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R53. Measuring the Impact of Nursing Informatics Competencies on Decision Satisfaction: Theoretical Model and Direction for New Research

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Abstract

Nursing informatics competencies (NIC) refer to the knowledge and skills needed to effectively use technological resources to provide effective care using health care technology (TIGER, 2006). NICs are crucial in providing patient-centred care in healthcare, an industry that uses different technology to support clinical activities, for example, electronic health records (EHR). This study will provide an overview of the benefits of nursing informatics competencies, and propose a theoretical model that can be used to assess the impact of nurses NIC level on their satisfaction with their decisions resulting in the use of decision support systems. This study will then discuss a proposed methodology, and managerial implications for the results, and future research directions which may be pursued. This preliminary research is important because it will indicate if and how this research should advance as it will determine if decision making satisfaction is a viable outcome of nurses and their level of NIC.

Keywords

Information Systems, Informatics, Nursing Informatics Competencies, E-Health, Patient-Centered Care, Decision Satisfaction

1. Introduction

The level of care provided by staff in hospitals, long-term care facilities and other healthcare organizations following a patient-centred model of care has the potential to be enhanced by investing in information technology. Some major benefits of technology are determined to be efficiency of care, effectiveness of care, provider satisfaction, patient safety, and patient satisfaction (Buntin et al, 2011). Research on the application of technology in healthcare areas that subscribe to patient-centred care show some positive outcomes (Bates & Bitton, 2010)

Although information technology may benefit health care facilities, little research focuses on the abilities required to effectively use of these systems and the impact on the practitioners themselves. Using information technology to support and transform health care activities is the concept of “e-health”. E-health entails the promotion of efficiency and enhancement of healthcare by using technology to extend the capabilities of healthcare (Eysenbach, 2001).

Decision support systems (DSS) are tools that provide information and aide the user in making decisions, especially in the area of healthcare (Henry, 1995; Bose, 2003). DSS have been successfully employed in healthcare, such as PRODIGY, a DSS used and implemented by UK General Practice (Rajalakshmi) and are currently being implemented in Ontario through the implementation of electronic health records (Ministry of Health and Long-term Care, 2013).

It is important that the nurses who use these technologies have a certain level of competency, but there is very little evidence concerning the actual benefits to the individual, the organization, and the impact on the patients when nurses have high levels of nursing informatics competencies. To attempt to address the subjective nature of assessing the impact of nursing informatics competencies, this research will explore decision making satisfaction as a possible outcome of an individual possessing nursing informatics competencies. Nurses lacking these competencies may present barriers when adopting and implementing new technology. Another barrier is the user satisfaction of the individual with the system being used by the organization. Systems which are not user-friendly may present barriers when using information systems as users may spend more time trying to learn the system than actually using the system (Deveraj, 2014).

The objective of this research is to determine the impact of NICs on decision-making satisfaction in a nursing environment. Although, this research is preliminary it can contribute to future research in assessing the impact of nursing informatics competencies and their direct impact on the organization, the nurses themselves and the adoption of technology in healthcare. The context of this research is at the individual level in a healthcare setting, more specifically in a hospital setting. It will examine the skill level of registered nurses in a variety of healthcare settings. This paper will present a theoretical model based on literature pertaining to patient-centred care, e-health, nursing informatics and associated competencies, decision making, and user satisfaction.

2. Background: Patient-Centered Care and E-Health

The Patient-centred care (PCC) model differs from traditional care models by basing care on the patient's needs and wants versus basing care on the course of the disease and/or illness (Dawson et al, 2009; Bechtel and Ness, 2010). The PCC model is a collaborative approach to patient care involving the patient, their family, and the care providers (Dawson et al, 2009; Bechtel and Ness, 2010). PCC requires communication, coordination, patient support, and in general whole person care which is when the health care provider takes the time to understand a patient's wants, needs, values is a very important attribute of the PCC model (Betchel and Ness, 2010). Shared decision making is a very important attribute of PCC (Barry & Edgman-Levitan, 2012).

Enhancing the PCC model using technology to enrich the collaboration and empower the patient is a concept called patient-centred e-health (Dawson et al, 2009). E-health promises to deliver more efficient, timely, and healthcare and supports a PCC model (TIGER, 2006). E-health promotes efficiency; enhances quality of care; promotes empowerment of the patient, encourages the establishment of new relationships between patient and health care professional; enables the exchange of information, promotes equity, promotes education and more (Eysenbach, 2001). The goals of e-health are to deliver value to the patient and achieve operational efficiency (Bose, 2003).

2.1 Nursing Informatics

Nursing informatics entails the use of information technology to deliver nursing in healthcare. More broadly, informatics focuses on many different areas within healthcare. For example, clinical informatics (also known as operational informatics), is the delivery of healthcare services through the application of informatics and information technology (AMIA, 2015). Nursing informatics integrates nursing science, computer science, and information science (AMIA, 2015; Henry, 1995; and Staggers & Thompson, 2002). The goal of nursing informatics is to effectively manage and communicate data, information, and knowledge in nursing practice and is supported through the use of information technology (Staggers & Thompson, 2002).

Nursing informatics supports decisions in all roles and settings (Staggers & Thompson, 2002). Nursing and health informatics are concerned with patient care, processing data, information and knowledge and decision making (Smedley, 2005). A crucial component in enhancing the PCC model of care with information technology is the ability to use informatics tools is integral in being able to provide PCC (Harsanyi et al, 2000; Norton et al, 2006). Indeed, informatics competencies are being incorporated into many nursing programs and becoming required for many roles within healthcare organizations (Curran, 2003; Smedley, 2005).

2.1.1 Nursing Informatics Competencies

The use of technology is becoming more prevalent in healthcare organizations to manage knowledge, especially with the increased knowledge of nurses (Curran, 2003). Nursing informatics competencies (NIC) are the informatics skills needed to effectively use these resources to provide effective care using health care technology (TIGER, 2006). Although many other informatics competency models have been developed for use in different contexts such as public health (eg. Sitthisak et al, 2007), a widely accepted competency model for nursing at different levels of nursing includes the following competency classifications: basic computer skills, information management, and information (Chang, 2011; Staggers et al, 2002). Different skills are applicable at different levels including beginning nurse, experienced nurse, informatics specialist, and informatics innovators (Staggers, et al, 2002). Although there the specific skills are numerous (e.g. ability to use smart technology, ability to use web browsers, etc.), they can be grouped into these three competencies (Chou and De Martinis, 2013; Sun and Falan, 2013; TIGER, 2006; and Staggers et al, 2002).

First, basic computer skills are essential to communication and documentation and include: being able to use word processors; the ability to type; create presentations; web browsing; use multimedia; telecommunications; the ability to use databases and information systems and more (Chou and De Martinis, 2013; Sun and Falan, 2013; TIGER, 2006; and Staggers et al, 2002). Second, information management is essential to protecting patient security; the ability to use information for decision making; collecting, processing, and presenting data; applying data for decision support and; protecting data and ensuring data integrity (Chou and De Martinis, 2013; Sun and Falan, 2013; TIGER, 2006; and Staggers et al, 2002). Third, information literacy is essential in ensuring the patient is given accurate, timely and relevant information; the ability to decipher relevant and irrelevant information by using critical thinking skills and; retrieving, evaluating and using information (Chou and De Martinis, 2013; Sun and Falan, 2013; TIGER, 2006; and Staggers et al, 2002).

The body of research surrounding NIC suffers from several setbacks. First, these abilities have been determined and categorized into the three presented variables. Nursing informatics competencies have been determined, but the actual impact on the individual, organization, patients, and other stakeholders is explored in the literature in far less depth. This is perhaps due to the subjective nature of the outcomes of having nursing informatics competencies as many of the outcomes are perceived by the individual, the organization, the patients and/or the stakeholders and are difficult to quantify. Second, few studies have researched the impact of NICs on any other outcome variables. Lin et al (2007) investigated the relationship between the informatics competency of nurses and their satisfaction regarding network education (long distance education strategies for nursing education to overcome barriers and allow for knowledge attainment). Lin et al (2007) determined that nurses with higher informatics competency were more satisfied with network education. Although this measured the benefit to the individual, it did not evaluate the impact of NIC on the organization, quality of care or any other benefit that is measurable. In a study by Hwang and Park (2011), it was determined that nursing informatics competencies were required and that the nurses in the study perceived their competencies as low, however, the study did not indicate how these results impacted the organization.

NICs can potentially impact the delivery of PCC (TIGER, 2006), however little, if any, research indicates how these competencies can impact PCC and therefore the management of operations within the organization. PCC is the method of care employed by the organization and thus would impact the strategic management of the organization (Luxford et al, 2011). Organizational impact or more specifically, decision making satisfaction will be a proposed measure in the presented models as decision making satisfaction has been used as an assessment of satisfaction with decision support systems (Alawan et al, 2014).

2.2 Decision Support Systems and Decision Making

Decision making is the three stage (predecision, decision, and post decision) process of searching for information to choose an appropriate alternative (Zeleny, 1982). The process of decision making in the clinical context starts with assessment, diagnosis/clinical inference, information seeking, and planning (Henry, 1995). However, this linear thought process is not necessarily used by all healthcare providers (Henry, 1995). Information technology is found to support decision making for nurses through technology such as decision support tools (Henry, 1995). Decision support systems (DSS) are adaptable and flexible systems, which support and facilitate decision making by providing solutions to non-structured problems (Rajalakshmi, 2011). DSS tools enable healthcare providers to make informed decisions (Henry, 1995).

2.2.1 Decision Making Satisfaction

Decision making satisfaction is used as an assessment of satisfaction with DSS (Bharati & Chaudhury, 2004). DSS are tools used to support decisions within an organization such as electronic health records (EHR) or enterprise content management (ECM) systems (Bharati & Chaudhury, 2004). ECM systems are decision support tools, positively influence decision making analysis, decision quality, and decision making speed (Alawan et al, 2014). ECM use may be beneficial for environments which are demanding in time and require up-to-date information (Alawan et al, 2014). Decision making satisfaction is positively impacted by DSS technology (Bernoider & Schmollerl, 2013).

2.3 User Satisfaction

User satisfaction is a person's feelings or attitude in a situation toward a situation, where for instance, the situation is an application being used (Bailey & Pearson, 1983). The skill level of the user and the information provided by the system strongly influence perceived usefulness and perceived ease of use (Moore, 2012). Additionally, trained and experienced users influence their perception of the system and more trained and experienced users understand the value in the system and the attitude toward the system is explained by the actual usefulness of the system (Moore, 2012).

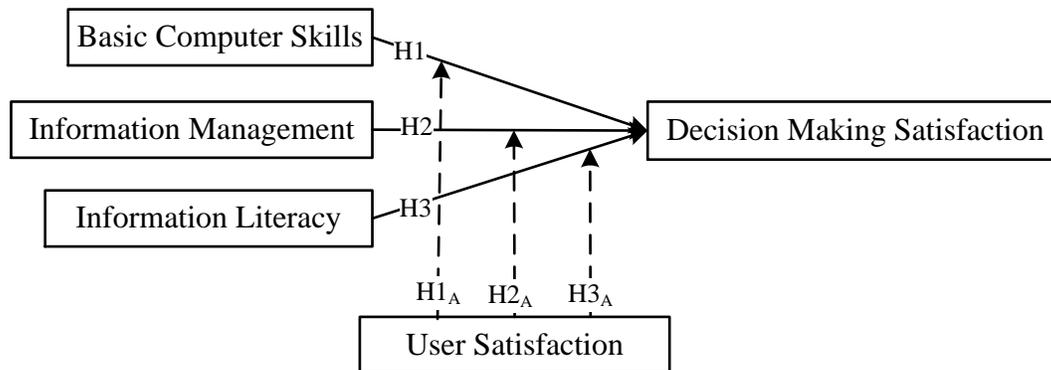


Figure 1: Research Model

3. Research Model

Figure 1 shows the proposed research model.

3.1 Nursing Informatics Competencies

As previously discussed, competencies of nursing informatics are categorized as basic computer skills, information management and information literacy (Sun and Falan, 2013; TIGER, 2006; Staggers et al, 2002; and Chou and De Martinis, 2013). Basic computer skills are essential to communication and documentation (Sun and Falan, 2013; TIGER, 2006; Staggers et al, 2002; and Chou and De Martinis, 2013). These skills encompass an individual's ability to use a computer's basic functionalities. Information management is the ability to use information for decision making by collecting, processing, and presenting data and applying the data for decision support (Sun and Falan, 2013; TIGER, 2006; Staggers et al, 2002; and Chou and De Martinis, 2013). Information literacy is the ability to decipher relevant and irrelevant information by using critical thinking skills and retrieving, evaluating and using information (Sun and Falan, 2013; TIGER, 2006; Staggers et al, 2002; and Chou and De Martinis, 2013). Since nursing informatics involves using DSS to support decision (Staggers & Thompson, 2002), it is proposed that NIC are needed to successfully to use DSS and result in user's being satisfied with their decisions.

H1: Basic computer skills will positively impact decision making satisfaction

H2: Information management will positively impact decision making satisfaction

H3: Information literacy will impact decision making satisfaction

3.2 User Satisfaction

User satisfaction determines the intent to use and more importantly, attitude toward the information system (Delone and McLean, 2003; Brown et al, 2002). User satisfaction will be used as a moderator for the research model as the individual's satisfaction with the system may impact their perception of the decision support received by the system. A low-skilled nurse may be highly satisfied with the system and therefore perceive their decision making satisfaction as highly satisfactory. The results must indicate the cause for the decision making satisfaction (or dissatisfaction).

H1A: The relationship between basic computer skills and decision making satisfaction is moderated (amplified) by the user satisfaction with the decision support system

H2A: The relationship between information management and decision making satisfaction is moderated (amplified) by the user satisfaction with the decision support system

H3A: The relationship between information literacy and decision making satisfaction is moderated (amplified) by the user satisfaction with the decision support system

4. Discussion

4.1 Methodology

This preliminary research will be a quantitative design using a survey (Creswell, 2009). The target population for this research is registered nurses who are in frontline roles within a Canadian healthcare organization. These nurses would not need to have any familiarity with nursing informatics. The nurses would ideally come from various hospital departments. Participation would be voluntary, anonymous and open to any registered nurses within the organization. The instrument being used is a questionnaire and will be composed of four sections adapting pre-existing and pre-validated scales that measure perceived decision satisfaction (Alawan et al, 2014); perceived user satisfaction (likourezos et al, 2004); and perceived level of NIC (Hunter et al, 2013). The items will be measured using adapted Likert scales (Alawan et al, 2014; likourezos et al, 2004; and Hunter et al, 2013). Additionally, the questionnaire will seek basic descriptive statistics including education level (registered practical nurse, registered nurse, etc.) age, gender, country of birth, department, and employment status. Ethics clearance will be sought from the participating organization (either a long-term care facility or hospital) as well as Lakehead University. Support will be sought from the Thunder Bay Regional Health Sciences Centre and St. Joseph's Care Group. The study involves voluntary, anonymous participation, therefore this study can be considered one of low risk. This research is preliminary, and therefore requires a smaller sample size. The small sample size is a limitation to this research. Additionally the sample size will come from one Canadian city.

4.2 Managerial Implications

This research will be the base for future research in the area of establishing the impact of NIC on healthcare workers. It will determine the direction of future research where decision making is measured to assess the impact of the NIC level of nurses within the organization to determine the value of these skills to the organization and to healthcare as a whole. Overall, the research will

impact healthcare organization through strategic management of operations and training and development.

If it is determined that NIC support decision making satisfaction when using technology in healthcare, the strategic management of operations within healthcare organizations could be impacted especially when deciding on technology implementation. Additionally, when developing and implementing new systems within an organization, more specific decision relating to systems implementation could be made, especially decision related to training (which could become more in depth and used as skill development).

With a more thorough understanding of how NIC impacts healthcare organization, financial benefits may be seen in decreased costs of administration, system implementation, training and more. Other benefits include increased quality of care as more attention can be given to the patients with less going to administration and training. Overall, NIC can benefit the overall healthcare industry improved knowledge growth and management in an industry which thrives through learning. As part of this study recommendations will be made on future research. More specifically, it will determine if there is any merit to using decision making satisfaction as a measurement of the outcome of having or not having nursing informatics competencies among nurses.

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