

## Preface

The prevalence and increasing pervasiveness of information technologies, the Internet, and new mobile technologies is resulting in far-reaching change in how nearly every healthcare organization and healthcare provider functions. While most sectors have embraced Information and Communication Technology (ICT) with open arms, taking advantage of its benefits to enhance customer service, connect with customers, reduce costs, and increase market share, the healthcare industry has been painstakingly slow in incorporating ICT to aid in the delivery of healthcare services and the collection, management, and use of health information. Although in recent years the health services sector has begun to move towards the use of ICT services to aid in providing patients with health care solutions, this shift has been slow and cautious, and much more can be done to improve current healthcare practices and add value to healthcare transactions.

The complexity of the healthcare industry and its need for nearly-instantaneous, accurate information means that the adoption of information technology to deliver health services poses many substantial benefits, but also numerous potential risks. ICT services show the potential to improve the quality of health services and to be more financially efficient than traditional paper-based practices. So far however, uncertainty about the effect on quality of patient-care and outcomes, its cost effectiveness and the long term financial benefits of e-health has significantly slowed the adoption of ICT in the health services industry. While it is impossible to have an exact and detailed view of how the health care industry will be affected in future years by the greater utilization of ICT services, there already exists substantial proof as to the potential benefits of health information technology. Throughout the book we outline areas where information technology can offer healthcare systems safe and superior solutions to existing problems, or simply improve system efficiency. Using concrete examples, key IT trends in health services, research and development are highlighted. The risks and benefits associated with the integration of information technology in the healthcare industry are examined, and means of doing this in a way that ensures IT is both cost-effective and advantageous to patients as long as certain safeguards are maintained, such as ensuring the accuracy, reliability, privacy and confidentiality of any health information that is transferred through ICT services.

The book also explores the flip side of the assimilation of ICT in the healthcare industry, looking at the risks and unintended consequences of using technology to deliver healthcare solutions. Such threats, such as the greater susceptibility of electronic health records to being accessed, lack of adequate training of practitioners, inadequate systems pose valid challenges to the use of health information technology services, and in some cases significantly contribute to the resistance to change that exists regarding the amalgamation and adoption of ICT services in the health care industry. If viable policies are put in place, for instance, to safeguard the reliability and confidentiality of health information obtained and

transferred through ICT solutions, such risks can be mitigated and the availability of that health data provide benefits, to the individual and to society, that far outweigh the risks.

The integration of ICT in the health services sector is not something that can be attained overnight, or by simply expending resources to upgrade facilities and equipment. The successful utilization of eHealth solutions will result in fundamental changes to the very way the health services sector is set up and run. Adopting ICT in the health care industry will also require changes in the scope and focus of medical education concerning the role of technology and how to use it most effectively. Additionally, the use of these new technologies poses new ethical questions, particularly in the areas of bioinformatics and biobanking of human tissues and in the emerging field of neuroimaging. New technologies also offer opportunities not possible today and may help to assist in easing the lives of the increasing number of elderly in the society and in researching and searching for information across collaborative networks. Ten years down the road the landscape may look totally different and unrecognizable from what we are familiar with today, but there is no turning back in advancing down this path of new technologies and health care improvements.

The book, comprised of seventeen chapters divided into six broader sections, examines current developments and challenges in the incorporation of ICT in the health system from the vantage point of patients, providers, and researchers. The authors take an objective, realistic view of the shift that will result for patients, providers, and the healthcare industry in general from the increased use of eHealth services, summarizing both the beneficial and potentially detrimental changes, and outline ways to insure maximum benefit while ensuring that the integrity and quality of patient care is not sacrificed.

Section 1 gives the reader an introduction and overview to the use of information and communications technologies in healthcare. Kendall Ho's first chapter provides a brief overview of "health in the digital world" and outlines some of the key technologies that are, and will, make a difference in health care. He outlines four IT trends that will potentially transform health care: the ideas of personalization, increased connectivity, social networking, and co-creation of information and knowledge. Often at odds with the traditional values of a more sedate health system these trends have transformed our modern cultures and society and will have an impact on health and health care. A further, more detailed analysis is given by Paolucci and co-authors in Chapter 2 looking at the effectiveness of IT and health informatics and the great promise of clinical decision support tools put into the hands of health providers. They also look at reasons for why the adoption of electronic records and these technologies has been relatively slow and what challenges (e.g. lack of standards for the integration of disparate technologies and legacy systems, unintended adverse effects, inadequate methodology in determining cost effectiveness) may be holding it up implementation. These topics are explored further in Chapter 3 by Jordanova, particularly from an international and global focus and looking at which 'players' may best be able to advance eHealth adoption. Finally Kabene and Wolfe delineate the risks and benefits of technology in three specific applications: the use of electronic health records, the access to reliable online medical information, and how technology changes the relationship of patients and providers.

In Section 2, in four chapters looking at computer use from the individual to the community, we pick up on the latter aspects of changed relationships in Shachak and Reis's excellent discussion of how the computer alters the traditional patient-provider interaction. The introduction of the computer as a third party in the consulting room accentuates for many physicians both the good and bad aspects of communication and personal styles and emphasizes the need for training of physicians in how best to use this tool in communicating with their patients. Another practicing physician, Bircher turns his eye to the electronic patient record and health information system in the hospital and the potential for

positive use in managing resources and activities of physicians and nurses in that clinical setting, but the down-side if that technology does not adequately address clinical needs and/or if clinicians are not provided with adequate training to use it effectively. Chapter 7 by Edirippulige and Smith explores the use of technology to extend healthcare services (telepediatrics) to indigenous children in Australia living in remote areas with limited infrastructure and accessibility. Within this section Wan and Evans-Mueller also present and extend the trend of “comparison-shopping” as a means for health consumers to assess and select between health services and health providers – a decision support tool that may prove useful to consumers, providers, and payers within the health system.

Section 3, comprised of two chapters, asks who will put these systems in place. In the Chapter 9 Pasupathy presents a rather simple answer in the form of a new type of health professional or systems engineer – in the practice of health systems engineering. These individuals have some overlap with health informaticians in that they have extensive knowledge of not only information technologies and the health system, but also a ‘world view’ that takes a holistic view of needs and systems and considers all aspects of the implication behind implementation of health information technology within the health organization. And in an intriguing argument von Lubitz in Chapter 10 suggests we should think of the deployment of IT and advanced information and knowledge management tools in the same way we approach a military campaign – have the right governing triad - politics, the “military” in the form of the healthcare industry, and the recipients of healthcare services – the people. The approach is one that can work globally or locally to coordinate efforts to put advanced technologies in place. In this military inspired model the ‘man on the ground’ becomes a team of leaders – individuals who are flexible, adaptable, comfortable in operating in complex environments, and build on interactions and a shared foundation of skills, knowledge, and attitudes of similar leaders.

Section 4, encompassing two chapters, looks at further challenges facing the security of healthcare information and how best to link various sources of health data to preserve privacy and confidentiality. A patient’s right to complete medical confidentiality is one of the cornerstones of our healthcare industry, and any ICT solutions for the future will need to ensure that this basic right is not violated. Gibson & Abrams review the public’s concerns over privacy and examine practices and policies that will be required to ensure privacy and confidentiality of patient information, as well as examining the implications that new health technology will have on health service delivery and public health in general. The key to an effective and efficient health record in which this vital information is shared is the linkage of health data from separate databases and repositories. Shah and co-authors look at specific technical solutions to ensuring that data is linked properly and effectively.

Section 5, in its two chapters, deals with some additional ethical challenges for the future produced by the introduction of new technologies in the area of medical research and future medical care such as biobanking and bioinformatics and functional brain imaging. These new diagnostic and research methods also lead to new ethical dilemmas that previously never existed or existed in more understandable frameworks. Consequently, in this section in Chapters 13 and 14, respectively, we look at the importance of a code of ethics in health ICT and the need to discuss and develop agreement on informed consent, not just for individuals but for societies and marginalized groups of people, and re-examine the concept of the mind-body dualism and free will.

Finally, Section 6 made up of the last three chapters of the book, gives us a glimpse of the future, both in terms of how health technology can be used to support an aging society and used in research to provide new collaborations and better shared knowledge management tools. Botazzi and colleagues examine how demographics is creating unique problems with aging “baby boomers” that can be allevi-

ated by technological solutions for eldercare, to assist them in continuing to live at home or in care. Fiaidhi, Mohammed and Wei present a prototype for a gene annotating system (GAS) blog that builds on the unique technologies of Web 2.0 and shared networking and connectivity to provide a more efficient system for locating and annotating gene ontologies. Finally we come full circle in Chapter 17 with Davis describing the transformation of health care by these various technologies and explains that we are in fact at the tipping point where it is no longer a question of whether these technologies will be adopted but when and how this will change our thinking, doing and actions.

The field of health care and medical research and development is one where the fast paced acquisition of accurate knowledge is of the utmost importance in improving the quality of patient care and in reducing and containing rising health care costs. ICT applications and services can facilitate advancements in medical research and care by providing reliable information where and when it is needed. If certain precautions are not taken however, the benefits of e-health may be outweighed by the possible negative ramifications for patients and healthcare providers alike. Mindful of the consequences, the pros and the cons, that ICT can have for the healthcare industry, all authors have done a noteworthy job in ensuring that the material has been presented in a balanced and objective way, and most eloquently with relevant examples that readers will find both informative and interesting, truly describing the developments, challenges and advancements in technology in health care.