Editorial: Information integrity in healthcare delivery

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Biographical notes: Kevin C. Desouza is completing his doctoral work at the University of Illinois at Chicago. He has authored *Managing Knowledge with Artificial Intelligence* (Quorum Books, 2001) and over 50 refereed articles in journals such as the *Communications of the ACM, Information & Management, Industrial Management, Technology Forecasting and Social Change, Journal of the American Society for Information Science and Technology, Journal of Business Strategy, Human Resource Magazine, Journal of Engineering and Technology Management, International Journal of Information Management, Government Information Quarterly, Journal of Contingencies and Crisis Management, Business Horizons, Competitive Intelligence Magazine, Across the Board, Emergence, European Management Journal*, and the likes. His recent book is *Managing Information in a Complex World* (co-authored with T. Hensgen, M.E.Sharpe, 2004). Mr. Desouza is currently serving as an associate editor of the *Journal of Information Science and Technology*, and is on the editorial board of several journals. His research interests include knowledge management, national security, and military intelligence. Mr. Desouza is the co-founder and President of The Engaged Enterprise, a global research and strategy consulting organisation.

Eliezer (Elie) Geisler is Professor and Associate Dean for Research at the Stuart Graduate School of Business, Illinois Institute of Technology. He holds a doctorate from the Kellogg School at Northwestern University. Dr. Geisler is the author of about 90 papers in the areas of technology and innovation management, the evaluation of R&D, science and technology, and the management of medical technology. He is the author of eight books, including: *The Metrics of Science and Technology* (2000), and *Creating Value with Science and Technology* (2001). Dr. Geisler was Founder and Editor of the Department of Information Technology for the *IEEE Transactions on Engineering Management*, and is Associate Editor of the *International Journal of Healthcare Technology and Management*. He consulted for major corporations and for many US federal departments, such as Defense, Commerce, EPA, Energy, and NASA. Dr. Geisler is Director of IIT's Center for the Management of Medical Technology (CMMT). Dr. Geisler co-chairs the annual Conference on the Hospital of the Future. His most recent books are: *Installing and Managing Workable Knowledge Management Systems* (Praeger, 2003, co-authored with Rubenstein)

and: *Technology, Healthcare and Management in the Hospital of the Future* (2003, with Krabbendam and Schuring). His forthcoming book is: *The Structure and Progress of Knowledge: Applications in Databases and Management Systems* (M.E. Sharpe, 2004).

Paul Prabhaker is an Associate Dean and Professor at the Stuart Graduate School of Business, Illinois Institute of Technology. Paul has a PhD in business administration (1984), specialising in marketing, and a Master's degree in econometrics (1979) from the Graduate School of Management, University of Rochester (NY). He also has an MBA and an undergraduate degree in engineering. Professor Prabhaker is recognised for his research in the fields of marketing strategy, information integrity, e-business strategy and value-based marketing. Dr. Prabhaker has published over 50 articles in leading journals such as the *Journal of Consumer Marketing*, *Journal of Marketing Research*, the *Journal of Advertising Research*, the *Journal of Psychology and Marketing*, the *Journal of Business & Industrial Marketing*. He has presented his research in numerous academic conferences in the USA and in several European and Asian countries. Paul is an outstanding classroom teacher, having won Best-Teacher-of-the-Year award four times in three different universities. Paul has reviewed over a dozen textbooks in marketing, for publishers such as Prentice-Hall. He is a member of the American Marketing Association, The Institute of Management Sciences, the Decision Sciences Institute, the Academy of Marketing Science and the Production and Management Society. Based on his scholarly contributions in academia and his professional contributions to management practitioners, Dr. Prabhaker has been nominated and listed in *Who's Who in the East* (1987), *Who's Who in Advertising* (1990) and *Who's Who in the World* (1991).

The healthcare industry faces constant and relentless pressures to lower costs while maintaining and increasing the quality of service. These central themes have led to the application of an assortment of methodologies designed to explore and utilise the information and knowledge that exist in healthcare and hospital information systems. In addition, the industry also faces challenges that arise from medical errors, the continuing lack of integration of medical databases, slow adoption of advances in information technology and knowledge management, and the demands and implications of HIPPA on the management of health information.

A key facet of the usefulness and successful adoption of emerging healthcare information technologies is the integrity of healthcare information. This can be defined as the accuracy, consistency, and reliability of information flowing within the healthcare delivery industry: providers, suppliers, regulators, and insurers. It is the accuracy of the input, consistency of the process over time and across databases, systems and organisations, and the reliability of outputs, including completeness and timeliness. It is also the level of confidence and trustworthiness of the content of information, its applications and systems.

The purpose of this special issue was to solicit papers that address the issues, barriers and critical elements that influence the information integrity in healthcare and the organisational dimensions and factors that are impacted by it. We sought a broad range of papers which take varying stances and approaches, such as strategy, operations, economics, organisational, and accounting. Topics of interest included, but were not limited to:

- the use of emerging healthcare information systems and knowledge management systems in the prevention, monitoring, detection, verification and correction of information errors

- issues related to security, audit and control of information and knowledge management in healthcare delivery

- adoption of healthcare information technologies in data scrubbing and cleansing and the creation of data warehouses

- the impacts of deficiencies in information integrity on individuals, groups, units, and organisations in healthcare delivery

- information integrity and the integration of healthcare information systems due to mergers, acquisitions and consolidations

- the implications and challenges of HIPPA on the management of healthcare information systems and the role that information integrity plays in this process.

We were excited by the interest that the call for papers had generated. Inquiries regarding the special issue were made from a diverse group of researchers from 25 countries. The call for papers not only drew academic interest but also enticed the attention of practitioners and members of the government community. The call for papers was sent out in early April 2003. As a result, 35 abstracts were received by potential researchers seeking guidance on the topical nature of their research and the fit to the special issue. From these inquiries, we received a total of 16 initial submissions for review and consideration for publication. Each paper was initially screened by the guest editors for fit to the special issue and publication promise. One paper was rejected at this stage due to poor fit with the special issue. The remaining 15 papers were sent to three referees each. On receipt of the reviews, seven papers were conditionally accepted pending revisions. On resubmission, all seven papers were accepted for publication.

The first paper 'Impact of HIPAA on the integrity of health care information' is by Jane Fedorowicz and Amy W. Ray, both from Bentley College, Massachusetts, USA. The authors present an interesting study of the information integrity issues involved in sharing information across multiple healthcare organisations. They also discuss issues involved in the administrative simplification provision of HIPAA, such as transaction codes and standards, unique identifier codes, and information privacy protocols.

The second paper is by Steven John Simon (Mercer University; Georgia, USA) and David E. Harrell (3M Health Care Consulting; Georgia, USA), entitled 'Hospital profitability crisis: an integrated process and technology solution'. Simon and Harrell argue that failure of hospital's to develop adequate process designs and healthcare technology solutions to keep up with ubiquitous and pervasive change in the operating and legal environments are root causes for the profitability crisis. The profitability crisis faced by hospitals, will eventually lead to poor quality in service delivery. The authors examine these issues with regard to ambulatory payment classification (APC) – the scheme that drives hospital billing systems – and an integrated technology solution. Two scenarios are provided illustrating a non-integrated/manual hospital and an integrated process and information system. Learning points, process flowcharts, and real-world examples are used to demonstrate potential gains from the integrated technology solution.

The third paper 'NHS information quality and integrity: issues arising from primary service provision' is co-authored by Matthew A. Guah and Wendy L. Currie from Brunel University, UK. The authors discuss the latest strategic model implemented by the UK's National Health Service – primary service provision (PSP). The PSP model is a subset of the more popular application service provision (ASP) model of conducting business over the internet. The authors discuss security issues involved with the PSP initiative and demonstrate how these can compromise the quality, reliability, and eventually integrity of information.

The fourth paper 'The strategic planning for health information systems in New Zealand: a telemedicine perspective' is by Nabeel A. Y. Al-Qirim (Auckland University of Technology; New Zealand). Al-Qirim reviews the strategic planning of health information systems in New Zealand, with a focus on aspects of telemedicine. Telemedicine technology is introduced as one possible panacea to provide integrated, continuous, quality, and immediate medical care to rural patients and to encourage networking amongst the different hospitals in New Zealand. The research suggests that certain issues need to be addressed first before telemedicine benefits could be realised in healthcare delivery in New Zealand. Implementing comprehensive cost-benefit analysis and identifying the benefits sought from adopting telemedicine are some of the suggested solutions in the paper.

The fifth paper is 'Protection of health information in data mining' by Jingquan Li and Michael Shaw of the University of Illinois at Urbana-Champaign. The authors employ a technical approach to the problem of managing information integrity in healthcare enterprises. Specifically, they show how privacy-enhancing technologies such as data filters, discretisation, fixed-data perturbation, probability distribution, and randomisations can help in protection of sensitive private patient information. These techniques can enable researchers and practitioners to use patient healthcare records for research purposes while preserving the privacy of sensitive data. The results of their experiments show that we can achieve comparative predictive accuracies without accessing the actual values of the sensitive attributes.

The sixth paper is 'Developing data production maps: meeting patient discharge submission requirements' by Bruce Davidson (Cedars-Sinai Health System), Yang Lee (Northeastern University), and Richard Wang (Massachusetts Institute of Technology). The authors build on their previous work which argues that information must be managed as a product, and what is an information manufacturing system that must be developed for delivering information products with high quality. In this paper, they show how data production maps have been developed at Cedars Sinai Medical Center to model, analyse, and improve the quality of patient-level data that Cedars-Sinai must submit to the State of California's Office of Statewide Health Planning and Development (OSHPD). Experience gained and lessons learned are presented as they relate to the case.

The seventh and final paper is 'Information integrity in healthcare enterprises: strategies for mitigation of medical errors' by Kevin Desouza (University of Illinois at Chicago), Yukika Awazu (YA Research), Darrin Thomas (University of Illinois at Chicago), and Yifeng Zhang (University of Illinois at Chicago). Medical errors emerge when there is lack of efficient and effective processing of information. Medical errors and mistakes are the most commonly reported negative press for the healthcare industry. In this paper,
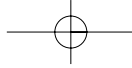
the authors provide a systematic framework, grounded in the theory of semiotics, to study medical errors. Using this framework, plausible strategies that can be used to mitigate the occurrence of errors are presented.

This special issue should serve as a forum for future discussions on issues of information integrity in healthcare delivery. The demographics of the accepted papers attests to the fact that maintaining and researching information integrity issues in healthcare enterprises is a global and a multidisciplinary engagement. We would like to thank the many people who helped in compiling the issue. A total of 45 reviewers helped in the refereeing process. We would like to express our appreciation to the editor-in-chief of the Journal for encouraging and accepting our proposal for the special issue. We hope our readers will find the papers interesting and stimulating.