Comparison of Colorectal Cancer Screening Practices between Rural and Urban Providers

by

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Abstract

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Although colorectal cancer screening has proven to reduce mortality rates from colorectal cancer, there still remains to be a relatively low percent of people participating in preventative measures specific to colorectal cancer. National data shows that less than half of adults aged 50 years or older have ever been screened for colorectal cancer, only 26% had a fecal occult blood test in the past two years and 53% ever having a sigmoidoscopy or colonoscopy (National Center for Chronic Disease Prevention and Health, 2004). In Wisconsin, approximately 27% of similarly aged adults report having a fecal occult blood test; 59% a sigmoidoscopy or colonoscopy (National Center for Chronic Disease Prevention and Health, 2004). Even though numbers in

Wisconsin are higher than the national average, the numbers are still lower than the desired 75% (American Cancer Society Challenge Goals, Principles, & Nationwide Objectives, 1996).

An obvious major determinant in frequency of colorectal screening is access to health care. One subpopulation for which access to health care is often an issue includes those living in rural areas. Specifically, rural areas have the potential for decreased access to screening due to physical proximity limitations, lack of specialists in the area, and appropriate health insurance.

The purpose of this study was twofold: first to examine if any differences exist between rural and urban providers' colorectal cancer screening practices and attitudes; second, to identify factors that account for such differences. Findings from this study suggest that there are significant differences between rural and urban providers' colorectal cancer screening practices. Interestingly, the differences were not found in the overall frequency rate of screening (61% rural; 68% urban), but in the method of screening. Rural providers had a statistically significant higher rate of screening with FOBT and urban providers with colonoscopy, even though both rural and urban providers perceived their patients to prefer a colonoscopy over FOBT screening.

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CHAPTER ONE

Introduction

Strong evidence supports that the number of individuals dying of colorectal cancer could be greatly reduced through appropriate screening. The American Cancer Society set a nationwide goal to increase the proportion of people aged 50 years or older who have colorectal cancer screening, consistent with the American Cancer Society guidelines, to 75% by the year 2015 (American Cancer Society Challenge Goals, Principles, & Nationwide Objectives, 1996). Ideally, the most comprehensive and preferred screening method to be used is a colonoscopy, which is referred to as the "gold standard" for screening colorectal cancer.

Even though there is general agreement that adults aged 50 years or older should be screened for colorectal cancer, national survey data shows less than half of these adults have ever been screened for this cancer. The 2004 Behavioral Risk Factor Surveillance System surveyed U.S. citizens who were 50 years or older (National Center for Chronic Disease Prevention and Health, 2004). This study found that in 2004, 26% of respondents reported having a fecal occult blood test within the past two years and 53% reported ever having had a sigmoidoscopy or colonoscopy. Specifically, data for Wisconsin is slightly higher than the national average, yet still fall far from the ideal (National Center for Chronic Disease Prevention and Health, 2004)). About 27% of Wisconsinites over 50 reported having a fecal occult blood test and 59% reported ever having a sigmoidoscopy or colonoscopy.

Health care providers greatly influence patient's decisions in regard to having a colorectal cancer screening procedure. Research has shown that physician recommendation for colorectal cancer screening is one of the strongest predictors of patient screening utilization (Vernon, 1997; Mandelblatt & Kanetsy, 1995; Taplin, Urban, Taylor & Savarino, 1997; Brenes & Paskett, 2000).

Cibula and Morrow (2003) found that the main source of information patients had regarding colon cancer screening were medical providers, specifically physicians and nurses; less informative were television, magazine and news articles. In addition, patients who had been advised to have a fecal occult blood test were nearly four times as likely to have ever had this test compared to patients who were not advised to do so (Cibula &Morrow, 2003). An additional issue of concern is that although a national survey found that primary care physicians perceived colonoscopy to be the most effective method of screening for colorectal cancer, 80% of the physicians most often recommend non-colonoscopy screening, specifically fecal occult blood testing and/or flexible sigmoidoscopy (Klabunde, Frame, Meadow, Jones, Nadel & Vernon, 2003).

In 1999, members of the Medical College of Wisconsin surveyed 600 primary care physicians in Wisconsin to document current physician attitudes and practices regarding colorectal cancer screening (Taylor & Anderson, 2002). There were large differences found between the estimated percent of screening rates for the different methods. Only 3% of physicians estimated that 50% or more of their patients are screened with colonoscopy, while 62% estimated that over half of their patients are screened with fecal occult blood testing. Further results suggest that there is an inconsistency of physician belief and practice. Although 98% of respondents either strongly or slightly agreed to the statement, "Every patient over 50 years of age should be screened for colorectal cancer," only 28% respondents estimated that they screened 75% or more of their patients who are 50 years or older. To explain this inconsistency, two different explanations have been generated.

The first pertains to the fact that the 1999 research study did not examine how many physicians *recommend* patients 50 years or older to have a screening procedure. There may be a

discrepancy between physician's belief and practice due to behaviors and attitudes of his or her patients, not necessarily of the physician. A physician may think every patient who is 50 and older should be screened, and recommend this to every patient who fits the criteria, but still have a low screening rate of patients who are actually screened due to factors related to the patient and area of residence.

A second possible explanation of the inconsistency in provider belief and practice is that unfortunately the 1999 study did not differentiate between providers who practice in a rural or urban area. Rural providers may have been overrepresented, which may account for low screening rates of certain colorectal cancer screening methods such as a colonoscopy. Rural areas have a smaller percentage of doctors and a higher percentage of healthcare providers such as physician assistants and nurse practitioners due to the affordability of their services and the difficulty in recruiting and retaining physicians (Rosenblatt & Hart, 2000). Roughly, 20% of the U.S. population reside in a rural area, but only 9% of the nation's physicians practice in these areas (Bureau of Rural Health Profession, 1992), however 30 % of physician assistants practice in rural areas (Medline Plus, 2005). These types of providers can't perform a colonoscopy, but can only recommend the procedure to be done, thus making the reported percentage of performing the actual procedure of a colonoscopy look smaller simply because the providers surveyed can't perform the procedure. Other reasons that may have accounted for low colorectal cancer screening rates, if indeed rural providers were over-represented in the study, is the difference in rural patients' remote location and distant access to appropriate healthcare facilities. Older adults living in isolated areas may not have physical access to a facility that offers the procedure or may not have comprehensive insurance, or any insurance at all, to cover the expense. Another possible reason could be that patients in rural areas don't have an

understanding of the importance of having a colonoscopy versus a fecal occult blood test or may be intimidated by its invasive procedure.

Statement of the Problem

Although colorectal cancer screening has proven to reduce mortality rates from colorectal cancer, there still remains to be a relatively low percent of age appropriate people participating in preventative measures specific to colorectal cancer. This has been identified nationally as well as in the state of Wisconsin. Not only are the low numbers for screening colorectal cancer alarming, the healthcare discrepancies in rural areas have potential for even lower screening numbers.

Purpose of the Study

This research is an exploratory study set forth to assess colorectal cancer screening practices and attitudes of family practice and internal medicine providers, located throughout six west-central Wisconsin counties. Of particular interest is identifying any differences among the urban and rural providers. Lastly, this study will identify and explore factors that account for any provider reported differences in screening for colorectal cancer.

Hypotheses

Although this study was predominately exploratory, specific hypotheses were tested. The first set hypothesized that there would be a relationship between providers' estimated percent of recommending a colorectal cancer screening procedure with the providers' estimated percent of actual screening for colorectal cancer.

- H_{01}: There will be no relationship between the provider's estimated rate of recommending a colorectal cancer screening procedure to patient's ≥ 50 years of age with the provider's estimated rate of patients ≥ 50 who have actually been screened.

- H_1: There will be a relationship between the provider's estimated rate of recommending a colorectal cancer screening procedure to patients $\geq$ 50 years of age with the provider's estimated rate of patients $\geq$ 50 who have actually been screened.

The second set concerned hypothesized differences in practices between rural and urban providers.

- H_{02}: There will be no percentage difference for screening for colorectal cancer in patients $\geq$ 50 between urban and rural sites.
- H_2: The urban sites will have a greater percentage of screening for colorectal cancer in patients $\geq$ 50 than rural sites.
- H_{03}: There will be no percentage difference for screening for colorectal cancer with colonoscopies in patients $\geq$ 50 between urban and rural sites.
- H_3: Urban sites will have a greater percentage of screening for colorectal cancer with colonoscopies in patients $\geq$ 50 than rural sites.

The third set hypothesized that provider's attitudes and beliefs regarding colorectal cancer screening would predict engagement of certain screening methods. Specifically:

- H_{04}: Provider's attitude regarding the effectiveness of a colorectal cancer screening procedure's ability to reduce mortality from colorectal cancer will not predict engagement in that screening procedure.
- H_4: Provider's attitudes regarding the effectiveness of a colorectal cancer screening procedure's ability to reduce mortality from colorectal cancer will predict engagement in that screening procedure.

- H_{4A}: There will be a relationship between a provider's belief that screening for colorectal cancer with fecal occult blood testing reduces mortality from colorectal cancer with the provider's estimated percentage of screening patients by fecal occult blood testing.
- H_{4B}: There will be a relationship between a provider's belief that screening for colorectal cancer with flexible sigmoidoscopy mortality from colorectal cancer with the provider's estimated percentage of screening patients by flexible sigmoidoscopy.
- H_{4C}: There will be a relationship between a provider's belief that screening for colorectal cancer with colonoscopy reduces mortality from colorectal cancer with the provider's estimated percentage of screening patients by colonoscopy.

Lastly, it was hypothesized that the provider's level of familiarity of the screening guidelines would be related to their overall screening rate, regardless of type of method.

- H_{05}: There will be no relationship between providers who are familiar with the American Cancer Society screening guidelines and their general colorectal cancer screening practices.
- H_5: There will be a relationship between level of familiarity with the American Cancer Society guidelines and general colorectal cancer screening practices.

Assumptions of the Study

The participants of this study were family practice and internal medicine providers. The subject selection was based on the assumption that these providers would be the providers most likely to screen patients for colorectal cancer. Family practice providers are the largest source of physicians in rural communities as well as being evenly distributed in proportion to the population for both urban and rural areas (Bureau of Health Professions, 1997).

The categorization of rural and urban was largely based on the rural-urban continuum code. However, one site that was located in an urban county was classified as a rural location due to the size and distance from the closest non-rural city. The assumption was made that this location had more rural characteristics. By doing this, the sub- sample sizes of urban and rural providers were more evenly distributed.

Definition of Terms

Colorectal cancer. Cancer of the colon, rectum, appendix and anus.

Incidence. The number of cancers that develop in a population during a defined period of time.

Morbidity. The number of cases of a certain disease that exist at some given point in time.

Mortality. The number of deaths due to a particular cause. For example the number of deaths caused by colorectal cancer.

Prevalence. The number of cancers that exist in a defined population at any given point in time.

Rural. The definition of "rural" is based on the rural – urban continuum code determined by the Office of Management and Budget (OMB). This continuum consists of nine codes and is used to classify all U.S. counties by degree of urbanization and proximity to a metropolitan area. Table 1 illustrates the nine rural – urban continuum codes.

Table 1

Rural – Urban Continuum Code

Code	Definition
	Metropolitan
0	Central counties of metropolitan areas of 1 million population or more
1	Fringe counties of metropolitan areas of 1 million population or more
2	Counties in metropolitan areas of 250,000 to 1 million population
3	Counties in metropolitan areas of fewer than 250,000 population non-metropolitan counties
	Non-metropolitan
4	Urban population of 20,000 or more, adjacent to a metropolitan area
5	Urban population of 20,000 or more, not adjacent to a metropolitan area
6	Urban population of 2,500 to 19,999, adjacent to a metropolitan area
7	Urban population of 2,500 to 19,999, not adjacent to a metropolitan area
8	Completely rural or fewer than 2,500 urban population, adjacent to a metropolitan area
9	Completely rural or fewer than 2,500 urban population, not adjacent to a metropolitan area

Sensitivity. The ability of a test to correctly detect individuals within a population who have a certain disease.

Specificity. The ability of a test to correctly detect individuals within a population who do not have a certain disease.

Limitations of the Study

This study only assessed family practice and internal medicine providers who practice within a certain healthcare system. Findings cannot be generalized outside of this specific healthcare system.

Methodology

The remaining paper is divided into chapters. Chapter two goes into detail of the development of cancer, both predisposing and lifestyle risk factors and the importance of prevention. The different screening methods approved by the American Cancer are discussed along with rural healthcare factors and issues of access to healthcare.

Chapter three describes the methodology and the subjects of this study. Explanation of the instrument is broken down by provider's screening preferences, screening behaviors, influential factors affecting screening behaviors, attitude and knowledge of colorectal cancer and provider demography. The procedure used for data collection, detail of data analyses for the hypotheses and limitations of the study conclude chapter three.

Chapter four presents the results for provider demographics, along with significant differences found between rural and urban provider demographics, and analysis of the proposed hypotheses.

Chapter five summarizes the first three chapters and discusses the results of the study.

CHAPTER TWO: LITERATURE REVIEW

General

Cancer is the second leading cause of all deaths after heart disease. In 2001, cancer was the culprit for 23% of all deaths in the United States, claiming 553,768 lives (US Mortality Public Use Data Tape, 2001; National Center for Health Statistics, Centers for Disease Control and Prevention, 2003). Whereas many rates of disease have decreased since 1950 such as heart disease, the death rate per 100,000 people from cancer remains relatively unchanged. Lung cancer is the number one cancer killer, affecting both men and women. The second killer for women is breast cancer and for men is prostate cancer. The third cancer killer in the United States for both men and women is colorectal cancer. It is estimated that there will be 150,484 new cases and 56,370 deaths from colorectal cancer in 2004 (American Cancer Society, 2004a) even though colorectal cancer is curable if detected early.

Development of Cancer

Cancer begins when the genetic material within a normal cell, known as DNA, suffers some type of permanent change or mutation. The genetic changes in the DNA are responsible for initiating the actions that can lead to cancer. The body's cells have a natural balance of cell growth and death, as new cells continually reproduce, older cells die out. Normal cells replicate at a steady rate and have innate "stop" signals that instruct the cells to stop dividing. Cancerous cells have lost this balance and never die out. They replicate at a much faster pace and have lost the signals that tell the cells to stop producing and continue to multiply. When this happens, the accumulation of cells in one location occurs and a tumor forms (President and Fellows of Harvard College, 2001).

In the colon and rectum area, this abnormal cell growth can lead to a polyp or raised clump of cells. While 90% of polyps are not cancerous, nearly all colon cancers start as polyps. Colorectal cancer is thought to develop from a changing and developing polyp over the course of at least five years. The two most common types of polyps are hyperplastic and adenomas. Hyperplastic polyps are generally less than 5 millimeters in size and contain an abnormal amount of normal-looking cells, but tend not to be cancerous (President and Fellows of Harvard College, 2001). Some of these cells in the polyp become abnormal through mutations, changing the polyp into a lesion called an adenoma. Adenomas tend to become cancerous by loss of a tumor suppressor gene as they grow, especially if they surpass 5 millimeters in size (Willis, Fuda & Chenault, 2002; Repertoire, 2002; Mayo Clinic Staff, 2003; President and Fellows of Harvard College, 2001). The etiology of cancerous polyps is considered sporadic, with some familial predisposition and lifestyle factors (Willis, et al, 2002).

Risk Factors

Predisposing Risk Factors

Predisposing risk factors account for only 25% of all new cases of colorectal cancer (Sargent & Murphy, 2003). For most people, the biggest risk factor for developing colorectal cancer is their age. Over 90% of people who are diagnosed with colorectal cancer are over 50 years of age (American Cancer Society, 2004a; President and Fellows of Harvard College, 2001). The incidence of colorectal cancer increases as people age. For example, at age 50, fewer than 1 in 1,000 people are afflicted with colorectal cancer. However, at age 85 the incidence rises to 7 in 1,000 (President and Fellows of Harvard College, 2001). This corresponds with the fact that the cellular changes in the colon or rectum takes many years to develop to a cancerous form. Adenomas, the precancerous polyps, become more common with age. At age 50, approximately

one third of all Americans have adenomas. At age 70, nearly one half of all Americans will have them (President and Fellows of Harvard College, 2001).

Inherited gene mutations are illnesses that can be passed down from one generation to the next. Two hereditary conditions known to cause 5% of colorectal cancers are familial adenomatous polyposis (FAP) and hereditary nonpolyposis colorectal cancer (HNPCC) (President and Fellow of Harvard College, 2001). Familial adenomatous polyposis (FAP) is a rare condition that causes hundreds of polyps to grow in the rectum and colon (Repertoire, 2002; President and Fellow of Harvard College, 2001). This inherited illness affects close to 1 in 9,000 people and accounts for approximately 1% of colorectal cancers. Hereditary nonpolyposis colorectal cancer (HNPCC) causes approximately 2-4% of all colorectal caners. Unlike FAP, HNPCC does not cause large numbers of polyps to grow in the colorectal area. Instead the mutation is found in several genes that code for proteins that are responsible for mending errors in DNA. Therefore, these mutations interfere with the repair process in the DNA of the cell. This interference is thought to allow errors to grow in other key genes that control cell growth. The gene errors lead to the early onset of colorectal cancer, usually in the proximal colon, around the age of 46 (President and Fellow of Harvard College, 2001).

A unique subpopulation has been identified as having a higher risk for developing colorectal cancer than the general population. Approximately 6% of Jews with ancestors from Eastern Europe, known as Ashkenazi Jews, are at higher risk. They have inherited a flaw in the gene that suppresses tumor growth, the APC gene. The general population has a 5% risk for colorectal cancer; however, this defect puts Ashkenazi Jews at an 8-30% risk (President and Fellow of Harvard College, 2001).

A family history of colorectal cancer increases a person's risk of developing this type of cancer. Mainly, having a first-degree relative, either a parent or sibling, who developed colorectal cancer before age 60 increases the risk of developing colorectal cancer. About 15% of people who have colorectal cancer have a strong family history. In addition, having first-degree relatives who have developed polyps before age 60, or two or more first-degree relatives who developed polyps at any age, places a person at higher-than-average risk (President and Fellow of Harvard College, 2001)

There are certain medical conditions that increase a person's risk of developing colorectal cancer. Ulcerative colitis, which is a bowel disease that causes inflammation or ulceration of the intestines, causes the greatest risk. People who have been afflicted by this disease for a long period of time have a risk for colorectal cancer that is 20-fold or more above the general population (President and Fellow of Harvard College, 2001)

Lifestyle Factors

The risk factors stated above (age, heredity, family and personal history) are mainly out of a person's control. However, there are other variables associated with an increased risk for colorectal cancer that have been identified, and these variables a person can control. Referred to as lifestyle factors, they are discussed below.

Energy imbalance has been identified as a critical factor in development of colorectal cancer (Giovannucci, 2003). Consuming excessive amounts of calories in relation to the amount of calories needed to maintain a normal body weight has consistently shown to increase risk of colorectal cancer. Since it is difficult to accurately calculate energy balance, measures of body mass index have been used to estimate long-term energy balance. Studies have found that a higher body mass index is linked with increased colorectal cancer (Wu, Paganini-Hill, Ross &

Henderson, 1987; Giovannucci, Asherio, Rimm, Colditz, Stampfer & Willet, 1995; Le Marchand, Wilkins & Mi, 1992). Having a body mass index greater than 25 increases the risk for developing colorectal cancer (President and Fellow of Harvard College, 2001). Many overweight people are also sedentary. Numerous studies have shown that individuals who are physically active are at a lower risk for colorectal cancer (Colditz, Cannuscio & Frazier, 1997). Colon cancer incidence is reduced approximately 30-50% among people with the highest level of physical activity compared to those with low levels of activity (Giovannucci, 2003).

Research suggests that high consumption of alcohol increases the risk of colorectal cancer (Kune &Vitetta, 1992). An interaction effect seems to play a larger role than just alcohol alone. Higher risks have consistently been observed among individuals with high consumption of alcohol and low intakes of folate (Freudehheim, Graham, Marshall, Haughey, Cholewinski & Wilkinson, 1991; Baron, Sandler, Haile, Mandel, Mott & Greenberg, 1992). A report indicated that women who are at higher risk for colorectal cancer because of family history could reduce their risk if they either had high intakes of folate or took a multivitamin (Fuchs, Willett, Colditz, Hunter, Stampfer, Speizer, & Giovannucci, 2002). The relation between alcohol and folate may be related to alcohol's antagonist effect on folate metabolism (Hillman & Steinberg, 1982).

Research is finding a link between colorectal cancer and dietary fat and cholesterol (President and Fellows of Harvard College, 2001). The risk of developing colorectal cancer increases as the level of total saturated fat and cholesterol increase. The food most associated with colorectal cancer is red meat. Not only is red meat high in saturated fat, but also under high temperatures, such as broiling or grilling, meat under goes a chemical change, which creates cancer-causing carcinogens. During digestion, the carcinogens come into contact with the bowel wall, which may produce colorectal cancer.

Prevention

Even though colorectal cancer has a high incidence, it is one of the most detectable cancers. Fortunately, if colorectal cancer is detected early, and still localized in the rectal area, 90 percent of patients survive five or more years (Sargent & Murphy, 2003). Unlike many other types of cancer, colorectal cancer is easy to identify during screening tests. Regular screening to identify and remove polyps is critical because most colorectal cancers begin as polyps. Yet, only 1% of polyps become cancerous, and there is no a priori way of identifying which polyp is cancerous. Thus, early detection and removal of all polyps by routine screening is vital. Doing so reduces the chance of ever acquiring this disease by 75%.

It's important to participate in regular screening rather than waiting for symptoms to be expressed because early signs can be as vague, nonspecific symptoms such as weight lose, fatigue or weakness. Other symptoms that indicate advanced growth of colorectal cancer could be a change in bowel habits, diarrhea, constipation or a sensation that the bowel does not empty completely, bright red or dark blood in the stool, unusually narrower stool, abdominal discomfort or vomiting. However, due to the fact that colorectal cancer develops slowly over a period of several years, the symptoms are often times not apparent until after the disease has progressed making chances of survival low (Mayo Clinic Staff, 2003). Waiting to be screened until symptoms are present may be too late. As such, prevention and early detection have a much greater potential to lower morbidity and mortality for colorectal cancer than treatments such as chemotherapy, radiation or surgery.

Primary prevention is actively participating in a behavior that has been identified to decrease the risk of developing a specific disease. Getting regular exercise, reducing red meat consumption, not smoking nor drinking heavily, and regular screening are examples of primary

prevention for colorectal cancer. Since the majority of colorectal cancers develop from polyps, regular screening to identify and remove polyps is considered vital prevention.

General Information: Disease Screening

According to Champion, Rawl and Menon (2002), several conditions must be met before preventative screening makes sense in asymptomatic populations. Healthcare professionals must have a way to alter the disease course. The disease must have natural histories and biologies that can be predicted. In addition, preclinical phases must have high prevalence and incidence. In other words, the disease must affect a high percentage of the population to warrant screening practices. However, there must be effective treatment for early stage diseases after they are discovered for screening to be recommended.

If the disease meets the necessary conditions for population screening, the screening tests must be specific and sensitive. Sensitivity refers to the ability to correctly identify people within a population who have the disease. All things being equal, it is commonly believed that the higher the sensitivity, the better the test. A test is not considered sensitive if it detects cancer only 10% of the time. Specificity refers to the ability to correctly identify people within a population who do not have the disease. Specificity relates to patient anxiety and unneeded medical procedures. For example, if a test detects a positive result 50% of the time for people who do not have the disease, further unnecessary tests are done along with unnecessary anxiety of thinking they are ill. Tests must be able to find cancer if it is truly present while simultaneously correctly and confidently identifying its absence.

An alternative way to conceptualize the appropriateness of a screening test is in terms of false positives and false negatives. False positives are abnormal results in people who are free from the disease, which can lead to unnecessary anxiety, costly medical expenses, and even

invasive medical procedures. False negatives are normal results in people who actually have the disease.

Lastly, experts must agree that the screening tests accurately detect the desired disease before organizations recommend population screening. Primarily, scientists look for tests that demonstrate significantly lower mortality from the targeted disease due to screening compared to a population who is not being screened (Champion, Rawl & Menon, 2002).

Colorectal Screening

The goal of screening for colorectal cancer is to identify cancers and polyps in the colon and rectum. Table 2 illustrates the 2004 American Cancer Society colorectal cancer screening guidelines for average risk men and women (American Cancer Society, 2004b).

Table 2

American Cancer Society Colorectal Cancer Screening Guidelines

Risk Category	Test Options and Frequency
Asymptomatic men and women age 50 and older	• Fecal occult blood test (FOBT) annually. If positive, follow up with colonoscopy • Flexible sigmoidoscopy every 5 years • Combination of FOBT annually and flexible sigmoidoscopy every 5 years • Double-contrast barium enema every 5 years. If positive, follow up with colonoscopy • Colonoscopy every 10 years

Fecal Occult Blood Test

Fecal occult blood test (FOBT) is used to chemically check stool for hidden blood (occult). The detection of occult blood in the stool may indicate cancer or polyps in the colon or

rectum since approximately two-thirds of cancers bleed and some polyps bleed (Mayo Clinic Staff, 2003). It is a relatively convenient, noninvasive procedure that poses little risks and is inexpensive.

FOBT is not a sensitive test and can miss early stages of cancers and polyps. Controlled studies involving large samples have shown that FOBT leads to a reduction in mortality rate from anywhere between 15-33% (Mandel, Bond, Church, Snover, Bradley, Schman & Ederer, 1993; Hardcastle, Chamberlain, Robinson, Moss, Amar, Balfour, James & Mangham, 1996; Kronborg, Fenger, Olsen, Jorgensen & Sondergaard, 1996) and about a 20% decrease in cancer incidence (Mandel, Church, Bond, Ederer, Geisser, Mongin, Snover & Schuman, 2000). However, the sensitivity is low for detecting precancerous polyps, especially small ones (Bond, 2000; 1998; Borum, 2001). Due to the test's low sensitivity, there are still a large percentage (67-85%) of people dying from colorectal cancer who have used FOBT as a method of screening. Further, if blood is detected, the source of the bleeding is not known. False positives appear if blood is detected from other parts of the body that are bleeding. False negatives occur because not all cancers or polyps bleed, or bleed very little, leading patients to think they are fine when in fact they have a polyp or cancer.

Flexible Sigmoidoscopy

The bowel is divided into two sections called the distal and proximal bowel. The distal bowel accounts for the first third of the bowel containing the rectum, recto sigmoid junction and sigmoid colon. The remaining two-thirds of the bowel is called the proximal bowel, which includes the descending colon, splenic flexure, transverse colon, hepatic flexure, ascending colon, cecum and appendix.

Flexible sigmoidoscopy allows for direct visualization of the distal bowel, along with the ability to obtain a biopsy specimen of suspicious lesions. This method rarely requires sedation and is less invasive and expensive compared to a colonoscopy. Nearly all cancers and polyps larger than one centimeter in diameter can be seen in the distal bowel with this technique. Some studies have shown that flexible sigmoidoscopy alone can reduce deaths from distal cancers by 60-80%. (Bond, 2000; Borum, 2001; Selby, Friedman, Quesenberry & Weiss, 1992). However, lesions in the proximal bowel, or two-thirds of the bowel, are not detected. The percent of colorectal cancers in the proximal bowel that go undetected by flexible sigmoidoscopy have been reported to be as high 40% (Mayo Clinic Staff, 2003).

Double Contrast Barium Enema

Double contrast barium enema is used to detect changes or abnormalities in the colon. Barium and air are inserted into the colon through the rectum to aid in the view of the colon via an x-ray machine. This technique can detect 50-80% of polyps less than one centimeter in diameter and 70-90% of polyps one centimeter or larger. A one-time screening can detect around 68-78% of advanced adenomas (Lieberman, Weiss, Bond, Ahnen, Garewal & Cheifec, 2000; Imperiale, Wagner, Lin, Larkin, Rogge & Ransohoff, 2000).

Colonoscopy

A colonoscopy is considered the "gold standard" for colorectal cancer detection. A colonoscopy allows visualization of the entire colon and rectum along with the option of removing biopsies of any abnormalities found. Although sedation and preparation are needed, it is the most sensitive test. Research has found that the use of colonoscopy reduced colorectal cancer incidence by 40-60% (Muller & Sonnenberg, 1995). One study found a single-test

sensitivity to be 75% for small adenomas, 90% for large adenomas and higher than 90% for cancer (Rex, Cutler, Lemmel, Rahmani, Clark, Helper, Lehman & Mark, 1997).

If the individual has Medicare, all techniques are covered as of July 1, 2001 (Medicare Report, 2003), with the option to more frequent testing if at higher risk (Mayo Clinic Staff, 2003). Unfortunately, the cost for a colonoscopy is the most expensive out of the other techniques and some insurance companies do not reimburse for the procedure. The relative cost of a colonoscopy is about $650 every 10 years (Rex, Johnson, Lieberman, Burt, & Sonnenburg, 2000). Other tests are less expensive but done more frequently and are less accurate.

Rural Issues

General

The characteristics that make a rural community unique such as isolation, small size and culture are factors that can also affect the health status of the residents. Not only is health status affected by demography and economy, but it is also affected by factors such as geographic isolation, culture of rural living, and the prolonged time it takes for more advanced technology and effective medical care to enter into the smaller communities (Hogan, 1986; Charlton, 1996; Park, Brook, Kosecoff, Keesey, Rubenstein, Keeler, Kahn, Rogers, Chassin, 1990). Even the composition of medical practice differs between rural and urban providers. Family practice providers are the largest source of physicians in rural communities (Bureau of Health Professions, 1997), whereas urban areas have more specialists. In comparison to non-rural areas, rural areas have different patient demographics, health risks and needs, lifestyles, access to healthcare, health insurance provider availability, resources, economies and effects of public policy. All of these factors lead to different health status and practices between rural and urban

providers (Blumenthal & Kagen 2002; Mueller 2002; Moscovice & Stensland 2002; Drain, Godkin & Valentine 2001).

Rural Health

Health and healthcare is closely related to the demography and economy of the community (Evan, Barer & Marmor, 1994). Table 3 illustrates that nationally; rural communities are generally poorer, have higher unemployment rates and are less educated than residents of urban communities. They also tend to have higher numbers of uninsured residents. In relation to urban elders, rural elders are less educated, have lower incomes, are more likely to be poor and are more likely to be in poorer health (Coward, McLaughlin, & Duncan, 1994). Lower economic status has been associated with lifestyle risk factors such as alcohol consumption and dietary factors (Broder, 1991). In addition, people with lower incomes and less education are more likely to report unmet health needs, less likely to have health insurance coverage and less likely to receive preventative health care (Blumenthal & Kagen, 2002).

Table 3

Characteristics of Rural and Urban Populations in the United States

	Rural	Urban
Population density, persons per square mile (1993)	18	202
Median income of households (1995)	$27,776	$36,079
Non-Hispanic, white	$29,392	$40,342
Black	$16,530	$23,348
Hispanic	$21,322	$23,348
Two-parent family	$37,075	$51,023
Female-headed family	$17,182	$22,478
Percent of families below poverty (1995)	15.6%	13.4%
Education of those older than 25 yrs (1995)		
High school graduation	76.9%	82.9%
Some college	37.8%	50.3%
B.A. and higher	14.8%	25.0%
Percent Foreign-Born	2.0%	11.0%

Rickett III, Johnson-Webb & Randolph, Populations and Places in Rural America from Rural Health in the United States, Ricketts (ed) 1999.

Access to Healthcare

Many people are limited to physician care due to difficulty in accessing appropriate healthcare facilities and having adequate, if any health insurance. Rural residents often have to travel longer distances to receive healthcare (Edelman & Menz, 1996; Cunningham & Cornelius, 1995). For the rural elderly, this creates bigger obstacles since only 12% of rural communities of populations less than 2,500 provide public transportation (Seccombe, 1995; Bridwell & Calesaric, 1996). Rural individuals under 65 years of age are less insured compared to those living in urban areas (Hartley, Quam, & Lurie, 1994). In addition, studies have found that urban families pay a lower proportion of their income for insurance premiums and have more insurance coverage than rural families (Mueller, Patil and Ullrich, 1997; Hartley, Quam, & Lurie, 1994). Medicare is important for rural Americans not only because a higher proportion of the rural

population is elderly, but also because rural providers rely more heavily on the Medicare program than on other payers. This is partly due because rural residents are less likely to have employment-related insurance as many residents are self-employed (Frenzen, 1993). However, the Medicare program pays less per rural beneficiary compared to their urban counterparts and pay less for the same service provided in rural than in urban places (Mueller, Schoenman, & Dorosh, 1999). This lower reimbursement may be an incentive for providers to use the least expensive procedure for patients who are on Medicare even if they know another procedure is more comprehensive and/or to not provide any services to Medicare recipients.

The 2002 Behavioral Risk Surveillance System data for colorectal cancer screening for Wisconsin residents shows the screening rates for FOBT and flexible sigmoidoscopy/ colonoscopy by income and education. Table 4 shows the lowest rate of ever having a flexible sigmoidoscopy or colonoscopy for individuals making less than $15,000; the highest rate for those earning between $25,000 - $34,999.

Table 4

Comparison of the Percentage of Wisconsin Residents Who have had a Colorectal Cancer Screening Procedure by Income Level

Method	FOBT		Flexible Sigmoidoscopy/ Colonoscopy	
Income	P	N	P	N
Less than $15,000	45.6	78	46.4	84
$15,000-$24,999	44.8	175	53.7	205
$25,000-$34,999	47.9	173	58.3	203
$35,000-$49,999	54.2	120	52.9	129
$50,000 +	46.3	191	57.1	228

Table 5 shows a higher percentage of college graduates have had either a flexible sigmoidoscopy or colonoscopy compared to individuals who have had less education.

Table 5

Comparison of the Percentage of Wisconsin Residents Who have had a Colorectal Cancer Screening Procedure by Education Level

Method	FOBT		Flexible Sigmoidoscopy/ Colonoscopy	
Education	P	N	P	N
Less than H.S.	51.9	107	52.0	118
H.S. or G.E.D.	44.8	334	54.3	402
Some post H.S.	49.6	206	57.1	226
College Graduate	52.9	242	61.2	281

Summary

In summary, differences in survival of malignant neoplasms have been observed between rural and urban populations (Horner & Chirkikos, 1987). Survival from disease is mostly dependent on early screening. Early screening and detection are related to availability of screening programs and access to health care facilities, which has shown to not be the same for urban and rural communities (Aday, 1985; Battista & Spitzer, 1983).

In the study to be presented in the following chapters, two urban locations and multiple rural settings were sampled. Compared with the rural locations, the urban centers had the advantage of advanced technology, public transportation and closeness to oncologists and colonoscopies.

The data gathered in this research study was funded by an American Cancer Society grant awarded to a healthcare system in west-central Wisconsin. The purpose of the grant was to increase family practice and internal medicine providers' knowledge of colonoscopy and to establish baseline data on attitudes and practices of colorectal cancer screening. To accomplish this, all family practice and internal medicine providers were sent the pre-test survey along with

packets provided by the American Cancer Society, and then given a post-test to determine effectiveness of the packets. The results presented address the pre-test findings. Specifically, findings regarding differences in colorectal cancer screening attitudes and practices between urban and rural providers.

CHAPTER THREE: METHODOLOGY

Purpose

This exploratory study examined colorectal cancer screening practices, attitudes and knowledge among family practice and internal medicine providers practicing in rural and urban areas of west central Wisconsin. Specific attention was given to the rural – urban comparison of screening rates for colorectal cancer, for which beneficial effects of screening have been demonstrated.

Subjects

The population of interest in this research was family practice and internal medicine providers within a west central Wisconsin healthcare system. This system offers a full range of medical services through a network of local areas including Eau Claire, Barron, Bloomer, Chetek, Chippewa Falls, Colfax, Mondovi, Osseo and Prairie Farm. Since the population size is small, not only were physicians included, but also physician assistants and nurse practitioners to increase the population size to 64 eligible providers. The full population (N = 64) was sent a survey, as each member of the population of interest was invited to participate in the study.

Method

The method used for attaining the data was a survey (Appendix A). This survey was a slight modification of the 2002 Wisconsin Colorectal Cancer Survey, which was designed by the Colorectal Cancer Task Force of the Wisconsin Chapter of the American Cancer Society to determine provider's knowledge of colorectal cancer screening and examine if there were differences between provider's beliefs and practices. This survey was modified to determine if there were differences between rural and urban providers, thus including location of the provider's practice. This survey also asked providers to estimate the percentage they

recommended a colorectal screening procedure.

Procedure

On March 1, 2004 an informed consent letter addressed from an oncologist was sent to all family care and internal medicine providers in the healthcare system along with a 40-question survey. The surveys were sent out via interoffice mail and took approximately 15 to 20 minutes to complete. After one week, a follow-up survey was sent to all providers. Data analysis plans are described below.

Measure

The 40-item survey measured screening preferences, screening behaviors, influential factors affecting screening behavior and attitude and knowledge of colorectal cancer. The full survey is attached in appendix A.

Screening Preference

The first section of the survey asked providers to mark their preferred screening methods, what they perceived as their patient's preferred methods and provider's preferred method of screening for self. The options the providers had to choose from were the following: fecal occult blood testing every year (FOBT), flexible sigmoidoscopy every 5 years, FOBT every year combined with flexible sigmoidoscopy every 5 years, colonoscopy every 10 years, double contrast barium enema every 10 years or other.

Screening Behaviors

The providers were asked to estimate the percentage of patients over the age of 50 for whom they recommended a colorectal cancer screening procedure; the percentage actually screened; and the percentage screened with the following: fecal occult blood testing, flexible sigmoidoscopy and colonoscopy.

Influential Factors of Screening for Colorectal Cancer

Providers were asked if they used a paper or computer reminder system for when patients are due for colorectal cancer screening. In addition, there was a question that asked which factors would make them more likely to screen for colorectal cancer. They were also asked if their screening practices have changed within the past four years. Additional questions were asked to help determine reasons as to why their screening practices changed and what influenced their screening practices.

Attitude and Knowledge of Colorectal Cancer

A rating scale was used to assess their level of agreement with statements about familiarity and knowledge of the American Cancer Society guidelines, perceived patient compliance of the three screening methods, factors that affect colonoscopy screening and beliefs of which screening method they thought reduced mortality from colorectal cancer.

Provider Demography

In order to describe the population from which the data was gathered, eight demographic/ descriptive questions were asked. They included whether or not the provider currently performed flexible sigmoidoscopy or colonoscopy, gender, age range, type of medical license, year received medical degree, department of practice and location of practice.

Data Analysis

Planned

The Statistical Program for Social Sciences, version 13.0, (SPSS, 2004) was used to analyze the data. A number of statistical analyses were used in this study. All of the questions on the survey were analyzed as a whole sample and also analyzed separately by rural and urban location. An alpha level of .05 was used for all statistical tests.

Hypothesis 1.

The Pearson r correlation analysis was used to determine if a relationship exist between the percentage of patients who are recommended for a colorectal cancer procedure and the percentage of patients who are actually screened.

Hypotheses 2 & 3.

Independent Groups T-Test analyses were conducted to assess differences between rural and urban sites in their overall estimated screening practice rates and estimated colonoscopy rates.

Hypothesis 4.

The Pearson r correlation analysis was used to explore if there was a relationship between provider's beliefs and practices. This was done by correlating the percentage of patients who were actually screened by fecal occult blood testing with the belief that screening with fecal occult blood testing reduces mortality from colorectal cancer; the percentage of patients who were screened by flexible sigmoidoscopy and the belief that screening with flexible sigmoidoscopy reduces mortality from colorectal cancer and the percentage of patients who were screened for colorectal cancer by colonoscopy with the belief that screening for colorectal cancer by colonoscopy reduces mortality from colorectal cancer.

Hypothesis 5.

The Pearson r correlation analysis was used to explore if there was a relationship between providers who were familiar with the American Cancer Society screening guidelines and their general colorectal cancer screening practices. This was done by correlating provider's level of agreement to their familiarity with the guidelines, with their self-reported estimation of screening patients for colorectal cancer in general, regardless of the screening method.

Post-Hoc

Given the exploratory nature of this study, post-hoc analyses will be performed. The post-hoc questions will be based upon the findings from the planned five hypotheses and will employ the appropriate statistical method. An alpha level of .05 was used for all statistical tests.

Limitations

A limitation of the instrument was discovered when the surveys were returned. Question number 5 asked, "Estimate what percentage of your patients over 50 years of age who are actually screened for colorectal cancer," and question number 6 asked, "Estimate what percentage of your patients over 50 years of age who are actually screened for colorectal cancer with: fecal occult blood testing ___%, flexible sigmoidoscopy___%, colonoscopy___%" Most providers have a percent for number 5 (i.e. 85% who actually were screened) and then 100% of that number (85%) was broken into the 3 options (i.e. 30% FOBT, 10% flexible sigmoidoscopy and 60% colonoscopy). This would have been interpreted as of the 85% of the people who were screened, 30% were screened with FOBT, 10% were screened with flexible sigmoidoscopy and 60% were screened with colonoscopy. However, there were some providers who gave a percent for question number 5 (i.e. 55% were actually screened) and then answered question number 6 with 50% were screened with FOBT and 5% were screened with colonoscopy. In order for this to be interpreted like the first example, the percentages for question number 6 was recalculated, for example, 50% of 55% is actually 90.1% for FOBT and 5% of 55% is 9.09% for colonoscopy. This way it could be interpreted that of the 55% of people who were screened, 90% were screened with FOBT and 9% were screened with colonoscopy. Responses that were clearly adding up the individual method responses to the number of their estimated overall screening percentage, and not 100% of the overall screening percentage, were recalculated to give a true

percentage. This amount of interpretation on the overall percentage of screening by FOBT and colonoscopy does put some limitations on the conclusions found due to manipulating the estimated percentage of each method, however it was quite apparent what the respondent's intentions were, making this researcher confident in the recalculations.

Some providers overlapped their percentages for the 3 methods in question number 6 (i.e., 30% for FOBT, 30% flexible sigmoidoscopy and 70% for colonoscopy). When this was done, the answer was not changed due to the fact that FOBT and flexible sigmoidoscopy are combined as a screening technique. Thus, this study was not able to distinguish if providers were using FOBT alone or in conjunction with flexible sigmoidoscopy.

The sample size of this study does present statistical weakness. Since the size of the sample is small, there may be significant differences that go unnoticed. However, it also reflects the reality of the number of providers available.

CHAPTER FOUR

RESULTS

The purpose of this study was to explore provider's colorectal cancer screening practices from a west central Wisconsin healthcare system. A 23-item survey was distributed in the spring of 2004 to all family practice and internal medicine providers, including physician assistants and nurse practitioners.

Demographics

Response Rate

There were a total of 51 respondents out of a possible 64 for a response rate of 80%. However, the "n" size for the 5 hypotheses differs due to respondents not answering every question on the survey.

Location

The locations were the name of the town or city in which the provider practiced. Due to the small sample size of the location, analysis of results per location was not possible. Thus, the locations were then categorized into either "rural" or "urban" based on the rural-urban continuum codes (Rural Policy Context – web). The rural category consisted of 24 providers and the urban category consisted of 26 providers. To see which locations were categorized rural or urban, refer to Appendix B.

Gender

About 61% (n = 31) of the sample were males and 39% (n = 20) were females. The ratio of males to females within the rural and urban categories reflected the overall gender distribution of providers. Of the providers who practiced in a rural location, 63% (n = 15) were males and

38% (n = 9) were females. Likewise, of the providers who practiced in an urban location, 62% (n = 16) were males and 38% (n = 10) were females.

Age

Approximately 73% (n = 38) of the providers were between the ages of 30-49. Table 6 shows the most frequent age group for rural providers (41.6%, n = 10) were in the group 30-39 and the age group 40-49 was the second most frequent (29.2%, n = 7). The reverse is true for urban providers. The most frequent age group for urban providers (42.3%, n = 11) was the group 40-49 and the second most frequent (30.7%, n = 8) was the group aged 30-39.

Table 6

Distribution of Rural and Urban Providers' Age

	Age Range													
	Under 30		30-39		40-49		50-59		60-69		Over 70		Total	
	n	P	n	P	n	P	n	P	n	P	n	P	n	P
Rural	0	0	10	41.6	7	29.2	5	20.8	1	4.2	1	4.2	24	48
Urban	1	3.8	8	30.7	11	42.3	4	15.4	2	7.7	0	0.0	26	52
Total	1	2.0	18	36.0	18	36.0	9	18.0	3	6.0	1	2.0	50	100

Type of Licensure

The majority (80.4%, n = 41) of providers had medical degrees. Of the urban providers, 100% (n = 26) had medical degrees. Of the rural providers, 58.3% (n = 14) had medical degrees, 25% (n = 6) were physician assistants, 12.5% (n = 3) were nurse practitioners and 4.2% (n = 1) was a doctor of osteopathic medicine.

Department of Practice

Overall, 78% (n = 39) of the providers worked in family practice. Of urban providers, 62% (n = 16) were in family practice and 39% (n = 10) were in internal medicine. Of the rural providers, approximately 96% (n = 23) were in family practice and 4% (n = 1) were in internal medicine.

Year Received Medical Degree

The mean year for which providers received their medical degree was 1987 (N = 49, SD = 10.3, minimum = 1958, maximum = 2003). Rural providers' mean year of reception of medical degree was 1988 (n = 24, SD = 10.6, minimum = 1960, maximum = 2002). Urban providers' mean year of reception of medical degree was 1985 (n = 25, SD = 10.1, minimum = 1958, maximum = 2003).

Significant demographic differences found between rural and urban providers.

Pearson chi-square was used to determine if there were any demographic differences between rural and urban providers. Two significant differences were found; the first concerned was type of medical licensure ($\lambda^2 = 13.54$, $p < .05$). All urban providers had a medical degree (n = 26) compared to only 58% (n = 14) of rural providers. The second significant pertained to medical department ($\lambda^2 = 8.55$, $p < .05$). Almost all rural providers (96%) work in family practice, whereas 62% (n = 16) of urban doctors work in family practice and 39% (n = 10) work in internal medicine. What this means is that almost fifty percent of rural providers do not have a medical license and of those who do, their area of expertise is in family medicine, not in a specialty area such as internal medicine.

Hypotheses

Hypothesis One

The first hypothesis stated there would be a relationship between providers' estimated percent of recommending a colorectal cancer screening procedure with the actual estimated percent of screening for colorectal cancer.

- H_{01}: There will be no relationship between the provider's estimated rate of recommending a colorectal cancer screening procedure to patient's $\geq$ 50 years of age with the provider's estimated rate of patients $\geq$ 50 who have actually been screened.
- H_1: There will be a relationship between the provider's estimated rate of recommending a colorectal cancer screening procedure to patients $\geq$ 50 years of age with the provider's estimated rate of patients $\geq$ 50 who have actually been screened.

The null hypothesis$_1$ was rejected. The Pearson r moment coefficient test indicated a positive relationship between provider's estimated percent of patients that were recommended for screening with the provider's estimated percent of patients who were actually screened ($r = .504$, $p < .05$). Since cause and effect cannot be determined by a test of correlation, this could have two meanings. One interpretation is that the more the providers recommend patients to be screened for colorectal cancer, the more the providers screen patients for colorectal cancer. This suggests that if providers increase the rate to which they recommend their patients to be screened for colorectal cancer, the rate to which the patients are actually screened should increase as well. Another interpretation could be that the more the providers screen their patients, the more the providers will recommend a screening test.

This illustrates the importance of providers recommending patients to be screened and the effects on patients providers' habitual screening.. If providers do not recommend patients to be

screened, there is less of a chance that the patients will be screened. Also, if providers are not in the habit of screening, they are less likely to recommend a screening procedure.

Hypotheses Two and Three

The second and third hypotheses pertained to differences in screening practices between rural and urban providers.

- H_{02}: There will be no percentage difference for screening for colorectal cancer in patients ≥ 50 between urban and rural sites.
- H_2: The urban sites will have a greater percentage of screening for colorectal cancer in patients ≥ 50 than rural sites.
- H_{03}: There will be no percentage difference for screening for colorectal cancer with colonoscopies in patients ≥ 50 between urban and rural sites.
- H_3: Urban sites will have a greater percentage of screening for colorectal cancer with colonoscopies in patients ≥ 50 than rural sites.

Table 7 shows the estimated mean percentage for rural and urban providers' screening practices. Null hypothesis$_2$ failed to be rejected. Independent samples t-tests were analyzed to determine differences between rural and urban provider's estimated screening rates for colorectal cancer. There was not a statistically significant difference found between rural provider's ($M = 60.63$, $SD = 19.90$) and urban provider's ($M = 68.00$, $SD = 19.14$), $t(47) = -1.32$, $p > .05$ estimated percentage of how many patients ≥ 50 are actually screened for colorectal cancer.

Null hypothesis$_3$ was rejected. There was a statistically significant difference found between rural and urban provider's estimated screening for colonoscopies. Urban providers estimated a higher percent of screening with colonoscopy (M = 76.04, SD = 20.12) compared to rural providers (M = 45.70, SD = 28.77), t (39) = - 4.18, $p < .05$. Urban providers estimated a statistically higher percentage of screening for colorectal cancer with colonoscopy than rural providers t (39) = - 4.18, $p < .05$.

Since a difference was found between urban and rural providers screening with colonoscopy, the other screening methods were tested in a post-hoc fashion. In addition to differences in colonoscopy screening, rural providers (M = 49.52, SD = 33.15) estimated a statistically higher percentage of screening for colorectal cancer with FOBT than urban providers (M = 19.58, SD = 21.17), t (37) = 3.67, $p < .05$ (Table 7).

Table 7

Differences Between Rural and Urban Providers Colorectal Cancer Screening Practices

Practices	Mean			Standard Deviation			Sample Size		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Recommend	94.79	95.30	95.15	6.99	8.44	7.66	24	26	51
Actually Screen	60.63	68.00	64.40	19.85	19.15	19.45	24	25	50
Colonoscopy	45.70	76.04	61.17	28.77	20.12	28.56	23	24	48
FOBT	49.52	19.58	35.40	33.15	21.17	32.00	23	24	48

Note. The values represent provider's estimated mean percentages

In summary, although there were no differences found between rural and urban providers' recommending and actual screening practices, there were rural and urban differences found within the screening methods. Rural providers had higher rates of screening their patients with colonoscopies and urban providers had higher rates of screening with FOBT.

Hypothesis Four

Hypothesis four stated that provider's attitudes and beliefs regarding colorectal cancer screening would predict engagement of certain screening methods.

- H_{04}: Provider's attitude regarding the effectiveness of a colorectal cancer screening procedure's ability to reduce mortality from colorectal cancer will not predict engagement in that screening procedure.
- H_4: Provider's attitudes regarding the effectiveness of a colorectal cancer screening procedure's ability to reduce mortality from colorectal cancer will predict engagement in that screening procedure.

Specifically,

  - H_{4A}: There will be a relationship between a provider's belief that screening for colorectal cancer with fecal occult blood testing reduces mortality from colorectal cancer with the provider's estimated percentage of screening patients by fecal occult blood testing.
  - H_{4B}: There will be a relationship between a provider's belief that screening for colorectal cancer with flexible sigmoidoscopy mortality from colorectal cancer with the provider's estimated percentage of screening patients by flexible sigmoidoscopy.

- H_{4C}: There will be a relationship between a provider's belief that screening for colorectal cancer with colonoscopy reduces mortality from colorectal cancer with the provider's estimated percentage of screening patients by colonoscopy.

The Pearson r moment coefficient test was used to analyze the above hypotheses. Null hypothesis $_{4A \& 4C}$ were retained as there were no relationships found between provider's belief that screening with FOBT reduces mortality from colorectal cancer with the provider's estimated percentage of screening patients by FOBT; likewise for colonoscopy (Table 8). However, null hypothesis$_{4B}$ was rejected. There was a weak negative relationship ($r = -.327$, $p < .05$) found between provider's belief that flexible sigmoidoscopy reduces mortality from colorectal cancer and the percentage of screening with flexible sigmoidoscopy (Table 8).

The negative relationship between the estimated percent of flexible sigmoidoscopy screening with the belief that screening with flexible sigmoidoscopy can reduce mortality from colorectal cancer from is difficult to explain. The providers being sampled belong to a healthcare system that discourages the practice of flexible sigmoidoscopies, even if the providers think this procedure can reduce mortality. Weaning away from flexible sigmoidoscopy has been done due to the fact that many colon cancers are being found in the right colon, an area that flexible sigmoidoscopy can not reach. Thus, a possible explanation for the negative relationship finding is administrative in nature.

Table 8

Correlations Between the Estimated Percent of Screening for Each Method with Beliefs of Each Screening Method's Ability to Reduce Mortality

	FOBT Percent		Flexible Sigmoidoscopy Percent		Colonoscopy Percent	
	N	r	N	r	N	r
FOBT reduces mortality	48	.003	-	-	-	-
Flexible sigmoidoscopy reduces mortality	-	-	48	-.327*	-	-
Colonoscopy reduces mortality	-	-	-	-	48	.099

* $p < .05$ (2 – tailed)

Hypothesis Five

Hypothesis five stated there would be a relationship between providers who were familiar with screening guidelines and their general screening practices.

- H_{05}: There will be no relationship between providers who are familiar with the American Cancer Society screening guidelines and their general colorectal cancer screening practices.
- H_5: There will be a relationship between level of familiarity with the American Cancer Society guidelines and general colorectal cancer screening practices.

The Pearson r moment coefficient test was used to assess the possible relationship between level of familiarity with the American Cancer Society guidelines and the estimated percentage of patients screened for colorectal cancer. Results indicate null $hypothesis_4$ failed to be rejected ($r = .03$, $p > 0.5$), suggesting that the degree to which a provider is familiar with the screening guidelines has no bearing on if they will screen age appropriate patients for colorectal cancer.

Post-Hoc Analyses

Since there were differences found between rural and urban screening methods, perceived patient preference by location was analyzed. Even though rural providers, as compared to urban providers, perceived that their patients preferred colonoscopy less (rural 54%; urban 81%), it was found that rural providers actually perceived their patients to prefer a colonoscopy (54%) over a FOBT (38%) procedure. This preference for colonoscopy over FOBT was found for urban providers as well (colonoscopy 81%; FOBT 12%).

With further inspection, there was a relationship found between provider's level of agreement that their patients would comply with having a flexible sigmoidoscopy as the screening method with provider's colonoscopy estimation rates ($r = .479$, $p > .01$). This suggests that if providers think patients will comply with having an invasive procedure such as a flexible sigmoidoscopy, the provider would recommend a more thorough method of screening that is compliant with the healthcare system guidelines, a colonoscopy. Thus, making the estimation rate of screening with flexible sigmoidoscopy low even if the provider believes this type of screening method can reduce mortality. The negative correlation between the estimated percent of flexible sigmoidoscopy screening and with the belief that screening with flexible sigmoidoscopy can reduce mortality from colorectal cancer increased only with urban providers.

This may suggest that urban providers who have colonoscopies more readily available and believe their patients would be more compliant with an invasive procedure would be more likely to screen their patients with a colonoscopy verses their rural counterparts.

The lack of relationship found between providers' beliefs of which method can reduce mortality from colorectal cancer and which methods are actually being done led to post-hoc analyses as well. Specific variables of interest were location of provider and provider factors. Regarding location, rural providers use FOBT as their most frequent screening method (M = 49.52) while urban providers use colonoscopy as their most frequent screening method (M = 76.04). Interestingly, both rural and urban providers most definitely agreed that colonoscopy reduces mortality from colorectal cancer, rural (M = 4.71, SD = 0.46) and urban (M = 4.76, SD = 0.44); while both rural and urban providers were less confident with the agreement that FOBT reduces mortality, rural (M = 3.75, SD = .74) and urban (M = 3.54, SD = 1.33).

Regarding provider specific factors, providers may believe that a certain screening method may reduce mortality, however, the provider may also give the patient options as to which test to have and/or give the patient the ultimate decision. Different factors may influence which screening method a patient decides to have done such as invasiveness of procedure, insurance coverage, ability to get to a specialist office for a colonoscopy, and patient's attitude of seriousness of the testing. Since the patients were not surveyed however, analysis can only be inferred about characteristics of the provider and provider beliefs regarding their patients. FOBT and colonoscopy appear to be the methods used most often by providers in this study. Since screening with colonoscopy appears to be the "gold standard" for screening for colorectal cancer, there was interest in determining which factors were predictive of screening with the gold standard, and without (i.e. FOBT). To determine which factors predict provider's use of

screening with FOBT, two models were entered into a linear regression. The reduced model consisted of main effects and the full model consisted of main effects and interaction effects (Table 9).

Table 9

Predictor Variables of Interest for FOBT

Main Effects	Interaction Effects
Factor 1: Provider's perception of patient's preference for FOBT.	Factor 6: Location of providers multiplied by whether or not the patient requested testing.
Factor 2: The use of a reminder system, either paper or computer.	Factor 7: Location of providers multiplied by provider's perception of patient's preference for FOBT.
Factor 3: Influence of availability of colorectal cancer screening procedures.	Factor 8: Location of providers multiplied by whether or not availability of colorectal cancer screening procedures influenced screening pattern.
Factor 4: Influence of patients requesting to be tested.	
Factor 5: Location of providers, rural or urban.	Factor 9: Location of providers multiplied by whether or not providers use a reminder system

The full model, containing both the main and interaction effects, did not have statistically significant predictive power in determining what accounts for the use of FOBT screening above and beyond the reduced model. The effect of the main predictor variables did not vary across rural/urban location.

The reduced model with only main effects was found to be significant ($F = 13.18 < .05$, $R^2 = .56$). Of the four main effect variables entered into the model two were significant: providers perceive their patients to prefer FOBT ($\beta = .60$, $t = 5.50 < .05$) and location of the providers ($\beta = -.30$, $t = -2.77 < .05$). The stronger of the two predictors, accounting for 36% of unique variance, suggests that the more the provider perceives their patient to prefer FOBT, the higher the rate of using FOBT as a screening method. Location of the provider did not show to be as of a strong predictor, but did predict about 9% of the variance uniquely, indicating that providers who practice in rural settings are more likely to use FOBT as a screening method. Together, these two variables accounted for 45% of the variance in predicting provider's use of screening with FOBT.

The same logic was used in determining which factors predict provider's use of screening with colonoscopy. Two models were entered into a linear regression with the reduced model consisting of main effects and the full model consisting of main effects and interaction effects (Table 10).

Table 10

Predictor Variables of Interest for Colonoscopy

Main Effects	Interaction Effects
Factor 1: Provider's perception of patient's preference for colonoscopy.	Factor 6: Location of providers multiplied by whether or not the patient requested testing.
Factor 2: The use of a reminder system, either paper or computer.	Factor 7: Location of providers multiplied by provider's perception of patient's preference for colonoscopy.
Factor 3: Influence of availability of colorectal cancer screening procedures.	Factor 8: Location of providers multiplied by whether or not availability of colorectal cancer screening procedures influenced screening pattern.
Factor 4: Influence of patients requesting to be tested.	
Factor 5: Location of providers, rural or urban.	Factor 9: Location of providers multiplied by whether or not providers use a reminder system

The results for predicting colonoscopy screening were similar to the results for predicting FOBT screening. The full model, containing both the main and interaction effects, did not have predictive power in determining what accounts for the use of colonoscopy screening. However, the reduced model showed to be significant ($F = 9.16$, $p < .05$, $R^2 = .47$). Of the four variables,

two were significant: provider's perception of patient preference for a colonoscopy ($\beta = .41$, $t = 3.37$ $p < .05$) and location of the providers ($\beta = .42$, $t = 3.42$ $p < .05$). The two predictors suggest that the more the provider perceives their patient to prefer colonoscopy, the higher the rate of using colonoscopy as a screening method. Also, providers who practice in an urban setting are more likely to use colonoscopy as a screening method. Together, these two variables accounted for 35% of the variance in predicting provider's use of screening with colonoscopy. This suggests that a provider's perception of a patient's screening preference and location of provider play a factor in choosing the type of colorectal cancer screening procedure.

Summary of Findings

Although the population size was small, the high response rate indicates that these findings are generalizable to this specific population. Significant results of the composition of the two groups were that little over half of the rural providers had medical degrees; the remaining 50% were either physician assistants or nurse practitioners. Almost all of the rural providers practiced in family medicine. All urban providers had medical degree, and although most practiced in family medicine, a sizeable amount practiced in internal medicine as well.

Differences were found between rural and urban providers in the type of screening performed. Specifically, rural providers estimated higher FOBT screening and lower colonoscopy screening compared to urban providers. In an attempt to identify which variables predict which type of procedure is performed, regression analyses were done. Results of these analyses suggest that the provider's perception of patient's screening preference as well as the provider's location predicts screening practices of the providers. This is highlighted by the fact that rural providers did have a much higher rate of perceived patient preference for an FOBT compared to urban providers.

Yet, this latter finding is misleading if not further explored. Rural providers actually perceived their patients to prefer a colonoscopy (54%) to an FOBT (38%). However, their estimation rates of actual practices were much closer in range than would be expected based upon patient preference data (FOBT 50%; colonoscopy 46%). Interestingly, this was not found with urban providers. This group of providers had a much larger gap in procedures performed (FOBT 20%; colonoscopy 76%), as expected given the large difference in perceived patient procedure preference.

One possible explanation for this greater discrepancy with rural providers is that rural providers have decreased access to colonoscopies. Although not a stastistically significant difference, there were more rural providers (21%) than urban providers (12%) who slightly or strongly agreed that the lack of availability made it difficult to use colonoscopy as a screening method.

CHAPTER FIVE: DISCUSSION

Summary

Colorectal cancer is a preventable disease; yet, the number of people who are screened in compliance with the American Cancer Guidelines is still relatively low. National prevalence data show that 26% of the U.S. population reported to have had an FOBT in the last two years and 53% reported to have ever had a colonoscopy or flexible sigmoidoscopy (National Center for Chronic Disease Prevention & Health Promotion, 2004). Colorectal cancer is a silent killer as it takes years for a polyp to become cancerous and the symptoms often go unnoticed until it is too late. Although only 1% of polyps become cancerous, there is no way to determine which polyp will become cancerous. Early detection and removal of polyps by routine screening reduces the chance of ever acquiring this disease by 75%.

The goal of screening for colorectal cancer is to identify cancers and polyps in the colon and rectum. However, in order for organizations to recommend population screenings for a desired disease, experts must agree that the screening tests accurately detect the disease. Primarily, scientists look for tests that demonstrate significantly lower mortality from the targeted disease due to screening compared to a population who is not being screened (Champion, Rawl & Menon, 2002). The American Cancer Society has identified FOBT, flexible sigmoidoscopy, double contrast barium enema and colonoscopy as appropriate screening methods for colorectal cancer.

Yet, FOBT is not a sensitive test and can miss early stages of cancers and polyps. Due to the test's low sensitivity, there is still a large percentage (67-85%) of people dying from colorectal cancer who have used FOBT as a method of screening.

Flexible sigmoidoscopy allows for direct visualization of the distal bowel, along with the ability to obtain a biopsy specimen of suspicious lesions. However, lesions in the proximal bowel, or two-thirds of the bowel, are not detected. The percent of colorectal cancers in the proximal bowel that go undetected by flexible sigmoidoscopy have been reported to be as high 40% (Mayo Clinic Staff, 2003).

A colonoscopy is the most sensitive test as it allows visualization of the entire colon and rectum, along with the option of removing biopsies of any abnormalities found. However, it is the most evasive and expensive method and some insurance companies do not reimburse for it.

Taylor and Anderson (2002) conducted a study of primary care physicians in Wisconsin and found large differences between the estimated percent of screening rates for the different methods. Specifically, a very small percent of physicians estimated that they screened their patients with colonoscopy, while a much larger percent estimated that their patients were screened with FOBT.

Findings specific to the present study concur with past research in that there continue to be differences between screening methods. Overall, without separating the physicians by location of practice, there were differences found between methods. Specifically, a large percentage of physicians use colonoscopy (62%), and only 36% use FOBT. This is the opposite of past research where the majority of physicians report using FOBT more often. This finding is very promising for the healthcare system in this study as it suggests there is progress being made in screening behavior towards the gold standard. The percentage of providers screening in this specific healthcare system with colonoscopies is higher than the national average, which is less than 50%.

A second interesting finding of the Taylor and Anderson (2002) study was that there was an inconsistency of physician belief and practice. Although almost all respondents either strongly

or slightly agreed to the statement, "Every patient over 50 years of age should be screened for colorectal cancer," only one forth of the respondents estimated that they screened 75% or more of their patients who were 50 years or older. Interestingly, however, Taylor and Anderson (2002) did not examine how many physicians *recommend* patients 50 years or older to have a screening procedure. There may have been discrepancies between physician's belief and practice due to behaviors and attitudes of his or her *patients*, not necessarily of the physician. A physician may think every patient who is 50 and older should be screened, and recommend this to every patient who fits the criteria, but still have a low screening rate of patients who are *actually screened* due to factors related to the patient and location of practice.

Another reason could be that the providers surveyed could only recommend their patients to have a colonoscopy because they can't perform the procedure, so naturally their estimation rates of actually screening would be low. Specifically, in order to perform the procedure, a provider needs a medical degree and, if the person is a family practice doctor, additional specialized educational training is required (Worthington, 2000).

The discrepancies between physician belief and practices found in the Taylor and Anderson (2002) study provoked the inclusion of supplemental questions in this study to help determine if there were underlying factors operating to explain the discrepancy discussed above. Specifically, given the results from the earlier study, there was a need to distinguish between urban and rural providers. In addition, questions regarding rates of recommending screening procedures were also included. If differences in recommending occurred, it could help explain previously found differences in screening.

Findings from the present study show that even though over half of all providers surveyed estimated that they screened for colorectal cancer with colonoscopies, the type of location, rural

or urban, was related to significant differences in screening practices. The fact that rural providers estimated a much higher percent of screening with FOBT and the urban providers estimated a much higher percent of screening with colonoscopy demonstrates that healthcare discrepancies between locations still exist.

According to the predictive models tested, a provider's perceived patient preference should have some impact on the estimated screening rate. While urban provider's estimation rates and perceived patient preference had a large gap between colonoscopies and FOBT, both favoring colonoscopies, rural providers actually perceived their patients to prefer a colonoscopy. Yet, rural providers still had a slightly more frequent estimation rate of using FOBT. This suggests that something else plays a role in determining the test that is used within the rural areas.

The other added factor to this study was the question asking the providers to estimate the percent of patients they recommended having a colorectal cancer procedure. In hindsight, an estimation of *recommendation to <u>each</u> procedure* should have been asked, as well as if they are eligible to perform colonoscopies As mentioned before, it was found that rural providers actually perceived their patients to prefer a colonoscopy rather than FOBT, however, the screening rates do not reflect this. Since more than half of rural providers do not have a licensed medical degree, and only one who practices internal medicine, it would be interesting to know to how many patients rural providers recommend <u>each</u> procedure and which providers are able to perform the procedure It is logical that urban providers would report a higher estimate of colonoscopies because there were more licensed and eligible providers in the urban areas who can perform this procedure. Rural providers could have a high rate of recommending a colonoscopy, but a low rate

of performing one because they can't perform the procedure, while the urban providers could have performed the colonoscopy of the patient who was referred by the rural provider.

Limitations

Four limitations exist in this study. The first is that the results cannot be generalized to providers outside of this healthcare system. The second is the small sample size of the study, however, it does reflect the true size of the population. The third limitation is the degree to which true percentages for the different screening methods had to be inferred and recalculated. These recalculated scores were the basis for comparisons between rural and urban providers' practices, as well as for the regressions in determining if there were factors that could predict either FOBT or colonoscopy screening. The last limitation is that this study does not uncover the causal reasons as to why there are discrepancies in the different methods of screening for colorectal cancer between rural and urban providers. On this, there can only be speculation and some relationship data until further research is done.

Conclusions

The fact that there were no differences between rural and urban provider's rates of recommending screening and the overall rate of having any screening method done suggests that no matter where the providers are practicing they all perceive screening to be important. However, the method of screening seems to be a function of provider location and possibly the provider's perception of patients' preference. The strength of this latter finding is questionable however, for although rural providers perceived their patients to prefer FOBT far more often than urban providers did, rural providers still perceived that their patients preferred a colonoscopy more than FOBT. A factor worth investigating would be asking the providers to report how many patients they recommend for each specific procedure.

The differences between rural and urban providers' screening method suggests healthcare discrepancies exist for this specific population. Rural providers reported lower rates of screening their 50 years of age or older patients with colonoscopy, which is the "gold standard," yet the most expensive test. Rural providers reported higher rates of screening with FOBT, which is the least invasive, least expensive test.

Research suggests that rural and urban healthcare discrepancies are due to a community's economic and educational level as well as insurance coverage and accessibility. Specifically, FOBT can be done in the comfort of one's own home and doesn't require an evasive appointment with a specialist, which most likely would be in a larger, more urban neighboring city. All insurances cover this method of screening and if a person does not have insurance, it is the least expensive screening test for colorectal cancer. In contrast, colonoscopies are evasive, expensive and done by a specialist. Regarding this last issue, the findings from this study suggest that most rural providers, specific to this Wisconsin sample, compared to urban providers, do not have the training necessary to provide a colonoscopy.

Any of the above factors, alone or in combination, can be determining factors of who gets which screening method. However, there is insufficient data from this research to draw any firm conclusions about why there are differences between rural and urban providers.

Implications

These results can help bring insight to colorectal cancer screening practices in this specific healthcare system. From this study, it is apparent that rural providers in this healthcare system are not screening with colonoscopies at the ideal rate. This information could be used as evidence for the need to request governmental funding assistance to recruit and hire licensed

internal medicine providers in underserved areas, specifically rural areas, or to provide training to the current rural-based family practice physicians. In addition, this type of information would be helpful in planning educational campaigns for patients and by knowing which population to target, and for creating educational training sessions for rural providers on how to educate their patients on the importance of colorectal cancer screening and how to actively engage them in the decision process.

Recommendations

There is evidence to suggest that there is something different between rural and urban practices re colorectal screening in this specific Wisconsin healthcare system. However, further research would be needed to determine if the differences were due to the patient demographics, such as income or educational level, or if it was due to characteristics of the providers or healthcare system practices.

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Appendix A: Colorectal Cancer Screening Survey

Please answer the following questions and return to Corporate Communications by Tuesday, March 16, 2004.

1. For patients at average risk, please check:

   a. **Your most preferred** method of screening for colorectal cancer: **(Check only one)**
      - ❑ Fecal occult blood testing (FOBT) every year
      - ❑ Flexible sigmoidoscopy every 5 years
      - ❑ FOBT every year combined with flexible sigmoidoscopy every 5 years
      - ❑ Colonoscopy every 10 years
      - ❑ Double contrast barium enema every 10 years
      - ❑ Other, please specify _____

   b. What you believe to be the majority of your **patients' most preferred** method of screening for colorectal cancer: **(Check only one)**
      - ❑ Fecal occult blood testing (FOBT) every year
      - ❑ Flexible sigmoidoscopy every 5 years
      - ❑ FOBT every year combined with flexible sigmoidoscopy every 5 years
      - ❑ Colonoscopy every 10 years
      - ❑ Double contrast barium enema every 10 years
      - ❑ Other, please specify _____

2. Which method of screening for colorectal cancer would you **choose for yourself** if you were an average risk patient over 50 years of age: **(Check only one)**
   - ❑ Fecal occult blood testing (FOBT) every year
   - ❑ Flexible sigmoidoscopy every 5 years
   - ❑ FOBT every year combined with flexible sigmoidoscopy every 5 years
   - ❑ Colonoscopy every 10 years
   - ❑ Double contrast barium enema every 10 years
   - ❑ Other, please specify _____

3. For patients over 50 years of age, estimate what percentage...
   a. you **recommend** for a colorectal screening procedure _____%
   b. are **actually screened** for colorectal cancer: _____%
   c. are screened for colorectal cancer with:
      Fecal occult blood testing _____%
      Flexible sigmoidoscopy _____%
      Colonoscopy _____%

4. Estimate how many patients over 50 years of age you see each year in your clinical practice: _____

Do you use a system to remind you when a patient is due for colorectal cancer screening? (Check only one)

- ❑ No
- ❑ Yes, paper system
- ❑ Yes, computer system

5. Which of the following would make you more likely to screen for colorectal cancer: (Check all that apply):
   - ❑ Reminder system
   - ❑ Easy availability of screening tests
   - ❑ Pamphlets for patients

6. Other things that would help you?

_____

_____

7. Has your screening pattern (type of test or frequency) for colorectal cancer changed in the past 4 years?

❑ No ❑ Yes

8. If yes, **how** has it changed?

_____

_____

9. If yes, **why** has it changed?

_____

_____

10. Which of the following have influenced your screening practices? (Check all that apply)

- ❑ Received ACS Screening Guidelines
- ❑ Read the Wisconsin Medical Journal screening article
- ❑ Read other medical journal articles
- ❑ Involved in CME courses/conferences
- ❑ Availability of screening procedures
- ❑ My patients have requested testing
- ❑ Other (please list) _____

11. **Please check your level of agreement or disagreement with the following statements:**

	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree	N/A
I regularly screen my patients over 50 years of age for colorectal cancer.	❑	❑	❑	❑	❑	❑
The guidelines for colorectal cancer screening are clear.	❑	❑	❑	❑	❑	❑
I am familiar with the American Cancer Society guidelines for colorectal cancer screening.	❑	❑	❑	❑	❑	❑
A patient with a family history of colorectal cancer is at increased risk for developing colorectal cancer.	❑	❑	❑	❑	❑	❑
Every patient over 50 years of age should be screened for colorectal cancer.	❑	❑	❑	❑	❑	❑
If I were to recommend a colonoscopy as the screening test for colorectal cancer, my patients would comply.	❑	❑	❑	❑	❑	❑
If I were to recommend fecal occult blood testing as the screening test for colorectal cancer, my patients would comply.	❑	❑	❑	❑	❑	❑
If I were to recommend flexible sigmoidoscopy as the screening test for colorectal cancer, my patients would comply.	❑	❑	❑	❑	❑	❑
The cost of colonoscopy makes me hesitant to recommend colonoscopy screening for colorectal cancer.	❑	❑	❑	❑	❑	❑
The risk of perforation from colonoscopy makes me hesitant to recommend colonoscopy screening for colorectal cancer.	❑	❑	❑	❑	❑	❑
The lack of availability of colonoscopy makes it difficult to use colonoscopy as a screening tool for colorectal cancer.	❑	❑	❑	❑	❑	❑
The lack of proof that screening with colonoscopy reduces mortality from colorectal cancer makes me hesitant to use colonoscopy as a screening tool.	❑	❑	❑	❑	❑	❑
Screening for colorectal cancer with fecal occult blood testing reduces mortality from colorectal cancer.	❑	❑	❑	❑	❑	❑
Screening for colorectal cancer with flexible sigmoidoscopy reduces mortality from colorectal cancer.	❑	❑	❑	❑	❑	❑
Screening for colorectal cancer by combining fecal occult blood testing with flexible sigmoidoscopy reduces mortality from colorectal cancer.	❑	❑	❑	❑	❑	❑
Screening for colorectal cancer with colonoscopy reduces mortality from colorectal cancer.	❑	❑	❑	❑	❑	❑

12. Do you currently perform flexible sigmoidoscopy? ❑ No ❑ Yes

13. Do you currently perform colonoscopy? ❑ No ❑ Yes

Demographics

Although you are answering demographic questions, your responses will not be used to identify you in any report or thesis.

14. Your gender: ❑ Male ❑ Female

15. Please check your age range:

- ❑ Under 30
- ❑ 30-39
- ❑ 40-49
- ❑ 50-59
- ❑ 60-69
- ❑ 70 +

17. Check what applies to you: ❑ M.D. ❑ P.A. ❑ N.P.

18. Please check your department? ❑ Family Practice ❑ Internal Medicine

19. What year did you receive your clinical degree? _____

20. Please check the location of your primary office:

❑ Barron ❑ Bloomer ❑ Cameron ❑ Chetek ❑ Chippewa Falls

❑ Colfax ❑ Eau Claire-MCC ❑ Eau Claire-MCLC ❑ Mondovi

❑ Osseo ❑ Prairie Farm

Thank you for your participation!

Luther Midelfort

Mayo Health System

Appendix B: Categorization of Locations

Categorization of Locations			
Rural	n	Urban	n
Barron	7	Chippewa Fall	5
Bloomer	5	Eau Claire	21
Cameron	2		
Chetek	1		
Colfax	2		
Mondovi	2		
Osseo	5		
Total	24		26