

# NURSES' LEVEL OF COMPUTER LITERACY, ATTITUDES AND RESPONSES REGARDING THE ELECTRONIC HEALTH RECORD SYSTEM IN THE UNITED ARAB EMIRATES

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## ABSTRACT

This study aimed at examining the perceived level of computer literacy, and the attitudes and behavioural responses of nurses to the introduction of the electronic health record (EHR) system in a selected hospital in the United Arab Emirates. The drive towards adopting a paperless EHR system by healthcare organisations around the world, demands an adjusted approach toward nursing practices and education. Quantitative data were collected from a convenient sample of 93 nurses in one hospital in the United Arab Emirates. The data were analysed using descriptive and chi-square Fisher's exact tests. A two-tailed  $p$ -value of less than 0.05 was considered statistically significant. A total of 93 nurses participated in the study. Of these, 38 per cent of the participants regarded themselves as proficient in the use of software applications. However, 76 per cent of the participants indicated that they seldom used the reference tools, while 79 per cent of the participants regarded the EHR system as too complex. The chi-square and Fisher's tests indicated a statistically significant dependency between computer literacy, behaviour and attitude. The EHR is a sophisticated and complex product that requires specific information management competencies, adequate preparation or training and appropriate attitudes. The adoption of the EHR can help nurses to accomplish their daily care tasks more efficiently and effectively, provided its functionalities are fully utilised. There is a need to understand the interface between nursing practice and technology. Implementation of the system will only be successful if nurses' concerns, skills and attitudes receive the necessary attention during all stages of the project.

**Keywords:** attitude; behavioural response; computer literacy; documentation; electronic health record; health information technology



## INTRODUCTION

Interest in the implementation of an electronic health record (EHR) system has grown significantly worldwide (Carroll et al. 2007). It is well documented that the use of information technology (IT), especially the EHR system, has the potential to improve the provision of healthcare and to enhance the communication, processing and management of healthcare information. Moreover, it is a vital element in improving patient safety and the quality and efficiency of healthcare by decreasing the potential for medical errors (Cipriano 2011; Deese and Stein 2004; Weiskopf and Weng 2013). As front-line health professionals, nurses generate huge amounts of data, and are invariably placed at the centre of any technological innovation in the healthcare industry. Accordingly, their acceptance and awareness of the benefits of health IT are critical to the successful implementation of the system (Deese and Stein 2004). The United Arab Emirates (UAE) introduced a unified health IT system to create a health database that links all hospitals and clinics across the country. The Cerner Millennium software system was implemented to automate healthcare, since it provides integrated modules for all healthcare providers which enable the establishment of the EHR system (UAE Ministry of Health 2011). The EHR streamlines the health providers' workflow and has the ability to generate a complete record of a clinical patient encounter. It captures data and makes that available to all health providers simultaneously, irrespective of geographic location.

## OVERVIEW OF THE LITERATURE

The shift to digitised healthcare requires nurses to use IT in the form of the EHR to deliver and document patient care and use evidence-based practice to transform clinical care, education and research (Skiba 2011). The implementation of the EHR involves changes in documentation, healthcare delivery and nursing workflow (Deese and Stein, 2004). The EHR generates a wealth of patient information, and nursing care decisions can therefore be guided by timely, accurate and comprehensive real-time health information (Grossman, Powers and McGuinness 2011). When the capture of documentation and information is standardised, nurses are able to create a single narrative for each patient and to track progress (Deese and Stein 2004; Grossman et al. 2011). The benefits of the EHR to nurses are improved access to up-to-date patient history and improved communication with healthcare practitioners and other healthcare facilities, while simultaneously capturing, storing and retrieving patient data more accurately (McNeil et al. 2003). Larger and more complex information systems require systematic ways of managing the processing of information (Knaup et al. 1999). The data in each patient's record are stored electronically, as separate pieces of information. The process of retrieving data is called querying, and can involve very complex requests for information (Harley, Sensmeier, and Brokel 2009).

Nurses require adequate computer skills, appropriate attitudes and a sound knowledge of EHR systems to enable them to execute complex functionalities, such as retrieving data from the system using computer-based referencing, and analysing, interpreting, and using health data for decision-making. They also need to be systematic in their thinking and be educationally prepared to respond effectively to technological advances (Waters, Rochester, and McMillan 2012). Approval and acceptance by nurses of the implementation of the EHR system are vital in being able to measure the success of the application of the EHR (Tan, Phang, and Tan 2009). The lack of user acceptance, and negative attitudes have been cited as factors that hinder successful implementation (Huryk 2010; Tan et al. 2009). Therefore, understanding how nursing intersects with technology is important. Smith, Morris and Janke (2010) examined the level of satisfaction and attitudes of nurses using computerised software and found that there was a decreased level of satisfaction with the EHR as compared to the paper-documentation method. On the other hand, McLane's (2005) study revealed that adequate training by experts in the EHRs, which is properly integrated with the nurses' schedules, resulted in increased satisfaction levels and contributed to a very successful EHR implementation.

## RESEARCH PROBLEM STATEMENT

Nurses require adequate computer skills and EHR knowledge to enable them to execute complex functionalities such as retrieving data from the system using computer-based references, to interpret and to use health data to document patient care (Waters et al. 2012). In order for the implementation of the EHR to be successful and sustainable, nurses must have a positive attitude to the implementation of health IT, and they must also be convinced that the electronic system will support the workflow and enhance their daily practice (Huryk 2010). The majority of nurses working in the UAE healthcare settings are trained in different countries; their informational and computer skills are unknown. Their initial response to the introduction of the EHR varied, the normal workflow processes and completion of tasks on the new technology seemed to take longer. There were concerns that the functionalities of the systems were not fully utilised to inform clinical decisions (own observations). Therefore, many questions still remained regarding the interplay between nurses' attitudes, their computer literacy levels and utilisation of the available systems functionalities to make sound practice decisions to support quality of healthcare. These observations provided the opportunity to explore answers to the following research question:

- What are the nurses' perceived level of computer literacy, their attitudes and behavioural responses regarding the EHR?

## OBJECTIVES OF THE STUDY

The objectives of the study were to

- a. identify the perceived levels of computer literacy of nurses,
- b. examine the response to the EHR which will be measured by the frequency of the use of the available online resources to inform nursing decisions (behavioural response),
- c. determine the attitude of nurses to the EHR, and
- d. examine the relationships between computer literacy, attitudes and behavioural responses regarding the EHR.

## SIGNIFICANCE OF THE STUDY

Adoption of the EHR is driven by the need to improve the quality of healthcare and to enhance patient safety. This leads to profound changes in the nursing workflow, interface and organisation of care. The rapid changes in healthcare systems and the push for knowledge translation in nursing care demand the integration of healthcare models that incorporate technology. Nurses spend considerable time with patients, and their acceptance of the technological innovations in healthcare is therefore imperative. They also need to have adequate skills or competencies to function in a digitalised healthcare environment. The benefits of the EHR could be enhanced when users' concerns are taken into consideration during the planning of and migration to the new system. Examination of nurses' response to the EHR might provide insights to the nursing managers regarding change management. Issues that hinder the successful implementation of the EHR needed to be identified and addressed.

## METHODS

### Research Design

A quantitative correlational descriptive design was used to indicate frequencies on attitudes, levels of computer literacy and behavioural responses of nurses to the EHR. Bivariate correlational statistics was used to identify how these variables relate with each other. The quantitative design was based on the premise that a snapshot of the variables of the study could be provided at a certain point in time, and that the focus could be on a small number of concepts (Brink, Van Der Walt, and Van Rensburg 2012).

### Participants

The target population consisted of 140 nurses who were available at the time of study, who had been working at the hospital for more than a year and who had received at

least five days of basic training on the EHR system. The online Raosoft sample size calculator using a five per cent margin of error, response distribution of 50 per cent and a confidence level of 95 per cent, generated a sample of 103. A non-probability convenient sample of 95 nurses from different hospital units was obtained.

## Data Collection

Approval for the study was obtained from the hospital management. At the time of the study, there was no established ethics board. Self-administered questionnaires in sealed A4 envelopes were distributed to the nurses during working hours and collected immediately or on subsequent days. The envelope included a cover letter outlining the purpose of the study and the rights and roles of the nurses as participants. Consent was considered to have been granted upon the return of the questionnaires. Data were collected during January 2013.

## Instruments

The research objectives, the relevant EHR components (on which training had been given), and literature review guided the design of the instrument. Demographic data (Section A) focused on age, gender, level of preparation and years of experience. A four-point Likert scale was developed for subsequent sections. Five items in Section B examined the perceived computer proficiency in Excel, PowerPoint, keyboarding skills, navigational aids, and the extent of the nurses' knowledge of the operating systems. Six items in Section C measured the attitude of nurses to the EHR. Eight items in Section D focused on behavioural responses measured against the frequency of the use of system functionalities. For this paper, only three functionalities that were selected as significant indicators for use of complex system functionalities are reported. Other items are routine for each patient.

## Validity and Reliability

Two health informatics specialists assessed the content and face validity of the instrument to ensure that items included in the questionnaire adequately covered the construct under study and dealt with the relevant technologies and their applications in the EHR. The Cronbach's alpha coefficient value ( $\alpha = 0.89$ ) for the instrument exceeded the minimum acceptable ( $\alpha = 0.7$ ) condition of total scale reliability. Based on the Cronbach's alpha values, results showed that the items under the other dimensions were internally consistent. The tool was distributed to a small sample of 10 nurses to pretest for reliability. A revised version of the questions was subsequently developed.

## Data Analysis

The data were captured and analysed using the Statistical Package for the Social Sciences (SPSS), version 22, for Windows. Descriptive statistics was used to examine the demographic profile of the respondents and to analyse the levels of computer literacy, behaviour and attitude regarding the EHR. A classification table was designed for the three variables of computer literacy, attitude and behaviour, and labelled high = 1, medium = 2, and low = 3, in order to calculate the chi-square statistics. SPSS was used to calculate the mean variable, which served as an overall measure of computer literacy, attitude and behavioural responses. Spearman's rho was used to examine the strength of association between the levels of preparation, years of clinical experience, ability to run a query, and proficiency in using computer-based reference tools. For this study,  $p$  values of  $\leq .05$  were considered statistically significant. In addition, a chi-square test and a Monte Carlo approximation of the Fisher's exact test were used to determine the significance of the relationship between categorical variables. Fisher's exact test is designed to accommodate low cell frequency counts and is therefore advisable when some cell frequencies are anticipated to be low. This approach was required because Pearson's ordinary chi-square test can sometimes be unreliable (Muller 2014).

## ETHICAL CONSIDERATIONS

Ethical clearance for the study was obtained from the hospital management. Participants were provided with a letter in a sealed A4 envelope requesting their consent and explaining the aim of the study and their basic right to withdraw from the study if they wished to do so. This was done to ensure confidentiality and to protect the nurses from any subsequent harm. The name of the hospital was kept confidential. The letter also provided the contact details of the researchers. Anonymity was ensured, and the envelope had eligibility criteria pinned on the outside in bold letters. Special, well-labelled boxes were placed at the nurses' stations where questionnaires could be returned in privacy and all documents were protected through passwords to ensure privacy and security of data.

## RESULTS AND DISCUSSION

### Demographic Information

A total of 123 questionnaires were distributed and 95 were returned. Two questionnaires were discarded owing to missing data. The demographic section focused on age, level of preparation and years of clinical experience. The level of preparation was defined as a diploma, bachelor in nursing and postgraduate qualification in nursing. An examination of the profile of the participating nurses showed that the majority of them, at 86 per cent ( $n = 80$ ), were between 25 and 49 years of age, with a mean age of 42, resulting

in a standard deviation (SD) of 10.6, and a range of between 25 and 63 years. From the total sample, 69 per cent (n = 64) of the nurses had more than five years of clinical experience, while 31 per cent (n = 29) had less than five years of experience. A total of 67 per cent (n = 62) of the participants had completed a bachelor’s degree, 11 per cent (n = 10) had a postgraduate degree, and 22 per cent (n = 21) had a diploma in nursing.

### Computer Literacy

A close examination of the descriptive statistics regarding the perceived levels of computer literacy, as shown in Table 1, revealed that 38 per cent (n=31) of the participants ranked themselves as highly competent in the computer components identified, while 22 per cent (n = 20) ranked themselves as having no experience in software applications such as PowerPoint presentations and Excel. Almost half, 55 per cent (n = 51), of the nurses indicated that they were less competent in keyboarding skills. A high number (79 %, n = 74) of participants believed that they had good skills in computer navigation.

**Table 1:** Perceived computer literacy

	Highly competent %	n	Competent %	n	Less competent %	n	No experience %	n
Using Excel	0		19	18	60	56	21	19
Using PPT	4	4	28	26	68	62	1	1
Keyboarding skills	5	5	40	37	55	51	0	
Navigational aids	18	17	61	57	21	19	0	
Knowledge of operating systems	11	5	53	48	39	35	0	

### Behavioural Response

The behavioural responses to the electronic documentation were measured by the frequency of using the system’s functionalities. Only non-routine functionalities are reported here. The other functionalities are done routinely and would not suggest a significant behaviour as intended in this study. Therefore, they are not reported in this article. The responses reported in this study are indicative of nurses’ willingness to

use decision support, patient support and reporting tools. Table 2 shows that patient flow monitoring was done frequently at 69 per cent (n = 64), while the computer-based reference tools option was hardly used. A total of 76 per cent (n = 71) indicated that they seldom used the reference tools. Very few nurses, that is, only 19 per cent (n = 18), used the query option. As mentioned previously, running a query involves the more sophisticated task of requesting patient data from the system (Harley et al. 2009). Therefore, a certain level of confidence is required to utilise this functionality.

**Table 2:** Behavioural responses to the EHR

	<b>Always</b>	<b>Most of the time</b>	<b>Seldom</b>	<b>Rarely</b>
Using computer-based references	2% (2)	22% (20)	76% (71)	0
Running a query	2% (2)	17% (16)	55% (51)	26% (24)
Monitoring patient flow	9% (8)	60% (56)	31% (29)	0

Spearman’s rho correlation coefficients were conducted to examine the relationships between the level of preparation and the years of clinical experience, and using a reference tool and running a query. Monitoring of patient flow was not correlated as data showed that this was done more frequently. Table 3 shows significant differences at  $p = .05$ , between the level of preparation and running a query,  $p = 0.041$ . Years of clinical experience,  $p = .483$ , and using computer based referencing  $p = .346$  were not significantly correlated to the level of preparation.

**Table 3:** Relationship between demographic variables and some behavioural responses to EHR

		<b>Level of preparation</b>	<b>Years of clinical experience</b>	<b>Using reference tools</b>	<b>Running a query</b>
Level of preparation	Correlation coefficient	1	0.074	-0.099	.212*
	Sig. (two-tailed)		0.483	0.346	0.041
	N	93	93	93	93
Years of clinical experience	Correlation coefficient	0.074		0.064	0.046
	Sig. (two-tailed)	0.483		0.541	0.661
	N	93	93	93	93



Using reference tools	Correlation coefficient	-0.099	0.064		-0.028
	Sig. (two-tailed)	0.346	0.541		0.789
	N	93	93	93	93
Running a query	Correlation coefficient	.212*	0.046	-0.028	
	Sig. (two-tailed)	0.041	0.661	0.789	
	N	93	93	93	93

\* Correlation is significant at the 0.05 level (two-tailed).

A chi-square test of independence was performed to examine the relation between computer literacy and behavioural response. The relation between these variables was significant,  $(N = 93) = 23.51, p < 0.01$ . Computer literacy appeared to have a strong influence on nurses' use of complex functionalities that support nursing decisions.

## Attitude to the EHR

In terms of the attitude to the EHR, the data reflected in Table 4 revealed mixed opinions in that 79 per cent ( $n = 73$ ) of the participants regarded the EHR as too complex (not easy). Less than half, that is 43 per cent ( $n = 40$ ), thought that the current system was optimally functional in improving the workflow. EHRs were designed to support documentation to ensure completeness, speed, and accuracy of data capture. However, a moderate number of nurses, that is 55 per cent ( $n = 52$ ), believed that EHR documentation is faster than paper-based systems. Only 25 per cent ( $n = 23$ ) of the nurses agreed that the electronic systems supported greater completeness of documentation. Some, that is 68 per cent ( $n = 63$ ), believed that the EHR improved clinical data quality. Slightly more than half, that is 56 per cent ( $n = 52$ ) of the participants, stated that training was adequate. These findings are consistent with Huryk (2010) who found that nurses' negative attitudes to EHRs were influenced by the system design and the speed of computers. Similarly, Culler et al. (2011) identified excessive log-in time as one of the barriers to the adoption of the EHR platform. However, after the system was modified, attitudes to the health information system improved considerably.

**Table 4:** Attitudes to and opinions of the EHR

		EHR easy to use	EHR improves workflow	EHR supports fast documentation	EHR supports completeness of documentation	EHR improves clinical data quality	Training was adequate
N	Valid	93	93	92	93	93	93
	Missing	0	0	1	0	0	0
Strongly agree		(0)	10% (9)	9% (8)	11% (10)	15% (14)	9% (8)
Agree		21% (20)	33% (31)	46% (43)	14% (13)	53% (49)	47% (44)
Disagree		79% (73)	57% (53)	34% (32)	54% (50)	24% (23)	34% (32)
Strongly disagree		(0)	(0)	10% (9)	21% (20)	8% (7)	10% (9)

### Relationship between Computer Literacy and Attitude

This study showed that nurses typically underused major system applications that supported comprehensive nursing care, and lacked the ability to document and report on their healthcare practices, as indicated by both the chi-square and Fisher’s tests, which indicated a statistical significant dependency between computer literacy and attitude. The  $p = .001$  was less than 0.05. Complex operations were not used, and many believed that the EHR is complex and not easy to use. The EHR enables nurses to deliver and document patient care and to use evidence-based practices to support clinical care (Skiba 2011). It is important for nurses to understand the system’s functionalities and be able to navigate it using computer-based reference tools. The EHR cannot improve the organisational performance if it is underutilised (Kuo, Liu, and Ma 2013). The nursing reference centre provides a wealth of medical and nursing information and was implemented to enable nurses to provide evidence-based care (UAE Ministry of Health 2011). The levels of preparation and computer literacy were significantly correlated to using the system’s functionalities, such as running a query. However, age and years of clinical experience did not have any impact on the attitude and behavioural responses to health IT. It is evident from this study that nurses need new skills in software applications as reflected by the significant relationship between computer literacy, attitude and behavioural responses.

The attitude to the EHR was found to be less than optimal, and opinions on the completeness of electronic documentation indicated challenges. This finding is

confirmed by several studies that showed that the electronic platform requires real-time processing of patient-clinical information, which means that nurses are required to increase the use of technological tools to aid in the analysis and synthesis of information to improve patient care (Conrad et al. 2012; Dees and Stein 2004; Huryk 2010). Nurses need improved computer skills to navigate the system and use existing functionalities to provide evidence-based practice. Therefore, they need to be knowledgeable about the unique nursing components of computerised health information to support nursing decisions.

Previous studies also confirmed that nurses who had adequate health information management skills were empowered to provide safer and higher quality patient care (Harley et al. 2009; Huryk 2010; Skiba 2011). In order to build knowledge of clinical practice from the aggregated data, the right data must be collected and stored in a retrievable format (Conrad et al. 2012). For example, nurses using Cerner systems can track and trend patient information electronically thus creating a wealth of evidence at the point of care. Kuo et al. (2013) found that nurses who felt technologically insecure or who lacked trust in the system were prone to creating erroneous records owing to the complexity of EHRs. Therefore, creating enabling environments that support nurses to develop qualities, such as an inquiring mind, critical thinking and data-driven decision-making, is imperative (Li and Korniewicz 2013). In this study, nurses with expertise in computer use had a more favourable attitude to EHRs than those with less expertise.

An extensive body of literature supports the introduction of nursing informatics in the nursing curriculum to enable nurses to keep abreast of innovations in healthcare, to provide evidence-based care, and to engage in research initiatives (Fetter 2009; Huryk 2010). Kuo et al. (2013) proposed that the perceived usefulness and ease of use are significant emotive drivers that influence peoples' attitudes to accepting technology. Their study of nurses' acceptance of mobile technologies showed that optimism has a salient effect on the perceived usefulness and ease of use. Therefore, if technology can be assimilated into nursing practice seamlessly, nursing will gain maximum benefits from it (Kuo et al. 2013).

## CONCLUSIONS

The findings of this study have confirmed that the EHRs require confidence, positive attitudes and adequate computer skills to manage patient health information in a digitised environment. Users need adequate preparation or training and continuous support from ICT and nursing managers. The adoption of the EHR can help nurses to accomplish their daily care tasks more efficiently and effectively if its functionalities are fully utilised. There is a need to understand the interface between nursing practice and technology. Computer literacy seemed to have a significant impact on attitude and behaviour, which suggests a need to refocus on basic nursing education. It appears that the EHR implementation will be successful if nurses' concerns, skills and attitudes

are given high priority during all stages of the project implementation. The highly acclaimed advantages of the EHR can only be realised when the prevailing attitudes to the system are positive and when adequate support systems are in place to fully utilise the functionalities to support decision-making.

## RECOMMENDATIONS

The changes that are anticipated by the introduction of the EHR system demand the provision of suitable psychological support and adequate training on the navigation, retrieval and usage of health information. More research is needed to identify and study electronic documentation system designs that are meaningful to nurses and that will support nursing practice. In preparation, nurses, and also other health providers will need new competencies in understanding computer software, data collection, collation, analysis, and dissemination in order to improve data integrity.

Nurse educators will need to collaborate with nurse managers to redefine nursing care competencies and identify effective strategies to integrate IT into the basic nursing curriculum to prepare a workforce that is technologically literate and ready for the advancing healthcare technologies. Additionally, nurses need to embrace and accept the changes that are brought about by the electronic documentation of healthcare. The role of nurse managers is significant in shaping the curriculum; they define relevant competencies required in a healthcare setting. Nurse educators translate the competencies to content for the nursing programmes.

## LIMITATIONS OF THE STUDY

The study was limited to one healthcare facility and data were collected from nurses using a self-administered instrument. Consequently, these findings may not be generalisable to other healthcare settings. However, they might provide useful information on relationships between different variables that have an impact on the ease of use of the EHR. The non-probability sampling strategy used in this study is regarded by various quantitative researchers as weak owing to limited control (Polit and Beck 2012). Samples from multiple settings would yield richer data.

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## REFERENCES

- Brink, H., C. van der Walt, and G. van Rensburg. 2012. *Fundamentals of Research Methodology for Health Care Professionals*. 3rd ed. Cape Town: Juta.
- Carroll, K., A. Bradford, M. Foster, J. Cato, and J. Jones. 2007. "An Emerging Giant: Nursing Informatics." *Journal of Nursing Management* 38 (3): 38–42. <https://doi.org/10.1097/01.NUMA.0000262926.85304a6>.
- Cipriano, P. F. 2011. "Nursing Informatics: The Future of Nursing and IT: The Quality Elixir." *Nursing Economics* 29 (5): 282–289.
- Conrad, D., P. A. Hanson, S. M. Hasenau, and J. Stocker-Schneider. 2012. "Identifying the Barriers to Use of Standardized Nursing Language in the Electronic Health Record by the Ambulatory Care Nurse Practitioner." *Journal of the American Academy of Nurse Practitioners* 24 (7): 443–451. <https://doi.org/10.1111/j.1745-7599.2012.00705.x>.
- Culler, S., J. Jose, S. Kohler, and K. Rask. 2011. "Nurses' Perceptions and Experiences with the Implementation of a Medication Administration System." *Computers, Informatics, Nursing* 29 (5): 280–288. <https://doi.org/10.1097/NCN.0b013e3181fcbe7e>.
- Deese, D., and M. Stein. 2004. "The Ultimate Health Care IT Consumers: How Nurses Transform Patient Data into Powerful Narrative of Improved Care." *Nursing Economics* 22 (6): 336–341.
- Fetter, M. S. 2009. "Improving IT Competencies: Implications for Psychiatric Mental Health Nursing." *Issues in Mental Health Nursing* 30 (1): 3–13. <https://doi.org/10.1080/01612840802555208>.
- Grossman, C., B. Powers, and J. M. McGuiness. 2011. *Digital Infrastructure for the Learning Health System: The Foundation for Continuous Improvement in Health and Health Care: Workshop Series Summary*. Washington DC: National Academies Press.
- Harley, E. C., J. Sensmeier, and J. M. Brokel. 2009. "Nurses Exchanging Information: Understanding Electronic Health Record Standards and Interoperability." *Urologic Nursing* 29 (5): 305–314.
- Huryk, L. A. 2010. "Factors Influencing Nurses' Attitudes Towards Healthcare Information Technology." *Journal of Nursing Management* 18 (5): 606–612. <https://doi.org/10.1111/j.1365-2834.2010.01084.x>.
- Knaup, P., M. Ball, R. Haux, K. C. Lun, and W. Swinkels. 1999. "Necessity and Potential of Educating Medical Students, Physicians and Other Health Care Professionals in Medical Informatics." *Medical Teacher* 21 (1): 73–76. <https://doi.org/10.1080/01421599980075>.
- Kuo, K. M., C. F. Liu, and C. C. Ma. 2013. "An Investigation of the Effect of Nurses' Technology Readiness on the Acceptance of Mobile Electronic Medical Record Systems." *Medical Informatics and Decision Making* (13). Accessed 10 February 2014. <http://www.biomedcentral.com/1472-6947/13/88>.
- Li, D., and D. M. Korniewicz. 2013. "Determination of Effectiveness of Electronic Health Records to Document Pressure Ulcers." *Medsurg Nursing* 22 (1): 17–25.
- McLane, S. 2005. "Designing an EMR Planning Process Based on Staff Attitudes Toward and Opinions About Computers in Healthcare." *CIN: Computers, Informatics, Nursing*, 23 (2): 85–92. <https://doi.org/10.1097/00024665-200503000-00008>.
- McNeil, B. J., V. L. Elfrink, C. J. Bickford, S. T. Pierce, S. C. Beyea, C. Averill, and C. Klappenbach. 2003. "Nursing Information Knowledge, Skills, and Preparation of Student Nurses, Nursing Faculty, and Clinicians: A US Survey." *Journal of Nursing Education*, 42 (8): 341–349.
- Muller, H. 2014. Correspondence. 11 November 2014.
- Polit D. F., and C. T. Beck. 2012. *Nursing Research: Generating and Assessing Evidence for Nursing Practice*. Philadelphia: Lippincot Williams & Wilkins.

- Skiba, D. J. 2011. "Informatics and the Learning Healthcare System." *Nursing Education Perspectives* 32 (5): 334–336. <https://doi.org/10.5480/1536-5026-32.5.334>.
- Smith, D., A. Morris, and J. Janke. 2010. "Nursing Satisfaction and Attitudes With Computerized Software Implementation: A Quasi-Experimental Study." *CIN: Computers, Informatics, Nursing*, 29 (4): 245–50. <https://doi.org/10.1097/NCN.0b013e3181f9dafa>.
- Tan, W. S., J. S. Phang, and L. K. Tan. 2009. "Evaluating User Satisfaction with an Electronic Prescription System in a Primary Care Group." *Annals of the Academy of Medicine, Singapore* 38 (6): 494–497.
- UAE Ministry of Health, 2011. *Annual report*. UAE Department of Preventive Medicine. Ministry of Health. Abu Dhabi: Government Printer.
- Waters, C. D., S. F. Rochester, M. A. McMillan. 2012. "Drivers for Renewal and Reform of Contemporary Nursing Curricula: A Blueprint for Change." *Contemporary Nurse* 41 (2): 206–215. <https://doi.org/10.5172/conu.2012.41.2.206>.
- Weiskopf, N. G., and C. Weng. 2013. "Methods and Dimensions of Electronic Health Record Data Quality Assessment: Enabling Reuse for Clinical Research." *Journal of American Medical Informatics Association* 20 (1): 144–151. <https://doi.org/10.1136/amiajnl-2011-000681>.