A Framework for a Medical Information System

Shivraj Kanungo

Department of Management Studies, Indian Institute of Technology, Hauz Khas, New Delhi 110016, India

ABSTRACT

This paper discusses the possibility of, and provides the conceptual schema for, a wide area network of hospital information systems in the Delhi metropolitan area. Based on an empirical investigation of the pressures on the health care system in the Delhi metropolitan area, we feel that given the existing resources, a well designed and coordinated information system will enable the health care system to respond better to mass health care needs by providing resource information sharing across hospitals, centralized ambulance information dissemination service, sharing of expertise, improved patient assignment to specialized treatment facilities, and disease and epidemic monitoring. As the magnitude of patient arrival increases the pressure will be on hospitals to not only increase their internal efficiency but also to implement enabling systems that will allow for a collective advantage to emerge. Technically, the proposed system is cheap, feasible, and sufficiently robust to withstand growing pains associated with any technological component of a new scheme.

Keywords: Information system, medical databases, information exchange, appropriate technology

INTRODUCTION

With the establishment of the ERNET (Education and Research Network) India became part of the Internet. The Internet is a loose amalgam of thousands of computer networks reaching millions of people all over the world and helping to "shrink the world." [4] The emergence of nationwide networks like NICNET (National Informatics Center NET) and ERNET will facilitate easy and cheap interchange of, and access to, information in all parts of the nation. This paper presents a scheme for using the available infrastructure to access and disseminate information relating to health care systems in India.

BACKGROUND

India is a populous country and among other issues that form a developmental priority, health care delivery will always remain high on the agenda. There is a tremendous discrepancy between what is desired (some notion of "health for all") and what the nation has been able to achieve. There are two broad problems that constitute the health care crisis in India. One is the administration of health services. The other has to do with quality of health care - an issue having to do with medical professional competence. In this paper the role of IT is discussed in the context of these two issues.

RELATED SUCCESS EXEMPLARS

This proposal for using IT to enhance health care is legitimized by experiences elsewhere and the availability of the IT infrastructure in India in addition to IT-enabled success in other developmental projects in India. For example, to attack the staggering "information poverty" of physicians in Africa Dr. Bernard Brown started SatelLife, a non-profit organization committed to promoting health in the developing world by providing improved communication and exchange of information. Related Indian experiences for developmental efforts have been successful and, therefore, serve as a legitimate exemplar for IT use in health care. The Weather Information System [5] is composed of Drought Monitoring Cells (DMC) connected via satellites, through the agency of the National Informatics Center Network (NICNET). An encouraging experience from the corporate sector further strengthens the prospects for using IT-enabled health services because participation of the private sector is not only attractive but also desirable in today's economic milieu where privatization (even in health care) is encouraged [5]. EID Parry (India) Limited set up a small R&D Group to design an Appropriate Information System (AIS) to generate (i) an early assessment of summer and winter monsoon performance, (ii) monitor onset and progress, (iii) make assessment, qualitative though, on the basis of climatology, persistence, synoptic chart analyses, statistical probability analyses, etc. of activity, lull, cessation, revival, and most probable risk analysis of value to operational decisions. This system has been beneficial to farmers as well as to Parrys [5].

A MODEL FOR HEALTH CARE ADMINISTRATION

Patient and disease tracking systems can be easily developed in India given the available IT infrastructure and the health administrative setup. A survey of hospitals in Delhi and adjoining areas has revealed that only one major hospital - AIIMS - has implemented a Hospital Information System that helps the hospital administrators to track patient data. None of the other hospitals use computers in hospital administration. It is proposed to have a well designed and
Table 1. Technology options and their impacts (excerpted from [3])

<table>
<thead>
<tr>
<th>Issues</th>
<th>Technology</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>resource information sharing across hospitals</td>
<td>e-mail, bulletin boards, conferencing, transaction processing systems</td>
<td>operational</td>
</tr>
<tr>
<td>centralized ambulance in formation dissemination service</td>
<td>CB-radio, cellular communications, wireless</td>
<td>operational</td>
</tr>
<tr>
<td>sharing of expertise</td>
<td>Interactive networked multimedia</td>
<td>operational</td>
</tr>
<tr>
<td>improved patient assignment to specialized treatment facilities</td>
<td>transaction processing systems</td>
<td>operational</td>
</tr>
<tr>
<td>disease and epidemic monitoring</td>
<td>e-mail, bulletin boards, conferencing, transaction processing systems, archival databases</td>
<td>tactical</td>
</tr>
</tbody>
</table>

It is very important to note that this information system is entirely decoupled from, but informationally dependent on, the internal workings of a hospital. It has to do with coordination technology so that collaborative linkages could be fostered to enable resource sharing and information exchange between different hospitals and a coordinating agency.

The disease database is not a new idea. A similar concept has been reported by Heden [2]. In the medical community in a country like India the outcome of this communication experiment is difficult to predict, but one can visualize results ranging from the establishment of information brokerage clubs to international laboratory teamwork or coordinated field experiments. Research at IIT - Delhi has shown that organizations in India tend to undermine the importance and potential of IT in actual use while espousing the benefits of IT in plans and at a conceptual level. Starting small will allow all the participants and stakeholders to experience success in some form or the other. IT should be introduced by cultural infusion [1]. Most importantly, it must be kept in mind that the information system is no guarantee for success (i.e., improvements in the quality of health care).

**Possible Future Enhancements**

There are two broad areas where we expect developments to take place based on our own analysis and on some comments that we have already received from selected experts and reference groups. The first enhancement has to do with added intelligence for the disease database. Secondly, this information system could be extended to rural areas in order to share the urban professional medical expertise with the rural masses.

**References**


