Primary Health Care Practitioners' Perception about Electronic Health Record Usability:

Introduction

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Chapter 1: Introduction to the Project

There are several studies that have shown the benefits of the use of Electronic Health Records (EHR) for patients' safety, as well as their ability to improve efficiency in primary care settings (Porterfield et al., 2014). Regardless of the positive effects of the implementation of EHR in primary health care settings, health care providers have moved slowly to adopt this technology (King et al., 2014). Practitioners who do not want to adopt EHR, especially electronic prescription, can endanger patient safety. Studies have shown that the use of EHR significantly reduces the number of prescription errors that can harm patients (Liao et al., 2017).

Medication errors, in turn, are a serious issue that causes numerous safety incidents in primary care. Inappropriate prescribing appears to be a most common medication error with a prevalence of five to ninety-five percent (Assiri et al., 2016). A World Health Organization (WHO) (2016) report stated that key interventions are the employment of clinical pharmacists, computerized provider order entries, and educational programs. Palabindala et al. (2016) also showed that the use of EHRs is capable of reducing medication error while also resulting in improved communications between patients and healthcare teams.

There are many barriers to the use of EHR by physicians. Some of them include computer skill requirements and the need for numerous organizational and environment facilitators (Palabindala et al., 2016). Kauppinen et al. (2017) also showed that primary health care practitioners might find the transition from handwriting documentation to electronic documentation and prescription very difficult and even unnecessary. However, this assertion is contradicted by the evidence which indicates that EHR can be very helpful, in particular, in reducing medication errors.

The presented project focuses on the EHR perception problem and its potential solution,

which is a specific quality improvement program. Said program will be tested through a quasi-experiment which will be used to establish whether the intervention alters the perceptions of care providers regarding EHR usability and helpfulness when medication errors are concerned while also reducing the incidence of medication errors at the Vega Medical Center. This way, the project will be able to contribute some data on various interventions that can increase and facilitate EHR use, which explains the reasons for it being conducted. This chapter will discuss the project, providing some background information and stating the problem, purpose and research questions. In addition, it will explain the significance of the project, including its contribution to the academic knowledge, discuss and rationalize its design, define the relevant terms, consider the assumptions and limitations, and offer a summary of the rest of the project.

Background of the Project

The importance of the use of EHR is documented well (Porterfield et al., 2014). The implementation of EHR improves patients' safety, reduces medication errors by up to 50%, and improves efficiency in primary care settings (Porterfield et al., 2014). However, despite the benefits of EHR implementation in primary health care settings, providers have been hesitant to adopt this technology (King et al., 2014). Practitioners reported several barriers to the use of EHR, including problems during the transition from handwritten to electronic prescriptions (Furukawa et al., 2014). Some of the obstacles that practitioners encountered when implementing EHR are the complicated and challenging process, as well as the need for computer skills, support from others, and numerous organizational and environment facilitators (King et al., 2014).

Miami Dade County has 14.6 % of all practicing practitioners in Florida (Scott & Philip, 2017). 66 % (n=1896) of those practitioners are working in small group primary care practice,

and almost two thirds (60 %) of those practitioners are fifty and older (Scott & Philip, 2017).

Practitioners who have been using handwritten prescriptions for a long period of time may not

want to change the established pattern and introduce e-prescription. However, prescription errors

may constitute up to 70% of medication errors in primary care, and the majority of them are

reported to occur because of handwriting (Scott & Philip, 2017). A study which aimed to

evaluate the prescription error frequency in handwritten prescriptions and e-prescriptions showed

that a total of 13,334 prescribing errors were found in 549 handwritten prescriptions, and 2,297

prescribing errors were found in 200 e-prescriptions (Joshi et al., 2016). Thus, evidence indicates

that handwritten prescriptions may be more error-prone, which highlights the importance of

investigating varied approaches to encouraging the adoption of EHR.

Problem Statement

Some of the benefits of the use of EHR are the facilitation of communication,

improvement of patients' safety, and reduction of medication errors (Porterfield et al., 2014).

However, health care providers have been hesitant to adopt this technology (King et al., 2014).

More than 50 % of organizations surveyed in a study reported practitioners' resistance to EHR

(Gupta et al., 2017). Some of the obstacles that they reported included the transition from

handwritten to electronic prescription, the need for user computer skills, and the complicated

nature of the system used (King et al., 2014). Handwriting prescriptions may be the cause of up

to 7,000 lethal accidents annually (Oyekanmi, 2018). Practitioners' perceptions of the usability

of EMR affect healthcare organizations in the implementation and adaption of EMR (Gupta et

al., 2017). The population that is of interest to the present study are the healthcare providers who

are hesitant to adopt or use EHR, but the broader population that is affected by the problem

includes the patients treated by such providers. In general, it is a major public health issue.

Therefore, it is necessary to look for strategies that will improve practitioners' attitudes toward the EHR. Educational training has been evidenced to be an effective intervention in changing practitioners' perception and behavior in primary healthcare settings (Squires et al., 2014). An educational training program that addresses the described problem should focus on the barriers to the use of EHR. While the literature on the topic indicates all the benefits of Electronic Health Records, it is unknown if the application of a quality improvement teaching program to primary health care providers will improve their perception of EHR usability. Similarly, it is not known if such an intervention can improve the medication errors rate at Vega Health Care clinic. Thus, the present project will address the need for such investigation and contribute some data which may assist in filling this gap.

Purpose of the Project

The purpose of this quantitative quasi-experimental project is to determine if there is a relationship between the application of a quality improvement teaching program and the improvement of practitioners' perception of EHR usability, as well as the reduction of the number of medication errors at the Vega medical center. The quality improvement teaching program will be defined as a teaching program with all the information needed to improve the practitioners' perception of the usability of EHR based on the literature researched. The practitioners' perceptions will be defined as perceptions of the practitioners regarding the usability of EHR; it will be measured by a survey which will be administered before and after the implementation of the quality improvement teaching program. The medication errors will be defined as transcription and prescription medication errors made by each practitioner before and three months after the implementation of the teaching program. The monthly medication errors log is one of the sections of the EHR kept by Vega, which makes the measurement of this

variable possible.

Vega Medical Center is a small primary care group facility that has eight practitioners serving the community of Miami Date. 90% of those practitioners are older than 50 years, and they are all foreign physicians. They are not used to computers, and they do not see the necessity in transitioning handwritten to electronic prescriptions. Clinical staff includes the people who transcribe all the prescriptions in order to enter them into the EHR system. As a result, Vega Medical Center has a high incidence of prescribing and transcribing medication errors. A DPI project that will improve the perception among practitioners about the use of EHR has the potential for enhancing the quality of care and reducing prescribing and transcribing medication errors, which is the eventual purpose of the project.

Clinical Questions

This quantitative quasi-experimental project intends to identify how the implementation of a quality improvement teaching program will influence the perceptions of Vega practitioners regarding EHR usability. The project will also identify how this intervention (and, potentially, its impact on the practitioners' perceptions) will influence the prescribing and transcribing medication errors at Vega. The data describing the practitioners' perceptions will be collected before and after the intervention, and the number of medication errors will be determined before and throughout the first three months that will follow the implementation of the improvement teaching program.

The PICOT question created for the project is as follows: (P) Among healthcare providers, (I) how does the implementation of a quality improvement teaching program (C) compared to the pre-intervention measurements (O) influences primary care providers' perceptions of the usability of EHR and medication errors (T) within three months of

participating in the program? The following clinical questions guide this quantitative project:

Q1: How does the implementation of a quality improvement teaching program influence the perceptions of primary care providers regarding EHR usability?

Q2: How does the improvement of primary health care practitioners' perceptions of EHR usability influence medication error?

Variable 1: Quality improvement teaching program

Variable 2: Practitioners' perception of EHR usability

Variable3: Number of medication errors (Prescribe and transcript errors)

Advancing Scientific Knowledge

The idea of improving practitioners' EHR skills by educating them is not a new one. It has manifested in programs that work to facilitate practitioners' use of EHR and help them to develop the necessary and additional knowledge that can have a positive effect on care quality (Robinson & Kersey, 2018). The search for a recent study that would present an intervention which would focus on the practitioners' attitudes regarding EHR has not been very successful. Similarly, when the search for the literature on resistance to EHR use is carried out, most sources that are returned consider the resistance that occurs during the introduction of EHR rather than significantly later and as a result of preferring old-fashioned methods.

However, the fact that practitioners can be resistant to EHR use is documented (Gupta et al., 2017; King et al., 2014), especially in papers dedicated to EHR implementation (Barrett, (2018). The present study will focus on using education to reduce resistance within the specific population that appears to be rather hesitant to use EHR as a result of personal preferences and perceptions, contributing to the body of knowledge on the topic by covering its relatively under-researched aspects. If the study is successful, it will also present a modest test for the

intervention, which means that it might be employed in future, and the report of the intervention's implementation can be useful for other change-focused projects.

The theoretical foundations of the project include the theory of planned behavior and the transformative learning theory. The former indicates that a person's intention to do something is a primary factor in their adoption of that behavior, which explains why the proposed intervention addresses the practitioners' beliefs and perceptions (Bai & Dinour, 2017). The second one focuses on critical reflection that can help people to acknowledge self-limiting factors (Zanchetta et al., 2017); in this study, they include negative ideas regarding EHR. The models have been applied to healthcare settings (Bai & Dinour, 2017; Zanchetta et al., 2017), and the present research will contribute to the growing number of such studies, offering relevant suggestions on their usefulness and application in health practitioners' education.

Significance of the Project

Even though the importance of EHR for patients' safety and care in general has been widely discussed in the literature, primary health care providers still have to face barriers to the use of the tool (Kivekäs et al., 2016). Some of the barriers of the implementation and use of the EHR are the high cost of the system and maintenance fees, the lack of technical support, and the need of computer skills (Kruse et al., 2016). The attitudes towards these barriers and EHR in general may deter practitioners from using EHR, limiting the effectiveness of EHR adoption (Gupta et al., 2017). Therefore, investigating the methods of adjusting such attitudes is worthwhile. By searching for a relationship between the employment of a quality improvement teaching program and practitioners' perceptions of EHR usability, the project will contribute some data to the study of various EHR-related educational interventions that are aimed at helping practitioners to use them (Robinson & Kersey, 2018). The research will be rather unique in

targeting the providers who resist the use of EHR and focusing on their attitudes and perceptions related to EHR. In addition, if the intervention is effective, the practitioners at Vega health care clinic will use EHR more often, improving patients' safety in the clinic.

Primary care is the setting that is not very fast in adopting EHR. Miami Dade County has 17% of all practitioners of the entire Florida State (Scott & Philip, 2017). 66% of them are working in small primary care group office, and the majority of them (60%) are older than fifty years' old (Scott & Philip, 2017). Older practitioners have had difficulty in the transition from handwritten to electronic prescriptions. The transcription of prescriptions is responsible for 63% of medication error in primary care settings (Brits et al., 2017). Therefore, if the project obtained a decrease in medication errors after the teaching program implemented, it can offer an example of a solution for other clinics that have the same problem.

There is a small amount of literature that discusses effective interventions to improve practitioners' behaviors about EHR usability (Gupta et al., 2017). This project will increase the knowledge about interventions that can affect primary care practitioners' perception regarding EHR usability. Positive results of the project will also show the importance of taking into consideration behavioral and learning theories during the development of any quality improvement project that is meant to improve participants' behavior.

Rationale for Methodology

The project will use quantitative methods to determine the relationship between three variables: the quality improvement teaching program (independent), the primary health care practitioners' perceptions of EHR usability (dependent), and the number of medication error (dependent). Given this purpose, the study has to employ a quantitative approach which would

allow the determination of relationships between variables (LoBiondo-Wood & Haber, 2017; Polit & Beck, 2017), thus answering the research questions.

Given the quantitative nature of the study, the data will be collected in a numerical form with the help of a questionnaire and electronic medical records. The questionnaire will use closed-ended questions that will provide quantifiable data. Cronbach's alpha test was done to the questioners for reliability that ranged from 0.87 to 0.98 for perceived usefulness and 0.86 to 0.98 for perceived ease of use (Seckman, 2008). This approach will provide reliable methods of quantifying the phenomena of interest (perceptions of practitioners and medication errors), and as a result, the study will be able to apply the quantitative methods of data analysis to them.

Nature of the Project Design

This project will use a quantitative methodology with a quasi-experimental design (pre-post intervention). Experiments and quasi-experiments are the primary methods of establishing the relationships between variables (LoBiondo-Wood & Haber, 2017; Polit & Beck, 2017). For this project, quasi-experimental design was chosen due to the specifics of the population of interest and the resources available to the researcher. In particular, the study will be carried out for Vega, which has a limited number of providers (only eight people). Splitting a small sample into two randomly assigned intervention and control group would be difficult and hardly helpful. Quasi-experiments provide less reliable evidence than proper experiments, but they are still an important source of information (Polit & Beck, 2017), and this approach to research design is capable of providing the answers to the research questions.

Furthermore, the pre-post intervention approach to measuring the variables is also justified by the purpose and questions of the study. In particular, it will allow establishing the effect of the tested intervention on the variables of interest by setting the baseline measurements

(pre-intervention) and comparing them to the ones obtained after the intervention. The data will be collected with the help of the EHR information and a survey aimed at measuring the perceptions of the participants. The EHR used by Vega tracks transcription and prescription errors, which allows establishing the baseline and monitoring the participants' errors for the next three months. The survey is the Perceived Ease of Use and Usefulness Tool, which involves twelve Likert-scale questions, and it will be administrated before the intervention and after it via email.

The data analysis is in line with the needs of the study: statistical tests, including t-test and ANOVA, will be employed to determine if there are statistically significant differences between pre- and post-test measurements. This way, the relationship between the independent and dependent variables can be reliably inferred (Polit & Beck, 2017). To summarize, the project's design was developed to respond to the research questions while taking into account relevant resource restrictions.

Definition of Terms

The following terms were used in the project.

Electronic health records (EHR). EHR are the electronic or digital version of health records, which can also be called patient charts (Gupta et al., 2017; Porterfield et al., 2014). They are similar in content to paper patient charts since they contain personal and health information, but they employ the electronic means of input, storage, and output, which makes them a preferable version that is less prone to medication errors and has other benefits (Porterfield et al., 2014).

Medication error; prescription and transcription medication error. Medication error is an umbrella term, which refers to any type of mistake that results in any inappropriate use of

medication (Assiri et al., 2016; WHO, 2016). They can be caused by a vast majority of factors from bad communication to incorrect labeling. In the present study, prescription and transcription errors are considered. For the purposes of the project, the former term refers to the medication errors that occur as a result of a prescription mistake, and the latter are the medication errors that are caused by transcription mistakes. Transcription refers to transcribing handwritten prescriptions, which is required in Vega because its practitioners prefer handwriting prescriptions that are then inserted into the EHR system by other people.

Quality improvement programs. In this study, the term refers to the educational intervention developed to improve the perceptions of EHR among Vega practitioners and help them to use EHR effectively. Similar training programs are not uncommon (Robinson & Kersey, 2018), but they do not often focus on the negative perceptions of EHR or target an EHR-resistant group of practitioners.

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Assumptions, Limitations, Delimitations

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The study does not employ particular assumptions; the key ideas about the project are informed by its theoretical foundations, recent studies, or evidence collected at the future project's site. It is assumed, however, that the study's delimitations and limitations will be taken into account when considering its findings, and the project will strive to enable such a perspective by interpreting the results appropriately. The following delimitations and limitations are important to consider.

1. The study's delimitations are concerned with the site of the project. The researcher has access to Vega and knows that the permission to conduct research at Vega will be issued, which explains why this location was chosen.

2. The study will not expand to involve other medical centers as a result of funding and time

constraints. Given the limited time that the researcher has to complete the work, this delimitation is unavoidable.

3. As a result of delimitations, the project's major limitation is that the study will have a small sample. Vega has eight practitioners, which means that the findings are unlikely to be generalizable. The study will not attempt to apply the results to particular populations like health practitioners in general, health practitioners who resist the use of EHR, Florida practitioners, or other broad populations. However, the study will fully involve the health practitioners of Vega, which means that it will have a noticeable practical value for the center while contributing some data on the possibility of using educational interventions for the improvement of attitudes towards EHR.

Summary and Organization of the Remainder of the Project

Extensive research indicates that the adoption of EHR has a number of positive outcomes, including the reduction of medication errors, which remain a major problem that can cost lives (Brits et al., 2017; Porterfield et al., 2014). However, there is some resistance to adopting EHR, which, among other things, can be caused by negative attitudes towards EHR and its usability (Gupta et al., 2017; King et al., 2014). There exists some research which indicates the effectiveness of educational interventions in improving the quality of EHR use (Robinson & Kersey, 2018); however, the studies dedicated to correcting negative attitudes towards EHR seem to be lacking.

The present research focuses on this problem and intends to test a quality improvement program by measuring its effect on the perceptions of participants regarding EHR and their usability and the changes in the medication error incidence three months after the intervention. In order to respond to the research question and as a result of the specifics of the available sample,

the study will be a quantitative quasi-experiment carried out at a medical center called Vega. The primary limitation of the research is its small sample, which reduces its generalizability but also allows to test the intervention locally, potentially resulting in a direct practice improvement at Vega.

The following chapters will be arranged as follows. Chapter 2 will offer a review of the literature on the topic, providing the background for the project. Chapter 3 will describe the methodology of the project in great detail. Chapter 4 will discuss the analysis of the data collected and present its results. Chapter 5 will offer a discussion of the findings and connect them to the literature review presented in Chapter 2, demonstrating the contribution of the project to the existing body of research.

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