Patient Education and Medication Adherence

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Abstract

Purpose/Aims: The purpose of this project was to evaluate how patient education can improve medication adherence.

Background and Significance: An exhaustive literature search was conducted with critical appraisal and evidence synthesis to evaluate the effectiveness of patient education on medication adherence. The search concluded that adherence is crucial to chronic disease processes. However, there was no one intervention that emerged as being superior for improving medication adherence. Working with patients individually to address needs through a variety of methods appeared to be the best way to improve medication non-adherence.

Methods: A project to improve medication adherence in an outpatient mental health clinic incorporated electronic medical record (EMR) technology with patient education materials. The project evaluated provider satisfaction with the EMR handout system and evaluated providers' perceptions of improved medication adherence. Providers (n=9) were followed for eight weeks once system was live. Appraisal was conducted on the providers and pre-test, mid project test, and an eight-week post-test were administered. The instrument used was the Technology Acceptance Model-2 (TAM-2).

Outcomes: Friedman Test was conducted. Results obtained showed no significant difference between the three tests ($\chi2$ (2) =2.889, p>0.05). The pretest had a standard deviation of 14.24. The posttest standard deviation was 23.75.

Conclusion: Providers educate patients about a variety of topics such as chronic conditions and wellness. It is beneficial to focus on education more broadly, instead of only medication adherence.

Keywords: patient education, medication adherence, physician perceptions

For Ryan, Emma, & Max. I couldn't have completed this or the past four years possible without your enduring love, support, and belief in me. I never could have imagined that I would be here now and it is all thanks to you. Your love has made me who I am and who I will forever be. I aspire to be the best wife and mom thanks to you. This is all for you.

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Chapter 1: Introduction

Background and Significance

Adherence vs. Compliance

The terms "adherence" and "compliance" are sometimes used interchangeably in medicine. Yet the words have different connotations. Merriam-Webster (2016) defines adherence as "the act of doing what is required by a rule, belief" (para 1). Compliance is defined as "the act or process of doing what you have been asked or ordered to do" (Merriam-Webster, para 1, 2016). The term "adherence" can be seen as preferable because it implies that a relationship or alliance has been established whereas compliance purports that the patient is following an order given to him by the doctor (Osterberg & Blaschke, 2005). The term compliance is identified as being a passive term whereas adherence implies that the patient is in accord with recommendations (Brown & Bussell, 2011). Another important distinction to make between adherence and compliance is that adherence allows the provider to build a partnership with the patient (Gould & Mitty, 2010). No longer is the provider dictating to the patient how and when he is to do things, but instead, through the use of adherence, the perspective is that care is a collaborative effort for the patient to eventually achieve "self-mastery" (Gould & Mitty, 2010, p. 2010).

Barriers to Adherence

Barriers to a collaborative effort and improved patient outcomes can be difficult to overcome. The WHO (2003) cites the following as barriers to adherence: disease state, treatment regimen, healthcare system/provider-patient relationship, socioeconomic factors, and personal patient qualities. One meta-analysis explored the patient-provider relationship specifically and found that physicians tend to not get adequate training on how to effectively communicate with

patients which in turn negatively impacts adherence (Haskard-Zolnierek &DiMatteo, 2009). There was a 19% greater risk of poor adherence related to a lack of effective communication skills from the healthcare provider (Haskard-Zolnierek & DiMatteo, 2009).

By categorizing the barriers to adherence presented by WHO (2003) into three main categories, it allows for better focus on the problem. Three main categories are: patient-related factors, physician-related factors, and health system/team building-related factors (Brown & Bussell, 2011). Patient-related factors include the patient's ability to be motivated to receive care, previous perceptions and experiences with therapies, "lack of understanding of their disease, lack of involvement in the treatment decision—making process, and suboptimal medical literacy," (p. 306). Physician-related factors include the prescribing of intricate drug regimens without adequately explaining or educating the patient about things such as adverse reactions. Health system/team building related factors look at "fragmented health care systems" (p. 307) where coordination of care and access to care are nearly impossible; this also includes the barrier to adherence in relation to lack of time. Clinicians are expected to see a vast number of patients in very short periods of time. Time constraints during patient assessments impede clinicians from appropriately having engaging conversation or dialoguing with patients about the importance of medication adherence or ways to ensure long-term adherence to ensure treatment goals and objectives can be met (Brown & Bussell, 2011). This barrier is familiar to any practitioner and can impede the ability to properly provide appropriate PE.

PE and Adherence

"Patient education begins in the doctor's office but should not end there," (Young et al., 2006, p. 1176). Collaborative patient education can make patients feel as though they are empowered participants of their care. Physicians do not spend enough time discussing what

patients want to know about with regards to antidepressant therapy (Young et al., 2006). When patients are not properly informed about medications such as antidepressants with information such as how long they should wait before seeing results and that using the medication over at least 4-12 weeks may improve efficacy, the ability to encourage adherence diminishes significantly (Young et al., 2006)

A systematic review was conducted to evaluate effective teaching strategies for delivering PE. The data shows that PE can be disseminated in a variety of ways (computers, audio, video, and verbal), however it is patient specific and specific to the situation (Friedman et al., 2011). In order for PE to be the most success, PE should be delivered in a variety of different modalities and should always be culturally sensitive and specific (Friedman et al., 2011)

An educational program was developed which involved PE in a group and asked patients to adopt a reminder activity daily. This activity would prompt the patient to take their medication daily. Results found that over 90% of the cases found the reminder activity helpful and, in turn, helped cut back on non-adherence rates (Kardas, 2013)

Bipolar disorder is a psychiatric disorder that requires a great deal of PE due to the impact that non-adherence can have on patients. By implementing a psychoeducational group along with psychiatric medication to treat bipolar disorder over a 2-year period allowed patients to have a "significant improvement in all areas of quality of life, number of relapses, and hospitalizations due to…medication compliance" (Javadpour, Hedayati, Dehbozorgi, & Azizi, 2012, p. 208). Another study found that a nurse led educational programs were beneficial in improving patient adherence in patients with bipolar disorder (Eker and Harkin, 2012).

A systematic review performed a review of 75 systematic reviews to evaluate the effectiveness of interventions directed at clients and medication efficacy. The review was aimed

at showing what ways promoted efficacy and safety most successfully. The review found that providing education unaided may be ineffective in providing long-term adherence for patients, however it showed to be effective in improving knowledge for patients; by improving knowledge for patient, this showed that clients made more informed medication choices long-term (Ryan et al., 2014)

A systematic review conducted a review of 182 systematic reviews and randomized controlled trials (RCT) to evaluate effects of a variety of interventions on medication adherence and clinical outcomes. Results varied greatly and the studies that were deemed to be of the highest quality were also complex in nature in their interventions. These studies had a variety of interventions to attempt to improve medication adherence. Few studies showed how medication adherence can consistently be enhanced. Also, only five RCTs were able to improve both adherence and clinical outcomes (Nieuwlaat et al., 2014).

Technology and Medication Adherence

As the medical community moves towards using health information technology (HIT), it is important to evaluate its effectiveness. Fang, Peifer, Chen, and Rizzo (2011) found that HIT improved physicians' awareness for the need to provide quality health care. Through the use of HIT, clinicians are mindful of their patients' care more readily than before. A systematic review of 119 articles found that HIT implementation led to improved medication adherence, improved staff productivity, improved patient-provider collaborations, and cost savings (Police, Rachel & Foster, 2011). Although there are numerous benefits to the implementation of HIT, there still appears to be barriers to the transition of fully operational EMRs; there also appears to be less emphasis in the literature on this topic as well (Police et al., 2011).

Through the use of adherence rather than compliance, a collaborative partnership is

created between the clinician and the patient to achieve the common goal of having the patient

achieving self-mastery. PE is beneficial in improving adherence in patients and can be used by

clinicians to build a tenacious relationship between clinician and patient. Although barriers to

adherence are present, it is important to not lose sight of the importance of the end goal, and

work through the barriers for the improved outcome of the patient which is to have the patient

achieve self-mastery. HIT has shown to help improve physician cognizance to improve patients'

need for improved care and this includes improving medication adherence.

Internal Evidence

In a suburban, private, outpatient mental health clinic in the East Valley, which has one

physician, one physician assistant, three nurse practitioners, three medical assistants, and one

licensed professional counselor, patient adherence is evaluated on a daily basis by practitioners.

Practitioners assess for adherence through subjective measurement (asking patients and family

members about adherence) and objective measurement (requesting pharmacy records).

Practitioners face daily problems of not being able to provide PE effectively to more adequately

address adherence.

Problem Statement

Currently the clinic has no set protocol on how much time is spent on PE with regard to

medication education or diagnosis education between practitioner and patients. The providers

feel that if there was a way this could be prompted and documented through the use of their

electronic medical record system (EMR), not only would it help facilitate the implementation of

a regular protocol, but they feel their patient population would be more receptive to it as well (L.

Amezcua-Patino, personal communication, September 29, 2014). The providers would also feel

more adequately prepared to provide PE when seeing patients if they had a system within the

EMR which was simple and user-friendly. This inquiry has led to the clinically relevant PICOT

question: In an outpatient, private mental health clinic, how does provider satisfaction and the

use of educational handouts with patients as opposed to not using educational handouts and not

feeling prepared affect provider perception of patient adherence to prescribed medications within

8 weeks?

<center>**Search Strategy and Process**</center>

Exhaustive search of the clinical literature and inquiry involved various search methods

to narrow down the most appropriate evidence to support the use of patient education to improve

medication adherence. Databases searched were ERIC ProQuest, PubMed, CINAHL, and

Cochrane Library. Keywords searched included: *patient education, adherence, medication*

adherence, and psychiatry. The "AND" Boolean operator was used throughout all searches to

help as an inclusive searching strategy. Initially, *patient education* and *adherence* yielded the

most results on all databases: ERIC ProQuest 151 results, PubMed 3803 results, CINAHL 1706

results, and Cochrane Library 16 results. By changing the search terms to *patient education* and

medication adherence on all databases, results became more limited allowing for more clarity on

subject matter. Final yields when using *patient education* and *medication adherence* were ERIC

ProQuest 44 results, PubMed 1087 results, CINAHL354 results, and Cochrane Library 7 results.

When the search term *psychiatry* was added to the databases ERIC Proquest, PubMed, and

CINAHL for searching, the results were limited too strictly, excluding too many studies.

Cochrane Library results were zero when searching with the term *psychiatry* was included.

PubMed's results were quite high (1087 results) so a rapid appraisal of these studies was

conducted to determine which studies were most appropriate for topic at hand.

Exclusion criteria used during searches included studies published before 2005, studies written in languages other than English, and doctoral dissertations. Only items published in scholarly journals were selected during the search processes as well in ERIC Proquest, PubMed, and CINAHL. Cochrane Library was limited to reviews only. Final yields after the exclusion criteria were the following: ERIC Proquest 26 results, PubMed 353 results, CINAHL 284 results, and Cochrane Library 7 results. Through careful deliberation by evaluating the strength of the evidence and the quality of the studies, ten studies were chosen, reviewed, and evaluated for appraisal. Currently, there are ten studies which were used for synthesis and evaluation (Appendix A) despite starting with over twenty studies that were deemed valuable.

Additional searches were conducted to include physicians' perceptions and attitudes towards HIT and the effect on medication adherence. Databases searched were ERIC ProQuest and CINAHL. Keywords searched included: *physician's perceptions* and *medication adherence*. The "AND" Boolean operator was used throughout all searches to help as an inclusive searching strategy. Same aforementioned exclusion criteria were used. ERIC ProQuest final yield was17 results. CINAHL final yield was 12.

Critical Appraisal and Synthesis

Overall, the studies chosen and critically appraised were of high quality. This includes five systematic reviews with two meta-analyses of level I evidence and confidence, four randomized controlled trials (RCTs) (level II), and one randomized experiment (level III). The levels of evidence and confidence were determined using Melnyk & Fineout-Overholt's (2011) Rating System for the Hierarchy of Evidence for Intervention/Treatment. There were several recurring themes seen throughout the studies that were evaluated (Appendix B).

Synthesis allowed for a merging of these themes to allow for homogeneity among the study variables. Ten out of twelve studies looked at strategies to improve medication adherence and seven out of twelve studies talked about psychoeducational programs and how these programs can impact medication adherence. Another common theme that seemed to be prevalent was physician communication methods. This subject was present in seven out of twelve of the synthesized studies. Other commonalities seen within the studies were conceptual frameworks. Nine out of twelve studies used the transtheoretical model. The second most commonly used conceptual framework among these studies was health belief model, used in two out of twelve studies. The biopsychosocial model was used in the remaining study.

Data analysis and analytic methods varied greatly amongst the studies (Appendix A). Statistical analysis was found to be appropriate to the type of studies conducted. No bias was noted to be present in the analysis of the studies. Some weaknesses were found within the studies such as low participation (including low acquisition of study participants) or small number of articles reviewed.

Conclusions from Synthesis Discussion

The literature synthesis and review imply that medication adherence is critical to helping patients with chronic illness. The literature also suggests that through the use of HIT clinicians can become more aware of the need to improve medication adherence. The appropriate interventions for improving medication adherence are not appropriately narrowed down or adequately researched. The literature synthesis concludes that there are a plethora of interventions suggesting improving medication adherence. However, no intervention is able to conclusively and statistically improve non-adherence. The findings are very positive in stating that there are many strategies that need to be encouraged for daily practice with patients in an

attempt to correct the problem of medication non-adherence as this problem should not be ignored. Working with patients individually to address their personal needs through multiple modalities appears to be the best way to improve medication non-adherence. Also taking into account physicians' use of HIT and proper implementation of HIT may lead to improved medication adherence. Implementing multi-faceted approaches into practice is a recurrent theme among the synthesized articles and necessary for providing evidence-based care.

Purpose Statement

The purpose of the proposed project was to evaluate provider satisfaction, comfort, and the effectiveness of education materials on medication adherence. The goal of this project was to evaluate how provider satisfaction with the EMR education handout system improved medication adherence. Long-term objectives of this project will look at how implementation of the EMR education handout system will develop processes in the outpatient psychiatric clinic and improve patient medication adherence.

Study Questions

The study questions for this project are the following: Will the use of an EMR education handout system improve provider awareness of medication non-adherence? Does provider satisfaction with an EMR education handout system improve provider perception of medication adherence? How does the overall acceptance of the EMR education handout system (technology) affect provider perception of medication adherence?

Chapter 2: Applied Clinical Project: Methods & Results

Introduction

This chapter will review the evidence-based practice model and conceptual framework used to guide the project. It will also discuss the approaches employed for recruitment and protecting human subject participants. Methods for the project as a whole are also described in detail including setting, organizational culture, procedures, outcome measures, data collection, analysis, and project results.

Evidence Based Practice (EBP) Model and Conceptual Framework

The ability to implement the synthesized information via a project requires a foundation with which to do so. The Stetler Model (Appendix C) was chosen as the EBP Model which will guide the proposed project. The Stetler Model is appropriate because its emphasis is on the "individual practitioner focus" (Stetler, 2001, p. 278). The model also clearly defines evidence as external versus internal (Stetler, 2001) which is essential in this project. The Stetler Model is comprised of five phases. They are preparation, validation, comparative evaluation/decision making, translation/application, and evaluation (Stetler, 2001). The Stetler Model provides a comprehensive strategy of critical evaluation for the proposed project.

The conceptual framework that will guide the proposed project will be Pender's Health Promotion Model (Appendix D). This model was developed by Nola Pender in the 1980's and explores the motivation behind what drives people to participate in health promoting behaviors (Pender, 1982). The model also looks at ways to promote and enrich health and quality of life. Enriching health and promoting health is an underlying theme of this project. The Stetler Model, creating the implementation design, and the Health Promotion Model, creating the intervention

design, together will serve as the foundation for the evidence-based project and provide guidance for implementation and intervention strategies.

<div align="center">**Project Methods**</div>

Ethics: Protection of Human Subjects and Recruitment

For the proposed project, all appropriate institutional review board (IRB) protocols were adhered to and submitted for approval. Exemption was granted on August 21, 2015 pursuant to Federal Regulation 45CFR46 (2) with IRBID STUDY00002967(Appendix E). All of the appropriate Collaborative Institutional Training Initiative (CITI) training had taken place by the Principal Investigator (PI) and Co-Principal investigator (Co-PI). Data storage was appropriately stored on Arizona State University (ASU) Secure Cloud Storage. The data was stored until May 2016 and removed and destroyed after data analysis was complete.

The proposed project had no foreseeable risks to the participants. Recruitment of the participants took place through the use of a flyer (Appendix F). The study also was discussed in a staff meeting. For tracking purposes, the pre and posttests were tracked in the following manner: favorite color, day of birth, and first initial of father's name. This allowed for full confidentiality of the participants. The consent of the participants took place prior to any study procedures. Each participant had as much time as needed to decide if they would like to participate in the project. Participation in this project was voluntary for all participants.

Setting & Participants

The setting for the proposed project was a suburban, private, outpatient mental health clinic in the East Valley of Arizona. The clinic consists of one physician, one physician assistant, three nurse practitioners, three medical assistants, and one licensed professional counselor. The providers see anywhere from eight to 25 patients per day and work 4 to 5 days per week. The

medical assistants work with patients daily educating them about their medications, and treatment, diagnoses. They each may speak with an average of 10 to 20 patients per day.

Organizational Culture

The clinic is considered a small company, being comprised of twenty-two employees. The clinic is organized as a democratic hierarchy. The CEO is the owner of the company. All major decisions for the company must be approved through him. However, he has a director of business development and a clinic supervisor who help manage the daily operations of the clinic. Between the three of these entities, the clinic is able to diplomatically make decisions about things such as operations, employees, and growth. The organization also values the input of its employees to make changes internally. When employees find an issue within a system, they are encouraged to bring it to management to see what sort of change internally can be made.

Procedure

The intervention for this project involves activating a patient education feature in the clinic's existing EMR system. In doing this, an educational session was held for the clinic's providers and medical assistants regarding the importance of medication adherence. The session discussed the purpose of the project and how to use the activated feature in the EMR. During the educational session, a pre-test was administered. After 4 weeks, a mid-project survey was administered. The posttest survey was administered after 8 weeks.

Outcome Measures

The data collection tool used is called the Technology Acceptance Model-2 (TAM-2) (Appendix G). The tool consists of 26 quantitative questions which evaluate user acceptance. TAM-2 was developed by Venkatesh and Davis (2000) from TAM-2 includes "additional theoretical constructs spanning social influence processes...and cognitive instrumental processes"

(Venkatesh & Davis, 2000, p. 187). Direct approval was obtained to use TAM-2 from the instrument's original authors (Appendix H). The survey also includes two qualitative questions to assess medication adherence. This survey includes minimal demographic information. However, due to the project not being dependent on demographics of the clinicians and participants, minimal demographic information will be collected for this project.

TAM-2 shows strong psychometric properties. All Cronbach alpha coefficient surpassed 0.80, ranging from 0.88-0.93. The principal components analysis with Oblimin Rotation showed high reliability.

Data Collection and Analysis Plan

Data collection for this project took place over 8 weeks. A pre-test was administered to commence the project, followed by a 4 week follow up test. An 8-week posttest was administered to close out the project.

The level of data collected for the project is Ordinal as it is a Likert-Scale. This project was looking at inferential statistics as the focus is on "how one variable is related to other variables" (Plichta & Kelvin, 2013, p. 6). The data collected was analyzed using paired Friedman Analysis of Variance (ANOVA) Test. This test is appropriate to the data being collected as it is a "non-parametric test equivalent of a one-way repeated-measures ANOVA" (Cronk, 2014, p. 113). The Friedman test is used with two or more measurements from related participant as in the case of this project of a pre, mid, and post-test.

Proposed Budget

The proposed cost for this project is $5.00 for handouts of the pre/post tests and $40.00-$100.00 to provide lunch to the participants at the educational meeting. No compensation was provided to participants. Salary of the participants is being compensated by the clinic.

Project Results

The pre-tests, mid project surveys, and post-tests were coded with unique identifiers as chosen by the participants. The method for coding was: favorite color, day of birth, and first initial of father's name. Participants (N=9) were reminded throughout the project to not put their names or other identifying features on the surveys. Most of the participants (66.7%) were providers while the remaining (33.3%) were medical assistants (see Figure 1). The majority of the participants were female (88.9%). Nine pre-tests, mid project surveys, and post tests were administered and all returned completed. A total of 27 surveys were synthesized using SPSS to determine the impact of educational handouts on provider satisfaction and provider perception of patient adherence to prescribed medications.

The TAM-2 tool was scored on a Likert scale from 1-7 (see Appendix G); 1 being strongly disagree and 7 being strongly agree. TAM-2 looked at nine domains when evaluating provider perceptions of the intervention. There were also two qualitative questions that were analyzed looking at provider perception of improved medication adherence. Out of the nine domains, only three out of the nine showed improvement of the average of scores from pre to post test. These domains were Intention to Use, Perceived Ease of Use, and Voluntariness. (see Table 1). The Qualitative questions were scored using 1 for yes and 2 for no. The average scores for the qualitative questions also showed positive results from pre to post test (see Table 2).

The pretest had a standard deviation of 14.24. The mid project survey standard deviation was 19.26. The posttest standard deviation was 23.75. A Friedman Test was conducted to compare all three tests performed. Data analysis plan had critical value at p.0.05. No significant difference was found between the three tests (χ^2 (2) =2.889, p>0.05). The education handout system did not significantly affect the providers' perception of medication adherence. Provider

satisfaction was also not found to be a significant result through the use of the education handout system.

Discussion of Results

The results of this project were not found to be statistically significant through the use of A Friedman ANOVA test. The sample size used in this project (N=9) may have contributed to the reason the results were not statistically significant. The project focused on the improvement of medication adherence and medication education. Providers frequently educate patients about many other things such as their chronic conditions, wellness, and provide improvement strategies. Since these education approaches were not part of the project, they were not deemed part of the TAM-2 results. It may have been beneficial to focus on education more broadly, instead of only on medication adherence. Medication adherence literature is consistent with the results of this project, which indicate that the most adequate interventions for improving medication adherence are not yet sufficiently researched.

The project had steady improvements in specific domains (see Table 1). These areas include Intention to Use, Perceived Ease of Use, and Voluntariness. These areas were not statistically significant improvements; however, the mean improvement of scores appears to be tendencies in the right direction. Clinical significance can be found in the domains in which mean improvement was found overtime from the pretest to the post test. These mean improvements are relevant to the project in various ways. Participants had intentions to use the system prior to starting, during, and even after finishing the project. The participants perceived that the system was overall an easy system to use prior to using it, while using it, and after the project had concluded. The participants also deemed the system to be voluntary; this being that participants felt inclined to participate in the project voluntarily and did not feel superiors in their

work place or peers pressured them to use the system. These mean improvements are clinically significant because they show trends of improvement: intention to use the system was evident, the level of difficulty of the system was not a barrier to the system's use, and participants' feeling pressured by peers to use the system was not a barrier to the project.

The mean scores for Job Relevance stayed relatively the same throughout the project as well. This, too, is clinically significant because it indicates that prior to and after the project the use of education handouts was and continues to be a relevant part of the participants' daily function.

Average scores of the two qualitative questions (see Table 2) also showed positive results from pre to post tests. This indicates clinical significance through mean improvement of scores over time. These improvements state that participants felt the system allowed their patients to be educated about their medications and helped them become more compliant with treatment.

Conclusion

Through the use of the Stetler Model to identify the links between the intervention and outcomes and Pender's Health Promotion Model guiding intervention design, this project was able to aptly take place. Organizational and ethical considerations were taken into account prior to any procedures taking place. For data collection, the Technology Acceptance Model-2 (TAM-2) was used to evaluate all participants who agreed to take part in the project. The project spanned over 8 weeks where three tests were collected. Data analysis involved the use of Friedman ANOVA Test which showed that there was no significant difference between the three set of tests collected. This is very typical of medication adherence projects. However, three different domains did show to have improvement in mean scores over time.

Chapter 3: Organizational/Health Policy Impact & Sustainability

Introduction

This chapter discuses the impact of the project in its entirety. It also looks at financial implications including a cost/benefit analysis. The chapter evaluates the impact of current policy which impacts the project's ability to be sustainable long-term. It will also look at this project's future application to future research and study.

Impact of Project

The project results show various outcomes which are impactful to the practice site, the providers and the system as a whole. First, the results show that emphasis was placed on education during the first half of the project. However, as the project went on, it appears there was a lack of emphasis that was placed on using the system. This can be seen in the drop of average scores (see Table 1). Another interesting point can also be said about the scores themselves. The highest mean scores on the pre-tests (Perceived Usefulness Subjective Norm) had the biggest drop to the posttest mean score. This would translate to mean that the participants went from perceiving the system to being extremely useful and part of their normal routine to not useful and not routine. In evaluating the mean scores that declined, it was important to evaluate them with the owner of the practice and decide how important it is to sit down with the providers and staff to see what needs to be done to make them more satisfied with the EMR handout system. If the providers are not happy with the system, it is evident they are unlikely to use it. It is also unlikely that patients will obtain the necessary education tools to improve adherence. It would be important to implement this system for the future due to its ease of use for the providers. However, it would be necessary to take into account this project and work with the providers on how to improve its use.

The impacts the project had, despite its lack of statistical significance were enormous. The participants are cognizant to the true power they have in being able to provide education by simply clicking a button. One provider that was not computer savvy, even would frequently ask "Are we sure the computer will know how to get the hand out to the patient?" The ever-changing world of healthcare technology is at our disposal. This was a small example of the many uses of health information technology.

Financial Implications of Project

The cost for this project was $5.00 for handouts of the pre/post tests and $40.00-$100.00 to provide lunch to the participants at the educational meeting. No compensation was provided to participants. Salary of the participants was compensated by the clinic for their time spent participating on the project. (see Table 3). The benefit of this project surpasses the cost of the project. The benefit, unfortunately cannot be measured monetarily as the benefit will be measured long-term in individual patient and provider successes. This will be seen in patients returning for follow-up visits more knowledgeable about their prescribed medications and being more adherent to treatment. It will also be seen in providers being more satisfied with their day to day experiences with patients, more satisfied with their place of employment, and seeing more patient success stories. These benefits and successes have no price.

Current Policy, Project Future, and Sustainability Plan for Project

The Affordable Care Act (ACA) and other healthcare policies will continue to impact healthcare on many levels. The potential impact of ACA on this project will be on the use of HIT. As of 2012, The Health Resources and Services Administration (HRSA) has provided numerous grants as part of ACA to help fund the enactment and implementation of HIT throughout community health centers across the United States (U.S. Department of Health &

Human Services. Health Resources and Services Administration (HRSA), 2012). The ongoing

use and implementation of HIT will allow for the healthcare system to become more efficient

and resourceful in the coming years.

This project's main barrier included time. The participants all have very short

appointment times with their patients. It was difficult for them to implement the system at first,

but once they were able to make it routine, it became habit. Another challenge faced were the

number of participants. Unfortunately the size of the clinic did not lend itself to have clinically

significant results with a sample size of 9. However, it did allow for good group dialogue and

being able to talk to participants one on one after the project ended to discuss more openly their

concerns or suggestions for bettering the system.

The future of this project includes full implementation into the clinic's daily protocols.

The providers have agreed to continue using the system and have asked for more handouts to be

added to the system that include broader topics such as wellness, chronic illness, therapy

modalities, and diagnosis education. In order to sustain the project, it will be necessary for the

administrative staff to reinforce the use of the system going forward and remind providers why

education is important. It will also be important to encourage providers to ask for new handouts

to be added to the system if necessary to encourage reciprocity and ongoing dialogue about the

system.

Implications for Future Research

As previously mentioned, literature is consistent with the results of this project. The most

adequate interventions for improving medication adherence are not yet sufficiently researched.

Provider's use of HIT has shown to improve patient provider collaboration and improve

medication adherence (Police, Rachel & Foster, 2011). It is difficult to pinpoint what problems

occurred. If the sample size were bigger, it is possible that statistical significance may have been obtained. However, due to the clinic size, that was not possible. In the future, it would be considered to use a larger population.

The next step for this project will be to meet with all the participants and discuss the project findings. It will also be to discuss what issues need to be corrected or changed with the system to encourage its ongoing use. These changes may include to add handouts to incorporate topics other than pharmacology such as chronic disease processes, therapy modalities, and sleep. The project may be replicated for future projects. This should be encouraged as ongoing patient education is vital to the advancement of improved patient quality of life.

Conclusion and Summary

The impact of this project will go far beyond the eight weeks that the project spanned. This is obvious in the ongoing protocols that have been implemented for patient education at the clinic and the renewed awareness and enthusiasm for patient education through the use of HIT. Overall, it was empowering to educate providers about the great need patients have to be educated during their visits and to implement this protocol at the site.

Adherence is an ongoing problem that all providers will struggle with on a daily basis. Any patient encounter will require a provider to ask about adherence and approach the patient in an individualized and personalized way to ensure adherence is achieved. Through the use of HIT, patients can be reached in a way that can be personal, effortless and expeditious for the provider and providers feel it can improve medication adherence as validated by this project. In closing, "Patient education begins in the doctor's office but should not end there," (Young et al., 2006, p. 1176). It is our duty to all patients to not allow time to be a constraint when it comes to education. We as healthcare providers must come up with ways to take the time during

appointments and have that communication; send the handout, send the video, make the referral. These are the things that will make the difference in the patients' lives and it is our duty to make this happen. We have the research and evidence and not using it would be imprudent and illogical. We have a responsibility to our patients to provide the best care possible, and with that comes education their healthcare.

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Table 1

TAM-2 Domains and Mean Scores

Domain	Pre-Test	Mid-Test	Post-Test
Intention to Use (Questions 1-2)*	5.6	5.8	6.1
Perceived Usefulness (Questions 3-6)	6.2	5.7	5.4
Perceived Ease of Use (Questions 7-10)*	4.7	4.8	5.4
Subjective Norm (Questions 11-12)	6.7	5.4	4.8
Voluntariness (Questions 13-15)*	5.2	5.4	6.1
Image (Questions 16-18)	3.6	2.7	3.2
Job Relevance (Questions 19-20)*	5.6	5.5	5.5
Output Quality (Questions 21-22)	5.9	4.9	5.2
Result Demonstrability (Questions 21-26)	5.2	4.8	5.1

Note. * Indicates that average scores increased or stayed the same throughout the course of the project.

Table 2

TAM-2 Qualitative Questions & Mean Scores

Questions	Pre-Test	Mid-Test	Post-Test
Do you think the system has allowed you to educate your patients more readily about their diagnoses and medications? (Question 27)*	1	1.3	1.2
Do you think the system has allowed your patients to become more compliant with their medications and treatment? (Question 28)*	1	1.2	1.2

Note. * Indicates that average scores remained positive throughout the course of the project
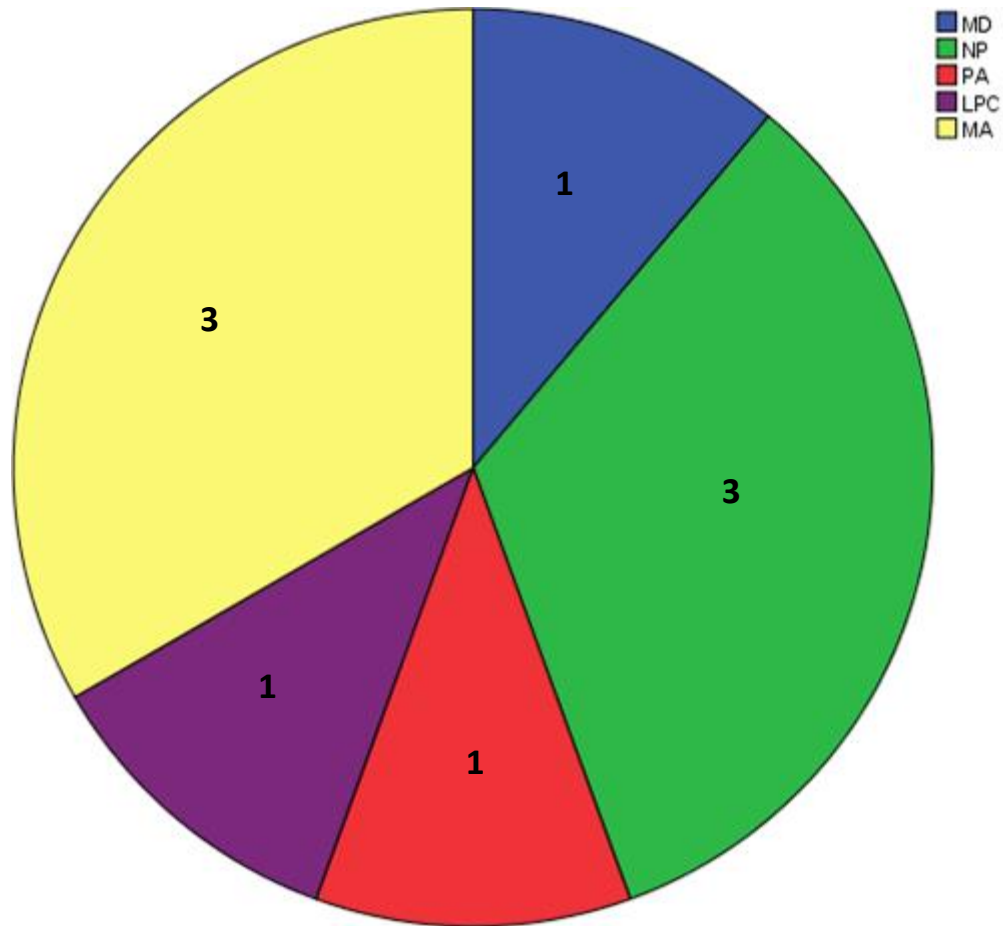
Project Participant Distribution

N=9

Figure 1. Participants of Project

Appendix A

Table

Evaluation table

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for use in Practice /Application to Practice
Brown, M. & (2011). Medication adherence: WHO cares? Country: USA Bias: MEDLINE articles used only	TTM	**Design:** SR *Level I* **Purpose:** To discuss the general aspects of MA using CVD as an example and provide clinicians with resources to improve MA.	n= approx. 127 not specified what kind, also states "more studies" were retrieved but never sates how many or from where **Inclusion Criteria:** Only articles found on MEDLINE database, English and non-English articles published between 1/1/1990 and 3/31/2010. Search terms: CVD, health literacy, MA, pharmacotherapy. **Exclusion Criteria:** Articles not discussing CVD, MA, and health literacy	IV1: Factors for NA IV2: Strategies to improve MA DV: MA	Systematic evaluation of MEDLINE database literature search based on inclusion criteria **Validity:** Not noted or discussed **Reliability:** Not noted or discussed	Manual sorting of retrieved articles	-Chronically ill patients have trouble adhering to medications -3 identified factors for NA: physician-related factors, pt related factors, health system related factors. -In addressing NA, all three previously identified factors must be taken into consideration to be successful.	**Strengths:** High number of articles reviewed (127+). Synthesis of information is valuable and practical **Weakness:** No statistical test for analysis used or discussed. Vagueness about number of studies **Conclusion:** Pts have trouble with MA and the problem is multifactorial in nature. **Feasibility:** RDD for use in practice due to high synthesis of articles culminating to provide practical recommendations on MA for daily practice

HBM- Health-Belief Model**, MA-** Medication Adherence**, PE-** Patient Education**, RCT-** Randomized Controlled Trial**, SR-** Systematic Review**, TTM-** Transtheoretical Model

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for use in Practice /Application to Practice
Friedman, A. J., (2011). Effective teaching strategies and methods of delivery for patient education: A systematic review and practice guideline recommendations Country: Canada Bias: None Noted	HBM	**Design:** SR with and without meta-analysis *Level I* **Purpose:** To determine effective teaching strategies and methods of the delivery for PE through a systematic review of literature	n= 23 systematic reviews **Inclusion Criteria:** Databases searched were MEDLINE, EMBASE, CINAHL, and HealthSTAR from years 1995-2009. Search terms included PE, teaching strategies, method of delivery.	IV1: Effective Teaching Strategies IV2: Methods of Delivery DV: PE	Relevant database search for SRs with or without meta-analyses **Validity:** AMSTAR Tool **Reliability:** Reliability of measurement not discussed	AMSTAR Tool *AMSTAR Scores:* 5 articles: 10/11 3 articles: 9/11 5 articles: 8/11 7 articles: 7/11 3 articles 4-6/11	-There are multiple effective teaching strategies and modalities for PE such as using computers, audio/videotapes, written materials, and verbal instruction. -The method of delivery of PE also is important: PE should be pt specific, involve multiple teaching strategies, culturally sensitive, and structured.	**Strengths:** Relatively good quality SR due to use of AMSTAR and high AMSTAR scores **Weakness:** Reliability could not be confirmed **Conclusion:** PE requires pt appropriate teaching strategies along with pt appropriate delivery in order to be effective and specific. **Feasibility:** RDD for use in practice due to ability to personalize care to pts and high quality of AMSTAR scores make SR applicable & translatable to practice

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Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for use in Practice /Application to Practice
Eker, F. (2012) Effectiveness of six-week psychoeducation program on adherence of patients with bipolar affective disorder

Country: Turkey

Bias: None Noted | HBM | **Design:** RCT *Level II*

Purpose: Examine effectiveness of a 6-week psychoeducation program on MA on patients with Bipolar Disorder

Inclusion Criteria: Patients receiving ambulatory care and diagnosed with Bipolar Disorder according to DSM-IV criteria and were in remission

AR: 0 | N=71 F=63 NC=35, F=33 MEA= 36.64±10.63. NI=36, F=30 MEA= 34.57±11.03. | IV: 6 week Psychoeducation program DV: MA | 6 week, 6 session psychoeducation program. Each session 90-120 min, each group= 10-12 pts

Validity: Validity of measurement not discussed

Reliability: Not reliable. Pts were only subjectively informing researchers if they were or were not being adherence to medication. No attempt at obtaining serum levels of medications to determine MA. | Chi-Test, independent sample t Test, paired t test & LOCF | Prior to intervention, 40% of pts in intervention group were adherent to meds; after intervention, 86.7% were found to be adherent. Control group tx adherence was 38.9% before intervention and 24.2% post intervention.

Pretest x^2= 0.009, p.0.05

Posttest of completers: x^2=24.649, p<0.01

Posttest of LOCF: x^2= 17.525, p<0.01 | **Strengths:** Large sample group, no AR

Weakness: Intervention done was informative to pts not aimed at long-term behavioral modification and difficult to measure objective MA (did not have serum levels to monitor medications) but instead only used subjective reports from pts.

Conclusion: MA was improved through the use of 6 week/6 session psychoeducation program and was statistically significant.

Feasibility: Not RDD as may be high cost associated with implementing this type of program in exact format; however this data supports psychoeducation improves MA subjectively therefore replicating program that may be cost-effective and sustainable for a practice or clinic may be worth looking into |

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Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for use in Practice /Application to Practice
Haskard-Zolnierek, K (2009). Physician communication and patient adherence to treatment: A meta-analysis. Country: USA Bias: Excluded Psychiatric Population	Biopsychosocial Model	**Design:** Meta-analysis *Level I* **Purpose:** Evaluate the relationship between physician communication and PA to treatment	n= 106 correlational studies, 21 experimental studies **Inclusion Criteria:** Studies were required to be: 1. Published in a peer-reviewed, English language journal from 1949 through Aug. 31, 2008, 2. Assess the communication of the physicians within a given study, 3. Assess PA, 4. Assess the effect size of the relationship between PA and physician communication **Exclusion Criteria:** Book chapters, dissertations, non-peer reviewed journal articles, prepublication drafts, conference proceedings. Substance use and psychiatric care studies were excluded	IV: Physician communication DV: PA to Tx	Articles were coded for moderator analysis **Validity:** Yes due to being systematic and coding methods allowing for valid data collection. **Reliability:** Yes. Using appropriate search catalogs and search terms based on meta-analytic techniques	Strength of association analysis (*r*) Fisher's Exact Test Fail-Safe n	**PA correlated with communication skill of physician:** k=106 -Weighted *r* (95% CI)= 0.15 (0.14, 0.16) -Unweighted *r* (95% CI)= 0.19 (0.16, 0.21) -Effect size d=0.39 -Fail-Safe n= 28,563 (tolerance level =540) **Training physician in communication skill: patient adherence as outcome:** k=21 -Weighted *r* (95% CI)= 0.09 (0.07, 0.11) -Unweighted *r* (95% CI)= 0.12 (0.08, 0.16) -Effect size d=0.24 -Fail-Safe n= 550 (tolerance level =115)	**Strengths:** High number of studies and scrutinizing data analysis **Weakness:** Very broad time frame of publication (49 years) which may weaken data **Conclusion:** All but 2 of the 106 studies evaluated found adherence and physician communication to be strongly correlated and significant with random effects tests and fixed tests. The risk of NA is 19% greater for pts who's physician has poor communication. **Feasibility:** RDD to evaluate the effectiveness of provider communication style in connection with PA and MA

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Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for use in Practice /Application to Practice
Javadpour, A. (2012) The impact of a simple individual psycho-education program on quality of life, rate of relapse and medication adherence in bipolar disorder patients Country: Iran Bias: Funding from a grant from Shiraz University of Medical Science and conducted at the university by researchers at the university.	TTM	**Design:** RCT *Level II* **Purpose:** Evaluate the impact of individual psycho-education program on QOL, rate of relapse and MA in bipolar patients	N=108 F=86 NC=54, F=41 MEA= 24.4 NI=54, F=45 MEA= 23.2 **Inclusion Criteria:** 18-60 y/o, at least 2 or 3 episodes of relapse in last 5 years of Bipolar Disorder, patients in euthymic state (HAM-D <8 and Bech Rafaelsen Mania Rate Scale , 9)	IV1: Pharmacotherapy IV2:Psycho-education & pharmacotherapy DV: MA	Intervention groups participated in 8, 50 minute sessions per week of psychoeducation followed by monthly phone contact for 10 minutes for 18 months with appointment reminders. Control group continued medication and written appointment reminders. -HAM-D Scale -Bech Rafaelsen Manic Assessment Scale (BRMS) **Validity:** HAM-D validity ranges from 0.65-0.90. (Cusin, Yang, Yeung, & Fava, 2009) BRMS has been found to be internally valid (Cronbach's alpha: 0.90 Loevinger's homogeneity: 0.49 Factor analysis: one factor Rasch analysis: accepted) (Bech, 2002) **Reliability:** HAM-D is very reliable in terms of inter-rater reliability (0.80-0.98) (Cusin, Yang, Yeung, & Fava, 2009) BRMS has been found to have high interrater reliability: Intraclass coefficients 0.92, 0.89 (Bech, 2002)	T-test, Chi-square test, and repeated measures Mann-Whitney *U* Test *P*<05	**Intervention Group:** Medication Adherence scores: *6 months:*7.93 *12 months:* 7.80 *18 months:* 7.91 P= 0.008 Quality of Life Domains: *Physical Health:* 63.81 *Mental Health:* 66.65 *Social Health:* 74.07 *Environment:* 65.05 P=0.000 **Median number of hospital admissions:** Intervention Group= 2.9 Control Group= 3.5 P= 0.176	**Strengths:** Statistically significant program developed in improving MA and improving quality of life. **Weakness:** Low number of participants. Unclear if hospital admission rates/statistics are related to intervention or not **Conclusion:** Psychoeducation group may improve MA in bipolar pts **Feasibility:** Unknown. Difficult to follow pts for 18 months and require participation to subjectively improve MA. Not a simple intervention as title may lead one to believe. However, program appears to be effective and should be considered for appropriate populations.

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Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for use in Practice /Application to Practice
Ryan, R. (2014) Interventions to improve safe and effective medicines use by consumers: an overview of systematic reviews Country: Australia Bias: None noted	TTM	**Design:** SR based on Cochrane Review Criteria *Level I* **Purpose:** To evaluate the effects of interventions that promote MA	n= 75 RCT N= 46962 participants **Inclusion Criteria:** Systematic reviews from *Cochrane Database of Systematic Reviews* & the Database of Abstracts of Reviews of Effects. Inclusion dates were from start dates to March 2012. Reviews were also sorted by intervention and included by any intervention affecting adherence to self-administration of medication.	IV: All intervention evaluated affecting MA DV: MA	Standardized selection of studies and extraction of data **Validity:** Yes due to being systematic and coding methods allowing for valid data collection. **Reliability:** Yes. Using appropriate research design for SR	AMSTAR Tool	Cochrane review found that there is an array of different methods to help improve MA. However there is not one specific way that was found to help improve MA significantly more than another. Some interventions prevalent in the literature include simplifying dosing regimens, collaboration with pharmacists, providing reminder cues, financial or material incentives, education programs in combination with enhanced follow-up and additional support.	**Strengths:** Large number of studies reviewed **Weakness:** No risk of bias analysis **Conclusion:** Many methods are researched to help improve MA. Statistically, one intervention has not been found to help more than another. **Feasibility:** Possible. Some of the interventions may be feasible to implement, however to have the knowledge of what may help improve MA for pts and what may not is vital for everyday practice in terms of MA.

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Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for use in Practice /Application to Practice
Nieuwlaat, R. (2014) Interventions for enhancing medication adherence. Country: Canada Bias: None noted	TTM	**Design:** SR based on Cochrane Review Criteria *Level I* **Purpose:** Evaluate the effectiveness of interventions aimed at improving both MA and CO	n= 182 RCTS **Inclusion Criteria:** Searched *The Cochrane Library* including *CENTRAL*, MEDLINE, EMBASE, PsycINFO, CINAHL, Sociological Abstracts, no language restrictions. Unconfounded RCTs of interventions improving MA and measuring both MA and clinical outcomes with at least 80% follow up of each group and for long term tx at least 6 month follow-up for studies with favorable findings. **Exclusion Criteria:** Substance Use related studies	IV: All interventions evaluated to affect MA and clinical outcomes DV: MA	Standardized selection of studies and extraction of data **Validity:** Yes due to being systematic and coding methods allowing for valid data collection. **Reliability:** Yes. Using appropriate research design for SR	Qualitative Analysis Risk of Bias evaluation using Cohen's kappa (k) Risk of bias for Random sequence: low in 105 RCTs and unclear in 77 RCTs. Concealment of allocation, risk of bias: high in 2 RCTs, low in 58 RCTs, and unclear in 122	Interventions to improve MA were deemed to be complex or complicated. These included increased family/peer support, education from a healthcare professional such as pharmacist or physician, or daily support for treatment. Large improvements were not notable and only five RCTs were able to improve CO and MA.	**Strengths:** Thorough research methods and database searches **Weakness:** Data analysis method did not include AMSTAR. **Conclusion:** Adherence requires complex strategies that do not show to have long term benefit and further research is necessary to look at strategies to improve MA & CO together. **Feasibility:** Not RDD. This review suggests that financially too many resources are being used up on MA without enough evidence to support this, mainly due to the complexity of the strategies researched.

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Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for use in Practice /Application to Practice
Kardas, P. (2013) An education-behavioural intervention improves adherence to statins. Country: Poland Bias: None noted	TTM	**Design:** Open-label, prospective, RCT *Level II* **Purpose:** To improve adherence through the use of a combination of education and behavioral interventions	N= 198, F= 196 NC= 91, F=89 MEA= 59.7 ± 9.5 NI=107, F=107 MEA= 59.5 ± 8.8 **Inclusion Criteria:** Adult cardiac patients with untreated hypercholesterolemia between ages 40-80 y/o **Exclusion Criteria:** Mental illness, dependence on other people's assistance in medical care (use of wheelchair or bed bound), substance abuse, homelessness, unstable angina,	IV: Educational counseling & Routine reminder activity (Behavioral intervention) DV: MA	Educational counseling provided to control group every 8 weeks upon follow-up after starting Statin medication and asked to adopt a routine evening activity. MPR **Validity:** Yes, due to being a standard measuring tool **Reliability:** Yes, mathematical ratio for measuring medication amounts	Chi Square Test	Average MPR intervention group: (+/- SD) = 95.4 +/- 53.7% Average MPR control group: (+/- SD) = 81.7% +/- 31% (P<0.05)	**Strengths:** Provides affordable interventions which are translatable to practice **Weakness:** Statistical weakness; could have provided more analytical data to support findings. **Conclusion:** Use of education counseling and a reminder activity improve MA. **Feasibility:** RDD as it appears to be cost effective and shows an effective and creative way to engage pts into being adherent to medication regimens.

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for use in Practice /Application to

AR- Attrition rate, **AD-** Antidepressant, **CVD** – Cardiovascular Disease, **CO** – Clinical outcomes, **DV**– Dependent Variable, **F**–Final number of participants, **HBM**– Health Belief Model, **IV**– Independent Variable, **LOCF**- last observation carried over, **MA** – Medication adherence, **MEA**– Mean age, **MPR** -Medication possession ratio, **n** – studies**, N**– sample size (people), **NA-** non-adherence, **NC**– Control Sample Group, **NI** – Control Intervention Group, **n**– sample size (studies), **PA**– Patient adherence, **PE**– Patient education, **PT-** Patient, **QOL-** Quality of life, **RCT-** Randomized Control trial, **RDD-** Recommended, **SD** – Standard Deviation, **SP-** Standardized patient, **SR-** systematic review, **TTM** – Trans-theoretical Model, **TX**– Treatment, **USA**– United States of America, **Y/O**– Years old

								Practice
Young H. (2006). Types of information physicians provide when prescribing antidepressant

Country: USA

Bias: None noted | TTM | **Design:** Controlled Observational Study *Level III*

Purpose: To assess information provided by physicians while prescribing ADs | N: 101 physicians (131 interactions recorded) with SPs MEA= 46.3 years, 69% males, 31% female

Inclusion Criteria: Physician specialties: general internists & family practice | IV: Type of information provided by physicians IV: Delivery method of physicians during assessments DV: Factors that influence provision of information disseminated by physicians. | Standardized patients were interviewed by physicians blindly. These sessions were recorded to evaluate the delivery method of patient education and type of information given during patient education

Validity: Not noted or discussed

Reliability: Not noted or discussed | Generalized Estimating Equations

Poisson Distribution | On average, physicians talked about 5.7 (SD=1.6) topics with regards to ADs. Main topic discussed was purpose (96%), name (90.7%), side effects (85.3%), timing (76.0%), and technical information (68.2%). | **Strengths:** Focuses on antidepressants and how physicians are educating patients about them

Weakness: Only used physicians in the study, no mid-level providers. Does not discuss the quality of what was discussed. Study used standardized patients which may not always mirror a typical patient-provider situation.

Conclusion: Pts leave their doctor's office without important information about medication.

Feasibility: Information gleaned from study is invaluable to apply to practice and develop new educational strategies when discussing medications with a pt |

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for use in Practice /Application to

AR- Attrition rate, **AD-** Antidepressant, **CVD** – Cardiovascular Disease, **CO** – Clinical outcomes, **DV**– Dependent Variable, **F**–Final number of participants, **HBM**– Health Belief Model, **IV**– Independent Variable, **LOCF-** last observation carried over, **MA** – Medication adherence, **MEA**– Mean age, **MPR -**Medication possession ratio, **n** – studies, **N**– sample size (people), **NA-** non-adherence, **NC**– Control Sample Group, **NI** – Control Intervention Group, **n**– sample size (studies), **PA**– Patient adherence, **PE**– Patient education, **PT-** Patient, **QOL-** Quality of life, **RCT-** Randomized Control trial, **RDD-** Recommended, **SD** – Standard Deviation, **SP-** Standardized patient, **SR-** systematic review, **TTM** – Trans-theoretical Model, **TX**– Treatment, **USA**– United States of America, **Y/O**– Years old

								Practice
Zygmunt, A. (2002). Interventions to improve medication adherence in schizophrenia Country: USA Bias: None noted	TTM	**Design:** Meta-analysis *Level I* **Purpose:** To improve knowledge about MA and evaluate interventions that may improve MA	n= 39 studies **Inclusion Criteria:** English language, published and unpublished doctoral dissertations, between 1980-2000, minimum of 10 subjects, participants with Schizophrenia diagnosis, measurement of MA as primary or secondary variable outcome. **Exclusion Criteria:** None specified	IV: Psychosocial interventions DV:MA	Standardized selection of studies and extraction of data **Validity:** Yes due to being systematic and coding methods allowing for valid data collection. **Reliability:** Yes. Using appropriate research design for SR	Qualitative Analysis	A wide variety of MA interventions were evaluated in this review. No single intervention was overwhelmingly or statistically successful in improving MA.	**Strengths:** Reviews different modalities to address MA **Weakness:** Statistical analysis is lacking and not discussed **Conclusion:** There are many interventions studied that look at MA. However it is important to evaluate its success in the specific pt population for overall effectiveness and appropriateness prior to implementation. Further research is needed to suggest one intervention over another. **Feasibility:** Pts are all individual and different. Using the strategies mentioned in this analysis may be useful in practice as adherence in pts with schizophrenia is a challenge and having new strategies to approach difficult pts is highly RDD.

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for use in Practice /Application to

AR- Attrition rate, **AD-** Antidepressant, **CVD** – Cardiovascular Disease, **CO** – Clinical outcomes, **DV**– Dependent Variable, **F**–Final number of participants, **HBM**– Health Belief Model, **IV**– Independent Variable, **LOCF-** last observation carried over, **MA** – Medication adherence, **MEA**– Mean age, **MPR** -Medication possession ratio, **n** – studies, **N**– sample size (people), **NA-** non-adherence, **NC**– Control Sample Group, **NI** – Control Intervention Group, **n**– sample size (studies), **PA**– Patient adherence, **PE**– Patient education, **PT-** Patient, **QOL-** Quality of life, **RCT-** Randomized Control trial, **RDD-** Recommended, **SD** – Standard Deviation, **SP-** Standardized patient, **SR-** systematic review, **TTM** – Trans-theoretical Model, **TX**– Treatment, **USA**– United States of America, **Y/O**– Years old

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Practice
Fang (2011). Health information technology and physicians' perceptions of healthcare quality Country: USA Bias: None noted	TTM	**Design:** RCT *Level III* **Purpose:** To evaluate the relationship between physicians perceptions and high quality health care	N= 11963 physicians in 2000-2001 N= 6306 in 2004-2005 **Inclusion Criteria:** Data from the Community Tracking Study Physician Surveys maintained at the Center for Studying Health System Change **Exclusion Criteria:** Only physicians	IV: Use of health information technology DV: Physicians perceptions	Standardized selection of studies and extraction of data **Validity:** Yes due to being systematic and coding methods allowing for valid data collection. **Reliability:** Yes. Using appropriate research design for RCT	Bivariate analysis, t test and $X2$ test	Health information technology is considered an important way to progress the effectiveness of healthcare. Health information technology improved physicians ability to provide improved care.	**Strengths:** High population/sample size **Weakness:** Only physicians, not other types of clinicians (NPs, PAs) **Conclusion:** Opened up the ability of other studies that should be looked at relating to health information technology and physician perception **Feasibility:** Information is feasible and valuable but should be looked at more closely due to information being so new when studied and further studies being needed on this topic.

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for use in Practice

AR- Attrition rate, **AD-** Antidepressant, **CVD** – Cardiovascular Disease, **CO** – Clinical outcomes, **DV**– Dependent Variable, **F**–Final number of participants, **HBM**– Health Belief Model, **IV**– Independent Variable, **LOCF-** last observation carried over, **MA** – Medication adherence, **MEA**– Mean age, **MPR -**Medication possession ratio, **n** – studies, **N**– sample size (people), **NA-** non-adherence, **NC**– Control Sample Group, **NI** – Control Intervention Group, **n**– sample size (studies), **PA**– Patient adherence, **PE**– Patient education, **PT-** Patient, **QOL-** Quality of life, **RCT-** Randomized Control trial, **RDD-** Recommended, **SD** – Standard Deviation, **SP-** Standardized patient, **SR-** systematic review, **TTM** – Trans-theoretical Model, **TX**– Treatment, **USA**– United States of America, **Y/O**– Years old

								/Application to Practice
Police (2011) Adoption and use of health information technology in physician practice organisations: systematic review Country: USA Bias: None noted	TTM	**Design:** Systematic Review *Level I* **Purpose:** To further understand benefits and barriers of health information technology in physician organizations	n= 119 studies **Inclusion Criteria:** English language, articles with abstracts, published between 2004-2009 on human research related to the adoption and usage of health information technology. **Exclusion Criteria:** Not US Articles, based in hospital…total of 23 exclusionary criteria reported	IV: Barriers and benefits DV: Current utilization	Standardized selection of studies and extraction of data **Validity:** Yes due to being systematic and coding methods allowing for valid data collection. **Reliability:** Yes. Using appropriate research design for SR	Qualitative Analysis	Health information technology has high prospective to impact organizations including the ability to improve things such as medication adherence, reduce cost, and improve the patient-provider relationship.	**Strengths:** Research articles are comprehensively searched and very thorough search strategies. Clearly explains each article used **Weakness:** Limited time frame of articles used **Conclusion:** Evidence shows that through the use of health information technology clinical improvements may occur including medication adherence. **Feasibility:** There is a great deal of data available supporting the adoption of health information technology due to its improvements in on day to day clinical operation. Further research is needed to focus on implementation.

AR- Attrition rate, **AD-** Antidepressant, **CVD** – Cardiovascular Disease, **CO** – Clinical outcomes, **DV**– Dependent Variable, **F**–Final number of participants, **HBM**– Health Belief Model, **IV**– Independent Variable, **LOCF-** last observation carried over, **MA** – Medication adherence, **MEA**– Mean age, **MPR -**Medication possession ratio, **n** – studies, **N**– sample size (people), **NA-** non-adherence, **NC**– Control Sample Group, **NI** – Control Intervention Group, **n**– sample size (studies), **PA**– Patient adherence, **PE**– Patient education, **PT-** Patient, **QOL-** Quality of life, **RCT-** Randomized Control trial, **RDD-** Recommended, **SD** – Standard Deviation, **SP-** Standardized patient, **SR-** systematic review, **TTM** – Trans-theoretical Model, **TX**– Treatment, **USA**– United States of America, **Y/O**– Years old

Appendix B

Synthesis Table

Studies	Brown 2011	Friedman 2011	Eker 2012	Haskard 2009	Javadpour 2012	Ryan 2014	Nieuwlaat 2014	Kardaas 2013	Young 2006	Zygmunt 2002	Police 2011	Fang 2011
Study Design												
SR (Level I)	✓	✓				✓	✓				✓	
Meta-analysis (Level I)				✓						✓		
RCT (Level II)			✓		✓			✓				✓
Randomized Experiment (Level III)									✓			
Conceptual Framework												
TTM	✓				✓	✓	✓	✓	✓	✓	✓	
HBM		✓	✓									
Biopsychosocial				✓								
Themes Related to MA												
Strategies to improve MA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Patient Specific Implementation of PE		✓				✓	✓	✓	✓	✓		
PE		✓				✓	✓	✓	✓	✓		
Physician Communication Methods	✓			✓		✓	✓		✓	✓		✓
Psychoeducation Program	✓		✓		✓	✓	✓	✓		✓		
Routine Reminder Activity								✓				
Physician Perception of HIT											✓	✓

HBM- Health-Belief Model, **MA-** Medication Adherence, **PE-** Patient Education, **RCT-** Randomized Controlled Trial, **SR-** Systematic Review, **TTM-** Transtheoretical Model

Appendix C

Stetler Model

Updating the Stetler Model of Research Utilization to Facilitate Evidence-Based Practice   Stetler
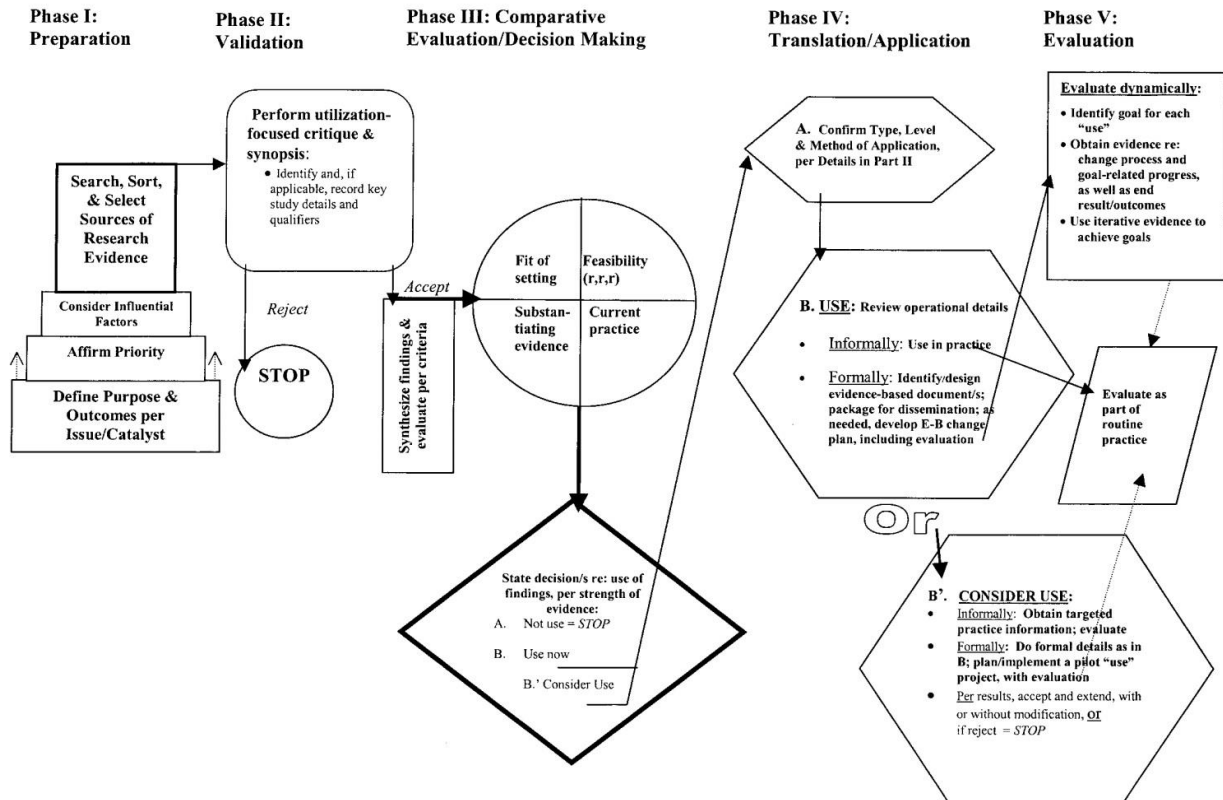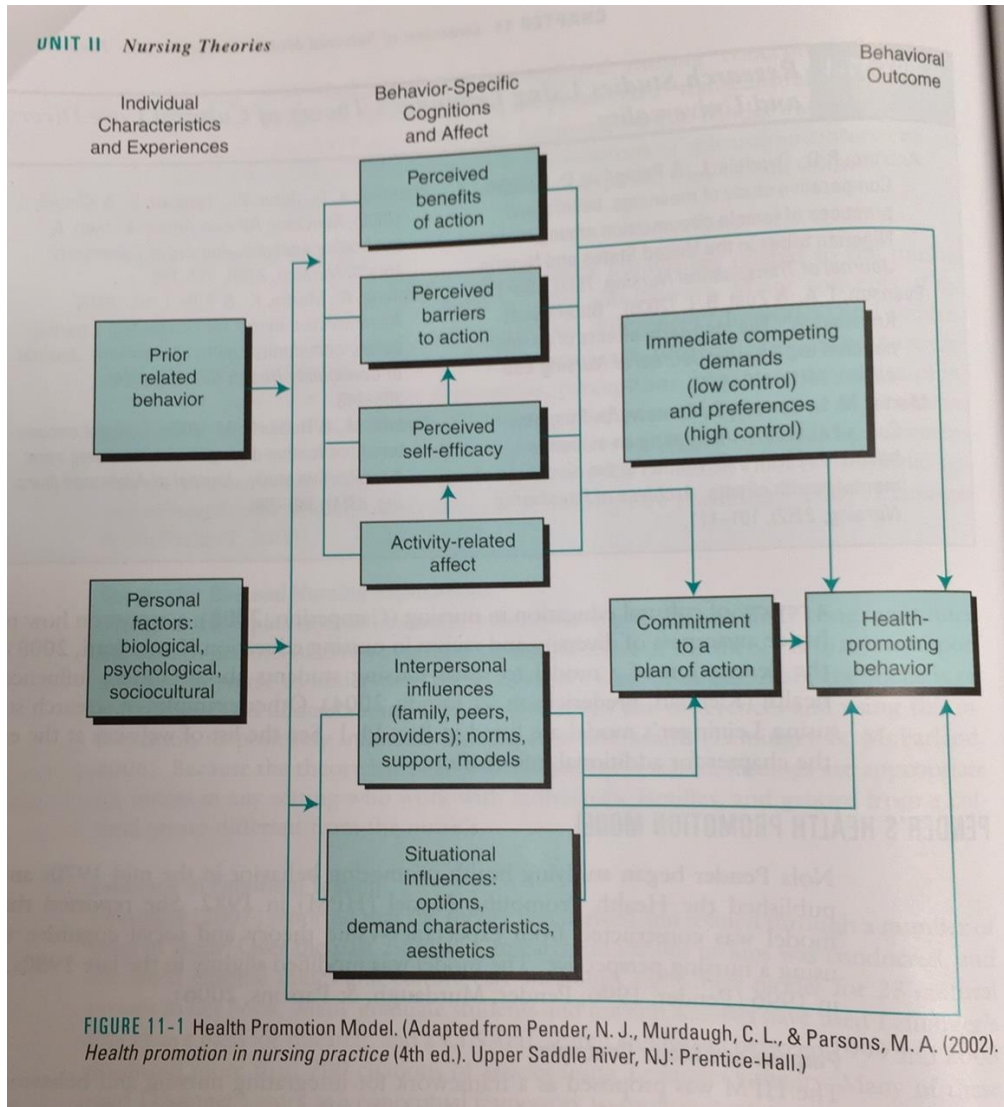
Figure 3A. Stetler Model, Part I: Steps of research utilization to facilitate EBP.

Stetler, C. (2001). Updating the settler model of research utilization to facilitate evidence-based practice. *Nursing Outlook. 49*(6).

272-279.

Appendix D

Pender's Health Promotion Model

FIGURE 11-1 Health Promotion Model. (Adapted from Pender, N. J., Murdaugh, C. L., & Parsons, M. A. (2002). *Health promotion in nursing practice* (4th ed.). Upper Saddle River, NJ: Prentice-Hall.)

Appendix E

IRB Exception

ASU Knowledge Enterprise Development

EXEMPTION GRANTED

Ann Guthery
CONHI - DNP
602/496-0794
Ann.Guthery@asu.edu

Dear Ann Guthery:

On 8/21/2015 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Use of educational handouts for psychiatric medication adherence
Investigator:	Ann Guthery
IRB ID:	STUDY00002967
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• TAM2 Measurement Scales and Reliabilities.pdf, Category: Measures (Survey questions/Interview questions/interview guides/focus group questions); • Sample Education Material 3, Category: Other (to reflect anything not captured above); • Sample Education Material 2, Category: Other (to reflect anything not captured above); • BSchulte_Site Approval Letter_Summer2015.pdf, Category: Other (to reflect anything not captured above); • BSchulte_Informed%20Consent_Summer2015.pdf, Category: Consent Form; • BSchulte_Permission to use TAM-2_Davis_Summer2015.pdf, Category: Other (to reflect anything not captured above); • Sample Education Material 1, Category: Other (to reflect anything not captured above); • Schulte_HRP-503a-TEMPLATE_PROTOCOL_SocialBehavioralV02-10-

	15_8-6-15.docx, Category: IRB Protocol; • Education Session Powerpoint, Category: Other (to reflect anything not captured above); • Schulte_DNP Applied Project Flyer_Summer2015.pdf, Category: Recruitment Materials; • Sample Education Material 4, Category: Other (to reflect anything not captured above); • BSchulte_Permission to use TAM-2_Venkatesh_Summer2015.pdf, Category: Other (to reflect anything not captured above);

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45 CFR 46 (2) Tests, surveys, interviews, or observation on 8/21/2015.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Barbara Schulte
       Ann Guthery
       Barbara Schulte

Appendix F

Recruitment Flyer

Provider Participants Needed!!

This DNP Applied Project will look at provider satisfaction and the effectiveness of education materials on medication adherence.

If you are interested in participating, we are looking for:
- ❖ Any provider who has direct patient contact
  - o This includes MD, NP, PA, LPN, MA
- ❖ Speaks and Reads English

Project Involvement Includes:
- ✓ 3 scheduled sessions including an Educational Session on how to use New EMR Education Handout System
- ✓ Using New EMR Education Handout System with patients on a daily basis

For More Information, please contact:
Barbara Schulte, RN, BSN   email: Barbara.Schulte@ asu.edu
Ann Guthery, PhD, PMHNP-BC   email: Ann.Guthery@asu.edu

ASU ARIZONA STATE UNIVERSITY

IRB#   Date of Approval

Appendix G

Technology Acceptance Model-2 (TAM-2)

Observation Period:_____
ID#:_____
Date:_____

PLEASE CIRCLE TITLE: MD   NP   PA   LPC   MA
Favorite Color:_____ Day of Birth:_____ First initial of Father's Name:_____

TAM2 Measurement Scales and Reliabilities

Please answer the following questions rating them 1 through 7:

1 = Strongly Disagree	5 = Somewhat Agree
2 = Moderately Disagree	6 = Moderately Agree
3 = Somewhat Disagree	7 = Strongly Agree
4 = Neutral (neither Disagree nor Agree)	

1.	Assuming I have access to the system, I intend to use it.	1 2 3 4 5 6 7
2.	Given that I have access to the system, I predict that I would use it.	1 2 3 4 5 6 7
3.	Using the system improves my performance in my job.	1 2 3 4 5 6 7
4.	Using the system in my job increases my productivity.	1 2 3 4 5 6 7
5.	Using the system enhances my effectiveness in my job.	1 2 3 4 5 6 7
6.	I find the system to be useful in my job.	1 2 3 4 5 6 7
7.	My interaction with the system is clear and understandable.	1 2 3 4 5 6 7
8.	Interacting with the system does not require a lot of my mental effort.	1 2 3 4 5 6 7
9.	I find the system to be easy to use.	1 2 3 4 5 6 7
10.	I find it easy to get the system to do what I want it to do.	1 2 3 4 5 6 7
11.	People who influence my behavior think that I should use the system.	1 2 3 4 5 6 7
12.	People who are important to me think that I should use the system.	1 2 3 4 5 6 7
13.	My use of the system is voluntary.	1 2 3 4 5 6 7
14.	My supervisor does not require me to use the system.	1 2 3 4 5 6 7
15.	Although it might be helpful, using the system is certainly not compulsory in my job.	1 2 3 4 5 6 7
16.	People in my organization who use the system have more prestige than those who do not.	1 2 3 4 5 6 7
17.	People in my organization who use the system have a high profile.	1 2 3 4 5 6 7
18.	Having the system is a status symbol in my organization.	1 2 3 4 5 6 7
19.	In my job, usage of the system is important.	1 2 3 4 5 6 7
20.	In my job, usage of the system is relevant.	1 2 3 4 5 6 7
21.	The quality of the output I get from the system is high.	1 2 3 4 5 6 7
22.	I have no problem with the quality of the system's output.	1 2 3 4 5 6 7
23.	I have no difficulty telling others about the results of using the system.	1 2 3 4 5 6 7
24.	I believe I could communicate to others the consequences of using the system.	1 2 3 4 5 6 7
25.	The results of using the system are apparent to me.	1 2 3 4 5 6 7
26.	I would have difficulty explaining why using the system may or may not be beneficial.	1 2 3 4 5 6 7

27. Do you think the system has allowed you to educate your patients more readily about their diagnoses and medications?

_____

_____

28. Do you think the system has allowed your patients to become more compliant with their medications and treatment?

_____

_____

Appendix H

Authorization to use TAM-2

ASU

Barbara Schulte <bschult2@asu.edu>

Doctor of Nursing Practice Project

3 messages

Barbara Schulte <bschult2@asu.edu>   Mon, Jun 22, 2015 at 11:19 AM
To: vvenkatesh@vvenkatesh.us
Bcc: Barbara Schulte <bschult2@asu.edu>

Hello Dr. Venkatesh,
My name is Barbara Schulte and I am a Doctor of Nursing Practice (DNP) Candidate from Arizona State University in the Family Psych Mental Health NP Program. I am writing you today to ask for some assistance. I have come across 2 of your papers written by you and your colleagues ("User Acceptance of Information Technology: Toward a Unified View" (2003) "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies" (2000)). I am writing you today for permission to use the tools you used and constructed in these papers. The papers describe and illustrate the Items used to measure UTAUT and the TAM2 Measurement Scales respectively. I need to use a tool that has already been constructed and tested for validity for my project. The instruments your team used appear to fit with my project. I also wanted to ask if you have a copy of the tool so that I may see how you administered it to your participants.

My project entails implementing patient educational handouts into an Electronic Medical Record (EMR) system at an outpatient psychiatric clinic. I would be assessing the practitioners' perceptions of the implementation and the effect it had on medication adherence. The assessments would take place prior to the project, mid way through, and afterwards.

I hope this email finds you well. If there are any questions I may answer for you, please don't hesitate to let me know. If there is someone else you feel I should reach out to instead that may be better suited to help me with this, please let me know. I really appreciate your help with this and any other guidance you may suggest. Have a wonderful rest of your day.

--

Barbara A. Schulte, RN, BSN

Viswanath Venkatesh <vvenkatesh@vvenkatesh.us>   Wed, Jun 24, 2015 at 8:01 PM
To: Barbara Schulte <bschult2@asu.edu>

Thanks for your interest. I am sorry for the delayed response which is due to a hectic travel schedule.

You have my permission.

You will find papers that are useful at: http://vvenkatesh.com/Downloads/Papers/fulltext/downloadpapers.htm

You may also find my book (that can be purchased for a significant student discount and faculty member discount) to be of use: http://vvenkatesh.com/book

Hope this helps.

Sincerely,
Viswanath Venkatesh
Distinguished Professor and George and Boyce Billingsley Chair in Information Systems
Walton College of Business
University of Arkansas
Fayetteville, AR 72701
Phone: 479-575-3869; Fax: 479-575-3689
Email: vvenkatesh@vvenkatesh.us
Website: http://vvenkatesh.com
IS Research Rankings Website: http://vvenkatesh.com/ISRanking

ASU

Barbara Schulte <bschult2@asu.edu>

Doctor of Nursing Practice Project
3 messages

Barbara Schulte <bschult2@asu.edu>   Mon, Jun 22, 2015 at 6:13 PM
To: fdavis@walton.uark.edu
Bcc: Barbara Schulte <bschult2@asu.edu>

Hello Dr. Davis,
My name is Barbara Schulte and I am a Doctor of Nursing Practice (DNP) Candidate from Arizona State University in the Family Psych Mental Health NP Program. I am writing you today to ask for some assistance. I have come across 2 of your papers written by you and your colleagues ("User Acceptance of Information Technology: Toward a Unified View" (2003) "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies" (2000)). I am writing you today for permission to use the tools you used and constructed in these papers. The papers describe and illustrate the Items used to measure UTAUT and the TAM2 Measurement Scales respectively. I need to use a tool that has already been constructed and tested for validity for my project. The instruments your teams used appear to fit with my project quite well, and truly this is the purpose of my email.. I also wanted to ask if you have a copy of the tools so that I may see how you administered it to your participants.

My project entails implementing patient educational handouts into an Electronic Medical Record (EMR) system at an outpatient psychiatric clinic. I would be assessing the practitioners' perceptions of the implementation and the effect it had on medication adherence. The assessments would take place prior to the project, mid way through, and afterwards.

I hope this email finds you well. If there are any questions I may answer for you, please don't hesitate to let me know. If there is someone else you feel I should reach out to instead that may be better suited to help me with this, please let me know. I really appreciate your help with this and any other guidance you may suggest. My project would really benefit from your assistance with this. Thanks very much. Have a wonderful rest of your evening.

--
Barbara A. Schulte, RN, BSN

Fred Davis <FDavis@walton.uark.edu>   Tue, Jun 23, 2015 at 9:46 AM
To: Barbara Schulte <bschult2@asu.edu>

Hello

You have my permission to use the TAM measurement scales for your research.   I do not have the original questionnaire instruments, but you should be able to construct them using a word processor following the wording provided in the articles.

Best wishes,

Fred Davis

From: Barbara Schulte <bschult2@asu.edu>
Sent: Monday, June 22, 2015 8:13 PM
To: Fred Davis
Subject: Doctor of Nursing Practice Project

[Quoted text hidden]

Barbara Schulte <bschult2@asu.edu>   Tue, Jun 23, 2015 at 10:17 AM
To: Fred Davis <FDavis@walton.uark.edu>
Bcc: Ann Guthery <Ann.Guthery@asu.edu>

Thank you very much for your quick reply with this. I really appreciate your permission to use the TAM measurement scale. This will help facilitate my project immensely. Have a great rest of your summer.