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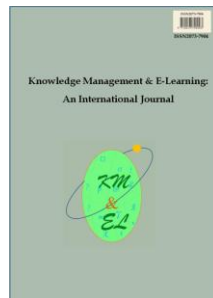
Editorial: Advances in healthcare provider and patient training to improve the quality and safety of patient care

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Abstract: This special issue of the Knowledge Management & E-Learning: An International Journal is dedicated to describing "Advances in Healthcare Provider and Patient Training to Improve the Quality and Safety of Patient Care." Patient safety is an important and fundamental requirement of ensuring the quality of patient care. Training and education has been identified as a key to improving healthcare provider patient safety competencies especially when working with new technologies such as electronic health records and mobile health applications. Such technologies can be harnessed to improve patient safety; however, if not used properly they can negatively impact on patient safety. In this issue we focus on advances in training that can improve patient safety and the optimal use of new technologies in healthcare. For example, use of clinical simulations and online computer based training can be employed both to facilitate learning about new clinical discoveries as well as to integrate technology into day to day healthcare practices. In this issue we are publishing papers that describe advances in healthcare provider and patient training to improve patient safety as it relates to the use of educational technologies, health information technology and on-line health resources. In addition, in the special issue we describe new approaches to training and patient safety including, online communities, clinical simulations, on-the-job training, computer based training and health information systems that educate about and support safer patient care in real-time (i.e. when health professionals are providing care to patients). These educational and technological initiatives can be aimed at health professionals (i.e. students and those who are currently working in the field). The outcomes of this work are significant as they lead to safer care for patients and their family members. The issue has both theoretical and applied papers that describe advances in patient safety and training.

Keywords: Health information technology; Decision support systems; Telemedicine; Online training; Clinical simulations; Classroom training; Risk management; Patient safety; Medical errors

Biographical notes: Dr. Elizabeth Borycki, RN, PhD is an Associate Professor with the School of Health Information Science at the University of Victoria in Victoria, British Columbia, Canada. Dr. Borycki's research interests include health information systems safety, human factors, clinical informatics, organizational behavior and change management involving health information systems. Elizabeth has authored and co-authored numerous articles and book chapters as well as edited several books examining the effects of health information systems upon health professional work processes and patient outcomes. Dr. Borycki is also the Vice Chair of the Health Informatics for Patient Safety Working Group for the International Medical Informatics Association, Geneva, Switerzland.

1. Introduction

With the publication of the Institute of Medicine's seminal report *To Err is Human: Building a Safer Health System* we saw the healthcare industry shift in its focus. Around the world health professionals and administrators implemented technologies and instituted educational programs to improve the quality and safety of patient care (Institute of Medicine, 2000). This work fueled a significant cultural shift in healthcare to that quality and safety. In universities and colleges we saw the introduction of educational initiatives and approaches that would help health professionals improve the quality and safety of the care they provided. Healthcare organizations also changed. Organizations such as hospitals, clinics and physician offices moved towards introducing new technologies that could improve quality of patient care while at the same time delivering the benefits to patients of safer care. These technologies included electronic health records and decision support systems which were used to support health professionals as they cared for patients (Burns, Bradley, & Weiner, 2012; Kushniruk & Borycki, 2008).

More recently, we saw the publication of the Institute of Medicines' report on *Health Information Technology Safety: Building Safer Systems for Better Care*. The report identifies that we need to not only continue to implement technologies that can improve the quality and safety of health care, but we need to design, develop and implement safer health information technologies (i.e. improve the quality and safety of the technologies health professionals use) (Institute of Medicine, 2011).

Since the 1990's we have seen a wave of publications about the technologies and approaches that can be used to improve the quality and safety of health care (Institute of Medicine, 2000). In the mid-2000's we saw a second wave of publications emerge where researchers started to document and publish about how the health information technologies we have designed to improve the quality and safety of health care need to be studied and improved so that they can be made safer (and so that they do not introduce new types of medical errors – sometimes referred to as technology-induced errors) (Borycki & Kushniruk, 2008; Borycki & Kushniruk, 2010). The next wave of publications in this area will focus on advances in training and education surrounding quality and safety of health information technologies used in patient care. Health professionals and health information technology professionals will continue to design, develop and implement new technologies that will improve the quality and safety of health care; however, there is also a need for these professional groups to learn about how to identify potential poorly designed and defective technologies that can lead to unsafe conditions and lead to medical errors. To do this, there is a need for training of health professionals and information technology professionals. Health professionals and information technology professionals can identify instances where the technology leads to unsafe conditions and may potentially lead to an error, but they must be educated about how to identify and fully report on these issues in such a way that the technology designers, developers and implementers can effectively improve the quality of the safety and technology itself. It is within this context that the current issue of the Knowledge Management & E-Learning: An International Journal has been published.

A number of themes are present in the papers published in this issue. Themes include the: (a) development and implementation of technologies that are able to improve the quality and safety of health care, (b) competencies among health and technology professionals to enable use of health information technologies to improve quality and

safety of patient care, and (c) development of competencies among health and technology professionals to enable use health information technologies to improve quality and safety of patient care.

2. Design, development and implementation of health information technologies to improve quality and safety of health care

The first theme focuses on health information technologies and how they can improve the quality and safety of health care. For example, Dexheimer, Gu, Guo, Johnson, and Kercsmar's article outlines the design, development and implementation of an information system aimed at supporting health professionals to treat asthma. The article describes an evidence-based, guideline-compliant decision support system that is being used in clinic settings. The system improves clinician training and thereby improves the quality and safety of patient care. Qureshi, Raza, Whitty, and Abdin's research analyzes the implementation of and explores the benefits of telemedicine upon the quality and safety of patient care in rural settings in Pakistan. The work concludes that an enhanced link between physicians and telemedicine leads to better physician care in rural health care settings.

3. Development of competencies among health and technology professionals to enable use of health information technologies to improve quality and safety of patient care

These articles are followed by papers that focus on development of competencies among health and information technology professionals that enable them to use the technologies that improve the quality and safety of patient care. For example, Saratan, Borycki, and Kushniruk, report on a research study investigating the views of nurses of information management competencies as described by "Technology Informatics Guiding Education Reform" (TIGER, 2015). The work validated the importance of these competencies for new graduates and practicing nurses, and identified the need for introducing several new competencies such as those involving information privacy, information security and reporting on technology-induced errors. Kleib and Olson's work describes the development of an informatics education intervention for student nurses. The findings show a large effect on knowledge gained, but no effect on nursing students' attitudes or confidence toward informatics. She was also able to show that face-to-face and vodcasting were equally effective for educating students about informatics. In the area of clinical simulation, Jensen's article outlines the value of clinical simulations in contributing to the safety and quality of patient care. The author identifies that clinical simulations can be used in requirements specification, analysis of user requirements, description of user work practices, evaluation of health information technologies and can aid in procurement. Davis and Davis report on findings from an interview study with clinical simulation facilitators. Their work identifies several important themes such as the role of fidelity, acceptance by participants, and documentation of scenarios as being important to simulations and influencing outcomes such as health professional communication as well as quality and safety of patient care.

4. Use of technology to train practicing health professionals about the quality and safety of health care

The last theme that emerges is a focus on practicing health professionals and how we are currently training them to improve the quality and safety of health care using technology – simulation and eLearning technologies. Borycki purposes a framework for teaching health professionals about health information technology risks. The framework is used to teach health professionals and health information technology professionals about technology risk and is used to motivate educational exercises in conjunction with simulations when training professionals. Younge, Borycki, and Kushniruk report on the findings of a scoping review of on-the-job training strategies for health professionals for electronic health and medical record training. The work identifies a number of time points when training is done: during technology implementation, orientation and post-implementation. She notes a number of training methods are used to educate health professionals who are working for healthcare organizations. Lastly, Samyn, Rai, and Piriou describe and advance thinking around training healthcare workers in the area of supply chain management of medications. They use a case study to illustrate how this is done using e-Learning and a community of learning and practice.

5. Conclusions

In this Special Issue of *Knowledge Management & E-Learning: International Journal* we have examined "Advances in Healthcare Provider and Patient Training to Improve the Quality and Safety of Patient Care". Researchers from around the world have contributed to this journal. Research from Belgium, Canada, Denmark, Pakistan and the United States demonstrates the international nature and commitment to quality and safety by health and information technology professionals to designing technologies that improve the quality and safety of patient care. We have the opportunity to read several publications that speak to developing informatics competencies in nursing students, new graduates and seasoned nurses. We also see the advancement of these competencies in other health professionals such as physicians, pharmacists and health information technology professioanls. Several authors describe how to use simulations to improve the quality and safety of technology (i.e. Jensen, Borycki) and in training health professionals to provide high quality, safe care (i.e. Davis, Davis). Lastly, we have two articles that focus on training. Younge, Borycki, and Kushniruk report on training health professionals about electronic health records and medical records while Samyn, Rai, and Piriou demonstrate the value of eLearning in the area of supply chain management. Researchers are advancing health care provider training to advance the quality of health care and improve patient safety – more research is needed as health information technologies improve and new technologies are used in health care.

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