Beliefs about Cholesterol Lowering Drugs and Medication Adherence Among Rural Adults with Hypercholesterolemia

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Abstract

Coronary artery disease (CAD) accounts for 600,000 deaths annually in the United States and is the leading cause of death for both men and women around the world. Treatment of hypercholesterolemia has been proven to decrease both morbidity and mortality of CAD. Primary and secondary prevention of CAD is based on controlled LDL cholesterol levels. Patient's beliefs related to lipid lowering medications impacts adherence to these medications. Influences on health are also impacted by place of residence. Negative influences on total health care are based on barriers present in rural communities. The use and acceptance of these medications by rural populations are essential. This pilot project begins to fill knowledge gaps related to rural patients beliefs about medication adherence. **Purpose:** The purposes of this pilot project were to describe rural patient's (a) belief's about high cholesterol and cholesterol lowering medications, (b) their adherence to taking these medications, and (c) relationships between adherence and beliefs. **Sample**: This was a convenience sample obtained at a rural Georgia clinic.

Method: A descriptive survey approach was used to explore rural dwelling patients' at a primary care clinic in rural Georgia.

Findings: The Morisky Scale addressed the patient's adherence to their prescribed cholesterol medications. The HABIT tool examined patients' beliefs. Calculations were completed on the responses of the participants. Spearman's rho correlation revealed patient's who believe the mediations work, and patient's who believe elevated cholesterol increases the risk of heart attack were more likely to be adherent with their cholesterol lowering medications.

Conclusion: Increasing the patient's knowledge and addressing beliefs can result in increased adherence with cholesterol lowering medications.

Keywords: Coronary artery disease, Rural populations, Patient's beliefs, Medication adherence

Beliefs about Cholesterol Lowering Drugs and Medication Adherence Among Rural Adults with Hypercholesterolemia

Coronary artery disease (CAD) accounts for 600,000 deaths annually in the United States (US), (Centers for Disease Control and Prevention [CDC], n.d.). The leading cause of death for both men and women in the US and worldwide has remained CAD (Calderon, Cubeddu, Goldberg, & Schiff, 2010; Schedlbauer, Davies, & Fahey, 2010). One in two men and one in three women are expected to develop CAD in their lifetime (Murphy, Roth, & Andrea, 2005). Treatment of hypercholesterolemia has been proven to decrease both morbidity and mortality of CAD (Cross & Franks, 2005).

Primary and secondary prevention of CAD is based on controlled low-density lipoprotein (LDL) cholesterol levels (Calderon et al., 2010; Marquez, Casado, Motero, &

Martin, 2007; Vrijens, Belmans, Matthys, deKlerke, & Lesaffre, 2006). Primary prevention of CAD suggests lipid lowering medications be prescribed to asymptomatic adults who have a risk of developing CAD in the next ten years (National Institute for Health and Clinical Excellence [NICE], 2006; Scottish Intercollegiate Guidelines Network [SIGN], 2007; Schedlbauer et al, 2010). Secondary prevention in CAD treatment with lipid lowering medication could decrease death and disability rates by more than 50%. Control of hypercholesterolemia can reduce the five year incidence of cardiovascular events irrespective of the initial lipid profile (NICE, 2006; SIGN, 2007; Schedlbauer et al, 2010). Substantial impact on public health can be achieved with lipid lowering medications. The use and acceptance of these medications by the public are essential.

According to Crawford et al. (2010), Caucasians are the highest proportion of the population diagnosed with hypercholesterolemia at 25.7%. African American populations have a 17.2% occurrence rate. Males have an occurrence rate of 25.1% and females follow at 19.2%. As age and body mass index (BMI) increase, the prevalence of hypercholesterolemia also increases. Calderon et al. (2010) also found persons older than 60 years have occurrence rates above 50%, and as BMI exceeded 35 the occurrence of hypercholesterolemia climbs to 33.9%. A reported 105 million Americans have elevated LDL levels. Forty two million of those have values considered at high risk and qualify for medication therapy (Calderon et al., 2010). Further, rural populations in the southern US have higher rates of smoking, physical inactivity, poor diet, death from ischemic CAD, which increases risks and makes medication adherence even more important and births to adolescents (Hartley, 2004).

Unique barriers to health care have been identified in rural populations (DeVoe et al., 2007; Hoerster et al., 2011; Hartley, 2004). The impact of place of residence on health has been established. Multiple disparities such as access to care, transportation, and diminished affordability arise more frequently in rural areas (DeVoe et al., 2007; Hoerster et al., 2011; Hartley, 2004).

Background and Significance

Research into medication adherence has been extensive in the last decade. Increased emergency room visits, hospital admissions, and morbidity and mortality have resulted from poor medication adherence (Benner et al., 2009). Distinctions have been made between poor adherence that is a result of deliberate actions by the patient versus poor adherence that may accompany complex regimens, lack of self-management skills, or inaccurate perceptions or beliefs. Toh, Jackson, Gascard, Manning, and Tuck (2010) define unintentional non-adherence as a patient's inability to follow directions due to poorly defined regimen or a physical disability and defined intentional non-adherence as a patient's decision not to take prescribed medications. Schwartz et al. (2009) attempted to identify barriers, predictors, and facilitators of medication use in African Americans with hypercholesterolemia. The authors studied medication adherence in African American patients, who were treated in a primary care clinic outside of a large urban city, and found medication adherence to fall below 30% (Schwartz et al, 2009). Barriers to adherence included timely diagnosis and treatment. Other factors preventing medication adherence were attributed to cost, forgetfulness, polypharmacy, and the absence of symptoms. The research indicated diagnosis and treatment should be based on nationally

accepted guidelines, and combined with primary patient education to increase medication adherence (Schwartz et al, 2009).

Scientific evidence related to the effectiveness of lipid lowering medications for the treatment of hypercholesterolemia abounds. Statin drugs, the most effective for lowering cholesterol levels, work by inhibiting HMG CoA (Calderon et al., 2010; Cross & Franks, 2005; Foley, Vasey, Berra, Alexander, & Markson, 2005; Hachem & Mooradian, 2006; Schedlbauer et al, 2010). This synthesis reduction decreases cholesterol content in the liver which lowers serum LDL cholesterol. The drugs from the statin category currently available reduce LDL levels approximately 30-50% in clinical trials (Besseling, van Capelleveen, Kastelein, & Hovingh, 2013). Achieved control of LDL levels with statin medications reduces the relative risk of CAD as much as 35% (Alla et al., 2013). Treatment to achieve goals often requires additional tests, and office visits with changes in medication therapy, frequently leading to decreased medication adherence (Foley et al., 2005). As statin drugs are titrated to achieve therapeutic goals, maximum statin doses come with increased side effects, including rhabdomyolosis (Hachem & Mooradian, 2006). At the same time, reports in the literature suggest poor medication adherence to HMG CoA reductase inhibitors continues (Harrison et al., 2013). For years research has shown patients fall short of the National Cholesterol Education Program (NCEP) standards for effective treatment of hypercholesterolemia (Besseling et al., 2013). One study in a primary care clinic outside of a large urban city found medication adherence to fall below 30%. Fewer than half of patients achieve cholesterol goals with the initial statin dose (Chi, 2014). Medication adherence in the treatment of hypercholesterolemia

has been shown to significantly lower morbidity and mortality related to CAD (Besseling et al., 2013).

Rural populations experience many disparities in the utilization of health care (Hartley, 2004). These disparities in rural areas are associated with social status, income, occupation, education, and place of residence. Negative influences on total health care are based on the barriers present in these rural communities. Water quality, agricultural methods, forestry, or mining can also impact health care for rural residents. Access to health care is impacted by decreased numbers of providers and transportation issues related to distance to receive care (Hartley, 2004).

Vehicle ownership has been associated with increased utilization of health care services (Hartley, 2004). Rural populations had diminished resources available to allocate to vehicle ownership inhibiting access. Public transportation also remains absent in rural areas. Additional barriers present in rural areas are a lack of insurance and costs related to health care. Uninsured and underinsured populations may struggle with co-pays, high deductibles, and prescription drug cost. Decreased numbers of health care providers is prevalent in rural areas (Pieh-Holder, Callahan, & Young, 2012). Access to care and the limitations caused by rural life style can complicate diagnosis, treatment, and follow up in this population.

Conditions seen in the rural demographic constitute a unique set of challenges. Access to care and the limitations caused by rural life style can complicate diagnosis, treatment, and follow up in this population. This pilot project begins to fill knowledge gaps related rural patients beliefs about medication adherence.

Purpose

The purposes of this pilot project were to describe rural patient's (a) belief's about high cholesterol and cholesterol lowering medications, (b) their adherence to taking these medications, and (c) relationships between adherence and beliefs.

Methods

Conceptual Framework

Donabedian provides an excellent framework to explore beliefs affecting medication adherence in the treatment of hypercholesterolemia. This model can be applied to the rural population to assist the primary investigator in understanding the unique challenges in this specialized population. Examination of beliefs related to medication adherence with statin medications in the treatment of hypercholesterolemia can be achieved through review of the structure, process, and outcomes as delineated by Donabedian (Driel, Sutter, Christiaens, & Maeseneer, 2005).

Design and Setting

A descriptive survey approach was used to explore rural dwelling patients' at a primary care clinic in rural Georgia. The population of the county is 11,346, with the following ethnic composition: 89% Caucasian, 10% African American, and 1% Hispanic. Growth in the population over the last 25 years was seen only in the Caucasian population. Age range statistics are 27% under age 18, 63% ages 18 to 64, and 10% over age 65. Average household income is $41,066 (Heard County Community Partnership, 2008). Mobile homes comprise 38% of the dwellings in the county. Over 51% of the school children receive free or reduced cost lunches (Heard County Community Partnership, 2008). Completion of high school or equivalent level of education had not been achieved by 34% of the adult population. Attainment of a four year degree was

achieved by only 1.6% of the population (Heard County Community Partnership). Social and cultural issues of the area include the prevalence of an agrarian lifestyle. Commercial timber, poultry houses, and cattle production prevail as 80% of the county remains in an agricultural or forestry land status (Heard County Community Partnership, 2008). Economically, the county benefits from having six power plants located within the area. (Heard County Community Partnership, 2008).

Health and access to health care within the county are available through only one clinic staffed by one physician and one nurse practitioner. The active patient population of the clinic is approximately 1,300 patients. The clinic provides care to families and children beginning at age eight. The clinic also has a staff of two certified medical assistants, an office manager, a receptionist, and one person responsible for medical records management. The clinic hours are Monday through Friday from 8am to 5pm.

The nearest emergency room and hospital are more than 30 miles away. Over 20% of the population is uninsured, and 42% receive some form of Medicaid. Births of premature infants average 20%, well above state and national averages (Heard County Community Partnership, 2008). Infant mortality rates, also above state and national averages, are 11.3%. Tobacco use during pregnancy is reported at an alarming 24%. The teen pregnancy rate of 22.6% is double the rate reported for the state of Georgia. Notably, 26.6% of babies born in the county are to mothers with less than 12 years of education (Heard County Community Partnership, 2008).

Measures

Three separate forms were used to collect information in this project, a demographic questionnaire, The Morisky Scale, and The Habit Survey. The

demographic questionnaire included the participant's specific age, and length of time the participant had knowledge of an elevated cholesterol level. Marital status was also acquired, the participants were able to select between single, widowed, married, separated, divorced, or long term relationship options. Categories listed for race included white, black, Native American, Pacific Islander, Asian, or Multi-Racial. Ethnicity was also an option as Hispanic or non-Hispanic. Educational status was obtained with the length of education divided up by obtainment of elementary, middle, high school, college, graduate, and post graduate education. Employment data collected provided options of full time, part time, unemployed, retired, cardiac disabled, or other disabled. Lastly, participants were asked to indicate if they had ever been diagnosed with heart disease, had a heart attack, coronary angioplasty, coronary stent, coronary artery bypass surgery, or chest pain.

The Morisky scale was used to assess the patient's beliefs about medications. The purpose of the Morisky scale is to identify the patient's beliefs and pinpoint persons with low adherence (Bharmal et al., 2009; Bondesson, Hellstrom, Eriksson, & Hoglund, 2009; Morisky, Ang, Krousel-Wood, & Ward, 2008; Shalansky, Levy, & Ignaszewski, 2004). Initially, reliability and validity of the Morisky Survey were established in a study of patients diagnosed with hypertension (Bharmal et al., 2009; Morisky et al., 2008). Following the successful use of the tool with patients diagnosed with hypertension, the scale has been utilized in studies which did not contain a homogenous group. Modifications to the Morisky Survey allows for assessment about patient beliefs and medication adherence. Bondesson et al. (2009) suggest the scale should be tailored to specific medicines or groups of medicines. Consequently, the format of the tool used in

this study was modified to address beliefs about medication adherence to statin drugs in the treatment of hypercholesterolemia.

The Morisky Scale items were scored with either a yes or no response. The eight items included questions inquiring if the participant ever forgets to take their statin medication, were any doses missed in the prior two weeks, and had the participant ever decreased or stopped their statin mediation with first discussing the issue with their provider. Further questions related to medication adherence and travel. One item inquired if the participant felt taking the mediation was an inconvenience. Lastly the Morisky questionnaire asked how often the participant has difficulty remembering to take all of their medications.

The final component of the packet was the HABIT survey for patients developed by Foley et al. (2005) for assessing attitudes and beliefs about hypercholesterolemia and its pharmacological treatment. Statistical reliability and validity of the instrument were established by the authors. A five point Likert scale allowed patients to select the degree to which they agree or disagree with each of the attitude statements. The statements used in the survey are rated at a sixth grade reading level. Three subscales of the HABIT survey were used in this study, effectiveness of statin medications, perceptions of adverse side effects at higher doses of statin medications, and severity of health problems if statin medications not taken.

Eleven items comprised the HABIT survey and targeted the participants beliefs related to their statin medication. Questions included inquiry into efficacy of statin medications, side effects, and if long term exposure could lead to liver damage or muscle aches. Then questions were directed to inquiry into statin medications and their

relationship to CAD. Questions included beliefs about the correlation between high cholesterol and a heart attack, and if taking statin medications lower the risk of a first or second heart attack. One question asked if the participant believed worries about cholesterol levels were relevant only if someone had already had a heart attack. Lastly the tool inquired if the diagnosis of high cholesterol was less serious than a diagnosis of diabetes and hypertension.

Data Collection

Data collection occurred over a two month period. Initial identification of eligibility was established by the primary investigator by reviewing a list of patients scheduled at the clinic on the days the study was conducted. A certified medical assistant offered each patient the option of participation, with explanation participation would not impact the care provided at the clinic. Further explanation emphasized to the patients there would be no penalty based on the decision not to participate. Dropping out at any time was acceptable and carried no penalty or consequence to the patient, and there was no impact to care received at the clinic. Patients who agreed to participate were then given the project packet with the study instruments. All patients who were approached agreed to participate in the study.

Participants were instructed to complete the forms in the packet onsite at the clinic and to return the packet to the medical assistant. The participant was also given the option of taking the forms home to return them by the postal service. An addressed stamped envelope accompanied the packet if patients elected this option. Inclusion in the study was not affected based on completion onsite or offsite. Participants were given a $3 gift card to a local grocery store redeemable for purchases of any items at the patient's

discretion after completion of the survey. Upon reaching the goal of completion of 30 surveys, data collection was concluded.

Description of the Sample

The convenience sample was obtained at a rural Georgia clinic. Permission for the study was granted through the Mercer University Institutional Review Board (IRB). The study protocol number is H1112300. The inclusion criteria consisted of a diagnosis of hypercholesterolemia, documentation of a prescribed statin medication, age of at least 18 years, mental capacity to self-administer medication, and ability to understand and sign the study consent form. The study forms packet was available in English only. Exclusion criteria included the inability to read or speak English. The study also excluded any persons who were incarcerated or residents of nursing homes, as staff at these facilities administer the prescribed medications.

Data for the 30 participants were analyzed. Descriptive statistics were used to describe the sample. The age range of the participants was from 35-81 years with a mean of 54.8 years of age. The majority, 73.3%, n=22 were female and 26.7%, n=8, were male. Time since diagnosis of high cholesterol ranged from 1-10 years with a mean of 4.1 years. . Thirty six percent (n=11) of the group reported they had been diagnosed with CAD. The group was predominantly white, at 86.7% (n=26) and 13.3% (n=4) were black. These proportions are congruent with the demographics of the area. The level of participant's formal education ranged from middle school to college attendance, with 60% reporting high school graduation. The study participants report significantly higher high school graduation rates than the published demographics of the area where only 34% had completed high school.

Findings

Patient Adherence to Cholesterol Lowering Medications

The Morisky Scale addressed the patient's adherence to their prescribed cholesterol medications. Table 1 reports participants responses to each of the 7 yes/no questions in the Morisky Scale. The two questions indicating the highest levels of non-adherence were "do you sometimes forget to take your medication" and "then traveling, do you sometimes forget to bring your medications along".

The final question on the Morisky Scale asked participants about remembering to take all of their medications. The format of this question was a Likert scale. Participants were asked "how often do you have difficulty remembering to take all your medications?" The responses were as follows: never/rarely 30% (n = 9), once in a while 23% (n = 7), sometimes 26% (n = 8), usually 17% (n = 5), and all the time 3% (n = 1). Indicating almost 80% of participants has difficulty remembering to take their medications at least some of the time.

Scoring of the Morisky Scale is determined by the number of "yes" answers. Totals of 0 - 1 "yes" responses indicates high adherence. Medium adherence is scored as 2 - 3 yes responses, and 4 or more yes responses indicates low adherence. Analysis of the Morisky scale revealed a mean score of less than six for 70% (n=21) of the participants placing them into a category of low adherence.

Patients Beliefs about Cholesterol Lowering Medications

The HABIT tool examining patients' beliefs, the range of scores from one-strongly disagree, to five-strongly agree was utilized. Calculations were completed on the responses of the participants.

Table 1

Patient Responses Related to Adherence on the Morisky Scale

Question	No	Yes
1. Do you sometimes forget to take your cholesterol medication?	33% (n=10)	66% (n=20)
2. People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your cholesterol medication?	56% (n=17)	44% (n=13)
3. Have you ever cut back or stopped taking your cholesterol medication without telling your doctor, because you felt worse when you took it?	44% (n=13)	56% (n=17)
4. When you travel or leave home, do you sometimes forget to bring along your cholesterol medication?	30% (n=9)	70% (n=21)
5. Did you take your cholesterol medication yesterday?	13% (n=4)	77% (n=26)
6. When you feel like your cardiovascular disease is under control do you sometimes stop taking your cholesterol medication?	40% (n=12)	60% (n=18)
7. Taking Medication every day is a real inconvenience for some people. Do you ever feel hassled about having to keep taking cholesterol medication?	40% (n=12)	60% (n=18)

When participants were asked about a CAD history, 63% (n = 19) believed they had no CAD, and 36% (n = 11) confirmed a prior diagnosis of CAD. Regarding the patients' belief about statin drug efficacy, 93% (n = 28) stated they agreed or strongly agreed cholesterol drugs work. When asked if the patient wonders whether or their cholesterol medication is working 70% (n = 23) selected agree or strongly agree. Analysis of the HABIT beliefs questionnaire revealed patients had a slightly stronger belief that higher doses would lead to more severe side effects. Inquiry related to beliefs about side effects revealed 73% (n = 22) of participants believed increasing dose of cholesterol medications may lead to muscle aches. Beliefs relating cholesterol and impact on health demonstrated that 96% (n = 29) believe high cholesterol increases the risk of a heart attack. Additionally 93% believe lowering cholesterol would reduce the chances of a heart attack

in the future. Fifty six percent (n = 19) saw cholesterol as serious of a problem as hypertension and diabetes while 43% (n = 13) saw cholesterol as a less serious problem. Table 2 below summarizes the findings.

Table 2

Patient response related to Beliefs on the HABIT scale

HABIT Scale Question	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
1. In general, do you think cholesterol lowering drugs work?	0% (n=0)	3% (n=1)	3% (n=1)	73% (n=22)	20% (n=6)
2. Do you wonder whether or not your cholesterol lowering drug is working?	10% (n=3)	20% (n=6)	0% (n=0)	60% (n=18)	10% (n=3)
3. Side effects are not related to the dose of cholesterol drugs.	10% (n=3)	46% (n=14)	0% (n=0)	40% (n=12)	3% (n=1)
4. Increasing the dose of cholesterol drugs may lead to muscle aches.	10% (n=3)	13% (n=4)	3% (n=1)	60% (n=18)	13% (n=4)
5. High doses of cholesterol drugs may cause liver problems.	3% (n=1)	10% (n=3)	6% (n=2)	63% (n=19)	16% (n=5)
6. The side effects from cholesterol drugs are relatively minor.	10% (n=3)	26% (n=8)	6% (n=2)	52% (n=16)	3% (n=1)
7. People with high cholesterol are more likely to have a heart attack than people with low cholesterol.	0% (n=0)	0% (n=0)	3% (n=1)	79% (n=24)	16% (n=5)
8. Lowering cholesterol will help lower the chances of having a heart attack or other heart problems in the future.	0% (n=0)	3% (n=1)	3% (n=1)	73% (n=22)	20% (n=6)
9. High cholesterol is not a serious problem, I feel fine.	10% (n=3)	17% (n=5)	3% (n=1)	73% (n=22)	0% (n=0)
10. People don't need to worry about their cholesterol if they have never had a heart attack.	13% (n=4)	57% (n=17)	0% (n=0)	26% (n=8)	3% (n=1)
11. The health problems caused by diabetes and high blood pressure are much more serious than the problems caused by high cholesterol.	3% (n=1)	40% (n=12)	0% (n=0)	43% (n=13)	13% (n=4)

Relationships between Beliefs and Adherence

Tests were completed comparing the various items with two significant findings. Item analysis with Spearman's rho correlation revealed two specific statements

significantly associated with better adherence. First “In general, do you think cholesterol lowering drugs work?” p=.015. Also the statement “People with high cholesterol are more likely to have a heart attack than people with low cholesterol” p=.035 was related to better adherence with cholesterol lowering medications.

Discussion

The purpose of this research was to examine patient’s beliefs about high cholesterol and cholesterol lowering medications, their adherence to taking these medications, and relationships between adherence and beliefs. The findings demonstrate the relationship between beliefs about statin medications for the treatment of hypercholesterolemia and increased medication adherence with these medications. Rates of adherence to cholesterol medications demonstrated in this study are consistent with findings in other studies (Benner et al., 2009; Besseling et al., 2013; Bondesson et al., 2009; Chi, 2014; Harrison et al., 2013; Schedlbauer et al, 2010) Reponses by participants also found adherence to their other medications was at a slightly higher rate. Contributing factors to low adherence include not taking medications when traveling and forgetfulness. Forgetfulness was also a common finding by Schwartz et al 2009. Significant numbers of participants reported stopping their cholesterol medications when they felt their cardiovascular disease was controlled.

When asked about beliefs related to cholesterol medications, participants were more likely to agree the medications work, yet they also wonder if their own medication is working. Stronger responses were related to participant’s beliefs about complications of taking cholesterol medications. Most of the responses indicated a belief these medications would cause liver damage. Further, the belief prevailed of increased dosing was linked to

muscle aches. This data parallels findings already published related to increased dosing not being tolerated by many patients (Besseling et al., 2013; Harrison et al., 2013).

Beliefs related to high cholesterol and cardiac conditions found significant numbers of the group believed high cholesterol increased the risk of a heart attack. Similarly, the belief prevailed; lowering cholesterol lowered the risk of a heart attack. The respondents were nearly equally divided on the belief on whether high cholesterol is as significant a health risk as diabetes and high blood pressure. This is difficult to explain based on patient's reporting better adherence to medications treating those conditions than to the medications treating cholesterol.

Implications

The small size of this pilot study and the convenience sample hamper these findings from being extended to other populations. Additionally, the Morisky Scale was modified from the original version for this study. The findings can inform care for providers in rural areas similar to the sample used for this study. The issue of adherence should be addressed at the time of diagnosis and reinforced throughout treatment. As suggested by Harrison et al. (2013), these conversations should begin as early as possible and be individualized to each patient's situation. Discussions with patients should incorporate strategies promoting adherence. Strategies for remaining adherent while traveling, in the absence of symptoms, and preventing forgotten doses are great examples. This education should focus on the crucial role of treating hypercholesterolemia in the management and prevention of CAD. Consideration and discussion should be given to the problem of symptomless diagnoses such as hypercholesterolemia, and the lack of motivation to adhere to daily treatment. The essential role of statins in treatment should begin as early

as testing for the condition. As suggested by Besseling and colleagues (2013), established evidence based guidelines are available and should be used upon diagnosis with each patient (NICE, 2006; SIGN, 2007). Presentation of the facts related to optimal benefit from statin therapies, reducing morbidity and mortality from CAD, and preventing heart attack are all vital.

Issues faced by rural communities including access to care, low income, and uninsured or underinsured all may impact adherence. Suggested areas of patient education may include feasibility of follow up visits, the cost of medications, and insurance coverage. Additionally, teaching patients the rational of monitoring CAD and cholesterol, along with improvement strategies is vital (Besseling et al, 2013; Harrison et al., 2013).

Efforts are needed to provide the vital information related to CAD and cholesterol in rural communities. Strategies could include taking advantage of access to the population through religious and civic groups or workplace. Increasing the public's knowledge can result in increased adherence with cholesterol lowering medications, as evidenced in this study.

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