Preventive Medicine 105 (2017) 311–318

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Disparities in cancer screening by occupational characteristics

Stacey A. Fedewa*, Ann Goding Sauer, Carol DeSantis, Rebecca L. Siegel, Ahmedin Jemal

Surveillance and Health Services Research, Intramural Research Department, American Cancer Society, Atlanta, GA, United States

ARTICLE INFO

Keywords:
Breast cancer
Cervical cancer
Colorectal cancer
Cancer prevention
Cancer screening
Race/ethnicity

ABSTRACT

Cancer screening patterns according to occupation characteristics in the United States are not well known, but could be used to help inform cancer control efforts. We examined cervical (CC), breast (BC) and colorectal cancer (CRC) screening prevalence and prevalence ratios (PR) by occupational characteristics in 2010, 2013 and 2015 National Health Interview Surveys (NHIS) among eligible US workers (CC women 21–65 years; n = 20,997), (BC women ≥ 40 years; n = 14,258) and (CRC men and women ≥ 50 years; n = 17,333). Cervical, breast and colorectal cancer screening prevalence among US workers was 84.0%, 68.9%, and 56.8%, respectively. Unadjusted prevalence ratios for cervical (PR = 0.92, 95%CI 0.90, 0.94), breast (PR = 0.86, 95%CI 0.83, 0.90) and colorectal cancer screening (PR = 0.83, 95%CI 0.80, 0.87) were lower among workers in small (< 25 employees) compared to large organizations (≥ 500 employees). People in food service, construction, production, and sales occupations were 13–26%, 17–28% and 9–30% less likely to be up to date with cervical, breast, and colorectal cancer screening, respectively, compared to healthcare professionals. Adjustment for socioeconomic factors and insurance status eliminated most associations. Disparities in cancer screening by occupational characteristics were mostly attributed to lower socioeconomic status and lack of insurance. These findings underscore the need for innovative public health strategies to improve cancer screening in vulnerable populations.

1. Introduction

Screening for breast, cervical and colorectal cancer has been shown to reduce mortality (Smith et al., 2017). In 2015, approximately 82.8% and 71.6% of women were up-to-date with cervical and breast cancer screening, respectively and 62.4% of men and women were up-to-date with colorectal cancer screening in the United States (White et al., 2017). Numerous studies have shown that screening rates are significantly lower among certain racial/ethnic groups, adults with low income and educational attainment, as well as the uninsured (White et al., 2017; Jerant et al., 2008; Miranda et al., 2012; Carney et al., 2012; Guessous et al., 2010). However, there is a paucity of data regarding cancer screening prevalence by employment characteristics. Such information would further knowledge about people who are less likely to be up-to-date with recommended cancer screening and could help inform where workplace-based and other cancer control interventions and efforts are needed most. The Centers for Disease Control and Prevention (CDC) recognizes the potential for workplaces to complement community-based efforts to improve cancer prevention and early detection, including screening, given the influence that worksites have on employees' health and health behaviors (Cancer Prevention in the Workplace Writing Group et al., 2017).

A few studies have examined employment characteristics or benefits, such as having paid time off and worksite wellness programs, in relation to screening utilization (Peipins et al., 2012; Hui et al., 2013; Vidal et al., 2009), yet no recent studies have examined cancer screening by detailed employer and occupational strata. In this study, we examined the prevalence of guideline-recommended screening for cervical, breast and colorectal cancers by occupation, industry type, and employer size in nationally representative surveys.

2. Materials and methods

Data from the National Health Interview Survey (NHIS), a nationally representative, in-person annual survey of the non-institutionalized civilian population, were used in this study. All data are based on self-reports. Employment characteristics are captured in the surveys annually and screening data are collected every two to three years. The 2010, 2013 and 2015 NHIS were used based on the availability of screening data; the respective response rates for these surveys were 60.8%, 61.2%, and 55.2% (US Department of Health and Human Services Centers for Disease Control and Prevention, 2015).

Three primary outcomes were assessed guideline-recommended cervical, breast, and colorectal cancer screening. Cervical cancer

* Corresponding author at: 250 Williams Street, Atlanta, GA 30303, United States.
E-mail address: Stacey.fedewa@cancer.org (S.A. Fedewa).

http://dx.doi.org/10.1016/j.ypmed.2017.10.012
Received 22 June 2017; Received in revised form 20 September 2017; Accepted 3 October 2017
Available online 05 October 2017

screening was defined as having a Pap test in the past three years as information on HPV co-testing was not available in the 2010 and 2013 surveys. Breast cancer screening was defined as having a mammogram in the past two years. Receipt of colorectal cancer (CRC) screening was defined as having a fecal immunochemical test (FIT) or fecal occult blood test (FOBT) in the past year, sigmoidoscopy in the past five years, or colonoscopy in the past 10 years. The age at which to begin screening varied throughout the study period and by recommending body. For the purposes of this study, we used the American Cancer Society's guidelines as of 2010 to define the above-mentioned screening measures and the following age ranges were examined: cervical cancer (21–65 years), breast (≥ 40 years), and colorectal cancer (≥ 50 years) (Smith et al., 2010).

We examined these three outcomes according to employment status and occupational characteristics. Employment status was categorized as: 1) currently working, 2) not currently working and not looking, hereafter referred to as retired, and 3) not currently working and looking for work hereafter referred to as unemployed, in accord with the United States Department of Labor definition (US Department of Labor Bureau of Labor Statistics, 2017). People not currently working and not looking may have also included caretakers and stay-at-home parents but the term "retired" was used to simplify data presentation. Employment characteristics among respondents who were currently working included number of employees (1–24, 25–99, 100–499 and ≥ 500 employees), occupation and industry type. There were 23 original occupational groups based on the federal government's Standard Occupational Classification System (Bureau of Labor Statistics, n.d.). Occupational groups with similar job descriptions and demographic profile were combined to improve sample size (outlined in Supplemental Table 1a) resulting in 13 categories analyzed. There were 21 industry groups based on the North American Industry Classification System (US Census Bureau, n.d.). Industries were combined based on similar demographics as outlined in Supplemental Table 1b, resulting in 14 industry categories. Employment benefits, including whether someone was paid hourly (yes/no) and had paid sick leave (yes/no) were also considered.

Age, survey year, and sex (for CRC screening only) were included as covariates. Race/ethnicity was grouped as Hispanic, non-Hispanic white (white), non-Hispanic black (black), non-Hispanic Asian (Asian) and other. Additional covariates included federal poverty level (< 200%, 200–399%, ≥ 400%) and educational attainment [≤ high school (HS) diploma, some college, and college graduates]. Insurance status (private, Medicaid/state plan, Medicare, uninsured and other) and visiting a primary care physician (PCP) in the past year (yes/no) were also considered. Geographic region (Midwest, Northeast, South and West) was also included.

2.1. Statistical analysis

We examined differences in sociodemographic factors and screening prevalence by employment status (currently working, retired and unemployed). Subsequent analyses examining the association between employer size, occupational and industry classifications and screening were restricted to adults currently working at the time of the survey. Differences were examined using Chi-Square tests ($\alpha = 0.05$). People with missing data for the outcome of interest and those with a history of the cancer were excluded from respective analyses as outlined in Supplemental Table 2. Women who reported having a hysterectomy were also excluded from the cervical cancer analyses. There were 20,997 women 21–65 years, 14,258 women ≥ 40 years and 17,333 men and women ≥ 50 years who were currently working and included in the analyses of cervical, breast and colorectal cancer screening, respectively.

To determine what sociodemographic and healthcare factors might account for associations between occupational characteristics and screening, a series of adjusted models were conducted. Model one estimated adjusted prevalence ratios (PR), accounting for non-modifiable factors including age, year, sex (for CRC only), and race/ethnicity. Model two accounted for factors included in the first model plus education, poverty level, healthcare factors and geographic region. Supplementary models accounted for factors in the second model plus additional occupational characteristics, including hourly pay and paid time off. Industry and occupation classification were not included in the same model as these two variables were correlated and significantly overlapped. All models were restricted to respondents with non-missing covariates. For CRC screening models, a test for interaction between sex and occupational characteristics was conducted using two-way product terms, no significant interaction was detected, therefore men and women were combined to improve the precision of estimates. Differences in receipt of the various CRC screening tests (stool testing, colonoscopy and sigmoidoscopy) were also assessed. We examined two-way cross product terms for survey year and employment characteristics to determine if the relationship between employment characteristics and screening prevalence changed over time; no significant interactions were detected. We also examined a two-way product cross product terms for age (< 65 and ≥ 65 years) and employment characteristics to determine if the association between employment characteristics and age varied, no significant interaction terms were detected. All estimates were weighted and accounted for the complex survey design. SAS version 9.3 was used.

3. Results

Among adult respondents in the 2010–2015 NHIS, 61.6%, 33.3% and 5.0% were currently employed, retired, and unemployed, respectively with average ages of 42.9, 59.6, and 38.7 years. (Table 1) The proportion of adults who were uninsured ranged from 9.8% in retired

Table 1
Sociodemographic characteristics and screening estimates according to employment status among adults 21 years and older, National Health Interview Survey 2010, 2013 and 2015.

	Currently employed			Retired[a]			Unemployed[b]		
Unweighted N (2010–2015)	53,652			33,973			4514		
	%	95%CI		%	95%CI		%	95%CI	
Total	61.6	61.1	62.1	33.3	32.8	33.9	5.0	4.9	5.2
Cancer screening									
Cervical cancer screening[c]	84.0	83.3	84.6	76.3	75.1	77.5	76.7	73.8	79.3
Breast cancer screening[d]	68.9	67.9	69.9	68.9	67.9	69.9	62.8	61.7	63.8
CRC screening[e]	56.8	55.9	57.8	62.2	61.3	63.0	47.0	43.2	50.9
Sociodemographic factors									
≥ 65 years	4.9	4.7	5.2	47.8	47.0	48.7	2.3	1.8	2.9
Male	53.0	52.4	53.5	38.0	37.3	38.8	38.0	37.3	38.8
Uninsured	14.8	14.3	15.2	9.8	9.3	10.2	45.2	43.3	47.0
	Mean	95%CI		Mean	95%CI		Mean	95%CI	
Average age	42.9	42.7	43.1	59.6	59.2	59.9	38.7	38.2	39.3

Abbreviations: colorectal cancer (CRC), Confidence Interval (CI)
[a] Includes people who are not currently working and not looking for employment.
[b] Includes people who are not currently working and are looking for employment.
[c] Pap Testing in the Past 3 year among women 21–65 years.
[d] Mammography in the past 2 years among women 40 + years.
[e] Colorectal cancer screening among men and women 50 + years. CRC screening was defined as: stool-based test in the past year, sigmoidoscopy in the past 5 years, and/or colonoscopy in the past 10 years.