Chapter 8

Diffusion of Innovations: A Foundational Theory for Medical Informatics Research

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ABSTRACT

In this chapter, the authors discuss the use of diffusion of innovations as a foundational theory for research in the medical informatics discipline. They performed a meta-analysis to examine the enduring efficacy of the tenets of diffusion of innovations. Then, they performed a content analysis to examine over 2,000 journal articles from the fields of medical informatics, medicine, and information systems. The authors found that tenets of diffusion of innovations theory were prevalent in much of the literature and that the relationships proposed by diffusion of innovations theory have remained significant in the empirical literature. Although several theories are useful in explaining phenomenon in the domain of medical informatics, diffusion of innovation is one such theory that can be applicable to a vast amount of medical informatics research focused on new technologies or work processes, and the authors suggest that scholars use and/or synthesize it with additional theory to provide a foundation for future research in this area.

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INTRODUCTION

It is remarkable that the first personal computers did not appear until the late 1970s, and the World Wide Web dates only to the early 1990s. This dizzying rate of change, combined with equally pervasive and revolutionary changes in almost all international health care systems during the past decade, makes it difficult for health care planners and institutional managers to try to deal with both issues at once. (E. H. Shortliffe & Cimino, 2006, p. 4)

The healthcare landscape is changing rapidly. Increasing costs, patient access to nearly limitless—and frequently conflicting—health information on the internet, medical identity theft, minimal standardization across health care facilities, and dramatic changes in healthcare legislation all place increasingly difficult demands on healthcare providers, hospital administrators, and the public at large (Weigel, Landrum, & Hall, 2009). Those demands manifest in increasing healthcare costs, taxes, and time demands. Unfortunately, the high level of expenditure does not always correlate to superior health care. Frequently, politicians, healthcare professionals, and private citizens welcome information systems and information technology as means to allay such challenges (Angst & Agarwal, 2009).

Although many countries contend with rising health care costs and citizens lacking adequate health coverage, no other country spends as much per capita on health care than does the United States. There is much recent legislation that reveals the scale of significance the U.S. places on improving healthcare. The Patient Protection and Affordable Care Act is the most substantial of these, requiring—with few exceptions—every U.S. citizen to have healthcare insurance or be subject to a tax penalty (“National Federation of Independent Business, et al. v. Sebelius, Secretary of Health and Human Services, et al.,” 2012), directing increases to Medicare, and other mandates, providing tax credits, and creating subsidies (PPACA; “Patient Protection and Affordable Care Act,” 2010). Other recent healthcare legislation includes foci on improving healthcare through use of healthcare information technology and includes the American Recovery and Reinvestment/Health Information Technology for Economic and Clinical Health Act—frequently referred to as the “Stimulus” (ARRA/HITECH; Latham & Yukl, 1975) and the Health Care and Education Reconciliation Act (HCERA; “Health Care and Education Reconciliation Act”, 2010). Although, the HITECH Act has its greatest impact on the use of healthcare information systems, the ACA’s focus on medical error reduction, patient safety improvement, increased academic research, and development of health information exchanges all imply the need for more and better information systems (“Patient Protection and Affordable Care Act,” 2010, p. SEC. 2717. Ensuring the Quality of Care).

Medical Informatics—positioned at the intersection of health care and computing—may likely be the field with the greatest appropriate cumulative knowledge for investigating the effect of health care information systems on health care and the pursuit toward taming the global health care crisis. To appropriately structure the discussion, it is important to define the artifacts of study; there are several that comprise health care information systems and we use a selection that includes those systems that are designed to improve health care. The systems include those that provide a means to maintain digital health records, systems that support clinical decision making, systems that provide patients access to their personally controlled health records (Halamka, Mandl, & Tang, 2008), and systems that provide physicians a means to order prescription medicines, labs, and other studies. The goal of these systems is to improve the quality and efficiency of health care.

The term medical informatics is derived from the French term informatique, a term that was used when discussing medical information science, and
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