

Preface

The field of biomedical informatics is undergoing rapid transformations due to recent developments in healthcare information technologies (HIT), new healthcare acts, federal regulations, new healthcare financing model, and the growth of data science. This is collectively having a tremendous impact on various care delivery processes, clinical decision-making, and outcomes. Due to the complexity of healthcare operations, data, and multiple stakeholders (e.g., patient, provider, payers), the impacts of recent innovations and transformations in this area require increased systematic study and research.

This volume addresses these issues and contains an important collection of articles that present recent research in healthcare information technology and analytics. In particular, the following key thematic areas are addressed.

A well-designed HIT system can have a multifaceted impact on various stakeholders and can require a deep-dive understanding of behavioral, cognitive, and perceptual factors. For example, Kato-Lin et al. investigate the impact of technology failure on electronic prescribing behavior in primary care; Dinev et al., on the other hand, focus on understanding user attitudes toward electronic health records from a privacy perspective; Thrasher studies the impact of information technology integration on integrated delivery systems; and Petter et al. evaluate emergency response medical information systems.

It is critical to reduce errors and improve patient safety. This can be done through various mechanisms. One approach is to design new and improved clinical systems or procedures and validate them. An excellent example of this is the paper by Myneni et al., which proposes a new risk assessment framework for critical care units and validates it in clinical settings. Another approach is to improve medical training through the use of persuasive technologies. For example, Khanal and his colleagues provide a comprehensive review of the historical work, as well as the state-of-art virtual world application for improving medical training.

Systematically evaluating various decision outcomes and using modeling approaches to gain better understanding of different care scenarios also play a vital role in reducing various medical errors. For example, Frezee et al. utilize a latent growth modeling approach to understand lifestyle decisions based on patient

historical data, Ramsey et al. investigate the dynamic decision-making tasks of primary care physicians treating patients with chronic conditions such as type 2 diabetes, and Bosire et al. design an integrated surgical care delivery system using axiomatic design and petri net modeling approaches.

Various healthcare processes and operations can significantly benefit from automated processes. The study by Loy and his colleagues validates the use of robotic operations for better inventory management and supply chain control in a health system pharmacy.

Big data and analytic approaches hold great promise for the biomedical field. The adoption of such approaches should lead to the development of next-generation innovations in healthcare and technology and serve as a guide to policy making. As our ability to process complex data increases due to next-generation computational infrastructure and the field of data sciences grows, we will see increased applications of real-time applications (such as in stroke) and smart systems such as cognitive systems integrated seamlessly into healthcare processes and technology. This clearly warrants a more aggressive research agenda. Montero et al. studied analytics of decision-support theoretic assistants based on contextual gesture recognition. This is a good example of integrating affective computing and analytics for patients requiring rehabilitation. The study by Scotch et al. uses natural language processing for understanding contraceptive use at the VA and is a good application of processing unstructured healthcare data. Scalability of such data sets requires shifting toward big data platforms and will likely facilitate the effective discovery of patterns.

Papers such as those collected in this volume indicate the kinds of research that are needed as healthcare transformation continues. Finally, we thank all the authors for making important contributions to this collection and the large pool of reviewers who provided valuable time to review the manuscripts.

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Advances in Healthcare Informatics and Analytics

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2016, XI, 262 p. 71 illus., 45 illus. in color., Softcover

ISBN: 978-3-319-23293-5