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Abstract: The ability of consumers of health information to effectively understand, process and apply health information presented to them is a critical factor in improving health knowledge and developing effective health promotion strategies. Nowhere has this become more apparent than in efforts to apply information technology in the development of a range of systems and applications targeted for use by patients, and the general population. Indeed, success and failure of eHealth initiatives has been shown to depend on consideration of how to effectively design and deploy health information to consumers. Health literacy has become an important area of study that focuses on studying how health information can be understood and applied to improve health. In recent years the concept of eHealth literacy has also emerged, that sits at the intersection of health literacy and information technology literacy. In this special issue, a range of papers are presented that focus on the emerging concept of eHealth literacy. The papers in the special issue focus on basic definitional and conceptual issues as well as methodological approaches to studying health and eHealth literacy. A special focus of the issue is on how these concepts apply and can be adapted for improving health information technologies and applications.

Biographical notes: Andre W. Kushniruk is Director and Professor in Health Informatics at the School of Health Information Science at the University of Victoria, Canada. He is a fellow of the American College of Medical Informatics. Dr. Kushniruk conducts research in a number of areas including usability engineering, human-computer interaction in healthcare and cognitive studies of end users of health information systems. He has been involved in some of the first work in providing patients with Internet access to their own health information (as stored in hospital-wide electronic health records) and he continues to work with designers and evaluators on a wide range of health information systems. He holds undergraduate degrees in Psychology and Biology from Brock University, as well as an MSc in Computer Science from McMaster University and a PhD in Cognitive Psychology from McGill University.

1. Introduction

In this special issue of the KM&EL international journal we include papers that describe advances in the emerging area of eHealth literacy. Methods for assessing eHealth literacy focus on ways of measuring the extent to which people can find, understand and use health information obtained from electronic sources (i.e. eHealth literacy). New approaches to understanding eHealth literacy are needed in order to improve the effectiveness of healthcare in the age of mobile and virtual healthcare (Chan & Kaufman, 2011; Norman, 2011). Indeed an increasing number of information systems and resources have been designed for use by the general population as well as specific patient and lay populations, such as the elderly, disabled and the young. There currently exists a wide range of systems and health IT applications since the first work less than two decades ago in allowing patients to access their own institutional health records over the WWW (Cimino, Patel, & Kushniruk, 2002). In many countries patient information has become readily available and accessible by patients and citizens over the Internet. However, the extent to which these technologies meet the information and understanding needs of end users is often questionable. Indeed many health systems, websites and on-line resources have been criticized for not only lack of usability but also for issues related to the content of information, its understandability, its usefulness and its presentation (Greenhalgh, Hinder, Stramer, Bratan, & Russell, 2010). To address these issues new methods (that can draw from areas such as health literacy, as well as user-centered and participatory health IT design processes) are needed to fine-tune and improve the uptake of information presented to users in order to improve the health of the general population.

In response to the challenges involved in effectively designing and presenting health information to patients and the general public, the concept of eHealth literacy has emerged (Norman & Skinner, 2006). In this special issue we have compiled papers that describe advances in understanding health literacy as the concept relates to use of on-line health resources, health promotion initiatives and health information systems. The special issue has focused on new approaches to defining and conceptualizing eHealth literacy, novel approaches to improving health and eHealth literacy, and to improving the adoption of systems and information resources targeted to patients, lay people and the general population. This can be achieved through improved educational initiatives and consideration of eHealth literacy in designing and developing applications as well as improved online information resources.

2. Preview of papers

This issue was designed to elicit both foundational and applied papers that describe efforts around eHealth literacy. We were interested in both theoretical and applied papers that aim to improve healthcare and specifically improve uptake of health information by the wider population using information technologies and online resources. We hoped to stimulate interest in the issues across academia, practice, industry, research and policy and therefore we welcomed focused papers from all sectors. A number of topics and themes emerged from the papers that were submitted to this issue that included the following:

- eHealth literacy as a concept
- The relation of eHealth literacy to health literacy research

- Advances in the application of concepts from eHealth literacy in the design and deployment of new information technologies
- Research on the potential and opportunities for improving the uptake of health related information using eHealth, web technologies, mobile health applications and virtual health applications
- Approaches to measuring and assessing eHealth literacy
- Approaches to assessing user needs regarding health information and its understanding and translation into practice
- Approaches to designing health information systems for the public that better take into account the information needs, understanding, capacity as well as limitations of end users
- Best practices for incorporating advanced health information technology into daily health practices and promotion.
- Approaches and technologies for providing distance health information and support to lay people and patients
- Results of studies examining eHealth literacy
- Educational practices and approaches to improving eHealth literacy
- New developments, trends and approaches to e-learning and distance education of the general public that takes into consideration eHealth literacy

Of the papers selected for inclusion in this special issue a variety of topics were covered. In this issue, the paper by Norgaard, Furstrand, Klokker, Karnoe, Batterham, Kayser, and Osborne describes a new approach to conceptualizing eHealth literacy. To better understand eHealth literacy, concept mapping was used to evaluate qualitative data from workshops and to derive what Norgaard and colleagues refer to as the seven domains of eHealth literacy. This work has been used as a basis for the development of survey tools as well as for application in requirements gathering and design of eHealth applications (Kayser, Kushniruk, Osborne, Norgaard, & Turner, 2015). The application of Norgaard et al.'s seven domains of eHealth along with consideration of new methods for design of Healthcare information systems is described in the paper in this issue by Monkman and Kushniruk. In this paper, the extension of the concept of health literacy to eHealth literacy is explored in the context of approaches to designing systems and applications that are appropriate in terms of demands on users' eHealth literacy. In the paper by Chan, Mirkovic, Furniss, and Kaufman, an innovative approach to assessing eHealth literacy is described that focuses on evaluating demands and cognitive processes underlying barriers to consumer health information seeking. The approach borrows from human factors and applies cognitive task analysis as well as methods for observing end users to assess issues regarding eHealth literacy. Following this, the paper in this issue by Karnoe and Kayser further explores the concept of eHealth literacy by providing a systematic review of how eHealth literacy is measured and what its measurement tells us. In the paper by Limaye, Deka, Ahmed, and Mwaikambo an approach to designing eLearning courses to meet the digital literacy needs of healthcare workers in lower and middle-income countries is outlined. Contextual factors and challenges to eHealth literacy are described by Olaniran who focuses on work in less economically developed countries. Describing yet another application of eHealth literacy in this issue are Mather and Cummings, who examine the need to consider those aspects that should be embedded in the design of systems, to enable promotion of eHealth literacy. The authors provide an example of their framework in the context of in-situ learning using mobile applications at

point of care. Also in this issue, King, Cianfrone, Korf-Uzan, and Madani describe their work in using methods to engage youth in the development, implementation and dissemination of eMental Health literacy resources. Hadzidedic Bazdarevic and Cristea in their paper focus on personalization of web sites by providing appropriate content to a subset of users. Finally, Hardiman and Ho describe their work on assessing the effect of educational attainment levels on the use of non-traditional health information resources.

Although the papers in this publication cover a diverse range of concepts, methods and approaches related to eHealth literacy, they are all focused on improving the understanding and usefulness of health information presented to a wide range of users by applying a range of techniques. It is hoped that the papers will stimulate further work and related advances in the future, with the goal of improving health and health promotion through application of information technologies.

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