

UCSF

UC San Francisco Previously Published Works

Title

Late Presentation of Colorectal Cancer in a Vulnerable Population

Permalink

<https://escholarship.org/uc/item/6vj7r3m7>

Journal

The American Journal of Gastroenterology, 108(4)

ISSN

0002-9270

Authors

Ho, Chanda

Kornfield, Rachel

Vittinghoff, Eric

et al.

Publication Date

2013-04-01

DOI

10.1038/ajg.2012.256

Peer reviewed

Published in final edited form as:

Am J Gastroenterol. 2013 April ; 108(4): 466–470. doi:10.1038/ajg.2012.256.

Late Presentation of Colorectal Cancer in a Vulnerable Population

Chanda Ho¹, Rachel Kornfield², Eric Vittinghoff³, John Inadomi⁴, Hal Yee⁵, and Ma Somsouk^{1,6}

¹Department: Medicine, Division of Gastroenterology and Hepatology, Institution: University of California, San Francisco. San Francisco, CA

²Department: Department of Medicine, Institution: University of Chicago. Chicago, IL

³Department: Epidemiology and Biostatistics, Institution: University of California, San Francisco. San Francisco, CA

⁴Department: Medicine, Division of Gastroenterology and Hepatology, Institution: University of Washington. Seattle, WA

⁵Department: Los Angeles Department of Health Services, Institution: Los Angeles County. Los Angeles, CA

⁶Department: GI Health Outcomes, Policy and Economics (HOPE) Research Program, Institution: University of California, San Francisco. San Francisco, CA

Abstract

Objectives—Health care delivery to vulnerable populations is a significant challenge as such systems simultaneously face financial challenges and resource limitations. Complex medical conditions, such as colorectal cancer (CRC), may identify disparities in access or delivery that affect clinical outcomes. Our objective was to examine CRC stage at presentation and mortality in a vulnerable population compared with nationally representative data.

Methods—From 1996–2009, consecutive CRC cases from San Francisco General Hospital (SFGH) were identified. Representative CRC cases were identified from the Surveillance, Epidemiology and End Results (SEER) database over the same time period. Demographic data, stage at presentation, survival after diagnosis, and utilization of surgical services were examined in both cohorts and by race/ethnicity. In addition, in patients who had established care at SFGH for at least one year, we examined utilization of CRC screening tests prior to CRC diagnosis.

Results—289 stage 1 to 4 CRC cases were identified at SFGH. Fifty-five percent of the SFGH cohort presented with advanced disease (stage 3 and 4) compared with 44% in the SEER cohort (adjusted odds-ratio (aOR) 1.28, 95% confidence interval (CI) 1.01–1.61, $p=0.04$). Increased risk of late stage at presentation at SFGH compared with SEER was most evident among blacks (aOR

Correspondence should be directed to: Chanda Ho, MD MPH, UCSF Gastroenterology Division, 513 Parnassus Avenue, S-357, San Francisco, CA 94143, Phone: 415-353-2318, Fax: 415-353-2407, chanda.ho@ucsf.edu.

CONFLICTS OF INTEREST/STUDY SUPPORT

Guarantor of the article: Chanda Ho, MD, MPH and Ma Somsouk, MD, MAS.

Specific author contributions: Conducted literature review, data analysis, manuscript preparation, and approved the final draft submitted: Chanda Ho; data collection and data analysis: Rachel Kornfield; statistical support, scientific writing, and approved the final draft submitted: Eric Vittinghoff; project supervision and critical review of conclusions and manuscript: Hal Yee and John Inadomi; study concept and design, acquisition of data, analysis and review of data, manuscript preparation, critical review, and approved the final draft submitted: Ma Somsouk.

Potential competing interests: None

1.80, 95% CI 1.02–3.17, $p=0.04$) and Asians (aOR 1.41, 95% CI 0.97–2.05, $p=0.07$). There was weak evidence for worse survival at SFGH compared with SEER overall (adjusted hazard ratio (aHR) 1.19, 95% CI 0.99–1.45). However, this varied by race ($p=0.002$), with poorer survival at SFGH among whites (HR 2.13, 95% CI 1.51–3.02) and possibly blacks (HR 1.38, 95% CI 0.95–2.01), but some evidence for better survival among Asians (HR 0.77, 95% CI 0.53–1.12). Among CRC patients at SFGH, Asians and Hispanics had significantly better survival than whites and blacks. Of the 56% patients receiving care at SFGH for at least 1 year, only 22% had received any form of CRC screening.

Conclusions—In this study comparing history of screening, stage at presentation, and mortality among CRC cases at SFGH with the SEER cancer registry, we found that SFGH cases were more likely to present with late CRC, in particular blacks and Asians, and mostly had shorter survival, especially whites and blacks. The screening rates among SFGH patients in care for at least 1 year at diagnosis were low, and may have contributed to late stage at presentation. These findings provide an opportunity to examine access and utilization by race/ethnicity in a vulnerable population and to identify areas where quality of CRC care can be improved.

INTRODUCTION

The Institute of Medicine (IOM) defines safety-net providers as “providers that organize and deliver a significant level of health care and other related services to the uninsured, Medicaid, and other vulnerable populations” (1, 2). Care delivery in the safety-net is a significant challenge as such systems simultaneously face financial challenges and resource limitations as they provide care to vulnerable populations (3–6). Furthermore, vulnerable populations are more likely to suffer from complex medical conditions due to socioeconomic factors (7). One area that deserves further attention is the pattern of colorectal cancer (CRC) presentation in the safety-net. Specifically, we focused on colorectal cancer presentation and survival outcomes.

CRC is the 3rd most common malignancy, and the 2nd leading cause of cancer death among men and women in the United States (8). Despite evidence which has shown that CRC screening is effective in reducing CRC mortality (9–11), CRC screening is underutilized by the general population and even more so among minority populations and in the safety-net (12–14). Patterns and outcomes of CRC care in the safety-net are worth examining given the very tools which allow safety-net hospitals to care for patients such as culturally competent programs can strengthen the quality of care given to patients (15, 16).

The objective of this study was to examine CRC stage at presentation and mortality in the safety-net compared with nationally representative data. Compared with nationally representative data, we hypothesize that in the safety-net, the spectrum of disease stage is weighted towards advanced disease, likely driven both by low exposure to screening and late utilization of medical care.

METHODS

Study Population

Consecutive patients diagnosed with CRC were identified at San Francisco General Hospital (SFGH) between 1996 and 2009. SFGH is the safety-net hospital for the residents of San Francisco. According to the 2010 US Census, the population of San Francisco was 805,235 persons (17). SFGH serves approximately 100,000 patients per year, and among those, the majority of patients are non-white. The hospital’s patient population is racially and ethnically diverse: 24% white, 30% Hispanic, 18% black, and 23% Asian (18). In 2009–2010, 79% of inpatients and 64% of outpatients were either uninsured or covered by Medi-

Cal, California's state health program for low-income and resource-limited residents (18, 19).

To compare our safety-net population data with nationally representative data, we obtained cancer surveillance data from the Surveillance, Epidemiology and End Results (SEER) program. The SEER program of the National Cancer Institute collects information on cancer incidence and survival from population-based cancer registries. It covers approximately 28% of the United States population and serves as the comprehensive source of population-based information on stage at cancer diagnosis and survival data (20). Mortality data linked to SEER are provided by the National Center for Health Statistics (20, 21).

Data Collection

From 1996–2009, consecutive cases of CRC at SFGH were first identified using ICD-9 codes (153, 153.X 154, 154.1, 154.2). Of 1366 patients identified, 400 patients were excluded because their chart lacked pathology reports. For the remaining patients, we searched pathology and imaging reports for keywords related to CRC. For the 550 patients with keywords, we reviewed operative, radiology, and endoscopic reports in the electronic medical record to determine CRC stage at presentation and presence of surgical resection. Of the 342 patients with confirmed cancer, 53 cases with carcinoma in-situ or unknown stage were excluded from the analysis. CRC stage was based on the American Joint Committee on Cancer system (22). For mortality data, we used SFGH medical records which are linked to the California death registry. In addition, we searched the Social Security Death Index to capture those not recorded within the California death registry.

In addition to CRC specific data, we also collected data on exposure to CRC screening. At SFGH, fecal occult blood testing is the primary CRC screening modality with colonoscopy offered to those with positive occult blood tests or at high-risk for developing CRC. We limited our analysis of patient utilization of CRC screening to those patients who had received care at SFGH for at least 1 year. These established patients would have had an opportunity to utilize screening tests. Conversely, those diagnosed with CRC within the year of establishing care at SFGH system are more likely to be symptomatic, which could confound the indication for testing.

From the SEER registry, we identified CRC cases using colon and rectum site codes (AYA Site Recode=8.6.1) during the same time period. Patients with histological codes for carcinoma in-situ were excluded. We extracted race/ethnicity, sex, age at diagnosis, presence of surgical resection, and American Joint Committee on Cancer stage at diagnosis during the same time period. Of 308,131 cases identified, 32,848 were dropped because they had carcinoma in-situ or unknown stage at diagnosis.

Statistical Analysis

Patient demographics were compared between the SFGH and SEER cohorts using t- and χ^2 tests as appropriate. We used a multinomial model to assess between-cohort differences in stage at presentation, after exploratory analyses using the simpler proportional odds model revealed violations of the proportional odds assumption. We also used a logistic model to compare presentation at stage 3 or 4. In all these analyses we adjusted for age, sex, and race, and also assessed effect modification by these covariates, using Wald χ^2 tests for interaction.

We then used Cox models to compare survival after CRC diagnosis in the SFGH and SEER cohorts, adjusting for age, sex, race, and stage at presentation. Tests for effect modification indicated heterogeneity by race ($p=.002$). We then used Kaplan-Meier curves to characterize survival in the SFGH and SEER cohorts, stratified by race, and adjusting for age, sex, and

stage at diagnosis. We also used Cox models and adjusted Kaplan-Meier curves to assess differences by race within the SFGH cohort, adjusting for age, sex, and stage at presentation.

We determined the proportion of individuals who utilized CRC screening and surgical resection before and after their cancer diagnosis, respectively. Exposure to any CRC screening test was determined among the individuals who had established care for greater than 1 year. We chose to restrict this analysis because while individuals may have screen positive CRC within the year of diagnosis, symptoms such as anemia, hematochezia, and changes in bowel habits secondary to the CRC may confound the indication for testing.

STATA Version 11 (Stata Corp., College Station, TX) was used for all analyses. This study was approved by the committee on human research at the University of California, San Francisco (Approval #: 10-01423).

RESULTS

Patient Characteristics

We identified 289 white, Black, Asian, and Hispanic patients with stage 1–4 CRC in the SFGH cohort and 272,857 cases in the SEER cohort; 2,426 additional CRC patients classified by SEER as “other” race were omitted from the analysis. As shown in Table 1, CRC patients at SFGH were younger (58 vs. 69), more likely to be male (57% vs. 51%), and more racially diverse (SFGH: 20% White, 22% Hispanic, 39% Asian, 19% Black; SEER: 76% white, 8% Hispanic, 7% Asian, 10% black).

Stage at Presentation

Relative to presentation at stage 1, SFGH patients had roughly two-fold increased risk, compared with SEER patients, of presenting at stages 2, 3, or 4 (overall $p=.001$), after adjusting for age, sex, and race (Table 2). SFGH patients were also more likely to present at stage 3 or 4 (adjusted odds-ratio (aOR) 1.28, 95% confidence interval (CI) 1.01–1.61, $p=0.04$). Although the test for interaction between cohort and race was not statistically significant ($p=.29$), later stage at presentation at SFGH compared with SEER was most evident among blacks (aOR 1.80, 95% CI 1.02–3.17, $p=0.04$) and Asians (aOR 1.41, 95% CI 0.97–2.05, $p=0.07$). The proportion of advanced stage CRC within SFGH was 50% in whites, 46% in Hispanics, 58% in Asians, and 67% in blacks.

Survival

In Cox models comparing SFGH to SEER patients, we found weak evidence for increased mortality risk in SFGH overall (adjusted hazard ratio (aHR) 1.19, 95% CI 0.98–1.44, $p=0.08$). However, this effect varied by race ($p=0.002$), with poorer survival in SFGH patients, compared with SEER, among whites (HR 2.13, 95% CI 1.51–3.02, $p<.001$; Figure 1a) and possibly blacks (HR 1.38, 95% CI 0.95–2.01, $p=0.09$, Figure 1d), but some evidence for better survival among Asians (HR 0.77, 95% CI 0.53–1.12, $p=0.17$; Figure 1c).

In comparisons *within* SFGH, mortality risk was lower among Asians than among whites (aHR 0.35, 95% CI 0.21–0.59, $p<.001$) and blacks (aHR 0.39, 95% CI 0.23–0.68, $p=0.001$) (Figure 2). Hispanics were also at lower risk than whites (aHR 0.45, 95% CI 0.25–0.81, $p=0.008$) and blacks (0.51, 95% CI 0.27–0.94, $p=0.03$) but comparable to Asians (aHR 1.28, 95% CI 0.70–2.34, $p=0.42$).

Utilization of Healthcare Services

We also examined the utilization of healthcare services, including screening and surgical resection. Of the SFGH cohort, 44% had a diagnosis of CRC within 1 year of establishing

care at SFGH. Of the remaining 56% who had been SFGH patients for at least 1 year, only 22% had any exposure to CRC screening tests. Of those patients, 27 had fecal occult blood testing, 4 underwent colonoscopy, and 4 underwent sigmoidoscopy. With regards to surgical resection, there was no statistically significant difference in resection rates between SFGH (87.5%) and SEER (90.4%). There was also no statistically significant difference in the resection rates by race in the SFGH cohort. The highest resection rate was 90% among Asians and Hispanics and lowest at 83% among whites and blacks ($p=0.33$).

DISCUSSION

In this study comparing history of screening, stage at presentation, and mortality among colorectal cancer (CRC) cases at SFGH, a safety-net hospital, with CRC cases reported to the nationally representative SEER cancer registry, we found that a somewhat greater proportion presented at an advanced stage at SFGH. The screening rates among SFGH patients with at least 1 year of care were low, and may have contributed to late stage at presentation. Survival was also nominally shorter among SFGH patients overall, compared with SEER, but the differences varied by race. At SFGH, survival was clearly longer among Asians, compared with whites, blacks, and Hispanics; there was also weak evidence that their mortality risk was lower than among Asians in SEER, despite nominally increased risk of presenting at stage 3 or 4. These findings may help us to understand racial disparities in CRC screening and presentation at a safety-net hospital, and to identify potential interventions to address them.

Such racial disparities in CRC, specifically late stage at presentation and higher mortality rates, have been well documented in the black population (23–26). While socioeconomic and biologic factors may play a role, lack of participation in CRC screening has been documented and is a modifiable factor (23, 26–28). One study showed that blacks may be less likely than whites to undergo colonoscopy even after an abnormal sigmoidoscopy (29). Blacks, then, tend to receive less screening and present with more advanced stage of disease (23, 27). Other studies have identified knowledge gaps and competing priorities as potential barriers to CRC care among blacks (30–33). Our observation that Asians also present disproportionately late, similar to blacks, suggests that similar challenges in either access or utilization of CRC screening services may exist.

While CRC screening tests are available at SFGH, utilizing such tests involves access to a primary care physician (PCP). In this study population, almost half (44%) of the patients presented to the safety-net for care within the year of their CRC presentation suggesting that many patients may access the system only after they become symptomatic. Therefore, solutions are necessary to reach a population of vulnerable patients often uninsured or underinsured prior to development of cancer. Among these solutions include culturally competent care, community education, and outreach.

For those patients with access to a PCP, low adherence to CRC screening may be a result of many factors, including differences in health beliefs or patient and provider knowledge gaps (34). We have shown, however, that with appropriate infrastructure to facilitate screening, this vulnerable population will complete CRC screening at rates approaching 70% (34). While the exact reasons for late disease presentation and low utilization of screening tests are beyond the scope of this work, a better understanding of health beliefs and competing demands for each individual may be important to bridge the divide between resource availability and a patient's access and utilization of those resources.

Our study has several important limitations. First, we did not have access to screening utilization data among all patients cared for at SFGH. Therefore, while we examined the

utilization rates among those with CRC, we cannot generalize these results to utilization of CRC services by the entire safety-net population. Second, SFGH is only one safety-net system. But like many other safety-nets, SFGH provides care to a diverse and underserved population. SFGH therefore serves as a model to understand opportunities to improve health care delivery to a challenging population.

In summary, our study shows that despite generally broad access to care at the safety-net hospital in San Francisco, patients with CRC are more likely to present at later stages than CRC cases in SEER. Nearly half of CRC cases are first seen within a year of diagnosis, likely prompted by symptoms, and too late for prevention strategies to be effective. Consequently, it is important that we identify individual, community, and system level barriers to uptake of primary care, including timely screening. In addition, follow-up studies of these safety-net CRC patients would help to understand differences in care and utilization that may contribute to disparities in survival. We conclude that improvements in access and utilization of colorectal cancer services have the potential to reduce these important safety-net disparities.

Acknowledgments

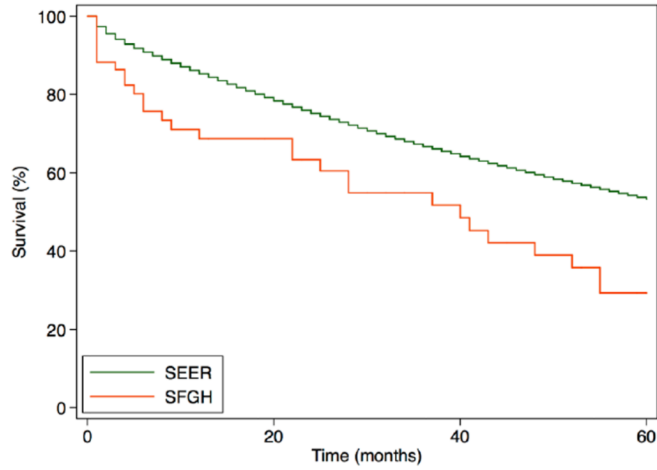
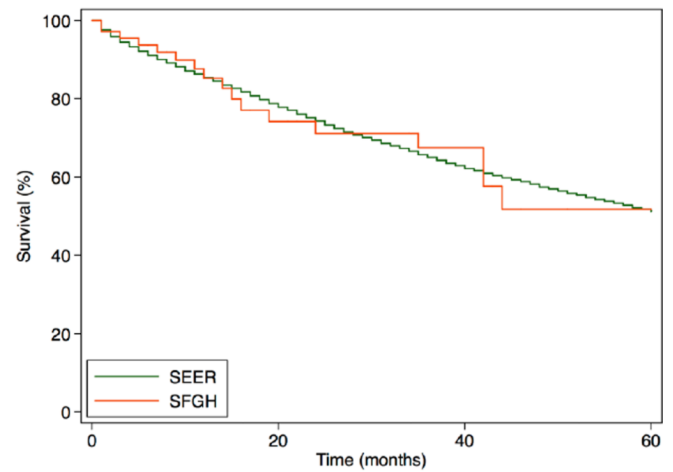
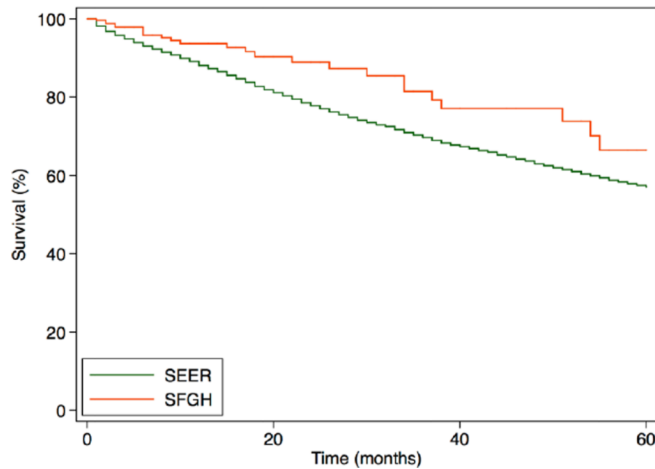
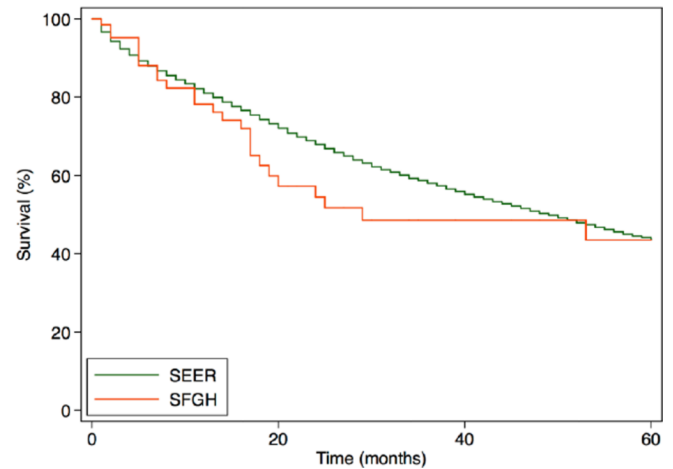
Financial support: This work was funded in part by grants from the National Institutes of Health: T32 DK060414 to CH and K24 DK080941 to JI. MS was supported by the American Society for Gastrointestinal Endoscopy Career Development Award and the NIH/NCI K23 CA157929 Award. CH was also supported in part by the Hefni Technical Training Foundation to HY.

REFERENCES

1. McHugh M, Kang R, Hasnain-Wynia R. Understanding the safety net: inpatient quality of care varies based on how one defines safety-net hospitals. *Med Care Res Rev.* 2009; 66:590–605. [PubMed: 19398722]
2. Institute of Medicine. *America's Health Care Safety Net: Intact but Endangered.* Washington, D.C.: National Academy Press; 2000.
3. Goldman LE, Vittinghoff E, Dudley RA. Quality of care in hospitals with a high percent of Medicaid patients. *Med Care.* 2007; 45:579–583. [PubMed: 17515786]
4. Hasnain-Wynia R, Baker DW, Nerenz D, et al. Disparities in health care are driven by where minority patients seek care: examination of the hospital quality alliance measures. *Arch Intern Med.* 2007; 167:1233–1239. [PubMed: 17592095]
5. Jha AK, Orav EJ, Li Z, et al. Concentration and quality of hospitals that care for elderly black patients. *Arch Intern Med.* 2007; 167:1177–1182. [PubMed: 17563027]
6. Werner RM, Goldman LE, Dudley RA. Comparison of change in quality of care between safety-net and non-safety-net hospitals. *JAMA.* 2008; 299:2180–2187. [PubMed: 18477785]
7. Woolf SH, Braveman P. Where health disparities begin: the role of social and economic determinants--and why current policies may make matters worse. *Health Aff (Millwood).* 2011; 30:1852–1859. [PubMed: 21976326]
8. Jemal A, Siegel R, Xu J, et al. Cancer statistics, 2010. *CA Cancer J Clin.* 2010; 60:277–300. [PubMed: 20610543]
9. Selby JV, Friedman GD, Quesenberry CP Jr, et al. Effect of fecal occult blood testing on mortality from colorectal cancer. A case-control study. *Ann Intern Med.* 1993; 118:1–6. [PubMed: 8416152]
10. Baxter NN, Goldwasser MA, Paszat LF, et al. Association of colonoscopy and death from colorectal cancer. *Ann Intern Med.* 2009; 150:1–8. [PubMed: 19075198]
11. Mandel JS, Bond JH, Church TR, et al. Reducing mortality from colorectal cancer by screening for fecal occult blood. Minnesota Colon Cancer Control Study. *N Engl J Med.* 1993; 328:1365–1371. [PubMed: 8474513]

12. Etzioni DA, Ponce NA, Babey SH, et al. A population-based study of colorectal cancer test use: results from the 2001 California Health Interview Survey. *Cancer*. 2004; 101:2523–2532. [PubMed: 15505783]
13. Gupta S, Tong L, Allison JE, et al. Screening for colorectal cancer in a safety-net health care system: access to care is critical and has implications for screening policy. *Cancer Epidemiol Biomarkers Prev*. 2009; 18:2373–2379. [PubMed: 19745221]
14. Walsh JM, Kaplan CP, Nguyen B, et al. Barriers to colorectal cancer screening in Latino and Vietnamese Americans. Compared with non-Latino white Americans. *J Gen Intern Med*. 2004; 19:156–166. [PubMed: 15009795]
15. Eisert SL, Mehler PS, Gabow PA. Can America's urban safety net systems be a solution to unequal treatment? *J Urban Health*. 2008; 85:766–778. [PubMed: 18553134]
16. Washington D.C: National Association of Public Hospitals and Health Systems; 2009. Safety Net Health Systems: An Essential Partner in Reducing Health Care Disparities. [Internet]. Available from: <http://www.naph.org/Main-Menu-Category/Publications/Disparities/HCR-Health-Disparities.aspx?FT=.pdf> [cited October 10, 2011]
17. Washington D.C: US Census; 2012 Jan 31. US Census Bureau State & County QuickFacts. [Internet]. Available from: <http://quickfacts.census.gov/qfd/states/06/06075.html> [cited 2012 February 1, 2012]
18. San Francisco: San Francisco General Hospital; 2011 Jul 15. San Francisco General Hospital & Trauma Center Annual Report Fiscal Year 2009–2010. [Internet]. Available from: http://www.sfdph.org/dph/files/SFGHdocs/AnnRpt2009_2010.pdf [cited October 4, 2011]
19. Sacramento: California Department of Health Care Services; 2007. Department of Health Care Services. [Internet]. Available from: <http://www.dhcs.ca.gov/services/medi-cal/Pages/Medi-CalFAQs.aspx#whatismedi-cal> [cited 2013 March 26, 2013]
20. Bethesda: National Cancer Institute; 2011. Surveillance Epidemiology, and End Results (SEER) Program. [Internet]. Available from: <http://seer.cancer.gov/about/overview.html> [cited 2011 October 4, 2011]
21. Bethesda: National Cancer Institute; 2011. Surveillance, Epidemiology, and End Results (SEER) Program. [Internet]. Available from: <http://seer.cancer.gov/statfacts/html/colorect.html> [cited July 12, 2011]
22. Chicago: American Joint Committee on Cancer; 2011 Dec 1. American Joint Committee on Cancer Staging Resources. [Internet]. Available from: <http://www.cancerstaging.org/staging/index.html> [cited 2013 March 26, 2013]
23. Chien C, Morimoto LM, Tom J, et al. Differences in colorectal carcinoma stage and survival by race and ethnicity. *Cancer*. 2005; 104:629–639. [PubMed: 15983985]
24. Clegg LX, Li FP, Hankey BF, et al. Cancer survival among US whites and minorities: a SEER (Surveillance, Epidemiology, and End Results) Program population-based study. *Arch Intern Med*. 2002; 162:1985–1993. [PubMed: 12230422]
25. Dimou A, Syrigos KN, Saif MW. Disparities in colorectal cancer in African-Americans vs Whites: before and after diagnosis. *World J Gastroenterol*. 2009; 15:3734–3743. [PubMed: 19673013]
26. Govindarajan R, Shah RV, Erkman LG, et al. Racial differences in the outcome of patients with colorectal carcinoma. *Cancer*. 2003; 97:493–498. [PubMed: 12518374]
27. Cooper GS, Koroukian SM. Racial disparities in the use of and indications for colorectal procedures in Medicare beneficiaries. *Cancer*. 2004; 100:418–424. [PubMed: 14716780]
28. Soneji S, Iyer SS, Armstrong K, et al. Racial disparities in stage-specific colorectal cancer mortality: 1960–2005. *Am J Public Health*. 2010; 100:1912–1916. [PubMed: 20724684]
29. Laiyemo AO, Doubeni C, Pinsky PF, et al. Race and colorectal cancer disparities: health-care utilization vs different cancer susceptibilities. *J Natl Cancer Inst*. 2010; 102:538–546. [PubMed: 20357245]
30. James AS, Daley CM, Greiner KA. Knowledge and attitudes about colon cancer screening among African Americans. *Am J Health Behav*. 2011; 35:393–401. [PubMed: 22040586]
31. McAlearney AS, Reeves KW, Dickinson SL, et al. Racial differences in colorectal cancer screening practices and knowledge within a low-income population. *Cancer*. 2008; 112:391–398. [PubMed: 18041073]

32. O'Malley AS, Beaton E, Yabroff KR, et al. Patient and provider barriers to colorectal cancer screening in the primary care safety-net. *Prev Med.* 2004; 39:56–63. [PubMed: 15207986]
33. Shankar S, Selvin E, Alberg AJ. Perceptions of cancer in an African-American community: a focus group report. *Ethn Dis.* 2002; 12:276–283. [PubMed: 12019938]
34. Inadomi JM, Vijan S, Janz NK, et al. Adherence to colorectal cancer screening: a randomized clinical trial of competing strategies. *Arch Intern Med.* 2012; 172:575–582. [PubMed: 22493463]

a. White (HR 2.13, 95% CI 1.51-3.02)**b. Hispanic** (HR 0.81, 95% CI 0.50-1.30)**c. Asian** (HR 0.77, 95% CI 0.53-1.12)**d. Black** (HR 1.38, 95% CI 0.95-2.01)**Figure 1.**

Kaplan-Meier curves of survival by race/ethnicity between SFGH and SEER cohorts, adjusted for age, sex, and stage at presentation.

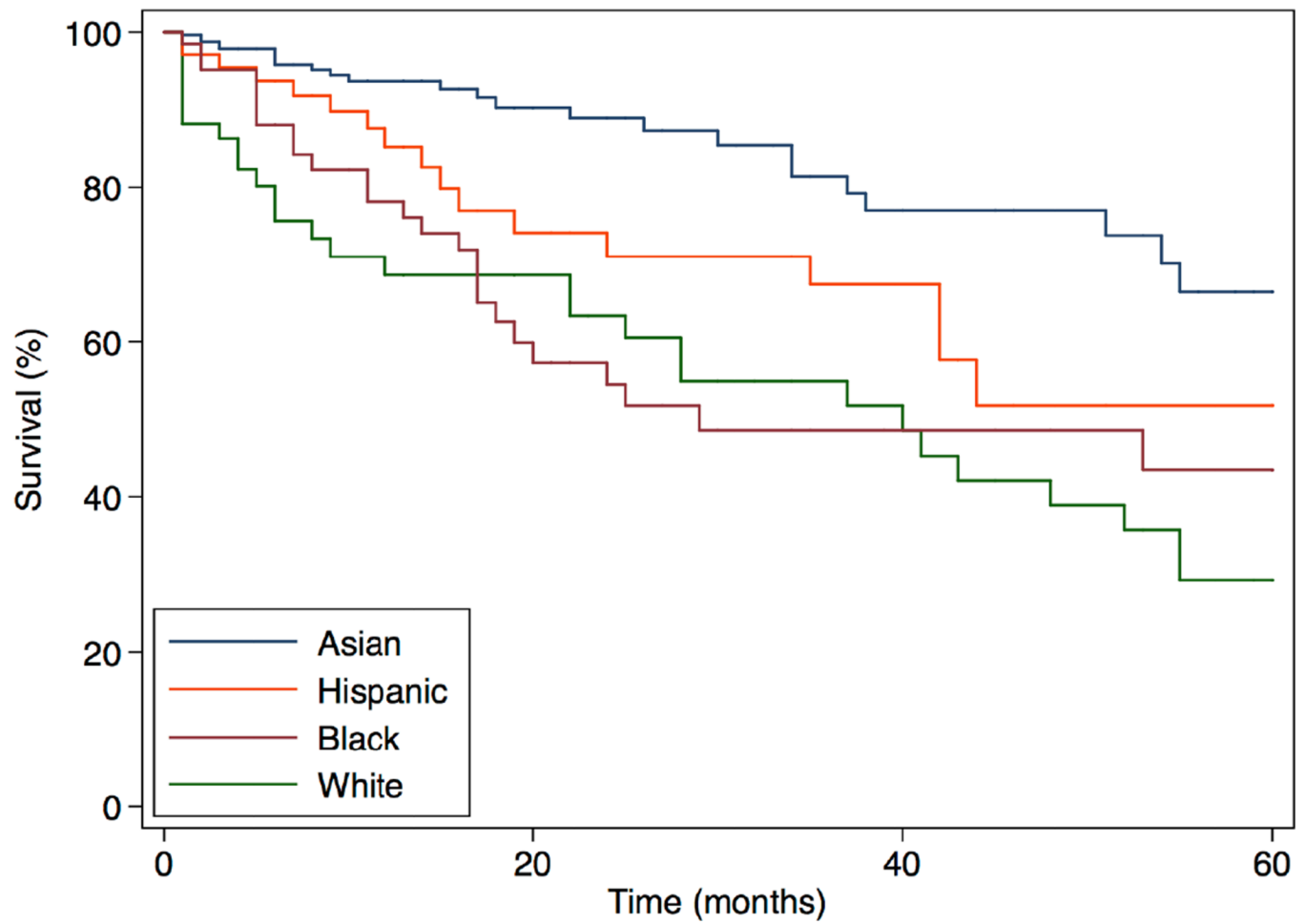


Figure 2.

Kaplan-Meier curves of survival by race/ethnicity after colorectal cancer diagnosis within the SFGH safety-net cohort, adjusted for age, sex, and stage at presentation

Table 1

Characteristics of the SFGH safety-net and SEER national cohorts.

	SFGH (n=289)	SEER (n=272,857)	p value *
Mean age at diagnosis, years	58	69	<0.01
Male, %	57	51	0.03
Race, %[‡]			
White	20	76	<0.01
Black	19	10	<0.01
Asian	39	7	<0.01
Hispanic	22	8	<0.01
Non-English language preference, %	37	-	
White	5	-	
Black	0	-	
Asians	74	-	
Hispanic	31	-	
Pre-cancer diagnosis care		-	
< 365 days in safety-net, (%)	127 (44%)	-	
Average time in safety-net, days	1130	-	

* p values were calculated with t-test for continuous variables and with χ^2 test for categorical variables

[‡] Percentages add to more than 100 because of rounding.

Table 2

Colorectal cancer stage at presentation for SFGH and SEER cohorts.

Stage	SFGH (%)	SEER (%)	aRRR *	95% CI	P-value
1	16	27	Ref.	—	—
2	29	28	1.96	1.36–2.81	<.001
3	30	25	1.80	1.26–2.58	.001
4	25	19	1.96	1.35–2.84	<.001

* adjusted relative risk ratio