Impact of a Multifaceted Intervention on Promoting Adherence to Screening Colonoscopy among HIV/AIDS Population

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UNIVERSITY OF MIAMI

IMPACT OF A MULTIFACETED INTERVENTION ON PROMOTING ADHERENCE TO SCREENING COLONOSCOPY AMONG HIV/AIDS POPULATION

By
Pansy Ferron

A DISSERTATION

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Doctor of Philosophy

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the requirements for the degree of
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IMPACT OF A MULTIFACETED INTERVENTION ON PROMOTING
ADHERENCE TO SCREENING COLONOSCOPY AMONG HIV/AIDS
POPULATION

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Colorectal cancer (CRC) is the second leading cause of death in the United States and has the highest death rate among Blacks. Whereas studies have targeted patients to increase CRC adherence in the general population few studies have focused on improving providers’ adherence to screening guidelines. Also, CRC screening studies among HIV-positive patients consistently show lower screening rates compared to screening rates among HIV negative persons. Results of screening colonoscopy studies among HIV positive patients show higher prevalence of neoplastic lesions and colon cancer is diagnosed at advanced cancer stages; these patients have shorter disease-free survival compared to HIV-negative patients.

The aim of this transdisciplinary retrospective–prospective and randomized control study is to examine providers’ adherence to screening colonoscopy guidelines before and after screening reminders, evaluate the impact of an educational screening video and review of colonoscopy decisions tree plus usual care on patient adherence compared to usual care only. Results showed that providers’ adherence to screening colonoscopy guidelines significantly increased after reminders to refer patients were placed in medical records. The randomized trial showed that patients in the intervention group were more adherent to screening colonoscopy appointments compared to patients in the usual care arm. Also, patients with little or no social support in the intervention arm were more likely to keep appointments.
This is the first reported study of a Transdisciplinary prevention model integrating evidence-based medicine, behavioral medicine and human factors decision support through a multi-faceted intervention to increase screening colonoscopy adherence in the HIV population. We integrated a provider reminder system, patient informed decision support of colonoscopy educational video and decision tree review in addition to patient provider communication to promote increased provider and patient screening behavior. Further studies are needed to elucidate the impact of patient centered intervention strategies and social support on screening colonoscopy behavior.
Dedication

This work is dedicated to my admirable daughter Karen and marvelous grandsons Ryan and Jayden, with all my love.
Acknowledgements

I would like to thank Dr. Steven Ullman and Wanda McSwiney for their support during the application process to Interdisciplinary Studies. Also, my gratitude to Drs. Ullman and Thomas LeBlanc for granting tuition remission to make this dissertation possible. I would like to thank Dr. Shihab Asfour, Dissertation Advisor for his unwavering support during the preadmission, and admission processes for this Ph.D. and his recommendation for tuition remission. Despite his many academic responsibilities, he has nurtured my ability to combine my professional and academic experiences in the development of and completion of this dissertation. His guidance and support has brought this formidable idea into fruition.

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Chapter 1. Introduction  

Background and Significance

Human Immunodeficiency Virus (HIV) causes the progressive deterioration to the body’s immune system; this condition, if untreated, leads to acquired immune deficiency syndrome (AIDS) (Langford, Ananworanich, & Cooper, 2007). Whereas the introduction of highly active Antiretroviral therapy (HAART) has prolonged HIV infected patients’ survival (Fang, Chang, & Hsu, 2007), the co-morbid conditions associated with aging have increased in this population (Sheth, Moore, & Gebo, 2006). Consequently, implementing timely screening guidelines such as cancer screening and cardiovascular prevention guidelines for the aging patient population improve patient quality of life and health outcomes (Eyre, Kahn, & Robertson, 2004).

Overall, integrating transdisciplinary collaborative (Emmoms, Viswanath & Colditz 2008) patient centered colon cancer disease prevention through evidence based guidelines, behavioral medicine and Human Factors Engineering patient and informed decision and patient-provider communication among the HIV/AIDS patient population would improve public health outcomes and consequently decrease the economic burden of healthcare costs.

Older Adults.

Middle adulthood is defined as the age between 40-65 years, late adulthood (elderly) includes ages 65 years and older; however, for purposes of research, older age is defined as 50 years and older (Penedo, 2006). Older age is associated with the onset of several chronic conditions including diabetes mellitus and cardiovascular diseases (Gebo, 2004).

Among persons living with HIV infection, seventy percent (770,000) are between 25-49 years, whereas twenty-five percent (280,000) are persons 50 years and over (MMWR,
October 2008). Older adults, often diagnosed with HIV infection later in the disease, experience progression more quickly, and survive for a shorter period than their younger counterparts (Goodroad, 2003; Gebo, 2004). Whereas earlier studies among HIV-infected older adults report increased psychological symptoms, more HIV-related life-stressor burden, less support from friends, and reduced access to health care and social services (Heckman, Heckman, & Kockman, 2002), current research shows that older adults report greater subjective support and psychological wellbeing and less depressive symptoms compared to younger HIV positive adults (Mavandadi, Zanjani, Ten Have, & Oslin, 2009).

**Public Health Impact**

Federal spending on HIV/AIDS care in 2009 was $19.4 billion (AHRQ 2009), and the estimated total cost of cancer care in 2010 was $263.8 billion (AHRQ 2010). Cancer was the nation’s second leading cause of death in 2009-2010 and both breast and colon cancers have high incidence rates, also minorities have a higher mortality from cancers (NCI 2009-2010). Finally, mental health and substance abuse that negatively influence patient adherence and outcomes among HIV/AIDS patients contribute to overall poor outcomes (Freeman, Patel, Collins 2005; Metsch, Pereyera, Messinger, Del Rio, Strathdee, Anderson-Mahoney 2008).

**Health Care Quality and Disparities**

The Institute of Medicine (IOM) defines health care quality as “the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge” (IOM, 2006). Healthcare disparities are defined as “racial or ethnic differences in the quality of healthcare that are not due to access related factors or clinical needs, preferences and appropriateness of intervention” (Smedley, Stith & Nelson pp 3, 2003).
Research in healthcare disparities in cancer has revealed that blacks have lower screening rates, are diagnosed with advanced cancer stages and lower survival rates. Also, co-morbid conditions such as diabetes, hypertension and heart disease contribute to disparities in post operative survival. (Morris, Rhoads, Stain & Birkmeyer 2010). Health care disparities in colorectal cancer are noteworthy in showing Colorectal cancer death rate is highest and the second leading cause of death among Blacks in the United States. (Altekruse, Kosary, Krapcho, Neyman, Aminou, Waldron, Ruhl, Howlader, and Tatalovich 2010). One study evaluating colorectal screening among Medicare beneficiaries ages 70-89 showed that although there were racial and ethnic disparities in colorectal screening adherence among Blacks and Hispanics compared to whites, utilization was higher following Medicare coverage for screening colonoscopy among Blacks OR 0.80(0.68-0.95) and Whites (OR1.0) in the age-gender adjusted analysis, however, Hispanics were less likely to be screened OR 0.73(0.54-0.79) (White, Vernon, Franzini, Du 2011).

Health System Process

A healthcare system integrates staff roles, responsibilities, tools and processes for the routine delivery of health care. Primary care, a component of the healthcare system, includes health promotion, prevention, health maintenance, and patient education. In this system, the responsibilities of each team member are defined: the process of care, procedures guidelines and performance, is measured by the patient outcomes (AAFP, 2008). Disease prevention includes colon cancer prevention such as screening colonoscopy.

Research conducted to increase colorectal screening adherence through improved health system process have been inconsistent. Constanza et al., (2007) conducted a community-based randomized controlled combined intervention of sending out a mailed booklet on colon cancer screening and follow-up telephone counseling to 1414 HIV negative
patients attending primary care providers in the University of Massachusetts Health Care system. The control arm of 1520 patients was of similar demographics. Results showed that the intervention did not increase colorectal screening rate when compared to the control group (Constanza, Luckman, Stoddard, White, Stark, and Avrinin 2007). In contrast, follow-up mailings of a brochure on screening colonoscopy were sent 10 days before the scheduled procedure to 791 participants from two general internal medicine practices; patients were randomized to usual care, and usual care plus mailed brochure. Results showed that the mailed brochure significantly increased the screening colonoscopy rates in this population (Denberg, Coombs, Byers, 2006).

Colonoscopy is frequently used for colorectal screening in the United States. This method of colon cancer screening is effective in the diagnosis and treatment of neoplastic lesions, and consequently facilitates the increase in colon cancer prevention rates (Liberman 2006). However, colonoscopy is associated with increased cost, and possible complications such as side effects from sedation, bleeding from biopsy site, or perforation of the colon (Sonnenberg, Delco, and Inadomi 2000).

Typically, the healthcare provider initiates discussions about screening colonoscopy with his/her patients. This process involves educating the patient about screening and making referrals for the procedure, ensuring that the patient receives the prescription, follows the instructions for the bowel preparation, and follows the pre-operative instructions. Health system barriers to this process include lack of provider recommendation, type of insurance coverage, inefficient referral process and long wait times for the procedure (Nash, Azeez, Vlahov, and Schori 2006).
Nash et al., (2006) in New York City conducted a retrospective analysis of 1,060 screening colonoscopy procedures performed before and after intervention involving patient navigators, the Direct Endoscopic Referral System, and enhancement of the gastroenterology suite. The intervention improved colonoscopy screening rates from 56.8 per month to 119 per month (Nash et al., 2006). In addition, a multicenter randomized controlled trial using patient navigators to increase colonoscopy screening among 21 low-income minorities showed that 54% of navigated patients completed screening colonoscopy, compared to 13% of non-navigated patients. Also one-hundred percent of the navigated patients were satisfied with the navigation services (Christie, Itzkowitz, Lihau-Nkanza, Castillo, Red, and Jandorf 2008).

**Patient-Provider Communication**

Patient centered care typically includes patient–provider communication and the incorporation of patient preferences in decisions about care, patient education visits, emotional support and overall care coordination (Flash, McCoy, Vaughn, Ward et al., 2004). Research conducted among HIV negative patients involving psychosocial and behavioral factors, attitudes and barriers to colorectal screening, have yielded suboptimal impact on adherence to screening (Janz, Wren, Schottenfield, Guire 2003; Hay, Ford, Klein, Primavera, Buckley, Stein, Shike 2003). For example, Janz used the Health Belief Model to assess the attitudes and behavioral determinants of colorectal screening through telephone interviews among 355 black and white men and women aged 50-79 years. Results showed fewer than 30% of patients sampled adhered to current screening guidelines, despite the powerful motivation from physician recommendation (Janz et al., 2003). In another non-HIV related study, results of a mailed survey of 2501 patients aged 50-70 years linked with 5 year retrospective claims data, reported 80% discussed colorectal screening with their physician;
however, despite patient-provider discussions about CRC screening, only 54% of patients were adherent to screening (Lafata, Devine, Moon, Williams 2006). Another study evaluated patient-provider communication through the Agency for Healthcare Quality and Research Consumer assessment of Healthcare Providers and systems (CAHPS) (n = 8323) on patient provider communication on colorectal screening and showed that patients were more likely to be screened if they were English speaking, had a higher education, and these patients were more likely to receive colonoscopy. Also, the ones who had more time with their providers had doubled the screening rate (Carcaise-Edinboro, P., Bradley, C.J., 2008). Results of a mailed questionnaire to elicit perceived barriers to colonoscopy screening, n = 1234, showed barriers included: lack of physician recommendation; in addition men were more likely to believe that they did not need a colonoscopy and had reported having had a bad experience with prior colonoscopies. If patients planned to have colonoscopy within six months, they were less likely to have these barriers (Vincent, Hochalter, and Broglio & Avotos-AVotins 2011)

**Human Factors Engineering**

Human factors engineering is the understanding of human physical and cognitive capabilities and the application of this knowledge to the design and development of appropriate systems and services (Wickens, Lee, and Liu 2004).

Human factors engineering in healthcare was traditionally concerned with technology development in the design of work place environment and patient safety. However, additional areas of interest include disease risk assessment and disease prevention (Klatz & Ayoub, 1995). In order to support medical decisions made by clinicians and patients, a Human Factors approach facilitates information delivery and patient participation in the decision
making process through patient decision aids and decision analysis. The National Research Council Committee on Human Factors proposes to increase quality patient care and satisfaction through enhanced prevention and treatment through improved program performance and effectiveness (Nickerson, 1995). In addition, these programs will also seek to achieve risk reduction and illness prevention in the areas of smoking cessation, breast and colon cancer prevention (Alvarado, Cao, & Klein, 2004; Klatz & Ayoub, 1995).

Cognition

Components of human factors engineering include cognitive reasoning and decision-making (Endsley, Hoffman, Kaber, & Roth, 2007). Cognitive reasoning capability includes the human information-processing system through which people perceive, think, and remember. Cognition integrates perception of the situation with the working memory in the decision-making and problem solving processes; also, the stages in this process involve perception of information about the environment and central processing of this information (Wickens et al., 2004). In addition, people’s perceived self-efficacy influence this cognition and information-processing system by the situation they construct and submit to the sensory register in the brain utilizing joint motivational and information-processing operations (Bandura, 1989).

Decision-making process involves the selection of one option of several alternatives from the available information. This process often requires increased cognitive ability; also, the decision makers should have both the necessary information and the cognitive reasoning capabilities to process that information consistent with their individual preferences (Wickens et al., 2004). They include choice of options, courses of action, beliefs about and means to
achieve the process, and finally, desires, values, or preferences associated with the outcomes of the action–event combination (Patel, Kaufman, Arocha 2002).

Patient Decision Support

Patient decision support (PDS) aids enhance the patient provider shared decision-making in both disease screening and treatment to achieve the most favorable outcome consistent with the patient’s preferences and values to facilitate improved patient outcomes. These aids, usually in booklet form or computer generated, are designed to communicate the best available evidence about the screening or treatment being recommended (Holmes-Rovner, Nelson, Pignone 2007).

Shared Decision Making in Healthcare

Overall, the lack of knowledge and options about disease prevention screening and treatment may lead the patient to select a suboptimal decision. Consequently, interventions and research are aimed at improving patient-provider decision-making, and the uses of patient decision support (PDS) aids during the decision making process are often utilized (Saba, Wong, & Schillinger 2006). Patients usually require the relevant information to understand the screening or treatment options with possible outcomes. In addition, decision makers usually require alternatives to options in order to facilitate the weighing of benefits and risks to assist in the selection of the right choice based on their preferences (Gravel, Legare, & Graham, 2006).

Although the results of shared decision-making research have been inconsistent, studies have shown the following: improved patient satisfaction; some patients preferring to share decisions with their providers (Golin, Dimatteo, & Duan, 2002); increased patient participation; and improved self-care (Saba et al., 2006). Other studies suggest that the degree
of physician adherence to clinical guidelines have been poor, and patients’ psychosocial factors bias medical decision-making (Legare, Moher, Elwyn et al, 2007).

**Barriers to Improved Outcomes**

While provider and patient recognition of barriers to self-care among patients with multiple co-morbidities often help to prioritize self-care, knowledge of patients’ abilities and adaptive behaviors to address specific issues of symptoms, medication management and adherence should facilitate improved intermediate outcomes (Bayliss, Steiner, Fernald, Crane, Main 2003; Johnson, Veazie, Kochevar et al 2002). Robbins and colleagues examined the role of family social support network among HIV-positive African American women in our patient population; results showed that the quality of social support was important in abating psychological distress (Robbins Szapocnik, Tejeda, Samuels, Ironson, Antoni 2003). The perceived quality of social support is significant to our study population.

**Transdisciplinary model**

Transdisciplinary research integrates discipline specific theories through a shared conceptual framework to address identified common problems in healthcare (Gibson, Martin & Singer 2002) and bridges the gap in the development of interventions to improve public health outcomes (Abrams 2006). The application of a transdisciplinary model to evidence-based practice augments provider and patient decision making to achieve improved quality health care and outcomes (Satterfield, Spring, Brownson, Mullen et al., 2009).

This dissertation research incorporates the principles of evidence-based medicine, health behavior, industrial engineering and human factors to promote screening colonoscopy adherence among HIV/AIDS patients over 50 years of age
Chapter 2

Statement of the Problem

Epidemiology

In the United States an estimated 141,210 men and women will be diagnosed and 49,380 will die of colon and rectal cancer in 2011 (Seer 2011). During the period 2004-2008, the median age for diagnosis of colon and rectal cancer was 70 years. For the period 2003-2007, the median age at death rate was 75 years. In addition, the incidence rate by race: 67.7/100,000 for black men and 51.2/100,000 for black women, 39.9/100,000 for Hispanic men and 28.4/100,000 for Hispanic women, while 54.4/100,000 for white men and 40.2/100,000 for white women. The age range at time of cancer diagnoses and percentage diagnosed were as follows: 45-54 years 12.8%, 55-64 years 19.6%, 65-74 years 24.1%, and 75-84 years 26.2% (Altekruse, Kosary, Krapcho, Neyman et al., 2010).

Colon Cancer Screening Guidelines to Detect Polyps and Cancer

The 2010-2011 US Preventive Services Task Force recommendation for colon cancer screening guidelines included recommending annual fecal occult blood testing and listed the following testing options to detect both polyps and cancer: Flexible sigmoidoscopy every 5 years; colonoscopy every 10 years (AHRQ 2010-2011). In addition, the guidelines suggested that patients with adenomas ≥ 3-10 adenomas or high-grade dysplasia are recommended to have follow-up colonoscopy in 3 years (Winawer, Zauber, Fletcher, Stillman, Obrien, Levin et al 2006). Colonoscopy is a procedure to look inside the rectum and colon for polyps, abnormal areas, or cancer; the gastroenterologist passes a colonoscope, a thin, tube-like instrument with a light and a lens for viewing and a tool to remove polyps or tissue samples.
through the anus. Biopsy tissue or polyps are checked under a microscope for signs of cancer (NCI PDQ®, 2007).

**Emphasis on Quality**

Despite multiple interventions to improve colorectal cancer screening, the overall screening rate of eligible adults to colorectal cancer screening is approximately 50 percent (CDC 2011). Studies have shown that blacks develop colorectal cancer (CRC) at a younger age than whites and 50% are more likely to die (American Cancer Society, 2008). Bini and colleagues in New York City conducted a prospective study among 165 HIV-infected and 2,217 uninfected controls to evaluate the prevalence of neoplastic lesions identified through screening flexible sigmoidoscopy. They found a higher prevalence of neoplastic lesions in the distal colon among HIV-infected patients (25.5%) compared to in HIV-negative controls (13.1%) p <0.001. Follow-up colonoscopy of patients with positive results revealed neoplastic lesions were more common in HIV-infected patients (odds ratio, 1.88; (1.02-3.46) 95% confidence interval (Bini, Park, Francois 2006).

In addition, Reinhold and colleagues conducted a retrospective study on colon cancer screening through medical records review among 302 consecutive HIV-infected patients ≥50 yrs old seen in their Veterans Administration outpatient clinic from 1/1/01 to 6/30/02, with age- and gender-matched HIV-negative control patients seen during the same time period. Results showed 17.2 % HIV-infected patients compared with 27.5 % (p=0.002) HIV-negative patients received colonoscopy screening. Also, HIV-positive patients in this study were less likely to have received at least one CRC screening procedure than HIV-negative patients: 49.3% compared to 65.6%, p=0.001 (Reinhold, Moon, Tenner, Poles, Bini 2005).
Finally, Wasserman and colleagues conducted a case controlled study among HIV-infected patients with colorectal cancer matched with two HIV-negative control patients with colorectal cancer (CRC) and compared the results with the Surveillance Epidemiology and End results (SEER) data. The study patients were matched by age, sex, race and tumor stage at cancer diagnosis. They identified and followed twelve (0.3%) HIV CRC patients out of 3,951 CRC patients for thirty months (6-65). Results showed the median age at diagnosis was 41 years (29-52). The HIV-positive patients had a 3:1 ratio between patients younger and older than 50 years, compared to 1.33 ratio in the general HIV-negative population; also, 90% of HIV-positive patients had advanced stages at diagnosis and had a shorter disease-free survival, compared to 57% in the general population (Wasserberg, Nunoo-Mensah, Gonzalez-Ruiz, 2007). Bini and colleagues followed HIV positive, n =131, and HIV negative, n =266 patients referred for screening colonoscopy prospectively for the identification of neoplastic lesions from April 2002 to October 2004. They diagnosed 62.5% HIV positive and 41.5% HIV negative patient with neoplastic lesions. The HIV positive patients were more likely to have adenomatous polyps 6-9 mm in diameter, two or more adenomatous polyps, advanced neoplastic lesions and adenocarcinoma. (Bini, Green, Poles 2009).

**Health Belief Model**

The Health Belief Model (HBM) “was one of the first and remains one of the widely conceptualized theories of health behavior” (Glanz, Rimmer, Lewis pp 45, 2002). Through numerous replications and developments of this theory, researchers have agreed on six main constructs that influence healthcare decisions among patients to adopt appropriate behaviors to prevent illness through screening (Croyle, 2005). These are described below.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
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<tr>
<td>Perceived susceptibility</td>
<td>Beliefs about the chance of getting a condition</td>
</tr>
<tr>
<td>Perceived Severity</td>
<td>Beliefs about the seriousness of a condition and its consequence</td>
</tr>
<tr>
<td>Perceived benefits</td>
<td>Beliefs about the effectiveness of the advised action to reduce the risk or seriousness</td>
</tr>
<tr>
<td>Perceived barriers</td>
<td>Beliefs about the material and psychological costs of taking action</td>
</tr>
<tr>
<td>Cues to action</td>
<td>Factors that activate readiness to change</td>
</tr>
<tr>
<td>Perceived Self-Efficacy</td>
<td>Confidence in one’s ability to take action</td>
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James et al. (2002) conducted a cross-sectional descriptive study of perceived barriers and benefits to colon cancer screening using the constructs of the Health Belief Model (HBM) among 397 African Americans over 50 years-old in North Carolina. Results showed the percentage of respondents to perceived barriers as follows: perceived preparation for screening too difficult, 20%; test would be painful, 45%; doctor never recommended the test, 55%; test would be too embarrassing, 22%. Perceived benefits included: more control over health, 75%; following doctor’s advice, 76%; less worry, 73% and setting a good example for family, 86% (James, Campbell, Hudson 2002).

Also, Hay and colleagues (2003) examined screening adherence and future intentions for CRC screening among 280 older well-educated Caucasian women 50 years and over in New York, who kept their mammography screening appointments. Consenting women received survey questionnaires on the day of their mammogram to complete and return. The questionnaire included the combined HBM and the Theory of Subjective Expected utility model, a decision making process determined by the individuals’ values, to elicit the
relationship among health beliefs and preventative behaviors. Results showed that 50% of study participants reported adherence to CRC screening. In addition, self-efficacy was significantly related to CRC screening adherence (Hay, Ford, Klein, Primavera, Buckley, Stein et al., 2003). The self-efficacy component of the health belief model is significant for screening colonoscopy because preparation for and adherence to screening is primarily self-directed (Kiviniemi, Bennett, Zaiter & Marshall 2010)

Finally, Shively and colleagues developed a 34–item self-efficacy questionnaire to assess patients’ self-efficacy for HIV disease-management skills. This instrument measures six domains of HIV self-management: managing depression/mood; managing medications; managing symptoms; communicating with the healthcare provider; getting support; managing fatigue and HIV illness. Reliability estimates ranged from .88-.97; also, Cornbach alpha was .96 for the six domains. Construct validity on the six domains ranged from .33 to .97, and efficacy scores for communicating with providers ranged from .57-.97; in addition, getting support ranged from .48-.93 (Shively, Smith, Bormann, Gifford, 2002). This self-efficacy questionnaire will provide a baseline of our patient population.

Decision Theory
Decision theory is the study of human decision making under uncertainty; this theory is used in engineering, psychology, medical and behavioral decision-making in addition to medical informatics (Patel et al., 2002; Thomson, Robinson, Greenway, Lowe 2002, Wickens et al., 2004).

Expected Utility theory (EU), outlines the choices a person should make when faced with a set of options with uncertain outcomes and when each choice has more than one outcome (Wickens, 2004). In contrast, The Subjective Expected Utility theory (SEU) was
based on the process people use to make their decisions through their own values or preferences; this process enable individuals to make informed decisions based on the information received (Simon, 1986; Bekker, Hewison, Thornton, 2004, Johnson 2002). Studies have shown that when used with patient decision support, this theory assumes that the decision maker has a preference among the possible presented outcomes (Holmes-Rovner, 2000; Thornton, 1992). SEU theory combines patient utilities also known as values or preferences in medical decision making while the risk and benefits are identified as probabilities. (Alemi, 1996; Holmes-Rovner, 2000). SEU uses the decision tree to describe options, outcomes and related probabilities (Holmes-Rovner, 2000). Decision tree and analysis help to separate the different types of uncertainty in the data and focuses the patient to think through the trade-offs between the benefits and harms (Sarasin, 1999).

Human factors engineering focuses on the strengths, limitations and processes of decision making and utilizes decisions aids to support the decision (Wickens 2004) while the behavioral component of the decision is based on the decision maker’s self-efficacy (Bandura 1989), judgment and capability to make the decision. (Butler, Talley, Burns, Ripley et al., 2011)

Conceptual Model

This Transdisciplinary conceptual model shown below integrates evidence-based medicine, Behavioral Medicine and Industrial Human Factors Engineering to promote patient and provider adherence may increase the quality of healthcare delivery system, and improve disease outcomes. This model also provides a multilevel approach: patient, care team or Micro-system and organizational levels through collaboration to improve quality for multiple aspects of HIV patient-centered care including prevention and treatment. Also, this
framework integrates the Transdisciplinary Model to promote Public Health Practice (Grossman, 2005; Leischow & Milstein 2006 Satterfield et al., 2009) and improve outcomes, Figure 1.

Figure 1: Transdisciplinary Patient Centered Care Model

*Theoretical Framework*

The conceptual model shown above seeks to increase colorectal screening at the patient, care team or micro-system and organizational levels among the aging HIV/AIDS population (Hudson et al., 2007), and integrates evidence-based guidelines, Health Belief model, and Industrial Engineering Human Factors Decision Theory to promote screening colonoscopy adherence among HIV/AIDS patients. The theoretical framework in Figure 2
represents the health system process including the usual screening colonoscopy process, the patient decision support includes the colonoscopy video and decision tree, the colorectal screening self-efficacy and social support represent mediators to improved screening adherence and outcome.

*Figure 2: Theoretical Framework, Multi-faceted Intervention Model to Promote Screening Colonoscopy Adherence*

This decision tree was developed based on decision analysis of colorectal screening test by age to begin, age to end and screening intervals (Erasmus, Van Ballegooijen, Lansdorp-Vogelaar et al., 2008). The tree shows the options to screening colonoscopy and probable events, possible alternatives, and outcomes to screening: “The Square equals a choice node where the decision maker must decide on an action; the circle is a chance node, where the chances of outcomes are obtained from the literature” (Holmes-Rovner, pp266 2000). The educational video on colonoscopy X-Plain module published by The Patient Education Institute with reference summary was accessed from http://www.nlm.nih.gov/medlineplus/tutorials/colonoscopy/htm/index.htm.
Figure 3: Basic Decision Tree for Screening Colonoscopy without Probabilities and Utilities
Chapter 3
Methodology

Purpose of the study

Literature reviews about screening colonoscopy have yielded research studies that have focused on psychosocial and behavioral factors, in addition to improving health system processes, to promote screening colonoscopy rates in the general population. However, to date these studies have not included an evaluation of a multifaceted intervention to promote screening colonoscopy adherence among an HIV/AIDS population with co-morbidities. Also, while studies have targeted patients to increase CRC adherence in the general population, few studies have focused on improving providers’ adherence to screening guidelines. This is of particular concern as previous research has shown that HIV specialty providers are less likely to refer patients for colorectal screening (Campbell, Young 2008, Iqbal, Browne-McDonald, Cerulli 2010).

This study examined HIV/AIDS provider adherence to referring patients 50 years and older for screening colonoscopy and patient adherence to scheduled appointments, and to evaluate the efficacy of patient decision support and colonoscopy decision tree in promoting adherence to screening colonoscopy among HIV/AIDS patients. The evaluation of the intervention process addresses the contribution of the patient decision support aids in promoting patient adherence to screening colonoscopy and patient satisfaction with the screening experience. In addition, the Health belief constructs of perceived susceptibility to CRC, self–efficacy for keeping appointment and perceived social support were analyzed.
Study Design

This research employed a retrospective-prospective design to identify the proportion of patients 50 years and older with current clinic follow-up appointments who were ever referred for flexible sigmoidoscopy or colonoscopy, patient adherence to scheduled appointments, and providers’ adherence to reminders to refer for screening. Also, a randomized controlled prospective study design evaluated the effect of patient decision support on promoting patient adherence to screening colonoscopy among patients 50 years and over. The target population was English speaking HIV/AIDS patients receiving care at the JMH/Miller School of Medicine, University of Miami (UM) adult Special Immunology Clinic.

The Retrospective-Prospective, randomized controlled study was conducted from September 19, 2009 to March 19, 2010 at the Jackson Memorial Hospital adult HIV outpatient clinic as an adjunct to the current routine colonoscopy screening process. The research team included physician assistant and licensed social workers employed by the University of Miami, who were also care providers for this patient population. The study participants were randomized to intervention and usual care or usual care arm only. The Miller School of Medicine, University of Miami Institutional Review Board approved this study.

Retrospective-Prospective Study

Prior to the start of the study, each provider was individually informed of the purpose of the study and that a reminder will be placed in the patients’ chart who are eligible for screening. The provider was asked to discuss the screening colonoscopy with the patient and
sign the colonoscopy request form if the patient agrees to the screening procedure. Retrospective review of 400 medical records was conducted between September 21, 2009 through November 18 2009 to identify provider referral for screening colonoscopy ever ordered at any period in the clinic visit history among patients 50 years and over. Data collected included referrals made by physicians and advanced registered nurse (ARNP)/physician assistant (PA) providers, the indication for and outcome of referral.

Patient records were reviewed of male and female patients 50 years and older and seen at least twice in the past twelve months. Eligible records were further reviewed, for colonoscopy referrals ever ordered and patient adherence and outcome to scheduled appointments. Data was collected on patients scheduled for screening colonoscopy within six months prior to the start of the study and the number of patients within the cohort who were seen within that six month period. Patient demographics and co-morbidities recorded in medical records were also collected. As part of routine maintenance preventive care, colonoscopy screening eligibility was assessed prior to the scheduled follow-up clinic appointments.

Records of eligible patients were flagged for referral by writing “please refer” on a colored post it note which was then placed on the colonoscopy referral form in the chart. This referral request served as a reminder for the physician to discuss colonoscopy screening with the patient. Figure 4 outlines the study schema. Records that were flagged were reviewed up to six months after the start of the study to see if referrals were made. The appointment schedules of the 400 patients were reviewed to see how many patients were seen within six months prior to start of the study and up to six months from the start of the study.
**Randomized Controlled Trial**

**Participant Eligibility**

Patients eligible for participating in the randomized controlled trial had to be English speaking, at least 50 years old, attending the UM/JMH Special Immunology Clinic, willing to give informed consent and not being treated for cancer; due for rescreen as indicated by gastroenterologist recommendation, had a sigmoidoscopy within the past five years and a colonoscopy in the past 10 years.

**Clinic visit**

**Recruitment and randomization**

Recruitment and randomization occurred from 10/20/2009 to 7/28/2010. The study coordinator/physician assistant reviewed the medical records of patients checked in at the JMH/UM Special Immunology Clinic to see the provider for study eligibility on scheduled clinic days. Patients were selected through a convenience sampling method, and were invited with the aid of a script to participate in the randomized controlled research study. After completing informed consent, the patients were enrolled in the study, randomized and the intervention administered prior to visit with the provider. For patients without flagged charts, colonoscopy screening request forms were placed in the charts as a prompt for the provider to discuss colonoscopy screening and refer patients. Patients who declined to participate in the study received usual preventive care; patients were still eligible to receive colonoscopy screening.
Informed Consent

The study staff asked the patients to sign consent to participate in the study.

Number of Participants

Seventeen male and female patients were randomized to intervention and sixteen to the usual care arms.

Baseline Assessment

Baseline assessment was conducted through face-to-face interviewer administered in the clinic prior to visit with providers. The baseline assessment lasted approximately 45 minutes.

Randomization

Patients who gave verbal consent to participate in the study were further screened for eligibility and written consent obtained. Consenting patients were randomized into the intervention plus usual care or usual care arm alone through the Randomization and Allocation Concealment Schedule (Doig, 2005). The Intervention (I) or Standard/usual care/(S) was written in the top right hand corner of the allocation paper. The paper, fifty in each group was then folded vertically in two with the allocation innermost, then folded again twice with the section containing the allocation and then inserted into an envelope. The envelopes were sealed and a name written over the seal and were placed in five blocks of eight, four from the intervention and four from the usual groups, and five blocks of 12, six from each group, were combined to make five blocks of 20. Each block, eight and twelve was shuffled and placed in separate piles. Based on the results of the flip of a quarter, each set of envelopes were placed on top of each other to a total of 100 hundred envelopes. The
envelopes were then numbered from 1-100. The patient identification number ranged from patient 001 to patient 100.

*Intervention*

*Patient Decision Support*

The intervention, patient education video on colonoscopy screening and decision tree, were administered to study participants after randomization on the same day of clinic visit and prior to his/her appointment with the provider. Patient Decision Support aid functions as an adjunct to the clinic visit with the provider (Holmes-Rovner, 2008), Components of the educational tutorial included an introduction and then information on anatomy, diseases of the colon, alternative procedures, the procedure, risks and complications, after the procedure and summary (The Patient Education Institute, 1995-2008). In addition, the research coordinator reviewed the colonoscopy screening decision tree for the possible options and outcomes to screening.

*Second Visit*

Post Intervention Colonoscopy Self- efficacy

Two weeks after randomization, the clinical therapist administered the post-intervention colonoscopy self-efficacy questionnaire to both groups by telephone (is this the second visit – these section should be put in the same section when you mention those visits).

*Third Visit*

Within two weeks after the colonoscopy screening, study participants who completed the procedure were administered another 10 minute telephone survey about their satisfaction with the screening experience.
**Instruments for Data Collection and Management**

**Patient Demographics**

Demographic information collected on the baseline assessment included age, gender, race, type of insurance, education level, social history relevant to substance abuse, co-morbid conditions and family history of colon cancer. Additional data included current medications, laboratory results, and facility in which the procedure was done. The data was collected in paper format and entered into the database.

Before patients were randomized into intervention/usual care or usual care only arms, interviewer questionnaires were administered to assess colorectal cancer perceived susceptibility (cronbach α=0.73), self-efficacy (cronbach α=0.81) and perceived social support prior to randomization (Kremers, 2002). Questionnaires also included current mental status through the Brief Symptom Inventory Depression scale, (cronbach α =0.88 (Recklitis et. Al., 2006) and HIV self-management self-efficacy (Shively, 2002).

**Social Support**

The study staff enquired about available transportation; assistance in the form of $20.00 for taxi services was given to patients in the intervention arm who lacked transportation to get home after the procedure.
Figure 4: Screening Colonoscopy Quality Process Chart: Adherence Study Schema
Table 2. List of Study Activities

<table>
<thead>
<tr>
<th>Study Activities</th>
<th>Medical Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening / Baseline assessment</td>
<td>Survey</td>
</tr>
<tr>
<td>Randomization / Patient decision AID</td>
<td>X</td>
</tr>
<tr>
<td>Post randomization phone call</td>
<td>X</td>
</tr>
<tr>
<td>Post procedure assessment</td>
<td>X</td>
</tr>
<tr>
<td>Usual Process of Care</td>
<td></td>
</tr>
<tr>
<td>Referral / prescription for prep written</td>
<td>X</td>
</tr>
<tr>
<td>Appointment made</td>
<td>X</td>
</tr>
<tr>
<td>Appointment and Instructions mailed</td>
<td>X</td>
</tr>
<tr>
<td>Patients received appointment</td>
<td>X</td>
</tr>
<tr>
<td>Instructions for bowel prep</td>
<td>X</td>
</tr>
<tr>
<td>Instructions for Pre op care</td>
<td>X</td>
</tr>
<tr>
<td>Follow up phone call made</td>
<td>X</td>
</tr>
<tr>
<td>Patient Characteristics</td>
<td></td>
</tr>
<tr>
<td>Demographics</td>
<td>X</td>
</tr>
<tr>
<td>Self efficacy</td>
<td>X</td>
</tr>
<tr>
<td>Self-management-adequate bowel prep</td>
<td>X</td>
</tr>
<tr>
<td>Patient Covariates</td>
<td></td>
</tr>
<tr>
<td>Post procedure support</td>
<td>X</td>
</tr>
<tr>
<td>Stage of HIV disease (HIV asymptomatic/AIDS)</td>
<td>X</td>
</tr>
<tr>
<td>Hypertension</td>
<td>X</td>
</tr>
<tr>
<td>Depression</td>
<td>X</td>
</tr>
<tr>
<td>Drug Abuse / Tobacco use</td>
<td>X</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>X</td>
</tr>
<tr>
<td>Diabetes</td>
<td>X</td>
</tr>
<tr>
<td>Outcomes</td>
<td></td>
</tr>
<tr>
<td>Adequate bowel preparation</td>
<td>X</td>
</tr>
<tr>
<td>Colonoscopy performed</td>
<td>X</td>
</tr>
<tr>
<td>Pt No Show for Colonoscopy</td>
<td>X</td>
</tr>
<tr>
<td>Patient satisfaction with experience</td>
<td>X</td>
</tr>
</tbody>
</table>

Adapted from: Cretin S. et al., 2004 an Evaluation of Collaborative Interventions to Improve Chronic Illness Care; Evaluation review, Vol 28 No 1, 28-51, Sage Publications
Enrollment and randomization were ongoing throughout eight months of the controlled trial. In order to decrease bias, providers were blinded to the randomization schedule and the PA/study coordinator was exempt from providing outpatient clinic care to study participants by the principal investigator.

Because we did not enroll the proposed study sample in the randomized trial within the proposed time, we requested and were granted an amendment from the University of Miami IRB to continue screening and enrolling patients in the randomized trial. However, the trial was stopped before enrolling the *a priori* sample size needed to detect significant group difference with power = 0.80, n = 88 patients, due to increased responsibilities of the physician assistant/study coordinator.

Ongoing quality assurance of the trial was conducted with the use of a study check list to ensure that all aspects of the study were completed. The individual collecting the information placed an initial at the relevant column and confirmed through quality assurance (QA) by another member of the team who initials the QA column. The study coordinator and licensed social worker alternated roles so that the person obtaining the information is different from the person performing the quality assurance audit.

Data collection was ongoing throughout the study.

*Patient Covariates*

Co-morbid conditions such as depression, hypertension, substance use, hyperlipidemia and diabetes, tobacco use, and current medications were obtained from medical records. Multiple co-morbidities and the stage of HIV disease could contribute to the competing self-management between HIV disease and other co-morbid conditions such as diabetes mellitus.
and arthritis. (Sheth, 2003) and decrease the patient’s ability to administer bowel preparation appropriately.

Study Assessments

A medical record review was conducted to document the gastroenterologist report and pathology results within one month after the screening procedure for both intervention and usual care arm study participants.

Data Collection and Management

Shared Decision Making

Patient report of patient–provider decision-making was measured from the CAHPS® clinician & group survey adult specialty survey (need citation here). The questions include choices in treatment or health care, discussion on the pros and cons to treatment or health care, and opinion elicited for choice of treatment or healthcare (CAHPS® 2006). In addition, patient education level and race were also collected.

Patient Satisfaction

The patient satisfaction survey elicited questions regarding the attitudes of staff, the bowel preparation for the procedure, the information received about the procedure, recollection about the procedure and overall experience about the procedure (New York City Colon Cancer Control, 2006).

Colorectal Screening Questionnaire

The colorectal screening questionnaire assessed patients perceived susceptibility (cronbach α=0.73), the self-efficacy for colorectal screening which included doing bowel preparation, going through the screening, finding time to go through the screening,
transportation to CRC screening, being nervous about the screening (cronbach $\alpha=0.81$).
Perceived social support responses relevant to CRC screening included whether patients
received advice to go through CRC from people in their environment, whether there was
someone offering to accompany patients to screenings, whether there was someone in their
environment who understood the patients’ feelings regarding screening and whether patients
knew someone who was also invited to screening (Kremers, 2000).

Social Support

Questions eliciting responses included: getting information from community
resources, getting family, friends and community resources to help with activities such as
transportation, cooking and shopping, getting emotional support from friends, family and
community resources to listen or talk over problems. The responses were measured on the 10-
point ordinal scale 1=not at all sure to 10=totally sure (Shively, 2002). In addition social
support was also measured by the type of transportation such as family, friend, or taxi the
patient used when discharged from the procedure.

HIV Self-Management Self-Efficacy

The measurement of self-efficacy within health promotion practice and research
measures (Hendricks, 2005) the patient’s beliefs about their capabilities about specific skills
to improve health. We used the 34–item self-efficacy scale to evaluate
HIV/AIDS patients’ self-efficacy for self-management. The six domains measure managing
depression/mood; managing medications; managing symptoms; communicating with the
healthcare provider; getting support; managing fatigue and HIV illness. cronbach $\alpha$ for the six
domains was .96 and scores for communicating with providers ranged from .57-.97 (Shively
et al., 2002).
Health System Processes

Data was collected on the screening referral process initiated by the provider, documentation of patient contact, and instructions given to patients. Also, a binary variable were used to identify patients who were adherent to screening colonoscopy appointments, 0=no 1=yes (Hudson, 2007).

Usual Care Process

The providers were blinded to the patients’ randomization status. The provider signs and sends the referral to the University of Miami patient clinical associate for appointment scheduling. The peer educator provided support to patients with Ryan White insurance who were referred for screening and both arms. The referral process was the same for both arms.

Medication Management

Patients were instructed to stop taking any medication that may cause bleeding such as aspirin, or nonsteroidal anti-inflammatory medications such as Advil or Naprosyn, and were instructed to contact his/her provider for further instructions if taking blood thinners.

Instructions for Bowel Preparation

Instructions for use of the bowel prep kit included drinking clear liquids only on the day before the procedure; at 4PM on that day, the patient drank one glass of the liquid every 15 minutes until completed. On the morning of the procedure, the patient self-administered fleet’s enema prior to leaving for colonoscopy appointment.
Adherence to Appointment

As part of usual care the patient clinical assistant reviewed the computerized medical record to assess the patients’ adherence within a week after the scheduled appointment; patients who missed their appointment were rescheduled (Christie, 2008).

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Mediators</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health system process</td>
<td>Providers/clinic/office support staff</td>
<td>Adherence</td>
</tr>
<tr>
<td>Patient decision support</td>
<td>Patient involved in decision making</td>
<td>Patient satisfaction</td>
</tr>
<tr>
<td>Health Belief Model</td>
<td>Perceived CRC screening sel-efficacy</td>
<td>Adherence</td>
</tr>
<tr>
<td>Social Support</td>
<td>Transportation</td>
<td>Adherence</td>
</tr>
</tbody>
</table>


Analytic Framework

This analytic framework integrates the conceptual models shown in figures 1 and 2 to improve patient adherence. The health system process includes evidence based medicine and providers’ adherence to screening guidelines and this process supports both providers and patients to achieve the desired outcome of patient adherence. Human factors decision theory supports and reinforces patient screening colonoscopy decision through the administration of the colonoscopy video whereas the decision tree informs the patient about the risks, benefits and outcome of screening. Also, the health belief model constructs, perceived susceptibility and self-efficacy identified their thoughts about colon cancer and confidence in keeping the screening appointments. Prior studies including health system process and patient decision
supports aids such as videos have been associated with improved patient adherence to CRC (Power, Miles, von Wagner et al., 2009). The health belief model with the constructs perceived susceptibility and self-efficacy in addition to family social support have been associated with patient adherence to colorectal screening (McQueen, Vernon, Myers et al., 2007); However, the combined independent variables were never evaluated for screening colonoscopy adherence among HIV/AIDS patients, See Table 3.

Primary outcome measures evaluated provider adherence to colonoscopy screening guidelines, the impact of patient decision support on patient adherence to screening colonoscopy appointment, and patient satisfaction with the screening experience.

Secondary outcome measures included self-efficacy between and within the two groups, the impact of the health system process, patient decision aids, perceived susceptibility, self-efficacy, social support and patient covariates on patient adherence (Hudson, 2007), in addition to the adequacy of patient bowel preparation as documented by the gastroenterologist.

*Primary Aims and Hypothesis*

Retrospective-prospective design

Research Question 1:

What proportion of eligible patients seen within the six months prior to study were referred by providers for colonoscopy screening compared to the proportion referred after charts were flagged.

Outcome

Providers increased adherence to colonoscopy screening guidelines.

Aim 1:
Evaluate provider adherence to colonoscopy screening guidelines before and after records were flagged.

Hypothesis 1:
 Providers show increased adherence to screening colonoscopy guidelines after records were flagged.

Randomized Controlled Design

Question 2:
What is the impact of an educational video on colonoscopy procedure and colonoscopy decision tree to increase patient adherence.

Outcome:
Patient adherence to screening colonoscopy

Aim 2:
Examine the impact of a screening colonoscopy educational video and screening colonoscopy decision tree plus usual care to promote patient adherence to colonoscopy screening compared to patients receiving usual care

Hypothesis 2:
Patient decision support aids, educational video plus colonoscopy decision tree, significantly promote patient adherence rates to screening colonoscopy.

Question 3:
What is the association between patient adherence as the criterion and patient decision support, patient CRC self-efficacy and social support as the mediators.

Outcome:
Patient adherence to screening colonoscopy
Aim 3:
Evaluate the combined association of patient decision supports, patient perceived Susceptibility, self-efficacy and perceived social support with patient adherence to screening colonoscopy appointments.

Hypothesis 3:
The combined patient decision supports, patient CRC perceived susceptibility, self-efficacy and perceived social support are significantly associated with adherence to appointments.

Question 4:
What is the impact of screening colonoscopy experience on patient satisfaction?

Outcome:
Increased patient satisfaction with screening colonoscopy experience among the intervention arm compared to usual care.

Aim 4:
Evaluate patient satisfaction with colonoscopy education and experience among the intervention group compared to standard care.

Hypothesis 4:
The intervention arm report increased satisfaction with their colonoscopy experience compared to usual care group.

Statistical Analytic Plan:
Statistical analysis was conducted using SPSS version 17.0 (IBM® SPSS® International Business Machines Corp Armonk, NY)
Objective of the analyses

Descriptive statistics summarized patient demographics and covariates, frequencies were calculated for binary (Y/N) variables. Means with ranges and standard deviations summarized the continuous variables. In addition, Chi Square analysis was conducted among the patient covariates to identify the proportion of patients’ co-morbidities within the retrospective and randomized cohorts. The hypotheses tested provider adherence to screening colonoscopy guidelines, the impact of multifaceted intervention on patient adherence, and patient satisfaction to screening colonoscopy.

To Test the Specific Hypotheses

Hypothesis 1:
In order to determine whether providers were more adherent to screening colonoscopy guidelines after charts were flagged, Chi square analysis, and two-sided test with significance level of $\alpha=0.05$ conducted for the null of no difference in provider adherence to screening guidelines before and after charts are flagged for colonoscopy screening.

Hypothesis 2:
Intention to treat analysis using Chi square statistics with and two-sided test with significance level of $\alpha=0.05$ was conducted for the null of no difference between patient decision support, screening colonoscopy decision tree compared to usual care alone in promoting patient adherence to screening.

Hypothesis 3:
ANOVA analysis was conducted to determine the association between patient adherence
as the criterion and perceived CRC susceptibility, self-efficacy and Chi Square analyzed social support as the mediators to patient adherence to screening colonoscopy.

Hypothesis 4:

Univariate analysis of variance was conducted for the null of no difference in patient satisfaction between the intervention and usual care arms.
Chapter 4

Results

*Demographics and Disease Related Variables*

The retrospective cohort consist of 248(62%) males and 152(38%) females with a median age of 55 (50-80) years (you should also report mean), (SD=5.325 – this is reported with means). The majority of patients were Black 276 (69%), while Hispanics accounted for 113(28%) and Whites 11/3%, Table 4.

<table>
<thead>
<tr>
<th>Race</th>
<th>Gender</th>
<th>Male</th>
<th>Percent</th>
<th>Female</th>
<th>Percent</th>
<th>Total</th>
<th>Percent</th>
<th>Age</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>Male</td>
<td>159</td>
<td>64</td>
<td>117</td>
<td>77</td>
<td>276</td>
<td>69</td>
<td>55</td>
<td>Years</td>
</tr>
<tr>
<td>Hispanic</td>
<td>Male</td>
<td>82</td>
<td>33</td>
<td>31</td>
<td>20</td>
<td>113</td>
<td>28</td>
<td>Range</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>Male</td>
<td>7</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>11</td>
<td>3</td>
<td>50</td>
<td>80</td>
</tr>
</tbody>
</table>

The patients from the retrospective cohort had a mean CD4 cell count 423mm$^3$ (range 5-476) median CD4 cell count 380.50 mm$^3$. The median viral load was 48 copies/ml, the mean was 9553 copies/ml and range 901,999. Most patients had two or more co-morbid conditions as shown in Table 5: 265(66.3%) had 1-2 diagnoses, 50(12.5%) had 3 to 4, 6(1.5%) had over four, and 79(19.7%) had none. These conditions included hypertension 226(56.5%), diabetes mellitus 91(22.8%), hyperlipidemia 90(22%), hepatitis 42(10.5%), arthritis 40(9.8%) and renal disorder 15(3.8%). Psychiatric disorders accounted for 73(18.3%) patients, of which 58(14.%) were being treated for depression. Of the 66(16.6%) patients who reported substance use 56(14.5%) reported tobacco use. See Table 5.
Table 5. Disease Characteristics

<table>
<thead>
<tr>
<th>Retrospective Cohort</th>
<th>n</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>226</td>
<td>56.5</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>91</td>
<td>22.8</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>90</td>
<td>22</td>
</tr>
<tr>
<td>Substance use</td>
<td>66</td>
<td>16.6</td>
</tr>
<tr>
<td>Psychiatric disorder</td>
<td>58</td>
<td>18.3</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>42</td>
<td>10.5</td>
</tr>
<tr>
<td>Arthritis</td>
<td>40</td>
<td>9.8</td>
</tr>
<tr>
<td>Renal disorders</td>
<td>15</td>
<td>3.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Co-morbid Conditions</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>79</td>
<td>19.7</td>
</tr>
<tr>
<td>One to two</td>
<td>265</td>
<td>66.3</td>
</tr>
<tr>
<td>Three to four</td>
<td>50</td>
<td>12.5</td>
</tr>
<tr>
<td>Over four</td>
<td>6</td>
<td>1.5</td>
</tr>
<tr>
<td>Total</td>
<td>400</td>
<td>100</td>
</tr>
</tbody>
</table>

Referrals

Providers referred 174/400 (43.5%) patients for colonoscopy at least once and 63 (36.2%) patients kept at least one scheduled appointment, 56 (89.6%) for screening and 7 (11.3%) for diagnostic examinations. Several types of polyps were identified and removed in 19 (30.6%) patients; 10/19 (52.6%) patients were diagnosed with adenomatous polyp, hyperplasia 7 (36.9%) and 2 (10.5%) benign. The number of adenomatous polyps were higher among Blacks 6 (75%) compared to Hispanics 2 (25%) and the mean age of patients diagnosed with these polyps was 58 (53 – 69) years. 386 of 400 records reflected at least one clinic visit within 6 months before the randomized trial. Providers referred 113 of 386 patients before six months and of 273 patients not referred 61 of 386 (27.3%) patients were referred for a
colonoscopy screening during the six month period before the start of the study. Of the 226 charts flagged for referral, 211 of 226 patients were seen by the providers within six months from the start of the study, see table 6.

<table>
<thead>
<tr>
<th>Table 6. Referrals</th>
<th>Charts</th>
<th>Flagged</th>
<th>No</th>
<th>Yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0</td>
<td>226</td>
<td>56.5</td>
<td>226</td>
</tr>
<tr>
<td>Ever Referred</td>
<td>Yes</td>
<td>174</td>
<td>43.5</td>
<td>0</td>
<td>174</td>
</tr>
<tr>
<td>Total</td>
<td>174</td>
<td>43.5</td>
<td>226</td>
<td>56.5</td>
<td>400</td>
</tr>
</tbody>
</table>

**Hypothesis 1**

226/400 (56.5%) charts were flagged for colonoscopy referral, and followed for six months after the start of the study for provider referrals made. Two hundred and eleven patients were seen within six months after the start of the study and 92/211 (43.6%) patients were referred compared to 61/386 (27.3%) referred within six months prior to the start of the study. The hypothesis that providers were more adherent to colonoscopy screening guidelines after charts were flagged was significant $X^2 p < 0.0001$ (2 tailed).

**Randomized Trial**

**Demographics and Disease Related Variables**

To decrease Type I error, the *a priori* sample size needed to detect a significant patient study group difference with Power=.80 was 88 (Cosby 2004), (Duncan 1983, Pagano 2000); However 33 patients were randomized into the intervention arm 17 (51.5%) and usual care arms 16 (48.5%) see figure 4. Participant characteristics in each group are as follows: Males 17 (51.5%) and Female 16 (48.5%), the median age 53 (50-75) years (again – you should report
the mean if you are reporting SD) SD=5.28). Blacks made up 90.9%(30), Hispanics 6.1%(2) Asian 3%(1). The mean CD4 cell count 435mm$^3$ range (55-1385). See figure 5.

![Flowchart of Participants through Each Phase of the Randomized Trial](image)

**Figure 5: Flowchart of Participants through Each Phase of the Randomized Trial**
Adapted from Davidson et al., 2003, Schulz et al., 2010

Patients reported education level: eight grade or less 2/33(6.1%), some high school 10/33(30.3%), high school graduate or GED 11/33(33.3%) some college 8/33(24.2%) and 4 year college graduate 2/33(6.1%). Most patients, 13/33(39.4%) reported household income less than $5,000, 12/33(36.4%) $5,001 and $10,000, 5/33(15.2%) reported $10,001 to
$20,000 while 3/33(9%) reported $ 20,001-$50,000. All patients had Insurance, the majority had Medicare or Medicaid 27 (81.8%) while 6(18.2%) had Ryan White, see Table 7.

| Table 7.                        Demographic  Characteristics |
|---------------------------------|-----------------------------|
| Randomized Study                | Interven | Usu Care | Total |
| Gender                          | n      | %        | n      | %     | n    | Percent |
| Male                            | 6      | 35.3     | 11     | 64.7  | 17   | 51.5    |
| Female                          | 11     | 64.7     | 5      | 31.3  | 16   | 48.5    |
| Age                             |         |          |        |       |      |         |
| Mean                            | 54.35 yrs | 54.13 yrs |
| Median                          | 53.25 yrs | 52.40 yrs |
| Race                            | n      | %        | n      | %     |      |         |
| Black                           | 15     | 50.0     | 15     | 50.0  | 30   | 90.9    |
| Hispanic                        | 1      | 50.0     | 1      | 50.0  | 2    | 6.1     |
| Asian                           | 1      | 100.0    | 0      | 0     | 1    | 3       |
| Insurance                       |         |          |        |       |      |         |
| Ryan White                      | 1      | 16.7     | 5      | 83.3  | 6    | 18.2    |
| Medicare/Medicaid               | 16     | 59.3     | 11     | 40.7  | 27   | 81.8    |
| Education                       |         |          |        |       |      |         |
| Eight grade or less             | 0      | 00       | 2      | 100   | 2    | 6.1     |
| Some High school                | 3      | 30.0     | 7      | 70.0  | 10   | 30.3    |
| High school grad or GED         | 8      | 72.7     | 3      | 27.3  | 11   | 33.3    |
| Some college                    | 5      | 62.5     | 3      | 37.5  | 8    | 24.2    |
| 4 year college graduate         | 1      | 50.0     | 1      | 50.5  | 2    | 6.1     |
| Household Income                |         |          |        |       |      |         |
| Less than $5,000                | 8      | 61.5     | 5      | 38.5  | 13   | 39.4    |
| $5,001 and $10,000              | 5      | 41.7     | 7      | 58.3  | 12   | 36.4    |
| $10,001-$20,000                 | 3      | 60.0     | 2      | 40.0  | 5    | 15.2    |
| $20,001-$50,000                 | 1      | 33.3     | 2      | 66.7  | 3    | 9       |

Hypothesis 2

17/33(51.5%) patients kept the screening colonoscopy appointment, the intervention group 12/17(70.6%) compared to usual care 5/17(29.4%). The impact of patient decision support was significant, \( X^2 \) \( p=0.024 \) odds ratio 5.29 (CI 1.20-23.3). Also, the intervention arm had good bowel preparation 76.9% (10/13) compared to 23.1% (3/13) in the usual care
arm was significant, $X^2 p=0.050$. Transportation was not significant between the two groups $X^2 p=0.793$.

The intervention also significantly increased adherence among females compared to the retrospective group $X^2 p=0.0003$. Adherence among men was not significant, Table 8.

<table>
<thead>
<tr>
<th>Table 8. Adherence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Female</strong></td>
</tr>
<tr>
<td>Appointment</td>
</tr>
<tr>
<td>Kept</td>
</tr>
<tr>
<td>Retro</td>
</tr>
<tr>
<td>Random</td>
</tr>
<tr>
<td>n</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td><strong>Male</strong></td>
</tr>
<tr>
<td>Appointment</td>
</tr>
<tr>
<td>Kept</td>
</tr>
<tr>
<td>Retro</td>
</tr>
<tr>
<td>Random</td>
</tr>
<tr>
<td>n</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Retro=Retrospective group Random=Randomized group

*Covariate analysis*

Overall 28/33(84.9%) patients had co-morbid conditions, 23(69.7%) patients had 1-2 conditions, 3(15.1%) had 3-4 and 5(15.1%) had none. These conditions included Hypertension 60%(20/33), hyperlipidemia 27.3%(9), arthritis 21.3%(7) hepatitis 18.2%(6), diabetes mellitus 9.1%(3) and renal disease 3%(1). Nine (27.2%) patients reported substance use and five of the nine patients reported tobacco use (why not just report on tobacco use in the total sample?), also eight of nine (27.2%) patients with psychiatric disorders had the diagnosis of depression. 69.6% of the randomized patients were diagnosed with 1-2 co-morbid conditions, and 15.2% with 3-4 conditions. There was no significant difference between the two groups. Please see Table 9.
Table 9. Disease Characteristics

<table>
<thead>
<tr>
<th>Randomized Cohort</th>
<th>Intervention n</th>
<th>%</th>
<th>Usual n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>10</td>
<td>58.8</td>
<td>10</td>
<td>62.5</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>18.8</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>5</td>
<td>29.4</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Substance Abuse</td>
<td>6</td>
<td>35.3</td>
<td>3</td>
<td>18.8</td>
</tr>
<tr>
<td>Psychiatric disorder</td>
<td>5</td>
<td>29.4</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>3</td>
<td>17.6</td>
<td>3</td>
<td>18.8</td>
</tr>
<tr>
<td>Arthritis</td>
<td>5</td>
<td>29.4</td>
<td>2</td>
<td>12.5</td>
</tr>
<tr>
<td>Renal disorders</td>
<td>1</td>
<td>5.9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Comorbid Condition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>3</td>
<td>17.6</td>
<td>2</td>
<td>12.6</td>
</tr>
<tr>
<td>One to two</td>
<td>10</td>
<td>58.8</td>
<td>13</td>
<td>81.1</td>
</tr>
<tr>
<td>Three to four</td>
<td>4</td>
<td>23.6</td>
<td>1</td>
<td>6.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
<td><strong>100</strong></td>
<td><strong>16</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The presence of multiple co-morbid conditions on the quality of bowel preparation was not significant, $X^2 p=0.570$. HAART adherence and adherence to screening was not significant (F.246) $p=0.624$. In addition, the Brief Symptom Inventory multiple response analysis of depression symptoms showed 72.3% reported no symptoms of depression while 27.7% reported symptoms that ranged from a little to extreme depressive symptoms, (cronbach $\alpha=0.81$). Patients reporting depressive symptoms who were not followed by psychiatry were referred to the licensed social worker to facilitate timely psychological assessment.

Reliability analysis with inter-item analyses conducted for baseline colorectal cancer screening questionnaire for perceived susceptibility showed cronbach $\alpha=0.87$;
Table 10. Colorectal Cancer Screening

<table>
<thead>
<tr>
<th>Perceived Susceptibility at Current Age</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very great</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Great</td>
<td>12</td>
<td>36.4</td>
</tr>
<tr>
<td>Neutral</td>
<td>8</td>
<td>24.2</td>
</tr>
<tr>
<td>Small</td>
<td>5</td>
<td>15.2</td>
</tr>
<tr>
<td>Very small</td>
<td>6</td>
<td>18.2</td>
</tr>
</tbody>
</table>

Self-efficacy to Bowel Preparation

| Very difficult | 2 | 6 |
| Difficult      | 6 | 18.2|
| Neutral        | 5 | 15.2|
| A Little difficult | 8 | 24.2|
| Not difficult  | 12 | 36.4|

Having transportation to screening

| Very difficult | 2 | 6 |
| Difficult      | 5 | 15.2|
| Neutral        | 4 | 12.1|
| A Little difficult | 3 | 9.1|
| Not difficult  | 19 | 57.6|

and self-efficacy cronbach α=0.83. Table 10 shows patient response for perceived susceptibility for current age and self-efficacy for bowel preparation and having transportation to screening.

Regarding social support, when asked if someone in their environment understood their feelings with regards to CRC screening 75.8% reported yes, also 57.6% reported they know someone who was also invited for CRC and 54.5% reported receiving advice to go through CRC screening and 39.4% reported someone offered to accompany to CRC screening (cronbach α=0.77).

Hypothesis 3
Patients who reported lower susceptibility to colorectal cancer were more adherent to their appointments (for what – was this for the screening?) compared to patients with higher perceived susceptibility, however ANOVA showed no significant differences to adherence in perceived susceptibility to CRC and self-efficacy, Table 11.

<table>
<thead>
<tr>
<th>Table 11.</th>
<th>Mean Susceptibility to CRC Scale Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kept Appt.</td>
<td>Intervention</td>
</tr>
<tr>
<td>Yes</td>
<td>2.3 ± 0.27</td>
</tr>
<tr>
<td>No</td>
<td>3.1 ± 0.35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kept Appt.</th>
<th>Self-Efficacy Scale Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Intervention</td>
</tr>
<tr>
<td>3.5 ± 0.29</td>
<td>3.9 ± 0.41</td>
</tr>
<tr>
<td>No</td>
<td>4.3 ± 0.32</td>
</tr>
</tbody>
</table>

Because of the small sample size, the scales for social support were run separately. While there was no difference between the intervention and usual care arm participants who reported having received social support, among the patients who reported no social support, patients in the intervention group were significantly more adherent to screening appointments (see Table 12). Table 13 shows participants’ responses to the specific perceived social support questions. The overall Mantel-Haenszel odds ratio was significant indicating greater social support in the intervention group as shown in Table 12. Chi Square for each social support question.
<table>
<thead>
<tr>
<th>Table 12. Social Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlling for Get advise from someone in environment</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Int</td>
</tr>
<tr>
<td>Kept</td>
</tr>
<tr>
<td>Appoint</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>OR=2.00, p=0.4990</td>
</tr>
<tr>
<td>Breslow-Day Homogeneity: 0.1519</td>
</tr>
<tr>
<td>Controlling for Offer to accompany to screening</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Int</td>
</tr>
<tr>
<td>Kept</td>
</tr>
<tr>
<td>Appoint</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>OR=2.50, p=0.4469</td>
</tr>
<tr>
<td>Breslow-Day Homogeneity: 0.3992</td>
</tr>
<tr>
<td>Controlling for Understanding your feelings to screening</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Int</td>
</tr>
<tr>
<td>Kept</td>
</tr>
<tr>
<td>Appoint</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>OR=2.16, p=0.3562</td>
</tr>
<tr>
<td>Breslow-Day Homogeneity: 0.0345</td>
</tr>
<tr>
<td>Controlling for know someone who was also invited</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Int</td>
</tr>
<tr>
<td>Kept</td>
</tr>
<tr>
<td>Appoint</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>OR=1.87, p=0.5093</td>
</tr>
<tr>
<td>Breslow-Day Homogeneity: 0.0872</td>
</tr>
</tbody>
</table>
Table 13. Responses Social Support to CRC Screening

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get advice from people</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>Offer to accompany to screening</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>Understand your feelings</td>
<td>25</td>
<td>8</td>
</tr>
<tr>
<td>Was also invited</td>
<td>19</td>
<td>14</td>
</tr>
</tbody>
</table>

Mantel-Haenszel Chi Square
Appointment kept vs Intervention controlling for Social Support

<table>
<thead>
<tr>
<th>Question</th>
<th>Odds Ratio</th>
<th>CI</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Advice</td>
<td>4.86</td>
<td>1.13-20.9</td>
<td>0.0284</td>
</tr>
<tr>
<td>Offer to accompany</td>
<td>5.19</td>
<td>1.16-23.2</td>
<td>0.0288</td>
</tr>
<tr>
<td>Understand feelings</td>
<td>4.04</td>
<td>1.04-15.6</td>
<td>0.0355</td>
</tr>
<tr>
<td>Who was also invited</td>
<td>4.54</td>
<td>1.11-18.6</td>
<td>0.0287</td>
</tr>
</tbody>
</table>

Hypothesis 4

Univariate analysis of variance was conducted to test the fourth hypothesis that the intervention group reported increased satisfaction compared to usual care group. There was no significant difference between the two groups (F=0.869, p=0.359). All patients in the usual care group, 5 of 5(100%) and 10 of 12(80%) in the intervention group did not remember going through the screening procedure, while 2 of 12(20%) patients reported some pain.

The mean wait time to screening completion was 14 weeks SD10.3 and ranged from 2-31 weeks.
**Patient Provider Communication**

When asked about communication with their providers, patients’ responses on a scale that was coded as 1 = Not sure at all to 10= totally sure, 72.7% of participants reported that they were totally sure that they could openly discuss problems with medications with their providers. Also 81.8% were totally sure that they could discuss issues and concerns related to their illness and 66.7% were totally sure that they could work out differences when they arose, (cronbach $\alpha$ =0.79.,

**Shared Decision making**

When asked about discussions about choices for treatment of any condition with their providers, 72.7% of participants reported that their providers told them that there was more than one choice for treatment, 84.8% reported that their providers discussed the pros and cons of each choice and 66.7% reported that their providers asked which choices the patients thought would be best for them, (cronbach $\alpha$ 0.65).
Chapter 5  Discussion

The colorectal cancer death rate is highest among Blacks and the second leading cause of death among Black Americans in the United States (Altekruse, Kosary, Krapcho, Neyman, Aminou, Waldron, Ruhl, Howlader, and Tatalovich 2010). While studies have targeted patients to increase CRC screening adherence in the general population, few studies have focused on improving providers’ adherence to screening guidelines, and HIV specialty providers are less likely to refer patients for colorectal screening (Campbell, Young 2008, Iqbal, Browne-Mcdonald, Cerulli 2010). Provider and patient adherence to screening colonoscopy are dependent on multiple factors including provider identification of eligible patients for screening, patient’s preferences and values and the health system process. Results showed that within six months prior to the start of this study, providers referred 61/386 (27.3%) patients for colonoscopy screening; in contrast, they referred 92/211 (43.6%) patients after the reminder for screening was placed $X^2 p<0.0001$.

The intervention arm of the randomized study included a colonoscopy educational video and the review of the colonoscopy decision tree. The majority of participants (70.6%; 12/17) in the intervention arm were adherent to colonoscopy screening compared to 29.4% (5/17) in the usual care arm $p=0.024$, a notable increase from 36% in the retrospective cohort. This randomized trial increased the screening rate to above the national rate of 50% (CDC 2011). A recent study reported increased colonoscopy attendance from 23.4% among patients without intervention to 37.69 % in the intervention group involving telephone interviews and on-site consultations (Men, Bi, Bai, Pan, CAI, Zhao, Zhang, 2009).

As reported in several studies, physician referrals for colonoscopy functions as a powerful facilitator that results in increased rates of colonoscopy screening (Klabunde, Lanier, Bresiau,
An ongoing multicenter study by Green and colleagues (2010) to increase colorectal screening and follow-up rates send electronic requests to the physicians to refer patients for colonoscopy (Green, Wang, Horner, Catz, Meenan et al., 2010). Patients with multiple chronic illnesses have the tasks of self-management of these conditions; therefore, the quality and effectiveness of the decision making process and behaviors are significant determinants of health outcomes (Wagner, Bennett, Austin, Greene et al., 2005).

One goal of human factors engineering is to enhance the performance of human interaction with systems (Wickens et al., 2004), and this population has multiple barriers to improved health outcomes including the health care system barriers. This dissertation research augmented the patient decision making task relevant to colon cancer prevention with the administration of a patient decision support of colonoscopy procedure and decision tree. This process enhanced decision making support to our patient population with lower neurocognition, health literacy (Waldrop-Verde 2009) and higher disease burden.

Shakar and colleagues conducted a cross sectional study among 168 participants in a diverse population to educate patients about different CRC procedures based on guidelines. Through shared informed decision making, patients were asked to rank their preferences for each screening tests from the list of attributes such as need for sedation and need for further testing. Patients changed their first choice of fecal occult blood test to colonoscopy after review of test attributes (Shakar, Carlson, Weller 2010).

A notable barrier to CRC screening is poor patient provider communication and inadequate patient education (Denberg et al., 2005). Wolf and colleagues conducted a mailed survey questionnaires and video observation study on patient–provider discussion of CRC
screening among primary care physicians; Results showed 84.8% reported colonoscopy was more frequently mentioned, however they described the test procedures on only 28% of the video encounters (Wolf, Baker, Makoul 2007). Although our patients reported that providers discussed pros and cons of specific treatments with them, educating patients about screening colonoscopy before the visit with providers ensures that they receive the required information to facilitate decision making.

The early diagnosis of adenomatous polyps decreases the probability of morbidity and mortality from adenocarcinoma colon cancer. Over half 52.6%(10/19) of the retrospective cohort and 40% of the randomized patients screened were diagnosed with adenomatous polyps. Other studies found adenomatous polyps were more prevalent among HIV infected compared to HIV negative patients, 50% vs 23.8% (Iqbal et al., 2010). Although studies have shown that HIV positive patients were diagnosed with CRC adenocarcinoma at younger ages and with advanced cancer stages compared to HIV negative patients (Bini et al., 2008, Wasserberg et al., 2007), our patients were diagnosed with adenomatous polyps at an older age, mean 58(53-69) years.

Good bowel preparation is critical to a successful screening colonoscopy and 76.9% in the intervention arm had good bowel preparation. This illustrates the need for providers to reinforce education on bowel preparation to patients when they write the prescription for bowel cleansing. While a few patients reported experiencing pain during the procedure, the overall satisfaction with the care they received relevant to screening colonoscopy was not significant between the intervention and usual care arms. The importance of adequate pain control among this group of patients with chronic pain syndrome should be appropriately addressed as patients are asked to hold non steroidal anti-inflammatory medications seven
days before the procedure. Finally, the mean wait time for study completion from the date of referral to screening was over fourteen weeks, this delay may have contributed to non-adherence; therefore, collaborative system level quality process improvement could be implemented to decrease the wait time.

Thirty-six percent of participants in the randomized trial reported an educational level of less than eighth grade to some high school, and several studies have identified the effectiveness of educational video among low literacy population (Power, Miles, Von Wagner, Robb, Wardie, 2009). Our intervention arm viewed the educational video on colonoscopy procedure and the colonoscopy the decision tree discussed. HIV positive patients with low health Literacy are associated with non-adherence (Osborn, C.Y., Paasche-Orlow, M.K., Davis, T.C., et al., 2007).

The presence of multiple co-morbid conditions in study participants were not associated with non-adherence in the retrospective cohort, and randomized group. 27.7% reported some types of depressive symptoms although not correlated with adherence. Previous research has shown that depressive symptoms (Knowlton et al., 2006), and negative mood states (Gonzalez, Penedo, Llabre, Duran, Antoni et al., 2007) have been negatively correlated with patient adherence to HAART; consequently patients identified with depressive symptoms or negative mood states should be encouraged to obtain psychological evaluation and treatment before proceeding with colonoscopy referral. Interestingly, Although the patient demographics are different with 83% are white, the results of the Women’s Health Initiative Observation Cohort Study evaluating the association of depressive symptoms and cancer screening among post-menopausal women showed no association between self-reported depressive symptoms and lower colorectal screening (Aggarwal, Freund, Sato,
Adams-Campbell et al., 2008). A larger sample size may elucidate a significant results of the association between depression and colonoscopy screening behavior in HIV population.

Several studies report non-significant associations between perceived susceptibility and screening adherence (Power et al., 2009); However, McQueen and colleagues (2010) identified perceived susceptibility moderated the change in perceived self efficacy whereas family influence mediated the effect of perceived susceptibility on CRC screening intention and behavior. Our patients in the intervention group with lower mean to perceived susceptibility to colon cancer at their current age were more adherent to screening appointments compared to ones who reported higher mean of (2.3 vs 3.1). In addition, patients in the intervention group who reported no social support were more likely to keep appointments, Table 12. This evidence suggest that among the patients with little or no perceived social support the intervention functioned as a surrogate for perceived social support. Studies have consistently shown association between social support and adherence to HAART among the HIV population (Knowlton, Arnsten, Eldred, Wilkinson et al., 2006). The social support of transportation as a mediator to screening colonoscopy adherence was not statistically significant.

Recommendations

Further studies are needed to evaluate the effectiveness of the Human Factors informed decision making and shared decision making with emphasis on patient’s values and preferences on the impact on colon cancer prevention outcomes in this patient population; in addition to providers’ attitudes to shared decision making and patients’ preferences and values to colorectal screening.
Colorectal screening behavior has been studied using several health behavioral models, however the health belief model with the perceived susceptibility construct had been well studied and self-efficacy behavior may be relevant for colonoscopy (Kiviniemi et al., 2010). Although we did not find significance for CRC self-efficacy in our study, the relationship between patient perceived susceptibility, self efficacy and social support as moderators and mediators to patient colorectal screening behavior among our patient population needs to be further explored. Further studies are needed to identify the specific roles of perceived susceptibility and social support on patient adherence behavior to colorectal screening in this patient population.

The results of this study provide preliminary efficacy of a targeted intervention involving patients at greatest risk to screening non-adherence and include patient decision support to those who need it most. The integration of the CRC screening process and care coordination within the routine clinic activities may enhance sustainability of the intervention without a significant increase in staff and clinic expenses. One aspect of patient centered care, improved patient–provider communication, is associated with increased delivery of preventive services (Flash et al., 2004). The integration of patient centered targeted prevention strategies (Phillips, Justman, 2009, Shiels, Pfeiffer, Gail, et al., 2011) to colon cancer prevention among HIV patients, may significantly decrease morbidity and mortality and improve quality of life in this population (Ferron, Young, Boulanger et al., 2010).

Limitations

There are several limitations to this study. First, this study was conducted in one urban hospital outpatient adult HIV clinic. Second, study participants in the randomized trial were selected through convenience sampling. Third, we did not include HIV negative patients and
the data sets were too small to facilitate analysis that could be generalized to other HIV populations. In addition, we do not have data on patient-provider discussion about colonoscopy screening as patients enrolled in the study prior to their visit with the provider and patients were not offered an alternative screening test to screening colonoscopy. Also, we did not explore providers' attitudes and beliefs about patient provider communication relative to screening colonoscopy among the HIV population.

Conclusion

The increased interest in Transdisciplinary initiatives, population health and elimination of health disparities (Hiatt, Breen 2008) provided the catalyst for integrating evidence-based medicine, behavioral medicine and human factors decision making into a patient centered cancer prevention program among HIV infected patients. Colorectal cancer, identified as one of the non-AIDS defining cancer is increasing in this HIV aging population (Ruiz 2009); to date this is the first reported study of a multifaceted intervention to increase screening colonoscopy adherence in the HIV population. We integrated provider reminder system, patient informed decision support of colonoscopy educational video and decision tree review in addition to patient provider communication to promote increased provider and patient screening colonoscopy behavior.
Bibliography


Green, B.G., Wang, C.Y., Horner, K., Catz, S., Meenan, R.T., Vernon, S. W., et al.,
Systems of Support to Increase Colorectal Cancer Screening and Follow-up Rates (SOS:
Design Challenges and Baseline Characteristics of Trial Participants. Contemporary


M., Ostroff, J.S., (2003). Adherence to Colorectal Cancer Screening in
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(26):553-576.

Persons 50 Years of Age and Older living with HIV Disease. Aging and Mental

Fostering Self Efficacy as an Ethical Mandate in Health Promotion
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Evaluation in Clinical Practice.6 (3) 263-272.

IPDAS symposium. Medical Decision-Making; 27; 599-608.doi:
10.1177/0272989X07307272.

Hudson S.V., Ohman-Strickland P., Cunningham, R., et al. (2007). The Effects of
Teamwork and System Support on Colorectal Cancer Screening in Primary

10.1007/s10620-0009-0774-8


McQueen, A., Vernon, S.W., Myers, R. E., Correlates and Predictors of Colorectal Cancer Screening among Male Automotive Workers (2007). Cancer Epidemiology, Biomarkers and Prevention and Prev: 16 500-509, DOI:10.1158/1055-9965.EPI-06-0757.


Decision Theory: The study of human decision making under uncertainty.

Expected Utility Theory: Decision making based on choices made from options with uncertain outcomes.

Subjective Utility Theory: Decision making based on individuals’ values and preferences from information received.

Usual Care: Patient receiving routine colonoscopy referral and scheduling without Intervention.

Randomization and Allocation Concealment

The Intervention (I) or Standard/ usual care/(S) was written in the top right hand corner of the allocation paper. The paper, fifty in each group was then folded vertically in two with the allocation innermost, then folded again twice with the, section containing the allocation and then inserted into an envelope. The envelopes were sealed and a name written over the seal. Envelopes were placed in five blocks of eight, four from the intervention and four from the usual groups, and five blocks of 12, six from each group, were combined to make five blocks of 20. Each block, eight and twelve was shuffled and placed in separate piles. Based on the results of the flip of a quarter, each set of envelopes were placed on top of each other to a total of 100 hundred envelopes. The envelopes were then numbered from 1-100. The patient identification number ranged from patient 001 to patient 100.

## Study Participants Contact Timeline

<table>
<thead>
<tr>
<th>Study Visit</th>
<th>1</th>
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<tbody>
<tr>
<td>Screening, Consents</td>
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<tr>
<td>Baseline assessment</td>
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<td>Randomization</td>
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<td>Intervention</td>
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<td>Telephone self–efficacy Survey</td>
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<tr>
<td>Telephone satisfaction survey</td>
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<tr>
<td>Medical records review</td>
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</table>
Retrospective Colonoscopy Screening Data Collection Form  R NO________

1. Gender
   - Male
   - Female

2. Date of Referral ________________

3. Provider
   - MD__________
   - ARNP/PA__________

4. Race/Ethnicity
   - Black
   - American
   - Caribbean
   - Haitian
   - Hispanic
   - Caucasian
   - Non-Hispanic
   - Hispanic
   - Other

5. Age ______

6. Family history of colon cancer
   - None
   - UNK
   - Not documented
   - Mother
   - Father
   - Sibling
   - Aunt/Uncle

7. Co-morbid conditions
   - Arthritis
   - Tobacco use

10. Date of Procedure________
<p>| | |</p>
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</table>
| Diabetes Mellitus | 11. Location of Polyp/lesion
| Hypertension | 12. No show
| Hyperlipidemia | 13. Procedure
| Other | 14. Pathology Report
| 8. Current medications | 15. Indication for referral
| NSAID | Sigmoidoscopy
| Aspirin use | Colonoscopy
| NRTI | 
| NNRTI | 
| Protease Inhibitors | Screening
| 9. Laboratory | Diagnostic
| CD4 | 
| Viral Load |
Colorectal Cancer Screening Questionnaire  ID_____________

Date________

Perceived susceptibility

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<tr>
<th>Very small</th>
<th>Small</th>
<th>Neutral</th>
<th>Great</th>
<th>Very great</th>
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</table>

1. The chance that I will ever get CRC is… 1  2  3  4  5
2. The chance that I will get CRC in
   The next two years is……………… 1  2  3  4  5
3. The chance of that someone my
   age will get CRC is………………… 1  2  3  4  5
4. In comparison with other persons
   my chances of getting CRC is……… 1  2  3  4  5

Self efficacy  Colorectal Screening (CRC)

Please circle the number that corresponds to how difficult the following tasks are for you to do

<table>
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<tr>
<th>Very Difficult</th>
<th>Difficult</th>
<th>Neutral</th>
<th>A little difficult</th>
<th>Not difficult</th>
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1. Doing the bowel preparation is 1  2  3  4  5
2. Going through CRC screening is 1  2  3  4  5
3. Finding time to go through CRC
   screening is 1  2  3  4  5
4. Transportation to CRC screening is 1  2  3  4  5
5. Because I am nervous about the screening,
   going through CRC screening is 1  2  3  4  5
6. Because I expect CRC to be painful,
   going through CRC screening is 1  2  3  4  5
### Social Support

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<tr>
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<th>Yes</th>
<th>No</th>
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<tr>
<td>1. Did you get advice to go through CRC screening from people in your environment?</td>
<td>1</td>
<td>2</td>
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<tr>
<td>2. Did someone in your environment offer to accompany you to the CRC screening?</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3. Do you think someone in your environment understand your feelings with regards to CRC screening?</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4. Do you know someone who was also invited for CRC screening?</td>
<td>1</td>
<td>2</td>
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Depression (Brief Symptom Inventory)                ID__________________

READ: The following is a list of problems and concerns that people sometimes have. Please indicate how you have been feeling during the past week, including today. Please tell me if you have felt this problem not at all, a little bit, moderately, quite a bit, or extremely.

not at all  a little bit  moderately  quite a bit  extremely
1           2            3             4             5

1. In the past week, how much have you been bothered?
   by nervousness or shakiness inside? ................................. 1 2 3 4 5

2. In the past week, how much have you been bothered?
   by feeling easily annoyed or irritated............................... 1 2 3 4 5

3. In the past week, how much have you been bothered?
   by thoughts of ending your life? ....................................... 1 2 3 4 5

4. In the past week, how much have you been bothered?
   by being suddenly scared for no reason? ......................... 1 2 3 4 5

5. In the past week, how much have you been bothered?
   by temper outburst that you could not control? .............. 1 2 3 4 5

6. In the past week, how much have you been bothered?
   by feeling lonely? .......................................................... 1 2 3 4 5

7. In the past week, how much have you been bothered?
   by feeling blue? ............................................................. 1 2 3 4 5

8. In the past week, how much have you been bothered?
   by feeling no interest in things? ...................................... 1 2 3 4 5

9. In the past week, how much have you been bothered?
   by feeling fearful? ......................................................... 1 2 3 4 5
10. In the past week, how much have you been bothered by feeling easily hurt? .................................................. 1 2 3 4 5

11. In the past week, how much have you been bothered by feeling hopeless about the future? ....................... 1 2 3 4 5

12. In the past week, how much have you been bothered by feeling tense or keyed up? .......................................... 1 2 3 4 5

Not at all  a little bit  moderately  quite a bit  extremely
1 2 3 4 5

13. In the past week, how much have you been bothered by having urges to beat, injure or harm someone? .......... 1 2 3 4 5

14. In the past week, how much have you been bothered by having urges to break or smash things? ....................... 1 2 3 4 5

15. In the past week, how much have you been bothered by having spells of terror or panic? ............................... 1 2 3 4 5

16. In the past week how much have you been bothered by getting into frequent arguments? ............................. 1 2 3 4 5

17. In the past week, how much have you been bothered by feeling worthless? ....................................................... 1 2 3 4 5

Drug and Tobacco use

Read: I would now like to ask you a few questions about smoking and other tobacco use

1. Do you currently smoke?

☐ Cigarette

☐ Cigars
2. Have you smoked in the past?
   □ Yes    □ Stopped    □ □ Years
   □ No

3. For how many years have you been smoking? □ □ years

4. On average, how many cigars/cigarettes do you smoke a day? □ □

Read: These few questions ask about alcohol use

5. In the past 4 weeks, have you had at least one alcoholic beverage?
   □ Yes    □ No

6. On the days you drink, on average, how many drinks do you have?
   □ less than 2 □ two □ three or more drinks

7. Do you currently use □ marijuana □ crack □ other ____________ □ none

Project Smile Baseline Questionnaire Unpublished Data
Shared Decision Making

1. Choices for treatment or health care can include choices about medicine, surgery, or other treatment. In the last 12 months, did this doctor, ARNP/PA tell you there was more than one choice for your treatment or health care?
   1. Yes
   2. No

2. In the last 12 months, did this doctor talk with you about the pros and cons of each choice for your treatment or health care?
   1. Yes
   2. No

3. In the last 12 months, when there was more than one choice for your treatment or health care, did this doctor or ARNP/PA ask which choice you thought was best for you?
   1. Yes
   2. No

4. What is the highest grade or level of school that you have completed?
   1. 8th grade or less
   2. Some high school, but did not graduate
   3. High school graduate or GED
   4. Some college or 2-year degree
   5. 4-year college graduate
   6. More than 4-year college degree

5. What is your age?

6. What is your race? Please mark one or more.
   1. White
   2. Black or African American
   3. Asian
   4. Hispanic
5  ☐ American Indian or Alaskan Native

6  ☐ Other

7. What was your total household income last year before taxes?

☐ $0 to $5,000

☐ $5,001 to $10,000

☐ $10,001 to $20,000

☐ $20,001 to $30,000

☐ $30,001 to $40,000

☐ $40,001 to $50,000

☐ $50,001 or more

2006 Clinician & Group Survey Adult Specialty Care Questionnaire
HIV Self-Efficacy (HIV-SE) Questionnaire

Information for users

Purpose/Background
The purpose of the HIV Self-Efficacy (HIV-SE) questionnaire is to measure self-efficacy for specific disease management behaviors in persons living with HIV. The HIV-SE has 34 items and 6 conceptual domains: managing depression/mood, managing medications, managing symptoms, communicating with the healthcare provider, getting support, and managing fatigue. The HIV-SE questionnaire items were developed, modified and expanded from items used in research on chronic illness (Lorig et al., 1996) and in preliminary work with HIV+ patients (Shively et al., 1998). The psychometric properties are reported by Shively, et al. (2002).

Scoring instructions: sum the responses for each item in a subscale. Divide that sum by the number of items in the subscale for the average/mean score. Scores range from 1-10, the higher the score the greater the self-efficacy.

Subscales
- Manage mood (9 items): questions 1-9
- Manage medications (7 items): questions 10-16
- Manage symptoms (5 items): questions 17-21
- Communicate with healthcare provider (4 items): questions 22-25
- Get support/help (5 items): questions 26-30
- Manage fatigue (4 items): questions 31-34

Permission
Permission is granted to copy and use the HIV-SE for non-commercial data collection purposes such as research or evaluation projects provided the copyright statement at the end is retained.

References


Acknowledgement
Supported by the National Institute of Nursing Research/NIH #1RO1 NR04415, the Office of AIDS Research/NIH, the California Universitywide AIDS Research Program, and the VA San Diego Healthcare System of the U.S. Department of Veteran Affairs.

Contact information
Martha Shively, PhD, RN
martha.shively@va.med.va.gov
The HIV-SE Questionnaire is printed below.

CONFIDENCE IN YOUR ABILITIES

Please CIRCLE the number that corresponds to how sure or confident you are that you can do the tasks regularly at the present time.

How sure are you that you can . . .

1. Keep from getting discouraged when nothing you do seems to make a difference?

1  2  3  4  5  6  7  8  9  10
Not at all sure  Totally Sure

2. Do something to make yourself feel better when you are feeling discouraged?

1  2  3  4  5  6  7  8  9  10
Not at all sure  Totally Sure

3. Keep from feeling sad or down in the dumps?

1  2  3  4  5  6  7  8  9  10
Not at all sure  Totally Sure

4. Do something to make yourself feel better when you feel sad or down in the dumps?

1  2  3  4  5  6  7  8  9  10
Not at all sure  Totally Sure

5. Keep yourself from feeling lonely?

1  2  3  4  5  6  7  8  9  10
Not at all sure  Totally Sure

6. Do something to make yourself feel better when you are feeling lonely?

1  2  3  4  5  6  7  8  9  10
Not at all sure  Totally Sure
7. Keep your sadness or depression from interfering with what you want to do?

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8. Do something to make yourself feel better when your sadness or depression interferes with what you want to do?

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9. Reduce the emotional distress caused by your health condition so that it does not affect your everyday life?

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10. Follow the instructions correctly for a large number and variety of prescription medications?

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11. Take your prescription medications at the appropriate timing?

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12. Take the medications to treat or prevent HIV or HIV-related diseases as directed?

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13. Thinking about the side effects, number, and timing of these medications, how sure are you that you can take most or all of your Protease Inhibitor and/or NNRTI medications as directed?

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14. Now suppose there were NO SIDE EFFECTS. Thinking about the number and timing of these
medications, how sure are you that you can take most or all of your Protease Inhibitor and/or NNRTI medications as directed?

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15. Take your medications everyday as they are prescribed?

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16. Work with your doctor/nurse practitioner to reach agreement on the best medication for you overall?

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17. Reduce your symptoms in general?

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18. Keep the sleep problems caused by your disease from interfering with the things you want to do?

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19. Keep the physical discomfort or pain of your disease from interfering with the things you want to do?

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20. Keep any other symptoms or health problems you have from interfering with the things you want to do?

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21. Control any symptoms or health problems you have so that they don't interfere with the things you want to do?

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22. Ask your doctor/nurse practitioner things about your illness that concern you?

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23. Discuss openly with your doctor/nurse practitioner any problems that may be related to your medications?

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24. Work out differences with your doctor/nurse practitioner when they arise?

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25. Ask your doctor/nurse practitioner things about your medications and treatments that concern you?

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26. Get information about your illness and its treatments from community resources?

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27. Get family and friends to help you with the things you need (such as household chores like shopping, cooking, or transportation)?

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28. Get community resources to help you with the things you need (such as household chores like shopping, cooking, or transportation)?

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29. Get emotional support (such as listening or talking over your problems) from friends and family?
30. Get emotional support (such as listening or talking over your problems) from community resources other than friends or family?

1 2 3 4 5 6 7 8 9 10
Not at all sure Totally Sure

31. Decrease your fatigue?

1 2 3 4 5 6 7 8 9 10
Not at all sure Totally Sure

32. Keep the fatigue caused by your disease from interfering with the things you want to do?

1 2 3 4 5 6 7 8 9 10
Not at all sure Totally Sure

33. As compared with other people with your condition, how sure are you that you can manage fatigue during your daily activities?

1 2 3 4 5 6 7 8 9 10
Not at all sure Totally Sure

34. How sure are you that you can deal with the frustration caused by your fatigue?

1 2 3 4 5 6 7 8 9 10
Not at all sure Totally Sure
Prospective Colonoscopy Screening Data Collection Form  ID_________

1. Date
2. Gender
   - Male
   - Female
3. Type of INS
   - Ryan White
   - Medicare/Medicaid
   - Other
   - No
4. Co morbid conditions
   - Depression
   - Substance Abuse
   - Diabetes Mellitus
   - Hypertension
   - Hyperlipidemia
   - Other
5. Current medications
   - NSAID
   - Aspirin use
   - NRTI
10. Kept appt □ Yes □ No
11. Indication for referral
   - Screening
   - Diagnostic
12. Tobacco Use □ Yes □ No
13. Prior Colonoscopy or sigmoidoscopy
   - Yes
   - No
   If yes date _______
   Results_____________
14. Facility procedure completed
   - JMH
   - UMHC
   - UMH
15. Patient decision support
   - Yes
   - No
16. Mode of transportation
   - Family
   - Friend
   - other _______________
NNRTI

Protease Inhibitors

6. Laboratory

CD4

Viral Load

7. Procedure Date

8. Polyp/lesion

Yes

No

Location

9. Pathology

Report

_____________________

_____________________

17. Bowel prep

Good

Fair

Adequate
Impact of a Multi-Faceted Intervention on Promoting Adherence To Colonoscopy Screening Among HIV/AIDS Population

SCRIPT

The University of Miami adult HIV department is conducting a research study using several methods among patients 50 years and over to help them keep their appointments for colonoscopy screening.

Would you like to hear more about this study?

Patient Colonoscopy Satisfaction Survey ID_________
Date_______  No Show____

Please circle the answer that is closest to how you feel.

1.  Was the staff polite and courteous – before, during and after your colonoscopy?
   1.  Yes.
   2.  Some people were polite.
   3.  I really did not notice one way or the other.
   4.  Someone was not nice to me.

2.  The prep the night before the colonoscopy was:
   1.  As bad as I thought it would be.
   2.  Worse than I thought it would be.
   3.  Better than I thought it would be.
   4.  So unpleasant that I would refuse to have another colonoscopy

3.  The information I was given about my colonoscopy before the test was:
   1.  More than I needed.
   2.  Just right.
   3.  Not enough.
   4.  Not nearly enough. I still do not know why I needed a colonoscopy

4.  During the actual colonoscopy
   1.  I was out of it. I do not even remember having the test.
   2.  I was mostly out, but I remember a short time.
   3.  I remember a short time with some pain, cramps or discomfort.
   4.  I was very uncomfortable.
   5.  I was so uncomfortable that I would not have another colonoscopy.

5.  Overall, my colonoscopy experience was:
   1.  Great, nothing to it.
2. OK. It was not as bad as I thought it was going to be.

3. Worse than I was expecting. The worst part
   was__________________

4. Very unpleasant, I wouldn’t do it ever again, even if my doctor said I
   had to.

6. Mode of transportation
   1. Family   2. Friend   3. Other

7. Other comments about your experience with screening colonoscopy.

   New York City Department of Health and Mental Hygiene (2006)
X-Plain

Colonoscopy

Reference Summary

Introduction
A colonoscopy is a simple procedure that allows your physician to look inside the colon and to discover certain diseases, such as cancer, very early. A colonoscopy is a very well tolerated procedure that could be life saving.

This reference summary will explain to you the advantages, as well as the possible risks and complications, of this procedure.

Anatomy
The colon is the last part of the intestines and is also known as the large intestine.

Swallowed food goes through the esophagus, also known as "the feeding tube." It then passes through the stomach, where it is partially digested. Digested food goes from the stomach to the small intestines, where nutrients are further digested and absorbed.

Fibers and digested food then reach the colon. In the colon, the rest of the nutrients get absorbed and stools are formed. Stools are then stored in the last part of the colon, the sigmoid and rectum, before being excreted.

Arteries provide blood to the colon, and veins take the blood back toward the heart.

The excess fluid is drained to the bloodstream through a network of vessels called lymphatic tissue and lymph nodes. Lymph nodes also help fight infections.

Colon cancer may spread to the liver, small intestines, and other parts of the body through the lymph nodes or through direct contact.
The colon is made up of the following parts:

- The ascending colon
- The transverse colon
- The descending colon
- The sigmoid colon
- The rectum and the anus.

Diseases Of The Colon
Colon cancer is one of the most common cancers among men and women. It tends to occur in families. A colonoscopy allows the doctor to detect colon cancer early and possibly cure it.

Colon cancer usually starts as an abnormality, called a polyp that dangles inside the colon. Not all polyps result in cancer, but they should be watched very closely.

Colon cancer can lead to blood in the stools, as well as a change in bowel movement habits.

Other diseases of the colon include chronic inflammation or infections of the colon. They can lead to diarrhea and possibly bleeding. Some of these diseases can lead to colon cancer.

Alternative Procedures
A barium enema is a radiological test that allows the doctor to see an x-ray of the colon. A barium enema does not provide actual pictures of the colon. In addition, biopsies are not possible with a barium enema.

In a biopsy, the doctor takes a sample of abnormal tissue for examination under the microscope. A colonoscopy is the only available procedure that allows your doctor to look at the inside of the colon and to take small samples from abnormal areas.

Before The Procedure
For a colonoscopy, the colon needs to be very clean. For this reason, you will be given a strong laxative. This will cause significant diarrhea that will clean the colon of any stools.

Before the procedure you will also be asked to go on a clear liquid diet for 1 or 2 days to help decrease the formation of any stools.
The Procedure
A colonoscopy is an outpatient procedure. This means you will get to go home after
the procedure is finished.

Prior to the procedure you will be given intravenous medications to relax and sedate
you. The procedure aims at introducing a flexible scope inside the colon, through the
rectum. The scope has a light source as well as fiberoptics
that allow pictures from inside the colon to be projected onto
a video screen.

As the scope is introduced into the rectum, you may feel the
urge to defecate. This is normal. Let your doctor know if
the sensation persists. He or she can give you more
medication to relax you.

After inserting the scope inside the rectum, the doctor looks
at the sigmoid and descending colon. Next, the doctor proceeds to the transverse
colon. Finally, the scope is taken all the way to the ascending colon.

If your doctor finds a suspicious area, he or she may be able to take part or all of it out
and send it to the lab. A pathologist then examines the tissue under a microscope and
determines whether it has evidence of cancer or other diseases.

When the procedure is finished, the doctor removes the scope.

The colonoscopy is usually not painful, but the patient may experience some
discomfort.

Risks And Complications
A colonoscopy is a very safe procedure that could be life saving. However, it has
possible risks that you should learn about.

Injuring the inside of the colon or even poking a hole through it is a rare possibility. If
this happens, an operation may be needed to fix the injury.

Occasionally, the colon is not as clean as it should be. In this case the colonoscopy
may need to be postponed. If tissue is removed, some bleeding from the rectum could
occur. This is usually not excessive.
After The Procedure
You should be able to go home the same day of the procedure. You will need somebody to drive you.

Your doctor may recommend that you rest and relax that same day until the effects of the sedation medication are gone. Be sure to call your physician if you experience severe belly pain, fever, or belly distention, where the belly gets bigger very quickly.

If tissue was removed, your doctor will schedule a follow-up visit within the next few days to discuss the results with you. Some patients may need to have the colonoscopy repeated regularly to make sure new abnormalities have not developed.

Summary
A colonoscopy is a common procedure that allows doctors to look inside the colon and to do biopsies if necessary.

A colonoscopy is a very safe procedure that can detect colon cancer early. Early detection of cancer can lead to early treatment and a possible cure. Some risks and complications exist, but they are very rare.
Impact of a Multi-faceted Intervention on Promoting Adherence to Screening Colonoscopy among HIV/AIDS Population

### Study Check List

**Randomized Study**

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<th>Participant ID</th>
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#### Visit Dates

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### Forms and Procedures

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#### Intervention completed

| Phone call --- Colorectal Screening self- efficacy # 2 | |

#### Data Collection form Completed

| Phone call Satisfaction questionnaire completed | |

#### Taxi Service

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