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**THE ELECTRONIC HEALTH RECORD SCORECARD:
A MEASURE OF UTILIZATION AND
COMMUNICATION SKILLS**

A Project Presented

By

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To

The Faculty of the Graduate College

Of

The University of Vermont

**In Partial Fulfillment of the Requirements
for the Degree of Master of Science
Specializing in Nursing**

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Abstract

As the adoption rate of electronic health records (EHRs) in the United States continues to grow, both providers and patients will need to adapt to the reality of a third actor being present during the visit encounter. The purpose of this project is to provide insight on “best” practice patterns for effective communication and efficient use of the EHR in the clinical practice setting.

Through the development of a comprehensive scorecard, this project assessed current status of EHR use and communication skills among health care providers in various clinical practice settings. Anticipated benefits of this project are increased comfortability in interfacing with the EHR and increased satisfaction on the part of the provider as well as the patient. Serving as a benchmark, this assessment has the potential to help guide future health information technology development, training, and education for both students and health care providers.

Keywords: electronic health record, patient-centered care, effective communication

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The Electronic Health Record Scorecard:
A Measure of Utilization and Communication Skills

Introduction

The use of an electronic health record (EHR) has become ubiquitous in almost every health care setting from hospitals and ambulatory care clinics to primary care and specialty practices. According to the Centers for Medicaid and Medicare Services, potential benefits of EHRs include streamlining clinical workflow, supporting evidence-based decisions, improving quality management, and facilitating outcome reporting (Zhang, Chen, Ashfaq, Bell, Calvitti, Farber, ... Agha, 2016). Additionally, EHRs can play an important role in the delivery of patient-centered care. EHRs have the potential to enhance patient trust, increase patient autonomy, and facilitate patient-centered communication (Zhang et al., 2016). While studies have shown the positive impact of EHR use within the clinical practice setting, the research also suggests that ineffective use of the EHR can have a negative impact on provider-patient relationships (Asan & Montague, 2012). These outcomes are largely influenced by the provider's skill in using the computer, the physical layout of the exam room, the level of distraction that providers experience when using the computer, and the configuration of the EHR itself (Street, Liu, Farber, Chen, Calvitti, Zuest, ... Agha, 2014). Despite the increasing deployment of computers in healthcare facilities, it has become apparent that both patients and providers still have reservations about the role of the computer in the clinical encounter (Kumarapeli & de Lusignan, 2013). This project attempted to establish a better understanding of effective EHR communication and utilization skills to assist in the development and integration of EHR systems in the clinical practice setting.

Project Purpose

The purpose of this project was to provide insight on “best” practice patterns for effective communication and use of the EHR in the clinical practice setting. Through the application of an educational needs assessment, this project aimed to assess current status of EHR use and communication skills among health care providers in the clinical practice. Serving as a benchmark, this assessment has the potential to help guide future information technology (IT) development, training, and education for all health care providers. The needs assessment consisted of a comprehensive scorecard that focused on provider’s EHR usage styles including chart review and documentation, workspace characteristics, how providers manage their interactions with EHRs and their patients during the visit, the availability of training and support, and any issues they experience arising from technology. The goal of this scorecard was to help providers and practices as a whole identify strengths and/or limitations in their current EHR communication and utilization patterns. The utility of this scorecard could be far-reaching as more practices convert to EHRs and must attend to the provider-patient relationship in the process. The scorecard is not specific to any one software program, media device, or practice setting. The information gathered from this scorecard may assist practices in optimizing their use of the EHR by identifying areas of success and areas in need of improvement with regards to EHR use. Furthermore, this information could help direct future teaching and training opportunities and may aid in the development of a standard educational protocol for effective EHR communication and use across all practice settings.

Project Importance

Provider-patient communication is paramount to the provider-patient relationship and a key element in health care delivery (Asan & Montague, 2012). This communication affects

patient satisfaction, adherence to prescribed or recommended therapies, provider-patient conflict resolution, and clinical outcomes (Rose, Ritcher, & Kapustin, 2014). With the introduction of the EHR, the paradigm has shifted from a two-way interaction, between provider and patient, to now a three-way exchange involving the EHR system. It is a delicate dance that requires skill, strategy, and training. If EHRs are to be used effectively, facilitators and barriers to EHR communication and use must first be identified and understood (Saleem, Flanagan, Russ, McMullen, Elli, Russell, ... Frankel, 2014). The intent of this needs assessment is to identify the factors within a practice that are beneficial or disadvantageous to EHR communication and use. With the application of a comprehensive scorecard, a measure of baseline EHR communication and utilization skills can be roughly determined. No instrument for a comprehensive assessment of EHR communication or utilization skills has been identified in the literature to date. Furthermore, there is an increasing need for provider training focusing on EHR usability/functionality, the development of patient-centered interview skills, and patient engagement. The information gathered from this project may aid in the development of standardized training and educational offerings in effective communication and use of EHR.

Theoretical Framework

The theoretical framework guiding this project is Rozzano Locsin's (2005) middle-range theory, *Technological Competency as Caring in Nursing*. This theory is best described as a "conceptual model that defines the relatedness among technology, caring, and nursing" (Casterline, 2006, p. 273). Human caring is the foundation of the nursing profession. As technology develops, the priority must remain with the patient. While technology has the potential of bringing the patient closer to the provider, it can also increase the gap between them. Locsin emphasizes the importance of being authentic and intentionally present within the

encounter (Locsin, 2016). He warns that fixation with technology may result in robotic mannerisms (“robo-nurse”) which takes away from the appreciation of caring for persons moment to moment (Locsin, 2005). It is imperative that health care providers realize technology and computer skill competence is merely a tool to optimize patient care. While maintaining focus on the patient, the provider can strategically incorporate technology to provide safe, high-quality care to meet their patients’ individual needs. Locsin’s theory promotes “the navigation of innovative responses within contemporary realities, in which technology is used to know persons more fully as whole and complete in the moment” (Locsin, 2016, p. 6). Nurses and other health care providers can enhance their caring abilities with the integration of technology to better serve the patient. Locsin theorized that through the effective use of technology, a nurse’s ability to know, care for, and be present with his or her patient is strengthened and improved (Locsin, 2016).

A critical component of this theory is the Universal Technological Domain (UTD) (Locsin, 2016). The UTD is “the continuous dimension of unending and ever-changing dynamics of knowing persons as caring in nursing” (Locsin, 2016, p. 5). This notion provides ways for “understanding, affirming, celebrating, and supporting being human in an ever-changing world” (Locsin, 2016, p. 6). It preserves humanness and the holistic nature of caring while considering the reality of contemporary health care practices in which technology is becoming more pervasive. According to Locsin (2016), further development of the UTD “inspires a grand visioning of technology evolving innovatively within the demands of human encounters- in ways illuminated by nurturing hopes, dreams, and aspirations of the nurse and the person being nursed” (p. 8). From this perspective, providers can use technology to know their patients more fully and patients can use technology to become more involved in their care. Both the patient and

the provider have a role in the caring process and thus appreciation for human collaboration is preserved. Technology is simply used to magnify the knowledge gained in these partnerships. Loscin's theory places nursing within the context of modern healthcare and acknowledges that technological competence and caring can co-exist harmoniously.

Relationship to Advanced Nursing Practice

This project complements several of the nurse practitioner core competencies identified by the National Organization for Nurse Practitioner Faculties (NONPF). It is essential that advance practice nurses possess these skills in order to “meet the complex challenges of translating rapidly expanding knowledge into practice and function in a changing health care environment” (NONPF, 2012, p. 1).

Quality Competency: Uses best available evidence to continuously improve quality of clinical practice. The EHR is an essential tool in improving quality and lowering costs of health care in the United States (Mysen, Penprase, & Piscotty, 2016). However, the complexity of EHR functions along with system issues, can produce unintended interruptions and can hinder the delivery of patient-centered care. To continue providing the highest quality of care, healthcare providers must develop strategies to overcome these barriers associated with EHR use. This project identified the best available evidence for effective EHR communication and created an innovative approach to the development of EHR utilization skills in the clinical setting.

Technological and Information Literacy Competency: Contributes to the design of clinical information systems that promote safe, quality, and cost effective care. According to Mysen et al. (2016), mastery of the EHR is important for the expansion of the advanced practice nurse role and increasing patient satisfaction. This project provided a stepping stone for the

establishment of a standard educational protocol for effective EHR communication and use across all practice settings, providing the opportunity for development and mastery of technological and information literacy skills.

Health Delivery System Competency: Analyzes organization structure, functions, and resources to improve the delivery of health care. The scorecard takes into consideration all factors involved in successful EHR implementation including but not limited to, workspace characteristics, IT availability, a provider's EHR usage style, and the extent of previous training in the use of the EHR and development of effective interview skills. The purpose of this project was to determine current communication and use of the EHR to help guide future teaching/training and improve the delivery of health care in the clinical setting.

Contribution and Anticipated Benefits

As the adoption rate of EHRs in the United States continues to grow, both providers and patients will need to adapt to the reality of a third actor being present during the visit encounter. This project helps to illustrate best practice patterns in the use of the EHR through a carefully constructed scorecard. Providers will likely be able to identify facilitating factors as well as barriers to effective EHR use through the application of this scorecard. The scorecard allows for comparison of a practice's current use of the EHR to the evidence-based recommendations for effective use and successful implementation. Anticipated benefits of this project are increased comfortability in interfacing with the EHR and increased satisfaction on the part of the provider as well as the patient. This project aims to generate awareness of effective EHR use and in the process, may contribute to increased acceptance of the EHR within the visit encounter.

Literature Review

A review of recent literature, within the last 5 years, was conducted through PubMed, OVID Medline, and Cinahl databases using a combination of the following key words and phrases: “EHR”, “electronic health record”, “communication”, “provider-patient interaction”, and “patient satisfaction”. Despite a relatively low yield of relevant articles, a variety of research designs including observational studies, qualitative studies, and systematic reviews are included in this discussion.

Electronic Health Record

The electronic health record (EHR), also referred to as the electronic medical record (EMR) or electronic patient record (EPR) has become a common staple in healthcare facilities across the United States as well as other parts of the world. The adoption rate of these health information technologies in the U.S. for office-based providers has steadily increased from 18% in 2001 to 78% in 2013 (Zhang et al., 2016). The evolution from paper charts to an electronic system has generated both positive outcomes as well as unintended consequences. Advantages to EHR implementation include electronic prescribing of medication, improved patient safety, built-in evidence-based decision support, greater access to research findings, real-time data review, and improved patient data collection at the point of care (Mysen et al., 2016). The EHR has the potential to enhance office productivity, facilitate care coordination, and promote patient-centered care if used appropriately. The American Recovery and Reinvestment Act (ARRA) supported the adoption of EHRs with the initiative for “meaningful use”, which states that EHRs should be used effectively to promote quality and efficiency in the healthcare system (Asan & Montague, 2012). However, the National Research Council (NRC) has reported that current EHR technologies fall short of this goal with inadequate consideration for human-computer

interaction, human factors, and ergonomics (Asan & Montague, 2012). In one study, providers reported stress and frustration associated with system usability of the EHR (Zhang et al., 2016). Interviews with providers revealed a set of usability issues including excessive mouse activity, unresponsive software user interface, lack of shortcuts, non-optimal information organization, and the lack of end-user involvement in the design process (Zhang et al., 2016). Increasing demands from the EHR may compete with the communicational and psychosocial needs of the patient and as a result, EHR use may be disruptive to the provider-patient relationship (Zhang et al., 2016). Strategies for overcoming these concerns associated with EHR communication and use are discussed in further detail later on.

Patient-Centered Care

Patient-centered care is defined as “being respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions” (Zhang et al, 2016, p. 137). It is the bedrock for high quality healthcare in this country. Patient-centered care is built on a foundation of trust and open communication between provider and patient. Many factors influence this relationship including verbal and nonverbal communication skills. Poor communication acts as a barrier to positive patient outcomes while effective communication has been shown to improve outcomes and increase patient satisfaction. Communication can also impact patient adherence to provider instructions. As a result, providers and patients have a strong incentive to maintain or enhance the dialogue that exists between them (Kazmi, 2013). With the introduction of the EHR into the conversation, both parties have expressed concerns about the potential adverse effects of these computing technologies on the patient-provider relationship. Explicit concerns of physicians regarding these effects include reduced eye contact, decreased chance of discussion of psychosocial topics, and reduced

cognizance of patient reactions due to unawareness of the patient's nonverbal communication behaviors (Kazmi, 2013). Studies have reported conflicting results on the effects of computer use on provider-patient communication. One study found that the introduction of the EHR does not affect patients' satisfaction related to the office visit by the nurse practitioner (Mysen et al., 2016). On the other hand, a systematic review of the effects of EHR use on doctor-patient communication, included two studies that noted adverse effects of EHR use on the flow of conversation between patient and physician (Kazmi, 2013). These studies cited keyboarding and screen gaze as factors negatively affecting the flow of conversation as well as patient satisfaction and trust (Kazmi, 2013). Understandably so, patients have reservations about the role of the EHR in the visit. These qualms may be reduced with increased familiarity and engagement with the EHR.

Barriers to Effective Communication and Utilization of the EHR

Challenges to effective communication and use of the EHR have already been mentioned but will be further examined in this section. The EHR presents itself as a third party contender within the visit encounter. It has its own demands not unlike those of the patient. The provider may spend a majority of the visit looking at the computer rather than the patient which can have negative implications on the efficacy of communication between the provider and patient. Screen gaze was shown in one study to be inversely proportional to a physician's use of psychosocial questioning (Kazmi, 2013). In addition, the provider must physically interact with the computer or device through mouse clicks, key strokes, or touch pad. Patients may view these tasks as disruptive and detracting of the provider's undivided attention (Street et al., 2015).

Other barriers to effective communication with the EHR, include the complexity of EHR functions and system issues (Mysen et al., 2016). Functionality of the EHR may include new

order notifications, test results, and other clinical reminders. These alerts may present during the encounter and require clinicians to be skillful and rapidly change between short duration tasks. Interruptions to the clinical workflow can substantially increase clinician's cognitive burden, making it difficult for them to simultaneously enter data and engage in thoughtful and meaningful conversation with the patient. Furthermore, the cognitive requirements of working with the EHR may deplete the cognitive resources needed to carry on a conversation and may take attention away from the patient resulting in conversational dead space and decreased perceived empathy (Street et al., 2015).

The electronic health record can be accessed on almost any device including a desktop computer, laptop, tablet, or mobile device. More important than the type of device used, is the mobility of the device and the physical configuration of the visit/examination rooms. The layout of these rooms, specifically the seating arrangements in relation to the computer or device, play a major role in effective communication with the EHR. "The spatial organization of the system can hinder how attention is given to the patient, and consequently jeopardize the quality of patient-centered care" (Zhang et al., 2016, p. 139).

Facilitators to Effective Communication and Utilization of the EHR

Strategies to overcome the impediments to effective communication and use of the EHR have been reported throughout the literature. One study, looking at the interruptive nature of the EHR, suggests redesigning the workplace to be interruption resilient and harnessing their possible positive effects (Kumarapeli & Lusignan, 2013). Another study by Mysen et al. (2016), proposes taking regular breaks from working on the computer to focus on the patient, considering the spatial arrangement of the examination room to make it more open, positioning the provider closer to the patient to allow more eye contact, and allowing patients to view their

own records on the computer. A research article titled, “Strategizing EHR use to achieve patient-centered care in exam rooms: a qualitative study on primary care providers”, found that providers deploy various strategies to mitigate the negative impact of EHRs on providing patient-centered care (Zhang et al., 2016). These tactics include charting beyond patient visits, the use of templates, engaging the patient in EHR use, the practice of multitasking, and establishing patient buy-in for EHR use (Zhang et al., 2016).

Lastly, workspace characteristics including the physical layout of visit/examination rooms, seating arrangements, and mobility of computerized devices can aid in the communication and interaction between the provider, patient, and EHR system. In rooms that allowed for the patient and provider to sit side-by-side, the provider took the opportunity to share the screen with the patient (Kumarapeli & de Lusignan, 2013). It is suggested that, collaborative reading of the EHR can lead to improved care quality, informed patient decision-making, and patient engagement (Zhang et al., 2016). If used appropriately, the EHR can serve as an effective educational tool fostering patient involvement and supporting patient autonomy.

Training and Education

There is a considerable lack in systematic training and educational models for effective communication and use of the EHR in the clinical setting. Generally speaking, clinicians tend to develop their EHR-use skills based on experience (trial and error) and observation (watching colleagues) in practice rather than formal training (Asan & Montague, 2012). With a lack of teaching interventions focused on EHR-specific interview skills, medical students have expressed “concern about their preparedness and ability to effectively use clinical information systems and integrate EHR use into clinical communication” (Asan & Montague, 2012, p. 2). Studies demonstrate that patients respond favorably to clinicians who they deem to be skilled at

utilizing health information technologies (Kazmi, 2013). One study in particular found that patients were “acutely aware of the providers’ learning curve in adapting to the system and perceived EHRs as a block to communication until the nurse practitioners and physicians became comfortable with the system and how to use various functions” (Rose et al., 2014, p. 679).

A multidimensional approach should be taken in regards to EHR training and education. The qualitative study by Zhang et al (2016) proposed that provider training can take place in three stages with the overarching goal of maintaining patient-centered care. These stages include: 1) training in EHR use which includes dissemination of ideas and skills on how to best multitask or how to construct a template for efficient documentation; 2) developing patient-centered interview skills in the computerized exam room that focuses on maintaining a connection and being sensitive to a patient’s needs while effectively prioritizing tasks on the EHR system; and 3) engaging patients through the EHR by teaching providers techniques for involving patients in the documentation and discussion of information such as sharing the screen when visual data is available and appropriate to share (Zhang et al., 2016). Additionally, Street et al. (2015), suggests that educational curriculum for clinicians should involve not only a traditional focus on communication skills, but also EHR management skills (i.e. templates, graphing capabilities, and shortcuts), that could promote interaction with the patient. There is a need for new guidelines to inform EHR design and implementation. Next-generation EHR systems must address better usability, workflow integration, and end-user involvement in the design process to facilitate effective communication with the use of health information technologies. With appropriate use, the perceived benefits of the EHR can become a reality.

RESPECTS©. RESPECTS© was developed by Dr. Marie Sandoval, MD and Dr. Mary Val Palumbo in 2013, as a teaching tool for medical and nurse practitioner students to remember

key points for best practice in the use of the EHR. This simple mnemonic outlines the following evidence-based EHR communication skills:

Review the EHR before entering the room

Enter the room and build rapport before EHR introduction

Say everything that you are doing on the EHR

Position the computer to share screen with patient

Engagement position shows you are listening

Computer confidence should be evident

Teach you patient using the EHR resources

Summarize the visit and sign out

(Sandoval & Palumbo, 2013)

RESPECTS© has been integrated into medical and nurse practitioner curricula at the University of Vermont and was well received in several workshops and presentations for providers at the local, national, and international level. It highlights many of the important factors that contribute to successful integration of the EHR within the clinical encounter. The RESPECTS© model is relative to this project as it is the proposed intervention following the completion of the needs assessment. The RESPECTS© model is a prime example of the development of innovative teaching strategies to promote effective EHR communication.

In summary, the literature describes both facilitators and barriers to effective EHR communication and utilization in the clinical practice setting. While systematic training and standardized educational interventions are considerably lacking in this area, research has highlighted several strategies to promote effective communication and use of the EHR. These “best practice” recommendations include easy mobility and accessibility of the computerized

device, careful review and preparation of the patient chart prior to the encounter, seating arrangements that support patient engagement and promote eye contact between the provider and patient, IT training and support to develop clinicians' skills and effective use of EHR while communicating with patients, and establishing patient buy-in for EHR use (Zhang et al, 2016).

Methods

An assessment of current EHR communication and utilization skills is needed before proper education or training can be offered. This educational needs assessment (the “scorecard”) will help to establish an understanding of providers’ EHR skills prior to a presentation and adoption of the RESPECTS© best practice model. As research has shown, providers use a variety of strategies to alleviate the unintended consequences of EHR use (Zhang et al, 2016). This assessment hopes to highlight those strategies as well as bring to light potential barriers to effective EHR communication and utilization. The data gathered from the scorecard may be used to inform subsequent training and educational offerings in effective communication and use of the EHR.

Development of Project Material and Implementation

Potential participants of this project are health care providers from four different outpatient clinical settings. The settings include a women’s health care center, a private hematology/oncology practice, and two patient-centered medical homes. This provider pool consists of physicians (MD), physician assistants (PA), advanced practice registered nurses (APRN) including doctorally prepared nurse practitioners (DNP) and certified nurse midwives (CNM). Participation in this project was entirely voluntary. Confidentiality was maintained by anonymous participation and retrieval of the scorecards and surveys. This project took place in late September of 2016. Approval was obtained from the Institutional Review Board and from the practice managers and/or staff prior to project implementation.

The scorecard, titled “The EHR Scorecard: A Measure of Utilization and Communication Skills”, was devised based on the literature supporting “best” practice recommendations for effective EHR integration in clinical practice. Each of the 20 statements on the scorecard

represents a different influential skill or factor which could be environmental, technical, or personal in nature. As addressed in the literature, all of these factors have the potential of positively or negatively impacting the use of the EHR within the visit encounter. Some of the items address certain strategies that have been reported in research studies to help providers overcome the unintended consequences of EHR use. Together, these statements form a comprehensive assessment of EHR communication and utilization skills within the clinical practice setting. Many versions of the scorecard were drafted before arriving at the “final” product. It was evaluated by a panel of experts in the field of EHR implementation and communication including two masters prepared nurses and a physician. Their feedback was critical to development of the “final” product.

The scorecard is divided into two sections, the first section consisting of 8 statements and the second consisting of 12 statements, for a total of 20 statements. The scorecard is designed using a Likert scale with the following headings assigned to numbers 1 through 5 in section one: Always = 1, Frequently = 2, Occasionally = 3, Rarely = 4, and Never = 5. The quantitative values are reversed in section two so that: Always = 5, Frequently = 4, Occasionally = 3, Rarely = 2, and Never = 1. This reversal is explained carefully in the instructions on the top of the scorecard so to not confuse the participants as they attempt to calculate their score. Participants are asked to respond to each statement honestly. As previously mentioned, the participants’ responses will remain anonymous. Once they have responded to all 20 statements, they are prompted to calculate their total score. The maximum possible score is 100 while the minimum possible score is 20. Scores are divided into three sets and are represented by the following three headings: Needs Attention, Good, and Excellent. The lowest range (20-46), titled “Needs Attention”, suggests that the EHR is being used ineffectively and that the barriers to use

outnumber the strategies in place to facilitate use. In contrast, the highest range (74-100), titled “Excellent”, suggests effective EHR communication and utilization skills, meaning that the provider has successfully integrated the EHR into his or her practice. A score that falls in the middle category (47-73), titled “Good”, suggests that EHR performance is okay but improvements can be made to enhance communication and utilization skills and reduce negative outcomes.

Upon completion of the scorecards, participants were asked to complete a brief survey titled, “The EHR Scorecard Post-Survey”. The survey consists of seven questions that address the following: formatting of the scorecard, informative nature of the material presented, perceived accuracy of the score they received, interest in additional education/training, support for dissemination in clinical practice, suggested changes to the scorecard, and type of device used to access the EHR. The first five questions of this survey are presented in Likert-style format where: Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly Agree = 5. Question #6 is presented as a short answer question and question #7 is presented as a multiple choice question.

The scorecards and surveys were distributed to the various clinical sites or placed directly in provider’s mailboxes. Participants were instructed to turn completed packets into a designated point person and then arrangements were made to pick up the packets at a separate time. Participants were asked to refrain from leaving any identifying information on the scorecards or surveys so to ensure the anonymity of participant’s scores and responses.

After completion of the packets, post-scorecard survey responses were analyzed using descriptive statistics. This analysis was performed to determine the impact of the scorecard on

provider's understanding of effective EHR communication and utilization skills, along with provider's perceptions of the utility and accuracy of this newly designed instrument.

Evaluation and Discussion

The EHR Scorecard consists of 20 items addressing everything from personal communication skills and utilization patterns of the EHR to technical support and adequacy of training during the different stages of EHR implementation. The maximum possible score of this scored assessment is 100 while the minimum possible score is 20. Scores are fairly distributed into three ranges with the following headings: Needs Attention = 20-46, Good = 47-73, and Excellent 74-100. Of the 12 participants who completed and returned both the scorecard and the survey, all 12 scored within the “Good” or “Excellent” categories. The range of scores was 61-96, with a mean score of 73.41666667.

The EHR Scorecard Post-Survey consists of seven questions. The first five questions are presented in Likert-style format where: Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly Agree = 5. Total scores range from 5-25 with a higher score indicating a strong positive response to the scorecard and a lower score representing a strong negative response to the scorecard. Therefore, a total score of 15 demonstrates a mixed or neutral response to the scorecard. The ranges and mean scores for each individual question, as well as total scores for questions 1-5, are listed in the table below.

Table 1*Range and Mean Score of Survey Statements 1-5*

Survey questions 1-5	Range	Mean Score
1. The EHR Scorecard was helpful in my understanding of effective communication and utilization of the EHR.	1-5	3
2. The format of the EHR Scorecard was easy to use.	1-5	3.545454545
3. The score I received from this assessment was accurate.	2-5	3.818181818
4. I am interested in further developing my EHR communication skills and improving EHR performance.	3-5	3.909090909
5. I would recommend the EHR Scorecard to other practices looking to assess their EHR utilization and communication skills.	1-4	3
Total score of questions 1-5	11-23	17

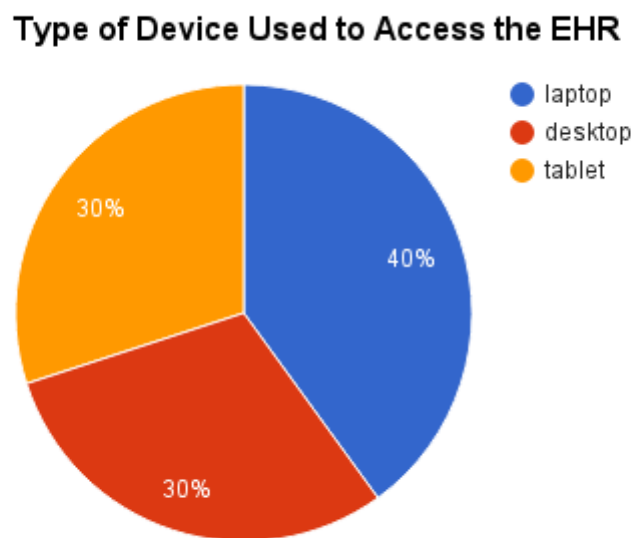
After distributing the scorecards and surveys to providers at four different outpatient practices, 12 scorecards and 13 surveys were completed and returned. The incomplete packet was excluded from this data analysis, resulting in a total of 12 completed scorecards and surveys. It is estimated that 48% of the eligible providers at the selected practices participated in this project.

The mean total score for questions 1-5 on the post-survey was 17. The range of total scores for questions 1-5 was 11-23. These findings suggest that providers expressed on average neutral, if not slightly positive, responses to questions 1-5. The wide range of total scores

indicate that some providers responded negatively to certain aspects of the scorecard while other providers showed great support and offered positive feedback about the scorecard. Questions #1 and #2 had the greatest range of scores from 1-5, suggesting that providers had polarized feelings regarding the informative nature of the scorecard and the feasibility of its format. Question #4 had the smallest range of scores from 3-5, suggesting that providers were unified in their interests of further developing EHR communication skills and improving EHR performance. Question #1 and #5 had the lowest mean scores of 3, while question #4 had the highest mean score of 3.909090909. Overall the mean scores for each question were neutral if not slightly positive with 3/5 questions having a mean score >3 .

Question #6 was presented as a short answer question that aimed at eliciting feedback regarding specific changes to be made to the scorecard. Of the 12 completed surveys, 6 of them answered this question with feedback while the remainder of the surveys offered no feedback or left the question blank. Common themes were extracted from the feedback that was offered and will be discussed in further detail in the next section.

Question #7 was presented as a multiple choice question which asked which type of device is used most frequently to access the EHR during the clinical encounter. The choices were desktop, laptop, tablet, or other. For this project “other” took into consideration TV monitors, projection screens, and other devices that could be used to access and display the EHR. Wall-mounted computers with fixed keyboards and operating systems fell under the title of “desktop” because essentially they are both stationary devices with little variance in mobility and accessibility. Participants were asked to select only one response. The responses to this question have been formulated into percentages and are represented in the pie chart below.

Figure 1

Discussion

The results of this project support the existing literature which suggests that providers develop strategies to compensate for pitfalls of EHR use within the visit encounter. This was demonstrated within the actual scores providers received from the scorecard assessment. Of the 12 participants, all 12 received scores falling within the “Good” or “Excellent” category suggesting an overall decent performance of the EHR with quality communication and utilization skills exhibited on the part of the provider. The qualitative study by Zhang et al., (2016) found that providers deployed a variety of strategies to help cope with the challenges of EHR systems. These strategies included charting beyond the patient visit to fulfil EHR-related tasks, using templates to structure documentation, using the EHR as an educational tool to engage patients, multitasking to meet efficiency requirements, and establishing patient buy-in (Zhang et al., 2016). Providers participating in this project reported utilizing some of these same strategies

along with other recommended “best” practice patterns including reviewing the patient’s chart before entering the exam room and providing opportunities to share the screen with patients. These skills have been shown to alleviate the tension between patient and EHR demands while maintaining efficiency and patient-centered care.

Concerns about the EHR and its impact on provider-patient relationships was reiterated by some of the providers participating in this project. Participants expressed that the EHR can negatively affect their ability to have eye contact with the patient. This is significant as research continues to support the importance of eye contact as a “non-verbal tool in establishing mutual understanding and common ground in the encounter” (Kazmi, 2013, p. 33). According to Rose & Kapustin (2014), “patients perceived eye contact as an indication that providers cared about them” and patients “felt a personal connection was maintained when providers had eye contact while typing on EHRs” (p. 677). Additional barriers to EHR communication, as discussed in the literature, were also confirmed by the providers participating in this project. Barriers such as physical room layout and seating arrangements were issues primarily for the providers who checked off “desktop” as their main device used to access the EHR during the patient visit. These findings suggest that the stationary design of a desktop can be detrimental to the interaction between provider, patient, and EHR. Yang & Asan (2016) observed that having a more portable device such as a tablet, “might increase the patient’s understanding of medical information” and is “easy to move, patients have more control when interacting with the tablet, and can access more individualized information” (p. 446). The literature recommends for clinicians, who wish to provide opportunities for patients to interact with the EHR, to adapt their room layout and seating arrangements to enable this to happen (Kumarapeli & de Lusignan, 2013).

The results also support the interest and need for further EHR training and education for health care providers seeking to develop their communication, utilization, and management skills while working with a computerized system. The majority of providers participating in this project shared an interest in developing their EHR communication skills and improving EHR performance status. Additionally, when asked if adequate training was/has been provided during the onboarding phase of EHR implementation and with system updates, there was a mixed review with some providers reporting “Rarely”, “Occasionally”, “Frequently” or “Always”. Adequate training in the effective use of the EHR should always be available and accessible to providers looking to enhance their skills. One study looking at the effects of EHRs specifically on physician-patient relationships called for the development of “standardized physician health IT training systems to develop physicians’ skills and effective use of EHRs while communicating with patients” (Asan & Montague, 2012, p. 8). Furthermore, studies support that any adverse effects of the EHR on provider-patient connection and communication should be mitigated by increasing clinician familiarity with EHRs and providing EHR-specific training (Kazmi, 2013). There is a desperate need for innovative teaching strategies, such as the RESPECT© model, to educate and train providers in effective communication while using the EHR.

Implications for Practice, Education, and Research

The results of this project suggest that “The EHR Scorecard” has the potential to be a useful instrument for the assessment of EHR performance status within the clinical practice setting. Practices may choose to use the scorecard as a measure of quality improvement. Overall, it was neutrally received by the providers who participated in this project. However, the feedback provided in question #6 suggests key revisions to be made to the scorecard to improve its quality

and accuracy. These revisions formed several themes including: 1. Changes to the scorecard format and scoring system, 2. The need for delineation between technical/logistic components and personal/user skills, and, 3. It's not the scorecard, it's the EHR itself that needs fixing.

Several providers expressed the need for the scorecard to be electronic, and to improve the layout and scoring system as it was "awkward" and "complicated" in its original 3-page paper format. Moving forward, the scorecard would be designed in an Excel spreadsheet or Google Sheets format and distributed electronically via email or accessed on a secure webpage. Additionally, the scoring system would be entirely behind-the-scenes. Programmable functions would allow for participants to simply enter in their responses and based on those responses the hidden formulas would automatically calculate a score. This will likely reduce cognitive burden, improve response time, and alleviate any confusion related to the scoring system. Moreover, distributing the scorecard as an electronic assessment tool is right in line with the NONPF (2012) competency of providing the opportunity for development and mastery of technological and information literacy skills.

It is apparent and necessary that the scorecard be divided into sections based on the nature of skill or component being addressed. The scorecard was developed to be a comprehensive assessment, including personal, technical, and physical features, but in doing so the scores erroneously reflected the provider's own abilities. Some participants voiced offense to the recommendations (based on score) that additional training/education in effective communication may be beneficial, especially when they felt that the majority of EHR issues were out of their control and were not the result of their communication skills. The intent of this assessment tool was not to offend or criticize providers' abilities but to shed light on potential facilitators and barriers to EHR communication and utilization within the clinical practice

setting. With that being said, it is clear that grouping provider communication skills in with logistical components does not render a particularly helpful score nor does it generate new knowledge about effective EHR use. Moving forward, the scorecard will be appropriately divided into sections based on the skills or features being addressed, such that questions about unresponsive software and IT support will be under one section, while documentation practices, eye contact, and chart review will fall under another section.

Finally, several providers voiced frustration with the EHR system itself and were hesitant to believe that the scorecard assessment would promote change or improve EHR performance status. Providers felt, on average, neutral towards recommending the scorecard to other practices. This neutrality was supported by the belief that change needs to occur within the EHR system software and at higher levels of organization rather than with providers or end-users of the EHR. The literature supports this notion, finding that “organizational level policies that affected clinical documentation, as well as challenges in timing of documentation tasks and the interface design, made ‘documentation burden’ a barrier” to every aspect of EHR use (Saleem et al., 2014, p. 150). It is possible that this scorecard could serve as a catalyst to foster change and ignite discussion within a practice, however it is increasingly evident that reform also needs occur beyond the practice setting. A collaboration between stakeholders (i.e. vendors, consumers, patients, healthcare organizations) is needed to improve this health information technology. Input from both patients and providers regarding EHR redesign is critical especially as patients become more active members of their care team. Research suggests that, “EHR workflows and data flows should be customizable by users, as well as having a capability to configure the environment, within certain boundaries, to suit individual clinicians’ needs” (Saleem et al., 2014, p. 150). Furthermore, Saleem et al. (2014) proposes that next-generation EHRs need to have a

highly interactive interface providing need-to-know information in real-time, such that clinical workflow and provider–patient communication is supported, not obstructed.

Limitations

Limitations of this project include a small sample size of 12 health care providers. Approximately 48% of the eligible providers at the four clinical sites participated in this project. Ideally, a larger sample size would have yielded more information and more feedback. Demographic information was not collected to ensure confidentiality but could have served to better understand if there were differences between age sets, education, and sex related to EHR use and communication skills. Both content validity and construct validity have yet to be determined for this instrument. The self-report instrument used in this project could have resulted in inaccurate calculations of the total score and questionable interpretation of each item. In addition, the wording of items on the scorecard may have led to respondent bias, as some statements possessed negative connotations while others had positive undertones. This response bias could threaten the internal validity of this project.

Conclusion

With completion of this project, it has been shown that providers have mixed opinions about the accuracy and efficacy of this assessment tool, however the majority of providers agree that a multi-stakeholder effort is needed to improve EHR performance and design. Research has demonstrated the need for education and training of providers to improve communication skills and comfort level with the EHR. However, among these participants it seemed that communication was not the issue but rather problems existed with software, workflow, and ergonomics (i.e. layout of the exam rooms). The results of this project suggest that there are many facilitators and barriers to effective communication and utilization of the EHR. Providers

develop strategies, through observation and experience rather than formal training, to help mitigate the deleterious effects of EHRs. The EHR Scorecard has the potential to provide insight into specific areas that pose threat to the delivery of patient-centered care and help to inform future developments of EHR systems and training curriculums.

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Appendix A

The EHR Scorecard

The EHR Scorecard: A Measure of Utilization and Communication Skills					
Instructions: Please read each of the following statements carefully. Check one box in the corresponding row for your response. Please respond to each statement honestly. Your response will remain anonymous. Once you have responded to all 20 statements, calculate your total score. Be mindful that the points allotted to each response are reversed in the second section.					
	Never = 5	Rarely = 4	Occasionally = 3	Frequently = 2	Always = 1
1) I encounter data entry errors while using the EHR.					
2) I encounter unresponsive software while using the EHR.					
3) I encounter interruptions with task reminders, new order notifications, or other view alerts while using the EHR.					
4) My interactions with the EHR affect my ability to have eye contact with the patient.					
5) The EHR detracts from my ability to be emotionally and psychosocially present during the visit with the patient.					
6) Visits extend over the scheduled visit time as a result of EHR use.					
7) Visit documentation is done entirely outside the exam room.					
8) Patients have made negative comments about the use of the EHR.					
Total score for each column:					
	Never = 1	Rarely = 2	Occasionally = 3	Frequently = 4	Always = 5
9) I review the patient's individual EHR before entering the exam room.					
10) I provide opportunities for patients to view their individual EHR in the exam room (i.e. share results, lab values, review med lists, etc.).					

	Never = 1	Rarely = 2	Occasionally = 3	Frequently = 4	Always = 5
11) I find the layout of the exam room to be compatible with use of the EHR.					
12) I find the seating arrangements allow for patients to view their EHR without difficulty.					
13) During the history-taking portion of the visit, I position myself to face the patient (knee to knee).					
14) I use templates within the EHR to facilitate workflow.					
15) I document in the patient's chart during the encounter.					
16) Patients have reported to me their satisfaction with the use of the EHR.					
17) I discuss with patients the "See Your Chart" (i.e. patient portal) option and encourage them to sign up.					
18) Adequate training and support during the onboarding phase of EHR implementation is (was) available for all providers.					
19) Adequate training and information when there are new program features/ updates to the EHR system is available for all providers.					
20) IT support is available and responsive should any problems arise with the EHR.					
Total score for each column:					
Total score for each column from the top section:					
Combined scores for each column from both sections:					
Total score overall:					

Check your score here:	Needs Attention = 20-46	Good = 47-73	Excellent = 74-100
	<p>EHR utilization and/or communication skills require some attention. This score suggests that additional education and training is needed to optimize the use and performance of the EHR. Barriers to effective use likely outnumber the facilitating strategies that are in place. Negative outcomes might be present as a result of ineffective use of the EHR. Intervention is recommended to reduce these negative outcomes and improve performance status.</p>	<p>EHR performance status is operating at a good level. This score suggests a distribution of strategies/ skills that support optimal EHR performance, as well as barriers that hinder effective use of the EHR. Supplemental training and/or education in effective communication when using the EHR and/ or EHR utilization problem-solving may be beneficial to reduce negative outcomes and improve performance status.</p>	<p>Excellent use and performance of the EHR. Communications skills are also strong. Positive practice patterns outnumber the barriers to effective communication and utilization of the EHR. Strategies have been developed to mitigate the unintended negative consequences of EHR use. Training and/or education can provide a refresher in effective use and should be offered whenever EHR systems are updated or program features are changed.</p>

Appendix B*The EHR Scorecard Post-Survey*

4

The EHR Scorecard Post-Survey

Instructions: Please complete the following survey upon completion of the EHR Scorecard. For each of the statements below, circle the response that best characterizes the way you feel about the statement, where: 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, and 5= Strongly Agree.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The EHR Scorecard was helpful in my understanding of effective communication and utilization of the EHR.	1	2	3	4	5
2. The format of the EHR Scorecard was easy to use.	1	2	3	4	5
3. The score I received from this assessment was accurate.	1	2	3	4	5
4. I am interested in further developing my EHR communication skills and improving EHR performance.	1	2	3	4	5
5. I would recommend the EHR Scorecard to other practices looking to assess their EHR utilization and communication skills.	1	2	3	4	5
6. What change would you make to the EHR Scorecard to better suit your practice?					

7. What type of device is used most frequently to access the EHR during the patient visit? (Please check one box)					
<input type="checkbox"/> Desktop					
<input type="checkbox"/> Laptop					
<input type="checkbox"/> Tablet					
<input type="checkbox"/> Other: _____					