

Editorial

The need for innovations in healthcare systems using patient experience and advancing information technology

Varadraj P. Gurupur^{a,*}, Thomas T.H. Wan^a, Rama Raju Rudraraju^b
and Shirang A. Kulkarni^c

^a*School of Global Health Management and Informatics, University of Central Florida, Orlando, FL, USA*

^b*Kirklin Solutions, Hoover, AL, USA*

^c*Department of Information Technology, Manipal Institute of Technology Bengaluru, Manipal Academy of Higher Education, Manipal, India*

Abstract. In the recent past we have observed improvements in information technology and associated computational science advance the healthcare eco system. This advancement is happening in many parts of the healthcare eco system. The aforementioned observed phenomenon is a transdisciplinary and transformative process underway and many of us are positively affected by this transformation. In this special issue the authors have commented on some of the critical regions of this change namely: user-centred postpartum care, communication channels of knowledge, diabetes care, and natural language processing health research. It must be observed that the observed innovations may have many facets such as improving user perception, reduction in time and cost for healthcare delivery, and more importantly providing key decision tools for clinicians; thereby, improving their performance in terms of time and efficiency. It is to be noted that the core purpose of these advancements is to improve patient experience.

Keywords: Patient experience, healthcare process improvements, user-centred care, and health information systems

1. Overview of improvement in technology for advancing patient experience

In the recent past advances in the use of technology for improving patient experiences is rapidly advancing (Gireesh et al., 2022; Gireesh & Gurupur, 2023). Here we need to fathom the saying, “necessity is the mother of innovation” improving technology for assisting patients has presented itself as the new impending necessity in healthcare delivery. While patient experience is a psychological phenomenon it requires improvements in technology. Therefore, this is a transdisciplinary and transformative process that encompasses advancement in computation, innovations in data processing, behaviour assessments, and implementation of hardware. It is to be noted that use of advanced analytical approaches such as Structural Equation Modelling (SEM) is required for identification of causality for the purpose of identifying factors leading to the right patient experience. Gurupur (Gurupur & Gutierrez, 2016) presented a framework for healthcare decision support identifying the necessary

*Corresponding author: Varadraj P. Gurupur, School of Global Health Management and Informatics, University of Central Florida, Orlando, FL, USA. E-mail: varadrajprabhu@gmail.com.

components of a healthcare decision support system. While data processing (Gurupur et al., 2018) is a key component of a healthcare decision support system Nasir (Nasir et al., 2017) presented the idea of data incompleteness in electronic health records. A scientific advancement of this method was illustrated by Gurupur (Gurupur et al., 2022; Gurupur & Shelleh, 2021). The purpose of all these advances was to improve patient experience and healthcare outcomes. We can therefore hypothesize that advancing information systems for healthcare is a key factor in improving patient experience within a healthcare ecosystem (Gurupur & Wan, 2017; Clark, et al., 2016).

2. Key components of patient experience and patient care innovation

Research on how to optimize patient experience and engagement plays a pivotal role in promoting selfcare management and quality improvement (Gleeson et al., 2016; Beattie et al., 2016). The current version of patient satisfaction instrument is centred in the assessment of the care process and need fulfilment. However, additional eight principles of patient centred care and experience could be incorporated in the design of a valid and reliable instrument that may include: 1) Coordination and integration of care (C), 2) respect for patient's preference (R), 3) emotional support (E), 4) activity and physical comfort (A), 5) technical information and education (T), 6) involvement of family and friends (I), 7) opportunities for continuity and transition of care (O), and 8) access to personal care network (N). In short, this refers to CREATION, the essential ingredients for enhancing patient satisfaction and, in turn, accentuating better patient care outcomes. With the emphasis on patient-centred care under the movement of promoting population health management, it is imperative to finetune the psychometric properties of the patient satisfaction measurement instruments. Thus, innovative patient care interventions such as multidisciplinary care or guided care could be expanded in the implementation of hospital quality improvement activities coupled with community-based health intervention strategies for chronic disease management. Many existing literatures (Bouldin et al., 2014; Luthria et al., 2020; Lyons et al., 2019; Menachemi et al., 2014; Sorin & Aran, 2019; Wan 2018) support the idea of optimizing hospital performance via population health management with the implication for patient experience and patient care innovation. These publications provide insights into optimizing hospital performance via population health management, emphasizing positive results in terms of healthcare expenditure reduction, quality and satisfaction measures, health information technology benefits, and integration strategies for patient-centred care outcomes. Coincided with this approach, a concerted effort is being made by the Society for Design and Process Science via its flagship journal (Journal of Integrated Design and Process) to dedicate a special issue for Health Systems Research. This further signifies the importance of the evidence-based and data-driven approach to the performance improvement and outcome maximization assisted by artificial intelligence and ChatGPT applications to healthcare (Wan & Wan, 2023).

3. Summary of the articles in this special issue

The article on user centred care (Chou et al., 2022) titled, "User-centred care, engagement, and user's orientation preference in postpartum care of quality: practitioner-postpartum women interdependence mediation analysis" discusses improving postpartum services. Here the investigators have used to demonstrate causality between competence and sensitivity. SEM and its associated Chi-Square tests have been used to demonstrate causality. Here the emphasis is on providing better patient experience by first investigating into the possible bottlenecks associated with the healthcare delivery process.

The analysis of user centred engagement for diabetes has been described by (Luh et al., 2022) in "A single framework of precision surveillance of diabetes disease prognosis for better care with collab-

oration”. Here the authors describe important factors in process improvements such as incorporating changing patient behaviour, risk assessment, assessing data inconsistency, and other important factors. It is to be noted that the authors in this article emphasize on performing critical analysis leading to process improvements leading to better patient experience and improved healthcare outcomes.

Reduction of skilled workers using Natural Language Processing (NLP) is described by (Cheligeer et al., 2022) in their article titled, “Natural language processing (NLP) aided qualitative method in health research.” Here the authors describe a process to reduce manual analysis of text-based data using NLP. The article describes NLP procedures with examples for performing the same. It is to be noted that use of artificial intelligence to reduce manual work within the healthcare ecosystem is a key step towards improving patient experience. This is because these modifications in processes will reduce the time involved in diagnosis and reporting. However, we need to be careful not to overuse automation leading since that might lead to unwanted adverse outcomes (Gurupur & Wan, 2020).

Finally, (Gurupur, 2022) describes the use of information theory in modelling and improving healthcare processes. Here the author focuses on the communication gaps between human to human, human to machine, and machine to machine in his article titled, “Can the theories of information and communication channels be used to explain the complexities associated with transformation of data into information, and information to knowledge?” This article lays out a broad framework for mathematicians and health administration researchers to collaborate and develop mathematical explanations and frameworks for processes within the healthcare ecosystem using the information theory. Once again, it is to be noted that theoretically identifying bottlenecks within healthcare processes is a key phenomenon in improving healthcare processes and ultimately patient experiences.

4. Conclusion

To summarize, the articles in this special issue have provided insights into new developments in information systems for healthcare. These improvements are valuable when they improve patient experience. We can perceive this as a necessary marriage between psychology and technology; thereby, making it a transdisciplinary and transformative science that is worth investigating. This transdisciplinary science involves transformation in data science applied to healthcare (Kulkarni et al., 2021), improvements in information systems (Wan et al., 2021), and dealing with user challenges (Gurupur & Miao, 2022). We would like to promise our readers that the advancement of this investigation will be presented in future issues of this journal.

Acknowledgments

The authors would like to thank the members of the editorial team for proving an opportunity to write this editorial article.

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Author Biography

Varadraj P. Gurupur, PhD is currently working as an associate professor in the Department of Health Management and Informatics at the University of Central Florida. Dr. Gurupur is a recipient of two international awards, one national award, and several regional and institutional awards. His core research is focused on software engineering decision support systems for healthcare and education. He has more than 7 years of teaching experience and has served as a teacher in two different countries. Dr. Gurupur is also someone who has worked in the healthcare industry for several years. Based on this work experience and academic training he is involved in discovering innovative solutions to difficult problems associated with Electronic Health Records.

Thomas T. H. Wan, Ph.D., MHS, is a professor emeritus of public affairs, health management and informatics, and medical education at the University of Central Florida. His research expertise includes healthcare informatics, health systems analysis and evaluation, long-term care, artificial intelligence applications in healthcare, and clinical health services research. He has conducted a national study on Rural Health Clinics in Accountable Care Organizations (ACOs) funded by NIH. This project enables him to investigate the effects of changing delivery systems or healthcare reforms on efficiency and effectiveness of patient-centric care in the United States. He is a Co-Editor-in-Chief of the Journal of Integrated Design and Process. He has published more than 235 articles, 27 book chapters and 15 books. His engagement in health services management research and consultation has helped the development of formal MHA graduate programs in Kazakhstan, Czech Republic, and Taiwan (Kaohsiung Medical University). He also has investigated how human factors may influence heart failure readmissions through a systematic review and meta-analysis of clinical trial studies. Based on this project, he, and Dr. Gurupur have developed a self-care decision support systems and predictive methods for reducing rehospitalization for heart failure and earned a U.S. Patent.

Rama Raju Rudraraju, PhD is Chief Technology Officer at Kirklin Solutions. He is a technology leader with extensive experience in 1) designing software and database architecture for healthcare software; and 2) applying machine learning and natural language processing to discover valuable insights from healthcare data. In 2013, he joined the Kirklin Institute of Research in Surgical Outcomes (KIRSO) at the University of Alabama at Birmingham (UAB) and played a key role in completing a major re-design of the database and software behind Intermacs and Pedimacs patient registries. Over the next three years, he worked with the team at KIRSO to create a unique software framework to build patient registries. As an architect and senior developer, he made significant contributions towards developing the reusable design and implementation of the framework. The framework was a huge success and helped cut down the development time of newer registries by more than 50%. This allowed KIRSO to rollout registries (to track patients with various heart conditions) at an international scale. Currently the registry software developed by KIRSO has a global footprint in 38 countries, 319 hospitals, and 62,000 patients. KIRSO launched as a health care technology start-up company called Kirklin Solutions in January 2023.

Dr. Shrirang A. Kulkarni is currently working as an Associate Professor with the Department of Information Technology, Manipal Institute of Technology Bengaluru, Manipal Academy of Higher Education, Manipal, India. He has also worked as Postdoctoral Fellow with the School of Global Health Management and Informatics, University of Central Florida. He earned his PhD in Computer and Information Science from Visvesvaraya Technological University in 2012. He has around 20 years of experience in academia. He has more than 40 publications in peer-reviewed journals and conference proceedings. His current research includes developing and applying machine learning algorithms to healthcare, cybersecurity and additive manufacturing. He is also a senior member of Association for Computing Machinery (ACM) and Institute of Electrical and Electronics Engineers (IEEE).