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Adenoma Prevalence and Distribution among U.S. Latino Subgroups Undergoing Screening Colonoscopy

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Abstract

Background—Colorectal cancer (CRC) is the second leading malignancy diagnosed among U.S. Latinos. Latinos in the U.S. represent a heterogeneous amalgam of subgroups varying in genetic background, culture, and socioeconomic status. Little is known about the frequency of CRC precursor lesions found at screening colonoscopy among Latino subgroups.

Aim—The aim was to determine the prevalence and distribution of histologically-confirmed adenomas found at screening colonoscopy among average-risk, asymptomatic U.S. Latinos according to their subgroup and socio-demographic background.

Methods—Cross-sectional analysis of pathological findings resulting from screening colonoscopy among average-risk, asymptomatic U.S. Latinos aged ≥ 50 in two prospective randomized controlled trials at an academic medical center.

Results—Among the 561 Latinos who completed screening colonoscopy, the two largest subgroups were Puerto Ricans and Dominicans. The findings among both subgroups were: adenomas 30.6%, proximal adenomas 23.5%, advanced adenomas 12.0%, and proximal advanced adenomas 8.9%. These rates are at least as high as those found at screening colonoscopy among U.S. whites. While Puerto Ricans were more likely than Dominicans to be born in the U.S., speak English, be acculturated, have a smoking history, and be obese, there were no significant differences in adenoma rates between these subgroups.

Conclusions—The prevalence of adenomas, advanced adenomas, and proximal neoplasia was high among both subgroups. These findings have implications for CRC screening and surveillance among the increasingly growing Latino population in the U.S.

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Keywords

Adenoma; Colorectal Cancer; Colonoscopy; Latinos; Screening

Introduction

Latinos are the largest and fastest growing immigrant population in the U.S [1]. Latinos in the U.S. have lower colorectal cancer (CRC) incidence and mortality rates than whites [1, 2]. From 2006-2010, the age-adjusted CRC incidence rate per 100,000 people was 50.9 among white men compared to 47.3 among Latino men, and 38.6 compared to 32.6 for white and Latino women, respectively [2]. During this period, the age adjusted mortality rate per 100,000 people was 19.2 among white men versus 16.1 among Latino men, and 13.6 versus 10.2 among white and Latino women, respectively.

Despite lower CRC incidence and mortality rates among Latinos compared to whites, CRC still looms as the second most common malignancy and the second and third leading cause of death due to cancer among Latino males and females, respectively [1-2]. Additionally, Latinos have lower completion rates for either the fecal occult blood test (FOBT) or endoscopy among individuals eligible for screening: 61.5% for whites versus 47.0% for Latinos [3]. The higher screening rate among whites may partly explain their higher age-adjusted incidence of CRC.

Although cancer data is generally reported for Latinos as a singular entity, there is heterogeneity among Latino subgroups based on genetic background, culture, socioeconomic status, and even screening behavior [1, 4-8]. Such variance may account for the differences in rates of CRC incidence and mortality among Latino subgroups, which have been recently described [9-12]. Furthermore, because Latinos are a predominantly immigrant population in the U.S., they manifest variation based on migration history, including whether or not they were born in the U.S., and acculturation, the process by which immigrants adopt the attitudes, beliefs, values, customs, and behaviors of their new culture, which is often measured by language [1, 13]. Both increased duration of U.S. residence and acculturation have been associated with higher CRC risk [1, 2, 13-16]. Many Latino individuals emigrate from countries of low CRC risk, and it is proposed that as they remain in the U.S. and raise their children here, their rates of CRC will rise to that of the general population. Thus, presenting cancer data for Latinos as an aggregate group may mask underlying differences in cancer rates based on subgroup, migration history, and acculturation.

Colorectal adenomas are important markers of CRC risk. Only recently have studies reported on adenoma rates among U.S. Latinos. Many of these studies, the majority of which were retrospective analyses of medical records, suggest that Latinos undergoing screening colonoscopy (SC) have similar or greater adenoma rates as whites [17-25]. However, the retrospective design of most of these studies often did not permit confirmation that the colonoscopies were done on average-risk, asymptomatic individuals. Additional limitations of some of these studies include not providing complete histological details of

SC findings, not analyzing Latino subgroups, and not accounting for migration history or acculturation.

For the past seven years, our group has conducted prospective studies to help eliminate disparities in CRC screening by facilitating SC among minority populations, including Latinos, served by our institution [4, 18, 23]. These studies have involved an open-access referral system and patient navigation (PN) [26]. Herein, we report the detailed pathological findings at SC of U.S.-dwelling Puerto Ricans and Dominicans, the most represented Latino subgroups within our screening population. Our primary aim was to determine the prevalence and distribution of colonic neoplasia among Puerto Ricans and Dominicans. Our secondary aim was to determine whether the prevalence and distribution of colonic neoplasia among Latinos was associated with age of emigration (including whether or not one was born in the U.S.) or acculturation.

Methods

Study design

This study represents a cross-sectional analysis of colonoscopic findings among consecutive Latino patients undergoing SC as part of one of two Institutional Review Board-approved, randomized-controlled prospective cohort studies at The Mount Sinai Hospital evaluating the effect of PN on SC completion rates. Informed consent was obtained from all individual participants of both studies. Mount Sinai is a tertiary-care academic hospital in East Harlem, New York City, which serves a diverse population that is approximately 55% Latino [27]. For both studies, patients who were referred via open-access endoscopy were enrolled and navigated in their preferred language - English or Spanish. The first study, conducted between May 2008 and December 2011, randomized subjects to receive standard PN or culturally-targeted PN [4]. The second study, conducted between May 2012 and December 2014, randomized subjects to receive standard PN, standard PN with general CRC print materials, or standard PN with culturally-targeted CRC print materials. Eligibility criteria for both studies included 1) self-identified Latino, 2) age ≥ 50 years, 3) average risk for CRC with no GI symptoms, 4) no SC in the previous five years, and 5) no significant medical comorbidities. As the purpose of the present study was to describe the pathological findings resulting from SC, we combined participants from both studies into an integrated analytic dataset.

Data collection

Patient information, including socio-demographic and socio-cultural measures, were collected via interviews at the time of enrollment and recorded in a secure database. These measures included self-identified gender, age, ethnicity (including Latino subgroup), marital status, education, income level, country of origin, and age of emigration (for immigrants). The 9-item Marin Acculturation scale was adapted from previous literature to evaluate language preference in a variety of settings (e.g. “In which language(s) do you usually think?”; rated 1 - “only Spanish” to 5 - “only English”) [28]. An additional four items assessed social acculturation by asking participants to rate their number of interactions with other Latinos (e.g. “Your close friends are:”; rated 1 - All Latinos to 5 - All non-Latinos)

with internal consistency of $\alpha = 0.942$. Based on the patient's electronic medical record at the time of enrollment in the study, the following variables were obtained: insurance status, characterized as Medicaid/Medicare or other (private insurance, self-pay, or self-insured); tobacco use, characterized as smokers (current or former use) or never smokers; and body mass index (BMI), characterized as obese (BMI ≥ 30) or non-obese (BMI < 30).

We collected the colonoscopy and pathology results of each participant from the electronic medical record, similar to our approach in previous studies [18, 23]. Expert board-certified GI pathologists at The Mount Sinai Hospital analyzed the original pathology specimens. The prevalence of adenomas was defined as the proportion of participants undergoing SC who had at least 1 adenoma. Advanced adenomas were defined as adenomas ≥ 1 cm in diameter or with any villous component, high-grade dysplasia, or cancer. The prevalence of proximal lesions was defined as the proportion of patients with at least 1 lesion located proximal to, and including, the splenic flexure.

Statistical analysis

Statistical calculations were performed using SPSS version 22 (IBM SPSS Inc, Chicago, IL). Analyses were performed on endoscopic findings, characterized by the most advanced lesion on histology, and socio-demographic and socio-cultural factors associated with endoscopic findings. Missing data, which was minimal due to the in-person nature of the interview, was excluded from the analysis; exact values of missing data are included in Table 1. Descriptive statistics were employed to determine the socio-demographic and socio-cultural characteristics of the study population. The chi-square test was used to compare proportions, and the student's *t* test was used to analyze continuous data. Based on the univariate analysis, variables were selected to be included in a logistic regression model ($p < 0.20$ was established for inclusion in the model). Multivariate logistic regression analysis was conducted to evaluate factors independently associated with the prevalence of adenomas, advanced adenomas, and proximal neoplasia. All tests of significance were two-sided with $p < 0.05$.

Results

Study population

A total of 1,024 patients were referred for SC through open-access endoscopy for both studies, of which 956 patients consented and enrolled (Figure 1). Of these, 256 patients did not meet eligibility requirements, were never reached by telephone, or refused to continue to participate in either of the studies. Thus, 700 patients were randomized to one of the study arms of each study, all of which included PN, and 563 (80.4%) patients were successfully navigated to SC completion. Among those who completed their SC, pathology reports were missing in two patients, resulting in 561 analyzable patients.

Among the 561 patients, there were 338 Puerto Ricans, 113 Dominicans and 110 patients who identified as South American, Central American, Mexican, Cuban, or multi-national, and were characterized as "Other Latino" for the purposes of this study (Table 1). Overall, 68.6% were female and the mean ($\pm$ standard deviation) age of the cohort was 59.6 ± 7.6

years, without significant differences among the groups. More Dominicans and Other Latinos reported being married than did Puerto Ricans ($p = 0.01$). Puerto Ricans completed higher levels of education compared to Dominicans and Other Latinos ($p < 0.001$). More than half of all patients had incomes below \$10,000 per year, and over 85% had public health insurance, with no differences among the groups. Unlike most Dominicans and Other Latinos who emigrated to the U.S. > 18 years of age, a significant proportion of Puerto Ricans were born in the U.S. or emigrated to the U.S. < 18 years of age ($p < 0.001$). The majority of Dominicans and Other Latinos were navigated in Spanish whereas the majority of Puerto Ricans were navigated in English or both languages ($p < 0.001$). Puerto Ricans were the most acculturated followed by Other Latinos and Dominicans ($p < 0.001$). Smoking status was available for 510 patients during the referral clinic visit, and a greater number of Puerto Ricans reported being current or former smokers than Dominicans and Other Latinos ($p < 0.001$). Body mass index (BMI) was available for 458 patients, and mean BMI was highest in Puerto Ricans followed by Other Latinos and Dominicans ($p < 0.01$).

Results of screening colonoscopy

The overall cecal intubation rate was 94.5% (530/561), with rates similar among all three groups (Table 1). The quality of the bowel preparation was noted to be poor for 7.7% (43/560) of participants, and the rate was higher among Puerto Ricans (10.1%) than Dominicans (3.5%) or Other Latinos (4.5%) ($p = 0.03$). Poor prep rates were actually lower in Spanish-speaking patients than in English-speaking or bilingual patients (5.4% vs. 10.9%, respectively; $p = 0.02$). Given the considerable heterogeneity with respect to country of origin for the “Other Latino” category, it was excluded from further analyses of histological findings.

The location, histology, size, and number of adenomas for the 451 Puerto Rican and Dominican patients are listed on Table 2. Among the total cohort, 30.6% had at least one adenoma, 23.5% had a proximal adenoma, 12.0% had an advanced adenoma, and 8.9% had a proximal advanced adenoma. There were no significant differences in adenoma rates between the two Latino subgroups for any of these categories. There was also no difference in the histological type, size, or multiplicity of adenomas between the groups.

Univariate analysis was performed to determine whether any socio-demographic or socio-cultural features were associated with pathological findings among the total group of Puerto Ricans and Dominicans ($N = 451$) (Table 3). The prevalence of adenomas was greater among males than females ($p = 0.03$). Patients aged ≥ 60 years had an increased prevalence of adenomas and proximal adenomas than those younger than 60 years old ($p = 0.04$ and $p = 0.04$, respectively). All other variables, including age of emigration, language of navigation, and acculturation, were not associated with neoplasia rates.

Variables with statistically significant differences and trends toward statistically significant differences in rates of neoplasia in the univariate analysis were included in the multivariate regression analysis, also considering Latino subgroup (Table 4). Males were more likely to have adenomas (odds ratio [OR] 1.60; 95% confidence interval [CI], 1.00-2.56) compared to females after controlling for age, Latino subgroup, marital status, insurance status, and smoking status. Patients aged ≥ 60 years were more likely to have adenomas (OR 2.08; 95%

CI, 1.32-3.27) and proximal adenomas (OR 2.04; 95% CI, 1.26-3.31) compared to those aged < 60 years. Individuals who were not married had higher rates of adenomas (OR 1.65; 95% CI, 1.02-2.68) and proximal adenomas (OR 1.78; 95% CI, 1.05-3.02) than those who were married. Patients with private insurance, self-pay, or who were self-insured had a higher prevalence of adenomas (OR 2.06; 95% CI, 1.08-3.94) than those with public insurance. There were no statistically significant differences in neoplasia rates based on Latino subgroup on multivariate analysis.

Discussion

We herein report the pathological findings resulting from SC among average-risk, asymptomatic Puerto Rican and Dominican individuals aged 50 residing in an urban community in the U.S. To our knowledge, this is the first study to compare the prevalence and location of histologically confirmed colorectal adenomas among U.S. Latino subgroups. We found that Puerto Rican and Dominican individuals had similar rates of adenomas, advanced adenomas, and proximal neoplasia.

Because the parent studies were designed to assess the effectiveness of PN on SC adherence specifically among Latinos in our community, we lacked a comparison group of white patients. To compensate for this, we compared our pathological findings to those of other SC studies in the U.S. that enrolled white and/or Latino patients (Table 5). The adenoma and advanced adenoma rates at SC among Puerto Ricans and Dominicans in the present study are similar to, or in most cases higher than, respective rates among predominantly white and Latino populations undergoing SC in other studies. In fact, the adenoma and advanced adenoma rates among Latino participants in our study were comparable to those found in the Veterans Affairs Cooperative Study, which included a relatively higher risk population in that the majority were male and white [29]. Only the study of Thoma and coworkers reported adenoma rates higher than those found in the present study [24]. However, since their study was a retrospective analysis, it is possible that the subjects may not have all been average-risk and asymptomatic for CRC. We should note that the study by Lee et al. reported the findings of Latinos from the first parent study used in the present analysis, and while those subjects also consisted of mainly Puerto Ricans and Dominicans, the results were reported in aggregate [23]. Interestingly, the retrospective study by Lathroum and colleagues of SC findings among Latinos in Puerto Rico found adenoma rates that were lower than the rates we herein describe among Puerto Ricans living in the U.S. [30]. This is consistent with the trends seen for CRC between island and mainland Puerto Ricans reported by Ho and colleagues (see below) [13].

Despite a lack of difference in adenoma rates between Puerto Rican and Dominican subgroups in our study, there were notable differences in their socio-demographic, socio-cultural, and colonoscopy quality characteristics, which may ultimately play a role in their risk for CRC. Puerto Ricans were more acculturated than Dominicans, and a greater proportion of Puerto Ricans compared to Dominicans were born in the U.S or emigrated 18 years of age. Among Latinos, acculturation and increased duration of U.S. residence are theorized to be related to worse CRC outcomes due to the adoption of poor health behaviors prevalent in the host culture pertaining to diet, physical activity, and alcohol and tobacco use

[1, 13-16]. Moreover, the smoking and obesity rates of Puerto Ricans were significantly greater than those of Dominicans, and both smoking and obesity are known risk factors for CRC [3].

With regard to colonoscopy quality characteristics, the overall rate of poor bowel preparation was low, likely due to patient navigation, which has been associated with improved rates of suboptimal bowel preparation [31, 32]. However, Puerto Ricans had a significantly higher rate of poor bowel preparation in comparison to Dominicans. As poor bowel preparation can obstruct the view of the colon and rectum during colonoscopy, the rates of neoplasia among Puerto Ricans in this study may have been underestimated.

While no studies to date have investigated adenoma rates among Latino subgroups in the U.S., recent studies have illustrated their variance with respect to CRC incidence and mortality rates. Pinheiro's group demonstrated the cancer incidence rates among Latino subgroups residing in Florida from 1999-2001 [11]. Puerto Rican and Cuban men had more than double the risk for CRC than Mexican men. Martinez-Tyson and colleagues reported that among Latino subgroups residing in Florida from 1990 to 2000, the CRC mortality rate for Puerto Rican men (12.1%) was greater than that for Cuban (10.7%) and Mexican (10.2%) men [10]. In order to explain such differences in colorectal outcomes, both studies described the variance in health behaviors among U.S. Latino subgroups. For example, Martinez-Tyson et al explained that Puerto Ricans and Cubans have higher rates of smoking than Mexicans in the U.S., and tobacco use is a known risk factor for CRC [3].

Neither age of emigration to the U.S, language of navigation, nor acculturation was associated with SC findings among Latinos in our sample. The motivation to pursue this aim was driven by previous studies that have shown variance in CRC rates based on migration history and acculturation. For example, Ho and colleagues demonstrated the CRC rates among mainland and island Puerto Ricans from 1998-2002 [13]. The age-adjusted CRC incidence rate for Puerto Ricans living on the island was 45.9 per 100,000 whereas that for Puerto Ricans living on the mainland was 62.4 per 100,000. The authors propose acculturation of unhealthy behaviors in the U.S., such as cigarette use, as one theory to account for this discrepancy in CRC risk among Puerto Ricans based on country of residence. An earlier study demonstrated the change in cancer incidence rates among Latino and white residents in Florida from 1981-1989 to 1990-1998 [16]. Over time, the age-adjusted CRC incidence rate for Latinos increased (47.9 per 100,000 to 53.2 per 100,000) whereas that for whites decreased (69.9 per 100,000 to 65.6 per 100,000), wherein the risk for CRC among Latinos gradually approached the risk of CRC among whites in the population.

In our multivariate analysis, male gender, age ≥ 60, being non-married, and having private vs. public insurance were associated with an increased prevalence of adenomas, with age ≥ 60 and being non-married also associated with an increased prevalence of proximal adenomas. While male gender and increasing age have been shown to be associated with increased rates of colorectal neoplasia, the relation of marital status or insurance status on adenoma rates has not been adequately explored [19, 21, 22, 30]. These findings deserve attention in future, larger studies.

A strength of this study is that all participants were enrolled in a prospective cohort study, enabling confirmation of their status as average-risk and asymptomatic for CRC. The prospective study design also enabled self-report of socio-demographic and socio-cultural variables, rather than relying on medical records to retrieve this information, which can be outdated or erroneous. Another strength is that all colonoscopy findings were histologically confirmed by expert GI pathologists at our institution, allowing for the appropriate classification of the prevalence and distribution of adenomas and advanced adenomas. Furthermore, the high rates of cecal intubation and low rates of poor bowel preparation demonstrate the superior quality of the colonoscopic examinations.

A potential limitation of this study is that all the patients were navigated through the SC process, which may select for individuals who are more compliant with health care. However, given that 93.4% of Latino individuals referred for SC through open-access endoscopy agreed to participate in either study, and among those, a majority was successfully navigated to SC completion, the participants in this study are likely representative of the general Latino population in our catchment area. Another limitation of this study is that we solely investigated colorectal adenoma rates among Puerto Ricans and Dominicans, as they were the most represented Latino subgroups within our screening population. As Puerto Rico and the Dominican Republic are both located in the Caribbean, Puerto Ricans and Dominicans may share common ancestral backgrounds, and thereby be genetically homogenous populations. Further, given the broad heterogeneity among the Latino population, with variation by country of origin, genetic background, and immigration patterns, the generalizability of the results may be limited to those Latino subgroups examined in this study. An additional limitation is the lack of a direct comparison group of white patients as the parent studies solely assessed the effectiveness of PN on SC adherence among Latino subgroups in our catchment area. To account for this, we compared the adenoma rates among Puerto Ricans and Dominicans in our study to the adenoma rates among whites, as well as Latinos as an aggregate group, from previous screening colonoscopy studies. Future screening colonoscopy studies are warranted to expand the screening population to include a broader geographic spectrum of Latino subgroups, taking into consideration migration history and acculturation, and to include a comparison group of white patients.

In conclusion, as the Latino population in the U.S. continues to grow, it becomes increasingly important to understand the health profile and health burden of this diverse minority group. In consideration of the heterogeneity among the Latino population, this task is contingent on understanding the health profile and health burden of each Latino subgroup. This study confirms the high rate of adenomas, advanced adenomas, and proximal neoplasia among average-risk, asymptomatic U.S.-dwelling Puerto Rican and Dominican individuals 50. Their high rates of adenomas and advanced adenomas should help guide CRC surveillance efforts aimed at these subgroups. The high rates of proximal neoplasia among Puerto Ricans and Dominicans underscore the importance of using CRC screening modalities with high sensitivity in the proximal colon for these subgroups. As of now, CRC screening guidelines in the U.S. are the same for Latinos and whites despite differences in their CRC incidence and mortality rates, and our findings support this, at least for U.S. Puerto Ricans and Dominicans.

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References

1. Siegel R, Naishadham D, Jemal A. Cancer statistics for Hispanics/Latinos, 2012. *CA: A Cancer Journal for Clinicians*. 2012; 62:283–298. [PubMed: 22987332]
2. Siegel R, DeSantis C, Jemal A. Colorectal cancer statistics, 2014. *CA: A Cancer Journal for Clinicians*. 2014; 64:104–117. [PubMed: 24639052]
3. American Cancer Society. Colorectal Cancer Facts & Figures 2014–2016. Atlanta, GA: American Cancer Society; 2014.
4. Braschi CD, Sly JR, Singh S, Villagra C, Jandorf L. Increasing colonoscopy screening for Latino Americans through a patient navigation model: a randomized clinical trial. *Journal of Immigrant and Minority Health*. 2014; 16:934–940. [PubMed: 23736964]
5. Cokkinides VE, Bandi P, Siegel RL, Jemal A. Cancer-related risk factors and preventive measures in US Hispanics/Latinos. *CA: A Cancer Journal for Clinicians*. 2012; 62:353–363. [PubMed: 22987448]
6. Sheinfeld Gorin S, Heck JE. Cancer screening among Latino subgroups in the United States. *Prev Med*. 2005; 40:515–526. [PubMed: 15749133]
7. Vargas Bustamante A, Chen J, Rodriguez HP, Rizzo JA, Ortega AN. Use of preventive care services among Latino subgroups. *Am J Prev Med*. 2010; 38:610–619. [PubMed: 20494237]
8. Zambrana RE, Breen N, Fox SA, Gutierrez-Mohamed ML. Use of cancer screening practices by Hispanic women: analyses by subgroup. *Prev Med*. 1999; 29:466–477. [PubMed: 10600427]
9. Howe HL, Lake A, Schymura MJ, Edwards BK. Indirect method to estimate specific Hispanic group cancer rates. *Cancer Causes & Control*. 2009; 20:1215–1226. [PubMed: 19609690]
10. Martinez-Tyson D, Pathak EB, Soler-Vila H, Flores AM. Looking under the Hispanic umbrella: cancer mortality among Cubans, Mexicans, Puerto Ricans and other Hispanics in Florida. *Journal of Immigrant and Minority Health*. 2009; 11:249–257. [PubMed: 18506623]
11. Pinheiro PS, Sherman RL, Trapido EJ, et al. Cancer incidence in first generation U.S. Hispanics: Cubans, Mexicans, Puerto Ricans, and new Latinos. *Cancer Epidemiol Biomarkers Prev*. 2009; 18:2162–2169. [PubMed: 19661072]
12. Soto-Salgado M, Suárez E, Calo W, Cruz-Correa M, Figueroa-Vallés NR, Ortiz AP. Incidence and mortality rates for colorectal cancer in Puerto Rico and among Hispanics, non-Hispanic whites, and non-Hispanic blacks in the United States, 1998–2002. *Cancer*. 2009; 115:3016–3023. [PubMed: 19402167]
13. Ho GY, Figueroa-Vallés NR, La Torre-Feliciano D, et al. Cancer disparities between mainland and island Puerto Ricans. *Revista Panamericana de Salud Pública*. 2009; 25:394–400. [PubMed: 19695128]
14. Chao A, Gilliland FD, Hunt WC, Bulterys M, Becker TM, Key CR. Increasing incidence of colon and rectal cancer among Hispanics and American Indians in New Mexico (United States), 1969–94. *Cancer Causes & Control*. 1998; 9:137–144. [PubMed: 9578290]
15. Warshauer ME, Silverman DT, Schottenfeld D, Pollack ES. Stomach and colorectal cancers in Puerto Rican-born residents of New York City. *J Natl Cancer Inst*. 1986; 76:591–595. [PubMed: 3457197]
16. Wilkinson JD, Wohler-Torres B, Trapido E, et al. Cancer trends among Hispanic men in South Florida, 1981–1998. *Cancer*. 2002; 94:1183–1190. [PubMed: 11920490]
17. Chen LA, Santos S, Jandorf L, et al. A program to enhance completion of screening colonoscopy among urban minorities. *Clinical Gastroenterology and Hepatology*. 2008; 6:443–450. [PubMed: 18304882]

18. Collazo TH, Jandorf L, Thelemaque L, Lee K, Itzkowitz SH. Screening Colonoscopy among Uninsured and Underinsured Urban Minorities. *Gut and Liver*. 2015; 9:502–508. [PubMed: 25287165]
19. Corley DA, Jensen CD, Marks AR, et al. Variation of adenoma prevalence by age, sex, race, and colon location in a large population: implications for screening and quality programs. *Clinical Gastroenterology and Hepatology*. 2013; 11:172–180. [PubMed: 22985608]
20. Francois F, Park J, Bini EJ. Colon pathology detected after a positive screening flexible sigmoidoscopy: a prospective study in an ethnically diverse cohort. *Am J Gastroenterol*. 2006; 101:823–830. [PubMed: 16494591]
21. Lebwahl B, Capiak K, Neugut A, Kastrinos F. Risk of colorectal adenomas and advanced neoplasia in Hispanic, black and white patients undergoing screening colonoscopy. *Aliment Pharmacol Ther*. 2012; 35:1467–1473. [PubMed: 22540887]
22. Lee B, Holub J, Peters D, Lieberman D. Prevalence of colon polyps detected by colonoscopy screening of asymptomatic Hispanic patients. *Dig Dis Sci*. 2012; 57:481–488. [PubMed: 21918852]
23. Lee KK, Jandorf L, Thélèmaque L, Itzkowitz SH. Colorectal neoplasia detection among black and Latino individuals undergoing screening colonoscopy: a prospective cohort study. *Gastrointest Endosc*. 2014; 79:466–472. [PubMed: 24528828]
24. Thoma MN, Jimenez Cantisano BG, Hernandez AV, Perez A, Castro F. Comparison of adenoma detection rate in Hispanics and whites undergoing first screening colonoscopy: A retrospective chart review. *Gastrointest Endosc*. 2013; 77:430–435. [PubMed: 23317579]
25. Zheng XE, Li T, Lipka S, et al. Location-dependent ethnic differences in the risk of colorectal adenoma: a retrospective multiethnic study. *J Clin Gastroenterol*. 2014; 48:e1–7. [PubMed: 23426462]
26. Bassett, M., Bogler, B., Feldman, G., Rosenberg, R., Silver, L., Winawer, S. [Accessed September 15, 2015] A Practical Guide to Increasing Screening Colonoscopy: Proven Methods for Health Care Facilities to Prevent Colorectal Cancer Deaths. Available at: <http://www.nyc.gov/html/doh/downloads/pdf/cancer/cancer-colonoscopy-guide.pdf>
27. Olson, EC., Van Wye, G., Kerker, B., Thorpe, L., Frieden, TR. [Accessed September 15, 2015] Take Care East Harlem: NYC Community Health Profiles. Second Available at: http://www.nyc.gov/html/doh/downloads/pdf/data/20_06chp-303.pdf
28. Marin G, Sabogal F, Marin BV, Otero-Sabogal R, Perez-Stable EJ. Development of a short acculturation scale for Hispanics. *Hispanic Journal of Behavioral Sciences*. 1987; 9:183–205.
29. Lieberman DA, Weiss DG, Bond JH, et al. Use of colonoscopy to screen asymptomatic adults for colorectal cancer. *N Engl J Med*. 2000; 343:162–168. [PubMed: 10900274]
30. Lathroum L, Ramos–Mercado F, Hernandez–Marrero J, Villafañá M, Cruz–Correa M. Ethnic and sex disparities in colorectal neoplasia among Hispanic patients undergoing screening colonoscopy. *Clinical Gastroenterology and Hepatology*. 2012; 10:997–1001. [PubMed: 22542749]
31. Lebwahl B, Neugut AI, Stavsky E, et al. Effect of a patient navigator program on the volume and quality of colonoscopy. *J Clin Gastroenterol*. 2011; 45:e47–53. [PubMed: 21030874]
32. Miller SJ, Itzkowitz SH, Shah B, Jandorf L. Bowel prep quality in patients of low socio-economic status undergoing screening colonoscopy with patient navigation. *Health Education and Behavior*. 2015; 1090198115606907
33. Barclay RL, Vicari JJ, Doughty AS, Johanson JF, Greenlaw RL. Colonoscopic withdrawal times and adenoma detection during screening colonoscopy. *N Engl J Med*. 2006; 355:2533–2541. [PubMed: 17167136]
34. Imperiale TF, Wagner DR, Lin CY, Larkin GN, Rogge JD, Ransohoff DF. Risk of advanced proximal neoplasms in asymptomatic adults according to the distal colorectal findings. *N Engl J Med*. 2000; 343:169–174. [PubMed: 10900275]
35. Imperiale TF, Wagner DR, Lin CY, Larkin GN, Rogge JD, Ransohoff DF. Using risk for advanced proximal colonic neoplasia to tailor endoscopic screening for colorectal cancer. *Ann Intern Med*. 2003; 139:959–965. [PubMed: 14678915]
36. Schoenfeld P, Cash B, Flood A, et al. Colonoscopic screening of average-risk women for colorectal neoplasia. *N Engl J Med*. 2005; 352:2061–2068. [PubMed: 15901859]

37. Schroy PC, Coe A, Chen CA, O'Brien MJ, Heeren TC. Prevalence of advanced colorectal neoplasia in white and black patients undergoing screening colonoscopy in a safety-net hospital. *Ann Intern Med.* 2013; 159:13–20. [PubMed: 23817700]

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Figure 1.

Diagnostic algorithm of patients referred for screening colonoscopy (SC) for the two prospective cohort studies examined in this analysis.

Table 1
Socio-demographic, socio-cultural, and colonoscopy quality characteristics

	Total (n = 561)	Puerto Rican (n = 338)	Dominican (n = 113)	Other Latino (n = 110)	p value
Gender					
Female	385 (68.6)	226 (66.9)	85 (75.2)	74 (67.3)	0.24
Male	176 (31.4)	112 (33.1)	28 (24.8)	36 (32.7)	
Age, mean (SD), y	59.6 (7.6)	60.0 (7.7)	58.9 (7.5)	59.3 (7.2)	0.37
< 60	296 (52.8)	170 (50.3)	66 (58.4)	60 (54.5)	0.30
60	265 (47.2)	168 (49.7)	47 (41.6)	50 (45.5)	
Marital status					
Married	199/560 (35.5)	102/337 (30.3)	51/113 (45.1)	46/110 (41.8)	0.01
Not married	361/560 (64.5)	235/337 (69.7)	62/113 (54.9)	64/110 (58.2)	
Education					
< High school	190/560 (33.9)	91/337 (27.0)	56/113 (49.6)	43/110 (39.1)	< 0.001
High school	260/560 (46.4)	184/337 (54.6)	38/113 (33.6)	38/110 (34.5)	
> High school	110/560 (19.6)	62/337 (18.4)	19/113 (16.8)	29/110 (26.4)	
Income					
< \$ 10,000	275/513 (53.6)	169/306 (55.2)	57/105 (54.3)	49/102 (48.0)	0.45
\$10,000	238/513 (46.4)	137/306 (44.8)	48/105 (45.7)	53/102 (52.0)	
Insurance status					
Medicaid/Medicare	488 (87.0)	296 (87.6)	100 (88.5)	92 (83.6)	0.49
Other	73 (13.0)	42 (12.4)	13 (11.5)	18 (16.4)	
Age of emigration					
Born in U.S.	145 (25.8)	132 (39.1)	2 (1.8)	11 (10.0)	< 0.001
18 years	126 (22.5)	107 (31.7)	11 (9.7)	8 (7.3)	
>18 years	290 (51.7)	99 (29.3)	100 (88.5)	91 (82.7)	
Language of navigation					
English/both	228/560 (40.7)	199/338 (58.9)	8/112 (7.1)	21/110 (19.1)	< 0.001
Spanish	332/560 (59.3)	139/338 (41.1)	104/112 (92.9)	89/110 (80.9)	
Acculturation					
Less (< 2.45)	289/559 (51.7)	118/338 (34.9)	99/112 (88.4)	72/109 (66.1)	< 0.001
More (≥ 2.45)	270/559 (48.3)	220/338 (65.1)	13/112 (11.6)	37/109 (33.9)	

	Total (n = 561)	Puerto Rican (n = 338)	Dominican (n = 113)	Other Latino (n = 110)	p value
Smoking status					
Current/former	236/510 (46.3)	176/312 (56.4)	31/102 (30.4)	29/96 (30.2)	< 0.001
BMI, mean (SD), kg/m ²	31.2 (6.9)	32.1 (7.6)	29.2 (4.6)	30.3 (5.6)	< 0.01
Obese, BMI ≥ 30	227/458 (49.6)	157/283 (55.5)	34/88 (38.6)	36/87 (41.4)	0.01
Cecal intubation					
Yes	530 (94.5)	316 (93.5)	108 (95.6)	106 (96.4)	0.44
Prep quality					
Poor	43/560 (7.7)	34/337 (10.1)	4/113 (3.5)	5/110 (4.5)	0.03

Values are expressed as no. (%) unless otherwise indicated.

SD: standard deviation; BMI: body mass index.

Marital status, education, language of navigation, and prep quality data available for 560 patients.

Income data available for 513 patients; acculturation data available for 559 patients.

Smoking data available for 510 patients; BMI data available for 458 patients.

Table 2
Adenoma location, histology, size, and count by Latino subgroup

	Total (<i>n</i> = 451)	Puerto Rican (<i>n</i> = 338)	Dominican (<i>n</i> = 113)	<i>p</i> value
Adenoma rates	138 (30.6)	108 (32.0)	30 (26.5)	0.28
Proximal adenoma	106 (23.5)	78 (23.1)	28 (24.8)	0.71
Advanced adenoma	54 (12.0)	43 (12.7)	11 (9.7)	0.40
Proximal advanced adenoma	40 (8.9)	30 (8.9)	10 (8.8)	0.99
Adenoma histology				
Tubular	118 (26.2)	92 (27.2)	26 (23.0)	0.38
Tubulovillous	13 (2.9)	10 (3.0)	3 (2.7)	0.87
Serrated	7 (1.6)	6 (1.8)	1 (0.9)	0.51
Adenoma size				
< 1 cm	87 (19.3)	67 (19.8)	20 (17.7)	0.62
1 cm	51 (11.3)	41 (12.1)	10 (8.8)	0.34
Adenoma count				
3 adenomas	19 (4.2)	15 (4.4)	4 (3.5)	0.68

Values are expressed as no. (%).

Table 3
Predictors of adenoma prevalence and location for U.S. Puerto Ricans and Dominicans

	Adenoma	<i>p</i> value	Proximal adenoma	<i>p</i> value	Advanced adenoma	<i>p</i> value	Proximal advanced adenoma	<i>p</i> value
Gender								
Female (<i>n</i> = 311)	85 (27.3)	0.03	66 (21.2)	0.09	35 (11.3)	0.48	25 (8.0)	0.36
Male (<i>n</i> = 140)	53 (37.9)		40 (28.6)		19 (13.6)		15 (10.7)	
Age, y								
< 60 (<i>n</i> = 236)	62 (26.3)	0.04	46 (19.5)	0.04	23 (9.7)	0.13	18 (7.6)	0.33
60 (<i>n</i> = 215)	76 (35.3)		60 (27.9)		31 (14.4)		22 (10.2)	
Latino subgroup								
Puerto Rican (<i>n</i> = 338)	108 (32.0)	0.28	78 (23.1)	0.71	43 (12.7)	0.40	30 (8.9)	0.99
Dominican (<i>n</i> = 113)	30 (26.5)		28 (24.8)		11 (9.7)		10 (8.8)	
Marital status								
Married (<i>n</i> = 153)	39 (25.5)	0.09	29 (19.0)	0.10	21 (13.7)	0.42	16 (10.5)	0.40
Not married (<i>n</i> = 297)	99 (33.3)		77 (25.9)		33 (11.1)		24 (8.1)	
Education								
< High school (<i>n</i> = 147)	43 (29.3)	0.90	33 (22.4)	0.92	17 (11.6)	0.74	14 (9.5)	0.86
High school (<i>n</i> = 222)	70 (31.5)		54 (24.3)		29 (13.1)		20 (9.0)	
> High school (<i>n</i> = 81)	25 (30.9)		19 (23.5)		8 (9.9)		6 (7.4)	
Income								
< \$ 10,000 (<i>n</i> = 226)	68 (30.1)	0.69	54 (23.9)	0.88	23 (10.2)	.30	19 (8.4)	0.91
\$10,000 (<i>n</i> = 185)	59 (31.9)		43 (23.2)		25 (13.5)		15 (8.1)	
Insurance status								
Medicaid/Medicare (<i>n</i> = 396)	116 (29.3)	0.11	92 (23.2)	0.72	47 (11.9)	0.85	36 (9.1)	0.66
Other (<i>n</i> = 55)	22 (40.0)		14 (25.5)		7 (12.7)		4 (7.3)	
Age of emigration								
Born in U.S. (<i>n</i> = 134)	39 (29.1)	0.87	27 (20.1)	0.55	12 (9.0)	0.39	9 (6.7)	0.48
18 years (<i>n</i> = 118)	38 (32.2)		29 (24.6)		17 (14.4)		10 (8.5)	
>18 years (<i>n</i> = 199)	61 (30.7)		50 (25.1)		25 (12.6)		21 (10.6)	
Language of navigation								
English/both (<i>n</i> = 207)	61 (29.5)	0.61	43 (20.8)	0.20	22 (10.6)	0.41	15 (7.2)	0.26
Spanish (<i>n</i> = 243)	77 (31.7)		63 (25.9)		32 (13.2)		25 (10.3)	

	Adenoma	<i>p</i> value	Proximal adenoma	<i>p</i> value	Advanced adenoma	<i>p</i> value	Proximal advanced adenoma	<i>p</i> value
Acculturation								
Less (< 2.45) (<i>n</i> = 217)	64 (29.5)	0.60	54 (24.9)	0.52	25 (11.5)	0.76	20 (9.2)	0.81
More (≥ 2.45) (<i>n</i> = 233)	74 (31.8)		52 (22.3)		29 (12.4)		20 (8.6)	
Smoking status								
Never (<i>n</i> = 207)	56 (27.1)	0.11	44 (21.3)	0.25	20 (9.7)	0.10	16 (7.7)	0.24
Current/former (<i>n</i> = 207)	71 (34.3)		54 (26.1)		31 (15.0)		23 (11.1)	
Body mass index, kg/m ²								
< 30 (<i>n</i> = 180)	56 (31.1)	0.79	43 (23.9)	0.75	22 (12.2)	0.71	14 (7.8)	0.98
Obese, ≥ 30 (<i>n</i> = 191)	57 (29.8)		43 (22.5)		21 (11.0)		15 (7.9)	

Values are expressed as no. (%).

Multivariate analysis of predictors of adenoma prevalence and location for U.S. Puerto Ricans and Dominicans

Table 4

	Adenoma			Proximal adenoma			Advanced adenoma			Proximal advanced adenoma		
	OR (95% CI)	<i>p</i> value		OR (95% CI)	<i>p</i> value		OR (95% CI)	<i>p</i> value		OR (95% CI)	<i>p</i> value	
Gender												
Female	Reference	0.05		Reference	0.14		Reference	0.79		Reference	0.77	
Male	1.60 (1.00 - 2.56)			1.47 (0.88 - 2.44)			0.91 (0.47 - 1.76)			1.11 (0.54 - 2.30)		
Age												
< 60	Reference	< 0.01		Reference	< 0.01		Reference	0.07		Reference	0.17	
60	2.08 (1.32 - 3.27)			2.04 (1.26 - 3.31)			1.78 (0.96 - 3.30)			1.61 (0.81 - 3.21)		
Latino subgroup												
Puerto Rican	Reference	0.52		Reference	0.28		Reference	0.60		Reference	0.95	
Dominican	0.84 (0.49 - 1.44)			1.36 (0.78 - 2.36)			0.81 (0.38 - 1.74)			1.03 (0.46 - 2.31)		
Marital status												
Married	Reference	0.04		Reference	0.03		Reference	0.43		Reference	0.64	
Not married	1.65 (1.02 - 2.68)			1.78 (1.05 - 3.02)			0.78 (0.41 - 1.46)			0.85 (0.42 - 1.72)		
Insurance status												
Medicaid/Medicare	Reference	0.03		Reference	0.26		Reference	0.45		Reference	0.89	
Other	2.06 (1.08 - 3.94)			1.51 (0.74 - 3.08)			1.41 (0.58 - 3.46)			0.93 (0.30 - 2.82)		
Smoking status												
Never	Reference	0.12		Reference	0.14		Reference	0.08		Reference	0.22	
Current/former	1.43 (0.91 - 2.25)			1.44 (0.89 - 2.35)			1.75 (0.93 - 3.28)			1.56 (0.77 - 3.15)		

OR: odds ratio; CI: confidence interval.

OR adjusted for gender, age, Latino subgroup, marital status, insurance status, and smoking status.

Table 5
Colonoscopy findings for whites/others^a and Latinos from studies

Reference	Study type	Male (%) ^b	No. of participants		Adenoma prevalence (%)		Advanced adenoma prevalence (%)	
			White/Other	Latino	White/Other	Latino	White/Other	Latino
U.S. Puerto Ricans ^c	Prospective	33	- ^d	338	-	32.0	-	12.7
U.S. Dominicans ^c	Prospective	25	-	113	-	26.5	-	9.7
Barclay et al ³³	Prospective	51	2053	-	23.5	-	5.2	-
Chen et al ¹⁷	Prospective	18	44	211	11.4	19.4	2.3	1.9
Collazo et al ¹⁸	Prospective	45	43	141	11.6	12.1	2.3	3.5
Imperiale et al ³⁴	Prospective	59	1994	-	-	-	5.6	-
Imperiale et al ³⁵	Prospective	68	3025	-	-	-	3.4	-
Lee et al ^{23,e}	Prospective	31	-	314	-	27.7	-	10.8
Lieberman et al ²⁹	Prospective	97	3121	-	37.5	-	10.5	-
Schoenfeld et al ³⁶	Prospective	0	1483	-	20.4	-	4.9	-
Schroy et al ³⁷	Prospective	51	1172	-	-	-	6.8	-
Corley et al ¹⁹	Retrospective	42	13266	1361	24.0	25.0	-	-
Lathroum et al ^{30,f}	Retrospective	40	-	745	-	25.1	-	4.0
Lebwohl et al ²¹	Retrospective	42	3542	942	19.0	22.0	3.7	6.5
Thoma et al ²⁴	Retrospective	51	1251	607	48.0	45.0	4.0	3.0
Zheng et al ²⁵	Retrospective	46	283	738	23.8	14.8	-	-

^aThe category whites/others refers to screening populations consisting of predominantly white individuals.

^bThis reflects the total percentage of males in the entire study population, which may have included more than just white/other and Latino individuals.

^cThis reflects the findings from the present analysis.

^dNot applicable or available.

^eLee et al reflects the findings for Latinos from the first prospective cohort study analyzed in the present analysis.

^fLathroum et al only included Latino residents of Puerto Rico.