Workshop on "Development in the Information Society – Exploring a Social Policy Framework"

January 18th – 20th, 2007
Bangalore

Impact of Information Technology on health sector

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United Nations Development Programme
Social Science Research Council, New York
International Development Research Centre

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Information Technology can enhance efficiency in most aspects of health care. These include public health, patient care and safety, logistics and insurance. It can be a major support for policy making in health sector. But IT on its own cannot solve the crisis that the health care sector in India faces today. It can respond to but cannot replace demands from patients for better quality of services. If the citizens demand more effective systems for anticipating and responding to epidemics it can support a response. For IT to be effective policy makers need to have a clear vision of how to lead the health sector forward. If these do not exist, investing in IT will be expensive exercise with little discernible results.

The areas where IT could impact efficiency of the health sector include Public health, Research and Monitoring, provider/patient interface and enhancing capacities.

Public Health:

Collection and analysis of information has been the source of understanding and responding to epidemics. In the days when pathogens were unknown researchers where able to identify the source of such disease as cholera merely by observation and analysis. Our understanding of etiology of diseases has progressed considerably in the biomedical side. But in the process non medical aspects have been ignored thereby alerting us to respond only when the disease is already on us. By then it becomes expensive and some bad effects cannot be avoided.

Analysis of time series data on the causative factors can provide indicators that can predict the onset of an epidemic. For instance if information regarding meteorological data on frequency and quantity of rainfall, density of population, quality of waste management, vector density and the incidence of vector borne diseases are collated over a many years it will be possible to develop models to predict the onset of an epidemic. This will alert public health authorities to look for the pathogen without waiting for the epidemic to strike and then reacting to it. IT will facilitate collection, recording and analysis of the data, including developing simulation models for prediction,

Currently the health department collects large sets of data but uses less than one percent of it. Collection and reporting of data is one of the major burdens of the workers at the village level. This data is never analysed and fed back to the workers at village level but aggregated and sent upto national level. The pointers for health management that would have been available at the village level are masked by the aggregation process. Feedback on the data collected is never given back to the persons who collect the data.

There have been sporadic attempts to address this issue. Multipurpose health workers can work handheld computers to input the needed data which can be fed into a computing machine. This data can be analysed and feed back provided to the health worker before being aggregated and fed upwards. If we can go one step further and provide her with connectivity to the higher level she will be able to receive health alerts, training inputs and she can contribute to the surveillance activities. At the primary health centre level the medical officer can bring in her

clinical observations and aggregate observations from different health workers and if given the authority and if trained to do so, can take preventive action to most situations that develop in her area.

The Village Health Committees set up under the National Rural Health Mission are expected to develop multisectoral plans to improve the health of the community. These involve analysing many non medical factors which have an influence on health such as water, sanitation, housing and nutrition. Outcome indicators such as birth, morbidity and mortality data also needs to be collected. Given the current trend towards decentralised planning the health plans should be linked to a wider database developed at the village level and accessed by different sector workers. Allocation of unique social ID number and the boost that GIS systems will receive when inputs from India's Cartosat becomes operational can become the trigger for such a data base. When all sectors contribute to the database and use it to develop interdependent plans it will lead to reinventing the community based health care for which the primary health care system was set up.

If we can move a step higher and develop Electronic Health Records for every family and individuals we can create the concept of family doctor. The doctor at the PHC then can become the custodian of the persons health and minister to his/her health care needs. If specialists are available on call through telemedicine neighbour hood doctors can ensure that cost effective and safe services are available. It can also prevent the phenomenon of bypassing through which patients move directly to specialists and thereby get inappropriate and costly care. Such an arrangement would make the job of a Primary Care Physician challenging again and lead to more doctors specialising in family medicine. In many developed economies the family doctors account for the largest users of Health Information Technology.

Research

In a country as diverse as ours, were every state ought to be treated as a country with its own demographic and epidemiological profiles, most of the decisions are taken with little reference to data. Most of such data is hard to come by as there is no system to capture the data generated by the system. The staff in public sector, on whom the load of generating such data is likely to fall, is certain to resist any attempt to generate such data. IT could ease the burden by capturing the data when the worker is collecting it. Their willingness to generate the data would be enhanced if results of analysis of the data they have collected were analysed and results given to them to improve their work. Existence of such data will also enable academic community to conduct longitudinal and cross sectional research. Policy makers will also have to justify the basis of their decisions based on evidence.

Curative services:

Most of the applications IT for health have happened in provision of curative services. These have occurred between institutions (e.g. Telemedicine) and between different departments in the same institutions (e.g: Electronic Health Records). Typically telemedicine involves linking an expert located in a central facility with consumers (patients or generalists) located in a peripheral centre through a communication link and sharing a technical and systemic platform. This has been

found to be effective when access to the peripheral institutions is difficult as in hilly locations and islands. There are interesting experiments currently being tried out in the Himalayas and the Indian Ocean. The system has also been successfully tried out in continuing medical education. Telemedicine requires the needed slack time of experts in tertiary hospitals, systems to align schedules of doctors at different levels and a degree of ownership of services provided in peripheral centres by tertiary hospitals.

Hospital Clinical Management

Using IT for patient management in hospitals is supported by experience and the availability of commercial software. It consists of a central data base into which all designated stations input data and from which users can access the information they need based on their level of authorisation. Emergence of wireless availability and handheld devises which can interface with it, the push towards interoperability between systems, explosion in information that practitioners are expected to consult while providing services and the premium attached to avoiding errors have all promoted the use of IT in hospitals.

Electronic health record aggregates of information about a patient different data bases and medical procedures, including diagnostic and curative centres and makes it available to making decisions about treatment. It is expected to improve efficiency and cut costs. But the most important benefit would be the preventions of medical errors. Let us examine how this would work in an outpatient system. The patient is recognised through a unique identification system (e.g. The proposed unique social security number). The clinician then calls up the patient records on her handheld device through the wi-fi network. If the records have not been stored in the hospital data base the system then searches (through a pre-authorised process) the network for information on the patient. The physician updates the data base with the current symptoms and transfers the patient to the diagnostic services. Results of the diagnostics are available to the clinician based on which she searches the medical data base with the patients record and her diagnosis. The system offers her the optimal recommendations. The electronic prescription (which may contain a range of options) is vetted by the medical data base for drug reactions, contra indications and appropriateness of the dosage. This is then examined by the pricing system which examines if cheaper options are feasible. The final choice by the physician is recorded in the prescription recording system and sent to the pharmacy. The pharmacist issues the drugs, runs down his inventory and updates the patient's medical record. The system can also generate information package for the patient including dosage, timings precautions and warning. If the patient so desires it can also generate electronic reminders to ensure compliance.
Such a system can reduce paper work, ensure transparency and facilitate reviews and protects service providers against malpractice suits. It can facilitate transfer of medical records from one location to another and facilitate referrals. If such a data base is built up over time it can predict emerging trends of health status of the population, monitor costs and provide the basis for appropriate premiums if and when India chooses to go in for universal health insurance. Analysis of such data and trends can be used by policy makers to develop appropriate regulatory and incentive regimes. Use of IT in admininstation can lead to better use of human resources, appropriate systems for supply chain management and monitoring of performance.

Efficient insurance, especially social insurance is impossible without IT. Patient data can be analysed to predict conditions that are likely to emerge later, pool information

on diagnostics based groups to calculate the cost and develop simulation models to predict future costs. Actuarial data can be built up to fine tune premiums and insurers can be changed without loss of credit or past information. This data can also be used by regulators to prevent insurers from skimming the cream by avoiding high risk patients and opting only for the young and the healthy.

Capacity Building

Medical knowledge, even in specialised areas, is more than what can be retained by one individual. And providers are expected to be aware of the lateset developments when they practice their trade. Use of distance learning platforms are increasing emerging as the best source of continuing medical education. It ensures that the person can schedule the timings, choose areas of his interest and probe areas of interest to the extent he needs. But currently this is done in an adhoc manner and results in considerable waste of time and energy. And government sponsored training programmes still depend on pulling providers out of their area of work.

But these systems can be built only on a platform of proactive policy. It can work only if all the players participate and are willing to collaborate. But the benefits generated are public goods and the costs are not insignificant. Since providers will not reap the entire benefit they are likely to under fund investments in IT for health raising the need for public subsidy. But justification of the subsidy could be questioned as such systems are more likely to benefit the better off.

The most important condition for an efficient utilisation of IT in health care is interoperability of systems. Comparing the history of Health Information Technology in relatively homogenous health systems such as in UK and Germany with that of the highly fragmented US systems suggest that standardisation has to precede any attempt at introducing IT as stand alone systems make it relatively more difficult to introduce interoperating systems at a later date. Structural rigidities created by fragmented IT systems could become an obstacle to standardisation in the sector itself.

Attitudes of service providers and patients need to be taken into consideration when planning the implementation of IT. The relationship between providers and consumers is often intensely personal. Any attempt to reduce it to systems and standardise it is likely to be resisted especially in an unregulated health care market like India. There would also be concerns of privacy and data security which need to be ensured at public cost. Redesigning of work and information flow systems is also likely to be considered threatening by persons who manage the present systems. All these point to the need for a sensitive process of system designing with active involvement of providers and patient groups. Fortunately some countries have developed models that have negotiated these issues successfully. But IT systems cannot be transported in the vacuum without the needed changes to the health system. The opportunity India has is to make IT an integral part of the health sector reform the country badly needs.

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