

Electronic Medical Records Use – An Examination of Resident Physician Intentions

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Abstract

Between 1992 and 2002, overall health care spending rose from \$827 billion to about \$1.6 trillion; it is projected to nearly double to \$3.1 trillion in the following decade. This price tag results, in part, from advances in expensive medical technology, including new drug therapies, and the increased use of high-cost services and procedures. Many policymakers, industry experts, and medical practitioners contend that the U.S. health care system—in both the public and private sectors—is in crisis [11, p. 33]. Efforts are underway to convert all medical records from paper to electronic. This manuscript uses the Unified Theory of Acceptance and Use of Technology as a lens to interpret the responses of physicians completing their Residency in Family Medicine regarding use and adoption of Electronic Medical Record Systems (EMR).

1. Introduction

The 2005 Government Accountability Office [11] report, 21st Century Challenges: Reexamining the Base of the Federal Government, was intended to identify critical issues and potential options for addressing key fiscal challenges facing the federal government. As indicated above, the GAO identified healthcare as one of the most critical issues facing federal policy makers. While primarily discussed in terms of a fiscal crisis, the GAO, Department of Health and Human Services (HHS), and academic researchers have documented a number of healthcare quality concerns [10, 8, 22, 20, 15]

Among the numerous policy issues associated with the provision of US healthcare is the call for increased adoption and use of health care information technology (HIT) to address structural inefficiencies and care quality issues plaguing the US health care industry [11]. Multiple clinical and administrative benefits have been identified with the adoption of HIT generally and EMR systems specifically. Yet the health care industry remains a laggard in IT adoption relative to other industries [3].

This is germane to the purpose our study investigating the intention of physicians serving residencies to adopt

electronic medical record (EMR) systems in their future medical practices.

As evidenced by President George W. Bush's promulgation of Executive Order 13335 Incentives for the Use of Health Information Technology and Establishing the Position of the National Health Information Technology Coordinator, the federal government is actively encouraging the development of "a nationwide interoperable health information technology infrastructure that:

- (a) Ensures that appropriate information to guide medical decisions is available at the time and place of care;
- (b) Improves health care quality, reduces medical errors, and advances the delivery of appropriate, evidence-based medical care;
- (c) Reduces health care costs resulting from inefficiency, medical errors, inappropriate care, and incomplete information;
- (d) Promotes a more effective marketplace, greater competition, and increased choice through the wider availability of accurate information on health care costs, quality, and outcomes;
- (e) Improves the coordination of care and information among hospitals, laboratories, physician offices, and other ambulatory care providers through an effective infrastructure for the secure and authorized exchange of health care information; and
- (f) Ensures that patients' individually identifiable health information is secure and protected."

Thus, a key objective of federal policy is to achieve widespread adoption of EMR within the next 10 years [8].

The GAO reports five potentially significant barriers to HIT adoption [12] including:

- Investment in IT can be costly and must compete with other investments, and depends on the organization's ability to access capital.

- Integrating new IT with other systems can further increase costs and system maintenance requirements.
- Maintaining full operations when making system changes presents additional challenges.
- Implementation of IT often requires changes in work processes and culture.
- Physicians' reluctance is a major hurdle to implementing IT, and overcoming it is key to successful projects.

This study seeks to investigate the influence of physician education and training on the intentions of new physicians, i.e., those still participating in residency training programs, to actively seek or avoid joining practices where an EMR system is employed.

The assumptions and logic underlying our focus on the adoption intentions of new physicians is thus:

- While recognizing that HIT is not a cure all for the myriad issues facing the health care industry, we do fundamentally agree that increased HIT implementation, when effectively employed, has and will provide substantial improvements in health care quality and will reduce health care costs. We do, however, acknowledge that poor design and implementation of IT can result in costly implementation failures.
- There are many elements of HIT that could be studied, e.g., telemedicine, computer assisted decision support, and a wide variety of administrative systems. Our interest is in the effective adoption of EMR; successful deployment and effective usage of EMR are central to achieving quality of care improvements and cost benefits.
- As further elaborated in the literature review, we recognize that effective implementation and use of information technology can be problematic, particularly in terms of systems failing to meet perceived user needs thus resulting in limited or ineffective system use.
- While acknowledging multiple barriers to effective EMR implementation, we consider physician *attitudes* to be a critically important element in the timing and ultimate effectiveness of EMR implementation and use.
- We foresee the adoption of EMR systems within the healthcare industry to be inevitable. However, we feel that this transition process can occur more or less effectively.

- We believe physicians entering the field can play a crucially important role in facilitating the effective utilization of EMR systems within the health care industry.
- Consequently, we feel it is important to obtain a better understanding of how medical schools are preparing physicians to employ HIT and assess the degree of support or resistance among new physicians toward HIT.

This paper reports the first step in a multi-phased research effort seeking to:

- Identify HIT related education and training for aspiring physicians provided by medical schools
- Assess new physician residents' beliefs, attitudes and perceived group norms concerning EMR use within their residency, using the Unified Theory of Acceptance and Use of Technology (UTAUT) [31], which is a comprehensive synthesis of the Technology Acceptance Model (TAM) [6, 7] and
- Assess whether residents' attitudes toward EMR utilization are strong enough to favorably or unfavorably influence their future employment decisions, i.e., will the existence or non-existence of an EMR system impact their decisions to join particular medical practices.

In contrast to typical studies based on TAM, we have employed qualitative data collection and analysis to provide what we believe to be a richer understanding of the UTAUT theoretical constructs.

2. The Role of Physicians Promoting or Resisting the Implementation of EMRs

A resident, faced with rounds that took all day to complete instead of several hours, decided to make a practical joke by prescribing a complete blood count every hour on the hour for five years. This overloaded the system and resulted in a shut-down [18, p. 472]).

Recent studies have highlighted the criticality of physician attitudes with respect to the effective adoption and use of HIT [14, 18, 23,17, 5, 13, 28] Physician resistance to technology adoption is not necessarily unwarranted. Snyder, Paulson and McGrath report that while the time required to perform the tasks of medical technicians may decrease, "the doctor is faced with an increase in his or her workload" [21, p. 90). Darr, Harrison, Shakked and Shalom [5] identified six domains of concern: "managerial implications of the EMR, limits on professional autonomy, impact on communications with colleagues, facilitation of research, legal defense, and

influence on the professional hierarchy within the hospital” [5, p. 353]. Kerr, McGlynn, Adams, Keeseey and Asch [15] raised many of the same issues particularly highlighting concerns regarding the impact of technology, i.e., data entry, on the quality of doctor-patient interaction, as well as problems with various perceived restrictions imposed by the system. Of particular relevance to this study, the negative attitudes of participating residents indicates it would be wrong to assume that younger, presumably more computer literate physicians will be more inclined to support EMR adoption.

Lapointe and Rivard [18] directly investigated antecedents to resistant behavior in their study of EMR adoptions at three separate hospitals. They consider the EMR implementation at two of these hospitals to be failures and the success for the third was not without problems. At the ultimately successful site, a university hospital, the pharmacology module was withdrawn, modified and re-implemented after physicians petitioned for its removal citing adverse impacts on patient healthcare resulting from system related delays in prescription fulfillment.

Despite negative perceptions documented by the above studies, physicians are not insensitive to the potential benefits of EMR systems [9, 26, 27]. However physicians must play an active role in planning for the effective implementation and integration of EMR initiatives.

3. Theoretical Approach

In this initial stage of our research, we have employed a qualitative research approach. However, rather than using a grounded methodology where theory emerges from the data, we follow the suggestion of [21] to adopt a theory or theoretical lens to guide our collection and initial analysis of the qualitative data.

The Unified Theory of Acceptance and Use of Technology (UTAUT) [31, 30], a comprehensive synthesis of the Technology Acceptance Model (TAM) [6, 7] served as our theoretical lens. TAM is the dominant theoretical approach for studying individual IT adoption and use having spawned an incredibly rich and widely cited stream of theoretical and empirical research [19, 2, 25]; Yet TAM is not beyond criticism [19, 2, 25, 1]. We find the publication of the Journal of the AIS special edition on TAM to be particularly fortuitous for its inclusion of the thoughtful articles critically assessing TAM successes and limitations – fortuitous in that these critical reflections articulate limitations in the TAM research stream that we had perceived and have attempted to address in our qualitative research design.

We acknowledge a strong policy, i.e., action, orientation to our research, and are sensitive the criticisms of TAM offered by Benbasat and Barki [2] that while

powerful in terms of prediction, TAM has proven to be much weaker in terms of producing actionable knowledge. In short, “repeatedly demonstrating that certain mediators (beliefs) are influential without understanding how to influence such beliefs through IT design is ultimately of limited value” [2, p. 215].

Consequently, our objective in employing a qualitative research design is to unpack key beliefs concerning perceived ease of use and perceived usefulness in such a manner is to obtain greater insight into the formation of such perceptions or beliefs – whether a function of individual traits or group/organizational/professional influences – such that subsequent recommendations (or hypotheses) for design changes for both the IT artifact or the work processes in which the IT artifact is employed might be generated.

Thus we break with the tradition of using positivist methods that are virtually universally employed in TAM-based research and adopt an interpretivist research approach wherein we seek insight into, “to unpack”, the understanding of resident physician future adoption intentions. This approach does not subscribe to the canons of positivistic science but reflects a commitment to validity in the context of ideographic research, that while not widely adopted by those using positivist research methods, is well recognized within organizational behavior and IS research [29, 4, 16].

4. Methodology and Case Study Site

To achieve the in-depth level of access required, we adopted a single site case study [24, 33]. The site of the study is a Family Medicine clinic (FMED) in the Intermountain region of the United States. The clinic resides in one of the larger population centers in the state, having a metropolitan area less than 75,000 persons.

The clinic saw 16,580 patients in the 2005-2006 fiscal year ending on June 30. Data were preloaded into the Centricity Physician Office EMR product in Fall, 2004 with initial patients seen with the EMR starting in December, 2004. All patients were on the EMR by Spring, 2005. Data are accessible at the clinic via a wireless network, and all attendant physicians are provided with notebooks while on call. The data are also accessible from the nearby hospital, and through secure remote access. In addition to data input directly into the EMR, Laboratory Tests, Radiology, and Pharmacy, including E-Prescriptions, are accessible through the network.

In addition to the Family Medicine Practice, a Pharmacy Practice and Psychology Practice also share the EMR. There are eight physicians on the staff at FMED who are also Faculty in the College of Health Professions, Department of Family Medicine at the university FMED is affiliated. The FMED practice is structured with two

physicians functioning as director and associate director, and a Pharm.D. as Director of Research.

A Family Medicine Residency Program is provided through the Department of Family Medicine. This program's "mission is to train physicians for successful rural family practice". Six Residents are admitted into the program annually, with eighteen Residents in training each year during the three year program. "Residency is a stage of postgraduate medical training in North America and leads to eligibility for board certification in a primary care or referral specialty. It is filled by a resident physician who has received a medical degree (M.D. or D.O.) and is composed almost entirely of the care of hospitalized or clinic patients, mostly with direct supervision by more senior physician." [32]. This program is housed at FMED, and affiliated with a regional hospital. First year residents spend a greater amount of their time with the hospital, whereas third year residents spend the majority of their time in FMED.

To assess the future intention of the residents in regard to EMRs, open ended interviews were conducted during Winter 2007, with seven (7) residents in the Family Medicine Residency program. Three residents were in their third and final year of residency and two were in each of the first and second years. Three of the residents were female and four were male, two were in their late twenties and 5 were 30 years of age or older, three were international. Four of the residents, including all international residents, had no experience with either paper or electronic medical records prior to their admission into the Family Residency program. Two of the residents had previously worked with an EMR. In addition, two of the residents had significant information systems backgrounds, both having worked in support functions prior to obtaining their MDs.

The authors acknowledge the limitation that only seven of 18 current residents agreed to participate in this phase of the study. However, given the interpretivist paradigm underlying the design of this research, we do not view this limitation to be as significant as if we intended to adopt a strictly positivist approach. In a time when research is published with survey responses in the lower teens, we were pleased to achieve a 39% level of participation given the intensive nature of our research interview and the tremendously busy schedule of resident physicians.

The face-to-face interview questions focused on how the residents used the EMR, their likes and dislikes of it, peer influence on their use, and intentions of future use of an EMR.

5. Findings

To frame the interview findings the three broad goals outlined at the end of Section 1 were used as the lens for analysis.

5.1 Healthcare Information Technology Related Education and Training

Two of the residents had worked with an EMR as part of their education prior to admission into the FMED Residency program. Four of the residents, including all international, had not worked with a medical record prior to admission into the FMED Residency. The other resident had been exposed to a paper chart system in their prior education.

One of the residents had been exposed to two EMRs in prior to admission into FMED. One of the systems was the same that had been implemented at FMED, but used in Geriatrics rotation. The other was the VA system. The other resident briefly worked with an EMR for two months of their prior medical education. Both of these residents stated that they were very technically proficient also commenting that they needed little, if any, training on technology issues.

Three of the residents, including the two with prior EMR experience, had worked with other EMRs during rotations while in the FMED residency. One of the EMRs was an inpatient system used in Intensive Care (ICU) at the local hospital in comparison to FMED outpatient EMR. The resident commented that although the ICU system was primarily nursing software, it did provide access to vital signs and lab results in graph and table form, as well as having good procedure templates for the nurses to use in their documentation. The other two physicians had worked with other systems as part of their rotations at other clinics. The resident that worked with two systems during their education had also worked with an EMR in a regional clinic. This resident commented that the system used in the regional clinic was slow and had poor workflow. In addition the system used by the regional clinic was not used as a true EMR, as usage was not mandatory and some physicians refused to use it. In that particular clinic, outputs from the EMR were filed in the paper chart system. The resident commented that this system was also not user-friendly. In addition this resident preferred the system at FMED over the VA system.

The other resident with prior EMR experience had worked with another system that was more searchable than the one at FMED. That particular system also had a set of items to check if a diagnosis was abnormal whereas the system at FMED required notes to be input for abnormal diagnoses. This resident, however, hadn't had enough of an opportunity to use the system to adequately compare it with the one at FMED.

In addition to these three residents, a fourth resident, who was in his third year and would soon be joining an existing practice, was being trained on the EMR system that was being implemented at the practice. This physician commented that the workflow in the practice's new system provided step by step guidance for procedures.

5.2 Unified Theory of Acceptance and Use of Technology (UTAUT) - Direct Determinants of User Acceptance and Usage Behavior

The UTAUT illustrates the presence of a set of variables as directly influencing the outcome variables of Behavioral Intent and Intent to Use technology. In addition, each of the direct determinants is mediated by one or more of a set of demographic variables, gender, age, experience, and voluntariness of use [31].

5.2.1 Performance Expectancy.

"Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance" [31, p. 447]. The seven residents were unanimous in their expectation that adoption of an EMR would enhance their ability to provide medical care. Although we found variance in how each resident used EMR with patients, they consistently commented on the value of having the patient's data available at any time, from either the clinic or hospital.

In addition, residents commented on the value of having standardized data elements in the system as a component of their performance expectation. Although 60% of the patients at FMED see a regular physician, the inherent turnover of residents imposes instability on a long-term physician-patient relationship. Having data standardized facilitates patient care by providing consistent history, diagnosis and treatment information for each patient.

5.2.2 Effort Expectancy.

"Effort expectancy is defined as the degree of ease associated with the use of the system." [31, p. 450] The residents unanimously commented about the accuracy of patient documentation, and the ability to easily locate data. Easy access to lab work, medications, prior visits, history and conditions were all discussed as being benefits of the system, in addition to the data being readable. Electronic prescriptions had recently been added to the functionality of the system and were also mentioned as a system benefit. In addition, because FM operated on a wireless network, as did the affiliated local hospital, access to data was facilitated when the residents were at either location.

One of the first year residents stated that the flowsheets for diagnosing and recommending treatment for certain conditions were quite helpful when seeing a patient that had a condition the physician was unfamiliar with. However, this same issue, flowsheets, was criticized by another of the residents as being extraneous and requiring too much data.

Overall, data input was the major problem with the EMR cited by residents. One third year resident commented that "the time it takes to enter all the data makes it difficult to see more patients." Another Resident commented that it "takes too long to wrap-up...there are too many tabs...it would be helpful to enter necessary data on one sheet." Navigation of the system was mentioned as a problem by another of the third year residents (5). Similar comments were echoed by all the residents, with the exception of a technology savvy resident who had prior experience in systems support and development. This third year Resident commented that he was "adept at the EMR." The greatest dislike this physician had was system outages, particularly with network crashes.

Additional drawbacks mentioned included system efficiency and the cumbersome nature of many screens, with some including multiple tabs for basic procedures. Because the Residents ideally completed their paperwork between appointments, interruptions were also cited as system drawbacks. In addition, one of the Residents commented that many of the other Residents that were not interviewed considered the training on the system to be excessive. We did hear from all Residents that more than half of all Residents were satisfied with the EMR.

5.2.3 Social Influence.

"Social influence is defined as the degree to which an individual perceives that important others believe he or she should use the new system." [31, p. 451] All the Residents expressed an interest in having some control over their adoption of EMRs in the future. The Residents consistently mentioned the availability and quality of data as one of the driving factors in their use of EMRs in the future. One of the third year Residents commented that 'paper systems do a fraction of what EMRs do'. To counter the observation that the current EMR was cumbersome, the ability to customize input screens was frequently mentioned as a factor that would influence the decision to adopt a particular package. Another commented that the adoption of an EMR must be 'all or nothing', as partial implementation of an EMR would create 'mayhem'.

As they had become more familiar with the EMR, the Residents commented that the system became better accepted among the second and third year Residents. When discussing peer influence, the Residents

consistently stated that some of their peers didn't like the system. The issue of training came up, as it was mentioned that some peers struggled with the system, and that for the 'tech savvy' Residents, the training was not useful. One of the less 'tech savvy' Residents commented that when they were first learning the system, it was extremely frustrating. It was also discussed that some of the Residents take more advantage of the system and were rather proficient with the EMR. The Residents also commented that peer influence was encouraged regarding screen modifications. One of the 'tech savvy' Residents stated that "peers had a big influence on what templates were used".

5.2.4 Facilitating Conditions.

"Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system." [31,p. 453]

Broad facilitating conditions existed to access the EMR at FMED. First, notebooks were available for all Residents that were at the clinic. Residents had a lightweight portable device with a full screen and touch screen technology, not dissimilar to a clipboard. Second, a wireless network provided access to the system while at either FMED or the adjacent hospital. This allowed them to input data not only in the vicinity of the visitation room, but also anywhere within the facility, at any time. Third, the FMED IT staff provided support services at the home of each Resident to configure them for remote access to the EMR.

A number of comments from the Residents confirmed that facilitating conditions were present. One Resident commented that "the Residency Director and IT are open to creating forms". Another Resident commented that input was sought from the Residents on form design.

Another resident commented that the EMR was available at the "clinic, hospital, from home, and other remote locations". All of the Residents discussed the existence of monthly training and updates by the IT staff to keep them abreast of changes in the EMR.

5.3 Unified Theory of Acceptance and Use of Technology (UTAUT) - Mediating Variables

A set of variables that mediate the effect of the determinant variables on behavioral intention and use behavior are proposed in the UTAUT [31].

5.3.1 Gender.

We did not observe any significant discussion of performance expectations by either gender or age in our interviews. This could have been caused by a number of factors. First, our sample size was very small, although close to balanced by gender. However, we did notice a

tendency for the males to have more technology experience than the females in our small sample, with two of the four males being 'tech savvy'.

5.3.2 Age.

We had little variation in the ages of our residents as most were in their late 20s to mid 30s. Only one of the Residents was over 40. In addition, as stated by the Residents in their discussion of governmental issues, EMRs will most likely replace paper charts as the 'gold standard' during their professional careers.

5.3.3 Experience.

Technical experience had a definite influence on effort expected and behavioral intention of system use in this study. The two 'tech savvy' residents endeavored to master the system, and realized that they had to learn the system either through training or on their own. Other residents were able to use the system, but expressed frustration with the interface and system scope. Because training was mentioned frequently by the residents when discussing their intentions of using the system, it seems that the level and nature of training provided to the residents may also be a broad influencing factor.

Experience with the system was discussed in the context of social influence. As one of the second year residents stated 'the influence was greater in the first year ... there was a lot of frustration'. This resident also commented that 'as everyone has gotten better in using the system...they are more positive'. This was also echoed by another second year resident who stated 'everyone had a hard time in the beginning...second and third year now understand it better...most like it.' A third year Resident mentioned observing the struggles that others had with the system. Training was mentioned by a number of residents as being a factor that enabled use of the system by other residents. The overall use of the EMR by the Residents can be seen in the context of a set of cohorts that are moving through a defined set of expectations over a three year period. The Residents, in addition to having a common goal of completing their residency, also share a goal of improved healthcare. In the case of this Residency practice, an ongoing culture of learning and assistance was seen as developing, which influenced, at least the subgroups intention to use the EMR and future EMRs.

FMED provided excellent facilitating conditions for the Residents to use the EMR. First, technology was widely available at both the clinic and at the local hospital where the Residents did some of their work. Second, at the time of the study, only 1/3 of the Residents had used the old paper system. Use of paper charts was not an alternative. The Residents commented on the accessibility of data from work and home, as this enabled their use of the EMR.

5.3.4 Voluntariness of use.

Use of the system was not voluntary. There was no other option, therefore all Residents, as well as faculty at FMED, used the EMR. Perhaps this influenced the number of participants in this initial study. Although provisions were made to enable participation by all Residents, less than half participated in the interview process. However, current use was not the focus of this study. The study examines whether the medical training and mandatory use of FMED's EMR system by the resident will influence his or her future employment decisions.

5.4 Outcome Variables - Behavior Intent

It was clear that there was peer or social influence involved in the intention to use the current system. In addition, experience with the system also influenced the intention to use the existing EMR, as this improved with familiarity and use. The overriding factor of the Residents intention to use an EMR focused on providing improved patient healthcare, performance expectation.

A third year Resident commented "paper charts can't do a fraction of what an EMR does." This Resident also wanted "control over what I pay for" and commented that the new EMR in the practice he was joining "has little flow, but it was a practice decision", having participated in the acquisition decision. This Resident, who had not worked with medical records prior to admission at FMED, had adequate IT skills, and strongly believed that EMR screens should "have templates and can be modified...customize screens for specific visits".

Another resident stated that "the EMR kept her on track better...patients could be assessed for temporary vs. permanent issues...sometimes had never been seen for a problem...paper charts hard to view all (data)". This resident believed that use of EMRs "would not want to be optional...would create mayhem...prefer all or none." "I'm more positive about the EMR than six months ago. It's good to track the patient, what happened, what was expected, what did happen and what other doctors have done."

The cost of EMRs was mentioned as a potential obstacle to residents intending to adopt EMR, particularly with smaller practices. Other obstacles mentioned were computer "savviness," particularly with older physicians; poor EMR interoperability, including geopolitical issues and; the difficulty of the conversion from paper to electronic records.

Pay for Performance (P4P) was identified as both an obstacle and government factor in potential EMR adoption by one of the residents. Data available within the EMR can be analyzed to identify which treatments

provide the greatest improvement for patients, meeting P4P objectives.

Federal regulations, such as the Health Insurance Portability and Assurance Act (HIPAA), were cited as external factors that would drive the adoption to EMRs, as would universal health care. This resident emphasized that the creation of regulations would enable the move to EMRs, as the nature of quality electronic records facilitates improved healthcare provision.

5.4 Use Behavior

Three of the residents had been trained by their medical schools to maintain eye contact with patients. One of the residents commented on the need for ease of use in entering data into the system while maintaining face-to-face contact with the patient. Another resident did not enter any data while in the room with a patient. This particular resident commented earlier about the excessive number of inputs in the system, unnecessary in his opinion, that impacted the efficiency of data input.

Three of the residents commented that they updated some of the data while meeting with the patient. All of the residents stated that they did the majority of their system updating as soon as possible after the appointment, preferably prior to seeing their next patient. Although remote access to FMED's EMR was provided, and the resident's home computers were configured to facilitate this access, the residents primarily completed their paperwork at the clinic. Two commented that they didn't have enough time to complete all the paperwork, particularly notes, prior to meeting with the next patient.

The Residents all commented on the importance of complete and reliable data as it assisted them in providing healthcare. Without reliable data, the EMR is not usable. In addition, one of the Residents commented that an EMR is "all or nothing...physicians cannot have the option of choosing not to use the EMR".

Some residents commented that they had been trained in their medical programs to maintain face-to-face contact with patients. One resident found that the positioning of the patient relative to the computer for inputs was problematic in maintaining the contact. Another resident stated that they didn't do any data input while with the patient. This resident also printed out brief history summaries prior to meeting with a patient. One Resident commented that he had "been trained to observe patients body language in the context of what they said".

5.5 Resident Attitudes Toward EMR and Employment Decisions

When asked if the existence of an EMR would influence their affiliation with a practice or hospital, five of the residents commented that, *ceteris paribus*, it would

positively influence their affiliation. The other two physicians, both in their third year, had already selected the practice that they would join upon completion of their residency. Both of the practices these physicians would be joining were in the process of evaluating and selecting an EMR, and this positively influenced their decision. In addition to the intent of the residents, it must be noted that most of them were planning on locating in a rural environment that would constrain their choice of hospitals and group practices, but did consider the presence of an EMR a benefit.

Although training was made available on a monthly basis, one resident commented that “refreshing their memory as to what is available in the system” would be helpful. Another commented that system enabled residents to keep on task and that paper charts made it difficult to get a holistic view of the patient. This Resident suggested that the ability to create temporary comments specific to acute conditions would be helpful. A third Resident stated that all required fields should be documented prior to moving to their next appointment.

One of the ‘tech savvy’ Residents mentioned that input screens were customizable and that the Director of FMED as well as the IT specialist were open to create forms. This implies that there may be a lack of communication or understanding on the part of many Residents. Perhaps this is also due to ‘tech savviness’, as the other ‘high tech savvy’ Resident also mentioned screen customization.

6. Discussion

Using the UTAUT as a framework for the interpretation of responses by respondents provides a lens to assess broad underlying factors for the adoption of EMRs by physicians completing their residency.

EMRs are beneficial in providing enhanced medical care. The overriding concern voiced by Residents was ease of use of the system, represented by requirements to enter excess (in the minds of certain Residents) data and multiple input forms.

Effort was impacted by a set of dimensions. Computer efficacy, a dimension considered but not included in the UTAUT may well be associated with ease of use with complex professional support systems such as EMRs. In light of high computer efficacy, three of the Residents commented that good typing skills were beneficial.

In addition, the role of training and peers was mentioned by Residents as having both positive and negative impact on ease of use. Both formal training and assistance by fellow Residents were seen as methods of making the system easier to use, particularly for the novice Resident. However, three of the Residents

commented that there was too much training, with one of them adding that the amount and type of training was received negatively by a set of Residents.

Use of the system by fellow Residents over time was seen as an emerging benefit by the two second year Residents. This was also echoed by a third year Resident with strong IT skills. Focused training for the first year Residents was seen by all the Residents as both a strategy to learn system basics that would enable them to avoid frustration while learning the system. The increasing knowledge base of system use by all Residents can be seen as a method of social influence impacting overall effort expended with the system.

Input from all Residents was seen as vital in streamlining the necessary inputs to the system. The supportive nature of IT and upper management in designing new input screens and making the system widely accessible may have caused the set of Residents in our study to not be concerned about the mandatory use of the EMR. We did not have the opportunity to interview the strongest naysayers and perhaps this was a negative issue with them. Also, such participation was possible due to the early stages of this project. It is not clear that future Residents will have such a feeling of participation or ownership as the basic forms and workflows will have already been developed. This suggests that there may be a need for formalizing a program of ongoing customization and general system improvement such that Resident perceptions of participation can be maintained.

Experience with the specific EMR was clearly linked to effort expectancy and social influence. It was also linked to the facilitating conditions and its impact on use behavior. The role of experience with the EMR, training, computer efficacy and group dynamics were mentioned by Residents, and warrant further examination and research, as there is also a relationship with ease of use.

Due to the limited size of our population, we did not find effects for gender or age in our interviews. However, one Resident mentioned that adoption of EMRs might be difficult for older physicians, particularly those with limited IT skills, even though this perception has been contradicted by some research [10].

The Residents and EMR at FMED provide an interesting set of conditions that perhaps influence, and certainly warrant, further research. Use of the system was mandatory, and FMED made efforts to provide facilitating conditions for system access. The Residents are essentially a cohort group, enabling group dynamics of social influence to impact behavioral intention. In addition, the combination of social influence, facilitating conditions, and experience with the EMR also provides a set of unique factors.

An overriding issue at FMED is the provision of quality healthcare. It was clear to the Residents that they could provide a higher quality of medical care due to the information at their fingertips with the EMR. In addition to the downsides associated with effort expectancy, the costs of the EMR and related facilitating conditions is of concern to Residents. It should be noted that FMED is now breaking even on the annual cost of the EMR and related expenses.

7. Future Research

Clearly our findings are preliminary. We find it interesting to note the generally more positive attitudes toward EMRs expressed by this study's participants relative to those presented in previous research e.g., [14] [18]. We suspect these more positive attitudes may result in part from the fact that EMR capabilities are improving over time, technical competency of several of the respondents, and the degree of participation Residents had in configuring the system.

Nonetheless, even Residents holding generally holding a positive attitude toward use of the technology expressed genuine concerns with technology configuration and how its use impacted upon doctor patient interaction. Further, in depth investigation of these concerns are required to improve our understanding of how technology and process redesign might be accomplished to ameliorate these concerns.

We are in the process of collecting data from an instrument directed to the Residents at FMED and the other Family Residency Program in the state. This Program uses the same EMR as FMED. It is our intention to receive input from the Residents that did not participate in our interviews, which should add better insight into the adoption and use issues identified in this manuscript.

8. References

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