INFORMATION AND COMMUNICATION TECHNOLOGIES ENABLED HEALTH CARE SERVICES: OPPORTUNITIES AND CHALLENGES

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ABSTRACT

This paper outlines the potential offered by technological progress in the information and communication technologies (ICTs) industries for the health sector in developing countries, presents some examples of positive experiences in India, and considers the difficulties in achieving this potential. The development of ICTs can bring about improvements in health in developing countries in at least three ways: as an instrument for continuing education they enable health workers to be informed of and trained in advances in knowledge; they can improve the delivery of health and disaster management services to poor and remote locations; and they can increase the transparency and efficiency of governance, which should, in turn, improve the availability and delivery of publicly provided health services. This paper has included some of the opportunities and challenges of health care industry by using ITC enabled service.

Key Words: Information technology, Delivery of health care, Medical informatics applications, Developing countries, India

Introduction

Developments in information and communication technologies (ICTs) during the last quarter of the 20th century heralded an information age in which economic and social activity has been widened, deepened and transformed. The more optimistic projections suggest that a computerized and networked world would not only ensure a more widespread and rapid growth of employment, productivity and output, but would also improve access to facilities that enhance the quality of life. In this article we consider some of the technological changes which could affect health conditions in developing countries. We focus on some experiences of using ICTs in the health sector in India which indicate how the potential of ICTs can be exploited in developing countries. We also consider the constraints on the realization of such potential. The
conceptual framework of this paper is based on the notion that ICTs can affect health conditions in poor countries both directly and indirectly. It can work directly by improving health care provision and disease prevention. It also works indirectly on the health status of the population through its effects on the broader determinants of health, such as growth, the economic position of households, and the social infrastructure\(^1\).

The effect of ICTs on health differs from its impact on other sectors in crucial ways. Achieving some of the benefits of ICTs requires that health workers are reached and not necessarily the final beneficiaries, thus, the cost of a given quantum of effect are reduced. In that respect, it does indeed hold out a great deal of promise. However, such promise is limited by a number of features which are common to most poor developing countries. These include large gaps in basic infrastructure availability, and the ability and willingness of health workers and others to make use of the opportunities that are being offered.

The potential contribution of ICTs to health services

The expectations that ICTs generate for health improvement in developing countries stem from three sources. The first is their role as an instrument for continuing education and lifelong learning that will enable doctors in developing countries to be informed about and trained in the use of advances in knowledge. The second is their use as a delivery mechanism to poor and remote locations of a wide variety of services varying from improved public health education to emergency advice, including advice on dealing with and mitigating the consequences of natural disasters. The third source is their potential use as a mechanism to increase the transparency and efficiency of governance which would, in turn, improve the available and delivery of publicly provided health services. Conceptually, this implies that the potential of ICTs in the health area lies in their mediating role between differentially endowed segments of the health system and between the health system, the health service provider and the beneficiary. In this role they promise to be a much better medium for delivering specific health services and of serving as a tool that can help reorganize the health system and render it more efficient. However, given their mediating role, the actual impact of ICTs on health depends not merely on the willingness of health administrators to adopt ICTs as a tool, but on the spread of, and access to, a network of ICTs among different segments of the health system. Thus, it is possible that the opportunity offered by ICTs in the abstract may not be relevant in practice. A typical example of the use of ICTs for advancing health status is the still nascent field of telemedicine, which undertakes to deliver the best medical advice and treatment to patients irrespective of their location.\(^2\) Besides advice based on standardized symptoms, work is in progress on ways of delivering higher-end medical care via satellite to remote rural sites or in response to disasters, for example, earthquakes.

**Health Care Information Technology and Communication Opportunities**

In addition to containing costs, advanced information technologies furnish health care providers with the opportunity to improve patient care by streamlining clinical processes and creating a seamless flow of information. Currently, health care providers use paper-based records to record a patient’s receipt of health care services. Unfortunately, the use of such records leads to the inadequate documentation of the care-giving process, a severe disruption in the flow of patient related information, and a substantial delay in the delivery of health care services. Advanced information technologies - such as computer-based patient records,

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2. The online doctor is in. Economist, 22 March 2001.
portable computers, and expert information systems - alter this situation by providing clinicians with real-time access to patient information at the point of care.

Categories of Technological Solutions

Advanced information technologies have the ability to restructure the health care industry’s data collection mode from a “collect many times, use once” system to that of a “collect once, use many times” arrangement. Some of the leading information technology developments that will assist health care organizations in achieving their objectives are in the following areas:

· **Computer-based Patient Records**
  A digitized compilation of all clinical and administrative information relating to the care of a single patient. The terms electronic health records (EHR) and electronic medical records (EMR) have come to be used interchangeably. While all these acronyms refer to the same consent, “EHR” implies broader functions and features, which include the “EMR” components. Such e-records are convenient for patients and doctors alike and can significantly reduce medical errors and help track public health problems.

· **Data Warehousing**
  The storing of vast amounts of clinical, financial, and operational information in an integrated decision support database that provides immediate easy access to health care practitioners.

· **Document Imaging**
  The process of scanning and storing images that are pictures of a paper form. The electronic image has the ability to be shared and accessed more readily by clinicians and administrators in various geographic locations.

· **Internet Solutions**
  Internet and Intranet developments allow providers to integrate clinical and financial information from numerous sites without having to invest in enterprise-wide systems.

· **Expert Information Systems**
  Every health care organization has a series of rules that are instrumental to the delivery of care for that particular enterprise. Clinical decision support systems apply these rules in order to assist physicians in the administration of health care services.

· **Technological Barriers**
  · **Lack of Industry Standards**
    Technological barriers, such as the health care sector’s lack of general adoption of industry standards, are often cited as a significant obstacle to the widespread use of advanced information technologies. A standard is a clearly defined and agreed upon convention for the operation and behavior of specific computing functions, formats, and processes. The majority of standards developed within the health care industry are classified into two basic categories – proprietary or consensus standards. Proprietary standards are standards that emerge after a single vendor acquires a large enough share of the market for a particular product. Consensus standards, in comparison, are standards that are developed by committees including: payers, providers, employees, the medical community, and government officials.

    The successful exchange of electronic information is contingent upon the use of recognized standards to ease the flow of information among various operating systems. Without industry-wide standards, advanced information technologies’ ability to speed up transactions through the elimination of human involvement is lost. In the past some have suggested that the sector’s failure to organize a centralized industry group to promote the use of data standards is the primary reason that the industry has been slow to invest in emerging
information technologies. On the other hand, the rapid emergence of the Internet as a medium for networked communications resolves the need to agree on many types of communications protocols and allows for many types of interfaces.

**Administrative Simplification**

Administrative simplification is the establishment of standards for the electronic transmission of certain types of information. Specifically, the adoption of standards for the identification of individuals, employers, health plans, and providers within the health care system. In addition, there is a need for standards for security, electronic signatures, and the transmission of specified financial and administrative information.

**Human and Social Barriers**

In addition to the previously mentioned technological barriers, there also exist human and social barriers that have to be addressed prior to the health care industry’s widespread adoption of information technologies. The health care industry’s use of advanced information technologies to complete administrative and financial transactions meaningfully alters the institution’s traditional norms and practices. Advanced information technologies require physicians to develop a minimum level of computer proficiency. Simultaneously, the adoption of computer-related technologies asks patients to accept substantive changes in the way medical information is maintained and stored. To ensure widespread adoption, the health care information technology community will have to address both physician and patient concerns.

- **The Need to Protect the Privacy, Security, and Confidentiality of Computerized Information**

  Many patients believe that the electronic transmission and storage of patient related information places the integrity and confidentiality of such information in serious jeopardy. Individuals who subscribe to this school of thought assume that the increased storage and transmission of information will encourage and create increased opportunities for the illegal interception and misuse of such information. To address these concerns, health care information technology companies will have to ensure that information networks provide the desired level of privacy, security, and confidentiality. The protection of privacy and confidentiality interests will require IT companies and health care providers to work together to ensure that information will only be shared among authorized personnel directly associated with the delivery of patient services. Protecting security interests, on the other hand, mandates that information will be protected from unwanted loss, modification, and dissemination. Both of the above interests can be adequately addressed through the establishment of firewalls or other practices that limit a health care provider’s ability to access information based upon his or her job specific responsibilities.

- **Physicians and Nurses Inexperience in Dealing with Advanced Information Technologies**

  The implementation of advanced information technologies within the health care sector significantly alters the organizational culture of the industry. Advanced information technologies require physicians and other health care practitioners to move beyond an environment accustomed to documenting administrative and clinical information in a paper-based format – and into one that supports the seamless flow of information. This is a “human” transition that other industries adopting information technologies have encountered and overcome.

  In order to persuade health care organizations to invest the necessary sums to establish computer networks, IT companies will have to first convince physicians and other health care practitioners that the utilization of information technologies can vastly improve the efficiency, convenience, and quality of health care services delivered. To address efficiency and convenience concerns, IT companies will have to develop technologies that are user friendly and provide physicians with the ability to find information more quickly. In order to convince physicians that information technologies will improve the quality of services delivered,
companies must convince doctors that the use of computer-related technologies will have a positive direct effect on patient care.

**Political and Legal Barriers**

The widespread adoption of IT by the health care industry is also limited by political and legal constraints. Governments maintain a great deal of responsibility over the regulation of health care providers. Unfortunately, many of these governments use this authority to enact legislation and establish regulatory schemes that do not fully appreciate ensuing technological advances. For example, certain regulations may require health care providers to maintain patients’ records in a paper-based format. Laws, such as this, retard the development of IT and thereby prevent providers from operating in a more cost-efficient and effective manner.

**Suggestion and Conclusion**

Build on and complement information and communication technologies already being used. No single technology will be suitable for all situations. Innovative and creative combinations of old and new ICTs will provide added value and new possibilities.

- Ensure a legal and regulatory environment that allows information and communication services, innovation and entrepreneurship and free flow of information. To be effective and efficient, the health care industry must operate in a digital environment that includes connectivity, commerce, community/content and information sites.

- Work with interested stakeholders to identify and address laws that forestall the implementation and utilization of health care related information technologies such as telemedicine.

- Establish private and public sector partnerships to ensure patient privacy, security, and confidentiality concerns are addressed.

- Encourage the development of user-friendly computer-related technologies and couples these developments with training and physician support services that help facilitate the transition from paper to computer based systems.

**Reference**


2. Third World contributes 27% to US$ 750 billion IT market. Economic Times (Delhi) 2000.


