The Role of Primary Care Physicians in Improving Colorectal Cancer Screening in Patients with HIV

Florence Momplaisir, MD¹, Judith A. Long, MD^{1,2}, Gia Badolato³, and Kathleen A. Brady, MD³

¹Division of General Internal Medicine, University of Pennsylvania Perelman School of Medicine, Philadelphia, PA, USA; ²Philadelphia VA Center for Health Equity Research and Promotion, Philadelphia, PA, USA; ³Philadelphia Department of Public Health, Philadelphia, PA, USA.

BACKGROUND: As HIV positive patients live longer, they become susceptible to the development of non-AIDS defining malignancies. Little is known about routine cancer screening practices in that population and the factors associated with cancer screening.

OBJECTIVE: Evaluate 1) the proportion of patients with HIV who had any type of colorectal cancer (CRC) screening and 2) whether having a primary care physician (PCP) or seeking care in an integrated care practice is associated with higher CRC screening.

DESIGN: A cross-sectional chart abstraction study of patients with HIV enrolled in the Philadelphia Medical Monitoring Project (MMP).

PARTICIPANTS: MMP participants age 50 and older.

MAIN MEASURES: CRC screening defined as having a documented colonoscopy, sigmoidoscopy, barium enema, or fecal occult blood test after the age of 50.

KEY RESULTS: Out of 123 chart abstractions performed, 115 had a complete clinical record from MMP. The majority of the population was male (71.3%), Black/Hispanic (73.8%) and between the age of 50 and 59 (71.3%). 45.2% of patients did not have a PCP. The overall proportion of patients who received CRC screening was 46.9%. Having a documented PCP was the only factor strongly associated with CRC screening. Rates of screening were 66.7% among those with a PCP versus 28.5% among those without a PCP (χ^2 $p < 0.001$). After adjusting for race, socioeconomic status, substance and alcohol abuse, the odds of getting CRC screening in those with a PCP was 4.59 (95% CI 2.01-10.48, $p < 0.001$). The type of practice where patients were enrolled into care was not associated with CRC screening.

CONCLUSIONS: Having a PCP significantly increases the likelihood of receiving CRC screening in patients with HIV. Competency in addressing primary care needs in HIV clinics will only become more important as patients with HIV age.

KEY WORDS: colorectal cancer screening; HIV; primary care; infectious diseases specialists; model of care.

J Gen Intern Med 27(8):940-4

DOI: 10.1007/s11606-012-2010-z

© Society of General Internal Medicine 2012

INTRODUCTION

As HIV infected patients live longer, they become more susceptible to the development of chronic diseases and cancers. Before the combination antiretroviral therapy (CART) era, HIV was a fatal diagnosis because death resulted from AIDS-related infections and AIDS-defining malignancies (ADMs).¹ Since the introduction of CART in 1995, the incidence of ADMs has declined tremendously, whereas the frequency of non-ADMs has risen disproportionately compared to the general population.^{2,3} Colorectal cancer (CRC) is the second leading cause of cancer death in the US⁴; the exact incidence of CRC in patients with HIV is unknown but non-ADMs are now the third most common cause of death in patients with HIV living in resource rich countries². Currently, there are only two published studies describing the use of CRC screening in this vulnerable population.^{5,6} One study found that 55.6% of HIV infected patients had at least one CRC screening test compared to 77.8% in HIV uninfected patients ($p < 0.001$)⁵, the other revealed a 41% screening rate among HIV-infected patients versus 67% in uninfected controls ($p = 0.0001$)⁶. These studies, however, did not evaluate potential factors associated with CRC screening in HIV patients.

A widely used model of care for patients with HIV is to have infectious disease (ID) specialists serve as primary care providers (PCP).⁷ However, this model may lead to a de-emphasis on the delivery of non-HIV specific care. More recently, integrated care clinics have become popular, where ID specialists and general internists or nurse practitioners work side by side addressing both HIV specific and primary care needs at the same time. To date, there are no studies looking to see if non-HIV related preventive care measures in this population are affected by the presence or absence of a generalist PCP. We hypothesized that CRC screening would be higher when HIV patients had a generalist in charge of their primary care or when they sought care in sites where primary and HIV care are integrated.

Received July 24, 2011

Revised January 11, 2012

Accepted January 26, 2012

Published online February 28, 2012

METHODS

Study Sample. Patients included in this study were selected from a larger project called the Medical Monitoring Project (MMP)⁸. The MMP is a surveillance project run by the Centers for Disease Control and Prevention (CDC) and conducted in 26 project areas in the United States. We collaborated with the Philadelphia Department of Public Health to obtain data from people infected with HIV living in Philadelphia and enrolled in the Philadelphia MMP. MMP utilizes a population-based survey and medical record abstraction to monitor clinical outcomes, standards of HIV medical care, and on-going risk factors of persons receiving HIV medical care. MMP participants are selected based on a three-stage sampling design described elsewhere⁸ and consist of patients with HIV seeking care from a diverse pool of providers in Philadelphia. Patients were included in our study if they were MMP participants aged 50 or older.

Data Source. The data were collected by means of chart abstraction. Any missing variable was retrieved by linking our files to the data collected from the MMP project. CRC screening in our data abstraction was determined using the National Health and Nutrition Examination Survey (NHANES) template which we added to the standard MMP chart abstraction tool. The abstraction form was tested and modified before use.

Data Management. The data generated through chart abstraction for this study were subjected to the same security and confidentiality requirements as for the MMP surveillance project. This includes adherence to CDC guidelines for the security and confidentiality of HIV/AIDS surveillance data. IRB exemption was granted by the Philadelphia Department of Public Health since this study is an analysis of public health surveillance data.

Outcomes. The primary outcome of interest was CRC screening defined as having a documented colonoscopy within the past 10 years, sigmoidoscopy or barium enema within the past 5 years, or fecal occult blood test (FOBT) within the last year after the age of 50. The indication for the procedure and study results were also abstracted when available.

Independent Variables

Patient Factors. Patient factors of interest included age, gender, race, socioeconomic status (SES), insurance type, year of HIV diagnosis, lowest and most recent CD4 counts, most recent HIV viral load, the number of opportunistic infections ever diagnosed, the presence of co-morbid conditions measured as having zero, one, two or more co-

morbid conditions, and a history of substance or alcohol abuse. SES status was categorized as low SES yes/no by using an algorithm provided by the CDC which identifies a person as low SES if their income to family size places them below the poverty line and/or if the individual had an associate or technical degree or below. Co-morbidities were defined as any new or existing diagnoses other than AIDS opportunistic infections; in general, these conditions were associated with either prolonged immune suppression or with the treatment of HIV infection, such as fatty liver disease, diabetes, and lipodystrophy. Patients with a history of substance abuse were further divided as active abusers if they had abused substances within one year of the chart abstraction and non-active users if they had abused substances greater than one year prior to the chart abstraction. The same definitions were applied for alcohol abuse. Alcohol and substance abuse were considered present if there was “documentation of reported or suspected alcohol abuse or other non-prescribed use of substances, including counseling or treatment for alcohol and/or substance abuse in or prior to the surveillance period.”

Documented PCP. We defined PCP as a general practitioner such as a general internist, family practitioner, nurse practitioner (NP) or physician assistant (PA) with or without HIV expertise, who, as documented in the chart, was in charge of the patient’s primary care. We dichotomized the variable into documented PCP yes/no.

Provider Factors. Provider factors included provider type (physician versus NP or PA), clinic size, primary payer (Ryan White or not) and practice type (integrated versus non-integrated). An integrated care practice was defined as a site in which patients get both their HIV and primary care addressed at the same site by either PCPs or ID specialists. These offices are accepted as primary care practices by insurance companies and referrals are not needed to see their doctors. A common example of an integrated care practice is a community health center. A non-integrated care practice was defined as a site in which only HIV care was provided. Although most patients seen in an integrated care practice had a PCP, a patient seen in one of these practices who had no documentation of having a generalist PCP was categorized as being seen in an integrated care clinic but having no PCP. We were able to link facility information to CRC screening because each participant identification number contained a facility number.

Statistical Analysis. We categorized all the variables including age. Statistical differences for CRC screening (yes/no) based on clinical and demographic factors were assessed using the χ^2 test. A multivariable logistic

regression model was created to assess the relative strength of the various associations. Variables associated with CRC screening at $p < 0.2$ were selected to be included in the logistic regression. Due to a small sample size, we chose this level so as to include variables that would potentially have been statistically significant if the sample was larger, without over specifying the model. Despite having an overall associated p value of 0.57, we included the low SES variable in the model because the comparison of CRC screening between patients with low SES and non-low SES yielded a $p = 0.1$.

RESULTS

Patient Demographic and Clinical Characteristics

From March to August 2010, we completed 123 chart abstractions, eight charts were excluded because of missing data. The patients' baseline characteristics are summarized in Table 1. Patients were mostly male (71.3%), Black/Hispanic (73.8%) and between ages 50 and 59 (71.3%). 33.0% of patients had a diagnosis of HIV for 15 years or more. Most patients had a recent CD4 count greater than 350 (69.6%), an undetectable viral load (75.6%) and no prior history of opportunistic infections (69.5%). Half of the patients (53.0%) had 2 or more co-morbid conditions other than HIV, 10.4% were active substance abusers and 7.8% were active alcohol abusers. 80% of patients were seen by physicians and 20% by nurse practitioners or physician assistants. 54.8% had a documented PCP and 43.0% were seen in an integrated clinic.

Prevalence of CRC Screening

In our sample, we found that 54 out of 115 (46.9%) patients were up-to-date with their CRC screening. Among patients who got CRC screening, 75.4% had a colonoscopy within the past 10 years, 14.0% had a FOBT done within the last year and 10.5% had a flexible sigmoidoscopy within the past 5 years. No one had a barium enema done. The indication for ordering the test was missing 81.7% of the time. When documented ($n = 21$), the most common reason for ordering the test was routine screening (76.2%).

Factors Associated with CRC Screening

As shown in Table 1, patients were less likely to be up-to-date with their CRC screening if they had a history of substance abuse ($p = 0.05$) or alcohol abuse ($p = 0.06$), if they were Black/Hispanic ($p = 0.19$), or if they had a low SES compared to high SES ($p = 0.1$). 66.7% of patients who had

Table 1. Demographic and Clinical Characteristics

	n (%)	Screened Yes (%)	P-value
Age			0.97
50-59	82 (71.3)	39 (47.6)	
60-81	33 (28.6)	16 (48.5)	
Gender			0.46
Male	82 (71.3)	41 (50)	
Female	33 (28.6)	14 (42.4)	
Race			0.19
White	30 (26.0)	17 (58.6)	
Black and/or Hispanic	85 (73.8)	38 (44.7)	
SES			0.57*
Low SES- Yes	61 (53.0)	32 (58.2)	
Low SES -No	23 (20.0)	10 (18.2)	
Missing SES	31 (27.0)	13 (23.6)	
Insurance status			0.31
Medicaid	41 (35.6)	17 (41.5)	
Other	74 (64.3)	38 (51.3)	
Year of HIV Diagnosis			0.37
Not documented	1 (1.7)	0 (0)	
1985-1994	39 (32.9)	19 (48.7)	
1995-2004	53 (46)	27 (50.9)	
2005-2009	22 (19.1)	9 (40.9)	
Lowest CD4 count			0.96
Not documented	1 (0.8)	0 (0)	
0-99	52 (46)	21 (40.4)	
200-349	32 (26.9)	21 (65.6)	
≥ 350	30 (26)	13 (43.3)	
Most recent CD4 count			0.74
Not documented	6 (5.2)	0 (0)	
0-99	8 (6.9)	3 (37.5)	
200-349	21 (18.3)	10 (47.6)	
≥ 350	80 (69.6)	42 (52.5)	
Most recent viral load			0.52
Not documented	7 (6.1)	0 (0)	
Undetectable	87 (75.6)	43 (49.2)	
Detectable	21 (18.3)	12 (57.1)	
Number of OI's			0.51
0	79 (69.5)	36 (45.5)	
1	22 (18.2)	13 (59)	
≥ 2	14 (12.1)	6 (42.8)	
Number of Comorbidities			0.52
0	21 (18.2)	9 (42.8)	
1	33 (28.6)	14 (42.4)	
≥ 2	61 (53)	32 (52.4)	
Substance abuse- Not alcohol			0.003
None	72 (63.4)	40 (55.5)	
Non-active abuse	31 (26)	13 (41.9)	
Active abuse	12 (10.4)	2 (16.6)	
Alcohol abuse			0.01
None	89 (78.2)	48 (53.9)	
Non-active abuse	17 (13.9)	6 (35.3)	
Active abuse	9 (7.8)	1 (11.1)	
Provider type			0.28
Physician	93 (80.2)	47 (50.5)	
Nurse practitioner or physician assistant	22 (19.0)	8 (36.4)	
Clinic size			0.66
50-300 patients	25 (21.74)	11 (44.00)	
>300 patients	90 (78.26)	44 (48.89)	
Ryan White funded clinic			0.36
Yes	82 (71.30)	37 (45.12)	
No	33 (28.70)	18 (54.55)	

* $p = 0.1$ when comparing CRC screening between patients who are low SES and patients who are non-low SS. When including missing SES, the p value is equal to 0.57

up to date CRC screening had a documented PCP compared to 28.8% who did not have a PCP ($p < 0.001$; Fig. 1). The proportion of patients who received CRC screening was similar in integrated versus non-integrated practices (44.9%

Figure 1. CRC screening among patients with HIV by PCP and practice type.

versus 50%, p-value of 0.86; Fig. 1). In the multivariate logistic regression, a history of substance and alcohol abuse, race, SES and having a documented PCP were included in the final model (Table 2). The odds of receiving CRC screening with a documented PCP were 4.59 (95% CI 2.01-10.48) in the adjusted model.

Power Considerations

Sixty-three patients in our study had a PCP and 52 patients did not. Screening among those with a PCP was 66.7%. Given our sample size, with a power of 0.8 and an alpha of 0.05, we are able to detect a difference in screening if those without a PCP have a screening rate of $\leq 40.8\%$ or $\geq 88.3\%$. Similarly, 49 patients in our study were seen in an integrated clinic. Screening among those seen in the integrated clinic was 44.9%. Given our sample size with a power of 0.8 and an alpha of 0.05, we are able to detect a difference in screening if those not seen in an integrated clinic have a screening rate of $\leq 20.1\%$ or $\geq 71.0\%$.

DISCUSSION

In this community based sample of patients with HIV seeking care from a variety of different practices across the City of Philadelphia, we found that having a PCP was strongly associated with up-to-date CRC screening. Previous studies have found CRC screening rates vary from 41%⁵ to 55.6%⁶ in HIV infected patients and this is similar to what we found (46.9%). However, among those with a PCP, the rates were 66.7% which is comparable to recent national estimates from the CDC in which the 2008 age-adjusted CRC screening prevalence in the United States was 62.9%.⁹

The majority of patients with HIV in this study had stable disease. Since non-ADMs is now the third most common

Table 2. Unadjusted and Adjusted Odds of Getting CRC Screening

	unadjusted OR (95% CI)	adjusted OR (95% CI)
Documented PCP *	4.29 (1.95-9.45)	4.59 (2.01-10.48)
Blacks and/or Hispanics †	0.56 (0.24- 1.31)	0.62 (0.21- 1.77)
Low-SES, no ‡	1.43 (0.54-3.76)	1.24 (0.37-4.08)
Missing SES ‡	1.53 (0.64-3.66)	0.53 (0.19-1.47)
Active substance abuse §	0.16 (0.03- 0.78)	0.11 (0.01-1.22)
Non-active substance abuse §	0.58 (0.25-1.35)	0.54 (0.16-1.81)
Active alcohol abuse	0.11 (0.01-0.89)	0.55 (0.02-13.11)
Non-active alcohol abuse	0.47(0.16-1.37)	0.74 (0.17-3.28)

* reference group =patients without a documented PCP. PCP= primary care physician

† reference group =Whites

‡ reference group =patients who were low-SES. SES= socioeconomic status

§ reference group =patients with no history of substance abuse

|| reference group =patients with no history of alcohol abuse.

cause of death among HIV patients on CART in resource-rich nations,^{10,11} the importance of high quality primary care and routine cancer screening is becoming as important as well-delivered HIV care. Moving forward, competency in addressing primary care needs in HIV clinic patients on the part of all providers will only become more crucial. Since the emergence of the HIV/AIDS epidemic in the 1980s, the pendulum has swung in opposite directions when thinking about who should be in charge of the care of patients with HIV. At the beginning of the epidemic, many generalists cared for these patients.¹² However, with the introduction and the increased complexity of CART, HIV care evolved into a subspecialty and the evidence suggested that unless generalists manage a minimum case load of patients with HIV, the quality of care delivered suffered.¹³ The site where patients with HIV get their routine health maintenance has been raised in the past; one study demonstrated that routine health maintenance screening is less likely to occur when testing requires a visit to an outside clinic or outside provider.¹⁴ We did not observe this in our study. Patients with HIV were equally likely to receive CRC screening whether they were seen in an integrated care practice or not, indicating that the essential factor for screening is more likely to be the presence of a PCP and not the organization of the clinic (integrated care or not). Indeed, patients with a designated PCP might have less competing priorities in one visit and might have more focused attention on primary care issues. However, given that integrated care clinics, in addition to providing primary care, also provide extensive social services which are much needed in patients with HIV, CRC screening would probably be lower if these comprehensive clinics did not exist.

Our study has several limitations. First, the data was obtained by means of chart abstraction; therefore, if it is possible that the proportion of CRC screening found was underestimated. However, this rate is consistent with

previous published studies. Second, we did not have a control group to compare our study findings with; therefore, our observations can only be applied to describe the population we studied. Third, our sample size was small but patients were selected from multiple outpatient clinics in Philadelphia as they were participants of the Philadelphia MMP which is a CDC funded population-based surveillance system of patients with HIV living in Philadelphia. Because of small sample size, there were a limited number of variables that we could account for in our final model and we only had statistical power to detect large differences. Finally, we evaluated one preventive health measure (colorectal cancer screening); other non-ADM screening such as breast and prostate cancer screening need to be assessed in future studies.

In our analysis of CRC screening among patients with HIV seeing community based providers, the rate of CRC screening was 46.9%. Having a documented PCP was the only variable strongly associated with CRC screening. As HIV becomes a chronic disease, it is crucial that patients affected by HIV get age appropriate preventive care. Given the complexity of HIV care and the disproportionate risk of patients to develop other chronic diseases such as cardiovascular diseases and non-ADMs, patients with HIV might benefit from having a PCP to coordinate their primary health care.

Funder: Supported by funding by a cooperative agreement between the Philadelphia Department of Public Health and the Centers for Disease Control and Prevention (grant # U62 PS001608-01).

Prior Presentations: We presented an earlier version of the manuscript as a poster at the 2011 SGIM Mid-Atlantic Regional Meeting in Baltimore, Maryland and won the prize for best poster. This project was also considered for the Lipkin award at the 2011 SGIM National Convention in Phoenix, Arizona, where it was presented orally.

Conflict of Interest: The authors declare that they do not have a conflict of interest.

Corresponding Author: Florence Momplaisir, MD; Division of General Internal Medicine, University of Pennsylvania Perelman School of Medicine, 423 Guardian Drive, 13th floor Blockley Hall, Philadelphia, PA 19104, USA (e-mail: fmo@mail.med.upenn.edu).

REFERENCES

1. Frisch M, Biggar RJ, Engels E, et al. Association of cancer with AIDS-related immunosuppression in adults. *JAMA*. 2001;285(13):1736-45.
2. Engels E, Biggar R, Hall H, et al. Cancer risk in people infected with human immunodeficiency virus in the United States. *Int J Cancer*. 2008;123:187-94.
3. Patel P, Hanson D, Sullivan P, et al. Incidence of types of cancer among HIV-infected persons compared with the general population in the United States, 1992-2003. *Ann Intern Med*. 2008;148:728-36.
4. US Cancer Statistics Working Group. United States cancer statistics. 1999-2007 Cancer Incidence and Mortality Data. Available at <http://www.cdc.gov/cancer/colorectal>. Accessed March 10, 2011.
5. Reinhold JP, Moon M, Tenner CT, Poles MA, Bini EJ. Colorectal cancer screening in HIV-infected patients 50 years of age and older: missed opportunities for prevention. *Am J Gastroenterol*. 2005;100:1805-12.
6. Iqbal S, Browne-McDonald V, Cerulli MA. Recent trends for colorectal cancer screening in HIV-infected patients. *Dig Dis Sci*. 2009;55(3):761-6.
7. Landon BE, Wilson IB, McInnes K, Landrum MB, Hirschhorn LR, Marsden PV, Cleary PD. Physician specialization and the quality of care for human immunodeficiency virus infection. *Arch Intern Med*. 2005;165:1133-9.
8. CDC. Medical Monitoring Project (MMP). <http://www.cdc.gov/hiv/topics/treatment/mmp>. Accessed March 10, 2011.
9. CDC. Vital signs: colorectal cancer screening among adults aged 50-75 years—United States, 2008. *MMWR Morb Mortal Wkly Rep*. 2010;59:808-12.
10. Lewden C, Salmon D, Morlat P, et al. Causes of death among human immunodeficiency virus (HIV)-infected adults in the era of potent antiretroviral therapy: Emerging role of hepatitis and cancers, persistent role of AIDS. *Int J Epidemiol*. 2005;34:121-30.
11. Mocroft A, Brettle R, Kirk O, et al. Changes in the cause of death among HIV positive subjects across Europe: Results from the EuroSIDA study. *AIDS*. 2002;16:1663-71.
12. Carrascal AF, Montesano-Ostrander K, Rukeyser J, Agins BD. Training HIV clinicians and building a clinical workforce: the experience in New York State. *AIDS Public Policy J*. 2005;20(3-4):102-7.
13. Landon BE, Wilson IB, Wenger NS, et al. Specialty training and specialization among physicians who treat HIV/AIDS in the United States. *J Gen Intern Med*. 2002;17:12-22.
14. Sheth AN, Moore RD, Gebo KA. Provision of general and HIV-specific health maintenance in middle aged and older patients in an urban HIV clinic. *AIDS Patient Care STDS*. 2006;20:318-25.