

Developing Medical IT Systems that Save Lives and Significantly Reduce Hospital Healthcare Costs

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INTRODUCTION

This chapter originated with strategic management work done at Jamaica Hospital in Queens, New York, and the Jewish Home and Hospital for the Aged in Manhattan, New York. As background for the project, the initial phase involved industrywide studies of health care institutions throughout the United States and abroad. During these studies, which involved both field research and a review of the research literature, many samples of which are given throughout this chapter, it became apparent that advances in hospital information technology (IT) are having a dramatic impact on improving patient health care services.

BACKGROUND

By creating the “Digital Hospital,” a number of hospitals in this country are leading the way in developing and using information systems to solve plaguing industry problems, including the fact that manually kept records were not up-to-date, were incomplete, were misplaced, or were illegible due to physicians’ handwritten prescriptions (Clark, 2004; Information Technology, 2005a, 2005b). Errors resulting from these problems alone have been estimated to kill more than 7,000 U.S. hospital patients yearly and drive up health care costs by an estimated \$2 billion (Evans, 2004; Marks, 2004; Turner, 2004). Even though major costs are involved, plans are underway to do the same in overseas hospitals; for example, in England. Evidently, in 2004, not enough U.S. hospitals were moving into the digital area. As a result, in mid-2004, Tommy Thompson, Secretary of Health and Human Services, supported by President Bush, unveiled an ambitious 10-year

initiative to transform hospitals in this country more aggressively and rapidly (Bush, 2004; Turner, 2004). Individual states (e.g., Massachusetts) were also considering both government and private financial support for this effort (Peter, 2004). The focus of this initiative will be on computer entry of prescriptions, improved intensive-care unit (ICU) staffing, and easier access to individual patient records for both the patient and hospital staff by integrating patient and other hospital records into integrated databases.

ROLE OF ADVANCED AND BASIC INFORMATION TECHNOLOGY APPLICATIONS AS IMPROVED HOSPITAL HEALTH CARE ENABLERS: A FRAMEWORK

The discussion in the following section provides an overview framework developed from this study, a framework that might help provide guidance to those thinking about understanding, developing, and introducing IT systems into their hospital environments. This framework is outlined in Figure 1.

CLIENT/PATIENT ORIENTATION

Hospitals face specific problems, such as the difficulty to coordinate and integrate diverse customer interactions in a way that (a) makes individual customers feel they were being treated as individuals and (b) enables the hospital to coordinate its services to these individuals. Hospitals have many divisions, such as radiology, emergency room care, test labs, prescriptions, medical nursing assistance, hospital rooms, and kitchens and

Figure 1. Major areas in which medical IT systems are generally developed

Client/Patient Orientation
An Integrated Accessible Electronic Database
Prescription Writing and Delivery
Intensive Care Units (ICUs)
Telemedicine/Telesurgery
Health Care Facilities and Their Financing
Other IT-Related Systems

food service, that provide services to patients. The doctors deal with these various divisions as well as with individual patients, as do nurses and other staff members whose time needs to be scheduled and managed. Tracking is needed to bill patients, preferably in a coordinated way; to maintain staff schedules; and to manage all operational areas efficiently and effectively. Interestingly, many hospitals studied do not even have an integrated billing system for patients, who still receive separate bills for various department services and room accommodations. This creates some confusion among patients and their insurance companies.

AN INTEGRATED ACCESSIBLE ELECTRONIC DATABASE

Based on hospital experiences with information technology development, the starting point almost always involves building accessible integrated electronic databases, especially in relation to individual patient information, as suggested in the preceding section. The most significant applications of such databases are in the prescription writing and delivery area and in the Intensive Care Unit (ICU) area. These findings are consistent with the authors' studies of individual hospitals and the areas that might benefit most from improvements.

Prescription Writing and Delivery

Probably the most visible evidence of the new digital systems at the Children's Hospital in Pittsburgh is the trolley used by physicians when visiting individual patients. The trolley has a laptop computer and wireless network card, which physicians use to log into

a program containing all the clinical information on each of their patients. The physicians fill out medication orders online and send these orders from the ward on the seventh floor to the in-house pharmacy in the basement, where a robot puts the prescribed drugs in an envelope for the nurses to dispense. All of this is made possible by the electronic patient database. This laptop-enabled system significantly reduced the major problems encountered from medication errors under the old paper-based system. While medical information technology applications do not necessarily eliminate all errors (in fact, they introduce some new ones), they do substantially reduce these errors (Conn, 2005; Marks, 2004).

INTENSIVE CARE UNITS (ICUS)

Another major benefit of medical IT systems is found in the management and running of ICUs. For example, in late 2004, intensive care patients at Inova Alexandria Hospital were scheduled to be monitored around the clock by doctors and nurses at their bedside as well as through digital cameras, microphones, and special software from miles away (Salmon, 2004). This system will enable these distant caregivers to remotely monitor heart rates, blood pressure, respiratory rates, and other vital signs of critically ill patients even more closely than the on-site duty staff can and thus provide guidance to that duty staff. An IT-based ICU system, where one doctor and nurse can keep a 24-hour watch over as many as 200 critically ill patients at once, can boost chronically short-staffed on-site care. In addition, studies have reported as much as a 50% drop in ICU mortality and 17% shorter stays since the first such system was set up at Virginia's Sentara Health care a few years ago (Allen, 2004; Salmon, 2004).

TELEMEDICINE/TELESURGERY

One early IT development area has been telemedicine. For example, the U.S. military in Iraq set up a field hospital unit connected by computer systems to well-staffed hospital units located elsewhere. This new technology enables treating injured people in remote locations using local staff guided by expert professionals located elsewhere (Hasson, 2004). Kaplolani Medical Center for Women & Children in Hawaii has



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