

RESEARCH ARTICLE

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Competencies in Nursing Informatics in the Saudi Arabian Context: A Sequential Explanatory Study

Abstract

Studies demonstrate that there is a dearth of literature published in the local context regarding competencies in nursing informatics in Saudi Arabia. This study employs mixed method design (specifically, a sequential explanatory approach) in documenting the nursing informatics competencies of nurses. A total population was used for the quantitative aspect and purposive sampling was used for the qualitative. There were 295 nurses as respondents. This study commenced with the approval of the Ethics Review Board of the University of Hail. The study was conducted from October 2016 to March 2017 at King Khalid Hospital, Kingdom of Saudi Arabia.

The results show that nurses are competent in computer literacy (3.38), informatics management (3.49), and informatics literacy (3.27). Nationality and area of assignment proved to be significant in relation to nurses' competencies. Three themes and six subthemes emerged which included: (a) uncertainty, with the subthemes of diffident and reticent; (b) uncovering the meaning of technology, with the subthemes of value for patients and technology for nurses; and, (c) streamlining Continuing Nursing Education, with the subthemes of competency perspective and the missing link.

Nurses acknowledged the significance of nursing informatics in promoting safety and quality care to the patient. However, there can be improvement in the impact of the results of this study by focusing on what the nurses consider as contributory factor in the full achievement of competence in nursing informatics.

Keywords: Competencies, Computer Literacy, Informatics literacy, Informatics management, Nursing Informatics, staff nurses.

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Introduction

Competencies in nursing informatics are imperative for nurses to work safely in a health care setting (Ball, Douglas, Hinton-Walker, DuLong, Gugerty, Hannah, Troseth, 2011). In fact, one of the many competencies required of nurses to be at par globally with other nurses is the input of emerging technology in their daily practice. Such consideration leads to the enhancement of patient care (Havens, Vasey, Gittell, & Lin, 2010) and safety (Dingley, Daugherty, Derieg, & Persing, 2008). Continuing education concentrating on nursing informatics is crucial within a framework of safety and improves patient outcomes. Indeed, the health care workforce processing these essential learning capabilities and their states of mind around using them--- can provide safe patient care (Boykins, 2014) and this can reduce medical errors. Unquestionably, competency in nursing informatics allows more opportunity for nurses to spend more time at their patients' bedsides (Chang, Poynton, Gassert & Staggers, 2011). Hence, competency in nursing informatics can bring the same range of comprehension about informatics' implementation (Choi & Bakken, 2013).

Research on informatics competencies have been focused on instrument development (Rahman, 2015; Hunter, McGonigle & Hebda, 2013; Curran, 2003; Kaminski, 2008; Westra & Delaney, 2008; TIGER, 2011; Staggers, Gassert, & Curran, 2002), and most research has been self-reported in nature (Choi and De Martinis, 2013; Choi, 2012; Campbell and McDowell, 2011; Elder and Koehn, 2009). Such premises, therefore, need reinforcement in studying competencies of nurses regarding nursing informatics using a different mode of inquiry. The argument is that self-reported information may not generally be precise to the population as the data may not have been specifically collected in a socially desirable way (Miller, Stimely, Matheny, Pope, Mcatee & Miller, 2014; Olajubu, Irinoye & Olowokere, 2014). Such a finding has been supported by Yang, Cui, Zhu, Zhao, Xiao and Shen (2014) who suggest that there is a need to consider different instruments in informatics and that there is a need to quantify tools on the level of the respondents' informatics competency as the self-reporting may imply under- and over-estimation. Fehr (2015) stated a similar limitation where nurses could under- or over-estimate their competency when self-reporting; Choi and Zucker (2012) recommend prescribed tools to assess competency for a qualitative measure of informatics skills.

Locally, there is a dearth of literature published regarding the nursing informatics competencies of nurses. Moreover, based on the searched literature, there is no evaluation yet regarding nursing informatics competencies using a different mode of inquiry. In this way, the under- and over-estimation measurement

can be addressed. Hence, there is a need to replicate past studies from self-reported instruments and validate them with personal accounts. After all, nurses need to consider that their skills in electronic health recording mean a lot to patients' safety and security. This study determined and explored the competencies of nurses in nursing informatics in a teaching hospital in the Kingdom of Saudi Arabia (KSA). Specifically, it sought to answer the following research questions: What is the level of nursing informatics competency of the staff nurses as to computer literacy, informatics literacy and informatics management skills? What differences exist when staff nurses are grouped according to age group, gender, area of assignment, years of experience and nationality? What are the lived experiences of the staff nurses in dealing with their competencies in nursing informatics?

Methods

A mixed method design - specifically, a sequential explanatory approach - was employed in this study. The competency instrument utilized was the Nursing Informatics Competency Assessment Tool (NICAT), which was used with the permission of the original developer. NICAT was utilized to provide nurses with a custom-made educational plan for Nursing Informatics abilities, including computer skills, informatics literacy and informatics management (Rahman, 2015). On the qualitative aspect, the researchers utilized a semi-structured questionnaire.

The respondents were the staff nurses from King Khalid Medical Center, Hail City, Kingdom of Saudi Arabia, the only agency of the Ministry of Health utilizing electronic health records. The respondents were chosen as they were the frontline workforce of the hospital, dealing with everything from data collection to data storing.

The researchers used the total enumeration on the quantitative and purposive for the qualitative aspect. Purposively, the researchers included those who: (a) had experience in everything from data collection to data storing; (b) were willing to participate; and (c) understood English. Excluded were the interns and student nurses who did not yet belong to the actual workforce of the hospital, and whose competence was thus limited.

This study has been approved by the Ethics Review Committee of the University of Hail and authorities of the King Khalid Hospital. Rigors in the qualitative aspect were established using the four criteria: credibility, dependability, confirmability and transferability.

Quantitative data was processed through SPSS version 21. Qualitatively, thematic analysis was employed.

Trustworthiness

Significant steps were taken to uphold the trustworthiness of the data, by utilizing such things as Audit Trail and Member checking.

Results

The majority (62%) of the respondents belonged to the millennial generation who were used to computers, and fewer of them (4.40%) belonged to an older generation. As to gender, females dominated (92.99%), with males making up only 7.01% of respondents. The hospital is divided into a number of departments, including the Emergency Room (ER), where 17.28% of respondents were employed, and the Intensive Care Unit where 11.86% of respondents were employed. Those departments where only one staff nurse was assigned were in the Nursing Service, Nursing Quality Management, Ophthalmology and Special Care Baby Units, each of which had .3389% of respondents. Most (171) of the staff nurses had five years' experience or less, and 125 out of 295 have more than five years. Lastly, King Khalid Hospital employs nurses of various nationalities, with Indians dominating the nursing population (53.22%), followed by Filipinos (25.08%), Saudis (19.322%) and Sudanese with 2.37 % (see Table 1).

The chart in Fig.1 shows the level of competency distribution among the staff nurses in three areas: computer literacy, informatics literacy and informatics management skills. The results show that nurses are competent in all three areas with a weighted mean of 3.38, 3.27 and 3.49 respectively.

A one way Analysis of Variance (ANOVA) (see Table 2) was used to determine the difference according to age group of the nursing competencies of the staff in the three areas. Statistically, there was no significant difference in the computer literacy of the staff nurses with $p < .05$ level as regards age group [$F(3,291) = .206, p = 0.892$]. In addition, there was also no significant difference on the informatics literacy at $p < .05$ level on the age of the respondents [$F(3,291) = 1.995, p = 0.115$]. Moreover, no significant difference was found in informatics management skills, found at $p < .05$ level regarding age [$F(3,291) = .989, p = 0.398$].

Table 1. Demographic Profiles of the Respondents

Demographic Profile			
Age group		Frequency (f)	Percentage (%)
	20 to 29	183	62.03
	30 to 39	61	54.57
	40 to 49	38	12.881
	50 to 60	13	4.40
Gender	Male	21	7.01
	Female	274	92.88
Area of Assignment	Emergency Room	51	17.28
	ICU(Intensive Care Unit)	35	11.86
	Others(fairly distributed)	209	
Years of Experience	5 years or less	171	57.96
	6 to 10	76	25.76
	11 to 15	34	11.52
	16 years or more	14	4.74
Nationality	Filipino	74	25.08
	Indian	157	53.22
	Saudi	57	19.32
	Sudanese	7	2.37

Figure 1. Level of nursing informatics competencies of the staff nurses

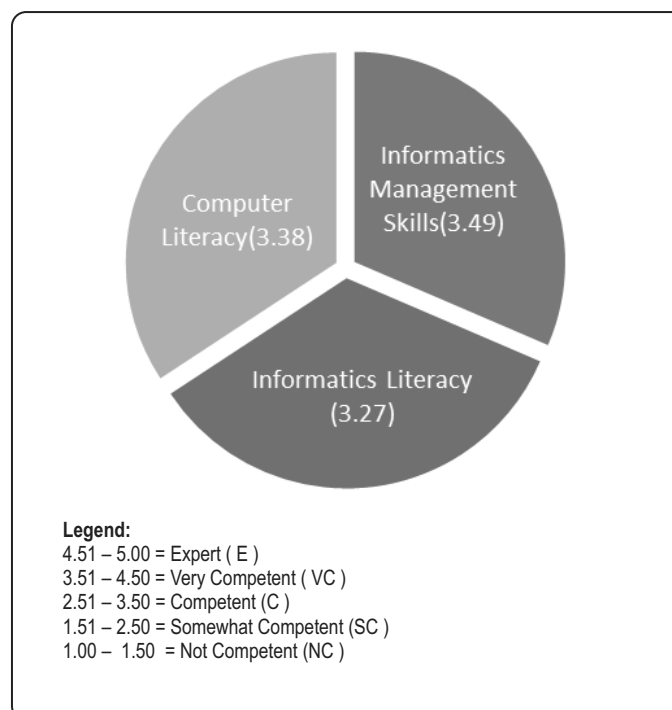


Table 2. One-Way ANOVA on Age Group

Competencies		Sum of Squares	df	Mean Square	F	Sig.
Computer Literacy Assessment	Between Groups	.506	3	.169	.206	.892
	Within Groups	238.202	291	.819		
	Total	238.708	294			
Informatics Literacy Assessment	Between Groups	2.968	3	.989	1.995	.115
	Within Groups	144.297	291	.496		
	Total	147.265	294			
Informatics Management skills Assessment	Between Groups	2.359	3	.786	.989	.398
	Within Groups	231.374	291	.795		
	Total	233.733	294			

Table 3. One Way ANOVA on Gender

Variable		Sum of Squares	df	Mean Square	F	Sig
Computer Literacy Assessment	Between Groups	4.980	1	4.980	6.243	.013
	Within Groups	233.728	293	.798		
	Total	238.708	294			
Informatics Literacy Assessment	Between Groups	.627	1	.627	1.254	.264
	Within Groups	146.638	293	.500		
	Total	147.265	294			
Informatics Management skills Assessment	Between Groups	1.098	1	1.098	1.383	.241
	Within Groups	232.635	293	.794		
	Total	233.733	294			

To determine the difference in the competencies of staff nurses as to gender, one-way ANOVA was utilized (see Table 3). A significant difference in the computer literacy assessment based on the gender of staff nurses was noted ($p > .05$), $[F(1,293) = 6.23, p = .013]$. Also, there was a significant difference in the informatics literacy of the staff nurses at $p > .05$ $[F(1,293) = 1.254, p = .264]$. Lastly, the difference in informatics management skills was found to be significant at $p > .05$ level with $[F(1,293) = .383, p = .241]$.

The researchers used one-way (ANOVA) to determine if there was a difference in the competence of the staff nurses in nursing informatics when the area of an assignment was considered (see Table 4). It can be gleaned that there was a significant difference in the computer literacy of the staff nurses at $p > .05$ level, $[F(20, 274) = 2.409, p = .001]$. Also, there was a significant difference in the informatics literacy of the staff nurses at $p > .05$ as $[F(20, 274) =$

$3.838, p = .000]$. Moreover, differences in informatics management skills were found to be significant at $p > .05$ level with $[F(20,274) = 1.641, p = .043]$.

One-way ANOVA was used to determine if there was a difference in the years of experience on the competencies of the staff nurses when computer literacy, informatics literacy and informatics management skills were considered (see Table 5). Statistically, there was no significant difference on the computer literacy of the staff nurses with $p < .05$ level, $[F(4,290) = .700, p = 0.92]$. Also, there was no significant difference in the informatics literacy at $p < .05$ level based on the years of experience $[F(4,290) = 1.957, p = 0.101]$. Moreover, informatics management skills were not significantly different at $[p < .05]$ level on the years of experience, $[F(4,290) = .942, p = 0.440]$.

To determine if computer literacy and informatics literacy differs based on the nationality of the respondents, a one-way ANOVA was used (Table 6). Statistically, the computer literacy competence was noted with significant difference at $p > .05$, $[F(3,291) = .910, p =$

$0.436]$. Also, there were significant differences in the informatics literacy at $p > .05$ level on the nationality $[F(3,291) = 2.737, p = 0.43]$ and on the informatics management literacy at the $p > .05$ level on the nationality $[F(3,291) = 3.690, p = 0.12]$.

Table 4. One Way ANOVA for Area of Assignment

		Sum of Squares	df	Mean Square	F	Sig.
Computer Literacy Assessment	Between Groups	35.701	20	1.785	2.409	.001
	Within Groups	203.007	274	.741		
	Total	238.708	294			
Informatics Literacy Assessment	Between Groups	32.226	20	1.611	3.838	.000
	Within Groups	115.039	274	.420		
	Total	147.265	294			
Informatics Management skills Assessment	Between Groups	25.002	20	1.250	1.641	.043
	Within Groups	208.732	274	.762		
	Total	233.733	294			

Table 5. One Way ANOVA for Years of Experience

		Sum of Squares	df	Mean Square	F	Sig.
Computer Literacy Assessment	Between Groups	2.284	4	.571	.700	.592
	Within Groups	236.424	290	.815		
	Total	238.708	294			
Informatics Literacy Assessment	Between Groups	3.871	4	.968	1.957	.101
	Within Groups	143.394	290	.494		
	Total	147.265	294			
Informatics Management skills Assessment	Between Groups	2.998	4	.750	.942	.440
	Within Groups	230.735	290	.796		
	Total	233.733	294			

Table 5. One Way ANOVA for Nationality

Competencies		Sum of Squares	df	Mean Square	F	Sig.
Computer Literacy Assessment	Between Groups	2.219	3	.740	.910	.436
	Within Groups	236.489	291	.813		
	Total	238.708	294			
Informatics Literacy Assessment	Between Groups	4.056	3	1.352	2.747	.043
	Within Groups	143.209	291	.496		
	Total	147.265	294			
Informatics Management skills Assessment	Between Groups	8.566	3	2.855	3.690	.012
	Within Groups	224.168	291	.774		
	Total	233.733	294			

Qualitative Results

From the quantitative results, the researchers explored the phenomenon to understand further from a qualitative perspective. The seven (7) respondents on the qualitative aspects had actively participated in a one-on-one interview. Three themes and six subthemes emerged.

The first theme was uncertainty. This theme defined the doubts experienced and questions raised by the staff nurses before and during the implementation of the nursing informatics in their practice. It depicted the chaotic situation where nurses were to immerse themselves in technology together with their complex nursing procedures. As such, it led to staff nurses feeling uncertain about how they would acknowledge the challenges in spite of the advantages of their new circumstances.

As described by the participants:

P4: "[A]t first, my colleagues and I are so hesitant and very uncertain if we can juggle learning the nursing informatics with the busy unit we have. Although, based on our readings, nursing informatics can lessen the paperwork of the nurses thereby giving more time to bedside care."

P7: "Being a product of Generation X, I was cautious of my activities when it comes to nursing informatics. Before, it seemed all is new to me... and I am so uncertain about everything. But with the many orientations and help of the IT personnel, I can say that I am more than competent"

Two subthemes have emerged: diffidence where nurses were not confident in the use of the computer technology together with their complex responsibilities; and reticence as they were unwilling to speak their minds about nursing informatics.

The subtheme of diffidence refers to lack of confidence in one's own ability. It explains that nurses as novice users of the electronic health records were still not confident as they needed to adapt to the changes.

As stated by the participants:

P1: "I believed that one of the best experiences that I have when informatics was introduced to me is the question of capability if I can do it."

P2: "I was excited to use the electronic health records as I have read of what or how this technology can bring something for me and my patients. But indeed, at first, I am confused and cautious as I may delete the data."

The experiences of these nurses during their immersion into and practice of computer technology had led them to be more cautious of their actions. Thus, even their feelings and thoughts were being

pre-occupied by the introduction of the computer technology. The subtheme reticence describes the hesitation of the respondents to do things as they were uncertain of the situation.

To wit:

P5: "It was timid enough of my thoughts when computer technology was introduced to us. It seems to me before that this computer technology is an additional function..."

P6: "[I]ndeed, I was not quite sure if I understood the essence of computer technology. I was even shy to ask the information technology personnel or my colleagues before."

The second theme was "Uncovering the Essence of Technology". This theme relates to the discovery of the truth as to how technology aids the nurses in their daily practice. This has been an offshoot of the continuing education of the staff nurses as they deal with their needs regarding nursing informatics. As participants claimed:

P1: "I acquired competencies from clinical instructors from my department and also from the education department of my hospital... [I]t is an advantage for the nursing profession to know about patient information including diagnosis, treatment."

P2: "My experience and training that I acquire have increased my competencies in nursing informatics and I can say that this technology is essential as it is easy to search for patient information and history."

In order to uncover the essence of technology in the nursing profession, two subthemes had emerged: "Value for patients" and "Technology for nurses". These subthemes referred to the actual advantages of nursing informatics to the practice of nurses, and to the benefit of the patients as they were the foremost recipient of the nursing technology.

Participants had claimed that technology has brought a good advantage to the patients. This subtheme relates to the claims of the "self" findings of the staff nurses after the implementation of the nursing informatics.

P5: "Indeed it is advantageous for the safety of our patient when it comes to giving medication... as there is already an advance medication technique."

P4: "[T]he nursing informatics technology is very helpful as we can have more time for our patient's bedside nursing care."

P7: "As there is less writing or documenting in the paper which consumes more time, I myself can say that I have given more quality time for my patient and even kept him safer."

The Technology for Nurses subtheme pertained to the benefits to the nurses from the implementation of nursing informatics. Based on the interview, the participants had stated that there were changes in their daily practice when the computer technology was implemented in the hospital.

When asked about the advantages in their nursing practice, the staff nurses stated:

P2: "It is easy to search for patient information and history."

P4: "we have easy access to viewing our patient's medical records (EHR)."

P5: "Easily accessible through computer and network. It can be used at any time to refer, to review".

Notwithstanding the competence level of the staff nurses in the three domains of nursing informatics, they still considered their engagement in higher competencies to be rewarding for their patients. Uncovering the essence of technology in the nursing profession, staff nurses had suggested a better outcome to intensify further their competencies in nursing informatics.

The third theme which arose was Streamlining Continuing Nursing Education, which deals with staff nurses maintaining and keeping abreast of nursing informatics competencies. As such, this is to provide safe patient care and keep pace with advances and innovations in nursing practice.

P2: "Training should be given to all staff nurses regardless of (their) senior or junior position in the hospital. Indeed, continuing education on nursing informatics is very helpful for all our staff nurses so that issues and concerns regarding the implementation of the program will be addressed accordingly."

P5: "I believed that training more and revisiting the policies and guidelines of Nursing Informatics should be discussed further in a forum as to educate us nurses."

P6: "[B]ased on my self-assessment and observations... staff nurses need more training."

Competency Perspective refers to the viewpoint of the staff nurses on the quantitative results regarding their nursing informatics competencies. Based on the quantitative results, staff nurses reported that they have been generally competent in computer literacy, informatics literacy, and informatics management skill. From their verbatim accounts, the staff nurses validated the results, to wit:

P1: "I agree with the result because most of the staff nurses in the hospital belong to the millennial age group."

P2: "Our self-reported competence as to computer literacy means true. The results show a validation of what we have... because most of the staff nurses are computer literate."

P3: "Majority of the staff nurses belong to the millennial age. They are all familiar with the basic components of the computer system."

Although the participants belonged to different age groups, they were competent in the three areas of nursing informatics. This proved that nurses remained in the realm of technology as it helped them to provide safe and high-quality nursing care.

The subtheme Missing Link refers to what requirements need to be implemented by the hospital for the staff nurses to uphold the quality care they give to the patients and be on par with the international arena. When asked about what needs to be done to improve their competencies, the staff nurses responded that:

P3: "[S]taff nurses need more training considering that we came from different places. My colleagues are employed here in King Khalid Hospital with less than a year and it is being expected that we are still novice to nursing informatics much that we were not exposed in our own country."

P5: "[I]t's the nurses who will encode it on the system. In case there is medication error, it's the liability of the nurses. I would suggest that the physician should encode directly to the system so as to avoid medication error."

P4: "[C]onsideration of our nationality should also be given importance in developing pieces of training in nursing. I believe that we differ in our own competencies because of the curriculum that we have in our own country."

Discussion

On Competencies and Accounts of Nurses

The results showed that nurses are "competent" in all the three areas of nursing informatics: computer literacy, informatics literacy, and informatics management. The competency levels as revealed in the results of this study refers to the ability of the nurses as to technical skills, application of the technology, and the realization of management pertinent to nursing care. This implies that staff nurses recognize the importance of nursing informatics in advancing patient safety and quality care. Thus, such acquired competencies show that nursing informatics is recognized in the practice of nursing in the workplace. This has been noted by many researchers (Ammenwerth et al. 2003; Brumini & Kovic 2005; Alquraini et al. 2007; Kipturgo et al. 2014; Kahouei et al. 2015) where knowledge in technology continues to be viewed as an

important factor that can enhance nurses' acceptance of information systems at work.

The participants viewed technology as being helpful in some if not most of their nursing responsibilities and that such assistance provides them with dynamic and cost-effective procedures for the patient. This has been captured in the theme "Uncovering the Essence of Technology" which declared that technology has benefitted the patients. Nurses understand the impact that informatics and innovations can have on quality nursing practice and how this affects well being of patients. Chang et al. (2011) stated that competency in nursing informatics allows more opportunities and time for nurses to spend at the patients' bedsides. The participants acknowledged that the implementation of nursing informatics in their area is a great help for them to be safer in caring for patients and also to have more time at the bedside. In the study of Çetin et al. (2015), it was mentioned that nurses think that the use of the computer in work-related activities brings benefits. In their practice, participants expressed the advantages of nursing informatics in their work as much as in their decision-making. Schenk et al. (2016) indicated that nurses felt positive that it would give a more holistic view of caring for the patient in using the Electronic Health Record.

Moreover, the findings of this study showed that the nurses are "competent" in all three areas: computer literacy, informatics literacy, and informatics management skill. However, this is opposite to the results of the study of Hwang and Park (2011), where they found that the majority of the nurses considered their informatics competency to be below average. This has also been noted by Olajubu, Irinoye and Olowokere (2014) where nurses rated themselves as "not competent" in the utilization of nursing informatics. The opposing findings can be explained based on the accounts of the participants. When asked about their experiences in acquiring competencies in the introduction of nursing informatics in their area, staff nurses acknowledged that there were "uncertainties" to be considered. Nurses question their own ability to acquire knowledge and skills given the fact that they have more responsibilities to face (diffidence), and more so when their thoughts are pre-occupied at the time of introduction of nursing information in their daily practice (reticence). Indeed, the application of nursing informatics is another responsibility that demands more time and changes in their routine. Schenk et al. (2016) emphasized that in the use of Electronic Health Records (EHR), nurses had lower confidence, and reported feeling overwhelmed and anxious about this change in the application of the EHR effectively. However, based on the accounts of the participants, these experiences have challenged them to consider patients' needs over uncertainties. This acknowledgment of nurses of their uncertainties can be a vital factor in enhancing the nursing

workplace and the nature of care displayed by patients (Vaismoradi, Salsali & Ahmadi, 2011).

On Differences and accounts of nurses to age, gender, area of assignment, years of experience and nationality

Age was not a considerable factor in developing policies and guidelines to streamline the continuing nursing education in nursing informatics. As such, age was no excuse for nurses' lack of competence in nursing informatics as it was imperative to improve patient safety and quality of care. Although, this did not mean that there was less sensitivity to the differentiated needs and capacities of the respondents in the older generation. This insignificant finding contradicts the earlier research of Hsu, Hou, Chang and Yen (2009, cited in Fehr, 2015) which revealed that age had a significant positive impact on the computer literacy of responding nurses. The present finding also contradicted Campbell and McDowell's (2011) finding which showed that younger nurses were more computer literate. The subtheme of competency perspective based on the participants' account qualifies the result where nurses claimed that they were generally competent despite more nurses belonging to the millennial generation.

With regards to gender, males and females differ significantly when it comes to their competencies. Colley et al. (1994) in Koivunen (2009) claimed that males were more proficient with computers than females. As Venkatesh and Morris (2000, cited in Koivunen) found that in contrast to women, men are more innovative. Interestingly, women were more affected by a view of convenience. The significant differences can be attributed to some of the barriers such as culture and lack of experience using the technology. In Saudi Arabia, it can be noted that males have had more opportunity to use smartphones and other kind of gadgets that can be used for research as compared to females. Furthermore, the lack of experience can also be attributed to the country of origin of the participants, where many are from countries not using information technology yet. These aforementioned barriers have been observed and experienced by the participants. The female participants claimed that males have more time in front of the computer while female nurses were found more at the bedside as they can care for either male or female patients. Moreover, when asked about the difference of male and female in terms of competencies, female respondents claim that it can be due to culture. More specifically, females are not used to and are being prohibited in the use of the internet.

The results of this research suggested that the competence of the staff nurses vary depending on the area of assignment. This was based on the experience and constant use of the technologies within the area. This present finding relates to the study of Welton,

Unruh and Halloran (2006) who claimed that nurses in the Medical-Surgical area had not experienced much technology compared to specialty units. When asked about the practice of nursing informatics in their area of assignment, nurses have different responses as to their competencies. Nurses from the wards have used a simple process of nursing informatics compared to those in the specialist units. The only time they use complex processing is when they were asked to be rotated into the area. Other participants claimed that sometimes they have appointed one nurse to do much of the processing on the computer when the area is demanding.

The experience of the staff nurses was not a factor in the improvement of competence in informatics. As Hsu et al. (2009) discovered, the amount of the nurses' experience had no influence on their computer literacy. In addition, the span of years of nurses' involvement in their work had been evident in their computer experience and competency (Huang & Lee, 2011). Yang et al. (2014) also confirmed that experience in nursing administration and information education/training were significant factors affecting informatics competency. Nurse participants in this study have different opinions when it comes to the level of competence as years of experience are a concern. The use of nursing informatics was introduced to them less than a decade previously and there is a yearly need for upgrading and innovation. Thus, whether novice or expert, all nurses are equally mandated to adapt to any changes and innovations. Others claimed that years of experience is not a consideration to being more competent in nursing informatics, but that rather it is the willingness of the nurses to learn.

The findings of this research suggested that the nationality of the staff nurses had an impact on their competence. Based on the searched literature, nationality has not yet been determined to interplay in the competencies of the staff nurses regarding nursing informatics. Indirectly, the study of Dalhem and Saleh (2014) revealed that there is a small relationship between the influence of nationality and the utilization of e-learning courses by the staff nurses. While the participants came from multiple countries, it is with the understanding that the practice of nursing informatics may vary in per country usage and that it is based on whether they are using such practice or not. When asked whether competence differs with nationality, some of the participants agreed since nursing informatics was not included in their country of origin's curriculum. This leads to the understanding that the competence of the staff nurses in nursing informatics may have sprung from the way by which their respective country's curriculum has been formed.

Despite competency levels in nursing informatics, participants claimed that there is still a need for them to have continuing nursing

education (**Competency Perspective**). These nurses came to understand how the nursing profession adapts to the changes in support to care innovation (**Missing Link**). This finding is in line with the study of Gagnon et al. (2010) where it was exhibited that there are strategies that can be used in nursing informatics. One such strategy is adequate training, which reinforces the perception of future benefits. In this study, participants emphasized that there are more things for them to be adept in when it comes to nursing informatics. Given this, the training of nurses in nursing informatics covers their needs as aligned with the standard (**Streamlining Continuing Nursing Education**). This claim of the nurses is consistent with that of Çetin et al. (2015), where nurses communicated that providing training would generalize the use of information technology. As stated by Liu, Lee and Mills (2015), nursing informatics interest groups should further develop training and certification programs to validate the professional image of the role. From the findings of the quantitative studies, it is not enough that staff nurses acknowledge the importance of technology; they also need to be more abreast with the demands of nursing informatics. This permits them to keep the same pace with the fast advancement of data innovation, especially in the field of patient quality care and safety. One of the many capabilities that needs improvement is the capability in technology development since it is necessary to improve their manner in terms of patient attention (Havens, Vasey, Gittell, & Lin, 2010) and patient safety (Dingley, Daugherty, Derieg, & Persing, 2008).

Conclusion and Recommendations:

Nurses acknowledged the significance of nursing informatics in promoting safety and quality care to the patient. However, the results of the study can be further improved by focusing on what affects the full achievement of nurses' competence in nursing informatics. Continuing professional education of nurses serves as a means to achieve patient safety and care improvement. The researchers recommend that there be a training on needs analysis focusing on the educational requirements of the nurses in informatics. Furthermore, the results of this study can be used by the trainers/developers and educators to streamline continuing nursing education in nursing informatics.

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