Improving Cardiovascular Medication Adherence

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Introduction

Cardiovascular disease (CVD) is the greatest health challenge for practitioners and other medical personnel (Gould, 2011). With CVD, many medications are required that the patient must take to maintain good health, in addition to lifestyle changes. Heart failure and myocardial infarctions (AMI) require long-term medications (Albert, 2008). Over 50% of all medications dispensed are not taken as prescribed. A large number of patients do not even refill a prescription a second time (Touchette & Shapiro, 2008). Adherence is described as how similar a patient's actual dosing history and the prescribed regimen is to each other. Adherence is an important link between the nursing process and outcomes. Non-adherence leads to a number of poor outcomes such as re-hospitalization and other costly medical events.

Due to barriers and obstacles that are faced daily by many in the population, non-adherence of essential medications occurs. Barriers to adherence can come in many forms: behavioral barriers that include lack of social support and personal beliefs and system barriers which include the confusion of multiple providers cost and complex, too frequent dosing schedules (Touchette & Shapiro, 2008). To increase adherence to create higher quality outcomes, the author is investigating studies and reports on medication adherence for patients with cardiovascular diseases when more comprehensive medication education or resources are required The PICO question created for the evidence-based project is: "In middle-aged patients with cardiovascular diseases, does increased patient medication education and community resources promote better prescription drug adherence?"

Comprehensive patient education can include, but is not limited to: reading materials that are user-friendly such as pocket cards or information sheets, consultation with patients and

families on medication prescribed and offerings of community resources for financial assistance

and transportation needs. The author investigated studies and reports on medication adherence

for patients with cardiovascular diseases when more comprehensive medication education or

resources are given.

Significance

Adherence is an important link between the nursing process and outcomes. Adherence

must occur for a quality outcome to happen. When taking life-saving drugs as most

cardiovascular medications are, adherence improves survival beyond what is expected

(Touchette & Shapiro, 2008). Studies show that patients who are given more comprehensive

instructions on medication, they recognize the importance of those medications to their disease

(Gould, 2007). Cardiovascular medications have become increasingly more expensive and more

widely prescribed, which place greater demands on clinicians to educate and take more proactive

measures to ensure adherence (Sokol, McGuigan, Verbrugge, & Epstein. 2005).

Purpose

The purpose of the evidence-based project (EBP) is to discover if more comprehensive

methods of intervention aimed to improve adherence may increase patient medication adherence

for cardiovascular drugs. Studies and reports have been found that help the author to assess if the

use of interventions can increase medication adherence in middle-aged patients with

cardiovascular disease.

Goals

Poor adherence has many indicators including: "living alone, low socioeconomic status, a

high number of medications taken, lack of insurance coverage, side effects, complex medication

regimens" and many others that impact the patient (Touchette & Shapiro, 2008, p. S3). Because

this is a prevalent issue in the lives of numerous patients, the author would like to attempt to make impactful interventions in order to see an increased adherence and better level of health in patients.

Targeted Population

The target population for the PICO is middle-aged women and men with varying cardiovascular diseases who currently are taking medication for the disease. The author plans to limit the number of patients studied to a small number, in a cardiologist's office, so a more comprehensive review can be completed. The clinic is located in Montgomery, Alabama, a region with urban and rural areas which has a large concentration of cardiovascular patients, due to a high level of obesity and related factors of heart disease.

Intervention methods will include: using more extensive exit interviews and follow-up phone calls with patients, detailing medication instructions, along with lifestyle change suggestions, asking about side effects and how that may affect usage, providing resources or links to organizations providing social support or transportation within communities and suggesting generic versions of the prescribed medications. Also, reminding patients to speak to their insurance company or Medicare/Medicaid representative about offerings of cost-sharing programs or expanded use of generic drugs may decrease cost for medication, therefore removing or lessening the impact of the barrier of financial hardship. Cost-sharing is achieved by "increasing generic utilization, decreasing brand utilization" and cost-shifting (Touchette & Shapiro, 2008, p. S3).

Steps for implementation will be consulting with physician and nurse practitioner (NP) to provide more time at the end of a patient's visit to execute the intervention and asking patients to stay for consultation, allowing for more communication to occur between nurse practitioner and

patient. This extra communication time can be used to learn more about the patient and the barriers they face that may affect adherence. The desired outcome of adherence will be evaluated during follow-up visits, phone calls with patients and their families, by asking about medication usage and issues that may have arisen.

Framework

The EBP model that best fits the author's clinical based problem is the Iowa model, developed by Marita Titler and faculty at the University of Iowa (Melnyk & Fineout-Overholt, 2011). The model is recognized for its ease of use for healthcare professionals and applicability for problem solving to promote quality care. Considering the whole healthcare system is a focus of the model, with care moving from provider to patient to infrastructure, with the background of research guiding decisions (Dontje, 2007). The Iowa Model describes knowledge transformation and guides evidence-based research into practice. It begins with the identification of a trigger that can be problem-focused or knowledge-focused and initiates the need for change. After the trigger is known, the next step is to review research, pertinent to the problem (Dontje, 2007). Framing a PICO question will assist the clinician in narrowing down research to find the best evidence. Establishing a PICO is done by answering the following questions: "Who is the patient population? What is the potential intervention or area of interest? Is there a comparison intervention or control group? What is the desired outcome?" (Dontje, 2007). The desired outcome should be considered in the areas of patient versus provider outcomes or short versus long term. Research can be performed for information pertaining to the best interventions and education methods. Evaluating the evidence is a critical step in the Iowa Model so the clinician can ensure that the research and evidence found is well-vetted and includes a body of studies.

Implementing the recommended change is the final step in the model and allows the nurse practitioner to evaluate outcomes in patients (Dontje, 2007).

Framework Theory

Self-regulation theory is an appropriate theory when studying interventional cardiac patients (Gould, 2011). This theory describes how each experience with illness is unique to each patient and how the patient will choose to perceive the illness (symptoms, diagnosis and instructions for care) differently. They will then decide how to manage the illness and how satisfied they are with the outcomes. Nurse practitioners and other medical staff can attempt to influence the patient's approach to illness or the care they will provide themselves but ultimately, the patient's decisions are the guide to their behaviors (Johnson, 1999). If they choose not to adhere to medication based on perceptions about the illness, the instructions for care, or what they feel will happen, the outcomes will be less than if the nurse practitioner helped to alter perception.

Acknowledging the link between adherence and patients' perceptions may help to create more comprehensive interventions and improve overall health of the population (Gould, 2011). The author believes that choosing self-regulation theory is appropriate due to the importance of patients' decision making skills and their impact on whether or not medication is taken as prescribed. Because there are so many factors that motivate patients to buy, take and sustain dosage schedules, self-regulation has to occur and must be understood by the nurse practitioner in order to communicate with patients, to result in quality outcomes.

Review of Literature

Literature was sought through multiple databases such as CINAHL, PubMed, and Cochrane. The types of literature sought were high level evidence such as systematic reviews

and randomized controlled trials and cohort studies. Search strategies included using databases

and also searching the internet for scholarly papers that may not be found easily in the databases.

The author searched for key words that included: nurse practitioner, education, cardiovascular

disease, medication, adherence, methods, intervention, and other related terms. Literature search

found numerous reviews, trials and studies on cardiovascular drug adherence in relation to two

main topics: barriers or predictors and interventions. The author believes that investigating the

barriers and then researching and implementing comprehensive interventions is a way to

encourage a higher level of adherence. The information found was relational to the author's

quest for information to complete the PICO proposal.

Barriers

All literature reviewed can be found in Appendix A, in the same sequential order as listed

in following paragraphs. Concerning the topic of barriers and predictors in relation to medication

adherence, Garavalia, Garavalia, Spertus & Decker (2009) explored patients' reasons for

discontinuance of heart medications by investigating personal beliefs and barriers to adherence.

The authors found that the most common reason was an unpleasant side effect that was painful or

interfered with their life. Other reasons were mistrust in healthcare system, confusion concerning

the medication instructions, or a personal preference for alternative therapy. Cost was also

mentioned as a barrier; many patients could not afford the co-pays or the transportation required

to obtain a prescription. Based on the author's findings, these are common findings in the realm

of barriers. Many patients in the qualitative, descriptive study also preferred more natural

approaches to high cholesterol such as using fish oil supplements. This study is unique due to its

qualitative nature. Traditional ways of understanding a patient's reasons for non-adherence do

not appear in medical charts or other usual ways of surveying. The study offers a glimpse into the more subjective and personal reasons why one would not adhere fully to heart medications.

Albert (2008) offers an inclusive report on barriers to adherence with numerous factors. Adverse effects, too frequent dosing, and cost are mentioned as well as poor communication, complex drug regimens and others. Albert (2008) describes the poor relationship between the number of daily doses compared to adherence and how reducing dosage can lead to more positive outcomes. Albert (2008) also suggests research shows patients who are given medication while still in the hospital, perceive the mediation as more important to their health and will adhere more strongly due to that perception. The use of pocket cards, poly-pills, once-daily medications, extended discussions on possible costs and confusion on instructions, the use of a pill box, clinical visits and telephone calls are offered as interventions to improve adherence.

In the prospective cohort study by Gazmararian et al. (2006), factors associated with medication adherence were explored to examine the relationship between health literacy and medication refill adherence in Medicare enrollees through an in-person survey. Health literacy is explained as a more in-depth understanding of instruction than the patient's education level, which is an important attribute of adherence (Gazmararian et al. 2006). The level of health literacy did not have significant effects of refilling of medication in this study. The authors do note that health literacy can have an effect on a refill being taken due to the perception that patients have about a medication and their willingness to take the medication. As mentioned before, cost is an important barrier or predictor to adherence and prescription drug expenditures are the fastest area of growth in the healthcare industry, affecting millions of patients.

In a 2005 study, Sokol, McGuigan, Verbrugge, and Epstein evaluated the impact of cost on medication adherence. The authors found, through a retrospective cohort observation, in the

cases of four chronic conditions: diabetes, hypercholesterolemia, hypertension, and congestive

heart failure (CHF); adherence was associated with lower costs related to the disease. By

adhering to the medications, patients experienced an overall decrease in cost for three of the four

diseases, excluding CHF, due to the lower need for hospital readmissions and office visits. While

this study does not have cost as the initial barrier, rather as a barrier that is encountered after a

patient does not adhere, the implications are strong for nurse practitioners in practice. By

discussing the potential costs that could occur due to non-adherence, the nurse practitioner could

encourage the patient to stay on the medication as directed. The prospect of large hospital bills

could be a deterrent to non-adherence.

Interventions

After learning about the barriers that could lead to non-adherence, the next step for a NP

is to determine the right intervention for educating and helping the patient to ensure adherence.

Numerous studies were found on the topic of intervention with varying results in their

effectiveness. To begin, a systematic review of the results of randomized controlled trials (RCT)

of interventions was assessed (Haynes, Ackloo, Sahota, McDonald, & Yao, 2008). The review

offered short-term and long-term interventions, with long term interventions showing more

promising results of higher adherence. Interventions found in the RCTs include, but are not

limited to: counseling, automated telephone calls, manual telephone and in-person follow-ups,

simplified dosing, special reminder pill packaging, dose-dispensing medication units, refill

reminders, encouraging self-monitoring, group meetings and difference medication formulations.

Haynes, et al. (2008) offered direct examples of several diseases, with hypertension, heart

failure and ischemic heart disease, being of interest to the author's research. In the area of

hypertension, one study offered a "telephone-linked computer system for monitoring and

counseling patients" versus patients receiving usual care. The intervention group showed greater

improvement in adherence. A nurse-led intervention was used in another study to assess

adherence to hypertension medication. The intervention group was given personal phone calls in

months one, two and four. Counseling was offered during this call as well as a change in dosage,

if needed. This led to positive results for the intervention group versus those receiving usual care.

In the area of heart failure, the authors reviewed a study in which a simplification of drug

therapy, an informational booklet, and instructions on self-monitoring were given. The

intervention group showed significant improvement in adherence after a 12-month time period

versus the control group. Ischemic heart disease patients were offered a mentor led group with

two hour meetings every month for a year. Volunteer pharmacists, dieticians, cardiac

rehabilitation nurses and others were present to assist patients. The mentored group showed

significant adherence with medication than the control group (Haynes et al., 2008).

Another systematic review searched for the optimal modes of intervention for

cardiovascular medication adherence, with positive results. Cutrona et al. (2010) performed a

review of 168 articles published over a 42 year period. They divided their research in to two

categories: person-independent interventions (mailed, faxed, or hand distributed; or delivered via

electronic interface) or as person-dependent interventions (non-automated phone calls, in-person

interventions). In the person-dependent interventions which were 52% successful, phone calls

showed low success rates (38%). In-person interventions at hospital discharge were more

effective (67%) than clinic interventions (47%). In the category of person-independent

interventions which were 56% successful, electronic interventions were most successful (67%).

The review offered a highly diverse array of options for interventions for nurse practitioners to

use in daily practice. Electronic intervention showed the most success in the review, with in-person interviews at the point of discharge also showing promise.

A RCT designed to investigate the intervention of promoting self-regulation of care at the time of discharge was performed by Gould (2011). The study compared patients undergoing cardiovascular disease procedures and given usual care instructions versus those given discharge nursing interventions (DNI). The DNI group was given written discharge instructions, and a telephone follow-up by an expert cardiovascular nurse. They also received a packet containing a pocket card, suggested internet sites and a survey, designed to assess dimensions of illness perception, the IPQ-R. Concerning medication adherence, the DNI group was asked if they had all medications on hand, asked if they took the medication as prescribed and were asked a series of four questions about forgetting or omitting medication. The experimental group had slightly more adherence regarding the first question but not in the remaining two. The study revealed that the patients receiving the DNI had a better understanding of the care they needed to provide themselves at home, including concerning medications, by recognizing the chronic nature of their disease. The ability to self-regulate only comes after the illness perception is clear to the patient and the nurse.

Interventions were offered in a study done by Berben et al. (2011). The authors gave a 45-item questionnaire to assess adherence and interventions to a group of cardiovascular medical professionals. Educational interventions were used most often with counseling to follow. Psychological interventions were not used often. The most prevalent intervention was providing reading materials, followed by training patients on medication during recovery. More than half reported using a combination to improve adherence.

Ornstein et al. (2004), determined that physician adherence is also important to examine, not to medication, but to implementing preventive clinical guidelines. In the study, improvement in adherence to clinical guidelines was based on a multi-method intervention and was more effective. The study included site visits to physicians' offices in addition to guideline dissemination and audit/feedback. The interest by the author in the study was to see if physicians adhered to better preventive measures, as medication can be for patients, could their patients become healthier or have better quality outcomes. One intervention, giving patients the clinical guidelines so they could self-manage more, was helpful to physicians and encouraged improved adherence. .

The author reviewed nine pieces of literature found in Appendix A, with two RCTs (Ornstein et al. (2004) and Gould (2011)) comparing more comprehensive interventions for patients and for physicians. Two systematic reviews were included, (Haynes, et al. (2008); Cutrona et al. (2010)) both offering positive intervention recommendations. The author reviewed one qualitative study (Garavalia, Garavalia, Spertus, & Decker (2009) that aimed to understand the barriers to adherence and one quantitative, descriptive study (Berben et al. 2011) listing the types of interventions used by cardiovascular medical professionals. A prospective cohort study (Gazmararian et al. (2006)) used a questionnaire to determine a link between health literacy and adherence was reviewed, along with a retrospective cohort observational study (Sokol, McGuigan, Verbrugge, & Epstein, 2005), reviewing the records of Medicare enrollees to determine cost increase with non-adherence. Lastly, a report on barriers and interventions for non-adherence was reviewed due to its implicit relevance the author's topic (Albert, 2008).

The first study appraised is that of Garavalia, et al. (2009), a qualitative descriptive study, offering evidence regarding patients' reasons for discontinuance and non-adherence to

cardiovascular medications. The study's weaknesses included a small study group and a refusal to ask participants if interventions were offered. The study had strength with a high level of credibility and trustworthiness shown and various clinical suggestions offered. The level of evidence for this study is deemed a 'IV' due to its singularity.

Albert's (2008) report on the barriers to and problems of, medication adherence in patients with heart failure and ways that nurse-based management can increase medication adherence is well written and trustworthy, but does not offer any trials or systematic reviews of the studies included so the evidence is not able to be used in more than a best practice manner. The certainty of the knowledge sources is firm with authors and studies named and dated thoroughly. The strength of the evidence is low, a 'VII', the lowest on the scale. In Gazmararian, et al., 2006 prospective cohort study, the evidence offered is thorough, but the study was derived from a larger, weakening its autonomy. This can cause issues with data collection and recording. The survey was performed in person and used structured data that ensured reliable sources of data. The study is considered a 'IV' due to its singularity.

In the 2005 retrospective cohort observational study, Sokol, et al.evaluate the impact of medication adherence on healthcare use and cost for four chronic conditions. The study included a review of medical and prescription benefits for over 137,000 patients over a two year period. The study, though overall strong in its review and results, has flaws due to its retrospective nature. Codes on medical claims may not reflect a patient's diagnosis accurately and chart data was not available for the authors to validate claim information. The certainty of the knowledge source is questioned, again due to its retrospective nature. The level of evidence given to this study is a 'IV'. In the systematic review by Haynes et al. (2008), the evidence is well supported

by 78 reviews of RCTs, derived from eight databases, offering a wide array. The certainty of

knowledge sources is high. There were weaknesses in the review - only published studies were

included in this review, which could have possibly overestimated the benefits of the

interventions tested to date. Literature about the topic is not indexed well, causing the authors to

possibly miss relevant trials. Showing strength of evidence, the authors did a thorough review,

contacting authors if information was not present. All studies were reviewed for bias and each

article was reviewed by at least two of the authors. The review is a 'I' level of evidence.

The systematic review of Cutrona, et al. (2010), surveyed 168 articles. The weaknesses of

the review include: studies were limited and findings were not consistent study to study

regarding the effectiveness or ineffectiveness of the interventions. The review was strong due to

its inclusion of only RCTs and the exclusion of trials that were not conducted in English. The

certainty of knowledge is high due to the detail in research and use of several reputable

databases. The level of evidence given to this review is a 'I'. Gould's (2011) quantitative study

using a randomized controlled trial, had many strengths, including direct questions asked of

patients to determine intervention improvements, using sealed envelopes to prevent tampering,

and the high participation in the study. There were some weaknesses, with a lack of diversity in

the group and a small sample size. Patients self-reported which could allow bias in results. The

certainty of the evidence is good, with detailed information about data collection and results

calculations being given by the author. The level of evidence for this study is a 'II'.

In the descriptive study by Berben, et al. (2011), interventions were assessed through a

questionnaire, developed specifically for the study, offering strong evidence for its applicability

to the objective. The study was also piloted prior to its inception. The questionnaire was given

only in English, weakening the study's strength as it was given at an international convention

and that may have excluded some participants. The level of evidence for the study is a 'VI'. In their RCT, Ornstein et al. (2004), demonstrated strength in the certainty of the knowledge source and in the design of the study. The study was over two years in length and was randomized to protect balance in the practice. The funding source had no role in the study. The group was small and the participants may have been aware of the hypothesis, causing the possibility of false results. The RCT is a 'II' in the level of evidence.

Critical Appraisal

Some of the studies reviewed were weak due to specific limitations but overall, the evidence was well-supported and most studies were completed without bias and with high validity. The recommendation for all studies and reviews is a Grade 'B' due to the results' practicality of use in clinical settings. Recommendations include: more attention given to patient medication instruction, counseling and mentoring through the use of new and expanded measures such as electronic monitoring and detailed instructions backed up by take home materials such as pocket cards and reference numbers. The need for a more comprehensive intervention strategy to increase cardiovascular medication adherence is dire. More involvement by nurse practitioners in the discharge process and through follow-ups calls and meetings is essential to improve quality outcomes for all patients.

Needs Assessment

The need for assessment of programs, protocol and people is important in any new undertaking or project. A basic understanding of all details, the knowledge of time and resources needed, and how to integrate the results into actual use was discovered during a needs assessment for an evidence-based project (Wright, Williams, & Wilkerson, 1998). The author

began this needs assessment by attempting to discover data that substantiated the problem on non-adherence. Much was found in researching past studies. At the clinic, there are several cardiologists working in the practice, and a NP assigned to each. The student will work with just one NP and one cardiologist. There is existing data based on patient histories that describe prescriptions taken and demographics about potential patients, with the possibility of knowledge about adherence levels based on a reading of interviews from past appointments. Research has been offered earlier in this document showing the need for further education regarding medication to increase adherence.

The current care delivery process at the out-patient clinic within the hospital does not include detailed education about medication or community resource offerings. The staff offers printed instructions if desired by patients. They offer no communication about community resources regarding pharmacies or transportation. Adverse events that can occur due to non-adherence are many, with readmission to a medical facility for symptoms related to cardiovascular disease, among most common. If increased education and resources can help even a small amount of patients and allow overall health to increase, the intervention will be worth resources and time spent by author. The opportunity for improvement is large in this small test of change with any increase in adherence due to the intervention to be viewed as an improvement. The key stakeholders in the EBP project are physicians, nurse practitioners, staff, students and educators– most of all – patients.

Patients have the most to gain from the success of the EBP project, if an increased adherence is achieved by understanding the information about their prescriptions and utilizing the resources offered by the author after the intervention. Initial stakeholder reaction should be

positive as there is no expectation for staff to directly work within the scope of the project, other than the nurse practitioner or the cardiologist. The staff will be aware of the project's intentions and process but will not be expected to take on additional duties due to their limited time. The author believes the staff will be interested to be part of an EBP project and see the results after completion. A needs assessment also infers that knowing what the culture of the environment is like is very important. The author discovered several indicators of a positive EBP culture at the proposed site for the project. There are ongoing activities that support EBP and Quality Improvement (QI) projects. There is support from management and section leaders but not a lot of resources that allow staff additional training to learn more about the QI initiatives.

The state of the practice environment is well-suited for the project due to a nurse practitioner that is able to help the author with the EBP project for the few days in the office with patients. The author chose this setting due to its large patient base and characteristics of said patients. The primary leaders are the cardiologist and his NP who will help to mentor the author. There is no known staff resistance as long as the project does not increase patients' appointment time significantly. Knowledge about the state of the practice will help the author to implement and evaluate the small test of change.

Implementation Plans

In order to implement the EBP project, evidence was first collected and appraised in order to determine the need for intervention and the best course to follow regarding the details of intervention. The author selected an intervention based on what he believes is lacking and verified in the literature regarding the type of education and resources offered to patients during prescription instruction time at appointments. Research and studies offer many reasons why

patients become non-adherent that include: believing the medication is not working if they do not feel better quickly, stopping medication when they believe they are better, not filling prescriptions due to lack of transportation and cost. The author believes offering this information more clearly and showcasing community resources would increase medication adherence. After evaluating the evidence researched and performing a needs assessment, the author believes the intervention will help patients' adherence and overall health; and assist to alter the culture of the clinic by promoting evidence-based research and increasing more time spent regarding prescription education and resources.

The implementation process is detailed, beginning with a thorough review of the selected patients' histories, testing of pre-intervention adherence levels using the Morisky Adherence Scale, an eight question survey; the intervention, and finally testing of post-intervention adherence levels through a second run of the survey. The author will monitor the patients' progress by calling one week after intervention to ask if their current prescription has been filled, and again three weeks later to remind patients to complete and submit post-intervention survey and to ask if a refill was made for prescription. The results from each survey will be documented and analyzed using the program, Statistical Package for the Social Sciences (SPSS).

Barriers and facilitators

Barriers and facilitators to the EBP project were analyzed regarding implementation. Barriers could include a supposed lack of time to incorporate EBP interventions. A push back from the office staff or NP of the cardiologist could occur accompanied by a possible resistance to change or increased duties. Facilitators could be an interest in adherence rates and how to improve the nursing process and outcomes by physician, NP and staff. Factors that could influence a successful implementation include: a positive response from the NP at cardiologist's office, a

friendly relationship with cardiologist and the staff at clinic. The author plans to manage barriers and facilitators by contacting office staff at least one month ahead of proposed starting point for project and providing research and information that shows the need for the project. The author also plans to work with the staff, NP and cardiologist to determine when they are available and it is convenient for the EBP project.

Resources

Resources that will be utilized in the implementation of the EBP project include: minimal clinic staff involvement, time of nurse practitioner for mentoring and assistance with patients, minimal money spent on the printing of educational and community resource documents and surveys, and the author's time to complete project. The project team consists of the author, the NP of cardiologist, cardiologist and faculty advisor, Dr. Bonnie Sanderson. The role of the author and Dr. Sanderson will be intradisciplinary and interdisciplinary as she is assisting the author in the development of the project and its implementation at the clinic site.

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Small Test of Change

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The small test of change, piloted in Spring 2012 and derived from the EBP project, will commence at the office of a hospital cardiologist, who sees patients in an outpatient setting. The patients will be within the practice of the cardiologist. Once permission is gained, the author will create flyers to put up around the office or department for patients to be informed. The author will be part of the discharge portion of appointment for patients. He will ask up to 20 patients if they agree to be part of the project. The author will continue recruitment until at least five or more agree and sign consent form. The patients who agree to be part of study will be asked to fill out the Morisky Adherence Scale survey, before hearing the intervention. After appointments, the author will review answers. The author will calculate all variables using SPSS and produce

an analysis of the results for use at end of EBP project. The patient will then be asked to listen

and take handouts relating to more comprehensive information regarding medication and

community resources. The author will attempt to highlight some areas of the education and

resources that relate to the patient's answers. The author feels that educating patients at time of

discharge will allow them to remember the education and resources offered during intervention.

The patient will be told the author will call twice over the 30 day period. The author will call

patients one week later to determine if prescriptions had been filled and directions understood.

The author will record answers of each patient. Two weeks later (in the last week of 30

day period) the author will call remind patients to complete second survey and to assess if

patients refilled prescriptions. The author will calculate all variables using SPSS and produce an

analysis of the two sets of results compared for levels of medication adherence and add in a 0

(did fill prescription) or 1 (did not fill prescription) to total Morisky score regarding the question

asked of patient after one week of appointment and at end of 30 days. The author will give a total

score for each patient to determine if intervention helped to increase medication adherence. A

low score indicates greater adherence. The total time commitment will be approximately 30

minutes from the initial meeting and intervention to the completion of the second survey over the

phone after 30 days. The effort on the patient's part will be minimal.

The author's role is to meet with patients, give initial survey, give intervention and give

take home survey to patients. The author will then follow up with phone calls, collect surveys

and produce analysis. The NP will mentor during project and the cardiologist will allow project

to go forward and mentor at will. The faculty advisor will guide project and advise. Approval

will be received from IRB prior to the commencement of the project. Approval in the form of

permission letters or authorization form will be received from hospital management, physician and any associated staff.

Project Timeline

The author proposes an approximate timeline for the project, not to exceed three months from start to finish. The author will finalize permissions including IRB approval by mid-December 2011 and begin staff orientation regarding EBP project at the beginning of January 2012. In mid-February, the author will begin screening qualified patients for inclusion into project, with between five and 20 patients agreeing to be part of project. The author will be part of the patients' appointments over the course of one month, performing survey offering and interventions. The patients will return home for 30 days, with the author calling at one week and three weeks, to monitor and remind about the remaining details of the project. The post-intervention surveys will be filled out via phone calls and author will analyze using SPSS, creating a results presentation for stakeholders. The conclusion of project will occur by the end of March.

Resources acquired prior to project include: an office from which to complete project, and permission from cardiologist and hospital management and time to complete project. Resources needed include: small funding for purchasing of materials. A proposed budget for small test of change will be in the realm of $50-100 for production of paper materials and cell phone costs associated with the monitoring and reminding of project's timeline for patients. The author will pay for any costs incurred during project.

Evaluation

Based on the original goals and purpose of the EBP project, the author will evaluate the project through results analysis, interviews with staff and a review of stakeholders' satisfaction.

Specifically, the author will evaluate the success of project using these tools: the Morisky

Medication Adherence Scale's results from pre- and post- intervention to determine an increase

in adherence; a tracking log that indicates progress made over proposed timeline, verbal

interviews with staff, NP and cardiologist and their responses to the inclusion of EBP research

and project into their daily operations; and the benefits or deficits to stakeholders' interests.

     The author will calculate the results using SPSS and produce a detailed analysis showing

pre- and post- intervention adherence levels and statistical data related to change. Lastly, the

author will create a presentation of results to share with all stakeholders previously identified.

The benefits and deficits involved will be discussed and outcomes evaluated. Any issues or

successes will be reviewed and suggestions will be offered for future EBP projects. The small

test of change will measure the same outcomes as full implementation would offer. The author

feels that using a small group of patients will still offer a range of adherence that could be seen

within a larger group. Primary outcome desired was an increased adherence to cardiovascular

medication following intervention. The participants included in the small test of change were a

diverse group and were asked for their sex, education level and diagnosis.

Participants [12]	
Demographics:	33% Male
	67% Female
Education:	58% Attended Some College
	25% High School Graduate
	16% Did not complete High School
Diagnosis:	41% Hypertension
	8% Peripheral Vascular Disease
	25% Cardiovascular Disease
	25% Hyperlipidemia

Table 1.

The author found it difficult to get a commitment from many patients and to find participants that were specifically on statins. The participants, once confirmed, were very helpful and compliant in the various stages of the study. The interventions went well and patients were receptive to the community information offered which included: location of pharmacies within 25 miles of physician's office, contact information regarding free or low cost transportation services in the area and prescription drug programs that could offer free or low cost prescriptions.

The results of the small test of change were not statistically significant with 10 participants staying in the high adherent group, one patient moved from low to medium adherence, showing improvement and none remaining in low adherence category.

Comparison of Pre and Post Intervention Morisky Adherence Scale Total Scores

PARTICIPANTS

n=10   n=10

PRE   POST

n=1   n=2

n=1

n=0

HIGH (0-3)   MEDIUM (4-7)   LOW (8-13)
ADHERENCE
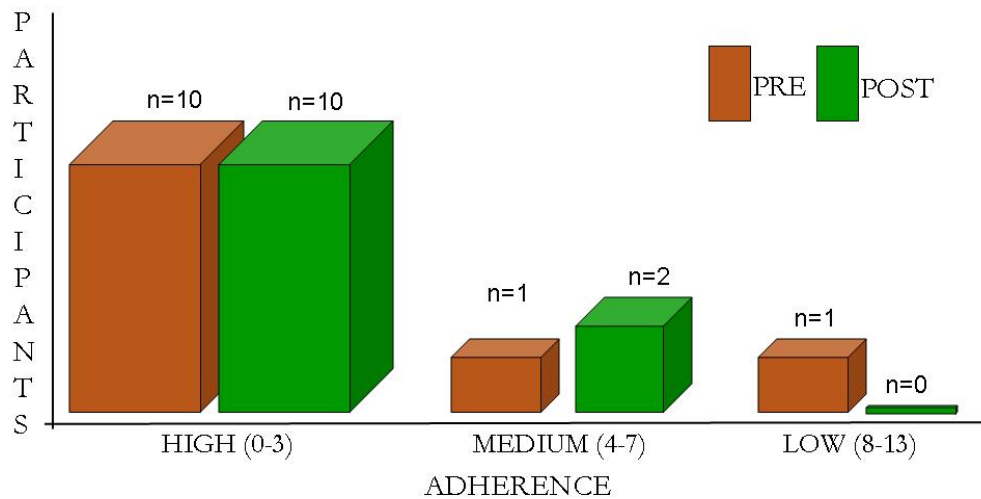
Graph 1.

Findings and Discussion

Cardiovascular affects a wide realm of the population, with education being a factor in the level of adherence. More adherent patients had a higher education level. A higher education level was seen in 58% of the participants (Table 1). The author found increased medication education and comprehensive community resources very slightly improved adherence (Graph 1). Participants who cited lack of transportation were also more likely not to fill or refill prescriptions. Population was highly adherent prior to intervention; no significant change resulted.

Recommendations

The next steps in this evidence-based project would be to present the finding, in hopes it encourages staff to spend more time with patients regarding education. For future studies, screening specifically for low adherent patients during recruitment and a sharper focus on said patients could produce more statistically significant results in future studies. Recruiting patients in an environment outside of a physician's office might allow for more honest answering of questions, due to the possibility of patients' desire to appear more adherent in front of their doctor. Lastly, engaging in a larger study with more participants would assist in reviewing a more diverse population and could help produce more statistically significant results.

A practice change this author believes is needed is more time spent at discharge with patient in order to explain the medication education and what financial resources are available to them. Also, the availability of the pharmacy map was received well by participants, indicating its importance in helping to fill or refill prescriptions more easily. New research is needed on better ways to inform and encourage patients to actively fill or refill prescriptions.

Conclusions

Due to non-adherence, many cardiovascular patients experience complications, readmissions and reoccurrences of illness. Many patients fail to fill, refill or finish their prescriptions. The author engaged in a 30 day study, assessing patients before and after an intensive intervention, to attempt to improve cardiovascular medication adherence. Out 20 eligible patients invited to participate, 12 (60%) consented in the project. Comparison between the pre- and post- intervention surveys show that there was an 8.33% improved level of medication adherence. The author will research more on the causes of non-adherence with a focus on innovative ways such as electronic monitoring for future studies.

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Appendix A.

Article citation in APA format Level of Evidence of article (I – VI)	Purpose of study/research questions	Design type and methods (sampling method/sample size, description of interventions (if any), and outcomes measured	Major findings/findings relevant to project	Critique of validity, bias and significance
Berben, L., Bogert, L., Leventhal, M., Fridlund, B., Jaarsma, T., Norekvål, T. … De Geest, S. (2011). Which interventions are used by health care professionals to enhance medication adherence in cardiovascular patients? A survey of current clinical practice. *European Journal of Cardiovascular Nursing*, *10*(1), 14-21. VI : evidence from one descriptive or qualitative study	The purpose was to assess which strategies cardiovascular nurses and allied health professionals utilize to (1) assess patients adherence to medication regimen and (2) enhance medication adherence via educational/cognitive, counseling/behavioral, and psychological/affective interventions.	The descriptive study used a survey methodology. A 45-item questionnaire to assess adherence assessment and interventional strategies utilized by health care professionals in daily clinical practice was distributed to a convenience sample of attendants of the 10th Annual Spring Meeting of the European Society of Cardiology Council on Cardiovascular Nursing and Allied Professions conference in March 2010. Respondents not in direct clinical practice were excluded. Of 276 distributed questionnaires, 171 (62%) were returned, of which 34 (20%) were excluded as respondents performed no direct patient care.	Educational/cognitive adherence enhancing interventions were used most frequently, followed by counseling/behavioral interventions. Psychological/affective interventions were less frequently used. The most frequent intervention used was providing reading materials (66%) followed by training patients regarding medication taking during inpatient recovery (48%). Slightly over two-thirds (69%) reported using a combination of interventions to improve patient's adherence. Questioning patients about non-adherence during follow-up was the most frequently reported assessment strategy (56%). Educational interventions are used most in clinical practice, although evidence shows they are less effective than behavioral interventions at enhancing medication adherence.	Weaknesses: 1) The questionnaire was only given in English, though it was distributed at an international conference, where a multi-language questionnaire might have garnered a larger response. Strengths: 1) The questionnaire was developed specifically for this study and discussed and adapted a number of times before finalization. The study was piloted to ensure understandability. Respondents were notified twice about the study to ensure knowledge. 2) Research associates were available during the conference to help with the questionnaire and answer any questions. 3) The study was random in selection of participants and unbiased. Significance to my PICO: 1) This study was the most applicable to the PICO I am working on. It offered numerous types of interventions that could be used to help promote medication adherence. 2) The interventions respondents supplied included many not thought of before and that can be further explored. 3) The study supports the NP in assertion of the need for interventions.

Gould, K. (2011). A Randomized Controlled Trial of a Discharge Nursing Intervention to Promote Self-Regulation of Care for Early Discharge Interventional Cardiology Patients. *Dimensions of Critical Care Nursing*, *30*(2), 117-125. II: evidence from one well-designed RCT, experimental design in which subjects are randomized to a control or treatment group.	The purpose of this study was to compare medication adherence, patient satisfaction, use of urgent care, and illness perception in patients with cardiovascular disease undergoing interventional revascularization procedures who receive usual care and those who receive a discharge nursing intervention.	This quantitative study using a randomized controlled trial was used to test the efficacy of this nursing intervention. The study was conducted at a large academic medical center that serves as both a city and community care center. All study methods and materials were approved by the system's Institutional review board (IRB). Patients were selected from a purposive population. The target population for this study was adult male and female patients between the ages of 30 and 80 years treated for an acute cardiac event with PCI and discharged from a hospital setting within 72 hours of the procedure. Following consent, patients were randomly assigned into 2 groups: control and experimental, determined by selection of sealed envelopes containing group assignment and study materials. Written and verbal consent was obtained.	The experimental and control groups of subjects receiving interventional diagnostic and interventional cardiac care was demographically comparable. Analysis on 4 outcome measures, medication adherence, use of urgent care, patient satisfaction, and illness perception, revealed only one statistically significant result. Adherence was examined in three ways. First, subjects were asked if they had all medications currently prescribed. Adherence with medication on hand was extremely high (124; 96.1%) for patients reporting that they had all medications ordered. The experimental group had a slightly higher rate of adherence (63 [98.4%] vs 61 [93.8%]) in the control group. However, the group difference was not significant (P = .177). Second, they were asked to indicate what percentage of aspirin and/or clopidogrel they took as prescribed. Questions related to adherence to specific medications, aspirin and clopidogrel, showed very little variation in the total sample and between groups. 22 Analyses showed there were no significant group differences in patients taking aspirin (P = .652)	Weaknesses: 1) This study also compared use of urgent care and illness perception in addition to medication adherence, and the student did not need that extra information for the EBP project 2) There was a lack of diversity in the participant group. 3) The sample size was small. 4) Patients self-reported which could bias results 5) The study was short, just 1-3 days Strengths: 1)The study did ask directly if patients receiving nursing intervention differed significantly from those that receive usual care on medication adherence and that focus helped greatly in providing background for my PICO. 2) There was a control and experimental, allowing for comparison. Instructions were given to participants in sealed envelopes to deter tampering. 3) Medical adherence was measured using a notable tool – Self Reported Medication Taking Scale of Morisky. 4) There was high participant rate for the study. Significance to my PICO: 1) In the results, there was a significant difference in the medication adherence of the control group versus the experimental. Additional nursing interventions did not increase adherence. 2) The study offers some solutions in achieving higher adherence, such as redesigning the discharge process and using electronic medical records and monitoring to increase adherence.

| | | Control group patients received routine discharge materials and usual care. The experimental group received a discharge intervention, consisting of written discharge materials and telephone follow-up by an expert cardiovascular nurse. Expert nurses were defined as those having advanced education and clinical expertise in the care and management of this population. Delivery of the intervention was time-sensitive. The intervention was offered at discharge and continued within 24 hours of discharge. Subjects in the control group received an envelope containing group instructions, copies of interview tools, and the IPQ-R. A second packet was prepared for the experimental group containing group instructions, medication review materials, a medication pocket card, suggested Internet sites, copies of the interview tools, and | or clopidogrel (P = .394). And third, they were asked a series of 4 questions about forgetting or omitting medication. Adherence, as measured by subjects' self-report of the 4 items, was recoded into a new variable labeled Morisky Adherence. Data for the recoded variable remained skewed at 8.32. To compare the experimental and control groups on Morisky Adherence, a nonparametric test, the Mann- Whitney U test, was used. The groups were not significantly different (P = .266). | |

| | | the IPQ-R instrument.

Consent was obtained from 154 patients, and final analyses included data from 129 patients. Twenty-five subjects did not complete the study for a number of reasons. Eighteen of the original 154 were lost due to extended hospitalization, and patients were no longer eligible for the study if their hospital stay extended beyond 72 hours. Of these 18, 8 subjects were admitted for urgent cardiac surgery, 2 for other types of urgent surgical procedures, and 8 for extended admissions due to procedural complications or medical issues requiring immediate attention. Six subjects were lost to telephone follow-up. Only 1 participant requested to be released from the study. | | |
| --- | --- | --- | --- | --- |
| Article citation in APA format

Level of Evidence | Purpose of study/research questions | Design type and methods (sampling method/sample size, description | Major findings/findings relevant to project | Critique of validity, bias and significance |

of article (I – VI)		of interventions (if any), and outcomes measured		
Garavalia, L., Garavalia, B., Spertus, J., Decker, C. (2009). Exploring patients' reasons for discontinuance of heart medications. *The Journal of Cardiovascular Nursing*. *24*(5): 371-379. VI: evidence from one descriptive or qualitative study	The purpose of the study was to explore clopidogrel and cholesterol-lowering therapy (CLT) discontinuance after an MI to understand patients' reasons for stopping these two medications, with a focus on understanding the barriers to persistence and the personal beliefs that contribute to the problem.	In this qualitative descriptive study, two groups of patients who stopped a heart medication-either clopidogrel or CLT-were recruited from a prospective myocardial infarction registry. Patients who discontinued CLT (n = 29) or clopidogrel (n = 11) were interviewed within 18 months of hospitalization. Patients were recruited and interviewed until data saturation was achieved. The Health Belief Model was used as an organizing framework in analyzing and coding the narrative data. The codes were then summarized for each group and compared to identify similarities and differences in reasons for CLT and clopidogrel discontinuance.	The most common reason for CLT discontinuance was adverse effects that were painful and interfered with daily life. Less common reasons for discontinuance were prescription confusion, cost, mistrust in medicines/healthcare system, and preference for alternative therapies. Reasons for clopidogrel discontinuance were duration confusion, adverse effects, and cost. Although doctors stopped patients' clopidogrel in preparation for surgery, doctors conceded to discontinuance of CLT for patients who experienced adverse effects after trying 2 to 3 different CLTs. Patients who discontinued CLT were more likely to believe that they did not need the treatment than do patients who discontinued clopidogrel.	Weaknesses: 1) The study group was small. 2) The study did not ask participants if interventions had been offered. 3) Since this study delved more into the reasons why, rather than solutions for, medication non-adherence, it was not as useful as initially deemed. Strengths: 1) Questions asked in the interview stage of the study offer ideas of what to ask patients as an NP when learning their health literacy level on medications. 2) Credibility and trustworthiness of the data received from study participants was established in four ways, ensuring reliability. 3) The study offered some clinical suggestions such as improved communication in particular, information being relayed about the needed duration of the medication for use, so patients do not just stop using it when they feel better or cholesterol drops. Significance to PICO: 1) The reasons for stopping medication by study participants is a good glimpse into what a NP might expect from patients and to know this ahead of time, gives the student a chance to think of alternate interventions to help increase adherence. Using resources to obtain samples and acquiring community information and transportation sources for patients would be very helpful. 3) The use of the Health Belief Model as a framework was helpful in allowing the student to see how a framework is used within a report.
Article citation in APA format Level of Evidence of article (I – VI)	Purpose of study/research questions	Design type and methods (sampling method/sample size, description of interventions (if any), and outcomes measured	Major findings/findings relevant to project	Critique of validity, bias and significance
Gazmararian J.,	The purpose of the	This was a	Overall, 40% of the	Weaknesses: 1) The study was derived from a

Kripalani S., Miller M., Echt K., Ren J., Rask K. (2006). Factors associated with medication refill adherence in cardiovascular-related diseases: A focus on health literacy. *Journal of General Internal Medicine.* *21*(12):1215-21.

IV: evidence from case-control or cohort studies | study was to examine the relationship between health literacy and medication refill adherence among Medicare managed care enrollees with cardiovascular-related conditions. | prospective cohort study in which new Medicare enrollees from 4 managed care plans who completed an in-person survey and were identified through administrative data as having coronary heart disease, hypertension, diabetes mellitus, and/or hyperlipidemia (n = 1,549). Health literacy was determined using the short form of the Test of Functional Health Literacy in Adults (S-TOFHLA). Prospective administrative data were used to calculate the cumulative medication gap (CMG), a valid measure of medication refill adherence, over a 1-year period. Low adherence was defined as CMG > 20%. | enrollees had low refill adherence. Bivariate analyses indicated that health literacy, race/ethnicity, education, and regimen complexity were each related to medication refill adherence (P<.05). In unadjusted analysis, those with inadequate health literacy skills had increased odds (odds ratio [OR] = 1,37, 95% confidence interval [CI]: 1,08 to 1.74) of low refill adherence compared with those with adequate health literacy skills. However, the OR for inadequate health literacy and low refill adherence was not statistically significant in multivariate analyses (OR = 1.23, 95% CI: 0.92 to 1,64). | larger one and that may cause some issues with data collection and recording.

Strengths: 1) The questionnaire in the study was done in person and this helps with the validity and reliability of data collected. 2) Using structured data along with the questionnaire helped to ensure the most reliable sources of data.

Significance to PICO: 1) Discovering information about the level of health literacy patients have can help to choose the right intervention. 2) The study included patients with a range of cardiovascular disorders which is relevant to my PICO, since I do not plan to focus on just one disease. 3) The study took into account several variables such as socioeconomic status and health status that are factors that I will consider to as a NP. This analysis helped to learn more about what causes patients to non-adhere. |
| Haynes, R., Ackloo, E., Sahota, N., McDonald, H., Yao, X. (2008). Interventions for enhancing medication adherence (review). *The Cochrane Library. Vol.* 4

I: evidence from | The purpose of the review was to update a review summarizing the results of randomized controlled trials (RCTs) of interventions to help patients follow prescriptions for medications for medical problems, including mental disorders but not addictions. | This was a review in which the authors updated searches of *The Cochrane Library,* MEDLINE, CINAHL, EMBASE, International Pharmaceutical Abstracts (IPA), PsycINFO (all via OVID) and Sociological Abstracts (via | For short-term treatments, four of ten interventions reported in nine RCTs showed an effect on both adherence and at least one clinical outcome, while one intervention reported in one RCT significantly improved patient adherence, but did not enhance the clinical outcome. For long-term | Weaknesses: 1) In the heart failure research, in the main study reviewed, the patients were not blinded to the study group, and the measures were subjective. 2) Only published studies were included in this review, possibly overestimating the benefits of the interventions tested to date. 3) In the studies reviewed, 36 of the 78 met the standard of including at least 60 participants, causing a lessening of power to detect clinically important effects. 4) The review is focused on interventions to increase adherence, excluding studies that |

systematic review or meta-analyses, which provides a synthesis evidence from all relevant, randomized control trials (RCTs), or evidence-based reviews		CSA) in January 2007 with no language restriction. We also reviewed bibliographies in articles on patient adherence and articles in our personal collections, and contacted authors of relevant original and review articles. Articles were selected if they reported an unconfounded RCT of an intervention to improve adherence with prescribed medications, measuring both medication adherence and treatment outcome, with at least 80% follow-up of each group studied and, for long-term treatments, at least six months follow-up for studies with positive initial findings. Study design features, interventions and controls, and results were extracted by one review author and confirmed by at least one other review author. The authors extracted adherence rates and their measures of variance for all	treatments, 36 of 83 interventions reported in 70 RCTs were associated with improvements in adherence, but only 25 interventions led to improvement in at least one treatment outcome. Almost all of the interventions that were effective for long term care were complex, including combinations of more convenient care, information, reminders, self-monitoring, reinforcement, counseling, family therapy, psychological therapy, crisis intervention, manual telephone follow-up and supportive care. Even the most effective interventions did not lead to large improvements in adherence and treatment outcomes. High priority should be given to fundamental and applied research concerning innovations to assist patients to follow medication prescriptions for long-term medical disorders. For short-term treatments several quite simple interventions increased adherence and improved patient outcomes, but the effects were inconsistent from study to study with less than half of studies showing benefits. Current methods of improving adherence for chronic health problems are mostly complex and not	reported only on reducing drop out rates and missed appointments. 5) Some study authors did not describe all parts of interventions, leaving information to be desired. 6) There is a possibility that the authors missed some trials that met all criteria due to a small amount of literature that is not indexed well and is scattered across disease boundaries. Strengths: 1) Ethical standards for adherence research dictate that attempts to increase adherence be judged by the benefits, not simply on adherence rates. The authors only included studies that judged both. 2) Each full text article was reviewed independently by at least two of the review authors according to criteria. 3) All articles were reviewed and the authors were contacted if information was missing or unclear. 4) The studies were reviewed for bias. Significance to PICO: 1) At first glance, the systematic review seems to offer a negative look at interventions and any success that they offer to adherence. But the authors chose to only review articles that included medication adherence and outcomes, so their criteria was more narrow-focused offering narrow results. But the information is valuable even if there are not much positive results. 2) The review shows that interventions involving allied health professionals appear to be promising.

		methods of measuring adherence in each study, and all outcome rates and their measures of variance for each study group, as well as levels of statistical significance for differences between study groups, consulting authors and verifying or correcting analyses as needed. The studies differed widely according to medical condition, patient population, intervention, measures of adherence, and clinical outcomes. Therefore, we did not feel that quantitative analysis was scientifically justified; rather, the authors conducted a qualitative analysis.	very effective, so that the full benefits of treatment cannot be realized.	
Article citation in APA format Level of Evidence (I – VI)	Purpose of study/research questions	Design type and methods (sampling method/sample size, description of interventions (if any), and outcomes measured	Major findings/findings relevant to project	Critique of validity, bias and significance
Cutrona, S., Choudry, N., Fischer, M., Servi, A., Liberman, J., Brennan, T., Shrank, W. (2010). Modes of delivery for	The objective was to determine the optimal modes of delivery for interventions to improve adherence to cardiovascular medications.	This was a systematic review in which the authors conducted systematic searches of English-language, peer-reviewed	The authors identified 6550 articles. Of these, 168 were reviewed in full and 51 met inclusion criteria. Among person-independent interventions (56%	Weaknesses: 1) Studies were limited to those with adult subjects with outpatient experience or those in inpatient/outpatient transition. 2) Studies were excluded if they described an intervention characteristic that only included regimen simplification as they could not be placed in an intervention category. 3) The findings are not consistent study to study

interventions to improve cardiovascular medication adherence. *American Journal of Managed Care. 16*(12): 929-941. I: evidence from systematic review or meta-analyses, which provides a synthesis evidence from all relevant, randomized control trials (RCTs), or evidence-based reviews		publications in MEDLINE and EMBASE, 1966 through December 31, 2008. The authors selected randomized controlled trials of interventions to improve adherence to medications for preventing or treating cardiovascular disease or diabetes. Articles were classified based on mode of delivery of the main intervention as (1) person-independent interventions (mailed, faxed, or hand distributed; or delivered via electronic interface) or (2) person-dependent interventions (nonautomated phone calls, in-person interventions).	successful), electronic interventions were most successful (67%). Among person-dependent interventions (52% successful), phone calls showed low success rates (38%). In-person interventions at hospital discharges were more effective (67%) than clinic interventions (47%). In-person pharmacist interventions were effective when held in a pharmacy (83% successful), but were less effective in clinics (38%).	regarding the effectiveness or ineffectiveness of the interventions. Strengths: 1) The studies were selected if they reported the results of randomized controlled trials that examined interventions to improve medication adherence for prevention or treatment of cardiovascular disease or diabetes. 2) Studies were excluded in they were written in a language other than English or were less than 24 weeks in duration because cardiovascular adherence requires long term adherence. 3) The review includes information on how individual studies were assessed 4) The authors included studies of differing population from different countries, and with different cardiovascular diseases, non-adherent versus all patients, and hospitalized versus outpatient patients. The reason to select different populations and locations was to achieve a wide view of all available information on adherence. Significance to PICO: 1) The authors say that future medication adherence studies should explore new electronic approaches and in-person interventions at the site of medication distribution. Identifying times of increased patient receptivity to the adherence message such as hospital discharge also will be important. 2) Two out of three of the person-independent (mailed, faxed or hand-delivered materials) interventions were not successful in achieving adherence, while four out of six of the person-independent electronic interventions (electronic pillboxes, programmable reminders, automated phone calls and computer-generated individualized interventions) were successful, showing that the electronic systems of interventions tend to improve adherence more 3) The results of the review relate to the patients' preference and values about care because the interventions reviewed are realistic, non-intrusive and provide options that a patient would appreciate when taking medication that should include additional education and reminding about the prescription.
Article citation in APA format	Purpose of study/research questions	Design type and methods (sampling method/sample	Major findings/findings relevant to project	Critique of validity, bias and significance

Level of Evidence (I – VI)		size, description of interventions (if any), and outcomes measured		
Ornstein, S., Jenkins, R., Nietert, P., Feifer, C., Roylance, L., Nemeth, L. et al. (2004). Multimethod quality improvement intervention to improve preventive cardiovascular care. *Annals of Internal Medicine.* *141*(7). 523-532. II: evidence from one well-designed RCT, experimental design in which subjects are randomized to a control or treatment group.	To determine whether a multimethod quality improvement intervention was more effective than a less intensive intervention for improving adherence to 21 quality indicators for primary and secondary prevention of cardiovascular disease and stroke.	The design was a 2-year randomized, controlled clinical trial with the practice as the unit of randomization. The setting was a 20 community-based family or general internal medicine practices in 14 states. All used the same electronic medical record. Participants were 44 physicians, 17 midlevel providers, and approximately 200 staff members; data from the electronic medical records of 87,291 patients. All practices received copies of practice guidelines and quarterly performance reports. Intervention practices also hosted quarterly site visits to help them adopt quality improvement approaches and participated in 2 network meetings to share "best practice" approaches. The percentage of indicators at or	Intervention practices improved 22.4 percentage points (from 11.3% to 33.7%) in the percentage of indicators at or above the target; control practices improved 16.4 percentage points (from 6.3% to 22.7%). The 6.0–percentage point absolute difference between the intervention and control group was not statistically significant (P > 0.2). Patients in intervention practices had greater improvements than those in control practices for diagnoses of hypertension (improvement difference, 15.7 percentage points [95% CI, 5.2 to 26.3 percentage points]) and blood pressure control in patients with hypertension (improvement difference, 8.0 percentage points [CI, 0.0 to 16.0 percentage points]). Primary care practices that use electronic medical records and receive regular performance reports can improve their adherence to clinical practice guidelines for cardiovascular disease and stroke prevention.	Weaknesses: 1)The authors had a problem with the laboratory had a problem with the testing of certain patients 2) The ability to detect differences between intervention and control groups was limited by the small group size 3) Because the practice was the primary unit of randomization, this reduced the effective sample size 4)Baseline and end of study indicators substantially varied among practices 5)Having a pure control group was not feasible because practices expected a benefit from sharing their data 6)Participants were aware of the study hypothesis and could have altered reported to indicate better results 7)There is a possible underestimation of performance data Strengths: 1) Study was long – done over 2 years 2)Study was randomized to ensure the practices would be as balanced as possible across characteristics 3)The funding source had no role in the study design, conduct, reporting of the study 4) The focus on office-based quality initiatives and electronic records suggests that the improvements derived from this study are beneficial to most Americans. Significance to PICO: 1) The study provided new Interventions that were not previously seen

		above predefined targets and the percentage of patients who had achieved each clinical indicator.		
Sokol, M., McGuigan, K., Verbrugge, R., Epstein, R. (2005) Impact of medication adherence on hospitalization risk and healthcare cost. *Medical Care.* *43*:521-530. IV: evidence from case-control or cohort studies	The objective of this study was to evaluate the impact of medication adherence on healthcare utilization and cost for 4 chronic conditions that are major drivers of drug spending: diabetes, hypertension, hypercholesterolemia, and congestive heart failure.	The authors conducted a retrospective cohort observational study of patients who were continuously enrolled in medical and prescription benefit plans from June 1997 through May 1999. Patients were identified for disease-specific analysis based on claims for outpatient, emergency room, or inpatient services during the first 12 months of the study. Using an integrated analysis of administrative claims data, medical and drug utilization were measured during the 12-month period after patient identification. Medication adherence was defined by days' supply of maintenance medications for each condition. The study consisted of a population-based sample of 137,277 patients under age 65.	For diabetes and hypercholesterolemia, a high level of medication adherence was associated with lower disease-related medical costs. For these conditions, higher medication costs were more than offset by medical cost reductions, producing a net reduction in overall healthcare costs. For diabetes, hypercholesterolemia, and hypertension, cost offsets were observed for all-cause medical costs at high levels of medication adherence. For all 4 conditions, hospitalization rates were significantly lower for patients with high medication adherence.	Weaknesses: 1) The study was observational so it is not possible to draw definite conclusions about the causal relationships among adherence, utilization, and cost. 2)The cross-sectional design also poses some interpretive problems because it yields some heterogeneity in the groups under study 3) The inclusion criteria for the study samples may limit the generalizability of the findings reported. 3) The selection methodology may produce a study sample that is weighted toward patients with more advanced disease or higher comorbidity, because it may exclude some patients who visit their doctors infrequently. 4) Codes on medical claims may not accurately or completely reflect the patient's diagnosis. 5) Medical chart data were not available to validate coding on claims. Strengths: 1)To minimize false positives, patients were identified for a study sample if they had 2 or more medical claims for outpatient services on different dates during the year and other specific identifying claims and dates to ensure a clear understanding of the participants' relevance to study. Significance to PICO: 1) The study can provide a good indication of the benefits of medication adherence in continuing patients with chronic disease. 2) Since there are large benefits derived from improved adherence, greater attention should be devoted to educating patients on the value of their drug therapy and motivating behavior changes that improve adherence and this study offers those cost values.

		Disease-related and all-cause medical costs, drug costs, and hospitalization risk were measured. Using regression analysis, these measures were modeled at varying levels of medication adherence.		
Article citation in APA format Level of Evidence (I – VI)	Purpose of study/research questions	Design type and methods (sampling method/sample size, description of interventions (if any), and outcomes measured	Major findings/findings relevant to project	Critique of validity, bias and significance
Albert, N. (2008). Improving medication adherence in chronic cardiovascular disease. Critical Care Nurse. 28(5): 54-64. VII: evidence from the opinion of authorities and/ or reports of expert committees	The clinical article is designed as a continuing education piece with a focus on the barriers to and problems of, medication adherence in patients with heart failure and those with left ventricular systolic dysfunction after myocardial infarction and to discuss ways that nurse-based management can increase medication adherence.	This is an informal review of recent studies and reports concerning barriers for patients and intervention suggestions for nurses and other medical personnel.	The author does not give any official findings but does offer numerous suggestions. The author describes barriers to adherence; adverse effects, too frequent dosing, and cost are mentioned as well as poor communication, complex drug regimens and others. The use of pocket cards, poly-pills, once-daily medications, extended discussions on possible costs and confusion on instructions, the use of a pill box, clinical visits and telephone calls, among others.	Weaknesses: 1)This is not a study or a review with structured perimeters 2) The report cannot be used with the same enthusiasm as a RCT or systematic review due to its low level of evidence. Strengths: 1)The author cites many valuable studies that offer an array of informative interventions for NPs 2) The author elaborates largely on the consequences of non-adherence and barriers leading to. Significance to PICO: 1)The report is positively significant, offering a simplified but very complete look at factors and interventions, helping the student to understand well the issues facing adherence 2) The author incorporates tables and charts that expand on the effects of non-adherence concerning particular drugs that would prescribe to cardiovascular patients.