	Expansion	Usage	Usage note
Hc	Health care (institution)		Used both in the sense of health care. Also used as a prefix to represent health care institution if the remaining part of the data element name starts with "i"
Hci	Health care institution		Use as a prefix to represent health care institutions where remaining part does not start with "i"
Hco	Health care Organisation		Used for data elements designed to hold information about an organisation usually having more than one health care institutions.
Id	Identification	Suffix	
Ip	In patient		
Lab	Laboratory		
Mob	Mobile		
Nr	Nurse		
Num	Number		
Cd	Code		
Op	Out patient		

P	Procedures		

b. Data Element

DEName	Expansion	Usagenote
Age	Age	
AgeM	Age of mother	
AgeUnt	Age unit	
Atime	Admission time	
BBN	Building or block name	
BDESC	Building or block description	
BDRID	Unique ID of the registrar under registration of	
BOrdr	Order of birth ie.number of live births	
BSn	Birth Serial number	
BSTN	Bed / room number	
CODCD	COD Code	
CODClassif	COD classification	
CODTxt	COD Text	
CRN	Council registration number	Registration number assigned by concerned
SSID	Social security Identifying number	
SSIDF	Social security ID of father	

c. Usage:-

Usage of Data Element names in Different software's will be maintained in this object

DName	Can	CanTy
CobCd	BDAP._DctBdm	Table
AgeM	HMIS.BirthReg	Table
AgeUnt	HMIS.Admissions	Table
AgeUnt	HMIS.Deathreg	Table
Atime	HMIS.Admissions	Table
BBN	HMIS.BBNDic	Table
BBN	HMIS.FACDIC	Table
BDESC	HMIS.BBNDIC	Table
BDRID	HMIS.BirthReg	Table

VI.Applications, objects & components for health

A. IHSVBLib.DLL

Dynamic Link Library (DLL) called IHSVBLib.DLL, developed at IHS itself. It is comprised of sections like Dictionary Maintenance, Acquiring Data, Investigation of Data, Review of Records, Statistics Generation, Report Generation and Online Help, which span across several menu items in the application.

B. BDAP

One practical problem with summary measures of population health status is the requirement of massive data inputs and daunting computational load on the researchers who take up to generate these estimates. As a result many country teams are discouraged to take up computation of summary measures. The problem of computation load to generate

summary measures of population health status became evident during the discussion at the session on burden of disease in the recently concluded Forum-3 of the Global Forum for Health Research. The country presentations in this session brought out the daunting task of handling a large number of spreadsheets. Participants from many countries expressed the need for a software that can handle the hundreds of spreadsheet that have now to be manipulated to generate the estimates. By automating the task of handling such a large number of computations, the researchers can direct their energies to analyse the results and ponder over the policy implications. The BDAP software will be developed to meet then computation needs of Global Burden of Disease estimations, so that researchers are free to concentrate more serious issues regarding data accuracy, consistency and analysis of results. This software generates estimates of Dale's for a specific country / state / community / etc. in terms of disease entities, risk factors etc..

C. HUMAN 2000

HI-MAN 2000 is a hospital management information system developed by the IT group of Institute of Health Systems (HIS). HI-MAN 2000 is segregated into two components as HI-MAN Client and HI-MAN Server software. Client software is an HL7 compliant application for data interchange between health care providers. It plays a role of a transaction collector in a hospital i.e. it keeps track of admissions, discharges, transfers, laboratory, stores, pharmaceuticals, etc.. apart from these modules it generates performance activity reports by daily, periodically and has the ability to connect to the Server software on demand to send the transaction information.

D. PRISM

The Processing and Research Information System for Mortality-data was developed for the research and analysis of the Cause of Death Study, which forms an important part of the various faculties of research, being carried out at The Institute of Health Systems (HIS). The application utility covers a wide range of user requirements and also enables functionality using several data sources.

PRISM is currently being used for the Cause of Death study of Andorra Prudish, and forms a major part of Global Burden of Disease Study, a WHO project. Due to its capacity of functionality across various platforms, it is not localised to the requirements of a particular organisation. On the contrary, it is generalised to suit the needs of any organisation, dealing in the Cause of Death Study.

The most significant feature of this software, is the inter-connectivity between several modules, wherein a user can switch to a different module with various criteria specified in one module. The software also enables the generation of other applications, which can be copied to floppies and installed on other machines.

PRISM can be installed either directly through floppies on any machine, or the IHSNET Server can be accessed for an Online installation of the software. Thus PRISM forms a sturdy and a robust application, enabling researchers to conduct an efficient Cause of Death Study for a given region. The PRISM software utilises data entry screens for population and deaths.

VII.Future Tasks Ahead

1. Registry of hospital statistics
2. Queries to public registry of doctors database

3. Queries to public registry of hospitals
4. E-mail to participating institutions
5. MEDLINE and such other bibliographic queries
6. VSNL GEM400 gate way account so that we have a continuous e-mail presence, This gateway will allow us to send faxes at very low cost.
7. Manual and software for connecting to IHSNET through PSTN
8. Manual and software for connecting to IHSNET through I-NET
9. Telemedicine
10. Standards
    i. Health data definitions
    ii. Health data interchange standards
11. IHS Http server
    i. IHS Web page designing improvement
    ii. Web master and his / her role

The future of the health care delivery will be marked by increasing competition for scarce resources. In the past, health care has under invested in information infrastructure when compared to other critical, information intense industry sectors, like the finance and air transportation. Beyond paying lip service to this need, strong visionary leadership will be required to maintain a steady course against inexorable budget pressure and time constraints. Studies have indicated that these systems more than pay for themselves (Clayton & Nobel, 1992).

How do we overcome barriers, avoid pitfalls and flatten obstacles? The successful design and implementation of health infrastructure will no doubt require diligent effort on many fronts. The deepening resolve, obvious within almost all care delivery systems, to respond boldly to the challenges inherent within them, will catalyse thoughtful innovations in structure and process. merged computing and telecommunication systems have and will continue emerging as the essential component of new delivery designs, in part because of their ability to measure inputs, throughputs and outputs of the delivery process, but moreover to co-ordinate effective action in complex organisational systems. Although many barriers exist, they are not insurmountable. Unified efforts, including the co-ordination of the public and private initiatives, are already in evidence internationally. Further, research into design, implementation, and evaluation strategies are clearly justified by the enormous potential benefit of effective, information systems as enabling infrastructure in health care delivery.

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