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Exploring the role of the nurse manager in supporting point of care nurses' adoption of electronic health records: Protocol for a qualitative research study

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Title:

Exploring the role of the nurse manager in supporting point of care nurses' adoption of electronic health records: Protocol for a qualitative research study

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Abstract:

Introduction: An increasing number of electronic health record systems have been implemented in clinical practice environments where nurses work. Findings from previous studies have found that a number of intended benefits of the technology have not yet been realized to date, partially due to poor system adoption amongst health professionals such as nurses. Previous studies have suggested that nurse managers can support the effective adoption and use of the technology by nurses. However, no known studies have identified what role nurse managers have in supporting technology adoption, nor the specific strategies that managers can employ to support their staff. Therefore, the purpose of this research is to better understand the role of the nurse manager in point of care nurses' use of electronic health records, and to identify strategies that may be effective in supporting clinical adoption.

Methods and Analysis: This study will use a qualitative descriptive design. Interviews with both nurse managers and point of care nursing staff will be conducted in a Canadian mental health and addiction healthcare organization where an electronic health record has been implemented. A semi-structured interview guide will be used, and interviews will be audio recorded. Transcripts will be analyzed using a directed content analysis technique. Strategies to ensure the trustworthiness of the data analysis procedure and findings will be employed.

Ethics and Dissemination: Ethical approval for this study has been obtained. Dissemination strategies may include a paper submission to a peer-reviewed journal, a conference submission, and meetings to share findings with the study site leadership team. Findings from this research will be used to inform a future study which aims to assess levels of competencies and perform a psychometric analysis of the Nursing Informatics Competency Assessment for the Nurse Leader instrument in a Canadian context.

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Strengths and limitations of this study:

- This is the first known study aimed at understanding the role of nurse managers, and identifying strategies that they can use to support point of care nurses' use of electronic health records

- Insights gained from this study can be used to inform future research that aims to examine the efficacy of specific strategies employed by nurse managers to support electronic health record adoption

- This study will be done at a single study site using a qualitative approach, and therefore the findings may not be generalizable

INTRODUCTION

Electronic health records (EHRs) are repositories of patient information accessible by health professionals through information and communication technologies, and used for a number of health related functions.[1] These functions may include electronic documentation, clinical decision making support, electronic medication administration and computerized provider order entry. In the last decade, EHRs have been increasingly implemented in numerous healthcare environments.[2-4] Evaluation studies have been conducted to determine the benefits of EHRs and related technologies to patients, health professionals, and organizations.[5-11] Findings of this work suggest that simply installing and implementing an EHR in a clinical environment does not guarantee its success in generating intended benefits. A study by Simon et al. reported that for an EHR to be most effective, health professionals should use the technology in a consistent, appropriate, and uniform way.[12] As nurses make up the largest health professional group in many countries such as the United States[13] and Canada,[14] they may be the largest group of users of EHRs.[15] Therefore, understanding how to achieve consistent, appropriate, and uniform use of the technology by nurses is of importance.

Electronic Health Records within Mental Health and Addiction Settings

While EHR implementations have continually grown in recent years, mental health and addiction settings lag behind other settings in adoption rates.[16-18] The causes of this disparity are not well understood. However, it may be partially explained by the unique needs and challenges of this population.[17,18] In contrast to acute care medical settings, mental health and addiction settings frequently structure their care based on a collaborative treatment and recovery model of care. This means that goals of treatment and needs for quality care monitoring may differ from other settings.[18,19] Consequently, customization may be required for EHRs to support care in this

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setting. Additionally, concerns of stigma and patient confidentiality are substantial in this setting and may be perceived as a further barrier to EHR implementation.[17]When EHRs are successfully implemented in mental health and addiction settings, they have been demonstrated to improve care coordination, facilitate quality assurance and improvement, support patient-centered practice, and improve addiction treatment delivery.[17,18,20] Therefore, it is of particular importance to examine how to achieve adequate use of EHR technology by nurses in this unique and understudied setting.

Nurse' Adoption of Electronic Health Records:

In the last decade, numerous studies have examined the factors that influence nurses' adoption of EHRs. Findings of these studies have suggested that factors related to the EHR usability,[21-24] the organizational context,[25-27] and individual nurse characteristics,[28] may influence nurse' use of the technology. Specifically, several authors have discussed the importance of the nurse manager (nursing managers who are also nurses themselves) in supporting nurses' use of EHRs.[11,29-31] Nurse managers were described in these studies as being those that had point of care nurses who directly reported to them. In Whittaker et al.'s study of barriers and facilitators to nurses' use of an EHR, nurses reported that having a supportive manager was believed to facilitate their use of the system.[30] Yang and colleagues report that nurse managers are well positioned to provide leadership and support to point of care nurses in their use of EHRs.[31] Each author has identified that nurse managers play a critical role in the successful adoption and use of the technology for point of care nurses. However, none of the authors identified what role nurse manager's play in providing support, and the related effectiveness of implemented strategies. Therefore, this research will seek to identify the role of nurse managers in providing support, in

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order to enhance point of care nurses' adoption of EHRs in organizations that currently have

EHRs implemented.

This study is important as no known studies have explored this topic in the past, and there

is expected to be an increasing number of EHRs implemented in organizations where nurses

work in the coming decade. Research that aims to identify the role of nurse managers in

providing EHR support, and what type of support is effective, may allow for interventions to be

developed and researched that enhance point of care nurses' adoption of EHRs. It is possible that

benefits of the technology may be realized when nurses are adequately supported, and are able to

effectively use the systems in their work.

METHODS AND ANALYSIS

Research Questions:

Given that there has been little research to date examining the role that nurse managers

play in supporting point of care nurses' adoption and use of EHRs, the authors aim to address the

following research questions:

1) What role do nurse managers play in supporting point of care nurses' adoption of

electronic health records?

2) What strategies have nurse managers used to support point of care nurses use of

electronic health records, and how do point of care nurses perceive these strategies?

Theoretical Framework:

This study will draw upon the Staggers and Parks Nurse-Computer Interaction

Framework (SPNCIF).[32] The SPNCIF was developed by nursing informatics researchers in the

United States, and has been used in the study of nurses' adoption of EHRs to identify relevant

contextual, system/usability and individual nurse characteristics that may influence nurses'

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adoption of the technology.[30,32,33] Given that SPNFIC has been found to be useful in identifying

barriers and facilitators of EHR adoption in previous reseach,[30] the framework will provide a

structure by which strategies identified by nurse managers and point of care nursing staff to

support nurse use of these systems can be understood. In this study, the SPNCIF will be used to

guide both data collection and analysis, given that supports provided by nurse managers may be

attributed to the three domains of the framework (contextual, system/usability, individual nurse

characteristics).

Design:

This study will employ a qualitative descriptive approach[34] consisting of semi-structured

individual interviews with both nurse managers and point of care nursing staff.

Sample:

The sample of participants in this study will consist of both nurse managers and point of

care nursing staff. Nurse managers are considered those who directly supervise and oversee point

of care nursing staff in a particular care setting. These managers may be responsible for both

administrative and clinical tasks such as hiring, managing, scheduling and disciplining nursing

staff, promoting the use of best practice, and managing patient and family feedback. There are a

number of job titles that nurse managers may have, including: 'nursing unit administrator',

'nurse manager', 'unit manager', 'nursing director' and others.

Point of care nursing staff are defined in this study as those who provide direct care to

patients as either registered nurses or registered/licensed practical nurses. Nurses working in

advanced practice roles, such as nurse practitioners and clinical nurse specialists will be excluded

from this study given their differing work patterns, and use of the EHR. Participants (nurse

managers and point of care nursing staff) who have been in their roles for a minimum of one year

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will be eligible to participate in the study. This criterion was set to ensure that only those

participants who are familiar with their own roles as either a nurse manager or point of care

nursing staff are included in this study.

Typical case sampling, a sub-set of purposive sampling, will be used to ensure that

participants are typical of the age range, education, and work experience of nurse managers and

point of care staff employed at the organization.[35] This will also be done to ensure that a range of

participant responses are captured during the interviews that represent those of the average nurse

manager or point of care nurse. Information on nurse manager and point of care nurse age,

education and work experience will be obtained through internal organizational documents and

resources. This information will be used to select an appropriate sample of participants.

Interviews with participants will be conducted until data saturation has been obtained. In

a previous study aimed at identifying the barriers and facilitators to point of care nurses' use of

an EHR, data saturation was achieved after eleven point of care nurses had been interviewed.[30] It

is therefore expected that between ten and twelve interviews will be conducted for each group

(nurse managers and point of care staff) totaling twenty to twenty-four interviews. However, it is

possible that a lesser or greater number of participants is required to reach data saturation in this

study.

Setting:

This study will be conducted at a large mental health organization in an urban setting in

Ontario, Canada. This organization has implemented a comprehensive EHR with several

common functionalities including computerized provider order entry, electronic medication

administration, barcode medication administration, clinical documentation, and laboratory and

results reporting and viewing. The EHR has been implemented throughout the organization, and

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nurses use the system to obtain information, make decisions and document assessments and care

provided. Point of care nursing staff receive two days of training on the EHR, while nurse

managers receive varying amounts of training ranging from none to two days. The particular

EHR in place was developed by an external vendor, and is present in a number of healthcare

organizations both locally and internationally. Customizations for particular fields and forms

have been made to the EHR at the study site, however the design and functionality remain

similar to those implemented at other organizations with the same vendor.

Recruitment and Data Collection:

Participants in this study will be recruited via an email invitation that informs potential

participants of the study purpose, details of participating, and voluntary nature of the study. If

the potential participant is in agreement, the researcher will coordinate a date, time and place for

the interview to take place. The research team will send a copy of the informed consent letter via

email for the potential participant to read ahead of time. Once the research team and potential

participant meet to conduct the interview, the research team will inform the potential participant

again about the purpose of the study, details of participating, and the voluntary nature of the

study. There will be time for the potential participant to ask questions of the researcher during

this time. Lastly, the informed consent letter will be signed before the interview begins.

Semi-structured interview guides specific to each group of participants (nurse manager or

point of care nursing staff), have been developed (see Table 1 and 2).

Table 1

Semi-Structured Interview Guide for Managers

Welcome and thank you for agreeing to participate in this study.	
The purpose of the study is to examine the role that nurse managers play in supporting point of care nurses' use and adoption of electronic health records such as [name of EHR].	
During this interview, you will be asked to share your perspective as a manager. Please do not discuss anything that was said today outside of this interview. As well, this interview will be audio recorded, however no identifying information such as your name, will be transcribed from the recordings.	
Do you have any questions before we begin?	
Question 1	What do you believe your role is in providing support to point of care nurses in their use of [name of EHR]?
Question 2	What strategies have you used to support point of care nurses' use of [name of EHR]?
Question 3	Can you describe for me which strategies that you have used that <u>have been</u> particularly effective in supporting nurses' use of [name of EHR]?
Question 4	Can you describe for me which strategies that you have used that have <u>not been</u> effective in supporting nurses' use of [name of EHR]?
Question 5	Are there other strategies that you would like to do to support point of care nurses' use of [name of EHR]? <u>Follow-up:</u> How come? How come you have not been able to implement this strategy thus far? What might it take for you to be able to implement this strategy?
Question 6	Is there anything else you would like to share with me about your support of point of care nurses' use of [name of EHR]?
Thank you for participating in this interview. Everything that was said today will remain confidential.	

Table 2

Semi-Structured Interview Guide for Point of care Nurses

Welcome and thank you for agreeing to participate in this study.

The purpose of the study is to examine the role that nurse managers play in supporting point of care nurses' use and adoption of electronic health records such as [name of EHR].

During this interview, you will be asked to share your perspective as a point of care nurse. Please do not discuss anything that was said today outside of this interview. As well, this interview will be audio recorded, however no identifying information such as your name, will be transcribed from the recordings.

Do you have any questions before we begin?

Question 1	What do you believe your managers' role is in providing support to point of care nurses in their use of [name of EHR]?
Question 2	What strategies has your manager used to support point of care nurses' use of [name of EHR]?
Question 3	Can you describe for me which strategies that your manager has used that <u>have been</u> particularly effective in supporting nurses' use of [name of EHR]?
Question 4	Can you describe for me which strategies your manager has used that have <u>not been</u> effective in supporting nurses' use of [name of EHR]?
Question 5	Are there other strategies that you would like to see your manager use to support your use of [name of EHR]?
Question 6	Is there anything else you would like to share with me about your managers support of point of care nurses' use of [name of EHR]?
Thank you for participating in this interview. Everything that was said today will remain confidential.	

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These interview guides were developed based on relevant literature, the theoretical

framework, and the research questions in this study. Each interview guide consists of six open-

ended questions. Participants will also be asked to provide the type of nursing registration they

hold (registered nurse or registered/licensed practical nurse), years of experience using the EHR,

and years of experience working as a mental health nurse. It is expected that interviews will take

approximately between 20 and 45 minutes depending on the amount of detail provided by the

participant. By using a semi-structured interview approach, all participants will be guided

through the same sets of questions, however the interviewer will have the opportunity to probe

further when required to gain a deeper understanding of the participant's perspectives.

Interviews will be audio recorded and transcribed verbatim via an external transcription

service with appropriate data security measures in place. No names will be transcribed; instead

pseudonyms will be used. Once the study has been completed, the original audio recording will

be deleted. The audio recorder will be kept in a locked filing cabinet in a locked room. The

transcriptions will be kept in an internal electronic secure folder only accessible by the principal

investigator.

Analysis:

Interview data transcriptions will be entered into NVivo qualitative data analysis software

(QSR International Pty Ltd. Version 11, 2014). Data analysis will be completed via a directed

content analysis[36] based on the domains from the Staggers and Parks Nurse-Computer

Interaction Framework. This is an appropriate technique given that the framework was used to

guide the study methodology, and semi-structured interview guide. Pre-determined codes will be

developed based on these domains. Two members of the research team will first independently

apply these codes to the interview data. These team members will then meet to compare and

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contrast their findings. Where disagreements in the applied coding are discovered, the two

research team members will discuss the emergent coding and come to a consensus regarding its

interpretation. If consensus cannot be achieved by the two research team members, the entire

research team will be involved in analyzing the data and coming to agreement regarding the

proper code to associate to a particular set of data. Data that cannot be attributed to a pre-

determined code will be subject to open coding through an inductive analysis process. During

this time, new codes may be generated to represent findings that did not apply to the pre-

determined codes.

Trustworthiness:

The authors will take several measures to conduct a credible and trustworthy study.[37]

First, experts in both the subject area and qualitative research methods have assisted in the

conceptualization and development of the study protocol. Second, direct quotes arising from

participants will be used to demonstrate alignment to the Staggers and Parks Nurse-Computer

Interaction Framework domains, and serve as a method to increase credibility of analysis. To

improve the dependability and trustworthiness of the analysis process, two members of the

research team will remain embedded in the data and independently code the raw data to the

framework. Member-checking with two nurse managers and two point of care staff members

who participated in the study will also be completed to ensure credibility and meaning were

captured appropriately within the preliminary analysis.

ETHICAL CONSIDERATIONS

This study is considered to be of low risk, and the participants are not considered

vulnerable. Ethical approval (2016-17.117) has been obtained from the organization in which

this study will take place.

DISCUSSION AND DISSEMINATION

The proposed study is significant for several reasons: 1) it examines the role of nurse managers in supporting point of care nurses' use of EHRs, which is currently unclear in the literature and in practice environments, and 2) it is the first study to allow for the identification of strategies that nurse managers can implement to support effective EHR implementation and adoption by point of care nurses. Results of this study will be of value to nurse managers and hospital leaders who have, or plan to implement an EHR in their clinical environment. Therefore the authors plan to pursue dissemination strategies that are targeted at nurse managers and hospital leaders through an academic peer-reviewed journal article submission. A journal that focuses on the topic of nursing management, administration or leadership will be selected. In addition to a journal article, the authors plan to submit an abstract for a presentation at the Nursing Leadership Network of Ontario annual conference. This conference is an appropriate forum as the attendees are made up of nurse managers, administrators and leaders. In addition, the findings from this research will be shared with the senior leadership team at the study site.

The results of this research will be used to develop a future study which aims to: 1) assess levels of informatics competencies of nurse leaders, and 2) perform a psychometric analysis of the Nursing Informatics Competency Assessment for the Nurse Leader (NICA-NL) instrument in a Canadian context. The NICA-NL is a self-assessment instrument that can be used by nurse leaders (inclusive of nurse managers) to evaluate their level of nursing informatics competencies.[38] Information obtained from this future study in combination with findings from the present study, can be used to identify areas where Canadian resources may be created to support the development of specific informatics competencies for nurse leaders, inclusive of nurse managers.

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Conclusion:

This research will make an important contribution to the nursing informatics literature in that it will be the first study aimed at better understanding the role of the nurse manager in point of care nurses' adoption of EHRs, and what strategies are effective. End-of-study dissemination strategies of the research results have therefore been planned to inform relevant stakeholder groups of the study findings. In addition, the results will be used to develop a future research study which aims to assess levels of competencies and perform a psychometric analysis of NICA-NL in a Canadian context.

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References

1. Hayrinen K, Saranto K, Nykanen P. Definition, structure, content, use and impacts of electronic health records: A review of the research literature. Int J Med Inf. 2008;77 (5): 291-304.

2. Canada Health Infoway [Internet]. Progress in Canada; c2017 [cited 2017]. Available from https://www.infoway-inforoute.ca/en/what-we-do/progress-in-canada

3. Charles D, Gabriel M, Searcy T. Adoption of electronic health record systems among U.S. non-federal acute care hospitals: 2008-2014. Office of the National Coordinator for Health Information Technology. 2015;23:1-10.

4. The Commonwealth Fund [Internet]. What is the status of electronic health records; c2017 [cited 2017]. Available from http://international.commonwealthfund.org/features/ehrs/

5. Bjarnadottir RI, Herzig CT, Travers JL, Castle NG, Stone PW. Implementation of electronic health records in U.S. nursing homes. Comput Inform Nurs. 2017. Epub 2017.

6. Bowman S. Impact of electronic health record systems on information integrity: Quality and safety implications. Perspect Health Inf Manag. 2013 Fall;10:1c.

7. Chaudhry B, Wang J, Wu S, Magilone M, Mojica W, Roth E, Morton SC, Shekelle PG. Systematic review: Impact of health information technology on quality, efficiency, and costs of medical care. Ann of Intern Med. 2006;144(10):742-52.

8. Campanella P, Lovato E, Marone C, Fallacara L, Mancuso A, Ricciardi W, Specchia ML. The impact of electronic health records on healthcare quality: A systematic review and meta-analysis. Eur J Public Health. 2015;26(1):60-4.

18

9. Koppel R, Wetterneck TB, Telles JL, Karsh B. Workarounds to barcode medication administration systems: their occurrences, causes, and threats to patient safety. J Am Med Inform Assoc. 2008;15:408-23.

10. Patterson ES, Rogers ML, Chapman RJ, Render MI. Compliance with intended use of bar code medication administration in acute and long-term care: an observational study. Hum Factors. 2006;48:15-22.

11. Poissant L, Pereira J, Tmablyn R, Kawasumi Y. The impact of electronic health records on time efficiency of physicians and nurses: a systematic review. J Am Med Inform Assoc. 2005;12(5):505-16.

12. Simon SR, Kaushal R, Cleary PD, Jenter CA, Volk LA, Orav EJ, et al. Physicians and electronic health records: A statewide survey. Arch of Intern Med. 2007;167(5):507-12.

13. American Association of Colleges of Nursing [Internet]. Nursing Fact Sheet; c2011 [cited 2017]. Available from http://www.aacn.nche.edu/media-relations/fact-sheets/nursing-fact-sheet.

14. Canadian Nurses Association [Internet]. Framework for the Practice of Registered Nurses in Canada; c2015 [cited 2017]. Available from https://www.cna-aiic.ca/~/media/cna/page-content/pdf-en/framework-for-the-pracice-of-registered-nurses-in-canada.pdf?la=en.

15. Kutney-Lee A, Kelly D. The effect of hospital electronic health record adoption on nurse-assessed quality of care and patient safety. J Nurs Adm. 2011;41(11):466-72.

16. The Office of the National Coordinator for Health Information Technology [Internet]. Data Brief; c2017[cited 2017]. Available from /evaluations/data-briefs/non-federal-acute-care-hospital-ehr-adoption-2008-2015.php

17. McGregor B, Mack D, Wrenn G, Shim RS, Holden K, Satcher D. Improving service
    coordination and reducing mental health disparities through adoption of electronic health
    records. Psychiatr Serv. 2016;66(9): 985-7.

18. Riahi S, Fischler I, Stuckey MI, Klassen PE, Chen J. The value of electronic medical record
    implementation in mental health care: A case study. JMIR Med Inform. 2017;5(1).

19. Oades LG, Deane F, Crowe T, Lambert WG, Kavanagh D, Lloyd C. Collaborative recovery:
    an integrative model for working with individuals who experience chronic and recurring
    mental illness. Australas Psychiatry. 2005;13(3):279-84.

20. Ghitza UE, Sparenborg S, Tai B. Improving drug abuse treatment delivery through adoption
    of harmonized electronic health record systems. Subst Abuse and Rehabil. 2011;2:125-31.

21. Ammenwerth E, Ehlers F, Hirsch B, Gratl G. HIS-Monitor: An approach to assess the quality
    of information processing in hospitals. Int J Med Inf. 2006;76:216-25.

22. Carayon P, Cartmill R, Blosky M, Brown R, Hackenberg M, Hoonakker P, et al. ICU nurses'
    acceptance of electronic health records. J Am Med Inform Assoc. 2011;18:812-9.

23.. Carrington JM, Effken JA. Strengths and limitations of the electronic health record for
    documenting clinical events. Comput Inform Nurs. 2011;29(6):360-7.

24. Schenk EC, Mayer DM, Ward-Barney E, Estill P, Goss L, Shreffler-Grant J. RN perceptions
    of a newly adopted electronic health record. J Nurs Adm. 2016;46(3):139-45.

25. Lu CH, Hsiao JL, Chen RF. Factors determining nurse acceptance of hospital information
    systems. Comput Inform Nurs. 2012;30(5)-257-64.

26. Maillet E, Mathieu L, Sicotte C. Modeling factors explaining the acceptance, actual use and
    satisfaction of nurses using an electronic patient record in acute care settings: An
    extension of the UTAUT. Int J Med Inf. 2015;84:36-47.

27. Saleem JJ, Plew WR, Speir RC, Herout J, Wilck NR, Ryan DM, et al. Understanding barriers
    and facilitators to the use of clinical information systems for intensive care units and
    anesthesia record keeping: A rapid ethnography. Int J Med Inf. 2015;84:500-11.

28. Ifinedo P. The moderating effects of demographic and individual characteristics on nurses'
    acceptance of information systems: A canadian study. Int J Med Inf. 2016;87:27-35.

29. Ash JS, Bates DW. Factors and forces affecting EHR system adoption: report of a 2004
    ACMI discussion. J Am Med Inform Assoc. 2005;12:8-12.

30. Whittaker AA, Aufdenkamp M, Tinley S. Barriers and facilitators to electronic
    documentation in a rural hospital. J Nurs Scholarsh. 2009;41(3):293-300.

31. Yang L, Cui D, Zhu X, Zhao Q, Xiao N, Shen N. Perspectives from nurse managers on
    informatics competencies. Scientific World Journal. 2014.

32. Staggers N, Parks N. Description and initial applications of the staggers and parks nurse-
    computer interaction framework. Comput Inform Nurs. 1993;11(6):282-90.

33. Staggers N, Kobus D. Comparing response time, errors, and satisfaction between text-based
    and graphical user interfaces during nursing order tasks. J Am Med Inform Assoc.
    2000;7(2):164-76.

34. Sandelowski M. Whatever happened to qualitative description? Res Nurs Health.
    2000;23(4):334-40.

35. Palinkas L.A, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K. Purposeful
    sampling for qualitative data collection and analysis in mixed method implementation
    research. Adm Policy Ment Health. 2015;42(5):533-44.

36. Hsieh H, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res.
    2005;15(9):1277-88.

37. Guba EG, Lincoln YS. Competing paradigms in qualitative research. In: Denzin NK, Lincoln

YS, editors. Handbook of qualitative research. Thousand Oaks, CA: Sage; 1994. p. 105-

17.

38. Yen PY, Phillips A, Kennedy MK, Collins S. Nursing informatics competency assessment

for the nurse leader: Instrument refinement, validation and psychometric analysis. Nurs

Adm. 2017;47(5):271-7.

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Abstract:

Introduction: An increasing number of electronic health record systems have been implemented in clinical practice environments where nurses work. Findings from previous studies have found that a number of intended benefits of the technology have not yet been realized to date, partially due to poor system adoption amongst health professionals such as nurses. Previous studies have suggested that nurse managers can support the effective adoption and use of the technology by nurses. However, no known studies have identified what role nurse managers have in supporting technology adoption, nor the specific strategies that managers can employ to support their staff. Therefore, the purpose of this research is to better understand the role of the nurse manager in point of care nurses' use of electronic health records, and to identify strategies that may be effective in supporting clinical adoption.

Methods and Analysis: This study will use a qualitative descriptive design. Interviews with both nurse managers and point of care nursing staff will be conducted in a Canadian mental health and addiction healthcare organization where an electronic health record has been implemented. A semi-structured interview guide will be used, and interviews will be audio recorded. Transcripts will be analyzed using a directed content analysis technique. Strategies to ensure the trustworthiness of the data analysis procedure and findings will be employed.

Ethics and Dissemination: Ethical approval for this study has been obtained. Dissemination strategies may include a paper submission to a peer-reviewed journal, a conference submission, and meetings to share findings with the study site leadership team. Findings from this research will be used to inform a future study which aims to assess levels of competencies and perform a psychometric analysis of the Nursing Informatics Competency Assessment for the Nurse Leader instrument in a Canadian context.

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Strengths and limitations of this study:

- This is the first known study aimed at understanding the role of nurse managers, and identifying strategies that they can use to support point of care nurses' use of electronic health records

- Insights gained from this study can be used to inform future research that aims to examine the efficacy of specific strategies employed by nurse managers to support electronic health record adoption

- This study will be done at a single study site using a qualitative approach, and therefore the findings may not be generalizable

INTRODUCTION

Electronic health records (EHRs) are repositories of patient information accessible by health professionals through information and communication technologies, and used for a number of health related functions.[1] These functions may include electronic documentation, clinical decision making support, electronic medication administration and computerized provider order entry. In the last decade, EHRs have been increasingly implemented in numerous healthcare environments.[2-4] Evaluation studies have been conducted to determine the benefits of EHRs and related technologies to patients, health professionals, and organizations.[5-11] Findings of this work suggest that simply installing and implementing an EHR in a clinical environment does not guarantee its success in generating intended benefits. A study by Simon et al. reported that for an EHR to be most effective, health professionals should use the technology in a consistent, appropriate, and uniform way.[12] As nurses make up the largest health professional group in many countries such as the United States[13] and Canada,[14] they may be the largest group of users of EHRs.[15] Therefore, understanding how to achieve consistent, appropriate, and uniform use of the technology by nurses is of importance.

Electronic Health Records within Mental Health and Addiction Settings

While EHR implementations have continually grown in recent years, mental health and addiction settings lag behind other settings in adoption rates.[16-18] The causes of this disparity are not well understood. However, it may be partially explained by the unique needs and challenges of this population.[17,18] In contrast to acute care medical settings, mental health and addiction settings frequently structure their care based on a collaborative treatment and recovery model of care. This means that goals of treatment and needs for quality care monitoring may differ from other settings.[18,19] Consequently, customization may be required for EHRs to support care in this

setting. Additionally, concerns of stigma and patient confidentiality are substantial in this setting and may be perceived as a further barrier to EHR implementation.[17] When EHRs are successfully implemented in mental health and addiction settings, they have been demonstrated to improve care coordination, facilitate quality assurance and improvement, support patient-centered practice, and improve addiction treatment delivery.[17,18,20] Therefore, it is of particular importance to examine how to achieve adequate use of EHR technology by nurses in this unique and understudied setting.

Nurse' Adoption of Electronic Health Records:

In the last decade, numerous studies have examined the factors that influence nurses' adoption of EHRs. Findings of these studies have suggested that factors related to the EHR usability,[21-24] the organizational context,[25-27] and individual nurse characteristics,[28] may influence nurse' use of the technology. Specifically, several authors have discussed the importance of the nurse manager (nursing managers who are also nurses themselves) in supporting nurses' use of EHRs.[11,29-31] Nurse managers were described in these studies as being those that had point of care nurses who directly reported to them. In Whittaker et al.'s study of barriers and facilitators to nurses' use of an EHR, nurses reported that having a supportive manager was believed to facilitate their use of the system.[30] Yang and colleagues report that nurse managers are well positioned to provide leadership and support to point of care nurses in their use of EHRs.[31] Each author has identified that nurse managers play a critical role in the successful adoption and use of the technology for point of care nurses. However, none of the authors identified what role nurse manager's play in providing support, and the related effectiveness of implemented strategies. Therefore, this research will seek to identify the role of nurse managers in providing support, in

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order to enhance point of care nurses' adoption of EHRs in organizations that currently have

EHRs implemented.

This study is important as no known studies have explored this topic in the past, and there

is expected to be an increasing number of EHRs implemented in organizations where nurses

work in the coming decade. Research that aims to identify the role of nurse managers in

providing EHR support, and what type of support is effective, may allow for interventions to be

developed and researched that enhance point of care nurses' adoption of EHRs. It is possible that

benefits of the technology may be realized when nurses are adequately supported, and are able to

effectively use the systems in their work.

METHODS AND ANALYSIS

Research Questions:

Given that there has been little research to date examining the role that nurse managers

play in supporting point of care nurses' adoption and use of EHRs, the authors aim to address the

following research questions:

1) What role do nurse managers play in supporting point of care nurses' adoption of

EHRs?

2) What strategies have nurse managers used to support point of care nurses use of EHRs,

and how do point of care nurses perceive these strategies?

Theoretical Framework:

This study will draw upon the Staggers and Parks Nurse-Computer Interaction

Framework (SPNCIF).[32] The SPNCIF was developed by nursing informatics researchers in the

United States, and has been used in the study of nurses' adoption of EHRs to identify relevant

contextual, system/usability and individual nurse characteristics that may influence nurses'

adoption of the technology.[30,32,33] Given that SPNFIC has been found to be useful in identifying barriers and facilitators of EHR adoption in previous reseach,[30] the framework will provide a structure by which strategies identified by nurse managers and point of care nursing staff to support nurse use of these systems can be understood. In this study, the SPNCIF will be used to guide both data collection and analysis, given that supports provided by nurse managers may be attributed to the three domains of the framework (contextual, system/usability, individual nurse characteristics).

Design:

This study will employ a qualitative descriptive approach[34] consisting of semi-structured individual interviews with both nurse managers and point of care nursing staff.

Sample:

The sample of participants in this study will consist of both nurse managers and point of care nursing staff. Nurse managers are considered those who directly supervise and oversee point of care nursing staff in a particular care setting. These managers may be responsible for both administrative and clinical tasks such as hiring, managing, scheduling and disciplining nursing staff, promoting the use of best practice, and managing patient and family feedback. There are a number of job titles that nurse managers may have, including: 'nursing unit administrator', 'nurse manager', 'unit manager', 'nursing director' and others. Managers who are female or male will be included in this study.

Point of care nursing staff are defined in this study as those who provide direct care to patients as either registered nurses or registered/licensed practical nurses. Nurses working in advanced practice roles, such as nurse practitioners and clinical nurse specialists will be excluded from this study given their differing work patterns, and use of the EHR. Participants (nurse

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managers and point of care nursing staff) who have been in their roles for a minimum of one year

will be eligible to participate in the study. This criterion was set to ensure that only those

participants who are familiar with their own roles as either a nurse manager or point of care

nursing staff are included in this study. In this study a diverse group of point of care nurses will

be recruited with varying levels of experience both in their role as a nurse, the length of time

they have used an EHR, and their mental health nursing experience. Both male and female point

of care nurses will be included in this study.

Typical case sampling, a sub-set of purposive sampling, will be used to ensure that

participants are typical of the age range, education, and work experience of nurse managers and

point of care staff employed at the organization.[35] This will also be done to ensure that a range of

participant responses are captured during the interviews that represent those of the average nurse

manager or point of care nurse. Information on nurse manager and point of care nurse age,

education and work experience will be obtained through internal organizational documents and

resources. This information will be used to select an appropriate sample of participants.

Interviews with participants will be conducted until data saturation has been obtained. In

a previous study aimed at identifying the barriers and facilitators to point of care nurses' use of

an EHR, data saturation was achieved after eleven point of care nurses had been interviewed.[30] It

is therefore expected that between ten and twelve interviews will be conducted for each group

(nurse managers and point of care staff) totaling twenty to twenty-four interviews. However, it is

possible that a lesser or greater number of participants is required to reach data saturation in this

study.

Setting:

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This study will be conducted at a large mental health organization in an urban setting in Ontario, Canada. This organization has implemented a comprehensive EHR with several common functionalities including computerized provider order entry, electronic medication administration, barcode medication administration, clinical documentation, and laboratory and results reporting and viewing. The EHR has been implemented throughout the organization, and nurses (and other clinical staff) are required to use the system to obtain information, make decisions and document assessments and care provided. Point of care nursing staff receive two days of training on the EHR, while nurse managers receive varying amounts of training ranging from none to two days. The particular EHR in place was developed by an external vendor, and is present in a number of healthcare organizations both locally and internationally. Customizations for particular fields and forms have been made to the EHR at the study site, however the design and functionality remain similar to those implemented at other organizations with the same vendor.

Recruitment and Data Collection:

Participants in this study will be recruited via an email invitation to their work email account that informs potential participants of the study purpose, details of participating, and voluntary nature of the study. The invitation will be sent from one of the researchers' email accounts and not by any person that a point of care nurse or manager may report to. Emails of potential participants are available to researchers through internal organizational documents. Upon receiving the email invitation, if a potential participant is in agreement, the researcher will coordinate a date, time and place for the interview to take place. The research team will send a copy of the informed consent letter via email for the potential participant to read ahead of time. Once the research team and potential participant meet to conduct the interview, the research team

will inform the potential participant again about the purpose of the study, details of participating, and the voluntary nature of the study. There will be time for the potential participant to ask questions of the researcher during this time. Lastly, the informed consent letter will be signed before the interview begins.

Semi-structured interview guides specific to each group of participants (nurse manager or point of care nursing staff), have been developed (see Table 1 and 2). The interview guides were developed so that participant responses could be mapped to the SPNCIF. The questions were purposefully broad so that the questions were not leading, and so that participant responses could be mapped to the framework domains. Whittaker and colleagues[30] used the same approach when completing a similar study of point of care medical-surgical nurses using the SPNCIF.

The specific researchers who will be involved in various elements of the study, their credentials, their occupation at the time of the study, their gender and both their experience and training, will be detailed in any dissemination materials.

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Table 1

Semi-Structured Interview Guide for Managers

Welcome and thank you for agreeing to participate in this study. The purpose of the study is to examine the role that nurse managers play in supporting point of care nurses' use and adoption of electronic health records such as [name of EHR]. During this interview, you will be asked to share your perspective as a manager. Please do not discuss anything that was said today outside of this interview. As well, this interview will be audio recorded, however no identifying information such as your name, will be transcribed from the recordings. Do you have any questions before we begin?	
Question 1	What do you believe your role is in providing support to point of care nurses in their use of [name of EHR]?
Question 2	What strategies have you used to support point of care nurses' use of [name of EHR]?
Question 3	Can you describe for me which strategies that you have used that <u>have been</u> particularly effective in supporting nurses' use of [name of EHR]?
Question 4	Can you describe for me which strategies that you have used that have <u>not been</u> effective in supporting nurses' use of [name of EHR]?
Question 5	Are there other strategies that you would like to do to support point of care nurses' use of [name of EHR]? <u>Follow-up:</u> How come? How come you have not been able to implement this strategy thus far? What might it take for you to be able to implement this strategy?
Question 6	Is there anything else you would like to share with me about your support of point of care nurses' use of [name of EHR]?
Thank you for participating in this interview. Everything that was said today will remain confidential.	

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Table 2

Semi-Structured Interview Guide for Point of care Nurses

Welcome and thank you for agreeing to participate in this study.

The purpose of the study is to examine the role that nurse managers play in supporting point of care nurses' use and adoption of electronic health records such as [name of EHR].

During this interview, you will be asked to share your perspective as a point of care nurse. Please do not discuss anything that was said today outside of this interview. As well, this interview will be audio recorded, however no identifying information such as your name, will be transcribed from the recordings.

Do you have any questions before we begin?

Question 1	What do you believe your managers' role is in providing support to point of care nurses in their use of [name of EHR]?
Question 2	What strategies has your manager used to support point of care nurses' use of [name of EHR]?
Question 3	Can you describe for me which strategies that your manager has used that <u>have been</u> particularly effective in supporting nurses' use of [name of EHR]?
Question 4	Can you describe for me which strategies your manager has used that have <u>not been</u> effective in supporting nurses' use of [name of EHR]?
Question 5	Are there other strategies that you would like to see your manager use to support your use of [name of EHR]?
Question 6	Is there anything else you would like to share with me about your managers support of point of care nurses' use of [name of EHR]?

Thank you for participating in this interview. Everything that was said today will remain confidential.

These interview guides were developed based on relevant literature, the theoretical

framework, and the research questions in this study. Each interview guide consists of six open-

ended questions. Participants will also be asked to provide the type of nursing registration they

hold (registered nurse or registered/licensed practical nurse), years of experience using the EHR,

and years of experience working as a mental health nurse. It is expected that interviews will take

approximately between 20 and 45 minutes depending on the amount of detail provided by the

participant. By using a semi-structured interview approach, all participants will be guided

through the same sets of questions, however the interviewer will have the opportunity to probe

further when required to gain a deeper understanding of the participant's perspectives. No

incentives will be provided to participants.

Interviews will be conducted in quiet meeting rooms throughout the organization where

this study will take place. Although it is unlikely that someone would know that a participant is

going into a meeting room to participate in this study, these rooms will purposefully be booked

in areas of the organization where the participant is not routinely working e.g. not on the clinical

unit where the participant is working or responsible for.

Interviews will be audio recorded and transcribed verbatim via an external transcription

service with appropriate data security measures in place. No names will be transcribed; instead

pseudonyms will be used. Once the study has been completed, the original audio recording will

be deleted. The audio recorder will be kept in a locked filing cabinet in a locked room. The

transcriptions will be kept in an internal electronic secure folder only accessible by the principal

investigator.

Analysis:

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Interview data transcriptions will be entered into NVivo qualitative data analysis software

(QSR International Pty Ltd. Version 11, 2014). Data analysis will be completed via a directed

content analysis[36] based on the domains from the Staggers and Parks Nurse-Computer

Interaction Framework. This is an appropriate technique given that the framework was used to

guide the study methodology, and semi-structured interview guide. Pre-determined codes will be

developed based on these domains. Two members of the research team will first independently

apply these codes to the interview data. These team members will then meet to compare and

contrast their findings. Where disagreements in the applied coding are discovered, the two

research team members will discuss the emergent coding and come to a consensus regarding its

interpretation. If consensus cannot be achieved by the two research team members, the entire

research team will be involved in analyzing the data and coming to agreement regarding the

proper code to associate to a particular set of data.

Data that cannot be attributed to a pre-determined code will be subject to open coding

through an inductive analysis process. During this time, new codes may be generated to represent

findings that did not apply to the pre-determined codes. Any disagreements regarding the need to

use open coding will be attempted to be resolved through discussion between the two researchers

involved in the coding. However, in cases when agreement cannot be reached, another member

of the research team will be consulted.

Trustworthiness:

The authors will take several measures to conduct a credible and trustworthy study.[37]

First, experts in both the subject area and qualitative research methods have assisted in the

conceptualization and development of the study protocol. Second, direct quotes arising from

participants will be used to demonstrate alignment to the Staggers and Parks Nurse-Computer

Interaction Framework domains, and serve as a method to increase credibility of analysis. To

improve the dependability and trustworthiness of the analysis process, two members of the

research team will remain embedded in the data and independently code the raw data to the

framework. Member-checking with two nurse managers and two point of care staff members

who participated in the study will also be completed to ensure credibility and meaning were

captured appropriately within the preliminary analysis.

ETHICAL CONSIDERATIONS

This study is considered to be of low risk, and the participants are not considered

vulnerable. Ethical approval (2016-17.117) has been obtained from the organization in which

this study will take place.

DISCUSSION AND DISSEMINATION

The proposed study is significant for several reasons: 1) it examines the role of nurse

managers in supporting point of care nurses' use of EHRs, which is currently unclear in the

literature and in practice environments, and 2) it is the first study to allow for the identification of

strategies that nurse managers can implement to support effective EHR implementation and

adoption by point of care nurses. Results of this study will be of value to nurse managers and

hospital leaders who have, or plan to implement an EHR in their clinical environment. Therefore

the authors plan to pursue dissemination strategies that are targeted at nurse managers and

hospital leaders through an academic peer-reviewed journal article submission. A journal that

focuses on the topic of nursing management, administration or leadership will be selected. In

addition to a journal article, the authors plan to submit an abstract for a presentation at the

Nursing Leadership Network of Ontario annual conference. This conference is an appropriate

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forum as the attendees are made up of nurse managers, administrators and leaders. In addition,

the findings from this research will be shared with the senior leadership team at the study site.

The results of this research will be used to develop a future study which aims to: 1) assess

levels of informatics competencies of nurse leaders, and 2) perform a psychometric analysis of

the Nursing Informatics Competency Assessment for the Nurse Leader (NICA-NL) instrument in

a Canadian context. The NICA-NL is a self-assessment instrument that can be used by nurse

leaders (inclusive of nurse managers) to evaluate their level of nursing informatics

competencies.[38] Information obtained from this future study in combination with findings from

the present study, can be used to identify areas where Canadian resources may be created to

support the development of specific informatics competencies for nurse leaders, inclusive of

nurse managers.

Conclusion:

This research will make an important contribution to the nursing informatics literature in

that it will be the first study aimed at better understanding the role of the nurse manager in point

of care nurses' adoption of EHRs, and what strategies are effective. End-of-study dissemination

strategies of the research results have therefore been planned to inform relevant stakeholder

groups of the study findings. In addition, the results will be used to develop a future research

study which aims to assess levels of competencies and perform a psychometric analysis of

NICA-NL in a Canadian context.

Authors Contributions: GS, RGB and RIB conceptualized the study. Modifications to the study were made based on the feedback obtained from SC and RS. GS drafted the manuscript and all authors made contributions to its development. All authors reviewed and approved the final manuscript.

Competing interests statement: The authors declare that they have no conflict of interest.

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References

1. Hayrinen K, Saranto K, Nykanen P. Definition, structure, content, use and impacts of

    electronic health records: A review of the research literature. Int J Med Inf. 2008;77 (5):

    291-304.

2. Canada Health Infoway [Internet]. Progress in Canada; c2017 [cited 2017]. Available from

    https://www.infoway-inforoute.ca/en/what-we-do/progress-in-canada

3. Charles D, Gabriel M, Searcy T. Adoption of electronic health record systems among U.S.

    non-federal acute care hospitals: 2008-2014. Office of the National Coordinator for

    Health Information Technology. 2015;23:1-10.

4. The Commonwealth Fund [Internet]. What is the status of electronic health records; c2017

    [cited 2017]. Available from http://international.commonwealthfund.org/features/ehrs/

5. Bjarnadottir RI, Herzig CT, Travers JL, Castle NG, Stone PW. Implementation of electronic

    health records in U.S. nursing homes. Comput Inform Nurs. 2017. Epub 2017.

6. Bowman S. Impact of electronic health record systems on information integrity: Quality and

    safety implications. Perspect Health Inf Manag. 2013 Fall;10:1c.

7. Chaudhry B, Wang J, Wu S, Magilone M, Mojica W, Roth E, Morton SC, Shekelle PG.

    Systematic review: Impact of health information technology on quality, efficiency, and

    costs of medical care. Ann of Intern Med. 2006;144(10):742-52.

8. Campanella P, Lovato E, Marone C, Fallacara L, Mancuso A, Ricciardi W, Specchia ML. The

    impact of electronic health records on healthcare quality: A systematic review and meta-

    analysis. Eur J Public Health. 2015;26(1):60-4.

9. Koppel R, Wetterneck TB, Telles JL, Karsh B. Workarounds to barcode medication
   administration systems: their occurrences, causes, and threats to patient safety. J Am Med
   Inform Assoc. 2008;15:408-23.

10. Patterson ES, Rogers ML, Chapman RJ, Render MI. Compliance with intended use of bar
    code medication administration in acute and long-term care: an observational study. Hum
    Factors. 2006;48:15-22.

11. Poissant L, Pereira J, Tmablyn R, Kawasumi Y. The impact of electronic health records on
    time efficiency of physicians and nurses: a systematic review. J Am Med Inform Assoc.
    2005;12(5):505-16.

12. Simon SR, Kaushal R, Cleary PD, Jenter CA, Volk LA, Orav EJ, et al. Physicians and
    electronic health records: A statewide survey. Arch of Intern Med. 2007;167(5):507-12.

13. American Association of Colleges of Nursing [Internet]. Nursing Fact Sheet; c2011 [cited
    2017]. Available from http://www.aacn.nche.edu/media-relations/fact-sheets/nursing-
    fact-sheet.

14. Canadian Nurses Association [Internet]. Framework for the Practice of Registered Nurses in
    Canada; c2015 [cited 2017]. Available from https://www.cna-aiic.ca/~/media/cna/page-
    content/pdf-en/framework-for-the-pracice-of-registered-nurses-in-canada.pdf?la=en.

15. Kutney-Lee A, Kelly D. The effect of hospital electronic health record adoption on nurse-
    assessed quality of care and patient safety. J Nurs Adm. 2011;41(11):466-72.

16. The Office of the National Coordinator for Health Information Technology [Internet]. Data
    Brief; c2017[cited 2017]. Available from /evaluations/data-briefs/non-federal-acute-care-
    hospital-ehr-adoption-2008-2015.php

17. McGregor B, Mack D, Wrenn G, Shim RS, Holden K, Satcher D. Improving service

coordination and reducing mental health disparities through adoption of electronic health

records. Psychiatr Serv. 2016;66(9): 985-7.

18. Riahi S, Fischler I, Stuckey MI, Klassen PE, Chen J. The value of electronic medical record

implementation in mental health care: A case study. JMIR Med Inform. 2017;5(1).

19. Oades LG, Deane F, Crowe T, Lambert WG, Kavanagh D, Lloyd C. Collaborative recovery:

an integrative model for working with individuals who experience chronic and recurring

mental illness. Australas Psychiatry. 2005;13(3):279-84.

20. Ghitza UE, Sparenborg S, Tai B. Improving drug abuse treatment delivery through adoption

of harmonized electronic health record systems. Subst Abuse and Rehabil. 2011;2:125-31.

21. Ammenwerth E, Ehlers F, Hirsch B, Gratl G. HIS-Monitor: An approach to assess the quality

of information processing in hospitals. Int J Med Inf. 2006;76:216-25.

22. Carayon P, Cartmill R, Blosky M, Brown R, Hackenberg M, Hoonakker P, et al. ICU nurses'

acceptance of electronic health records. J Am Med Inform Assoc. 2011;18:812-9.

23.. Carrington JM, Effken JA. Strengths and limitations of the electronic health record for

documenting clinical events. Comput Inform Nurs. 2011;29(6):360-7.

24. Schenk EC, Mayer DM, Ward-Barney E, Estill P, Goss L, Shreffler-Grant J. RN perceptions

of a newly adopted electronic health record. J Nurs Adm. 2016;46(3):139-45.

25. Lu CH, Hsiao JL, Chen RF. Factors determining nurse acceptance of hospital information

systems. Comput Inform Nurs. 2012;30(5)-257-64.

26. Maillet E, Mathieu L, Sicotte C. Modeling factors explaining the acceptance, actual use and

satisfaction of nurses using an electronic patient record in acute care settings: An

extension of the UTAUT. Int J Med Inf. 2015;84:36-47.

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27. Saleem JJ, Plew WR, Speir RC, Herout J, Wilck NR, Ryan DM, et al. Understanding barriers and facilitators to the use of clinical information systems for intensive care units and anesthesia record keeping: A rapid ethnography. Int J Med Inf. 2015;84:500-11.

28. Ifinedo P. The moderating effects of demographic and individual characteristics on nurses' acceptance of information systems: A canadian study. Int J Med Inf. 2016;87:27-35.

29. Ash JS, Bates DW. Factors and forces affecting EHR system adoption: report of a 2004 ACMI discussion. J Am Med Inform Assoc. 2005;12:8-12.

30. Whittaker AA, Aufdenkamp M, Tinley S. Barriers and facilitators to electronic documentation in a rural hospital. J Nurs Scholarsh. 2009;41(3):293-300.

31. Yang L, Cui D, Zhu X, Zhao Q, Xiao N, Shen N. Perspectives from nurse managers on informatics competencies. Scientific World Journal. 2014.

32. Staggers N, Parks N. Description and initial applications of the staggers and parks nurse-computer interaction framework. Comput Inform Nurs. 1993;11(6):282-90.

33. Staggers N, Kobus D. Comparing response time, errors, and satisfaction between text-based and graphical user interfaces during nursing order tasks. J Am Med Inform Assoc. 2000;7(2):164-76.

34. Sandelowski M. Whatever happened to qualitative description? Res Nurs Health. 2000;23(4):334-40.

35. Palinkas L.A, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. Adm Policy Ment Health. 2015;42(5):533-44.

36. Hsieh H, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res. 2005;15(9):1277-88.

37. Guba EG, Lincoln YS. Competing paradigms in qualitative research. In: Denzin NK, Lincoln

YS, editors. Handbook of qualitative research. Thousand Oaks, CA: Sage; 1994. p. 105-

17.

38. Yen PY, Phillips A, Kennedy MK, Collins S. Nursing informatics competency assessment

for the nurse leader: Instrument refinement, validation and psychometric analysis. Nurs

Adm. 2017;47(5):271-7.

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the inter view or focus group?	
Duration	21	What was the duration of the inter views or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.