2017

Improving Workflow at the Point of Care Using the Electronic Health Record

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Abstract

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MS, Walden University, 2006

BSN, Regents University New York, 2003

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

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Abstract

The electronic health record (EHR) is an important part of the effort to improve health care and reduce costs in the United States. Primary care providers, among the largest group of caregivers in the nation, often experience difficulty with implementation and utilization of EHRs. Efforts to enhance the provider's effectiveness in the use of the EHR should result in improved patient outcomes as well as decreasing the overall cost of health care. Guided by the diffusion of innovation theory, this project was initiated to develop a plan for improved usage of the EHR in a primary care setting. A survey and observations were used to better understand how the providers and staff were using the EHR. Observations and a survey of 11 participants were completed. The observations utilizing a mock patient revealed issues related to the usability of screen information, information availability, and user preference for documentation. The mock patient scenario took 25-35 minutes, on average, to complete. All participants stated they had stayed late to input information on actual clinic patients or to clarify their documentation. The same 11 participants completed the Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers responses. Descriptive statistics were used to analyze the results. Most participants indicated that the screen font was difficult to read (72.7%), they had difficulty using the EHR (72.8%) and were not satisfied with its use (63.6%). The project recommendations include working with the vendor to improve information access and ongoing training. Improvements to the EHR should support social change by improving access to information at the point of care, enhancing quality treatment and improving patient care outcomes.

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Dedication

I would like to dedicate this to my husband, *Gerald C. Sparks*. He gave me encouragement and strength and went to heaven during this journey. Without that encouragement, I would not have come this far. To our daughters, *Sharissa, Chrystal, and Megan* (God blessed us with great kids), who helped with chores, did endless reading, asking questions, and critiquing, but gave much encouragement and strength along the way. To my grandchildren, *Trenadee, Josee, Olivia, Keagan, Ezekiel,* and *Joshua*, for letting Grandma study and work instead of playing outside. I hope each of you understand the important roles that knowledge and hard work play in who we are. And to *Katherine and John Sullivan* for always believing in me as moms and dads do. I want to thank God for helping me complete a life journey, blessing me with great people along the way.

Acknowledgments

Precious God sent a mentor for this project, Dr. Dirk H Mous. His guidance, perpetual caring, and pushing helped complete this project. Without his grand knowledge base, I would have been lost along the way. He kept me on the right track and guided me with his gentle manner. There is a special place for such teachers in heaven.

I thank Dr. Deborah Lewis for her gentle kindness when things got difficult. For her patience when I seemed to stumble and her ever-true steadfastness to keep me on track. I could not have made it without you. God too holds a special place for you. Carey Little Brown for her assistance with writing and for her terrific editing skills. God gives gifts to us all to help each other through this life.

I thank the clinic that participated in this project for allowing me to study with them, learn from them, and hopefully help them. Finally, the DNP committee that reviewed this proposal for their patience and guidance Dr. Deborah Lewis, Dr. Marisa Wilson, and Dr. Murielle Beene.

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Section 1: Nature of the Project

Introduction

The 2010 Patient Protection and Affordable Care Act (PPACA) was designed to improve the quality and lower the cost of health care, as well as to place primary care providers in a position to deliver the comprehensive care the population needed (Duska & Engelhard, 2013). In this study, *electronic medical record (EMR)* and *electronic health record (EHR)* are used interchangeably. Because the use of electronic systems is to make documentation easier, providers should have more time to examine patients and prescribe appropriate treatment, resulting in better health outcomes. However, in a survey of providers in 2015, workflow disruption and data entry time accounted for 24.7% of providers' complaints about the use of the EMR (Albright, 2015). Albright (2015) reported, "EMRs have provided faster access to patient data and billing, but workflow disruptions have prevented many providers from realizing efficiency and patient care benefits from the technology" (p. 6). Another issue that surrounds the EHR is the fact that not many studies have been conducted on providers' adoption of the EHR. Most of the studies on the EHR have focused on its implementation and "go-live" success. However, "going live" only means that a system has been successfully installed; it is not a measure of the actual usage or adoption of the EHR. Without adoption by providers, the EHR will never function at its highest level. If the EHR does not function at its highest level, the providers cannot see as many patients, nor can patients realize the best care in order to achieve better physical health. In order to address the diversity of need and care plans of

patients, a cost-effective and efficient EHR system is required to create social impact for a healthier population.

This paper describes an effort to develop a plan to help redirect workflow at the point of care to enhance provider effectiveness in the use of the EHR. The potential outcomes of the proposed changes are increased face-to-face time between the provider and patient and improved patient outcomes**.**

Problem Statement

An EHR is an instrument health care providers use to support diagnostic decision-making, documentation, and follow-up care and to make that care more efficient for the patient. The EHR is intended to give time for the provider to see the patient, review past information about the patient, record information during the appointment, document findings, provide teaching, e-prescribe medications, order lab tests or radiologic examinations, and provide discharge information. As this list indicates, there are many tasks to complete in an average 15-minute patient visit. With the EHR, it is possible to complete these tasks in this timeframe, and the information recorded can be reported to the necessary entities and tell the complete patient story.

The EHR is a system that has the capability to automate required patient test reminders, to alert the provider of abnormal test results, to keep appointments and schedules aligned, and to warn of any potentially adverse interactions between prescribed medications. In the event of an emergency or epidemic, the EHR could be linked with the public health department or the Centers for Disease Control and Prevention, which may be monitoring indicators of such outbreaks (Bates, Ebell, Gotlieb, Zapp, & Mullins,

2003). Emergency rooms and primary care clinics are at the forefront of health care provision. As primary access to care points, these health centers act as a first point of contact for data reporting so that all entities can see where public health issues are arising and address them readily. If providers at these clinics can use electronic systems to transmit data quickly to the organizations that oversee the health of the U.S. population, epidemics, flu outbreaks, and other factors endangering the public can be identified and dealt with rapidly. For this to occur, clinics must be able to use the EMR with consistency.

The purpose of this project is to develop a plan to help redirect workflow at the point of care to enhance provider effectiveness in the use of the EMR. By instituting the recommendations outlined in this project, the clinic that is the focus of this study (referred to by the pseudonym *Clinic X*) should be able to improve inefficient EHR system issues. Improved efficiency in using EHR would result not only in more straightforward information transfer, but also in an increase in providers' capacity to see more patients per day. In this way, the clinic's improved use of the EHR may provide relief to overburdened emergency rooms servicing patients unable to access appointments at their primary care clinic due to unavailability. Unavailability of appointment times increases waiting times for assessment by a primary care provider and can result in an escalation of symptoms, prompting individuals to access care through an emergency room. This places undue burden on emergency services and increases the cost of treatment for both the patient and the health care system.

Clinic X is a primary care facility servicing approximately 5,000 patients and has four physicians as the health care providers. The support help is four medical assistants, two data entry clerks, and one office manager. The organizational leaders of Clinic X have adopted an EHR system that they felt would most benefit the patient and provider while improving the billing process. The problem is the providers in this clinic do not feel the system gives them enough face-to-face time, nor does the EHR readily give information without the provider searching the entire patient chart within the EHR. Data put in the chart from outside entities- laboratories or consults- are neither listed by date nor type of information, so the provider spends a great deal of time trying to retrieve the information from the EMR. While doing this, the provider is not facing nor communicating with the patient. This extends visit time past the 15-minute period allotted for an appointment, reducing the number of patients a provider will see within a day, thereby reducing income as well. Clinic organizational leaders researched various EHRs that were available, and the cost of the EHR system must now be recouped to keep the clinic open and give better care. Therefore, the important part of this plan is to find out why the EHR is not easy to use and to generate recommendations to fix the problem.

Project Question

The project study examined the use of the EHR in Clinic X in order to identify the aspects of the EHR that are inefficient. Data gathering, documentation, and understanding the codes in the EHR have increased time demands for the provider that have resulted in fewer patients accessing care, as well as patients waiting longer to be seen by a clinician.

This clinic, like most facilities of its type, purchased a general EHR software package but did not purchase the entire system. As a result, the staff and providers began to use system "workarounds" that have created excessive delays. Whereas the EHR should make it possible to retrieve information easily, these required "workarounds" have decreased efficiency.

A solution to the following questions was required:

1. Where are providers wasting time during patient visits?
2. Is the EMR user friendly, or is it confusing and difficult to use?
3. What is the relationship between the use of the EHR and the speed at which providers can see patients and make a diagnosis?
4. Was the EHR training given adequate for the providers? Is there a need for more training, or a different method of training?

Studies have shown the reluctance of providers to use the EMR, with the most common complaints of providers concerning the EMR being difficulty of use, difficulty in finding information quickly, and the need to type everything into the EMR while seeing the patient, which decreases the opportunity for face-to-face conversation (Hsieh, 2010). At Clinic X, providers are working around the EHR and an assessment of why this is happening had not been completed. With an assessment addressing the above questions, recommendations can be developed to help redirect workflow at the point of care to enhance provider effectiveness in the use of the EHR.

Project Objectives

The goal of this project is to develop recommendations to redirect the clinical workflow at the point of care using the EMR in Clinic X so that the provider and staff will use the EMR more effectively. This will result in better care for patients, which may lead to better health outcomes and better follow-up of chronic diseases. Rust et al. (2008) reported in their study on barriers to care that 4 of 5 adults seeking care in an emergency department could not obtain an appointment with their primary care provider, so they came to an emergency room. The increased efficiency achieved through the development of a change of workflow in the use of the EMR system may also result in an increased number of patients being seen in the clinic before they become very sick and access care through an emergency room or are hospitalized due to the exacerbation of a chronic condition. According to a study by Flarup et al. (2014), patients with chronic conditions were more likely to have a better prognosis by their primary care provider than by any after-hours care providers who saw them. To reach this goal, several objectives must be met.

The objectives of this project are the following:

- Identify the current challenges faced by providers in the use of the EMR system through provider questionnaires.
- Propose recommendations to the reported challenges that can be implemented through simple changes.
- Engage all providers in the change process to make the EMR more user friendly or to help them better understand the EMR.

Evidence-Based Significance of the Project

The EMR must be able to easily transmit information about a patient to the provider, the patient (via e-mail or patient portal), and anyone else who needs to access health information. Additionally, the EMR should help patients access their medical records as required. With the ability to see whether all meaningful-use objectives put forth by the government have been met, the provider will be able to ascertain whether the patient has received the best care reflecting the latest evidence-based practice.

Another positive impact of the increase in the efficient use of the EMR system for Clinic X is that the Health Information Technology for Economic and Clinical Health (HITECH) Act provides incentive payments for providers who implement a working EMR system (Rippen, Scott, & Hartley,2013). Further, from 2016, penalties will be imposed on physicians who do not meet the meaningful-use criteria for EMRs (Gold, McLaughlin, Devers, Berenson, & Bovbjerg, 2012). As health budgets tighten, greater attention must be paid to cost-effectiveness. Meaningful Use Stage 1 requires the provider "to report clinical quality measures and public health information and also provide a clinical summary to the patient" (Rippen, et al , 2013, p. 9). By Meaningful Use Stage 3, providers must be able to "focus on improving quality, safety, and efficiency leading to improved outcomes, decision support for national priority conditions, patient access to self-management tools and access comprehensive patient data through patient centered HIEs [health information exchanges]" (Rippen et al., 2013, p. 9). By using the EMR, the government can gather information on disease processes and apply epidemiology science to national health care, thereby increasing response efficiency and

reducing costs. Through proper utilization of the EHR, the provider can record all of this information quickly and efficiently and still have quality time with the patient. However, the EHR must be user friendly and have the qualities that are necessary to create an environment in which the provider can complete the task quickly. Further, the provider must have adequate training in order to understand the EMR fully (Haugen & Woodside, 2010).

If providers cannot keep up with the changes in the EHR and the infrastructure of the nation's health care system, they will lose funding and end up closing their doors, resulting in a shortage of providers and points of access to care. Therefore, the development of recommendations for improved usage of the EHR in a primary care clinical setting is extremely important.

Implications for Social Change

If the EHR becomes more user friendly, the information-gathering process will become easier. This system has the ability to provide information to determine what works and what does not in health care for disease prevention and treatment. It may be possible for health care personnel to assess this information in order to deliver better care with better outcomes for less money, thereby achieving a healthier population without putting undue financial pressure on the nation. This may help people live longer, more productive lives in addition to saving trillions of dollars and decreasing poor health outcomes. In 2000, Kaiser Permanente did a study on tele-health and the EMR and found decreased cost of care of patients with chronic diseases and improved health outcomes (Johnston, Wheeler, Deuser, & Sousa, 2000).

At the local level, the goal of the EHR is to "improve both the quality of care delivered and the ability of the physician to be more effective in managing the care of patients at the population level" (Rippen et al., 2013, p. 268). By assessing current barriers, the recommendations developed in this project will support the efficient use of these systems, thereby enabling the meeting of this goal.

Definitions of Terms

All terms have been defined with reference to the *HIMSS Dictionary of Healthcare Information Technology Terms, Acronyms, and Organizations* (2013) unless otherwise noted.

Electronic medical record (EMR): Also known as an electronic health record (EHR). Computer used for collecting and storing patient information. (*HIMSS Dictionary of Healthcare*, p. 68)

Face-to-face communication: Communication of two or more people in person with the exchange of ideas or information.

Health information exchange: Movement of electronic health information between organizations according to a set of values. (*HIMSS Dictionary of Healthcare*, p. 82)

Health Information Technology for Economic and Clinical Health Act (HITECH): Part of the American Recovery and Reinvestment Act of 2009 that addresses privacy and security concerns related to the transmission of electronic health information. (*HIMSS Dictionary of Healthcare*, p. 83)

Interoperability: There are three levels of health information technology interoperability:

- *Foundational*: Allows data from one information system to be received by another and not require interpretation.
- *Structural*: Intermediate level that defines the structure and format of data exchange. The data are unaltered and preserved. It ensures that data from each system can be interpreted in the data field.
- *Semantic*: Provides interoperability at its highest level, which is the ability of two or more systems or elements to exchange information and use the information that has been exchanged. (*HIMSS Dictionary of Healthcare*, p. 90)

Meaningful use: Term used in the HITECH Act; describes a meaningful user as an entity that uses the EMR to capture health information to track key conditions (Rippen et al., 2013, p.7).

Provider: Any supplier of health care services. Physician, physician assistant, or nurse practitioner (*HIMSS Dictionary of Healthcare*, p. 127)

User: A person, device, program, or computer system that uses a system for the purpose of data processing and information exchange. (*HIMSS Dictionary of Healthcare*, p. 155)

Workaround: (a) A plan or method to circumvent a problem (as in computer software) without eliminating it; (b) A method for overcoming a problem or limitation in a program or system.

Assumptions and Limitations

Assumptions are deficiencies in the research that are assumed true. Limitations are areas not in the control of the researcher and are the weaknesses of the study.

Assumptions

- An electronic data system can make medical record keeping simpler and more efficient.
- All providers have received training on the use of the EMR system and will become more efficient with increased use of the systems.

Limitations

- There is a lack of experience in the use of the EMR system. A learning curve is expected for all new requirements placed on providers, and the EMR system is still a fairly new.
- There is a lack of definitions for the operating systems used with each system. Different EMR systems lack a common language and the automated transference of information is still near impossible due to this lack of coordination. A common language, rules, and policies are being developed but this will take time (thus interoperability).

Summary

If the EMR can be made to be more user friendly, better health outcomes for patients will be achieved. The provider can see more patients in a day's work and not be frustrated with documentation and searching for information about the patient. As stated

by Oram (2014), “No one benefits as much as patients from the convenience and predictive power of electronic records” (p. 39).

The exploration of changes in the workflow and management of patient care within Clinic X has already been completed and may help other providers in small practices overcome the barriers and difficulties in the implementation of the EMR. This may encourage more usage of the EMR by all private providers. Focusing now on the EMR and how to improve the workflow by using the EMR or within the EMR will be where energy needs to be spent. This may also contribute to the health technology field of health care by getting better utilization of the EMR, which can result in better funding for the practice, better health for the patient, thus reducing the cost of health care to the populous (Rifkin, 2001).

Section 2: Background and Context

Introduction

A thorough and exhaustive review of the literature was conducted to gather evidence-based information to propose solutions to make the EMR system more user friendly and provide a better workflow for Clinic X. I found in general that providers have not been adopting EMR systems, and solutions are needed to address this shortfall.

The research was conducted through Walden University Online Library. Databases included in the research were Computer and Applied Sciences Complete, Science Direct, IEEE Xplore Digital Library, ProQuest Central, Academic Search Complete, MedLine with Full Text, PubMed, Ovid Nursing Journals Full Text, and CINHAL Plus Full Text. In addition, the Health Information Management Society Library and the American Health Information Management Association Library were used to gather information. I found workflow studies in many articles, but they did not relate to primary care clinics and the EHR. Results were filtered down to specifics of provider usage of the EHR, workflow and the provider, billing and the EHR, and workflow and the post implementation of the EMR/EHR, which reduced search results to 25 articles pertaining to the research topic. Articles relating to unrelated aspects of the EHR, including staffing articles, were ruled out. Article research was completed systematically with the following search terms: *EMR user friendly, clinical workflow and the EMR, screens of the EMR, Flags in the EMR, patients and the EMR usage, time management and the EMR, workflow of a primary care clinic, doctor satisfaction with the EHR, post implementation of the EHR, EHR and the patient's story, telling the patient*

story through the EHR, and variations of these phrases and words. Little research has been completed on the primary care provider or clinics or post implementation of the EHR. There is a need to understand why the providers are having so much trouble adopting the EHR and why the patient's story is not complete. Most published articles were from the last 10 years. Most articles focused on large hospitals and acute care facilities. Very few studies were done on post implementation of the EMR in primary care settings.

Specific Literature

Due to the large amount of information and new strategies being studied, evidence-based practice changes are occurring every day. Arditi, Rege-Walther, Wyatt, Durieux, and Burnand (2012) examined the ordering of tests and treatments practices of physicians in the clinical setting. Due to "unconscious acts of omissions, information overload or inaccessible information" (Arditi et al., 2012, p. 5), the authors found data collection practices to be less than perfect. These imperfect practices have led to poorer health outcomes for patients, due to inefficiencies arising from improper EHR use. Very few researchers had a plan to fix the problem; most of them felt more studies would be necessary to clarify the problems occurring. Some authors felt retraining is the best method of better usage (Albright, 2015, Arditi et al, 2012, Bates et al, 2003, Daly, 2016) . When the EMR is implemented, it is considered a success even prior to analysis of everyday use after going live. When in training, there is support to help with the use of the EMR and questions are answered, but when the trainers leave the staff and providers must use the system without help and the learning curve becomes difficult. Because the

job needs to be accomplished, staff and providers use workarounds. Therefore, the system is not being used to its fullest potential. The patient's story is not complete nor is it told so others can understand the patient's condition.

Evidence- based follow-up appointments and testing have "the potential to reduce health care costs per person and improve access without compromising or restricting care" (Javorsky, Robinson, & Kimball, 2014, p. 19). By using the EMR to track appointments and testing, the patient will have better outcomes at a lower cost. If timely access to care for patients with chronic conditions can be managed through the EHR system, fewer patients will experience complications and they will need to access services in fewer instances. This will open more appointments on the calendar for other patients. Wagner (2012) found that meeting the needs of the chronically ill patient is difficult without changing the way health care professionals do primary ambulatory care. Chronically ill patients and their families have different needs than patients with acute illnesses. These patients require regular planned appointments for systematic follow-up and disease management education for self-led monitoring by the patient. These appointments should include systematic assessments, attention to treatment guidelines, and behaviorally sophisticated support for the patient's role as self-manager (Wagner, 2012.). The EHR "promotes communication" gives "knowledge management", and can be "rapidly translated [to] the evidence based guidelines" by the provider at the patient face-to-face encounter (Dove, 2005, p. 194-195). The management of diabetes as a chronic disease is estimated to cost over $200 billion dollars by the year 2020 (Wyne, 2008). The EMR gives providers the potential to treat the disease at a much lower cost if

they can educate patients to self-lead care for their disease and keep desirable health outcomes. The team of physician, patient, and clinical staff improves outcomes for patients with the assistance of a properly implemented EHR at the end of the study.

Lyon and Slawson (2011) found that when changes were addressed through a team approach focusing on improved use of the EHR, there was no need to hire additional staff, existing staff had higher job satisfaction, providers liked the additional assistance, the patients had increased visits before their condition became too difficult to handle outside of the primary care setting, and the patients generally became more active participants in their care, thus creating better health outcomes with a reduced cost. An increase in face-to-face time between the patient and provider was also found.

However, Vashitz et al. (2009) found that many providers, who reported an overload of electronic reminders and alarms, did not use the automated clinical reminder function, leading to a loss of attention providers would pay to the tasks they would have been reminded of. Vashitz et al.'s recommendation was to build into the system a series of checks and balances addressing compliance, reliance, spillover, and reactance. This would give statistical information on which providers are not using the reminders function. After identification, the providers could be addressed individually to correct any problems they were having with the EMR. Shojania, Mayhew, Ramsay, Eccles, and Grimshaw (2009) found point of care "reminders generally achieve small to modest improvements" in provider behavior (p. 221). However, Goedert (2008) wrote how physicians used a "green light at the bottom of the page indicating a time sensitive issue" (p. 26), and the providers responded well to this light within the system of the EMR.

Workarounds are common in many facilities where an EMR is being used. Ser, Robertson, and Sheikh (2014) identified workarounds as staff delaying inputting information in the EMR from hours to days later, instead of during the patient encounter. Ser et al. found the reasons for workarounds were "operational, cultural, organizational, and technical" (p. 5) factors. These workarounds can be addressed with policies, education, training, and direction. The providers have had burdensome requirements when tasks are not delegated to clinical staff.

In their mixed-methods study, Vishwanath, Singh, and Winkelstein (2010) found providers thought the EMR "would influence the whole health care delivery process from patient processing and quicker reimbursements to patient safety and care" (p. 786). In practice, providers had difficulty using the system, resulting in dissatisfaction with the workflow. Not using the system correctly can affect the reimbursement for seeing the patients, resulting in loss of income.

National standards of care require interval testing for chronically ill patients to maintain good health and prevent hospitalization (Centers for Medicare and Medicaid Services, 2014). The EHR does not have built within it nor have availability of these tests necessary by a chronic diagnosis follow-up. There are not dropdown lists for the tests, so the provider may overlook them. In other cases, the providers spend a lot of time to locate the labs or tests they need done for the patient to order them. A study on diabetics found improvement in several key indicators (Hgb A1c, LDLs, and urine micro albumin tests) after initiation of a clinical informatics initiative through the EMR (Chaudhry et al., 2009). The development of these required test lists for chronic diseases would make the

EHR more useful to the providers and create a continuity of care for the patient managing their chronic disease. Presently, if routine testing is not done, the patient may have an exacerbation of their chronic disease or experience instability causing hospitalization. The insurer can withhold reimbursement care to the provider because of the oversight (Centers for Medicare and Medicaid Services, 2014).

Another aspect of the EMR is the ability to track the tests done by the provider or other providers the patients sees. The primary care clinic, Clinic X, is a pay-for performance (P4P) established pay system. For a P4P clinic, some insurers might require more documentation of these follow-up tests or examination to follow the chronically ill (Rippen et al., 2013). An EHR that can be used to track and provide this documentation would be useful. Details such as date of test and the entity responsible for the conduct of a procedure could be recorded and provided to the insurer directly. Furthermore, the record of these tests would then be in the patient's file, decreasing the likelihood of unnecessarily duplication of the tests, providing a cost reduction benefit. Rippen et al. (2013) went on to explain how using the EMR for what its purpose is—electronic workflow—will decrease the time staff need to retrieve information, resulting in time gained for other tasks and reduced costs. For the patient (who is being poked multiple times for blood test), safety from duplicate tests or medications that conflict and timely reporting of results will encourage better patient care and outcomes. If duplication is reduced, costs will be minimized to the health care system.

In trying to find the items he or she needs while the provider is seeing the patient, that provider may miss some items (such as lab tests, procedure orders, etc.) and realize it

later. Chaudhry et al. (2009) reviewed staff actions trying to find necessary labs or tests that needed to be done for the patient and found it took 5 to 10 minutes to locate the necessary information. If a provider sees 15 to 20 patients a day, this would waste 3.5 hours that could have been used productively. Weber, Bloom, Pierdon, and Wood (2008) found the EHR improved diabetic care when the EHR was used. Better tools for the provider and reminders and audits with feedback plus incentives were used to improve compliance with the diabetic care bundles. Weber et al. (2008) used an all-or-none approach to study their diabetics. However, they were not sure if improvements were because of the providers becoming more aware of the guidelines or not. Even with this, however, patients improved. Thus, the conclusion at the end of their study was that EHR registries or tools could be used "to galvanize physician lead teams to improve care" (Weber et al., 2008, p. 382).

General Literature

According to Tufano (2009), the idea of promoting the EHR and its universal adoption is a core component of the current efforts to reform health care in the United States. The EMR exists, Tufano argued, "to achieve quality improvement, patient access, economic stability" (p. 7). For this reason, making the EMR user friendly is very important.

Another factor to consider is the cognitive load of the providers. According to a study done by the Agency for Healthcare Research and Quality (AHRQ) in October of 2009 (Armijo, McDonnell, & Werner, 2009), the EHR must not have so many icons or busy frameworks that the mind is overcome and the thinking process slows down. When

the ability of one's mind to understand the information coming in exceeds one's ability to comprehend the information, performance slows and suffers.

As I began planning for the proposal of this project, it was important to understand how the system was currently being used and how the providers' workflow was being interrupted by the system. I recognized that not only are these information systems costly, they also cause "disruptions in clinician's communication and workflow" (Kaufman, Roberts, Merrill, Lai, & Bakken, 2006, p. 37). Understanding the clinical EHR workflow will inform suggestions for increased efficiency.

The challenges in the use of EHR systems can be classified as implementation and use problems. A poorly implemented system is often associated with a range of usability problems. Thus, usability problems as challenges in using EHR can be traced back to the planning, design, and initial implementation of an EHR system. The implementation of an EHR system in an organization often is a significant change process. In changing, it is important to consider and to pay sufficient attention to the change goals, the role that the organization will play in effecting the change, and the (multilevel) nature of change. Strong et al. (2014) established that there were certain user behaviors that went contrary to the requirements set forth in Information Technology (IT)-change theories and frameworks. In implementing an EHR system, it is fundamental to consider the materiality of IT artifact, the multilevel nature of IT change, nondeterministic nature of IT on organizations, and the intentionality of the users and managers as change agents. Failing to consider these considerations increases the likelihood of failing to implement an EMR or EHR as IT changes.

Leadership is widely considered a vital consideration in any change process. Daly (2016) identified five types of leadership decisions that can smooth the process of selecting and executing EMR systems and their upgrades. The first aspect is the need to balance choices with the population health priorities. This decision often affects the time and resource allocated to the implementation of EHR systems. This leads to the second leadership consideration, which is deliberating on the approaches to reduce costs while easing implementation. Daly also noted that prioritizing physicians' training for 6 months with the EHR is an equally important consideration. Another important leadership consideration is an all-at-once implementation aimed at eliminating clunky workflows. Lastly, it is vital to identify quick-to-value functions and features. Even though most EHRs are feature-laden, it is imperative to establish features and functions that will bring the most value with respect to the goals in implementing an EHR system. Prioritizing the implementation of these features helps ensure that the gains and the value associated with the use of EHR systems are identified early. This helps develop the good will and appreciation required for the successful implementation of the features associated with lower value.

Grant (2011) developed observations relating to the challenges faced in the implementation of EHR technology. The observations were developed from the researcher's involvement in meetings with health care providers with the aim of offering professional services to aid in the selection, implementation, and optimization of EHRs. Grant noted that a majority of providers who had selected EHRs did so without planning. A detailed and comprehensive planning process is essential in ensuring that the selected

EHR matched the implementation parameters of the health care facility. In addition, the researcher noted that such selection decisions seldom meet the technical and practical requirements for the EHR. Thus, such choices lack objectivity and are in most cases influenced by vendors' marketing strategies including brand names and pricing. Most health care providers choose EHR solutions because other providers are using the same solution, the hospital or university they are associated with employs the same solution, or because the software appears to be the best solution among the few vendor demos they observed. These reasons have a commonality in the failure to consider how the EHR will be implemented and the challenges that could be faced.

Conceptual Model

This project involved using Rogers's (2003) theory of diffusion of innovations to assess the usage of the EHR by a health care provider. This theory pertains to how new innovations or systems are spread. The theory stipulates that there are categories of adopters, or users (Rogers, 2003). These categories include innovators (those who want the change to happen quickly), followed by early adopters looking for ease of use, and then the early and late majorities who begin to use the system as it is changed for better usage through the input of the first two groups. Finally, there are those who do not engage with the system. The successful adoption of a new system relies on the specifics of the system itself, the channels through which its use is communicated, time, and the social environment in which the system is being introduced (Rogers, 2003). Failed diffusion occurs when a system is not widely adopted. The concept of innovation-decision in Rogers's theory is a five-step process: (a) knowledge, to have the idea of how

something functions; (b) persuasion, to be either favorable or unfavorable to make a change because of the new-found knowledge; (c) decision, to reject or accept the usage of the knowledge; (d) implementation, to the idea or new knowledge to work; and (e) confirmation, to evaluate if the knowledge indeed works (Rogers, 2003). Haugen and Woodside (2010) defined the use of an EHR in relation to this theory, arguing that implementation occurs when the EHR is going live or has gone live within the clinic, whereas adoption refers to when everyone is using the EHR as it was designed to be used.

Summary

The purpose of this project is to develop a plan to help redirect workflow at the point of care to enhance provider effectiveness in the use of the EHR. Wyne (2008) stated, "Information technology improves synthesis of information, the delivery of knowledge, and efficiency of communication, allowing for coordinated care across delivery systems" (p. S16). The EMR can provide all the elements but needs to be used as it is intended in order to improve efficiency. Nuckolls (2003) explained how EMRs are a "key initial component for motivating the physicians and initiating effective [disease] management plans" (p. 54). Until the EMR is more user-friendly, or the use of the EMR is improved, organizations may not see that use come of fruition.

Section 3: Collection and Analysis of Evidence

Introduction

The purpose of this project is to develop a plan to help redirect workflow at the point of care to enhance provider effectiveness in the use of the EMR. The clinic for which this project was conducted is one of several owned by a group of private physicians. In this medical group, there are 125 staff and 65 providers in total, including medical assistants, office managers, nurses, nurse practitioners, physician's assistants, and physicians. Many members of this team are also professors in a resident physician program at a university. Clinic X, which is the focus of this project, has four medical assistants who help providers, one office medical assistant who schedules consults, one office manager, two front desk workers, and four providers. This project may eventually be implemented in this clinic and others owned by this group. All of the stakeholders were supportive of any change and the proposed project. The project will be reviewed for possible future implementation by the clinic; if successful, it may be implemented in the future in other clinics of the group as well. Although I conducted research to understand the problems within Clinic X, I have only made recommendations to correct these problems. Due to the length of time necessary to change the EHR and the involvement of the company, implementing these recommendations was outside the scope of this project.

Project Design/Methods

The evidence-based literature relevant to the proposed project has been limited. Information gathered from the clinic gave insight into how the clinic's current workflow is managed, including the use of the EHR. In order to facilitate future implementation of

the proposed change across the medical group, this study will need to be repeated in the group's other clinics, for each clinic has its own personality and workflow.

The goal of this project was to generate recommendations that would improve efficiency in the use of EMR so that the staff at the clinic can spend less time gathering information, the providers can spend more time with patients in face-to-face encounters, and patients can experience better outcomes.

To reach the goal of this project, an anonymous questionnaire, the Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers (AHRQ, 2016), was administered to all clinic personnel. The items in the questionnaire followed a 5-point Likert scale. The questionnaire yielded information needed to understand the confidence of the providers in performing their tasks within the EHR. Confidence is a good indicator of the knowledge that providers have in using a system. In addition, an appointment was made with each clinic personnel regarding how they handled using the computer in the exam room; each staff member was observed inputting data with a test computer patient.

Protection of Human Subjects

In exploring workflow in the EHR, the confidentiality of all participants was maintained. The identities of the providers were kept anonymous during the questionnaire. The CEO of the clinics and the board of the clinics granted approval for the proposed study and implementation of a project to achieve better usage of the EHR. Walden IRB approval was sought prior to implementing the project, and the Walden IRB approval number is 09-30-16-0102593.

Theory Utilization

The proposed method of changing the present system involved exploring the present EHR workflow in order to identify flaws and time-consuming constraints. This yielded the information necessary to determine the amount of time saved after the change had occurred. Rogers (2003) explained in his theory that the questions to clarify why the EHR is not being utilized should identify "1) how earlier adopters differ from later adopters…2) how the perceived attributes of an innovation affect the rates of adoption…[and] 3) Why the S-shaped diffusion curve takes off at about 10 to 20 percent adoption" (p. 12).

Data Collection/Analysis

All staff members at the project site were eager to begin improvements in the environment of the EHR. To gather the information, the Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers (AHRQ, 2016) was administered to all 11 clinic personnel. This allowed anonymity of the providers and staff to give a general representation of where the problems were within the workflow and EHR that had caused loss of time. The Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers (AHRQ, 2016) appears in Appendix A.

I spent time observing each provider to gather information on his or her use of the EHR with a computer test patient. No live patients were involved. The EHR has test patients that were utilized for this purpose.

Summary

As in any project, change brings some difficulties and requires time. Change can be difficult for anyone in clinical practice. When a computer is added to the picture and the change involves the entire workflow, the change is difficult to maintain until it becomes the new routine. Given the quick growth of the EHR and the expansion of its abilities to help providers do their jobs more efficiently, the EHR is being accepted and used fully. Once the requisite systems have been developed and knowledge has been attained, the providers will have more face-to-face time with each patient, be able to amplify the patient's story using the EHR, and be able to see more patients each day.

Section 4: Findings and Recommendations

Introduction

The purpose of this project is to develop a plan to help redirect workflow at the point of care to enhance provider effectiveness in the use of the EHR. Two different methods were used to gather data. I collected data in part by observing workflow for each of the clinic personnel at one point in time, making notes on comments and capturing the workflow of the clinic staff. This action was followed by each staff member completing the Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers (AHRQ, 2016). Descriptive statistics were used to analyze the data gathered from the questionnaires, and summaries were done on the open-ended questions to gather themes that were produced. The data for this project focused on the usage of the EHR.

Findings and Discussion

All clinic staff were invited and agreed to participate. By involving all staff, there is a clearer picture of all clinic duties and inputs that would go into the system. The participants were four men and seven women; there are seven support staff who include medical assistants, data input clerks, and an office manager, and there are four providers. All of these participants use the EHR in some fashion and are involved in the workflow and patient contact. One provider had extensive familiarity with computers, but no other participants had experience with the system or computer systems before this system was implemented.

Observations of data input with a computer test patient were completed to develop an understanding of the usage of the EHR by each participant. Participants had to complete several elements related to the sequence of actions and the input and output of information in the EHR were made. Most participants expressed general feelings of difficulty reading the screens and difficulty with the sequencing of information on the screens. One key observation was a provider who would choose to return to the central desk to input information instead of in the patient's room. One provider stated that he used the same code for most everything because he could not find where the correct code was. This will lead to incorrect information in the patient's record. In addition, all participants stated that they had stayed late to input information from the day on patients that had been seen or to clarify records they had documented and that overall they were not satisfied with the EHR.

The Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers (AHRQ, 2016) was chosen due to ease of use and in the hope of gathering information the staff may not have told me during observation. The questionnaire (Appendix A) consisted of two demographic items, eight multiple choice questions, 17 Likert-scale questions, and three open-ended questions for comments by the participants. The questionnaires were distributed in an anonymous fashion; no personal information was collected. All 11 participants returned the questionnaires.

Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers (AHRQ, 2016) Questions 3 through 7 are included in Table 1.

Table 1

Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers: Part 1

Item	EMR	Paper Chart	Both
In our opinion, which one is faster to complete your documentation?	72.9	18.2	9.1
Which type of record is more accurate?	54.5	18.2	27.3
Which type of record is safer for the patient care provided?	18		63.6
Which type of record has more complete information?	54.5	9	36.4

Note. Gender: Male = 4 Female = 7. Job title: Provider = 4, Manager = 1, Medical Assistant = 4, Data Entry Clerk = 2, $N = 11$.

The questions were related to the EHR and the participant's opinion about the usage and safety of the EMR. Participants found that the EHR was faster to use and generally considered it to be more accurate than the paper record alone. There was no perceived difference between using the EMR or paper record related to patient safety of information. The majority of participants believed that the EMR could provide more complete information.

The next four multiple choice questions (Questions 8 through 10) focused on the training participants received. Most participants (45.5%) reported using the online training provided, 36.4% were trained by someone else, and 18.2% trained themselves. When asked how well they were prepared for using the EMR, 45.5% of the participants

felt somewhat prepared, 27.3% were not prepared enough, 9.1% felt not at all ready, 9.1% felt that they were well prepared, and 9.1% felt adequately prepared. When queried if the format of the EMR was good, 63.6% answered that is was somewhat good, 27.3% answered that it was adequate, and only 9.1% answered that it was well made. Finally, when asked about the ease of use, 72.7% responded that it was somewhat easy, and 27.3% answered that it was moderately difficult. It appeared this group had adequate training and felt they were prepared for the implementation, and a large majority felt the EMR was somewhat easy to use.

The Likert-scale portion of the Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers (AHRQ, 2016) was processed through SPSS for frequencies and Likert reliability, and nonparametric tests were performed. The information obtained from the frequencies indicated one participant had not answered several questions on the Likert portion of the questionnaire. Cronbach's Alpha was 0.898 for the 17 items, proving accuracy due to being above 0.7. Results from the 17 questions using the Likert scale appear in Table 2.

Table 2

Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers: Part 2

Item	Strongly Agree	Agree	Not Applicable	Disagree	Strongly Disagree
I have difficulty using the EMR.	45.5	27.3		18.2	
There is a wait time to use the EMR at times.	36.6			36.6	
I see as many patients now than before the implementation of the EMR.	18.2	18.2	36.4		18.2
I think the quality of care has improved since the introduction of the EMR.			27.3	54.5	
I encounter problems while using the EMR.	27.3	18.2	18.2	18.2	18.2
I think it takes me longer to document after patient hours than before implementation of the EMR.	9.1	36.4	27.3		18.2
I have difficulty finding information within the EMR.	9.1	36.4		18.2	18.2
I spend less time documenting after patient hours than before implementation of the EMR.	18.2		54.5		
I am satisfied with the EMR performance.	18.2	9.1		36.4	9.1
The characters on the screen are hard to read.	9.1	63.6			
Organization of the information on the screen is difficult to use.		54.4	18.2		
Sequence of screens make the EMR difficult to use.		54.5	18.2		
There are too many messages on the screen while I am trying to input information about the patient.	9.1	36.4		18.2	
I explore new updates by using trial and error.		18.2	27.3	27.3	

(table continues)

Item	Strongly Agree	Agree	Not Applicable	Disagree	Strongly Disagree
Tasks can be performed in a straight forward manner.	18.2	18.2	45.5		
System speed is adequate and does not slow me down.	18.2		18.2	36.4	9.1
Overall, I am satisfied with the EMR.				54.5	9.1

Note. Gender: Male = 4 Female = 7. Job title: Provider = 4, Manager = 1, Medical Assistant = 4, Data Entry Clerk = 2, *N* = 11.

Most participants reported difficulty using the EHR and were not satisfied with its use. Most did not agree that the quality of care has improved since the implementation of the EMR. Questionnaire results further indicated that the speed of the EMR slows down the work processes and that the screen font and organization are difficult to read. Most participants also agreed that it takes longer to document using the EHR.

The final three questions were write-in responses. When asked to name the one thing they liked about the EHR, comments included the potential to have access to all patients, ease of renewal of prescriptions, and the ability to quickly find a patient's chart and to access charts from anywhere. The next question asked if there was one thing they could change about the EHR. Participants responded that they would like to have increased communication options including messages and clinical data elements including simplified order sets and ease of access to common diagnostic codes. The final question was open ended and asked for any comment the participants might wish to add. Most responses were related to concerns about ease of working with the vendor for feedback and updates.

Implications

Most participants chose online training on the EHR; however, most stated that they only felt adequately prepared. For those employees having difficulty, additional time training with a coach or experienced user might help. Tailoring the training to the learner's learning style preference may be beneficial. When I observed the staff, they were frustrated due to time constraints and several aspects of the EHR including readability of the screens. Finding information quickly will hopefully increase as use of the EHR continues. There may be need to address concerns raised with the vendor regarding needed changes to improve ease of use and utility of the EHR.

Strengths and Limitations of the Project

The sample size of 11 is small and does limit the finding to this clinic or other clinics within this practice that are using the same EHR. The findings are very consistent with the literature and response to improvements based on observations, and recommendation based on the literature should make a positive impact on identified concerns. The willingness of all personnel to participate demonstrates their interest in improving patient care processes in this clinic setting.

Analysis of Self as a Scholar, Practitioner, and Project Manager

My interest in the project is being the patient's advocate. As a registered nurse and caregiver, I understand that misinformation sometimes relayed by the EHR to the provider or consultant can cause errors in care. I have experience in nursing for over 40 years and have watched the medical field blossom with new techniques, new medications, and the involvement of the EHR in caring for patients. By having

experience with both acute care and primary care record keeping, both paper chart and EHR, this gives me a better understanding of both worlds and the obstacles that may be a part of both these worlds and record keeping. In my experience, correct documentation can save a life and create productivity of the people utilizing the information. On the same note, incorrect information or difficulty using the EHR can cause detrimental situations that can result in harm to our patients. We took an oath "to do no harm."

Summary

Efficient use of the EHR can promote effective communication, increase face-to-face time between the patient and provider, and improve the process of documenting patient care. The result can lead to improved patient outcomes and improved clinic workflow. A poorly implemented system is often associated with a range of problems. The implementation of an EHR system in an organization brings about significant change. In managing change, it is important to consider the role that individuals in the organization play in effecting the change. Several factors that may have impacted the implementation of the EHR in Clinic X were related to planning for the multilevel nature of information technology needs, including planning for training and the acceptance by the users of the change. It is important to consider the findings of this project that include enhancing user-friendliness of the screens, having access to commonly used information needed at the point of care, and support for additional training and technical support. Prioritizing these recommendations should help Clinic X develop an improved EHR that will improve clinic flow and ultimately improve patient outcomes. A comprehensive

planning process with the vendor is needed to ensure that these recommendations are met.

There also needs to be further exploration of the EHR systems themselves. Much of the existing research has been done on the usage of the EHR and training individuals to use the equipment, but there have been few studies in the EHR and its design. Many companies have built EHRs for commercial value. Money is a great item to have, but patients need to come first. A great deal of money has been spent on the EHRs, and these companies need to be responsible and ethical enough to work with providers to make the best possible way to gather accurate information and tell the patient's whole story. This story needs to be readily available to whomever should need the information for the best care possible. Patients have the right to have their story told—completely and accurately. Providers of care have the right to have access to a system that they can use easily, that accurately gathers information, and that makes it readily available.

Section 5: Dissemination Plan

This section includes recommendations for Clinic X related to the findings of the project. I gave a complete report to the CEO for possible future implementation in their other clinics. The staff in Clinic X found that the information needed from the EHR was limited and did not include common order sets and common diagnoses. In addition, they may have not been trained well enough to utilize the system adequately. They were generally dissatisfied with the speed of the system and expressed overall dissatisfaction.

Ultimately, changes to the EHR software must come from the company that makes the EHR. The EHR software company needs to be informed of the findings of this project and the need for future changes. My recommendation for the clinic is better communication with the EHR vendor to further tailor the EHR to the providers and staff needs. Another recommendation is to have more IT support in the office to help with issues and have that IT person communicate with the vendor. The vendor can make changes when approached with an understandable request. Having one person communicate with the vendor would keep the vendor listening and not create too many calls. Each staff member had different complaints. Some were obviously related to improper training or understanding. Others, however, were related to the EHR not having usability. The frustration of the providers at the patient's side searching for information due to poor layout of the EHR can be rectified by the vendor. The EHR can only give information that was put into it and must have quality information input to have correct and true output. In addition, there is a need for further study of the staff and providers utilizing the EHR. The EHR is an evolving thing. Changes to the EHR are many during

this time of development. It is hoped that the outcomes of this project may help other private practices avoid these same pitfalls.

This project will be submitted to two organizations: AHIMA as an abstract and to HIMSS Nursing Informatics Community to communicate the needs within the EHR community.

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Appendix A: Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers

1. Gender: Male

   Female

2. What is your job title?

   Provider

   Nurse

   Medical Assistant

   Data entry clerk

3. In your opinion, which one is faster to complete your documentation?

   a. EMR

   b. Paper chart

   c. Both the same

4. Which type of record is more accurate?

   a. EMR

   b. Paper chart

   c. Both are the same

5. Which type of record is safer for the patient care provided?

   a. EMR

   b. Paper chart

   c. Both are the same

6. Which type of record has more complete information?

a. EMR

b. Paper chart

c. Both are the same

7. What type of training did you receive when you were introduced to the EMR System?

a. Trained self

b. Was never trained

c. Used the online training session

d. Someone else trained me

8. How adequately do you think you were prepared to use the EMR?

a. Not at all- not trained on the EMR

b. Not prepared even though I received training

c. Somewhat prepared

d. Adequately prepared

e. Well prepared

9. Do you feel the EMR is well laid out in format?

a. Somewhat

b. Adequately

c. Well made

10. Is the EMR easy to use?

a. Somewhat

b. Slightly difficult

c. Moderately difficult

d. Very difficult

Efficiency of the EMR in the office

Please use the Likert Scale on the following questions:

1 = strongly agree, 2= agree, 3= not applicable, 4 = disagree, 5 = strongly disagree

11. I have difficulty using the EMR.
12. There a wait time to use the EMR at times.
13. I see as many patients now than before implementation of the EMR.
14. I think the quality of care has improved since the introduction of the EMR.
15. I encounter problems while using the EMR.
16. I think it takes me longer to document using the EMR compared to the paper chart.
17. I have difficulty finding information within the EMR.
18. I spend less time documenting after patient hours than before implementation of the EMR.
19. I am satisfied with the EMR performance.
20. The characters on the screen are hard to read.
21. Organization of the information on the screen is difficult to use.
22. Sequence of screens make the EMR difficult to use.
23. There are too many messages on the screen while I am trying to input information about the patient.
24. I explore new updates by using trial and error.
25. Tasks can be performed in a straight forward manner.

26. System speed is adequate and does not slow me down.

27. Overall, I am satisfied with the EMR.

    Narrative reply

28. What is the one thing you like most about the EMR?

29. If there was one thing you could change about the EMR what would it be?

30. Please feel free to add any comments about the EMR or the questionnaire.

Thank you so much for your time and energy.

Appendix B: Copyright Status: Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers

Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers

This is a questionnaire designed to be completed by physicians in an ambulatory setting. The tool includes questions to assess user's satisfaction of electronic health records.

Survey Link: Primary Care Information Project (PCIP) Post-Electronic Health Record Implementation: Survey of Providers (PDF, 258.73 KB)

Year of Survey: Created prior to 2010

Survey Type: Questionnaire

Survey Focus: Satisfaction

Respondent Type: Physicians

Care Setting: Ambulatory

Technology: Electronic Health Records

Copyright Status:
Permission has been obtained from the survey developers for unrestricted use of this survey; it may be modified or used as is without additional permission from the authors.

Organization: New York City Department of Health and Mental Hygiene

Location: New York, NY