

Integrating Health Information Technology into Clinical Guidelines

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Abstract—The current use of Health Information Technology (HIT) within healthcare practice is limited. Clinical guidelines have been developed to bring research based evidence into practice. However, there is no defining step during the development process that explores the use of HIT and how it can benefit the patient, staff and delivery of care process. This paper presents a review of current research on the integration of HIT into clinical guidelines, a methodology for updating and altering the clinical guideline development process to include exploration of HIT and an updated version of the Patient Journey Modeling Architecture (PaJMa) to include a technology layer to assist in visually depicting how HIT can benefit healthcare.

I. INTRODUCTION

Clinical guidelines have been planned, developed and used in the healthcare field to benefit patients through consistency of best clinical practice care. Clinical guidelines provide a well constructed foundation for various treatments, diagnoses and testing procedures for a variety of common patient symptoms. If guidelines are developed and followed appropriately, they will increase the quality of care delivered “by decreasing inappropriate variation and expediting the application of effective advances to everyday practice” [1]. However, various studies [1-5] have proven that these advances in healthcare, especially health information technology (HIT), are not being incorporated into clinical guidelines or being utilized by practitioners following the clinical guidelines. Although clinical guidelines are described as educational tools, and are intended to encompass current research based evidence, Shaynefelt [2] found that “less than 10% of clinical guideline development processes contained formal methods of combining scientific evidence or expert opinion”. Therefore discovering techniques to disseminate the importance of using evidence based research in guideline development is of top priority as, at present, it is not occurring.

This paper presents a review of current research on the integration of HIT into clinical guidelines and policies by analyzing the literature surrounding guideline and policy development, implementation, and continuous improvement. This paper then presents a methodology for updating and altering clinical guidelines and policies by integrating HIT

into guideline development through various modeling techniques that will enable healthcare professionals to view their current and future care practices.

To modify the current dilemma of limited HIT incorporation into clinical guideline development for patient care, healthcare professionals need to be informed about the change and how it can benefit them personally. Teaching methods, such as the Continuing Medical Education (CME) program, is a good starting point for introducing the benefit of HIT to healthcare professionals and to aid in closing the gap between HIT and clinical guidelines [4]. This existing training program needs to be updated for dissemination of knowledge on clinical guideline creation and maintenance and how HIT should to be explored and integrated.

The Patient Journey Modeling Architecture (PaJMa) is a methodology which enables a visual representation of the interaction of processes used to support a patient’s experience in the healthcare system. PaJMa has been designed specifically for healthcare and focuses on providing a visual representation of the processes involved in a patient journey [6]. This modeling technique represents the following layers staff roles, processes, information creation/movement patient needs/practice guidelines/policies and metrics [7]. The use of the PaJMa approach aids in visually depicting the current care processes within a particular healthcare unit or facility. PaJMa is an effective method for pointing out inefficiencies and allowing healthcare professionals to work with and alter the model to benefit their practices [6]. This paper is proposing an updated version of PaJMa to include a technology layer that will incorporate HIT into clinical process analysis to assist in clinical guideline development.

The structure of the remainder of this paper is as follows; Section II; related research, III; Methodology, and IV; Conclusion & Future Research.

II. RELATED RESEARCH

A. Clinical Guidelines

Clinical guidelines have been described in a number of different ways by healthcare organizations, professionals, researchers etc. This paper uses the definition from the Institute of Medicine which describes clinical guidelines as “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances” [8]. Clinical guidelines are also intended to improve the uniformity of care across facilities and organizations by standardizing the care delivery process, therefore increasing the quality of care provided to all patients [9].

One of the most influential aspects of clinical guideline use is that they are intended to interconnect the most recent evidence based research with healthcare professional’s

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patient care practices. With the current technology era there are a number of research findings that support the utilization of advancing health information technologies (HIT) in clinical practice [5, 9, 13]. However, HIT use is rarely found in current clinical guidelines or during their development process [5]. Haynes & Haines [10] found that in order to successfully incorporate evidence based research into useful clinical guidelines, strong policies also need to be in place to ensure that the revised best practice clinical guidelines are followed accordingly. The authors also found that policies tend to be formed by “non-evidence based factors including historical, cultural, and ideological influences” [10] and the policies tend to promote healthcare professionals to carry out practices that do not incorporate evidence based research. MacDougall et al further outline how HIT is not being incorporated into clinical guideline use today and the potential benefits of changing this current dilemma [5].

B. Why Do Clinical Guidelines Need To Be Changed?

A number of studies [5, 9, 11, 14] have been conducted and provide excellent reasoning as to why the current clinical guideline development process needs to be changed. Chaudhry et. al [11] found that although the benefits of using HIT in the healthcare setting have been proven to improve patient care “adapting new information systems to healthcare has proven difficult and rates of use have been limited”. They also found that most of the technology used is for administrative and financial benefit and not related to delivery of patient care. There are many HIT resources available, such as electronic health records, computerized physician order entry systems, clinical decision support systems, to increase patient care through delivery and security of patient information and of the quality of care delivered. So why is it that the use of HIT has not been incorporated into clinical guidelines? One of the reasons is because the current process of clinical guideline development does not contain a defined step in analyzing HIT during clinical guideline development [5].

Furthermore, a study completed by Shekelle, et. al [12], highlighted how quickly guidelines become out of date. During their study they found that many guidelines state that they should routinely be updated to keep the practices as current and evidence based as possible, yet there is no written criteria for when a guideline should be updated or how it should be updated. Technology also changes at a rapid pace, therefore, requiring more frequent updates for guidelines to remain current. When analyzing the validity of these guidelines they determined that approximately three quarters of them needed to be updated and that half of the guidelines become out of date after 5.8 years [12]. Guidelines need to constantly be created, reviewed and updated to remain valid and accurate.

It has become apparent that incorporation of HIT into clinical guideline development is important as currently HIT exists but is not being used to its full potential. Approximately 19.1 billion dollars, is going to be invested into implementing EHR’s and other HIT in the U.S. healthcare sector [13]. Also, in clinics, physicians themselves will be required to purchase the systems and

software for the EHR’s costing them around \$25, 000 each [14]. This is a large investment for both the government and physicians especially given the lack of confidence that the implementation of HIT will result in a positive return expressed by many physicians [13]. The majority of HIT initiatives thus far have proven that there is a lack of proper integration into clinical practice. Healthcare professionals seem to lack an understanding of how HIT can aid in their clinical practice. Due to the current ineffective use of HIT, changing the current clinical guideline development process to include the use and integration of HIT is required.

C. How Do We Go About This Change?

A number of procedure need to occur in order to successfully adjust the current clinical guideline development process. If the healthcare setting is not conducive to change [15], implementing a new methodology for clinical guideline creation to include HIT will be very challenging. Ensuring that the staff in your organization is aware of the change is a very important aspect of change management and knowledge transfer. Establishing a new clinical guideline development method will only be successful if the concerns of the clinical staff are addressed [16] and they are presented with a number of resources to help them better identify, synthesize, and understand why the change needs to occur.

Disseminating knowledge about HIT to clinical guideline developers and healthcare professionals can be done through programs such as Continuing Medical Education (CME). CME is defined as “any educational activity that works to maintain, develop, or increase knowledge, skills, performance and relationships that a physician uses in care of patients” and has proven to be a very effective program for knowledge dissemination of healthcare advances [4]. Replicating a program like this for HIT advances or incorporating sessions on HIT advances will be very beneficial. This process is difficult as many healthcare professionals show some resilience in breaking their current methods of delivering patient care [4]. Grol & Grimshaw [15] have outlined several strategies to help in the change management and knowledge transfer process. They found that “developing a proposal for change that is evidence based, feasible and attractive; studying the main difficulties in achieving the change, and selecting a set of strategies and measures at different levels linked to that problem” [15] can be helpful methods to keep healthcare employees actively involved in the change process.

III. METHODOLOGY

We have developed a new process that can be used specifically to explore the use of HIT during the developmental stage of clinical guidelines. Figure 1 outlines what should happen during the researching of relevant evidence stage. A more defined process of collecting research based HIT evidence needs to be included within clinical guideline development to ensure that HIT is explored further. Understanding the benefits that HIT can bring to the patient, staff and to the delivery of care is an important part of guideline development. Once the benefits

of HIT have been weighed, the guideline developers must then apply the use of HIT to clinical practice. Next, the developers need to determine when this guideline needs to be reevaluated for updates and changes. With the rapid rate of technological advances in today's world this time frame should be within the next 3-4 years.

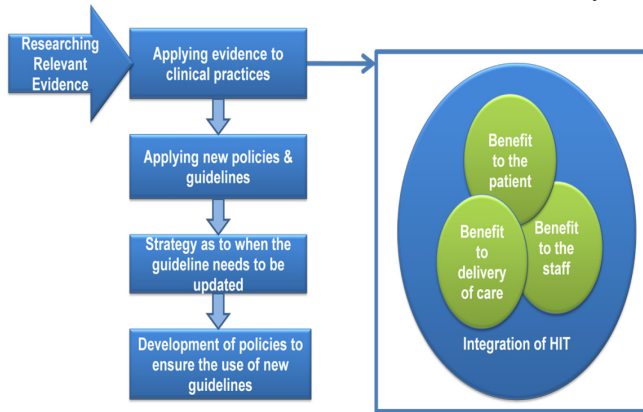


Figure 1: Exploration of HIT within clinical guideline development

This timeline should be sufficient to keep up to date with the technology and is faster than the current review schedule.

Finally, policies need to be reviewed and updated to ensure that the HIT is fully incorporated and followed by the healthcare professionals. Ensuring adherence to the guideline is the most difficult step but with structured policies and audits of the organizations following the new guidelines, adherence should not be an issue.

Overall, with this new developmental process (fig. 1) of HIT incorporation into the clinical guideline, developers of clinical guidelines will be forced to pay more attention to the various technologies available to benefit patient care and more carefully consider their use within the healthcare setting. This will ensure that patients are receiving the best care possible as well as a good return on HIT investment.

The PaJMa modeling technique is used to visualize the clinical guideline integration in the patient journey and highlight inefficiencies in patient care, including the ineffective use of HIT. These models are developed to show an organization their current care processes and to develop altered models for the changes that need to be made in future. Using a modeling technique like this can be beneficial in determining where HIT can be incorporated to link patient data with technology, increasing the effectiveness of health care delivery. The existing PaJMa modeling method does not have a layer to represent HIT usage by patients and staff [17]. If the professionals viewing the model cannot clearly visualize where HIT can be used to benefit their practice, then this contributes to the challenge of HIT integration into clinical guidelines as the understanding of the benefits will be limited.

A new layer is required to highlight where HIT is providing data directly into systems, such as electronic health records (EHR), how the technology is supporting clinical decision making and communication among health care professionals. Figure 2 is the proposed adaption to the

PaJMa model framework with the technology layer added [17]. The technology layer enables practitioners to clearly view where and how HIT is supporting information flows and improved efficiency. Data is electronically transmitted from bed side computers and PDA's into the EHR allowing the information to be readily available for use by any healthcare professional with the most recently updated status of the patient. The use of the technology layer also clearly shows the connection between electronic inputs from physiological data, such as, blood pressure cuffs, heart rate monitors etc. and historical data, previous tests, allergies, surgeries etc. This layer also allows organizations to understand how HIT can benefit their practice and reduce repetition that comes with paper documentation. The constant electronic updates provide healthcare professionals with access to useful and accurate patient data and update patient data immediately.

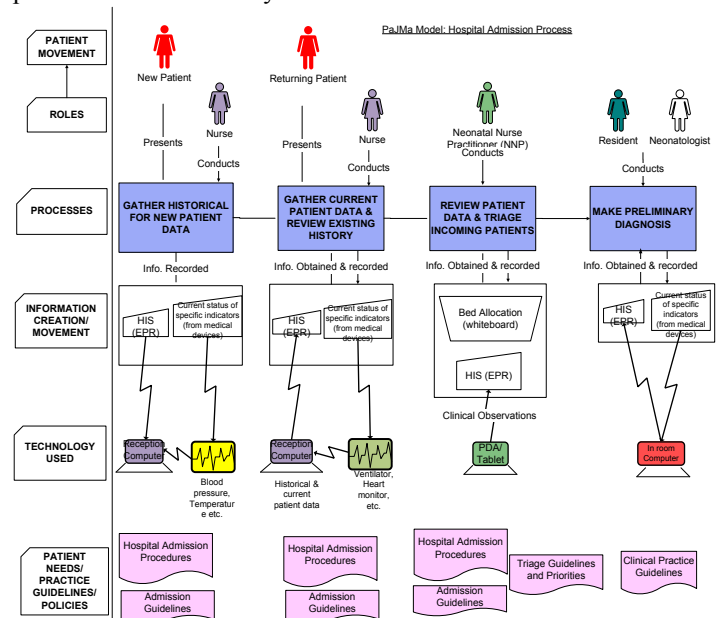


Figure 2 : PaJMa model of an admission process with the technology layer.

The use of this model will allow a healthcare organization to clearly visualize how useful HIT can be beneficial for themselves and patients. The model can be adjusted to suit their practice and work with HIT they have available to them. Through the use of a new clinical guideline development technique (fig. 1), and the new technology layer in PaJMa (fig. 2) incorporating today's best HIT advances to support patient care can be more fully integrated adopted. This will also support a more effective and easy implementation of new HIT as healthcare professionals can visualize the benefits and sources of support for clinical decision making before implementing the new technology.

IV. CONCLUSION & FUTURE RESEARCH

This paper has presented a framework to incorporate HIT within clinical guideline development. An abundance of time and money is spent researching and exploring new healthcare advances yet the results of these studies are not being incorporated into daily practice. The incorporation of HIT into clinical guidelines and therefore clinical practices

are essential to the future of healthcare. Not only will it increase accessibility to patient information but it will also increase patient safety, support patient confidentiality, and decrease time spent reviewing and asking about a patient's health history.

The resources to increase patient care and safety as well as staff efficiency are readily available but the knowledge of their use still needs to be disseminated. The use of a new clinical guideline development process (fig. 1) and the PaJMa modeling technique (fig. 2) can help disperse the knowledge of HIT incorporation and educate healthcare professionals on the importance of HIT use. The CME program as well as policies for guideline compliance can help for a smooth transition when implementing a new guideline process for healthcare professionals use.

Changing the current clinical guideline procedures and ensuring their compliance is a challenge. Although the steps outlined in Part II (c) are great starting points to changing clinical guidelines, ensuring continued compliance and implementation requires more demanding strategies. Future research needs to be conducted in the area of policy/guideline compliance procedures.

Written policies to follow new procedures go hand in hand with new clinical guideline developments. Without policies in place, healthcare professionals would not be obligated to follow the changes, and care practices would never truly be updated. One important aspect of clinical guideline compliance is that without healthcare provider commitment it will not succeed [18]. The visualization that the PaJMa model is providing aids in overcoming this obstacle by increasing commitment of healthcare professionals to the successful implementation of developed future state models [19]. Future research should look into how to adequately transform an organization to use new practice guidelines and what needs to be done if they fail to do so.

The Hospital for Sick Children is assisting us with testing the impact of the implementation of PaJMa in the NICU. We plan to replicate this case study in a number of NICUs to further refine and validate the methodology.

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