Editorial

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Biographical notes: Ali K. Kamrani is an Associate Professor of Industrial Engineering and the Director of the Industrial Engineering Graduate Program Studies and Accelerated BS to MS Program. He is the Founding Director of the Design and Free Form Fabrication Laboratory at the University of Houston, USA. He is also the Princess Fatimah Alnijris's Research Chair for AMT Visiting Professor in the Industrial Engineering Department at King Saud University, Riyadh. Saudi Arabia. His research has been motivated by the fundamental application of systems engineering and its application in advanced design and development of complex systems. He is a licensed Professional Engineer at the State of Texas.

The healthcare industry has proven to have a significant influence on the industrial nations' global competitiveness their economical growth. Currently, The USA's cost of healthcare is estimated to be 15% of the GDP and will be more than 20% by 2015. As the result of the high cost of healthcare delivery, the quality of service has begun to suffer and impacted those requiring it. It has also put a significant strain on the resources available by the healthcare providers. The increasing cost of healthcare while maintaining high quality of delivery have forced many nations to consider the need to address this national issue and consider the application of a systematic approach to address this problem. In a 2007 Mechanical Engineering Magazine featured article entitled '*Reengineering healthcare'*, A. Noor argues that engineers today are well equipped to meet the challenges of designing, implementing and operating the today's healthcare systems. In a 2001 report by the Institute of Medicine (IOM), six major goals for implementation the 21st century healthcare system has been identified. These include:

1 safety

2 effectiveness

3 patient-centred

4 timely

5 efficient

6 even-handed.

Each of these characteristics is similar to those required for designing any complex system. This process presents many challenges due to changing organisations, technology, and policies. In another study, IOM concluded that the existing proven

engineering applications are not widely used in solving problem associated with the design and development of healthcare systems. A systematic way of improving healthcare system, application of the state-of-the-art medical and information technologies, and reengineering process of delivery and organisational operations are the scope of what is called as 'healthcare systems engineering'.

The goal of this special issue is to address this subject and its impact on global demand of affordable and quality healthcare in the 21st century. The objective of this special issue is to publish the latest articles on a variety of topics related to this subject with the emphasis on the application of systems engineering to address the six major goals set by IOM.

In the first article entitled, 'Analysis of healthcare supply chain systems exposed to random capacity disruptions', Savachkin and Uribe-Sánchez present a set of mathematical tools for modelling and analysis of risk inherent in healthcare supply chains, such as pharmaceutical and medical equipment/devices enterprises. Their formulation leverages the analytical convenience of formalism of capacitated feed forward flow matching networks (FMNs) with multiple points of delivery (POD). In the second article, entitled 'Streamlining physician peer review process and capacity prediction using simulation', Lee et al. describe how the quality of medical care and service is improved using simulation modelling by streamlining RCHIs rural physician peer review process. The Rural Community and Health Institute (RCHI), a component of The Texas A&M University System Health Science Center, has developed an effective virtual physician peer review program that removes bias and promotes education. 'Applying healthcare systems engineering methods to the patient discharge process' is the title of the third article. In this article, Farris et al., presents results from a case study in a 362 bed regional teaching hospital in Texas, USA, where healthcare systems engineering methods were applied to document the current state of the discharge process and identify the most significant root causes of delays. Directions for future research on the design and management of the patient discharge process are identified and proposed. The fourth article by Mutic et al. demonstrate IDEF0 and its capability that can be used by healthcare professionals to model their clinical operations. The title of this article is 'System mapping of complex healthcare processes using IDEF0: a radiotherapy example'. Ashour and Okudan in the fifth article entitled, 'Fuzzy AHP and utility theory based patient sorting in emergency departments' present a triage algorithm that uses fuzzy analytic hierarchy process (FAHP) along with the multi-attribute utility theory (MAUT) to sort the patients. Patients' vital signs are converted into a score, using FAHP, to reflect the patient status. The FAHP takes into account the changing relative importance of the vital signs based on the primary complaint to reflects the severity due to the complaint and the vital sign levels. The sixth article is Zeid et al. present a study is to identify the significant risk factors of 'fall' among elderly people living in community centres. Different factors that may associate with falls are analysed via logistic regression and artificial neural networks models. The title of this article is 'Analysis of risk factors and predictive model for recurrent falls in community dwelling older adults'. In the seventh article by Garrett et al. an empirically supported language for describing strategies and processes that healthcare providers utilise to obtain, share and use resources during healthcare delivery is developed. A combination of observational data from clinical providers and reviews of prior literature in the resource foraging domain have resulted in an improved theoretical framework of multidimensional resource foraging. The title of this article is 'Provider information and resource foraging in

healthcare delivery'. Finally in the last article entitled, 'Linking medical records: a machine learning approach', Wang and Alexander proposed a methodology that develops the rules for identifying potential matching records using a machine learning algorithm.

I would like to thank the reviewers of this special issue. Without their assistance this project would not have been possible. I would also like to thank Dr. Dorgham and Mr. Jim Corlett from Inderscience Publishers for their support and assistance. Finally, I would like to thank our contributors by allowing us to share the results of their research with the rest of the business, engineering and medical communities.