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Research and Evaluation: Future Directions

James G. Anderson and Carolyn E. Aydin

During the 1970s, efforts to develop and introduce computers into healthcare settings focused primarily on components of inpatient and outpatient systems. Inpatient systems included hospital information systems, clinical laboratory systems, and support systems for radiology and emergency medicine. There was also a parallel development of systems to support outpatient care such as ambulatory medical records, physician office systems, and telecommunications for medical consultation [1–3].

Advances in computer technology and artificial intelligence during the 1980s led to the development of expert systems and other clinical decision support systems [4]. In addition, the use of inpatient and outpatient systems became widespread as more healthcare organizations began to adopt applications such as order entry and support systems for ancillary departments [5]. In the 1990s, the need for cost-effective delivery of health services led to integrated databases and computer-based systems supporting outcomes research, identification of physician practice patterns, utilization review, and total quality management programs [6,7]. Concerns about patient safety also accelerated planning and implementation of computerized physician order entry (CPOE) and more comprehensive electronic health records [8].

Since the publication of the first edition of this book in 1994, important advances have also been made in the *evaluation* of healthcare information systems. In 1994 we noted the lack of comprehensive and unifying models to aid in understanding the success and failures of new systems. Such models would take into account the relative importance of the environment, both external and internal, the organization and its policies, characteristics of potential users of the system, and the attributes of the technology itself. Much work has been done in this area in the last decade. In the introduction to Chapter 1 of the present volume, we directed the reader to new theoretical frameworks and related perspectives that complement and extend the "social interaction" perspective described in that chapter. On the methodological front, the chapters in this book describe recent developments in system evaluation that give informaticians valuable new tools for conducting system evaluations. The increased recognition of the importance

of organizational issues in the evaluation of new technologies has also resulted in the creation of active working groups in both the International Medical Informatics Association (IMIA) in 1993 and the American Medical Informatics Association (AMIA) in 1996.

Despite these advances, however, expensive system failures persist. Many groups and institutions implementing new systems remain unaware of the importance of system evaluation or reluctant to allocate the resources required for an adequate evaluation. In addition, acceptance by primary care physicians of new electronic medical records, electronic prescribing systems, and point-of-care decision support systems has been limited. A recent survey of primary care physicians in the United States [9] found that only 20% to 25% of primary care physicians reported using these information technology applications in their practice. In contrast, studies have shown that 52% of primary care physicians in New Zealand and 59% in the UK were using electronic medical records, while 44% of physicians in Australia, 52% in New Zealand, and 87% in the UK were using electronic prescribing [10].

As this book goes to press, the President's Information Technology Advisory Committee's Draft Report calls for accelerated adoption of information technology in the healthcare sector [11]. They recommend the adoption of (1) electronic health records to maximize the information available to healthcare providers at the point of care; (2) computer-assisted decision support to increase compliance with evidence-based medicine; (3) electronic order entry in both outpatient and inpatient practice settings; and (4) interoperable electronic information interchange. In order to facilitate the implementation of these recommendations, President Bush has proposed $100 million to be spent on promoting health information technology.

In light of past experience, however, the implementation of many of these newer systems, as well as new adoptions of more established systems, will result in unforeseen costs and organizational consequences, or even fail, because developers and administrators neglect their social impacts [12–16]. The methods and applications included in this book provide an overview of current knowledge and emphasize the importance of a multimethod approach to system evaluation based on an understanding of the complex social and behavioral processes occurring within healthcare organizations. The dissemination of this knowledge to those involved in system design and implementation, however, remains a challenge.

The purpose of this book has been to provide a practical guide for determining (1) appropriate evaluation questions based on specific underlying models of change, and (2) the most effective methods available to evaluate anticipated impacts and answer the questions posed. Too many informaticians remain unaware or unconvinced of the importance of system evaluation, or are unable to make the case for the required funds to the organization's administration. Too often evaluation experts continue to "preach to the choir," without reaching out to convince decision makers of

the importance of an adequate evaluation. The challenge for researchers in system evaluation today is to identify appropriate venues and strategies that will ensure that healthcare administrators are both (1) aware of the importance of system evaluation to a successful implementation, and (2) willing to make the necessary organizational commitment to conducting and using appropriate evaluation methods throughout the implementation process.

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