# Nurses' Attitudes Toward the Use of an Electronic Health Information System in a Developing Country

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## Abstract

The electronic-based documentation system is considered a major transformation in health care in many hospitals worldwide. Successful implementation of the system makes nurses' jobs easier, saves time, and improves the quality of care that is delivered to patients. However, little is known about the adoption of electronic health information systems in developing countries. The purpose of this study was to understand and evaluate nurses' acceptance and attitudes about implementation of an electronic health information system in Palestinian hospitals. A descriptive, cross-sectional study was conducted with 191 nurses in three governmental hospitals in Palestine. A majority of these nurses understood the need for and accepted the computer-based documentation as demonstrated by their scores on the attitude questionnaire. Inclusion of nurses in early phases of planning and implementation is important. Other developing countries can learn from the Palestinian experience with implementation of electronic health records.

## Keywords

electronic health records, developing country, health information system, nurses' attitudes

## Introduction

The traditional paper-based health record is being replaced by an electronic-based documentation system in many hospitals worldwide. It was an expectation that by 2014, all hospitals across the United States would use an electronic medical record (EMR), which also includes electronic nursing documentation (Kelly, Brandon, & Docherty, 2011). An electronic health record (EHR) is a digital record of an individual that can be shared with other health-care settings. When EHR was first introduced in the 1960s, it was primarily used for billing purposes (Consultant, 2013). Nowadays this record includes all the patient's information: demographics, progress notes, medications, vital signs, health problems, past medical history, past surgical history, immunizations, age, weight, billing information,

laboratory data, and radiology reports (Menachemi & Collum, 2011).

In September 2012, an EHR application known as AviCenna® Hospital Information Management Platform (AviCenna Health Information System [HIS]) was implemented in the Palestinian Medical Complex hospital. Following its adoption in this hospital, it was implemented in the remaining four connected Palestinian

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governmental hospitals. The rollout of the system included education for head nurses by the AviCenna HIS engineers. In a train-the-trainer model, the head nurses were then responsible for teaching the nurses on their units how to use the system. However, nursing was not involved in system design or customization.

As a developing country, Palestine shares challenges faced by other developing contries in adopting health informatics (Luna, Almerares, Mayan, Gonzalez Bernaldo de Quiros, & Otero, 2014). Unlike many other developing countires, however, residents of Palestine often have limited access outside of their country to study new technologies. Since documentation plays a major role in delivering health care, and despite the many benefits of EHR implementation, its results will not be effective unless it is associated with acceptance from nurses using the technology. Thus, the purpose of this study was to examine and evaluate nurse's attitudes toward computerized health records.

EHRs are a digital record for an individual in a health-care setting that contains all medical history related to an individual. HIS is the computerized documentation system that is currently being used in the Palestinian hospitals. Nursing documentation is anything written or electronically generated that describes the status of a client or the care or services given to that client (Timby, 2007).

Adoption of this technology, even in developed countries with very sophisticated health-care systems, has been uneven. Laramee, Bosek, Shaner-Mcrae, and Powers-Phaneuf (2012) compared inpatient nurses' attitudes at three different time periods: before EHR implementation, 6 months after implementation, and 18 months after implementation. The authors found that preimplementation attitudes were positive, while at 6 months, the attitudes were less positive but became more positive again by 18 months. Preimplementation, nurses were excited because they had high expectations that the EHR would make their jobs easier and save time. At 6 months, the nurses went through a period of frustration due to the gap between their expectations for the EHR and the reality of the actual experience. By 18 months, the nurses had a longer time to adapt to the EHR and better appreciated its advantages and disadvantages.

Ammenwerth, Mansmann, Iller, and Eichstadter (2003) found similar results after comparing attitudes of nurses before implementation of the EHR, and at 3 and 9 months after implementation. Kritsonis (2004–2005) suggested, according to Lewin's theory, that when nurses had a sufficient amount of time to learn the EHR, they would eventually accept it. This is exactly what happened in both Laramee's and Ammenwerth's studies. In order for EHR usage to be effective, nurses must be aware of all the advantages that come with it to increase their willingness to use it.

## Literature Review

### Benefits of EHRs

The transformation to EHR is associated with many benefits. To start with, nurses no longer have to struggle trying to interpret an illegible physician's handwriting or colleague's documentation which enhances the quality of nursing documentations (Johnson, Sanchez, & Zheng, 2016). This, in return, may contribute to decreasing medical errors that are a result of misinterpreted orders (Mohammadi, Jafarlalal, Emamzadeh Ghasemi, Bahrani, & Sardashti, 2016). With EHR including all of a patient's important information, nurses have access to everything they may need to provide high-level care.

Also, transferring a medical record from one health setting to another becomes just a click away. Since medical errors can be avoided, this can also contribute to improved patient safety (Coffey et al., 2015; Stokowski, 2013; Yontz, Zinn, & Schumacher, 2015). Patient safety is defined as "avoiding injuries to patients from the care that is intended to help them" (Institute of Medicine, 2001). Financially, EHRs can reduce the cost of performing repeated diagnostic and laboratory tests because all the information can be easily pulled from the patient's record. Also, because paper documents are no longer needed it can reduce the costs that are needed for their storage (Menachemi & Collum, 2011).

### Drawbacks of EHRs

Despite the fact that an EHR can be financially beneficial, implementation costs, constant maintenance, and updating software costs can be a burden on the hospital or health setting. Another drawback includes privacy and security concerns related to electronic transference of health information from one health setting to another. In some hospitals, staff members that inappropriately access files are terminated. In addition, when patient care is completely based on an EHR system, it may sometimes lead to nurses becoming fully dependent on it. Nurses should be able to deliver patient care even in the absence of technology (Menachemi & Collum, 2011). In an ethnographic study of EHR implementation and usage, physicians and nurses echoed that concern with some worrying about providing "cookbook care" (Ventrez et al., 2006).

### EHR Acceptance

Nurses' acceptance of EHR is very important and should not be underestimated. It can be the reason for success or failure of EHR implementation (Yontz et al., 2015). If nurses accept the technology, they will continue to use it and over time will learn about all of its strengths and maximize its use. However if they do not accept it, they

will either not use it or incorrectly use it which will in return decrease the quality of their work rather than improve it. Also based on their acceptance of the technology, they might be more likely to either encourage others to use it or influence others not to use it.

A study by Lorenzi (2004) found that 50% of EHR implementations fail because nurses do not accept it and are not willing to use it. Another study compared two nursing homes in Australia (Yu, Hailey, & Li, 2008). The first home implemented EHR while the other remained paper based. Due to effective training, the nurses quickly adapted to EHR. Nurses in both homes supported and were satisfied with the documentation system that they used. However the level of satisfaction with EHR was higher than with paper-based records. Both groups were asked about their attitudes toward EHR, and both were positive about it. The group that remained paper based commented that if they had to switch to EHR, they would support it. These results support the assertion that with proper training and positive attitudes, nurses can adapt to the use of EHR (Yu et al., 2008).

In a study of intensive care unit nurses' acceptance of EHR, Carayon et al. (2011) found that acceptance of EHR was influenced by the EHR's usability and usefulness. Usability means that the nurses believe that the EHR will be easy to use (Nielsen, 1993). Usefulness means that the nurses believe that the EHR will be beneficial to their work and possibly make it easier (Anke & Anneke, 2010). Before EHR implementation, the nurses received 10 hours of training. These authors found that EHR acceptance was positive at 3 months and was significantly higher at 12 months. The longer the nurses used the EHR, the more familiar they become with its technology and therefore it became easier to use (Carayon et al., 2001). They also reiterated the importance of planning and training in ensuring successful implementation.

## Barriers to Implementing EHRs

Despite the many benefits associated with the use of EHR, many hospitals still have not transformed from the use of paper records to computerized records. This is attributed to many reasons. To start with, it is a very expensive transformation. Several studies estimate that the cost of implementing an EHR systems ranges somewhere between $15,000 and $70,000 (Fleming, Culler, McCorkle, Becker, & Ballard, 2011). This includes the costs of buying computers, printers, and other needed hardware, as well as the costs of maintenance, training, and technical support. The EHR systems are not standardized which means they need frequent updates. At first they are more difficult than using paper-based records but with continued use it becomes easier (Ajami & Bagheri-Tadi, 2013). Sometimes the main reason why an EHR has not been implemented yet is because nurses simply refuse to use it. They feel like this change has been forced on them without being consulted about it. Before implementing an EHR, hospital and system administrators should ensure that nurses are at the table from the beginning when nursing-related technology is discussed (Lavin, Harper, & Barr, 2015). This should not be a mere consultation with nurses. Instead, nurses need to be key decision-makers, as they make up the majority of end users. Full inclusion in the process from the beginning can increase the chance of full and timely adoption of the technology.

In summary, we found that most nurses are accepting of, and positive about usage of EHRs. In addition, proper training and support increased level of acceptance (Abell, Bragg-Underwood, Alexander, Abell, & Burd, 2015). However, these studies were largely undertaken in developed, Western countries. This study contributes to the literature by looking at issues of EHR implementation and acceptance by nurses in a smaller area where EHR is still a very new technology.

## Methods

### Aim

The purpose of this study was to understand and evaluate nurses' acceptance and attitudes toward the EHR implemented in Palestinian hospitals.

### Design

The study design was quantitative, cross-sectional, and descriptive. Data were collected by questionnaire.

### Sample and Setting

This study was conducted in three public hospitals in Northern, Southern, and Central Palestine. Three hospitals were chosen to better represent the disparate geographic areas of Palestine. Differences might occur because of physical obstacles, including checkpoints and roadblocks, that make it extremely difficult to travel from one area of the country to another. All nurses with a minimum of 2 years of experience were eligible to participate in the study. A total of 200 nurses were willing to participate and completed the full questionnaire.

### Ethical Considerations

Human subjects clearance for the study was received from the Faculty of Nursing and the institutional review board—Helsinki Committee in Palestine, from the hospitals where data were collected, and from the Palestinian Ministry of Health.

## Data Collection

*Instruments.* For the purpose of this study, the nurses' attitudes toward computerization questionnaire was used with permission from the original author (Stronge & Brodt, 1985). This questionnaire consists of 20 items with a 5-point Likert-type scale. The nurse can choose to respond with *strongly agree, agree, uncertain, disagree*, or *strongly disagree*. The domains reflected in the questionnaire items focus on the association between computer-based documentation and the following points: benefit to the institute, patient care issues, computer's capabilities, how willing a nurse is to use a computer, and legal issues associated with computer usage. Also, a demographic survey was used that included age, gender, number of working years, and highest degree obtained in nursing.

*Procedures.* Data were collected over a 1-month period during nursing Shifts A and B. Questionnaires were distributed to all nurses in all wards, consent was received, and a total of 200 questionnaires were gathered. After data cleaning and review, only 191 participants were included in the study, due to missing or incomplete data from nine participants.

## Data Analysis

Data were analyzed using SPSS 17.0 software. To assist with data analysis and interpretation, responses to each statement were collapsed into three groups; those that strongly agreed and agreed (agree) those that were uncertain (uncertain), and those that disagreed and strongly disagreed (disagree). Spearman's rank two-tailed correlation, *t* test, and analysis of variance were used in the analysis.

## Results

The majority of the participants (61.8%) were younger than 30 years, and 50.3% of the participants were females. Most (52.4%) of the participants were registered nurses with a bachelor's degree, and 82.7% of the total participants had worked in the hospitals for 10 years or less (Table 1).

Percent agreement with each item on the attitude questionnaire is displayed in Table 2. A Spearman's correlation coefficient was obtained between sex, highest level of degree obtained in nursing, age, work years, and the 20 questionnaire statements. There was a significant correlation ($p = .024$) between gender and the statement "The time spent using a computer is out of proportion to the benefits." The majority (52, 54.7.0%) of males disagreed with this statement, whereas 43.8% of females agreed and 37.5% disagreed. In total, 53.9%

**Table 1.** Study Demographics.

| Variable | Frequency | Percentage |
|---|---|---|
| Male | 95 | 49.7 |
| Female | 96 | 50.3 |
| Age | | |
| ⩽25 | 34 | 17.8 |
| 26–30 | 84 | 44 |
| 31–35 | 37 | 19.4 |
| ⩾36 | 36 | 18.8 |
| Degree in nursing | | |
| LPN | 76 | 39.8 |
| Bachelor | 100 | 52.4 |
| Master | 15 | 7.9 |
| Years of working | | |
| ⩽5 | 120 | 62.8 |
| 6–10 | 38 | 19.9 |
| ⩾11 | 33 | 17.3 |

LPN = licensed practical nurses.

agreed with the statement. There was a significant correlation ($p = .001$) between gender and the statement "Only one person at a time can use a computer terminal; therefore, staff efficiency is inhibited." Forty-one percent of males agreed with this statement, whereas 62.5% of females agreed. In total, 51.8% agreed with this statement. There was a significant correlation between age and the statement "Computers cause a decrease in communication between hospital departments" with a *p* value of .029. Unsurprisingly, the highest level of agreement was in those aged 36 years and older (47.2%). In total, only 37.2% agreed with the statement. There was a significant correlation between highest degree and the statement "If I had my way, nurses would never have to use computers" with a *p* value of .003; 14% and 13.3% holding bachelors and masters degrees in nursing, respectively, agreed with this statement, with a total of 22.5% in agreement.

There was a significant correlation ($p = .003$) between degree and the statement "Because of computers, nurses will face more lawsuits." Sixty-four percent of licensed practical nurses agreed with this statement and 13.2% disagreed. There was a significant correlation ($p = .03$) between working years and the statement "If I had my way, nurses would never have to use computers." Twenty-five percent of those who worked 6 years or less agreed with this statement, 17.9% of those who worked from 7 to 10 years agreed and 15.2% of those who worked for 11 years and more agreed.

There was a significant correlation ($p = .038$) between working years and the statement "Computers should only be used in the financial department." About 27% of those who had worked for 6 years or less agreed with

**Table 2.** Questionnaire Attitudinal Items.

| | | SA % | A % | U % | D % | SD % |
|---|---|---|---|---|---|---|
| 1. | A computer increases costs by increasing the nurses' workload. | 5.8 | 27.2 | 9.4 | 41.4 | 16.2 |
| 2. | Computers cause a decrease in communication between hospital departments. | 11.5 | 25.7 | 10.5 | 33.5 | 18.8 |
| 3. | Computers will allow the nurse more time for the professional tasks for which he or she is trained. | 6.8 | 32.5 | 11.5 | 34.0 | 15.2 |
| 4. | Part of the increase in costs of health care is because of computers. | 4.2 | 28.8 | 20.4 | 33.5 | 13.1 |
| 5. | The time spent using a computer is out of proportion to the benefits. | 4.2 | 33.5 | 16.2 | 36.6 | 9.4 |
| 6. | Computers represent a violation of patient privacy. | 11.5 | 39.3 | 14.1 | 27.2 | 7.9 |
| 7. | Only one person at a time can use a computer terminal; therefore, staff efficiency is inhibited. | 15.2 | 36.6 | 14.1 | 30.4 | 3.7 |
| 8. | Computerization of nursing data offers nurses a remarkable opportunity to improve patient care. | 10.5 | 38.7 | 16.2 | 28.3 | 6.3 |
| 9. | Computers contain too much personal data to be used in an area as open as a nursing station. | 15.2 | 46.1 | 12.0 | 24.6 | 2.1 |
| 10. | Computers cause nurses to give less time to quality patient care. | 12.0 | 28.3 | 10.5 | 39.3 | 9.9 |
| 11. | If I had my way, nurses would never have to use computers. | 5.2 | 16.8 | 12.0 | 42.4 | 23.6 |
| 12. | Computers should only be used in the financial department. | 5.8 | 18.8 | 10.5 | 48.2 | 16.8 |
| 13. | Computers make nurses' jobs easier. | 17.8 | 17.3 | 9.4 | 31.4 | 24.1 |
| 14. | Paperwork for nurses has been greatly reduced by the use of computers. | 15.2 | 26.2 | 7.9 | 34.0 | 16.8 |
| 15. | Orientation for new employees takes longer because of computers and, therefore, unnecessary work delays occur. | 9.4 | 36.1 | 16.8 | 30.4 | 7.3 |
| 16. | Nursing information does not lend itself to computers. | 4.7 | 31.9 | 28.3 | 30.9 | 4.2 |
| 17. | Computers save steps and allow the nursing staff to become more efficient. | 13.1 | 27.7 | 10.5 | 31.4 | 17.3 |
| 18. | The more computers in an institution, the less the number of jobs for employees. | 9.4 | 33.5 | 16.2 | 36.1 | 4.7 |
| 19. | Increased computer usage will allow nurses more time to give patient care. | 8.9 | 31.4 | 11.5 | 40.8 | 7.3 |
| 20. | Because of computers, nurses will face more lawsuits. | 7.9 | 44.5 | 23.0 | 20.9 | 3.7 |

*Note.* SA = strongly agree; A = agree; U = uncertain; D = disagree; SD = strongly disagree.

this statement, 25% of those who worked between 7 and 10 years agreed and 12% of those who worked for 11 years or more agreed, with an overall agreement of 24.1%. A total of 66.0% of the participants responded negatively to the statement "If I had my way, nurses would never have to use computers," demonstrating that most understood the importance of EHRs.

The attitude questionnaire total mean score was 59.7 (SD = 12.1), showing that overall nurses in Palestine have positive attitudes toward computerization of EHRs. According to the one-way analysis of variance (Table 3), no statistically significant differences were identified between age, years of working, and the total means score from the questionnaire ($p = .130$; $p = .241$, respectively). However, for highest degree obtained,

there was a significant difference between groups ($p < .000$) with higher attitude scores correlating with higher degree.

## Discussion

In general, people have a hard time adjusting to change especially when it involves technology. Even though we are living in a world that is basically operated by computers and advanced technology, many people still do not know how to use a computer. In order for this transformation to be effective, a nurse must be willing to use a computer and feel comfortable using EHRs. In this case, the transformation from paper records to electronic records can improve patient care as well as nurses' job satisfaction.

**Table 3.** Demographic Versus Attitude.

|  | F | Significance |
| --- | --- | --- |
| Age × Total Mean | 1.904 | .130 |
| Highest Degree × Total Mean | 8.245 | <.000 |
| Years of Working × Total Mean | 1.428 | .242 |

*Note.* Not significant ($p > .05$); significant $p < .05$.

The aim of this study was to evaluate nurses' attitudes toward the EMR in a developing country in which EHRs are an emerging technology, and where nursing input is often not sought. Similar to findings from previous studies (Kaya, 2011; Yontz et al., 2015), results from this study showed that nurses generally have a positive attitude toward computerization. For example, 66.0% of our participants disagreed with the statement "If I had my way, nurses would never have to use computers." In addition, the mean score for the 20 question instrument was 59.7, again indicating that relatively positive attitude. This positive attitudinal finding mirrored that of nurses in another developing country, Kuwait (Alquraini, Alhasem, Shah, & Chowdhury, 2007). This mean score, however, was lower than the mean of 73.53 in a similar study by Mathew, Lucy, Ann, and Margaret in 2014.

This study was carried out in a developing country, so it will be interesting to see if attitudes improve even more as Palestinian nurses have more experience with this new technology. Differently than the Mathew et al. (2014) and Yontz et al. (2015) studies, which found no significant relationship between work experience and attitudes toward computers, we found that nurses with more experience were more positive about the electronic health information system. It makes sense that nurses with more working years had experienced many difficulties associated with a paper-based documentation system, which may have encouraged them to use a computerized system. It would be interesting to explore whether young developing countries such as Palestine, where professional nursing is emerging differ in this regard from even other developing countries where nurses are older and traditional health care more established.

Similar to results from the Yontz et al.'s (2015) study, the present study found no correlation between age and acceptance of computerization. In fact, the older age-group accepted the computer usage at least as well as the younger age-group. These results contrast with the results of a previous study (Laramee et al., 2012) where younger nurses were more accepting of EHR than older nurses, possibly due to their familiarity with technology and computers. As said by an 18-month respondent in the Laramee et al. study, "As a person who is not computer savvy, I'm 53 years old, it has been a challenge for me. My younger counterparts skate circles around me in this area, and at times, that is frustrating." Other studies also found that younger nurses had more positive attitudes toward computerization (Abell et al., 2015; Mathew et al., 2014). One possible explanation for our differing results is that 81% of the participants in our Palestinian sample were younger than 36 years. This is consistent with the overall age of Palestinian residents in this young country. We postulate that young, developing countries such as Palestine may actually have an easier time with this type of technology-oriented change than more developed countries with an older demographic.

As in the Mathew et al.'s (2014) study, our study found that nurses with higher degrees had more positive attitudes toward EHRs. This is understandable, as bachelors programs in universities may be more likely to include more computer-based learning modalities than certificate and vocational programs. However, this finding contradicts that of the Yontz et al.'s (2015) study which showed no significant relationship between degrees level and attitudes toward EMR implementation.

In our study, unlike others (e.g., Mathew et al., 2014; Stokowski, 2013), gender did not influence attitude toward EHR acceptance. These other studies found that female nurses held more positive attitudes toward the EMR than did males. The participants in our study affirmed several positive phrased related to EMR use, such as "the EMR improves patient care," and "the EMR is more efficient in providing care for the patient," and disagreed with the statement "If I had my way, nurses would never have to use computers." This confirms that nurses in this study had a positive attitude toward EMR system implementation. In part, this positive attitude may result from difficulties associated with a paper-based documentation system, which has been a factor in successful adoption of EMRs in other studies (De Veer & Francke, 2010; Mathew et al., 2014).

## Conclusion

The purpose of this study was to examine Palestinian nurses' attitudes toward computerized documentation. Nurses were generally accepting of computer-based documentation regardless of gender, highest nursing degree, years of nursing experience, or age. It would be interesting to directly compare attitudes between nurses in developing countries, who are just on the forefront of implementing EHRs and who may not always seek nursing input, with attitudes of their counterparts in more developed countries. In addition, it would be important to explore other factors that influence attitudes toward integration of EHRs, such as work classification. This work involved nurses only. It would be important to identify other health-care groups that might have similar or different levels of acceptance. The next steps in assuring successful integration of EHRs into developing

countries might include increased levels of staff orientation and assuring that nurses, as well as other health-care providers, are at the table from planning to final rollout.

## Authorship Statement

All authors listed meet the authorship criteria, and all authors are in agreement with the content of the manuscript.

## Declaration of Conflicting Interests

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## References

Abell, C. H., Bragg-Underwood, T., Alexander, L., Abell, C. E., & Burd, V. (2015). Nurses' knowledge and attitudes toward implementation of electronic medical records. *International Journal of Faith Community Nursing*, *1*(3), 74–80.

Ajami, S., & Bagheri-Tadi, T. (2013). Health information technology and quality of care. *Journal of Information Technology and Software Engineering*, S7, 2003.

Alquraini, H., Alhashem, A. M., Shah, M. A., & Chowdhury, R. I. (2007). Factors influencing nurses' attitudes towards the use of computerized health information systems in Kuwaiti hospital. *Journal of Advanced Nursing*, *57*(4), 375–381.

Ammenwerth, E., Mansmann, U., Iller, C., & Eichstadter, R. (2003). Factors affecting and affected by user acceptance of computer-based nursing documentation: Results of a two-year study. *Journal of the American Medical Informatics Association*, *10*(1), 69–84.

Anke, J., & Anneke, L. (2010). Attitudes of nursing staff towards electronic patient records: A questionnaire survey. *International Journal of Nursing Studies*, *47*, 846–854.

Carayon, P., Cartmil, R., Bloskey, M. A., Brown, R., Hackenberg, M., & Hoonaker, P. (2011). ICU nurses' acceptance of electronic health records. *Journal of American Medical Informatics*, *18*, 812–819.

Coffey, C., Wurster, L., Groner, J., Hoffman, J., Hendren, V., Nuss, K., . . . ,Covert, J. (2015). Comparison of paper documentation to electronic documentation for trauma resuscitations at a Level I pediatric trauma center. *Journal of Emergency Nursing*, *41*, 52–56.

Consultant, E. (2013). *Hospital information system*. Retrieved from http://www.emrconsultant.com/emr-education-center/emr-seltion-and-implementation/hospital-information-systems-his/

De Veer, A. J. E., & Francke, A. L. (2010). Attitudes of nursing staff towards electronic patient records: A questionnaire survey. *International Journal of Nursing Studies*, *47*(7), 846–854. doi:10.1016/j.ijnurstu.2009.11.016

Fleming, N. S., Culler, S. D., McCorkle, R., Becker, E. R., & Ballard, D. J. (2011). The financial and nonfinancial costs of implementing electronic health records in primary care practices. *Health Affairs (Millwood)*, *30*(3), 481–489. doi:10.1377/hlthaff.2010.0768.

Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC: Author.

Johnson, M., Sanchez, P., & Zheng, C. (2016). Reducing patient clinical management errors using structured content and electronic nursing handover. *Journal of Nursing Care Quality*, *31*, 245–253.

Kaya, N. (2011). Factors affecting nurses' attitudes toward computers in healthcare. *Computers, Informatics, Nursing*, *29*, 121–129.

Kelly, T. F., Brandon, D. H., & Docherty, S. L. (2011). Electronic nursing documentation as a strategy to improve quality of patient care. *Journal of Nursing Scholarship*, *43*(2), 154–162.

Kritsonis, A. (2004–2005). Comparison of change theories. *International Journal of Scholarly Academic Intellectual Diversity, 8*(1), 1–7.

Laramee, A. S., Bosek, M., Shaner-Mcrae, H., & Powers-Phaneuf, T. (2012). A comparison of nurse attitudes before implementation and 6 and 18 months after implementation of an electronic health record. *Computers, Informatics, Nursing*, *30*, 521–530.

Lavin, M. A., Harper, E., & Barr, N. (2015). Health information technology, patient safety, and professional nursing care documentation in acute care settings. *The Online Journal of Issues in Nursing*, *20*(2), 6.

Lorenzi, N. M. (2004). Beyond the gadgets: Non-technical barriers to information systems need to be over come too. *British Medical Journal, 328*, 1146–1147.

Luna, D., Almerares, A., Mayan, J. C., 3rd. Gonzalez Bernaldo de Quiros, F., & Otero, C. (2014). Health informatics in developing countries: Going beyond pilot practices to sustainable implementations: A review of the current challenges. *Healthcare Informatics Research*, *20*(1), 3–10. doi:10.4258/hir.2014.20.1.3.

Mathew, K. K., Lucy, W. K., Ann, K. K., & Margaret, M. M. (2014). Attitudes of nursing staff towards computierisation: A case of two hospitals in Nairobi, Kenya. *BMC*, *14*, 1472–6947.

Menachemi, N., & Collum, T. H. (2011). Benefits and drawbacks of electronic health record systems. *Risk Management and Health Care Policy*, *4*, 47–55.

Mohammadi, F. M., Jafarlalal, E., Emamzadeh Ghasemi, H. S., Bahrani, N., & Sardashti, S. (2016). Evaluation of vocal-electronic nursing documentation: A comparison study in Iran. *Informatics for Health and Social Care*, *20*, 1–11.

Nielsen, J. (1993). *Usability engineering*. Amsterdam, The Netherlands: Morgan Kauffman.

Stronge, J. H., & Brodt, A. (1985). Assessment of nurses' attitudes toward computerization. *Computers in Nursing*, *3*(4), 154–158.

Stokowski, L. A. (2013). Electronic nursing documentation: Charting new territory. *Medscape*. Retrieved from http://www.medscape.com/viewarticle/810573_2.

Timby, B. (2007). *Fundamental nursing skills and concepts* (7th ed.). Centreville, MI: Glen Oaks Community College.

Ventrez, W., Kooienga, S., Vuckovic, N., Marlin, R., Nygren, P., & Stewart, V. (2006). Physicians, patients, and the electronic health record: An ethnographic analysis. *Annals of Family Medicine*, 4, 124–131.

Yontz, L. S., Zinn, J. L., & Schumacher, E. J. (2015). Perioperative nurses' attitudes toward the electronic health record. *Journal of PeriAnesthesia Nursing*, 30(1), 23–32. doi:10.1016/j.jopan.2014.01.007.

Yu, P., Hailey, D., & Li, H. (2008). Caregivers' acceptance of electronic documentation in nursing homes. *Journal of Telemedicine and Telecare*, 14(5), 261–265. doi:10.1258/jtt.2008.080310.