Original Research Paper

**Technology Integration In Nursing Practice**

Anas Husam Khalifeh, RN, MSN, CNS

Accepted 11th December, 2015.

Abstract: With technology development and increasing advances in technology, nurses moving from the bedside to administration have found that information systems and technology are now a standard part of the daily nursing workflow. Nursing Informatics (NI) divided into basic computer competence and advanced nursing informatics competence. The purpose of this paper is to provide and highlight the information about Nursing Informatics (NI) and the effect on patients care and outcome. Health professionals should use informatics to communicate, manage knowledge, mitigate error, and support decision making using information technology. Organizations and, authors recommended NI for analyzing, formalizing and modeling the collection, management, processing and analysis of data to build information and knowledge that will inform decisions regarding patient care, which included more than one view.

**Keywords:** Technology, Nurse, Nursing Practice, Nursing Informatics, Patients

INTRODUCTION

Nursing is the prevention of illness and injury, alleviation of suffering through the diagnosis and treatment of human response, protection, promotion, and optimization of health and abilities, and advocacy in the care of individuals, families, communities, and populations (American Nurses Association [ANA], 2010). On the previous century Florence Nightingale found three overlap health sciences: health services research, evidence based practice, and nursing informatics (Ozbolt & Saba, 2008). With technology developing and increasing advances in technology, nurses moving from the bedside to administration have found that information systems and technology are now a standard part of the daily nursing workflow (Mitchell, 2011).

In the 1970s, development in field of medical informatics which emerged new specialty area that combines nursing skills with computer expertise called Nursing Informatics (NI) (Mitchell, 2011). Day after day physical location for the delivery of care is changing, which provide both opportunities and barriers to moving out from the room walls of a clinician’s office, outpatient department or hospital room to provide care. Furthermore, nurses are key leaders in developing the basic physical and organizational structures and facilities for effective and efficient health IT that transforms the delivery of care (Healthcare Information and Management Systems Society [HIMSS], 2011).

On other hand, Healthcare is delivered with a steady infusion of new solutions into clinical environments which concluded by revolution of technology (HIMSS, 2011), so, electronic medical records, order entry, online learning, and e-mail within the workplace become increasingly important to the nursing in workflow that showed with computers (Mitchell, 2011). Likewise, in 21st century the responsibilities to use new information resources and access to theme become more important and need wisdom. Nurse educators face the challenges of transforming their curricula and their teaching methods to integrate these resources into the cognitive, psychomotor, and organizational processes of professional practice. Modern nursing produced from the root nursing informatics (Ozbolt & Saba, 2008).

Nursing Informatics (NI) divided into basic computer competence and advanced nursing informatics competence (Rajalahti, Heinonen & Saranto, 2014). NI is the combining of three different sciences: computer (the hardware, including communication capabilities), information (the software), and nursing which come together to manage data, information, knowledge, and wisdom into the practice of nursing (Carey, 2013). However, several organizations have published definitions of nursing informatics. The definitions all have similar elements combining patient care (nursing) and computer based technology. NI definition highlights the importance of nurses contribution to health, Scope and Standards of Nursing Informatics Practice in 2008 defined NI as the blend of nursing science, computer information science, and cognitive science for managing and communicating data, information and knowledge in nursing practice (American Medical Informatics Association [AMIA], 2009).

In addition, International Medical Informatics Association Special Interest Group for Nursing Informatics (IMIA-SIGNI)
defines NI as science and practice integrates nursing, its information and knowledge and their management with information and communication technologies to promote the health of people, families and communities worldwide, which encompasses a nursing theory such as the nursing process, a nursing model, and a nursing vocabulary (Alexander & Staggers, 2009). The goal and purpose of NI showed through used their depth of knowledge and understanding of the patient care process, combined with the power of technology, to contribute to the care of the individual and the transformation of healthcare (Sensmeier, 2011).

NI is today has evolved to be an integral part of healthcare delivery and a differentiating factor in the selection, implementation, and evaluation of health IT that supports safe, high quality, patient centric care as nursing specialty (Sensmeier, 2011). Moreover, Supporting and enhancing clinical processes and decision making which improve patient safety and outcomes through informatics nurses who key contributors to a working knowledge about how evidence based practices designed in information systems (Murphy, 2010). Although, NI has been recognized the special expertise needed to connect everyday work to nursing education and practice is still in the making. Both global and national debate and research are needed to further develop nursing informatics competences in nursing and nurse education (Rajalahiti et al., 2014).

Jordan Nursing Council at professional credentialing level, which started a computer based Jordanian Nursing Competence Exam (JNCE) for all baccalaureate graduates. All Jordanian Universities that operate nursing baccalaureate programs has planned and piloted a JNCE exam prior to making this initiative operational. Moreover, the JNC for nurses and midwives (equivalent of nursing association) is currently retrieving a national database of nursing and midwifery practitioners in Jordan (Hasna, 2009).

The purpose of this paper is to provide and highlight the information about Nursing Informatics (NI) and the effect on patients care and outcome.

LITERATURE REVIEW

Computer applications in nursing began to appear in the professional and scholarly literature in the early 1970’s (Ozbolt & Saba, 2008). Though, provide the nurse and other professionals with useable, evidence based data at the point of care showed when moving beyond the electronic health record which dynamic and clinically intelligent system (Nickitas & Kerfoot, 2010). Discover knowledge and improve health from the molecular to the global level which exhibit through clinical encounters by nurses are critical for the transition to an automated healthcare environment that promotes the continuum of care across time and place, in addition to wellness and health maintenance activities (HIMSS, 2011).

Functions of Nurse Informatics

The functions of NI identified through many organizations which included ANA and HIMSS, that mentioned functions by the following: system implementation (preparing users and providing training and support), systems optimization/use (applying technology applications to maximize value for the stakeholder and organization), system development (customizing or updating vendor systems and developing or updating homegrown systems), clinical analytics (discovering and communicating meaningful patterns of clinical data for performance monitoring, compliance and integrity management, quality improvement, decision support, and population health management), quality initiatives/reporting (problem solving, system evaluation, and quality improvement), informatics education (serving as a resource to healthcare providers, patients, families, administrators, and information technology staff regarding nursing informatics principles, processes, skills, and competencies), liaison/communicator (coordination, bridging communication between the technical and clinical arenas, user requirements and technology solutions, and project vision and work process realities), and regulatory initiatives (compliance, transparency, and reporting related to regulatory programs involving) (ANA, 2010; HIMSS, 2014).

Nursing Informatics And Caring For Patients

Informaticists provide shoulder to shoulder support for clinical staff members during the go live phase of electronic health record implementation (McGonigle, Hunter, Sipes, & Hebdal, 2014). Ozbolt and Saba (2008) stated that powerful resource for assessing and improving the quality of care through data from standardized patient records. NI with practice of using nursing science and technology that enhance the pathway of data take to become knowledge to improve patient care (McGonigle et al, 2014). Helped to shape the further development of NI field by participants identified types of data and applications that useful in patient care, management, education, and research (Ozbolt & Saba, 2008).

According to Nursing Education Healthcare Informatics (NEHI) stated framework of NI includes 3 content domains: patient safety/quality, data management and analytics, and point of care technology (McBride, Tietze & Fenton, 2013). Moreover, Murphy (2010) stated criteria for meeting NI included: improve quality (safety, efficiency, and reduce health disparities), engage patients and families, improve care coordination, improve population and public health, and ensure adequate privacy and security protections for personal health information.

Moreover, Bishop (2001) reported that informatics used by nurses in storing clinical data, linking clinical data and knowledge, translating clinical data into information. Furthermore, access to nurses and other health care providers to electronic patient records can placed on the nursing units or outpatient departments as point of care computers. On the other hand, Gugerty and Delaney (2008) stated used information systems in a variety of settings such as, translate between healthcare providers, technical staff, and patients which ensure that high quality data to improve health outcomes. In addition, in most of countries are founded way of improving the efficiency, quality and safety of care that patients receive by engaged in the process of implementing Health Information Technology (HIT) systems, often supported by significant Government investment in UK: £12.4 billion, US: $19 billion, and Canada: $2.1billion which improve health outcomes and decrease healthcare costs in future (Canada Health Infoway, 2012; National Audit Office, 201; Steinbrook, 2009; Tellez, 2012).

The National League for Nursing (NLN), the American Academy of Colleges of Nursing (AACN), and Quality and...
Safety Education for Nurses (QSEN) all stated that information management skills are needed to analyze and synthesize information to provide and improve the quality and effectiveness of patient care (Skiba, 2011). In Jordan at any given time or interval of time NI helps in retrieving evidence based standards of practice, legislation acts, and statistical analysis of the profession of nursing and the practitioners as macro level and policy making level and at the micro level is to support clinical decision making and the delivery of nursing care (Hasna, 2009).

One of most countries which developed NI sphere it, Taiwan, has progressed significantly since 2003, with long journey started that year by inspiring passion through nationwide workshops. In 2006, the NI professional association, Taiwan Nursing Informatics Association (TNIA) began, and in 2010 honored by the International Medical Informatics Association Nursing Informatics Special Interest Group (IMIA-NI-SIG) and chosen to host the NI2014 conference in 2014 (Kuo, Chang, Feng, Ball & Westra, 2012).

On the other hand, nursing workers are busy in the wards giving care. New technologies will be difficult to accept the new nurses’ ideas who are educated recently with a positive attitude to the advantages of information technology. This group of nurses can be encouraged to be integrated into the potential of E-learning as well as continuing education (Button, Harrington & Belan, 2014). Furthermore, there are more than one program to preparing the clinical workforce to use technology and informatics to improve the delivery of patient care, including technology informatics guiding education reform (tiger). Tiger program prepared nurses to use technology & informatics to improve patient care, accelerated the adoption of smart, standards based, interoperable, patient centered technology that make healthcare delivery safer, more efficient, timely, accessible, and efficient in a new interdisciplinary approach, and created a collective vision for nursing practice and education within 10 years if nurses were fully enabled with IT resources (Gugerty & Delaney, 2008).

Barriers To Success As A Nurse Informaticist. Nurse informaticists faced some barriers, according to Gugerty and Delaney (2008) stated some of the barriers which, lack of administrative support and lack of staffing resources in 2014, and in 2004 mentioned lack of financial resources and lack of administrative support.

Outcomes of Nursing Informatics

Bishop (2001) stated point of care computers will result in error free orders, documentation of medications and nursing care measures electronically, and capturing food and drug allergies. In addition, outcome of point of care computers would be paperless diagnostic results from X-ray and laboratory departments and physical and respiratory therapy departments.

Furthermore, as compatible efforts of NI and point of care computers to reduce medication errors, and use system of bar coding and scanning medications before they are administered (Brousard & Brousard, 2013). Likewise, According to an Institute of Medicine (IOM) report, greater use of informatics decreases errors (Phillip, 2010).

To enhance the quality of nursing services and producing further knowledge by share empirical knowledge electronically and using past experiences to recapture nursing knowledge (Hasna, 2009), and enhance the quality of nursing domains outcome by increased information and communication technology application (McNelis, Horton-Deutsch & Friesth, 2012). Poor quality of care and lack of safety that gap enhanced by changing healthcare professional education through provide patient centered care, work as members of interdisciplinary teams, use evidence based practices, apply quality improvement strategies, and use informatics proficiently (Long, 2003).

Usability of Nursing Information Systems

Usability covers some of aspects: nurse computer interaction in working context, information exchange, and collaboration between healthcare professionals. Defined system can be used by specific users to achieve specified goals with effectiveness, efficiency, satisfaction, learnability, and memorability (International Organization for Standardization, 2010). Furthermore, usability attributes of Electronic Nursing Record (ENR) systems included, the fluency of reporting practices using ENR systems (the efficiency and effectiveness of documentation, simplicity of the system, ease of use), accuracy of documentation (errors in the performance of documentation, system’s support for failure protections and recovery), learnability (intuitiveness of use, system’s ability to guide new users), exploitation of documented information within the nurses (support for nurse’s work, exchange of information, manner of representation (content and layout)), and support for collaborative care (nurses and other healthcare professionals) (accessibility and readability of documented information, information exchange, and manner of representation compared to multi professional needs) (Wu, Orr, Chignell & Straus, 2008; Viitanen, Kuusisto, & Nykanen, 2011).

Viitanen, Kuusisto, and Nykanen (2011) described a usability evaluation study of four currently used ENR systems in Finland, conducted with 18 nurses from deferent wards, the result showed nurses had mainly negative experiences on nurses’ documentation practices and nursing work, and thus reflect to the healthcare professionals’ attitudes towards standardized documentation with ENRs, on the positive side, nurses seem to prefer electronic documentation and are not willing to go back to paper based practices. Moreover, the problems of usability determined with lab order entry system, analyzed critical data entry problems, and commercial electronic health record such us inflexibility of system, inability to navigate, visibility and incomprehensible button labels, errors of omission, and inefficient order behavior (Peute & Jaspers, 2007).

Electronic patient files are included for billing for pharmacy items and medical supplies and disposable items as well as dietary and hospitality services, which is service level, in acute ambulatory settings and some of the private hospitals and teaching hospitals have computer applications and point of care computers to service level (Hasna, 2009).

Disadvantages of Nursing Information System

Advantages of technology in the workplace are many, in spite of that there are several potential disadvantages, which including possible decreased patient safety, depersonalization of care, breach of confidentiality, poor infection control and possible inappropriate behavior. Moreover, patients can perceive a lack of empathy and a sense of aloofness if caregivers focus more on electronic devices than on the patients themselves, which for these issues should to create and maintain high quality patient care delivery systems by examined and policies established (Brousard & Brousard, 2013).
SUMMARY AND CONCLUSIONS

Nursing is art and science, which develop of nurse practice with developing of technology and allows the healthcare team to connect with patients absent the barriers of time or physical proximity, and offer opportunities to provide quality care to patients in remote settings, improving the access to specialized resources. Health professionals should use informatics to communicate, manage knowledge, mitigate error, and support decision making using information technology. NI provides the tools and capabilities necessary to enrich the data, information, knowledge, and wisdom pathway and, therefore, literally puts the information and knowledge nurses need at their fingertips. Nurse informaticists in hospital and ambulatory settings are focused on developing, implementing, or optimizing nursing clinical documentation, electronic health records, and computerized provider order entry.

For successful implementation of the electronic health reporting system, nurses must be knowledgeable about information technology, computer skills and informatics knowledge and skills. NI systems that improve patient outcomes include electronic drug interaction tools, electronic laboratory and test results reporting, and patient portals for communication and education purposes. In order to effectively achieve health outcome improvements, patients and families will need to become an integral part of the care team, with access to their health information in order to participate in decision making about their wellness and illness care. On the other hand, the nursing information systems share several usability problems in common, most of them relating to the efficiency of use, intuitiveness, and poor fit for multiprofessional needs.

Many aspects such as data recovery, ethics, patient care, decision support systems, human computer interaction, information systems, imaging informatics, computer science, information science, security, electronic patient records, intelligent systems, e-learning and telenursing have been added to the field.

RECOMMENDATIONS

Organizations and authors, recommended NI to analyzing, formalizing and modeling the collection, management, processing and analysis of data to build information and knowledge that will inform decisions regarding patient care, which included more than one view.

Clinical Practice
- Remove scope of practice barriers. Nurses and all other health care providers must be able to practice to the full extent of their education and training. This means reforming practice acts, extending authority for care as well as reimbursement under Medicare.
- Expand opportunities for nurses to lead and diffuse collaborative improvement efforts.
- Implement nurse residency programs.
- Build an infrastructure for the collection and analysis of inter-professional healthcare workforce data.

Education
- Create opportunities for faculty to develop the skills and knowledge necessary to teach nursing informatics.
- Provide the planning and the resources to create the infrastructure necessary for such curricula to blossom.
- Bachelor’s and graduate programs, online courses, and conferences.
- Ensure that nurses engage in lifelong learning.

- Promote the continuing education of all levels of nursing, particularly in the areas of EHRs and health IT.
- Policy: Nursing informatics leaders should be knowledgeable and current in public policy initiatives.
- Government agencies should recognize that regulations and reimbursement policies that remain exclusively physician-focused won’t achieve the goals of healthcare transformation.

REFERENCES


www.savantjournals.org


