Original scientific article/Izvirni znanstveni članek

Primary healthcare nurses' perceptions about their ability to utilise electronic health records

Samoocena sposobnosti medicinskih sester za uporabo elektronskih zdravstvenih kartotek v primarni zdravstveni dejavnosti

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Key words: electronic health records; nurses' perceived skill levels; primary healthcare

Ključne besede: elektronske zdravstvene kartoteke; medicinske sestre; samoocena sposobnosti; primarno zdravstveno varstvo

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ABSTRACT

Introduction: The implementation, adoption and use of electronic health records remains a global challenge despite the numerous advantages associated with their use. This paper explores primary healthcare nurses' perceptions regarding their skill levels in using EHRs.

Methods: Data were collected using a self-administered questionnaire from a sample of 71 nurses (63% response rate) in selected primary health care (PHC) facilities of the Northern-Tygerberg substructure, Cape Town.

Results: The overall results show that 59 respondents (83%) believed that they were skilled in using EHRs in PHC**.** Nearly two thirds of all nurses (46 or 64.8%) reported using EHRs for nursing documentation, 45 nurses (63%) reported using EHRs to store, retrieve and transfer data, 44 (62%) reported being able to design a flow chart, 38 (53.5%) reported being able to access databases and 38 (52.1%) reported being able to convert electronic files for various applications. However, 33 nurses (46.5%) were unsure of their computer skills in creating multimedia files. This varied from service department to service department, with 62 respondents (87.3%) in pediatric care and 59 respondents (83.1%) in family planning, adult nursing and HIV management reporting having EHR skills. Enrolled nurses rated their EHR skills significantly lower (58%) than registered nurses (92%) ($p = 0.028$).

Discussion and conclusion: Although most respondents in this study reported being skilled in using EHRs in PHC, better computer accessibility and continuous training are important ongoing requirements. Further qualitative research is needed to better understand some of the problems and barriers which affect nurses' ability to use EHRs in PHC settings.

IZVLEČEK

Uvod: Uvedba in uporaba elektronskih zdravstvenih kartotek (EZK) predstavlja globalen izziv kljub številnim prednostim, povezanim z njihovo uporabo. Namen raziskave je bil raziskati sposobnosti uporabe EZK medicinskih sester v primarni zdravstveni dejavnosti.

Metode: Za zbiranje podatkov smo uporabili lasten vprašalnik na vzorcu 71 medicinskih sester (63-odstotna stopnja odziva) v izbranih ustanovah primarnega zdravstvenega varstva v podstrukturi Northern-Tygerberg, v mestu Cape Town.

Rezultati: Rezultati raziskave kažejo, da 59 anketirancev (83 %) ocenjuje, da so vešči uporabe EZK v primarni zdravstveni dejavnosti. Skoraj dve tretjini medicinskih sester (46 oz. 4,8 %) uporablja EZK za potrebe zdravstvene dokumentacije, 45 (63 %) medicinskih sester uporablja EZK za shranjevanje, pridobivanje in prenos podatkov, 44 (62 %) medicinskih sester je sposobnih oblikovati diagram poteka, 38 (53,5 %) medicinskih sester zna dostopati do baz podatkov in 38 (52,1 %) medicinskih sester zna pretvarjati elektronske datoteke za rabo z različnimi aplikacijami. Vendar pa kar 33 (46,5 %) medicinskih sester ni bilo prepričanih o svojih računalniških spretnostih za ustvarjanje večpredstavnostnih datotek. Rezultati se razlikujejo po posameznih oddelkih zdravstvene nege. Kar 62 (87,3 %) anketirancev v pediatrični oskrbi in 59 (83,1 %) anketirancev na področju reproduktivnega zdravja, oskrbi odraslih in na področju obvladovanja virusa HIV izkazuje veščine za uporabo EZK. Srednje medicinske sestre svoje spretnosti uporabe EZK ocenjujejo bistveno nižje (58 %) kot diplomirane medicinske sestre (92 %) ($p = 0,028$).

Diskusija in zaključek: Čeprav večina anketirancev v raziskavi meni, da je vešča uporabe EZK v primarni zdravstveni dejavnosti, je potrebno zagotoviti boljšo dostopnost do računalnikov in stalno usposabljanje osebja. Potrebne so nadaljnje kvalitativne raziskave, ki bi osvetlile težave in ovire, ki vplivajo na veščine medicinskih sester za uporabo EZR v zdravstvenih ustanovah.

Received/Prejeto: 14. 8. 2021
Accepted/Sprejeto: 21. 8. 2022

https://doi.org/10.14528/snr.2022.56.3.3123

Introduction

The implementation, adoption and use of electronic health records (EHRs) is a global challenge despite their numerous advantages for improving health care services. The use of EHRs (O'Mahony, Wright, Yogeswaran, & Govere, 2014; Murua, Carrasco, Agirre, Susperregi, & Gómez, 2017) helps prevent data loss, reduces room for error, enhances the work of nurses, and reduces patient waiting time in the hospital. EHRs can help get more work done efficiently, streamline work processes, and provide point-of-care decision support (Noah & Thomas 2017). Moreover, the use of EHR systems can significantly improve connectivity within the healthcare system, encourage continuous education of healthcare professionals, and allow remote access to patient data, as well as improve patient follow-up (Thomas, 2016).

Nevertheless, the use of EHRs is not without problems. The EHR challenges reported include lack of computer skills, poor infrastructure, and poor implementation strategies (Ajiboye, Adekoya, Alawiye, & Oyedipe, 2014; Odekunle, Odekunle, & Shankar, 2017). Although healthcare systems around the globe are geared towards using EHRs to enhance healthcare delivery, Mugomeri, Chatanga, Maibvise, & Masitha (2016) highlight that this is only possible if healthcare workers possess the fundamental computer skills. According to Alwan, Awoke, & Tilahun (2015), the current skill level of healthcare professionals is one of the most common obstacles to the adoption of EHR systems in health care. Holden & Karsh (2010) argue that the success or failure of EHR systems depends on nurses as they play a pivotal role in the healthcare team. If they do not possess the necessary computer skills, their engagement in the functions of the EHR system would be very challenging (Tubaishat, 2017). However, the EHR system could reduce disparities in the quality of care by enabling people in remote areas to access the services and expertise that would otherwise not be available to them (World Health Organization [WHO], 2008).

In South Africa, the eHealth strategy was introduced in 2002. It represented an initiative to move from a paper-based health record system to an EHR system in primary health care (PHC) facilities. However, there is little evidence in the literature which would indicate that PHC nurses possess the necessary skills to implement an EHR system (Thomas, 2016).

Access to computers and lack of computer skills among nurses is a challenge in developing countries, including South Africa, and it impacts on the use of EHR systems (Furst et al., 2013). This has affected both productivity and workflow, with productivity measured by the number of patients healthcare staff treat per hour (Masselink & Erikson, 2016). Due to the extensive documentation and complexity of the EHR software, healthcare staff find it very time-consuming. In addition, Frogner, Wu, Ku, Pittman, & Masselink (2017) report that nurses lack the skills of using EHR systems, which in turn affects the implementation of EHR and therefore negatively impacts nurse productivity in primary health centres.

Aims and objectives

Understanding the current perceived skills of PHC nurses in EHR use could help the Department of Health (DoH) and all relevant stakeholders to develop better strategies to equip PHC nurses with the necessary skills and support so as to improve the implementation of EHR systems in PHC facilities. The purpose and objective of this study was to investigate the perceived skill levels of primary care nurses regarding their use of EHRs at PHC level.

Method

The study was carried out using a quantitative research approach. This allowed the researcher to draw conclusions based on numerical data, which were quantified and examined using mathematical procedures (Houser, 2016). According to Alwan et al. (2015), surveys are the most commonly used method of assessing perceived skill levels as they provide respondents ample time to reflect on a given topic while maintaining privacy and confidentiality. This approach also ensures that researchers cannot influence the responses as they are measured using a Likert scale.

Oliver's (2000) ICT skills benchmarking system was used to assess whether respondents felt they possessed lower or higher skill levels, where a score of 0 meant the respondent possessed no skills, and where all 18 questions answered correctly meant the respondent had maximum skills. Those who scored 75% and above were considered having higher skill levels, while those who scored below 75% were considered having lower skill levels.

Description of the research instrument

A descriptive survey design with a self-administered questionnaire was used to investigate PHC nurses' perceived skill levels in using EHRs in selected PHC facilities. The questionnaire consisted of two sections: Section A consisted of closed-ended questions on demographic data (age, gender, race, marital status, work experience, highest professional qualification, and areas of experience). In contrast, Section B consisted of 18 questions developed by Jiang, Chen, & Chen (2004). These questions tested respondents' skills in using computers, applications and software. Similar studies were conducted by Cheng, Meng-Hsiang, & Chen-Wei (2014) and Asah (2020). The questions in Section B were rated using a Likert scale ranging from

"Agree" to "Disagree". The Cronbach's alpha test of the questionnaire was 0,96, indicating that the internal consistency of the instrument was reliable.

Description of the sample

Data collection was carried out from ten purposively selected PHC facilities in the Northern-Tygerberg substructure in Cape Town (Northern & Western: Bloekombos, Brackenfell, Brighton, Durbanville, Wallacedene Clinics and Tygerberg/ Klipfontein: Delft South, Dirkie Uys, Elsies River, Parow Clinics, Kasselsvlei Community Health Centre. Self-administered questionnaires were distributed to all nurses who were willing to take part in the study (112 PHC nurses). A total of 71 PHC nurses returned completed questionnaires, yielding a response rate of 63%. The information obtained from the questionnaire and during data analysis was secured with codes to avoid disclosure of information that could cause harm to the respondent.

Description of the research procedure and data analysis

Data were collected from September to October 2018 and analysed using the Statistical Package for Social Services (SPSS) version 25.0. Descriptive analysis was conducted to determine frequencies and percentages (numerical values were assigned to a three-point Likert scale, namely Disagree – 1, Uncertain – 2, Agree – 3). A Chi-square test was performed and a bivariate analysis was used to test the relationship between two variables, with a cross-tabulation test to determine the association between sociodemographic characteristics (age, gender, years of work experience, level of qualification), and nurses' perceived skill levels in using EHRs in health care. The threshold for statistical significance was fixed at $p < 0.05$.

Results

About 39 percent of nurses were between 40 and 50 years of age, followed by 26 nurses (36.6%) between 30 and 40 years of age. There were 9 nurses (12.7 %) above 50 years of age and 8 nurses (11.3%) between 20 and 30 years of age. In terms of work experience, 28 nurses (39.4%) had more than 15 years of work experience in the nursing profession, and 23 (32.4%) had 5–10 years of work experience, followed by 14 (19.7%) and 6 (8.4 %) of those with 1–5 and 10–15 years of work experience respectively. More than half, i.e., 26 nurses (36%) held a Bachelor's degree in nursing, followed by 23 nurses (32.4%) with an advanced nursing qualification. In comparison, 12 nurses (16.9%) had an additional qualification or were pursuing a qualification in nursing and 10 (14.1%) had a diploma in nursing.

Results show that a larger proportion of nurses had work experience in more than one clinical setting. The majority, 62 nurses (87.3%), had worked in paediatric care and adult care. A total of 59 nurses (83.1%) had worked in family planning, HIV treatment and management and adult consulting. Others (n = 58, 81.7%) had experience in tuberculosis (TB) management and 54 (76.1%) in trauma or emergency departments, while 52 (73.2%) had experience in antenatal care. Forty nurses (56.3%) had experience in the delivery room, 36 (50.7%) had experience in neonatal care, and 35 (49.3%) had worked in psychiatric service areas.

Perceived level of skill in EHRs

As can be seen in Table 1, about 46 nurses (64.8%) were able to use EHRs to conduct nursing work (nursing records), while 45 (63.0%) reported using EHRs to store/retrieve and transfer data, such as patient and drug information. Privacy maintenance when using nursing information systems (EHRs) was reported by 44 nurses (62.0%), flowchart design by 44 (62.0%) nurses and database software use to access patient files by 38 nurses (53.5%). On the other hand, being unsure of their computer skills for creating multimedia files was reported by 33 nurses (46.5%), for statistical data use by 32 nurses (45.1%), for resolving common computer errors by 30 (42.3%) and for assembling essential computer components by 29 nurses (40.8%).

As for the use of online libraries and databases, 53 nurses (74.6%) reported being able to use a library retrieval system such as Medline to search for information. Fifty-eight nurses (81.7%) reported being able to use the World Wide Web to search for information. The majority of nurses, i.e. 52 (73.2%), were able to use computerised self-learning equipment. Some nurses were uncertain about their ability to create multimedia files when recording patient information (46.5%), to use statistical software for analysing research data when necessary (n = 34, 45.1%), to resolve common computer errors (n = 30, 42.3%) and assemble essential components of the computer (n = 29, 40.8%).

Except for professional qualification, there were no significant variations between demographic information and perceived competence in the use of EHRs (Table 2). Nurses with a Bachelor's degree in nursing (n = 24, 92.0%) and nurses with an advanced nursing diploma (n = 21, 91.0%) reported having significantly higher skills than enrolled/auxiliary nurses (n = 7.58%) in EHRs (p = 0.028).

Those with 15 years of work experience and more (n = 23, 82 %), and those with 5–10 years of work experience (n = 18, 78 %) reported having higher skill levels in the use of EHRs compared to those who had 1–5 years, and 10–15 years of work experience.

Table 1: *Perceived skill levels in the use of EHRs in PHC*
Tabela 1: *Samoocena sposobnosti medicinskih sester za uporabo EZK v PZD*

Statements/ Izjave	***Agree/ Strinjam n (%)***	***Uncertain/ Neodločen n (%)***	***Disagree/ Se ne strinjam n (%)***
Being able to send/receive mails regarding patient care as part of EHRs	65 (91.5)	3 (4.2)	3 (4.2)
Being able to use the World Wide Web (www) to search for treatment guidelines and protocols	58 (81.7)	12 (16.9)	1 (1.4)
Being able to use word processing software to record patient health information (EHRs)	55 (77.5)	13 (18.3)	3 (4.2)
Being able to use computers as self-learning tools to gain knowledge on diseases and management protocols	55 (77.5)	15 (21.1)	1 (1.4)
Being able to use a library information retrieval system for research on diseases and management protocols	53 (74.6)	13 (18.3)	5 (7.0)
Being able to use computerised equipment for recording patient information (EHRs)	52 (73.2)	17 (23.9)	2 (2.8)
Being able to use Microsoft (MS) software when recording patient information (EHRs)	50 (70.4)	19 (26.8)	2 (2.8)
Being able to use nursing information systems for EHRs	46 (64.8)	23 (32.4)	2 (2.8)
Being able to use EHRs to do nursing work	46 (64.8)	23 (32.4)	2 (2.8)
Being able to store/retrieve EHRs of patients from a nursing information system	45 (63.0)	24 (33.8)	2 (2.8)
Being able to maintain privacy when using nursing information systems for EHRs	44 (62.0)	25 (35.2)	2 (2.8)
Being able to design and use a flowchart when recording patient health information (EHRs)	44 (62)	22 (31)	5 (7.0)
Being able to use database software to access patient file for electronic health recording	38 (53.5)	28 (39.4)	5 (7.0)
Being able to convert files for different applications when recording patient information (EHRs).	37 (52.1)	29 (40.8)	5 (7.0)
Being able to use statistical software to analysed research data when necessary	34 (47.9)	32 (45.1)	5 (7.0)
Being able to create multimedia files when recording patient information	32 (45.1)	33 (46.5)	6 (8.5)
Being able to resolve common computer errors when recording patient information (EHRs)	22 (31.0)	30 (42.3)	19 (26.8)
Being able to assemble basic components of the computer	22 (31.0)	29 (40.8)	20 (28.2)

Legend/Legenda: n – number/število; % – percentage/odstotek

Table 2: *Association between demographic information and perceived skills in the use of EHRs in PHC*
Tabela 2: *Povezava med demografskimi podatki in zaznanimi veščinami pri uporabi EZK v PZD*

Demographic data/ Demogafski podatki		***Perceived skills, n (%) of the total score/ Zaznane veščine, n (%)***				***p***
		Lower skill levels/ Nižja stopnja veščin n (%)		***Higher skill levels/ Višja stopnja veščin n (%)***		
Age group (years)	30–40	4	15.4	22	84.0	0.102
	40–50	8	28.6	20	71.0	
	50+	0	0.0	9	100	
	20–30	0	00.0	8	100	
Highest professional qualification	Bachelor of Science in nursing	2	7.7	24	92.0	0.028
	Advanced nursing	2	8.7	21	91.0	
	Diploma in nursing science	3	30	7	70.0	
	Enrolled/Auxiliary nurses	5	41.7	7	58.0	
Years of experience	15+	5	17.9	23	82.0	0.221
	5–10	5	21.7	18	78.0	
	1–5	0	0.0	14	100.0	
	10–15	2	33.3	4	66.0	

Legend/Legenda: n – number/število; % – percentage/odstotek; p – statistical significance/statistična značilnost

Table 3: *Areas of work experience and perceived skill levels in the use of HER*
Tabela 3: *Področje dela in zaznana stopnja EZK*

Areas of experience/ Področje dela	***Lower skill levels/ Nižja stopnja veščin n (%)***	***Higher skill levels/ Višja stopnja veščin n (%)***	***p***
Paediatric rooms	7 (11.3)	55 (88.7)	0.001
TB rooms	8 (13.8)	50 (86.2)	0.140
HIV rooms	9 (15.3)	50 (84.7)	0.412
Adult consulting rooms	11 (18.6)	48 (81.4)	0.385
Family-planning rooms	11 (18.6)	48 (81.4)	0.385
Antenatal rooms	8 (15.4)	44 (84,6)	0.573
Emergency/trauma rooms	11 (20.4)	43 (79.6)	0.165
Labour/delivery rooms	5 (12.5)	35 (87.5)	0.261
Neonatal rooms	3 (8.3)	33 (91.7)	0.051
Psychiatric rooms	4 (11.4)	31 (88.6)	0.225

Nurses with higher skill levels in using EHRs (55 or 88.7%) had worked in paediatric departments. Statistical significance was found between working in paediatrics and the perceived level of skills in EHR use (p = 0.001). These findings show that the perceived skill levels of the 50 respondents (86.2%) who had experience working in tuberculosis care and the 50 respondents (84.7%) who had worked in HIV management of HIV or the HIV consulting rooms were significantly higher.

Similar results were observed in more than two-thirds of the nurses (n = 48, 81.4%) who had experience in adult consulting rooms and in those working in family-planning (n = 48, 81.4%), as their perceived skill levels in the use of EHRs were significantly higher

Discussion

The study revealed that the majority of the participating nurses felt that they were skilled in the use of EHRs even though very few computers were available in their health facilities. Nurses working in paediatrics, as well as those working in TB and HIV management, had more opportunities to work with computers and EHR systems. In contrast, Mugomeri et al. (2016) reported that the majority of nurses in Lesotho were found to have inadequate computer skills. This was attributed to the many years that had passed since the nurses obtained their latest qualification and the lack of accessibility to computers in their work environment. Furthermore, most of the nurses participating in our study reported that they were able to use the World Wide Web (www) to access library database systems such as Medline to search for evidence-based practices relating to patient care, treatment and management protocols. In contrast to this study, Sadoughi, Azadi, & Azadi (2017) reported that nurses had insufficient skills to search the internet for evidence-based practices or to search online databases for information. The authors also point out that computer skills are essential for storing and retrieving patient health information and treating patients based on best evidence-based practice (Sadoughi et al., 2017).

Respondents had some level of experience using computers as they were able to send and receive emails regarding patient care as part of EHRs. The majority of respondents were able to use word processing software to record patient health information, use presentation-editing software, design and use flowcharts, or convert files for different applications when recording patient health information. Similarly, Kahouei, Zadeh, & Roghani (2015) noted that the use of EHRs in PHC facilities should not be a problem as most of the respondents in the study had the essential skills or some degree of experience in information literacy and computer use in health care (Kahouei et al., 2015).

Some nurses were unsure of their ability to create multimedia files, use statistical software to analyse study data, troubleshoot typical computer errors, and assemble a computer. This supports the findings of a Delphi survey in which nurses from Indonesia reported that these skills were irrelevant to their daily work activities (Rachmani et al., 2020). The study identified no significant association between age and skills in EHR use and between years of work experience and EHR use. In contrast, Mugomeri et al. (2016) identified a significant relationship between nurses' age and inadequate computer skills and between their years of work experience and inadequate computer skills. With regard to educational attainment, there was a significant relationship between nurses' highest professional qualification attained and their skill levels in EHR use. This could be due to the fact that most nurses had a Bachelor's degree or an advanced diploma in nursing. The same categories of nurses were also

in managerial positions or worked in specialty areas such as TB/HIV, and they had access to computers for electronic recording of patient information or calculating statistics for the Department of Health.

We found a statistically significant relationship between work area and skills in using the EHR system. We found that work areas are essential in developing nurses' computer skills and EHR skills in PHC. This was evident from the fact that nurses who worked in paediatric care had more exposure to computers and electronic health information recording than nurses working in other areas. Kim et al. (2017) note that the adoption of EHRs improves the efficiency and quality of childhood immunisation through EHR-based clinical alert systems and results in higher immunisation rates in paediatrics. Nurses working in such settings were therefore exposed to computers on a daily basis. Although the majority of respondents reported higher perceived skill levels, a small percentage reported lower perceived skill levels, which is concerning as these skills are essential for an effective use of any EHR system. Management should therefore develop programmes for health professionals to learn using EHR systems as part of their continuous professional development so as to increase the use of EHRs by nurses. Increasing computer accessibility in all PHC facilities and providing regular computer skills training will help them enhance their computer skills and use the EHR system in their work environment. This study only covered PHC facilities in the Western Cape that are part of the Tygerberg-Northern substructure, which limits its representativeness to the broader population of all Cape Town nurses. Moreover, the small sample size means that the results cannot be generalised to other nursing populations or significantly affect nursing legislation, thus highlighting the need for similar research with a larger sample size. Nurses who were less interested in EHRs or less comfortable with computers may not have participated in the study, which might have led to reporting bias.

A larger-scale study is therefore recommended in order to inform decision-making and policy development regarding the use of EHRs in health care. In addition, further qualitative research is needed to better understand some of the issues and barriers which affect nurses' perceived skills in the use of EHRs in PHC settings. A study of nurses' ICT competences in South Africa is needed, as is an exploration of the framework for incorporating nursing ICT into the new nursing curriculum.

Conclusion

The findings of this study demonstrate that the majority of respondents have perceived skills in the use of EHRs. However, the perceived skill levels vary by nursing department, with nurses working in paediatrics, TB and HIV departments reporting higher skill levels than those working in other departments. Nevertheless, this is an encouraging initiative for more nurses to be able to use computers for EHRs. Better accessibility of computers in all PHC facilities and continuous training in computer skills could improve nurses' skills in using computers and EHR systems in PHC facilities. Accessibility of computers for nurses is critical for the successful implementation and use of the EHR system in primary health facilities.

Conflict of interest/Nasprotje interesov

The authors declare that no conflict of interest exists./Avtorja izjavljata, da ni nasprotja interesov.

Funding/Financiranje

The study received no funding./Raziskava ni bila finančno podprta.

Ethical approval/Etika raziskovanja

The study received ethical approval from Biomedical Science Research Ethics Committee of the University of the Western Cape. It approved the scientific methodology and ethics of the above mentioned research project (Ethics Reference Number: BM18/3/4)./Raziskavo je odobril Odbor za etiko raziskav biomedicinskih znanosti Univerze Western Cape. Potrdil je znanstveno metodologijo in etiko omenjenega raziskovalnega projekta (Referenčna številka: BM18/3/4).

Author contributions/Prispevek avtorjev

The first author conceptualised the study, reviewed the literature, collected and analysed the data, compiled the article and submitted the manuscript. The second author assisted in conceptualising the study, analysing the data, and writing the manuscript./Prva avtorica je zasnovala raziskavo, pregledala literaturo, zbrala in analizirala podatke in sestavila članek. Drugi avtor je pomagal pri konceptualizaciji raziskave, analizi podatkov in pri pisanju prispevka.

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Cite as/Citirajte kot:
Tengeh L. N., & Bimerew, M. (2022). Primary healthcare nurses' perceptions about their ability to utilise electronic health records. *Obzornik zdravstvene nege*, 56(3), 176–183. https://doi.org/10.14528/snr.2022.56.3.3123