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Electronic Health Records: Quality of Nursing Documentation: Paper-Based Health Records Versus Electronic-Based Health Records

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Abstract

objectives: To assess and compare the quality of paper-based and electronic-based health records. The comparison examined three criteria: content, documentation process and structure.

Background: Nursing documentation is a significant indicator of the quality of patient care delivery. It can be either paper-based or organized within the system known as the electronic health records. Nursing documentation must be completed at the highest standards, to ensure the safety and quality of healthcare services.

However, the evidence is not clear on which one of the two forms of documentation (paper-based versus electronic health records is more qualified.

Methods: A retrospective, descriptive, comparative design was used to address the study's purposes. A convenient number of patients' records, from two public hospitals, were audited using the Cat-ch-Ing audit instrument. The sample size consisted of 434 records for both paper-based health records and electronic health records from medical and surgical wards.

Results: Electronic health records were better than paper-based health records in terms of process and structure. In terms of quantity and quality content, paper based records were better than electronic health records. The study affirmed the poor quality of nursing documentation and lack of nurses' knowledge and skills in the nursing process and its application in both paper-based and electronic-based systems.

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Conclusion: Both forms of documentation revealed drawbacks in terms of content,process and structure. This study provided important information, which can guide policymakers and administrators in identifying effective strategies aimed at enhancing the quality of nursing documentation.

Relevance to clinical practice: Policies and actions to ensure quality nursing documentation at the national level should focus on improving nursing knowledge, competencies, practice in nursing process, enhancing the work environment and nursing workload, as well as strengthening the capacity building of nursing practice to improve the quality of nursing care and patients' outcomes.

Keywords: *electronic health records and audit instruments, paper-based, process, quality of nursing documentation, structure.*

Introduction

Nursing documentation is a significant indicator of effective patient care delivery (Wilson, Hauck, Bremner, & Finn, 2012). Documentation can be either paper-based or electronic-based, as per the electronic health records (EHRs), which include all information related to patient care. Regardless of the method of documentation, nursing documentation has to be conducted at the highest standard, to ensure the delivery of safe and high-quality healthcare services (Noureldin, Mosallam, & Hassan, 2014). A high quality of nursing documentation is expected in every area of care and in every setting (Wilson et al., 2012); it is considered an important responsibility of nursing, to ensure the continuity of effective patient care (Asamani, Amenorpe, Babanawo, & Ansah Ofei, 2014) and to improve patients' outcomes (Stevenson & Nilsson, 2012). Nurses, the largest group of healthcare providers in the healthcare system, play a crucial role in every area of performance improvement in healthcare organisations. The role demands documenting and managing patient information through coordinating patient care and communicating with other interdisciplinary team members. It is believed that paper-based documentation does not meet the requirements of high-quality documentation and communication among healthcare providers, because it is time-consuming, repetitive and inaccurate (Yu, Zhang, Gong, & Zhang, 2013). Problems arise when attempting to obtain information from paper-based records, as it is considered labour intensive. Health care is built upon and revolves around information. The introduction of electronic health records (EHRs) as a method of documentation is more legible and more accessible (Nguyen, Bellucci, & Nguyen, 2014). The increasing amount of data makes managing information difficult to assemble and more importantly, more difficult to provide the best care to patients. The challenge of transforming data into information and knowledge and using both to improve health communication has led to the development of the health information system (HIS). HIS, EHRs, patient health records and a computerised patient record system are used interchangeably within the literature and are necessary to improve the quality of patient care (Ajami & Bagheri-Tadi, 2013; Middleton et al., 2013). Electronic health record documentation has been used by many nurses for documenting nursing care including the nursing process, such as entering orders and accessing laboratory results, as well as supporting healthcare professionals in processing, managing and communicating data in a variety of settings. It has the potential to improve patients' safety, enhance healthcare professionals' access to a patient's healthcare information, ensure appropriate use of resources and finally, improve the communication among healthcare professionals (Secginli, Erdogan, & Monsen, 2014). Currently, there has been considerable interest throughout the world's healthcare sectors to increase the quality of nursing documentation (Evatt, Ren, Tuite, Reynolds, & Hravnak, 2014).

According to Wang, Yu, and Hailey (2013), the quality of nursing documentaltion includes three main components: content, documentation process and format or structure. Documentation content focuses on completeness and accuracy of data that reflect reality (Wang et al., 2013). The documentation process focuses on the patient's data completeness and the regularity of data in the patient's records, while documentation structure focuses on physical presentation, which includes the legibility and completeness of the patient's information.

It has been recommended that the implementation of EHRs, in comparison with paper-based records, would result in greater accuracy to the multiprofessional use of all healthcare providers (Collins et al., 2013). However, the evidence is not quite clear. This requires further assessment and investigation of the quality of nursing documentation in both paper-based and EHRs (Wang, Bjorvell, Hailey, & € Yu, 2014). Although the EHR has been introduced in Jordan during the last decade, its full application is still limited. Several institutions in Jordan are working on introducing the HIS in different healthcare settings to cope with the expanding technology of the information system. Currently, the EHRs in the public healthcare sector are an important part of a national initiative programme called the electronic health solution (EHS). The national EHS aims at increasing the effectiveness of medical management, reaching the best international standards and improving workflow procedures in hospitals and healthcare centres. It has several subsystems which include computerised patients' record system (CPRS), patients' booking and laboratory and pharmacy system among others. The EHS is based on a software application with a specific application for nurses.

Assessing the quality of nursing documentation provides insight into the best practices and limitations to improve the quality of documentation and patients' outcomes. Therefore, there is persistent need for evaluating the quality of paper-based versus EHR documentation prior to further expansion of using the EHR system at the national level.

Aim

The aim of this study was to assess and compare the quality of nurs- ing documentation of paper-based versus EHR in terms of content, process and structure.

Theoretical framework

The Sweden model, known as the VIPS model (Figure 1), was used as a framework for the current study. The VIPS model is a valid model, designed to be used in nursing documentation, following the nursing process. VIPS is an abbreviation of V€albefinnande, Integritet, Prevention and S€akerhet: an acronym for the Swedish terms for well-being, integrity, prevention and safety. The components of the VIPS model align very well with the goals of the nursing process (Darmer et al., 2006) that is used for nursing documentation. It is estimated that the model has a positive effect on understanding and assessing the nursing process documentation by the application of its keywords (Ehrenberg, Ehnfors, & Thorell-Ekstrand, 1996).

The model is composed of two levels of keywords and exempli- fies the content underlying each keyword. The first level corre- sponds to the nursing process model, along with the keywords of nursing history, nursing status, nursing diagnoses, nursing goals, nursing interventions, nursing outcome and discharge notes. The second level of keywords consists of subdivisions for nursing history, nursing status and nursing interventions as shown in Figure 1 (Ehrenberg et al., 1996).

Methods:

A retrospective, descriptive, comparative design was used for this study. The study was

conducted in two public hospitals in the north- ern part of Jordan where one hospital is using paper-based records and the other is using EHRs for documentation. The two hospitals are considered to be large in the north of Jordan. Medical and surgi- cal wards were chosen due to the similar nature of nursing docu- mentation. The nature of documentation in terms of the nursing process in both medical and surgical wards helped in auditing the record easily, which in turn helped to compare the same wards between the two hospitals.

Sample

A convenient sample of patients' records was used. The sampling process involved two steps. The first step included the selection of two Ministry of Health (MOH) hospitals (one used paper-based and the other EHRs). The second step involved the selection of the patient's records. All electronic- and paper-based records from the medical and surgical wards of the approached hospitals, which had been saved for at least 2 months prior to data collection, were eligi- ble to be included in the current study. A period of 2 months is a suitable period to have the patient's records ready to audit, as they can be easily audited without any interruption of the work of health- care providers. Any records that did not meet the inclusion criteria were excluded from the auditing process. The number of records needed for auditing was determined using the guidelines of a UHBristol Clinical Audit Team (2009). The guidelines maintain that the sample size calculation takes into consideration the population size. Therefore, for a confidence level of 95%, degree of accuracy of 0.05 and expected incidence of 50%, 217 records from each of the two hospitals are required for a total of 434 patients selected conveniently.

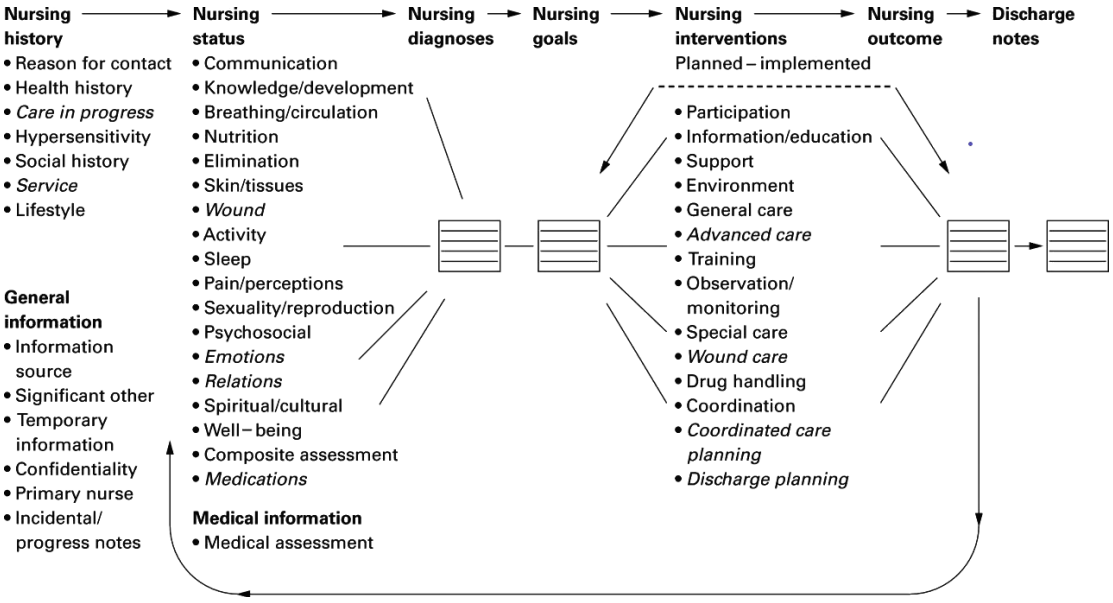

FIGURE 1 VIPS model for nursing documentation. Reprinted from nursing documentation in patients' records: experience in the use of the VIPS model, by Ehrenberg, A., Ehnfors, M. &Thorell-Ekstrand, I. (1996). J Adv Nurs, 24(4), 853–867

Data analysis

Data were analyzed using Statistical Package for Social Science (SPSS), version 22, for Windows. Descriptive statistics were used according to the level of measurement to describe the study's variables. The data were checked for normality, t test was used if data were nor- mally distributed, while Mann–Whitney U test was used to assess mean differences between paper-based and EHRs, if the data were not normally distributed.

Result:

A total of 434 health records were audited with equal numbers of both paper-based and EHRs (n = 217). Of the total audited records (N = 434), there were 256 (59%) records from the medical wards and 178 (41%) from the surgical wards.

There were four items in the Cat-ch-Ing audit instrument assessing the quantity aspect of the process' components of nursing documentation. The results revealed that the mean score of the items related to the documentation process of the EHRs was higher than paper-based records (Table 1).

The results revealed a mean score of 8.2 (SD = 1.9, range, 0–13) for the paper-based records and 12.9 (SD = 1, range, 0–13) for EHRs, which was statistically significant; t (432) = 31.8, p = .000.

Assessing and comparing paper-based and EHR documentation structure (format)

The documentation structure in the Cat-ch-Ing audit instrument is limited to one item about record legibility, which is related to the quality aspect of nursing documentation. The scores of the records' legibility item were not normally distributed. Thus, Mann–Whitney U test was used to compare the mean differences in paper-based and EHRs. The results revealed a significant difference with better EHR legibility (U = 435, p = .000).

Assessing and comparing paper-based and EHR documentation content

Measuring the total score of the documentation content in relation to the quantity aspect, the results revealed a mean score of 15.08 (SD = 5.89, range, 0–34) and 10.21 (SD = 3.6, range, 0–34) for paper-based and EHRs, respectively, which was statistically signifi- cant; t (432) = 10.34, p = .000. In addition, measuring the total score of the documentation content in relation to the quality aspect, the results revealed a mean score of 14.00 (SD = 5.034, range, 0–24) and 7.98 (SD = 2.86, range, 0–24) for paper-based and EHRs, respectively, and the result was statistically significant; t (432) = 15.32, p = .000.

Looking at the items related to the quantity aspect of documen- tation-related content, the results revealed statistical differences between paper-based and EHRs. The results revealed a better quan- tity of the nursing history (M = 0.9; SD = 0.6) of paper-based records versus EHRs (M = 0.5; SD = 0.6). Nursing diagnosis was written with better quantity using paper-based documentation (M = 1.9; SD = 1.1) compared to EHRs (M = 0.13; SD = 0.59). The planning was written with better quantity using paper-based docu- mentation (M = 1.1; SD = 0.80) compared to EHRs (M = 0.10; D = 0.41). For implementation, paper-based was superior (M = 2; SD = 1.2) to the EHRs (M = 0.11; SD = 0.60). Writing the nursing outcome, the results revealed a better quantity of writing the nurs- ing outcome using paper-based (M = 1.9; SD = 1.4) compared to EHRs (M = 0.07; SD = 0.45).

Looking to the audited records, in terms of the number of com- pleted records, with regard to different items, there were differences between both records. For writing the nursing history, there was only one completed record in paper-based and electronic health- audited records. For the nursing status at discharge, 208 (95.9%) of the paper-based records were not completed compared to 169 (77.9%) EHRs. Of the EHRs, 207 (95.4%) did not include nursing diagnosis compared to 44 (20.35%) of paper-based records, and only three (1.4%) paper-based records included completed patient care planning compared to two (0.9%) of EHRs. For nursing process- related implementation, 108 (49.8%) paper-based records were com- pleted compared to only eight (3.7%) of EHRs. For VIPS keywords content item, both records have nearly the same number of uncompleted records (Table 2).

In terms of the quality aspect of the content component, the results revealed statistical

differences between audited paper-based and EHRs with better quality related to paper-based in terms of nursing history (M = 2.4; SD = 1.1) compared to EHRs (M = 1.5; SD = 1.4). Nursing status at arrival was with better quality content of paper-based records (M = 1.8; SD = 0.59) compared to EHRs (M = 1.6; SD = 0.88). On the other hand, the updated nursing status was better in the EHRs (M = 1.9; SD = 0.64) than in paper-based records (M = 1.7; SD = 0.74). For nursing diagnosis, it was written with better quality using paper-based (M = 1.9; SD = 1.1) compared to EHRs (M = 0.12; SD = 0.58). Planning was also better in paper- based (M = 2.1; SD = 1.1) compared to EHRs (M = 0.12; SD = 0.6). The nursing outcome was better using paper-based documentation (M = 1.9; SD = 1.4) compared to EHRs (M = 0.07; SD = 0.45).

Looking to the completed audited records, with regard to the nursing history, 154 (71%) paper-based records were completed compared to 86 (39.6%) EHRs. However, writing the nursing status at arrival had a poor quality of 20 (9.2%) paper-based records com- pared to 49 (22.6%) EHRs. Updated nursing status had a poor quality of 35 (16.1%) paper-based records compared to 19 (8.8%) in EHRs. The nursing diagnosis was of poor quality in the paper- based 49 (22.6%) versus 208 (95.9%) in EHRs. The planning had a poor-quality documentation in paper-based documentation (49 [22.6%] compared to electronic health records 208 [95.9%]). The nursing outcome had a poor quality of 75 (34.6%) paper-based records compared to poor-quality documentation of EHRs (212 [97.7%]). Finally, using VIPS keywords has poor-quality usage in both paper-based and EHRs that was 52 (24%) and 50 (23%), respectively (Table 3).

For the last item, which assessed the presence of nursing dis- charge note, the chi-square test was used to assess proportional dif- ferences. The results revealed there were just three (2.2%) paper- based records with nursing discharge note compared to 136 (97.8%) in the EHRs. The chi-square result revealed $v2 = 187.22$, $p = .000$.

Discussion

The current study assesses and compares the quality of documenta- tion of paper-based and EHRs in terms of content, process and struc- ture. Paper-based and EHR documentation both had their drawbacks. Many problems and weaknesses of nursing documentation had sur- faced in terms of content, process and structure, while using the EHR, as well as the paper-based systems. The results of this study affirmed that nurses have failed to grasp and apply the core concepts of nursing diagnosis, planning, implementation and evaluation. This is alarming to the quality and effectiveness of nursing education as well as staff development and training programmes for nurses.

Further research regarding the quality of nursing documentation and application of the nursing process in practice should be con- ducted prior to any further expansion of the EHR's national pro- grammes, on a large scale. Further studies should be conducted prior to any further expansion of the EHR national programmes on a large scale, in order to identify specific factors that might influence the content and quality of nursing documentation such as nurses' com- petencies, knowledge and skills in documentation and application of nursing process as well as patient-to-staff ratio, nursing background and characteristics.

RELEVANCE TO CLINICAL PRACTICE

Documenting the nursing process is crucial for ensuring the require- ment of high-quality documentation and supporting healthcare deci- sions, to improve patient care and ensure patient safety. This study provides timely information to guide polices and solid decisions to improve and identify effective strategies and actions to enhance the quality of nursing documentation of EHR and paper-based systems. It also identifies effective policies and steps to successfully implement the EHRs in hospitals and other healthcare settings at the national level. Policies

and actions to ensure quality nursing documentation and full adoption of the EHRs at the national level should focus on improving nursing knowledge, competencies and practice in the nursing process, enhancing the work environment and nursing workload, as well as strengthening the capacity building of nursing practice to improve the quality of nursing care and patients' outcomes. Administrators and pol- icy makers should assess, evaluate and monitor nursing practice in elec- tronic- and paper-based documentation, including the nursing process and factors influencing the nursing documentation.

Bridging the gap between practice and education is important for enhancing the nursing competencies and personal qualifications to ensure that they will be ready to meet the demands of their future profession. Health informatics and nursing documentation should be considered as integral parts of the undergraduate and graduate nursing programmes. Nursing students should be well pre- pared on the application and use of nursing knowledge and skills, in technology and the real world of practice for effective nursing care and patients' outcomes.

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