Chapter 12
Health Infonomics: Intelligent Applications of Information Technology

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ABSTRACT

Researchers are currently challenged to document the economic aspects of information across an array of contexts. While some lessons can be applied generally, certain contexts present unique challenges for researchers interested in the acquisition, management, and use of information. Health is one such field currently undergoing a revolution driven by new applications of information-based technologies and services. This chapter provides background on health informatics and current issues as health informatics impacts the provision of health in doctors' offices, shifts the provision of healthcare services into patients' homes, and presents new opportunities to address public health concerns. An outline of a future research agenda in health informatics and a look at the prospect of health informatics applications provides the necessary foundation for focused work on the economic impact of this information-driven transformation in healthcare delivery.

INTRODUCTION

Informatics, the maximization of data use and acquisition through the intersection of information and computer science, is becoming commonplace across a range of applications that interface with everyday life. Currently, researchers are challenged to document economic aspects of information across a vast array of decision-making contexts. There are important general lessons that can be applied across applications from the field of infonomics, but context can also drive the impact and evolution of information use in distributed business environments.

Healthcare is one such context uniquely poised for transformation based on informatics and the economic aspects of information-driven changes

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in the provision of healthcare. The delivery of health services represents one of the more complex examples of distributed decision making as multiple stakeholders - providers, patients, family caregivers, insurance payers, and government regulators - have interests in individuals' health decisions and treatments.

Prompted by rising healthcare costs and concerns over quality, there is significant pressure to reform healthcare in both developed and developing countries. Stakeholders are looking to a wide array of information technologies to address challenges in health delivery, including access to care, medical errors, cost efficiencies, health outcomes, patient and provider satisfaction, demographic challenges such as aging populations, and provider shortages. Such challenges are particularly pressing given the unprecedented strain the health care industry will face due to an aging global population. The United Nations projects that by 2050 the number of older people (60 years or older) will outnumber younger people worldwide, due to people around the world living longer and having fewer children (United Nations, 2002).

While informatics may not present a solution to every problem in healthcare, appropriate applications of new information technology to the provision of health can indeed present promising strategies for addressing shortcomings in the healthcare system or advancing the practice of medicine. The sheer quantity of information necessary to practice medicine and to be an informed patient is rapidly increasing. Health informatics systems can serve as gateways for this vast amount of information to be utilized and managed by both providers and patients.

In line with the recognition that information technology can be used as a tool to address the challenges in healthcare, there is also a growing movement for paradigmatic shifts in the very nature of healthcare provision. For example, the movement toward "patient-centered care" seeks to provide health services that explore a patient's main reason for a health visit, concerns, and need for information; gain an integrated understanding of the patient's emotional needs and life issues, find common understandings of the etiology of the problem, allow the patient and health provider to mutually agree on management; enhance prevention and health promotion; and reinforce the continuing relationship between the patient and health provider (Stewart, 2001). Health informatics can assist in this movement of patient-centered care, empowering patients and their communities so they can make informed decisions regarding their healthcare (Cornford & Klecun-Dabrowska, 2001). Operationalizing this concept calls for employing information technologies to meet the core goals of patient-centered care, namely (Sherer, 1993):

- Locating services as close as possible to patients
- Redefining work by desegregating job tasks and providing health workers with necessary support, skills, and training
- Meeting patient needs, rather than the needs of a department, discipline or field.

This chapter seeks to illustrate the evolution and impact of health informatics, review what research has taught us to date, and comment upon future directions to advance health informatics and infonomics research. The discussion will include the utilization of health informatics systems designed to assist healthcare providers in their work, technology to bring health services into patients' homes, and population-based applications that can advance public health. A greater understanding of health informatics applications - what these systems are and how they could radically transform the healthcare system - can provide the foundation for studies of the economic impact of an information-driven revolution in healthcare delivery. While many of the statistics and examples cited in this chapter are drawn from the U.S., lessons learned and potential applications would