Current e-Governance Scenario in Healthcare sector of India

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ABSTRACT

Current e-Governance scenario in healthcare sector in India is disappointing. Public health service run by Government is overburdened and collapsing. Large geographical size, increase population density, lack of transport, inaccessibility, illiteracy, poverty, poor nutritional status, diversity in food habit and life style are various impediments. Government priorities for providing food, safe water and school education is yet to be fulfilled. At this stage low budget for health, lack of funds and coordination have triggered down trend in health services. As medical science is fast developing and information resource is pouring in, there is urgent need for dissemination knowledge by interlinking primary, secondary and tertiary level health centres by ICT applications. This will help health personal to deliver high quality services. From 2006 onwards corporate IT giants are experimenting for ICT application in health sector both in Government and private hospitals, This paper reviews ICT applications at National Level and also in Orissa province. It presents facts on tele-medicine, tele-referal services and health information dissemination by Video conferencing, Gramsat and e-Grama tools used in Orissa The prospects and constraints of ICT implementation for Governance of healthcare is addressed.

Keywords: e-health , e-governace , tele-referal service, Gramsat, e-Grama

1. Introduction

Storing of information in digital form accessible and transferable, wherever and whenever needed is essential. Tele-healthcare can be defined as the use of ICT to support the delivery of healthcare directly to people outside the conventional care centers such as Hospitals or residence. A tele-healthcare system can be as simple as providing a patient with the means to alert a remote care provider of their need for assistance. European Telecommunication Standards Institute (ETSI) formed a specialist task force (STF) to prepare an ETSI guide (EG) designed (Bruno, et.al.) to help tele-healthcare delivery. The guide focused on trust, privacy, confidentiality, ethics, integrity, safety, reliability, availability keeping in mind legal aspects and satisfaction of end users. The pressure on healthcare industry is well known. Shortage of human resource, constraint of fund, higher sensitivity of patients for health issues, high expectation for best quality treatment at lowest cost without inconvenience. There has been undue delay in implementing e-governance and e-healthcare in developing countries like India due to following reasons (1) Absence of competition in health sector – for long time healthcare is handled by Public Health System(PHS) with no competition. (2) Weak customer with low bargaining power (3) Non-existence of funding system like insurance or social

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security agency. (4) Strong professional culture among doctors hostile to new ICT applications (5) Doctors and nurses believe on their skill than on computer. (6) Lack of computer-aid in medical and nursing education. Consequentially e-governance thinking is nearly non-existent or in initial/adhoc stage in health sector.

Evidence based clinical practice needs sufficient knowledge (Lele, 2008) on latest development in medical science. Automated information management tools like internet, web based libraries, CME, Electronic Medical Record (EMR), Electronic Health records (EHR), and Computerised prescriptions are important components. Computerization of hospitals (Registration, OPD, In-patient, Laboratory, Imaging section and record section are initial steps. Quality Assurance (QA) by Total Quality Management (TQM), medical and nursing audits supported by computerization of all processes like store, pharmacy, finance and purchase section, inventory and administrative machinery would save money, time and transcend human error. Computer help should be utilized for clinical decision making for selecting suitable tests, proper interpretation, accuracy in diagnosis and update management. Though computer can't be substitute for human brain, it is definitely useful as a neutral platform for unbiased analysis (Blobel, et. al.) to assist the physician against commission of error. Computer is highly useful for medical and nursing teaching, evaluation of entrance tests and various competitions for awards and certifications to eliminate human bias and error (Lele, 2008 and Lele, 2007). EMR or EHR integrates patients data with decision making system, EMR contains perfect complete history by patient-computer interaction and records sensitive issues like addiction, abnormal sexual behavior, STD and HIV, mental illness and suicidal tendency etc. Ultimately EMR leads to data mining for newer scientific developments. EMR enable easy communication of patient data between different healthcare professionals like Gram Panchayats, specialists, care team and pharmacy. EMR may be integrated by e-mail for patient's education. EMR can be kept in patient custody in form of a CD-ROM or Smart card. Prescribing information is available on internet having drug database and drug dictionary. Computerized prescription has the advantage of correct dose, duration, patient and pharmacy compliance. Health-connect is a web based tool for doctor patient communication. Web page exists for every specialty, sub- specialty and even for specific diseases with necessary data base. ICT tools enable the Government for effective programming of anti-poverty projects related to health, nutrition and employment.

Governance and management are not same. Management is a goal oriented activity inside the organization. Governance is made from outside. Governance is abstract in character, an architecture dealing with multiple organizations. It can be simplified by ICT application. ICT can enable health related information in the web, create PPP model, help customer contact, allocate patient to different level of health care, provide electronic forum for patient interaction and build e-prescription system. It is high time to explore how doctors and IT personnel can work together to reduce health care cost, deliver high quality service and cover rural mass. However over use of ICT has also limitations and hazards. (1) free information will shift the power balance between doctors and patients. (2) the patient can not differentiate right and wrong information in specific context. (3) computer guided self treatment may be hazardous. (4) greater empowerment of patients put higher responsibility regarding self treatment. (5) Need of special legislation on data privacy (Blobel, et. al., 2006; Han Song, et. al. 2006) , security, authorization etc. In paper based records a lot of information lie buried useless and unexplored .EMR is handy, useful, need based. Sophisticated, data mining techniques can be applied to EMR data to enable research and new discoveries .EMR can be integrated with e-mail for health education and self care in diabetes, asthma, CKD, arthritis etc. e-prescription helps pharmacovigilance, computer-simulated patient encounter, computer assisted instruction (CAI) are valuable in medical education. Booming of e-health.com (O'Buyonge and Chen Leida) based on the fact that 40% of internet queries are health related is a successful business plan. Due to large population, lack of infrastructure, low per capita income, diseases and illiteracy, it is felt that nearly 70% of vulnerable populations are in the villages and out of reach. Here comes the concept of Village e-health Centers to provide basic health care via online video-conferencing.

Retrieval of computer based medical information is an essential skill necessary for the Doctors in future. Q-Med foundation in India extends expertise on medical data retrieval for medical librarians and Doctors. Personal Health Record (PHR 2000) by N. G. Rao of Hyderabad is available in CD-ROM and Smart Card for use as EMR. Execution and success of ICT application lies in the hands of Doctors and Medical staff, not on IT industry. Training, interest and commitment of medical fraternity is needed for reaping the final benefit. Tele-heath is closely linked to medical informatics which is in infancy in India. It may encompass all spheres of health care in future. IAMI (Indian association of Medical Informatics), IMIA (International Medical Informatics association) and AMIA (American Medical Informatics association) are supervising the ethical and legal issues of ICT application to help the growth of this new frontier of bio-medicine in India (Blobel, et. al.).

2. Current E-Health Scenario In India

E-health is a relatively recent term for healthcare practice which is supported by electronic processes and communication. Seminal 2001 definition published in the article what is e-health? J Med Internet Res 2001;3(2):e20, by eHealth researcher Gunther Eysenbach is among the most frequently cited and reads: "e-health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies.". According to EU ICTs for Health:" e-Health describes the application of information and communications technologies across the whole range of functions that affect the health sector, from the doctor to the hospital manager, via nurses, data processing specialists, social security administrators and - of course - the patients."

Corporate healthcare is gearing into fast track growth using latest technology to provide best quality service to face the competition. Overburdened and collapsed public health care system (Govt. Hospitals) is also taking ICT route (Deepalakshmi, 2008) in various part of the country. Changing the dynamics of healthcare is the prime objective. Development gateway foundation provides web-based   information sharing platforms for developing countries. It holds an on-line community for professionals working on e-governance initiatives. Health care ICT helps in increase productivity (use of OT, equipments, Doctors, Nurses and live saving drugs), It helps for maintaining stock and store, patient satisfaction, delivery of quality care and abolish outdated procedures. It reduces red tapism, delay, chaos encountered in big Government hospitals. Web services are essential for medical professionals, administrative members and patients to organise, share and access medical services.

Wipro for Delhi Municipal Corporation (DMC): Wipro provided Hospital Information System (HIS) to six hospitals of DMC. This HIS has 28 modules meeting the hospital needs, like Patient registration, demographic details, outpatient visits, doctors' appointment scheduling, Admission/ Discharge/ Transfer, Order Entry, Laboratory/ Radiology/ Cardiology Result Reporting, Operation Theatre Management and Pharmacy etc. Automating these functions has helped DMC in handling large numbers of patients and helps them in providing better patient care. An Electronic Patient Folder with details of each visit would be available at all of these locations once the implementation is done at all six hospitals. This will enable the doctors to have ready access to past episodes and information of the patient, thus ensuring efficient patient care.

TCS for Tamil Nadu: The Tamil Nadu Government has allotted Rs 5 crore to Tata Consultancy Services (TCS) to develop a suitable solution to maintain electronic medical records (EMR). The system will start functioning in all the 26 district headquarters hospitals, 162 taluka hospitals and 77 non-taluka hospitals and some of the Primary Health Centers (PHCs) managed by the Government(O'Buyonge and Chen Leida). This application created by TCS is web-based, wherein each patient will be allotted a unique ID. All related data will be fed into the system. The system, being centralized, can be accessed from anywhere,

making the clinical history of the patients handily available. ICT is employed in medical college hospitals in Tamil Nadu to manage in-patient and out-patient details, medical records, office automation, and lab and pharmacy services. Such electronic dataflow lends accuracy. Tamil Nadu State AIDS Control Society (TNSACS) has successful web based management information to cover 1100 VCTC, Blood bank, ART centers, STD clinics, ANC, NGOs. Number of HIV+ cases, age sex breakup, ART stock, VCTC kits stock is monitored by Chenai head office. Data privacy, authentification(Lele, 2008) is used for aids. Final decrease in aids prevalence in Tamilnadu speaks about success of e-governance and ICT applications.

21st Century's Health NET in Goa: The Government of Goa in association with 21st Century Health Management Solutions implemented a Rs-2.5-crore Hospital Management Information System (HMIS) called Health NET in Goa Medical College (GMC) Hospital. The objective is to improve the availability and quality of healthcare delivery process and give Goa a fully computerized healthcare system by providing good quality healthcare services to all segments of society, especially the poor in remote locations. It includes Patient Management Systems, Hospital Management Systems, the Laboratory Management System, Blood Bank Management System, the Advanced Imaging System Library and Academic Section Management System, and Management Information System

Intel's World Ahead: The World Ahead Programme is an initiative launched by Intel to provide education and healthcare service in India. In the healthcare sector, Intel has carried out tele-health projects in Baramati, Maharashtra and Trivandrum, Tamil Nadu, and child health monitoring in Chandni Chowk, Delhi. Rui hospital connected with Aurobindo Eye hospital Madurai and Narayan Hrudayalaya Bangalore for getting tele-health service for Heart and eye patients. Later a Trivandrum hospital acquiring clinical support from Shankar netryalaya Chennai has become possible by ICT. Intel also provided a school health monitoring system, developed by TCS, in St Philomena Girls' Higher Secondary School, Trivandrum .The web-based solution introduces schoolchildren and faculty to benefits such as digitalized health records and health camps with participatory and action-based health learning. The child health monitoring system in Chandanichowk in Newdelhi for poor needy urban children, to check for under nutrition as per WHO guideline. Intel has experience in ICT application in Health sector in Maxico, Brazil, China and South Africa.

HP in Maharashtra: In January 2007 with 100 Cr. funding automation project of 19 Govt. hospital and 14 medical colleges started. HP healthcare solution and Amrita Technology worked together for system integration and doctor's training. HP services used at JJ hospital (Grant Medical College), where the registration desk deals with 5 lakh OPD patient and 30 thousand in-patients annually. There has been remarkable change in patient experience towards e-healthcare and computerisation.

CMC LTD: India Healthcare Project in Andhra Pradesh: Hand held mobile computing devices like Personal Digital Assistants(PDAs) are being provided to Primary Health Centers (PHCs) and Auxiliary Nurses and Midwives (ANMs). While nursing or counseling the beneficiaries, the ANMs collect data using the PDA in the villages. At the PHC they transfer the data from PDA to the desktop. All data that is available on the desktops at various PHCs is transferred to the district level and State Health Commissioner's office using available network. Data compilation and report generation could now be done at the PHC level, district level and State level. Application of ICT at grass root level covering 459 ANM in 67 PHC in Nalgonda district of Andhra Pradesh.

3. E-Health Scenario in Orissa
Tele medicine and tele referral services of NIC: First Tele CMEs were started in north eastern states through community information centre (CIC)(Community Information Centre, 2008) of NIC in collaboration with SGIPGMS, Lucknow. Later the same started from Berhampur for KBK districts of

Orissa. Using the GRAMSAT network, Khariar Block of Nuapada Dist and Jeypore Block of Koraput district were added to the tele-referal(Das and Dash, 2007) services of NIC. Prof. S.K.Mishra of SGPGIMS explained on methodology and use of this service to all the doctors of dist. headquarter hospital of KBK district, Orissa. Dr. A.N.Mishra from NEIGRIHMS Shilong conducted series of CME on risk factors, diet, lifestyle modification and prevention of CAD. Organized by NIC Berhampur a CME on "Prevention on Sickle Cell disease by DTN formula and Genetic counseling" was conducted for doctors of all 30 districts of Orissa. The tele-medicine center of MKCG Medical College is functioning with monthly Video conferencing http://vidcon.nic.in) with SGPGIMS on difficult cases from all clinical departments. Using GRAMSAT network of Orissa, tele-medicine can reach all blocks and panchayats from Medical college experts to serve rural community. latest research like pulmonary scintigraphy(Mahapatra) in AIDS conducted at Nuclear medicine unit at MKCG Medical College, Berhampur can be disseminated to medicine specialists at district level through video conferencing.
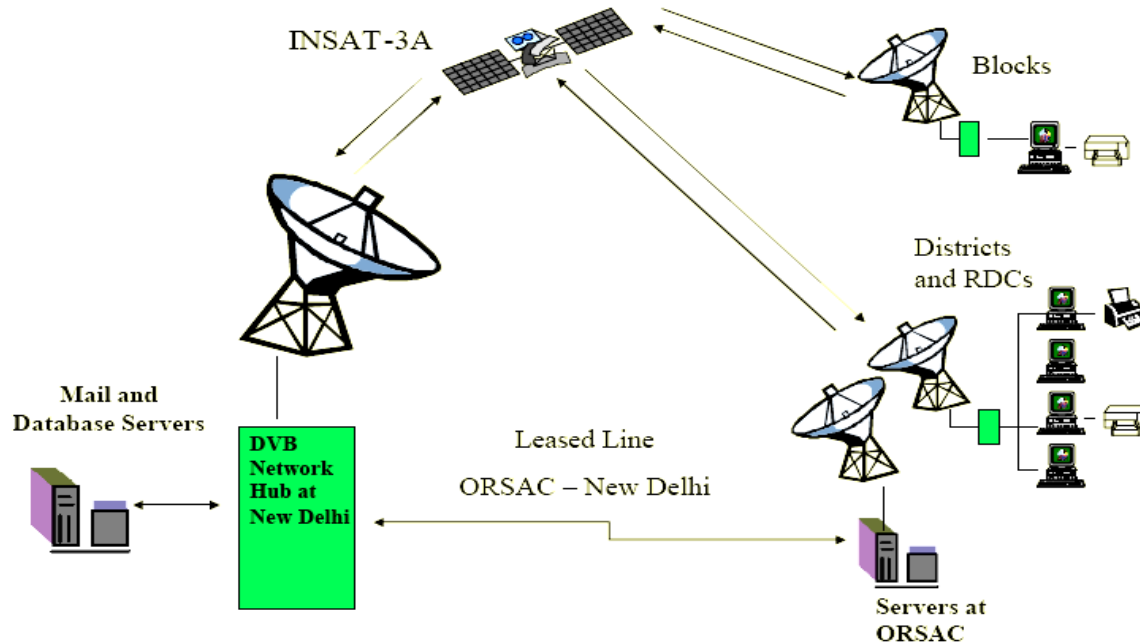

Figure 1: GRAMSAT Orissa Data network Deployment Architecture

Orissa GRAMSAT project: Is a satellite based communication network for conducting training programme, tele-education and tele- medicine etc. It operates on INSAT 3B using C band (DRS Network). The programmes are transmitted from ORSAC (Orissa Remote Sensing Application Centre).The VSAT (Very Small apertures Terminal) data network connects 30 DRDAs , 314 Blocks, 9 State Govt. offices and 800 gram-panchayats of KBK district, with the objective of providing digital communication between the state capital, districts and blocks for different e-governance projects.

E-Grama: Is an e-governance effort(Mishra, et. al. 2004) by NIC Berhampur, Dept of IT, Govt. of India, which started in December 2002, with the objectives of providing G2C services to common man through different Gram Panchayat and village level IT KIOSKS using Information and Communication Technology (ICT). In this model, the self-financed KIOSKS were opened by the villagers, youth clubs and NGO's. from their own resources and they were accessing the intranet portal from the server placed at NIC Berhampur through different Remote Access Servers(RAS). Different static and dynamic services in Oriya

(State local language) and English are provided. This project has been successfully implemented in the rural areas of the province of Orissa, as a pilot project in Ganjam district and it is extended to the other eight KBK districts of Orissa. There is zero cost involved in developing and implementing the customized software and training, as everything was done in house at NIC Berhampur. The "e-Grama" IT Kiosks are evenly distributed over the geographical area of the districts - one kiosk per 3 to 4 Gram panchayats. The Kiosks are run by Kiosk operators, who are given free of cost training at NIC regarding the implementation and running the web based software Currently a project has been undertaken to apply ICT tools for prevention of AIDS at MKCG Medical College by effective use of e-Grama IT Kiosks.

Hello doctor 24X7 at MKCG Medical College: Hello doctor24x7 is a project extending e-health care service undertaken by 3 final yr medico of MKCG medical college using internet and mobile phones to provide health care information to rural people in form of tele consultation, tele-medicine, specialist referral, and emergency health care information to poor patients of remote area. This idea has been appreciated at IIPC(Intel India Pioneer Challenge competition 2008), jointly organized by DST,INTEL & Indo-US technology forum on the subject "Technology entrepreneurship". University of California, Berkeley selects aspiring entrepreneurs having innovative idea and business plans which are novel, feasible, useful to improve society. A rural person may save around 80% of his medical expense by this proposed project using e-clinic, mobile health calling cards and web enabled consulting cards.

SORIG: A service oriented frame work for rural information grid (Patra and Das) proposed by NIC, Berhampur is an Endeavour to meet need of rural population. This service also includes tele- medicine, e-health care, disease surveillance, epidemics and aids prevention etc.

4. Concluding Remarks

This paper analyses the scope for application of ICT at Primary, Secondary and Tertiary healthcare institutions. Effective computerisation of hospitals and Medical Colleges supported by Networking and Video Conferencing would increase efficiency, quality of Patient care and patient satisfaction. Tele-medicine aims to deliver specialist care at doorstep to the helpless patients in remote area. Presently ICT implementation in health services is in infancy but its further use in both medical education and healthcare industry will revolutionize the healthcare provided by Government hospitals, corporate sector. This overview of e-governance scenario with ICT application aims to create awareness among physicians, medical students and IT industry. Its purpose is to evoke interest among medical students to acquire ICT skills in addition to their specialty knowledge. This will save their precious time which can be utilized for higher professional growth. Finally good quality health care delivery at doorstep in low cost would safeguard national health leading to economic growth.

References

1. Bachman JW, The patient computer interview- A neglected tool that aid the Clinician, *Mayo Clinic Proc*. 2003; 78 : Pages: 67-8.
2. Blobel B, Nerdberg R et al, Modelling privilege Management and access control, *International Journal of Medical Informatics*, 2006,75:597
3. Bruno von Nirman, Steve brown User experience design guidelines for Tele-care (e-Health) Services, *Interactions*, Sept 2007, Pages: 36-40.
4. Community Information Centre Web site http://www.cic.nic.in la last visited 30 Sep'08
5. Das R K, Dash S S (2007), Telereferal Service of NIC- A Helping hand for the Doctors and Inhabitants of KBK districts of Orissa, *Adopting e-Governance*, GIFT Publishing 2007 , Pages: 253-8
6. Han Song, Skinner Geoff et al, A Framework of Authentication and Authorisation for e-Health Services. 2006 ACM 1-59593546-0/06/0011 Pages: 105-6
7. Deepalakshmi, K "Public healthcare service takes IT route" from web site http://www.expresshealthcare.in April 2008

8. Lele R.D (2008), *ICT in day-to-day Clinical Practice Postgraduate medicine* API and ICP 2008 Vol. XXII. pp. 3-9.
9. Lele R.D, *Computers in Medicine : Progress in Medical Informatics*, McGraw Hill 2007
10. Mahapatra SC, Pulmonary Scintigraphy in AIDS, Update in Medicine 2004 Vol-I Pages: 32-5
11. Mishra Sanjeeb Kumar, Rajput N.B.S, Das R K et al (2004), E-Grama: The Rural Information Gateway of Ganjam District (Orissa), In *Promise of e-Governance Operational Challenges*, M.P.Gupta (eds.), TMH, 2004, Pages: 540-46.
12. NIC's Videoconferencing Services web site " http://vidcon.nic.in" last visited 30 Sep'08.
13. O'Buyonge Abrams A, Chen Leida, E-Health.dot-coms Critical Success factor 2006 Idea Group Inc Pages:: 379 -84
14. Patra, M R, Das R K, SORIG: a service-oriented framework for rural information grid -- an implementation viewpoint, *ACM International Conference Proceeding Series*; Vol. 232 p 49-52
15. Shaffer V I (2008) *Key issues for Healthcare Delivery Organisations and E-Health Programes*, Feb 2008 Gartner Inc Id No: G00155039
16. Smith & Gresmic (2004), Computer interviewing in Primary care office, *MEDINFO*, 2004, Pages: 1162-65

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