

Case report

Understanding Gender, Race and Ethnicity in Colorectal Cancer Screening

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Abstract

Background: Colorectal cancer (CRC) is the third most common cancer and the third leading cause of cancer death in both men and women in the United States. The overall rate of CRC screening remains unacceptably low. To increase CRC screening rates, populations who are refractory to screening must be identified. Identifying barriers and facilitators of screening specific to these groups will assist the development of targeted interventions to improve CRC screening.

Methods: This review synthesizes the published literature regarding the role of gender, race and ethnicity in receiving colorectal cancer screening in the United States. Specifically, this review examines cross-sectional and prospective studies of colorectal cancer screening. These studies provide important data about the impact of race, gender and ethnicity on colorectal cancer screening rates.

Results: Female gender and non-white race are not consistent barriers to screening. However, Hispanic ethnicity does seem to consistently confer a barrier to screening.

Conclusion: The impact of female gender and non-white race on screening is inconsistent suggesting that other factors (e.g. socioeconomic status, access to care) play a greater role and perhaps that targeted efforts have been effective in addressing disparity. Improved CRC screening rates in these groups can inform approaches to improving rates in other groups, such as Hispanics, who consistently fall behind.

Keywords: Colorectal cancer screening; Race disparity; Gender disparity; Prevention

Introduction

Colorectal cancer (CRC) is the third most common cancer and the third leading cause of cancer death in both men and women in the United States. Since CRC impacts both genders, it is actually the second most common cause of cancer death overall [1]. CRC screening has been proven to result in a reduction in CRC mortality [2]. CRC screening reduces mortality both through the earlier detection of cancers and offers the opportunity for primary prevention i.e. removal of pre-cancerous polyps [3]. The American Cancer Society (ACS) and the United States Preventive Services Task Force (USPSTF) recommend screening for individuals over the age of 50, regardless of race, gender or ethnicity. Due in large part to the increasing awareness and availability of colonoscopy, the rates of CRC screening have risen significantly in the last 10 years. However, the overall rate of CRC screening remains unacceptably low, around 60% [4].

To increase CRC screening rates, populations who are refractory to screening must be identified and assisted. Numerous factors influence whether or not a patient participates in screening. This review focuses on three key determinants of screening: gender, race, and ethnicity.

Methods

The authors classify race and ethnicity per US Federal recommendations [5]. The literature search for this review was conducted by a certified medical librarian and based on the strategy used by Vernon [6] in a comprehensive 1997 review of participation in CRC screening. The literature review is current as of October 2014. We began with the MeSH terms, colorectal neoplasms/ di, pc [Diagnosis, Prevention and Control] and mass screening to identify > 130,000 articles. MeSH headings were added to capture gender, race and ethnicity and restricted our review to studies in English and in the United States. Any study that examined an outcome of stool blood

testing, endoscopy or a combination of both was included in analysis. Studies with either 1) gender or 2) race or 3) ethnicity as a predictor of screening in either multivariate or univariate analysis were included (n=121). Authors reviewed the 121 potential articles individually for quality and applicability (n = 45). Occasionally studies would report more than one outcome (e.g. fecal occult blood test (FOBT) and colonoscopy as two separate outcomes). When there was a differential association for our variable of interest (e.g. gender) and the outcome (e.g. a positive association between female gender and FOBT but no significant association between female gender and colonoscopy) we reported the analyses separately i.e. as two entries in our chart. So, some studies appear more than once in the tables [7-11].

Results

Extensive literature review

Gender in CRC screening: CRC screening rates in U.S. men and women are equivalent [4]. Table 1 presents the literature on gender and CRC screening. We identified 36 analyses which included gender. Fifteen articles found no screening differences for women vs. men while 14 showed lower screening and seven showed a positive association between female gender and CRC screening. There is no significant

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Studies w/Negative Association	Sample	Outcome
Harmon et al. [25]	Washington State (Insured) (N=140,398)	Overall CRC Screening
Wernli et al. [26]	Multiethnic cohort (MEC) (N=81,223)	Colonoscopy
Fenton et al.[27]	Washington State Health Plan (N=11,110)	FOBT
de Bosset et al. [15]	Virginia BRFSS ¹ insured (N=2,887)	Overall CRC Screening
Peterson et al. [10]	NHIS ² (N=32,374)	Endoscopy
Meissner et al. [21]	NHIS ² (N= 4,692)	Sigmoidoscopy/ Any Test
Zhao et al.[11]	Physician Claims CMS ³ (N=691,018)	BE/Sigmoidoscopy/Any Test
Christman [28]	Medical Records from CHC ⁴ (N=1,196)	Overall CRC Screening
Etizioni [29]	California HIS⁵ (N=22,343)	Overall CRC Screening
Rao et al.[12]	NHIS ² (N=38,209)	Overall CRC Screening
Brawarsky et al.[30]	Massachusetts BRFSS ¹ (N= 869)	Overall CRC screening
Bell et al.[7]	North Carolina BRFSS ¹ (N= 5700)	FOBT
Coughlin et al.[31]	BRFSS ¹ (N=61,412)	Colonoscopy/Sigmoidoscopy
McMahon et al.[9]	Michigan Medicare	Colonoscopy
Studies w/no Significant Association	Sample	Outcome
Fenton et al.[27]	Washington State Health Plan (N=11,110)	Any non-FOBT test
Hood et al.[17]	All African Americans (N= 439)	Overall CRC Screening
Bazargan et al.[32]	Urban African American & Hispanics (N= 306)	Overall CRC Screening
Griffith et al.[16]	Maryland (N= 5,040)	Overall CRC Screening
Schenck et al.[33]	Medicare (N= 82,996,703)	Overall CRC Screening
CDC et al.[48]	BRFSS ¹ (N= 201,157)	SBT and/or Colonoscopy
Trivers et al.[34]	NHIS ² (N= 6,463 (2000) & 7,364 (2005)	Overall CRC Screening
Lawsin et al.[35]	Urban African Americans (N=111)	FOBT
Peterson et al.[10]	NHIS ² (N= 32,374)	Overall CRC Screening
Ata et al.[20]	NHIS ² (N= 358)	Overall CRC Screening
Callcut et al.[36]	Statewide Claims (N= 103,580)	Endoscopy
Meissner et al.[21]	NHIS ² (N= 4,692)	Colonoscopy or FOBT
Zimmerman et al.[37]	Inner City Health Clinic (N= 325)	Colonoscopy
Fisher et al.[38]	North Carolina Colon Cancer Study (N= 1,051)	Overall CRC Screening
Taylor et al.[39]	Urban African Americans (N=74)	Sigmoidoscopy, Colonoscopy & FOBT with greater than M trend
Studies w/Positive Association	Sample	Outcome
Martinez et al.[22]	African American Medicare beneficiaries in Baltimore (N=1,552)	Overall CRC screening
Hood et al.[17]	All African Americans (N= 439)	Colonoscopy
Peterson et al.[10]	NHIS ² (N= 32,374)	FOBT
Zhao et al.[11]	Tennessee CMS ³ claims (N= 691,018)	FOBT
Bell et al 2001[7]	North Carolina BRFSS ¹ (N= 5,700)	FOBT
Coughlin et al.[31]	BRFSS ¹ (N= 61,412)	FOBT
McMahon et al.[9]	Michigan Medicare	BE/Sigmoidoscopy

¹Behavioral Risk Factor Surveillance Survey ²National Health Interview Survey (NHIS) ³Centers for Medicare and Medicaid Services (CMS) ⁴Community Health Centers (CHC)

⁵Health Interview Survey (HIS)

Table 1: CRC screening in Women.

change in the pattern when eliminating studies which do not include colonoscopy, the most common choice of CRC testing. Nine studies showed no association with female gender, seven studies showed a negative association and one, show a positive association.

Race in CRC Screening: Disparities in CRC mortality persist in racial subgroups and only around 49% of eligible African-Americans undergo CRC screening [4]. We identified 38 analyses which examined race and CRC screening. Table 2 presents CRC screening outcomes for individuals of non-white race. Non-white (African American/Black) race was associated with lower rates of screening in 18 studies. There was no association between race and screening in 15 studies. In 5 studies, a positive association was noted. Most analyses used colonoscopy or

overall CRC as their outcome of interest. The majority of these analyses were adjusted for some measure of socio economic status (SES) or access to care. When considering only studies which utilized national data sets and included colonoscopy a clearer pattern emerges, 12 studies revealed a negative association between African American/Black race and CRC screening while five showed no association, and one showed a positive association.

Ethnicity in CRC Screening: Only around 37% of eligible Hispanics undergo CRC screening [4]. Table 3 presents data on ethnicity and CRC screening. Twenty-five studies examined ethnicity (Hispanic vs non-Hispanic) as a predictor of CRC screening. Twenty studies demonstrated a negative association between

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Studies w/Negative Association	Sample	Outcome
Harmon et al.[25]	Multiethnic cohort (MEC) (N=140.398)	Colonoscopy
Liss et al.[40]	BRFSS ¹ (N=226,546)	Overall CRC Screening
May et al.[41]	Los Angeles Veterans Affairs System	Overall CRC Screening
CDC et al.[48]	BRFSS ¹ (N=201,157)	Colonoscopy
Brounts et al.[42]	Insurance Claims (Tricare) (N=17,252)	Overall CRC Screening and Colonoscopy
Meissner et al.[43]	NHIS ² (Males) (N=3,394)	Overall CRC Screening
Schenck et al.[33]	Medicare (N= 82,996,703)	Overall CRC Screening
CDC et al.[48]	BRFSS ¹	FOBT and/or Colonoscopy
Cronan et al.[44]	Low Income Random/Public Sample (N= 158)	Colonoscopy
Shih et al.[45]	NHIS ² (N= 38,633)	Overall CRC Screening
Peterson et al.[10]	NHIS ² (Black Women) (N= 32,374)	Overall CRC Screening
Zhao et al.[11]	Tennessee CMS ³ Claims (N= 691,018)	Any 1 of 3 test
Zimmerman et al.[37]	Inner City Health Clinic N=325)	Colonoscopy
Christman et al.[28]	CHC ⁴ (N=1,196)	Overall CRC Screening
Rao et al.[12]	NHIS ² (N= 38,209)	Overall CRC Screening
Bell et al.[7]	North Carolina BRFSS ¹ (N= 5,700)	FOBT
Hsia et al.[46]	Women's Health Initiative (N=55,278)	FOBT or Sigmoidoscopy
McMahon et al.[9]	Michigan Medicare	BE/Sigmoidoscopy
Studies w/no Significant Association	Sample	Outcome
Modiri et al.[47]	California HIS ⁵ (N= 10,596,208)	Overall CRC Screening
Cole et al.[48]	BRFSS ¹ (N= 1,036,001,646)	Overall CRC Screening
CDC et al.[8]	BRFSS ¹ (N= 201,157)	Colonoscopy
Bazargan et al.[32]	Urban African American & Hispanics (N=306)	Overall CRC Screening
Doubeni et al.[49]	Medicare Enrollees (N=23,923)	Endoscopy/ Overall CRC Screening
Meissner et al.[43]	NHIS ² Females (N= 4,533)	Overall CRC Screening
Katz et al.[50]	Low Income Women (CARES Project) (N= 2,098)	Overall CRC Screening
Peterson et al.[10]	NHIS ² (Black Men) (N= 32,374)	Overall CRC Screening
Ata et al.[20]	NHIS ² (N= 358)	Overall CRC Screening
Etzioni et al. [29]	California HIS⁵ (N=22,343)	Overall CRC Screening
Fisher et al.[38]	North Carolina Colon Cancer Study (N= 1,051)	Overall CRC Screening
Brawarsky et al.[30]	Massachusetts BRFSS ¹ (N= 869)	Overall CRC Screening
Goel et al.[51]	NHIS ² (N= 32,440)	Sigmoidoscopy
Coughlin et al.[52]	BRFSS ¹ (N= 106,572)	Sigmoidoscopy or Colonoscopy
Bell et al.[7]	North Carolina BRFSS ¹ (N= 5,700)	Sig/Procto, FOBT & Sig/P, either test
Studies w/Positive Association	Sample	Outcome
Oluyemi et al.[53]	BRFSS ¹	Overall CRC Screening
CDC et al.[8]	BRFSS ¹ (N= 201,157)	FOBT
Zhao et al.[11]	Tennessee CMS ³ Claims (N= 691,018)	BE
Dolan et al.[54]	Veterans Affairs (N=1,688)	Overall CRC Screening
O'Malley et al.[55]	Low Income Urban (N=1,205)	FOBT
McMahon et al.[9]	Michigan Medical Claims	Colonoscopy

¹Behavioral Risk Factor Surveillance Survey (BRFSS) ²National Health Interview Survey (NHIS) ³Centers for Medicare and Medicaid Services (CMS) ⁴Community Health Centers (CHC) ⁵Health Interview Survey (HIS)

Table 2: CRC screening and Non-white Race.

Discussion

Hispanic ethnicity and CRC screening. Four studies demonstrated no significant association with CRC screening and one showed a positive association with CRC screening and Hispanic ethnicity. The study with a positive association was conducted in men only, all of whom were insured. There is a predominant pattern whereas Hispanic ethnicity is negatively associated with CRC screening. The majority of these studies were adjusted for some measure of SES or access to care and utilized large data sets e.g. state Behavioral Risk Factor Surveillance Study (BRFSS) or National Health Interview Survey Data (NHIS).

Improvements in CRC screening have not equally permeated our society and mortality disparities persist. Socioeconomic status, culture and lack of adequate health insurance have been critical barriers [13]. Variation in disparity by three factors, race, gender and ethnicity presents a complex picture. SES and access to care are variables that likely cluster differently depending on race, gender, and ethnic subgroup. SES and access are meaningful determinants of screening and these modifiable factors represent an opportunity for improvement.

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Studies w/Negative Association	Sample	Outcome
Liss et al.[40]	BRFSS ¹ (N=226,546)	Overall CRC Screening
Modiri et al.[47]	California HIS ² (N= 10,596,208)	Overall CRC Screening
Cole et al.[48]	BRFSS (N= 1,036,001,646)	Overall CRC Screening
Brounts et al.[42]	Tricare Insurance (N=17,252)	Overall CRC Screening and Colonoscopy
Meissner et al.[43]	NHIS ³ (Men and Women) (N= 7,927)	Overall CRC Screening
Schenck et al.[33]	Medicare (N= 82,996,703)	Overall CRC Screening
CDC et al.[8]	BRFSS ¹	FOBT and/or Colonoscopy
Cronan et al.[44]	Low Income Random/Public Sample (N= 158)	FOBT, Colonoscopy or Sigmoidoscopy
Shih et al.[45]	NHIS ³ (N= 38,633)	Overall CRC Screening
Trivers et al.[34]	NHIS ³ (women) (N= 13,827)	Overall CRC Screening
Peterson et al.[10]	NHIS ³ (N= 32,374)	Overall CRC Screening
Ata et al.[20]	NHIS ³ (N= 358)	Overall CRC Screening
Callcut et al.[36]	Over 60 yrs (N= 103,580)	Colonoscopy
Shah et al.[56]	NHIS ³ (N= 38,633)	Overall CRC Screening
Etzioni et al.[29]	California HIS ² (N=22,343)	Overall CRC Screening
Rao et al.[12]	NHIS ³ (N=38,209)	Overall CRC Screening
Goel et al.[51]	NHIS ³ (N= 32,440)	FOBT/Sigmoidoscopy
Coughlin et al.[52]	BRFSS ¹ (Urban, Metro, Rural) (N= 106,572)	Colonoscopy or Sigmoidoscopy
Hsia et al.[46]	Women's Health Initiative (N=55,278)	FOBT or Sigmoidoscopy
Coughlin et al.[31]	BRFSS ¹ (N= 61,412)	FOBT/Overall CRC screening
Studies w/no Significant Association	Sample	Outcome
Bazargan et al.[32]	Urban African Americans & Hispanics (N= 306)	Overall CRC Screening
Doubeni et al.[49]	Medicare (N= 23,923)	Endoscopy/Overall CRC Screening
Christman et al.[28]	Medical Records from CHC ⁴ (N=1,196)	Overall CRC Screening
Etzioni et al.[29]	California HIS ² (N=22,343)	Overall CRC Screening
Studies w/Positive Association	Sample	Outcome
Coughlin et al.[31]	Suburban BRFSS ¹ (N= 106,572)	Colonoscopy or Sigmoidoscopy

1 Behavioral Risk Factor Surveillance Survey (BRFSS)

2 Health Interview Survey (HIS)

3 National Health Interview Survey (NHIS) 4 Community Health Centers (CHC)

Table 3: CRC screening and Hispanic Ethnicity.

The "gender gap" is closing. This reduction in the gender gap is credited in part to rapid uptake of colonoscopy by women and public health efforts to dispel the myth that CRC is a "man's disease". Improved CRC screening in women will be a success story to guide improved screening in other groups. Interestingly, African American males are less likely to screen when compared with their female counterparts [17]. Given that women access the health care system more frequently than men [14], women may more ready and able to respond to screening messages and recommendations. Of the four studies which specifically examined insurance as a predictor of CRC screening [8,15-17], one stratified according to gender. The effect of not having insurance was strongly predictive of CRC screening in men but not in women [14]. For men, lack of insurance may equate to full disengagement from the care system while African American women may be more able to work around this barrier and remain connected to the health care system.

The national racial gap in CRC screening rates is not yet closed [18]. A small majority of the studies included here, examining race and CRC screening, indicated that Black or African-American race was associated with lower rates of screening. When considering only those studies in the last 10 years with a national cohort; a more distinct pattern of negative association emerges; there are 11 studies showing a negative association between race and CRC screening and six showing no association. Some of the differences may be regional and may include state-based variations in funding or outreach programs. In Delaware, which has one of the highest statewide CRC screening rate,

community-based outreach targeted specifically to African Americans is credited with eliminating race-based discrepancies in CRC screening [19]. Likewise, one of the studies which showed no negative association with race was done in Massachusetts which has universal access and very high rates of screening compared with other states. Other factors which may explain this variability include difference between black men and black women, differences in urban vs. rural and again, SES and access [10,20,21].

The variations in this literature demonstrate that gender and race are not consistently barriers to screening. However, Hispanic ethnicity does seem to consistently confer a barrier to screening. While individual preferences and cultural/social biases undoubtedly contribute to racial, gender and ethnic disparities, cancer burden in underserved groups also relates to socioeconomic status [1,12]. In fact, lower socioeconomic status confers increased cancer risk regardless of race. However, the impact of SES on screening is variable within race/gender subgroups.

This literature on Hispanic ethnicity and CRC screening was the most straightforward. A clear majority of studies demonstrate that Hispanic ethnicity is associated with a lower likelihood of having been screened. This is not surprising given that this group has consistently been found to have the lowest cancer screening rate nationally. Literature in this area suggests that certain subgroups, e.g. Mexican women and newer immigrants and non-English speakers, may be especially at risk [22]. Social integration or connectedness may also be very important in cancer screening in Hispanics [23]. The path to help Hispanics to

complete CRC screening is not well elucidated but finding this path will become increasingly crucial as this minority grows to represent an increasing proportion of the U.S. population.

Conclusion

Although CRC screening rates are improving, disparities in screening and mortality persist. How barriers and facilitators interact to promote or reduce screening disparities is complex and not yet fully elucidated. Future research should seek to characterize barriers and facilitators, particularly in Hispanics, under/uninsured and individuals of low SES. In populations experiencing low rates of screening, more interventional studies are needed.

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